NewsMAC

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New Graduate Student Research in New Mexico

Contents

EDITOR'S INTRODUCTION

I am pleased to present this *News*MAC issue on new research by graduate (or recently graduated) students on the amazing archaeology of our State. I have been teaching classes at the University of New Mexico for some time now, and I am consistently impressed with the enthusiasm and quality of the graduate students I meet. A particularly encouraging trend both at UNM and across the country, which is reflected in many of these papers, is a keen interest in gleaning new data from existing collections and archival records.

While some may long for the days of Nelson, Kidder, and Wetherill, when massive archaeological excavations were the norm, we are still left with the millions of artifacts collected as part of late nineteenth through mid-twentieth century projects. Surprisingly, it is only in the last 10 years that many of these valuable assemblages have been systematically and scientifically analyzed, most through master's theses and doctoral dissertations.

This was a major theme of the 16th Biennial Southwest Symposium in Denver, Colorado, in January of this year. Despite the challenges of working with old collections and legacy data, new techniques and interpretive frameworks can yield important insights into everything from ritual practice to raw material procurement.

At a minimum, my goal with this issue was to present a sample of recent research conducted in New Mexico or on New Mexican archaeological collections by graduate students. In addition, I wanted all three major universities in the state represented—the University of New Mexico, New Mexico State University, and Eastern New Mexico University. As you'll see, other institutions are represented as well, including the University of Arizona, the University of California at Los Angeles, and Los Alamos National Laboratories.

Graduate students (and postdocs) are terribly busy. And looking back, it was probably cruel of me to request yet another paper from these poor souls already drowning in coursework, assistantships, and research. But more than half of them came through, and I am incredibly grateful for their time.

I also hope that you readers will contact these young scholars if their research intersects with your own and offer input, additional references, and a place in their growing professional networks.

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Ritual Duality and Faunal Remains at Pueblo Bonito, Chaco Canyon

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While archaeologists are generally pictured in the field with trowel in hand, researchers are increasingly shifting their field sites to museums in order to analyze or reanalyze existing collections. This is particularly true in regions such as the Southwest United States where extensive excavations have been undertaken for over a century resulting in thousands and thousands of boxes of artifacts. In addition to the recording of artifact characteristics, working with collections from historic excavations requires detailed review of existing legacy data in order to reconstruct original provenience and post-excavation treatment. Thus, working with museum collections requires archaeologists to first reconstruct the details of historic excavations themselves, before using that information to reconstruct original cultural context.

Despite the increasing focus on museum collections, concerns remain over the integrity of data collected at different times using different archaeological methods. There is no denying that excavation methods have changed over time and collections from the late 19th century will reflect different decisions on the part of the excavators than those undertaken in the 1950s, and neither will match current standards. While there are a number of reasons for these changes—ranging from funding sources to scientific techniques to research questions—they have resulted in variable sampling strategies that can impede current archaeological investigations. As important as it is to keep these limitations in mind when working with museum collections, the responsibility of archaeologists to work with these materials far outweighs the potential complications.

The Society for American Archaeology's seventh principle of archaeological ethics explicitly refers to the importance of working with existing collections (http://saa.org/AbouttheSociety/PrinciplesofArchaeologicalEthics/tabid/203/Default.aspx).
The explanation for this principle highlights two main points. First, the preservation of archaeological data extends beyond sites to include the materials and documents that result from this research. Second, because excavations result in the destruction of original archaeological context, archaeologists have a responsibility to incorporate these materials and data into their analyses. In addition to the ethical importance of utilizing these collections, they also often represent excavations completed at a scale that would be unheard of today, resulting in expansive (even if imperfect) datasets.

The Archaeology of Chaco Canyon

Our current research focuses on employing the sizable collections that have resulted from archaeological work in Chaco Canyon, particularly those from Pueblo Bonito. Two large projects in the 1890s and 1920s—the Hyde Exploring Expedition directed by George Pepper and the National Geographic Society-sponsored project led by Neil M. Judd—resulted in the excavation of about 95% of the great house's 350+ rooms (Plog 2015). Collections from and records of these projects have ended up in museums and archives held throughout the country, with the majority in either the American Museum of Natural History in New York City or the Smithsonian Institution in Washington DC. Reports were published on both projects (Judd 1954, 1964; Pepper 1920), but these contain only a portion of the information recorded in the thousands of pages of field notes, and many of the artifacts recovered have never been fully analyzed.

The Chaco Research Archive, directed by Dr. Carrie C. Heitman, with PIs Steve Plog and Worthy Martin, has focused on the digitization of the dispersed paper records from these projects. Once digitized, these data were integrated into a relational database accessible to the public (chacoarchive.org). On the website, individuals can easily retrieve all available information associated with any room at Pueblo Bonito and many of the other excavated sites within the canyon through the use of interactive maps. Users can also query the database and download lists of rooms, artifacts, images, or a number of other items that share specific characteristics. The availability of legacy data has made research on the collections from Chaco Canyon a much more feasible undertaking for scholars today.

Despite over a century of research, the occupation of Chaco Canyon from about AD 850-1130 remains one of the most contested and least understood archaeological phenomena in the Southwest. Archaeologists continue to debate topics ranging from the possibility for substantial local agricultural production to population size and the type of social organization. Detailed analyses of museum collections from the canyon have increasingly been used to understand the populations who occupied the great houses and small sites. These artifact-based studies have ranged from comprehensive reviews of Pueblo Bonito as a whole (Neitzel 2003) or the burial suites in particular (e.g., Marden 2015; Plog and Heitman 2010) to studies of artifact associations within particular contexts such as caches (e.g., Ditto 2017; Heitman 2015; Mills 2008) and detailed analyses of materials including ornaments (Mattson 2016), bone tools (Watson 2012), cylinder vessels (Crown and Wills 2003), and turquoise (Mathien 2001). Our current research expands upon these studies by examining the distribution of a set of ritual faunal remains throughout the great house.

The Significance of Ritual Fauna

Ethnographic research has demonstrated that animals are of paramount symbolic and ritual importance in the Pueblo world. Specific types of animals maintain different symbolic associations and meanings and are appreciated for their various physical and behavioral characteristics. Birds of prey, for instance, may be revered for their keen hunting abilities. The depiction of animals in imagery and the use of actual parts of the animal itself (e.g. skins, tails, skulls, feet) can serve as symbolic proxies for valued characteristics of an animal and can be used to bring those revered powers to bear on a given situation. Skulls and claws are particularly common, potentially indexical components of ritual paraphernalia, costuming, and performance. Both are used by multiple pueblos to make fetishes, elements of ritual clothing, or ritual display objects (Lange 1959; Parsons 1920; Stephen 1936; Strand 1998; White 1947). Archaeologically, these elements show up in caches or otherwise structured deposits throughout the Southwest, suggesting that they were of comparable ceremonial value in the past.

Similarly, the use of whole animals in ritual and their subsequent deposition as articulated individuals has been discussed in both ethnographic and archaeological research. While descriptions of the burial of whole animals in the ethnographic record refer predominantly to birds, formal burials of many different types of animals have been found in archaeological contexts, including turkeys, dogs, and multiple species of raptors and parrots (Hill 2000). Because their ritual importance has been demonstrated across time and space in the Southwest, the study of these types of remains in the archaeological record can speak to the value of different animal taxa in the past.

Ritual Faunal Remains at Pueblo Bonito

By combining the analysis of museum collections with the examination of archival documents and records, we examined the contextual and spatial distribution of articulated animals, and claws, talons, and skulls at Pueblo Bonito. Faunal data for this project were produced from the analysis of museum collections from the National Museum of Natural History and the American Museum of Natural History. Contextual details of the deposition of these remains were compiled from archival materials made available by the Chaco Research Archive, including excavation notes, photographs, and drawings. Together, the use of archival documents and the analysis of museum collections from historic excavations has allowed us to reconstruct detailed information concerning the deposition of these remains at Pueblo Bonito.

After data were collected, the distribution of articulated fauna, skulls, and claws/talons were mapped across Pueblo Bonito. This revealed several important patterns. First, all articulated fauna at Pueblo Bonito are birds. While not all buried, this analysis only included those individuals whose placement was intentional. A total of fourteen were intentionally deposited, two of which are hawks (Red-tailed Hawk, Swainson's Hawk) and twelve of which are parrots (Scarlet Macaw, Military Macaw, Thick-billed Parrot). All of these birds were found in rooms only on the eastern half of the pueblo and in the earliest-constructed northern arc, outlined in red in Figure 2. The examination of skulls, claws, and talons revealed similarly interesting and patterned distributions. We compared these remains from different types of animals, focusing on carnivores, birds, and artiodactyls. While the remains of birds (both skulls and talons) and of artiodactyls (skulls) are distributed throughout the pueblo, those of carnivores (skulls and claws) are restricted mainly to the western half of the pueblo (Figure 1). Depositional contexts of carnivore remains include in room fill, on floors, and in kiva caches.

This research suggests exclusivity between the east and west halves of Pueblo Bonito in the use and placement of certain ritually valuable faunal remains. While articulated birds were restricted in deposition to the eastern half of the pueblo, carnivore claws and skulls were restricted to the western half. There is overlap of these materials in what Jill Neitzel (2003) has labeled the "ritual precinct," the back, northern arc of the pueblo that also contains both burial clusters (Plog and Heitman 2010), as well as a greater quantity of certain materials, including jet, turquoise, and shell, relative to the rest of the pueblo. This east-west divide in the deposition of important faunal remains demonstrates the significance of the principle of duality in structuring ritual and social life at Pueblo Bonito.

Many researchers have proposed the existence of a dual organizing system at Pueblo Bonito based on the east-west architectural complementarity of the pueblo and the presence of two burial suites (e.g., Fritz 1978, 1987; Heitman and Plog 2005; Mills 2015; Vivian 1970, 1990; Ware 2014; Whiteley 2015). However, the three-hundred-year occupation of the pueblo and frequent construction activities complicate interpretations. While our study is also lacking in fine chronological control, the patterns found in the deposition of faunal remains suggests that a principle of duality structured ritual practice. These practices accumulated over time, creating a visible pattern in the archaeological record that could be reconstructed from the museum collections and archives of excavations that occurred 90–120 years ago.

A detailed discussion of this study will appear as an article in an upcoming issue of *Kiva* as the winner of the Julian D. Hayden paper prize. We are very grateful to the Hayden Prize Committee, the Arizona Archaeological and Historical Society, the Arizona Archaeological Council, and the editorial board of *Kiva* for their recognition. Our research on Chaco continues to expand as we examine the distribution of a range of faunal remains and other materials throughout Pueblo Bonito and other excavated sites in the canyon. We look forward to exploring the articulation of the use and deposition of different artifact types and their implications for social organization at varying scales. Excavations of the scale of those undertaken in Chaco in the late 19th century and first half of the 20th century are unlikely to be conducted again. Advancements in our understandings of the complex phase of Puebloan history that Chaco represents will depend on the continuing analyses of existing museum collections and associated legacy data.

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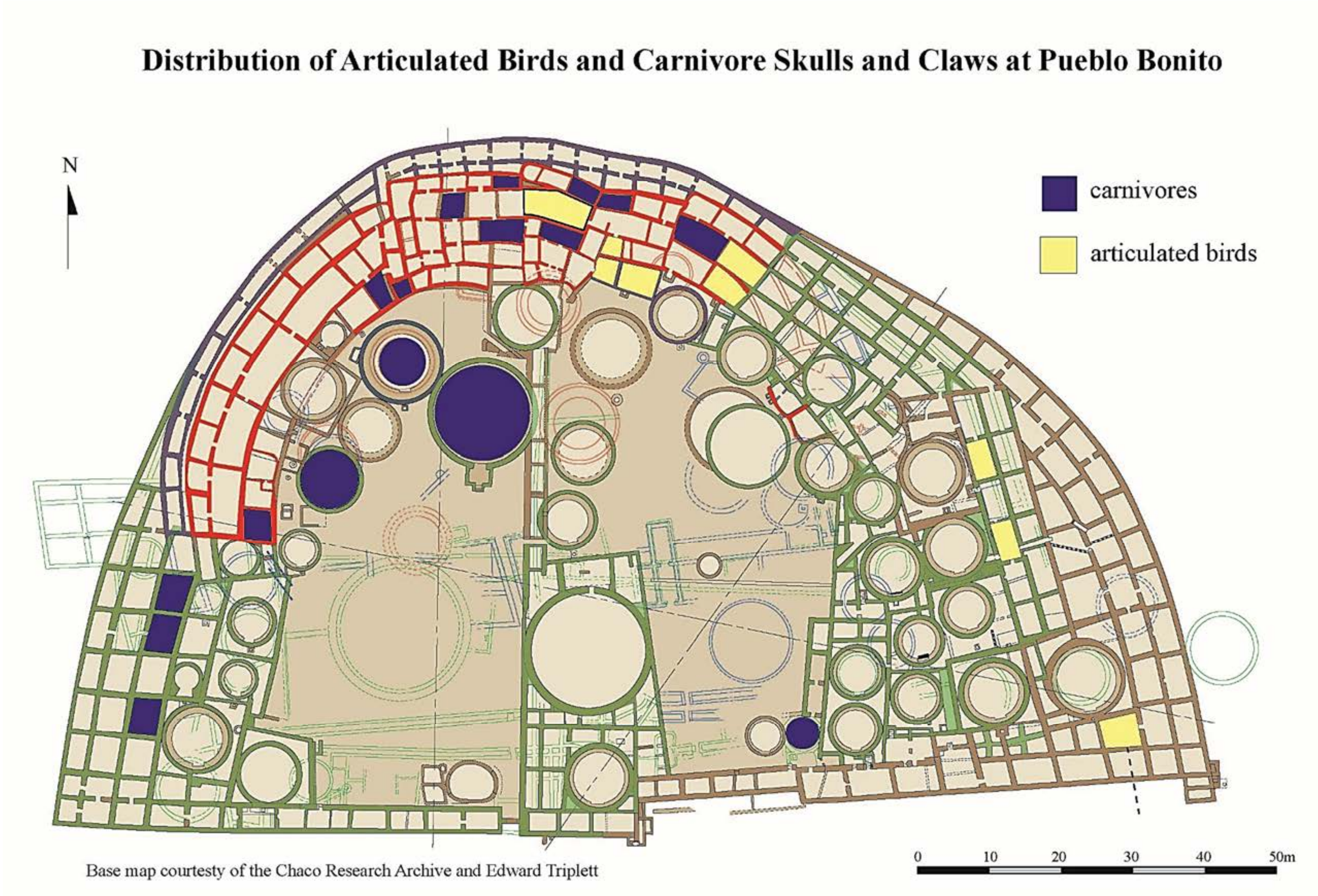
Figure 1.


Distribution of Articulated Birds and Carnivore Skulls and Claws at Pueblo Bonito
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carnivores
articulated birds
Base map courtesy of the Chaco Research Archive and Edward Triplett
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Rock Art as Ritual Communicator: A New Approach

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Rock art is predominantly analyzed stylistically and artistically as symbols or as forms of symbolic interpretation. It has a long history of field analysis spanning several centuries in North America, much of which remains relevant to current research trends. Analysis have contributed significantly to our understanding of image variation and have been crucial to the categorization of culture areas and relative dating schemes still followed today. Yet, despite a long history of inquiry and examination, rock art's data potential has largely been regarded peripherally in archaeology.

In the last two decades, the field of rock art research has experienced an increased presence in archaeology. Renewed interest in the data potential of rock art has spawned the application of exciting new forms of technology. For example, microscopy can now be used to identify the stratigraphy of pictograph paint layers, providing researchers with the order of color application (Wagner and Sharpe 2017). Absolute dating of pictograph paint can also be achieved through the analysis of its organic compounds. However, petroglyphs (engraved, scraped, ground, or pecked rock art) confound these processes of analysis and present the archaeological community with a unique problem. How can we learn more about petroglyphs when they challenge analysis by traditional archaeological methods? Is it possible to probe the behavioral aspects of rock art production and use? Furthermore, can we analyze more than just simple artistic elements, to infer a purpose behind their manufacture in time and space?

What remains elusive to rock art research are explanations for the abundance of inter and intra site variation that lead invariably to questions regarding how interactions between rock art and human beings took place prehistorically, and an applicable scientific methodology for answering such questions (Bednarik 1998, Porr and Bell 2011). To address these problems, I am currently applying Michael Schiffer's Behavioral Communication Theory (Schiffer and Miller 1999) to rock art at Cottonwood Spring Pueblo (LA 175), in southern New Mexico (Figure 1 and 2) to examine the range of communication processes that took place during prehistoric petroglyph manufacture. Cottonwood Spring Pueblo is the largest El Paso phase pueblo in the Jornada Mogollon, located roughly 40 miles from Las Cruces, New Mexico at the base of the San Andres mountain range, in a portion of the Jornada del Muerto. The site has three hilltops that surround the pueblo that have rock art predating its construction. Cottonwood boasts an extensive and diverse inventory of rock art and exhibits a long history of production with imagery extending into the Archaic (Schaafsma 1980, 1992). These aspects make the site ideal for the evaluation and comparison of multiple communication processes. An evaluation of the processes will produce data that can be used to make viable inferences about rock art production and use behaviors at the site.

It may at first seem strange to associate communication with the manufacture of rock art. However, while it is true that rock art is a form of visual communication, as objects with agency they can also act as a conduit for communication between humans and nonhumans (Bradley 2000, Brown and Walker 2008, Conti and Walker 2017, Fewkes 1896, Gell 1998, Hodder 2012, Schiffer and Miller 1999, Vanpool and Newsome 2010). Communication is derived from more than visual elements (Schiffer and Miller 1999) to include the activities associated with the active production of rock art. These activities are the human/object interactions that create archaeological evidence (Schiffer 1976, 1987), in this case rock art attributes, that reveal the communication strategy. Essentially, as a human *maker* approaches and interacts with the surface medium, image elements, and tool(s), his/her physical responses during send and receive scenarios generate visible traces in the archaeological record that we can measure (Schiffer 1987). Measurable

Figure 1. Map of Cottonwood Spring Pueblo Areas A-F. (Lekson and Rorex 1987)

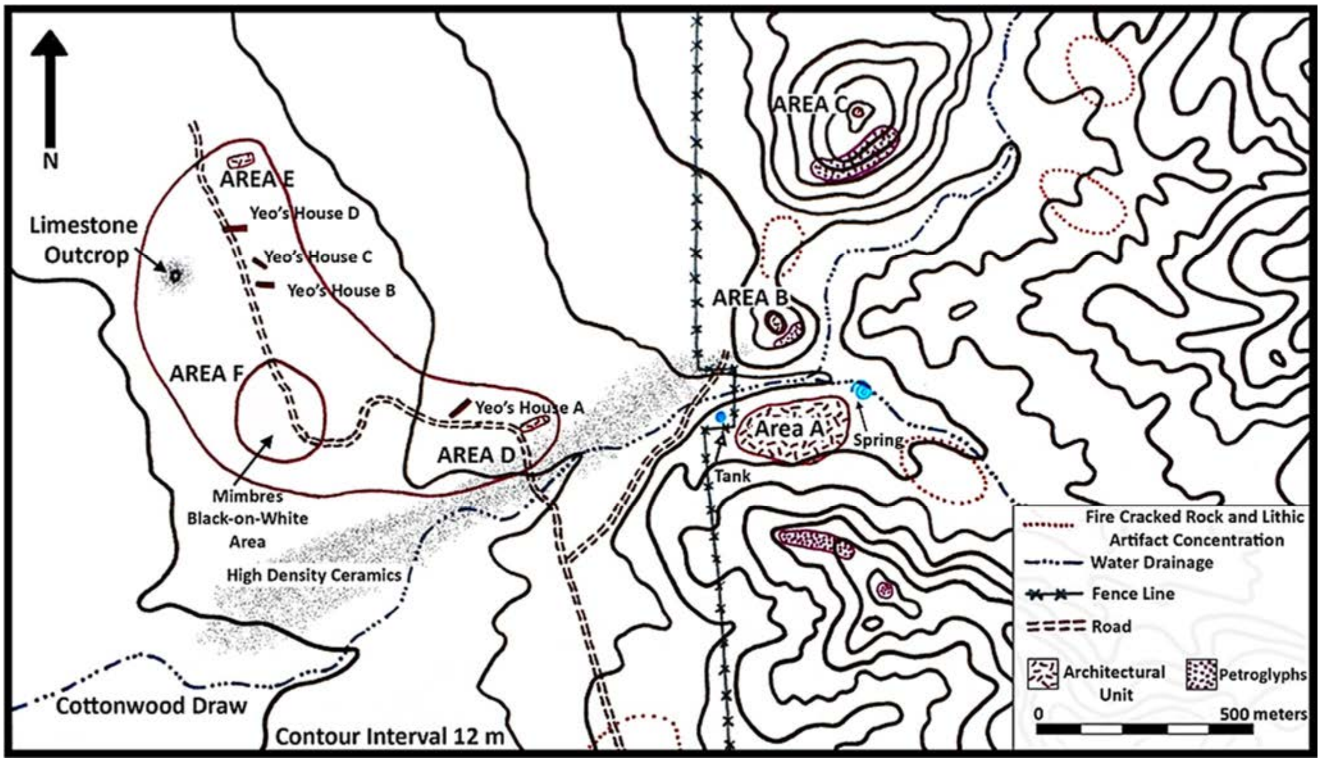
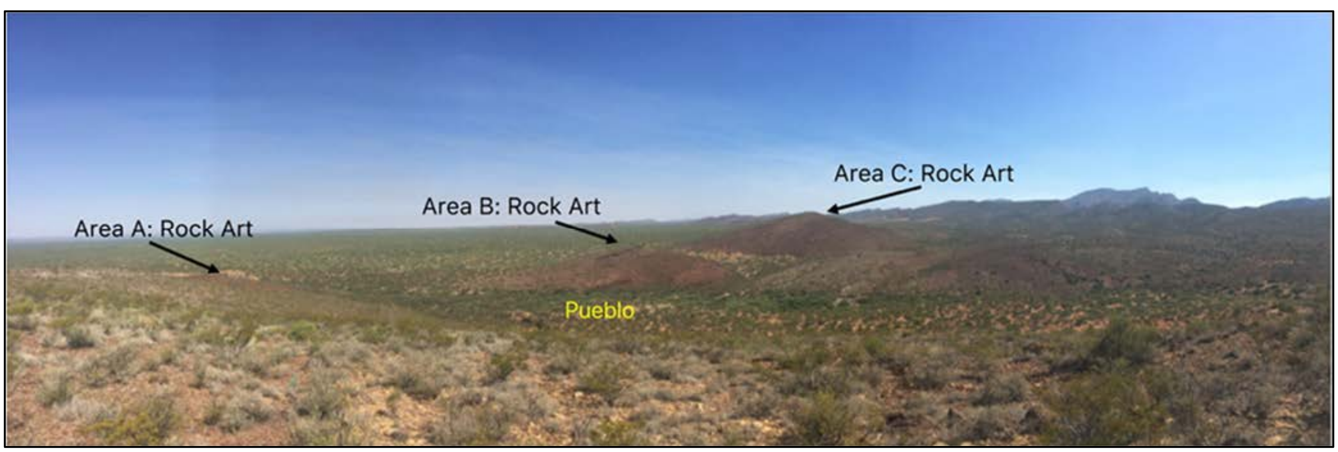


Figure 2. Panoramic photograph showing position of rock art areas and pueblo at Cottonwood (facing north/northwest)



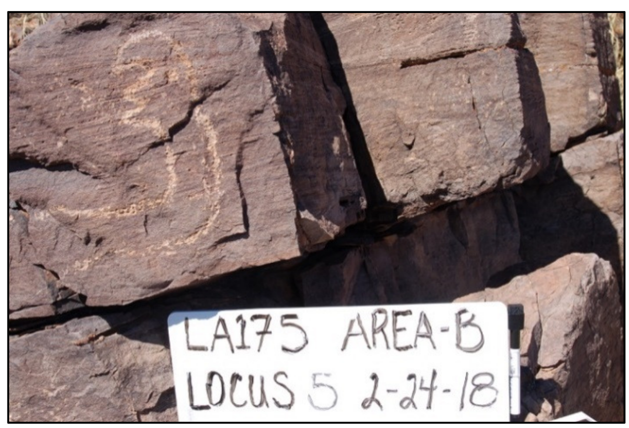
aspects can include method of production and orientation, and formal attributes such as image size, line quality, density, color, to name only a few.

The theory is that production choices are related to an overall design preference, which essentially means objects are made and used by humans to perform specific tasks in specific ways. Therefore, production choices reveal the intentional exploitation of particular performance capabilities over all others (Schiffer and Skibo 1987). For example, by noting that a parietal image was produced using paint, we identify a preference for the method of production that favors the use of pictograph over petroglyph. In turn, we can infer that color was potentially more important to the communication strategy than the audible qualities of pecking. In addition, if pictographs and petroglyphs were likewise represented in the same cave, they indicate that different communication strategies were employed within the same interaction zone. Using this example, what becomes clear is that by using a behavioral communication model, what is commonly overgeneralized as *rock art*, is actually several entirely different modes and strategies of communication. Consequently, data potential and knowledge are simultaneously increased.

Moreover, the theory allows inquiry to continue beyond simple distinctions of pictograph/petroglyph and image/symbol to consider all of the applied production choices, including things like color, line quality, even whether the pigment or tools were locally available. The choices for specific performance qualities in turn tells us a lot about why the rock art was produced and how it was used, and they generate new lines of inquiry. Effectively, the framework allows the freedom to ask new questions, spawning the kinds of new inferences and inquiry so critical to the forward motion of archaeological research.

To demonstrate how I am currently applying the theory at Cottonwood, let us consider the production of a petroglyph. Petroglyphs can be pecked, engraved or scraped, embossed, or ground, and each represents a production choice. At Cottonwood, I am presented with pecked, ground, and scraped petroglyphs (Figure 3), so I begin by considering how these variations in the production method might impact communication.

Figure 3. Examples of petroglyph manufacture from Cottonwood



Comparing the methods of production, I note that the activity of pecking yields a different sound and sound quality than grinding or scraping. The sound is louder and more drum-like, which I infer would be conducive to producing rhythm and reverberation, which ethnographically reveals its use as a way to summon an entity forward from the stone in which it resides (Martin 2008: 177-178, Porr and Bell 2011). Grinding and scraping, though less loud and rhythmic, would produce significant amounts of debris in the form of dust. Again, using ethnographic data, I can infer this may have been important if the stone had power and one wished to transport that power away from the interaction zone, for example as an applied remedy for infertility (Loendorf, Chippindale, and Whitley 2005:199-211).

The interaction zone, or location, is also an important contributor to the communication strategy. Rock art is a platial object, meaning it resides in the place it was created and is immovable. Its location is specific and segregated from habitation areas. Locations dictate the appropriateness of the behaviors enacted within them, not unlike the way a church demands a state of quiet reverence, whereas a ballpark provokes loud competitiveness. In this way, locations hold powerful sway over communication strategies.

Rock art created in easy to access areas near trails employ a much different communication strategy than rock art created in tough to access locations. Such attributes indicate there are distinct forms of public and private communication, respectively. Furthermore, it is apparent that the interaction zone and mode of communication are different *on purpose*. As a production choice, the location intentionally constructs an avenue for public consumption, or for reverent access to the sacrosanct. Thus, it is apparent that Cottonwood rock art employed sacred communication strategies intended for direct communication with spiritual entities because it exhibits limited access in hilltop locations that require a challenging climb to interact with the petroglyphs or access them visually. It is clear that the act of ascension is an important performance of production and use, and the limited space indicates communication was likely a private affair, spatially supporting no more than one or two individuals. I can also infer who likely engaged in communication strategies at Cottonwood, because the challenging location would have prevented the very young, very old, or infirm individuals from accessing the glyphs physically or visually. The fundamental contribution of applying the framework in the way I've described is that it applies methodology and eliminates conjecture. It may seem intuitive to say that rock art in a tough to access location is sacred, but without the use of methodology this statement exists solely as subjective opinion. However, a behavioral model uses the four variables of artifact variation—formal, frequential, spacial, and relational—to evaluate the production choices made during communication processes and generate solid inferences about rock art production and use. Furthermore, because the theory is activity-based, and therefore not confined by the restrictions of time or space, scientific inquiry is limitless.

In summary, rock art is not art, it is an artifact with a life history comprised of its interactions with human beings. Yet much of the archaeological community continue to regard it as a periphery object. It is regarded as a form of symbolic interpretation, a two-dimensional rendering of ancient ideology that has no obtainable data potential. However, this is a false assumption, rooted in Eurocentric perspectives of visual communication and art that promote conjecture and, in turn, stunt construction of a valid framework for the study of rock art.

Symbol is defined by New Webster's Dictionary (1992) "something that stands for or suggests something else by reason of relationship, association, convention, or accidental resemblance". Saying that rock art is a symbol is problematic. It is an oversimplification that is intrinsically ethnocentric, with biased and subjective definitions that have their origins in western practices of fine art analysis. The definition has markedly defined the parameters for research questions about rock art by restricting its interpretation to aspects of style and form, and their large scale distributions. The result of labeling rock art as a symbol is the separation of the imagery from crucial aspects of location, power, and activity, to view it instead as a series of art elements that describe deities or events that occur elsewhere, or in the mind and imagination of a creator/artist.

In contrast, Behavioral Communication Theory does not separate the artifact from the location and activity of its life history. By looking at the production phase of the life history, I have found a behavioral framework is applicable to the problem at Cottonwood Spring Pueblo by approaching rock art as a conduit for communication between humans and spiritual entities. The framework focuses on the activities directly associated with rock art production to reveal specific production choices made by human *makers,* seen as responses generated during a send and receive dialogue with the surface medium, location, visual and tactile elements. The production choices provide measureable attributes that offer clues about how and why rock art was produced and used at a location.

By using Cottonwood Spring Pueblo (LA 175) as my case study, my thesis will ultimately demonstrate how the methodology can be applied using site-specific data. In so doing, I directly addresses the need for a broadly applicable methodological framework for rock art research in New Mexico and beyond, one that replaces speculation with informed archaeological inference, and offers this exciting field of research room to grow by encouraging valuable new lines of inquiry.

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What the Dead Can Tell You: Potential Changes in Burial Practices from Pre-contact to Post-contact

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For the Puebloan groups that inhabited the Southwest, there were many changes that occurred in their lives as a result of Spanish colonization. One of these was the introduction of a new religion, Catholicism. For the Spanish, conversion to Catholicism was an important part of the colonial strategy in the New World in order to have more perceived control over the indigenous groups they encountered there. In New Mexico, conversion of the Puebloan peoples became the main reason for remaining in the territory after little to no material wealth was found. Much of this conversion was forced, and the question remains as to exactly how many Puebloans converted, partially or completely. By analyzing burial patterns pre- and post-Contact, it is possible to see changes in burial ritual related to the conversion process. Catholic burial ritual involves a specific set of steps, from the last rites to the interment, while the Pueblos had their own burial rituals that differed from Catholicism in many ways. Both of these can be compared to Puebloan mission burials to see what, if any, changes occurred due to missionization.

Background Information

The first permanent colonists arrived in New Mexico in 1598 under the leadership of Juan de Oñate (Elliott 2002:46; Wilcox 2009:102). Oñate's father owned a mining business and had served as the governor of Nueva Galicia; thus, he was well connected (Knaut 1995:31). Oñate was given permission to establish a colony in 1595 (Knaut 1995:31). However, delays due to bureaucratic issues did not allow him to leave until February 7, 1598 (Knaut 1995:32). Oñate made the Pueblo of San Juan the new Spanish capitol, relocating the Puebloans that lived there (Montgomery 2002:23; Wilcox 2009:131). He then proceeded to send representatives to each of the Pueblos to read the *Requerimiento* and persuade the Pueblos' to swear loyalty to the Spanish (Wilcox 2009:131), as well as designating priests to minister to certain Pueblos (Elliott 2002:46). The Franciscans had established 50 churches by 1630 (Montgomery 2002:24).

Juan de Oñate failed to find the wealth for which he came (Weber 1999:3). He was made to resign in 1606 (Wilcox 2009:134). However, despite the Viceroy's wish that those in New Mexico abandon the area, the Crown determined it was necessary for them to stay for the sake of missionizing efforts (Weber 1999:3; Wilcox 2009:134). After this determination in 1608, the Crown took over financing the colony from the royal treasury (Weber 1999:5). Oñate was succeeded as governor by Pedro de Paralta (Roberts 2004:98).

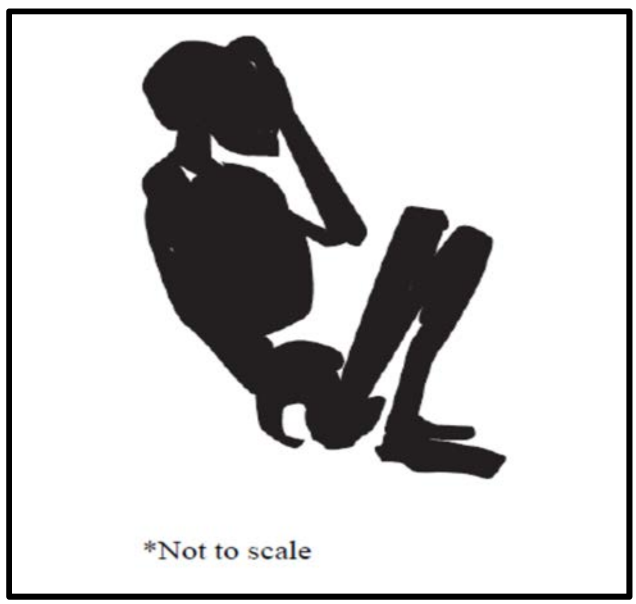
The friars who came with Oñate, or who came later, were there expressly to convert the people of the Pueblos to Christianity, specifically Catholicism. These missionary efforts continued throughout the 17th century until the Pueblo Revolt of 1680, when the Pueblos kicked the Spanish out of New Mexico for 12 years until the *Reconquista* led by Vargas in 1692 (Weber 1999:6). Spanish priests endeavored to re-convert the Pueblos after the Pueblo Revolt, but they were more relaxed and more accommodating in doing so (Knaut 1995:184; Liebmann and Preucel 2007:208; Weber 1999:8; Montgomery 2002:25). The priests still insisted on Puebloans converting to Catholicism. However, they showed greater tolerance towards those who chose to combine elements of native religion with Catholicism.

Burial Positions

There are four main burial positions, though there is quite a bit of variation within each position type. These positions are flexed (Figure 1), flexed and seated (Figure 2), semi-flexed (Figure 3), and extended (Figure 4). Note that in Figure 1, the arms and the legs are folded tightly into the chest, with the knees next to the arms and the feet tucked under pelvic bones. With the flexed and seated burial (Figure 2), most of the body is the same as the flexed burial, but the seated position causes the feet to be up next to the pelvic bones rather than beneath them.

Figure 1. Example of a flexed burial lying on its side (Adapted from Hayes et al. 1981: Figures 226 and 232, Rocek and Speth 1986: Figures 64 and 71, and Smith 1972: Figures 44, 46, and 47)

Figure 2. Example of a flexed, seated skeleton from the side (Adapted from Smith 1972: Figures 42 and 48)



In Figure 3, the arms and legs are still bent, but they are not pulled as tightly into the body, and the feet are not really tucked at all, resulting in the looser body position referred to as semi-flexed. Figure 4 shows a burial that is supine and extended with arms straight at the sides of the body and the legs straight and fully extended.

Figure 3. Example of a semi-flexed skeleton (Adapted from Hayes et al. 1981: Figure 228, Rocek and Speth 1986: Figure 20, and Smith 1972: Figures 43 and 48).

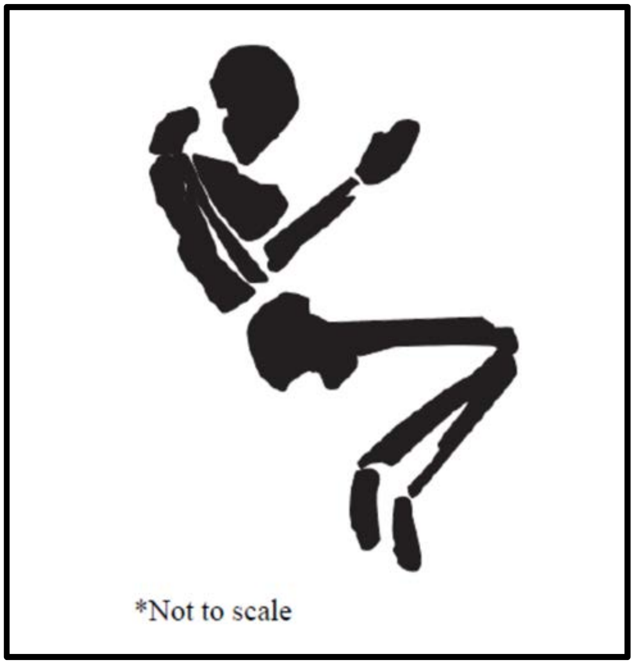


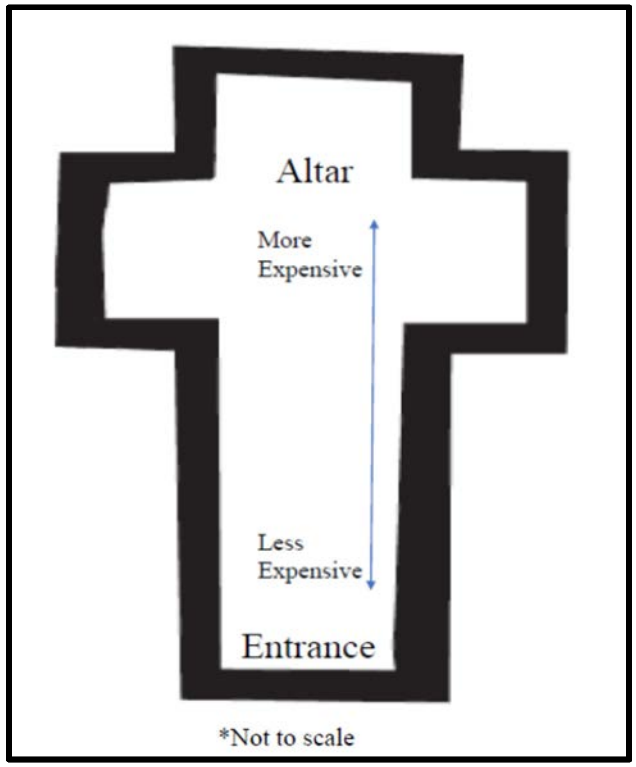
Figure 4. Example of a supine, extended burial (Adapted from Hayes et al. 1981: Figure 229 and Smith 1972: Figures 42 and 45)

Extended burials can also be face down. In all four burial positions, and the range of variation therein, bodies were placed with the head in a wide range of orientations (N, S, E, W, NE, NW, SE, SW). The flexed, semi-flexed, and flexed and seated are generally associated with pre-Contact burials, though there are some post-Contact burials that are in one of these positions. In addition, the extended burials are generally associated with Contact period burials, though some pre-Contact burials are extended.

Church Structures and Burial beneath the Church Floor

Three of the most common forms that mission churches take are cruciform (Figure 5), coffin-shaped (Figure 6), and rectangular (Figure 7). As Figures 5 to 7 show, the altar was placed at the opposite end of the main church body from the entrance to the church.

Figure 5. Example of a cruciform church (Adapted from Kessell 1980: Figure 13 and Hallenbeck 1926: Figures 7 and 10)



As part of the missionization process, one of the changes that the Franciscans introduced to Puebloan burial practices was a shift to burying the deceased beneath the floor of the church or in a formal *campo santo*, or cemetery (Dakudao 1992). The closer to the altar an individual or their family desired to be buried, the more expensive the burial was (Dakudao 1992; Kessell 1980:82; Will de Chaparro 2007:86-87; Zucchi 1997, 2006). The further back from the altar, the less expensive burial was, and the *campo* *santo* was the least expensive place for burial (Dakudao 1992; Kessell 1980:82; Will de Chaparro 2007:86-87; Zucchi 1997, 2006). However, if a person was excommunicated or committed suicide, they were not allowed to be buried on consecrated ground (Will de Chaparro 2007:72). In addition to the cost of the burial itself, there was an additional fee to the priests for goods, such as candles, used in the funerary rites and the ceremony itself (Will de Chaparro 2007:81).

Figure 6. Example of a coffin-shaped church (Adapted from Kessell 1980: Figure 6 and Hallenbeck 1926: Figure 9)

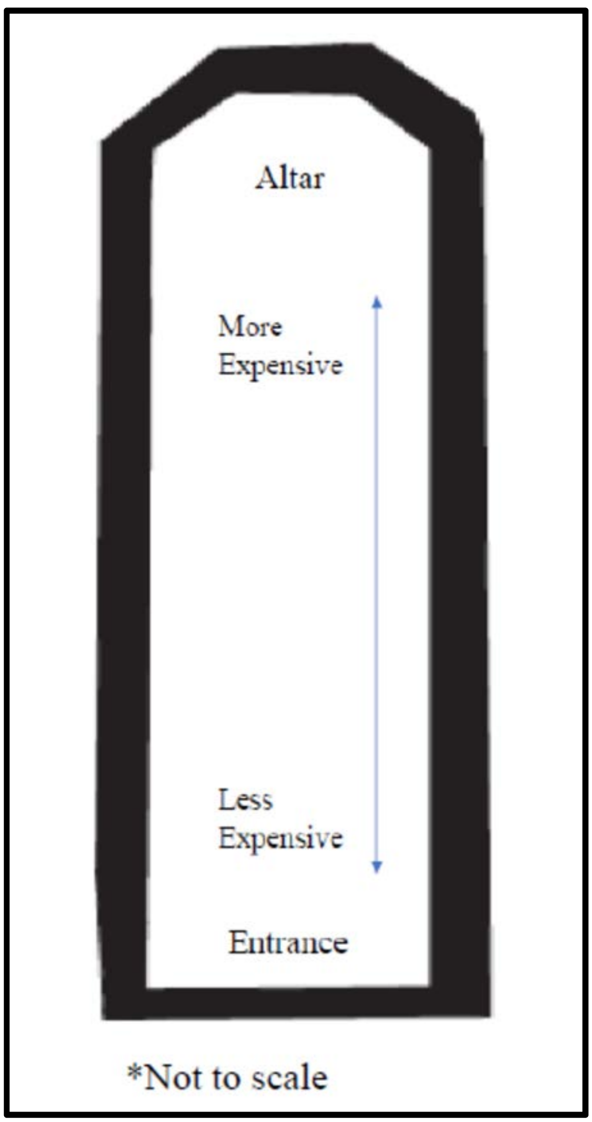
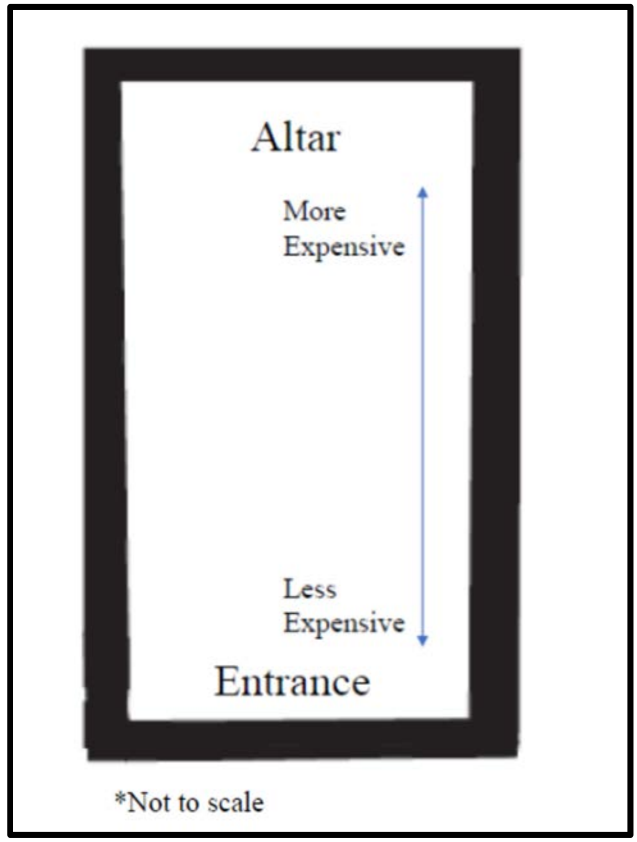


Figure 7. Example of a rectangular church (Adapted Kessell 1980: Figure 147 and Hallenbeck 1926: Figure 6)



Data and Analysis

Preliminary examination of published reports from Gran Quivira, Hawikuh, and Awatovi support the idea that specific changes occurred in burial practices after Spanish contact and missionization, specifically in orientation, body position, and burial goods. At Hawikuh, pre-Contact Zuni burials almost always included burial goods (Smith et al. 1966:183). Cremations were recovered from nine of the fourteen burial spaces, but notably, no cremations are found either within the church or associated with Spanish (Smith et al. 1966:187-188). This is likely due to the fact that church doctrine did not allow cremations at this time (http://www.newadvent.org/cathen/04481c.htm). In addition, while orienting the head to the east was present pre-Spanish, the variety of different directions for orientation appears to have decreased post-Contact (Smith et al. 1966:195), as did the variety of burial positions (with most post-Contact burials extended on their back) and the quantity of funerary items (Smith et al. 1966:197). It is interesting to note that the earliest burials beneath the floor of the nave of the church were actually "oriented a little east of north" rather than true east, suggesting that the Franciscans did not yet have full control over burial practices (Smith et al. 1966:200).

Unlike Hawikuh, Awatovi shows a mix of Christian and non-Christian burial practices even within the Church itself with the exception of the sacristies (Montgomery et al. 1949:95, 97). Montgomery et al. (1949: 95) describe the burials as "Christian burials or at least as partially Christian with a pagan trait or two." The funerary items discovered in the burials are a combination of Christian items, such as crucifixes, as well as items important to Puebloan religion, such as prayer sticks, and household items such as pottery, moccasins, and projectile points (Montgomery et al. 1949:98). In keeping with the pattern set at Hawikuh, however, the burials show a distinct lack of variety in burial orientation or position, with most of the skeletons that were attributed to the pre-Revolt period recorded as supine and extended with head or feet in the direction of the altar, as was Catholic custom (Montgomery et al. 1949:98), though a few burials were flexed (Montgomery et al. 1949:97). The greater variety in burial could be due to the larger distance between Awatovi and Spanish governing centers, such as Santa Fe. Greater distance would mean less support, both from Church and civil authorities, and therefore the priest may have been more willing to overlook some continuation of native burial practices for the sake of keeping the peace.

For Gran Quivira, it is of importance to note that all of the burials excavated before the Late Period (1550-1672) were inhumations; it is not until the Late Period that cremations are found (Hayes et al. 1981:173). However, these cremations were not found in or near the churches but rather room blocks where families were still living (Hayes et al. 1981:173). It is likely that these cremations were either all pre-Contact, or some were post-Contact cremations done without the knowledge of the priest. Like Awatovi, Gran Quivira also does not appear to show the same decrease in variation of positions and orientations, though there is an increase in the number of burials oriented to the east (Hayes et al. 1981:169). There is not enough specificity in Hayes et al. (1981) to determine patterns with burial goods.

Conclusions and Future Research

The issue that arises is whether or not these changes are statistically significant and if so, what do these changes mean in terms of identity. There is reason to suspect that in the case of many Puebloan groups, it is likely that they kept up the façade of Christianity for the priests and Spanish officials while continuing to practice their native religions in secret, though true conversion to Catholicism cannot be ruled out either. In my future dissertation research, I will expand the missions to be analyzed to include Pecos, and the other two Salinas missions (Abo and Quarai). Using the archival record for documents such as excavation records on all of these missions from museums, National Park Service documents for excavations performed on NPS lands, and any more modern skeletal analyses that have been performed, I will broaden my analysis to include age and sex in addition to the burial orientation, burial position, and funerary items. My analysis will include both pre- and post-Contact burials at these same sites, so that I can attempt to determine any changes that occurred after missionization. The chi-square testing that I will use will allow me to demonstrate the significance, or lack thereof, of the changes described above.

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Excavating the Collections: A Case Study at Mesa Portales

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Archaeologists recover a massive number of artifacts and other cultural materials in the field and the lack of funding that curation facilities receive to maintain these archaeological collections has resulted in what is known as the "curation crisis". Repositories find themselves short of funds from continuing budget cuts and lack the staff necessary to work with the massive collections that are held within museums and other repositories around the country (Flexner 2017:1). Bulk samples of sediment, for example, can provide researchers with evidence such as ancient pollen and charcoal that can be radiocarbon dated and tell us about prehistoric human diet, ancient environments, and climate change; however, they take up a huge amount of space within repositories and some archaeologists question the merit of expending such effort and funds to preserve them (Sullivan and Childs 2003:39). For my thesis project, I intend to investigate whether curated archaeological sediment samples can effectively be used to address new archaeological questions.

To examine the utility of bulk sediment samples, I will use a collection from the archaeological repository at Eastern New Mexico University (ENMU) as a case study. This collection originates from Mesa Portales, a landform roughly 15 miles south of Cuba, New Mexico (Figure 1). The Mesa Portales region has evidence of two prehistoric human occupations known as Gallina and Puebloan, which range from A.D. 850 to 1325. ENMU's excavation seasons in 2003 and 2005 generated 29 boxes of sediment samples. I will examine sediment samples from two pit houses, LA145165 and LA 145166, to determine whether post-depositional processes affected the context of archaeological materials and, as a result, the original interpretations of the site, which suggest social interaction between Gallina and Puebloan peoples.

Background

Case Study

The case study used for this thesis was chosen because of the number of boxes that contained sediment samples and the unique evidence for interaction between Gallina and Puebloan peoples on the mesa. Prehistoric people from the Gallina region are not known for extensive cross-cultural interaction (Anschuetz 2006:241; Byrd 2016:112-113; Green 1962:154; Hibben 1949:201; Sleeter 1987:3). However, evidence for Gallina interaction with other Ancestral Puebloan groups is hypothesized to be represented by stratigraphic levels that contained mixed Gallina and Chacoan artifacts at LA145165 and LA145166 (Myers 2007:179). The analysis of sediment samples from both pit structures at Mesa Portales will be used to understand whether evidence for Gallina-Chaco interaction inferred from the archaeological record at Mesa Portales is accurate or was affected by other factors which could change interpretations about Gallina cultural interaction.

Excavations at Mesa Portales

Archaeological work at Mesa Portales started during the late 1990s when the Bureau of Land Management initiated a cultural resource inventory for the Mesa Portales region (Durand and Wiseman 2015:8). Anthony Lutonsky (BLM) and volunteers documented over 300 sites during the inventory. Archaeologists from ENMU mapped and recorded a small portion of these sites, some of which were reported as burned, on the southern section of the mesa during a survey in 2002 (Durand and Wiseman 2015:8). In 2003 and 2005, ENMU excavated at LA 145165 and LA 145166 at Mesa Portales (Durand and Wiseman 2015:28). During these two field seasons, neither site was completely excavated, though more work was completed at LA 145165 than LA 145166.

Figure 1. A Photo from the Top of the Mesa Portales Landform. Courtesy of Donald Purdon

ENMU 2003-2005 Excavations

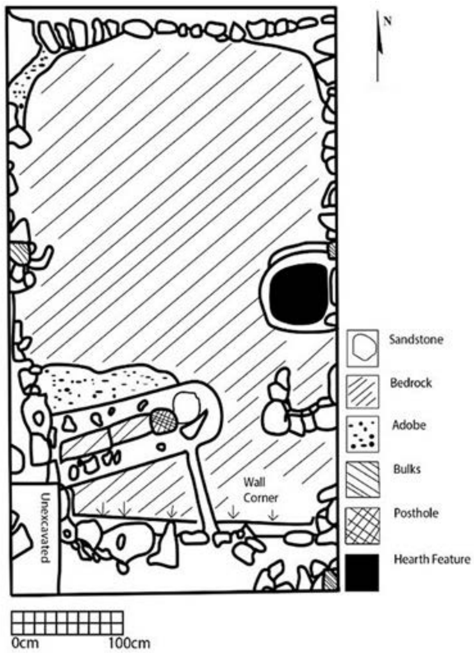
LA 145165. Excavations at LA 145165 were completed at the end of the 2005 field season. One surface structure with five rooms and one pit structure were partially exposed (Durand and Wiseman 2015:28). The pit structure's (Feature 8) western portion was exposed during excavation and is the focus of this project (Figure 2a). This pit structure has many characteristics of Gallina architecture and is the furthest southward occurrence of this style currently recorded (Durand and Wiseman 2015:34).

Excavations continued until the structure floors were exposed and documented (Durand and Wiseman 2015:29). The dimensions of the rectangular pit structure were 4.13 m north-south by 4.75 m east-west, the depth of the pit structure was 2.2 m. Walls of the pit structure were lined with unaltered stone slabbed together using mud. Features inside of the pit structure included a ventilator on the south wall, fire pit located in the center of the structure, deflector, and a wing bin/connector located on the west wall (Durand and Wiseman 2015:29).

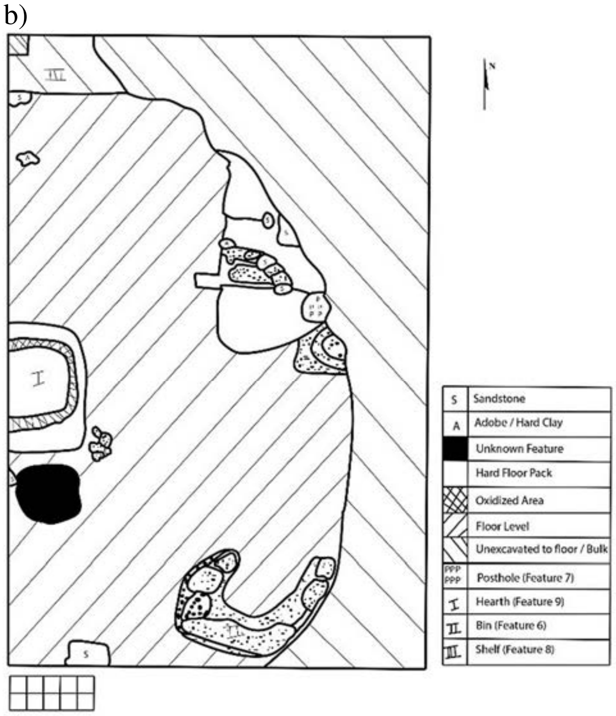
LA 145166. The conclusion of excavations at LA 145166 resulted in the partial excavations of one surface structure and one pit structure (Durand and Wiseman 2015:34). The pit structure Feature 2 is the focus of this analysis (Figure 2b). The pit structure does not have any features that represent Gallina architecture. Excavation of Feature 2 only exposed the eastern half of the pit structure to the floor (Durand and Wiseman 2015:35). The pit structure was circular with a diameter of approximately 3 m with a depth of 2.2 m. A coating of mud was used for the walls of the pit structure. Features inside the pit structure included a wall opening, which was partially excavated, a fire pit located in the center of the pit structure, a metate pedestal, a hole in the floor (possible ash pit), and two possible post holes/supports. Dates from a midden found stratigraphically above the pit structure produced dates that indicate this pit structure may represent an early occupation of the Mesa around A.D. 861-1042 (Myers 2007:118).

Figure 2. The Excavated Portion of each Pit Structure (A) LA 145165 and (B) LA 145166 (left to right). Drawn by Students from the ENMU 2005 Field School. Retraced and Digitized by Author.

a)



b)



Methods

The analysis portion of my thesis has three components. During the field component I will collect new core samples from the Mesa Portales landform. These new core samples will allow me to understand the natural stratigraphy of the landform and compare the natural stratigraphy to the stratigraphy recorded and sampled within each of the pit structures. Note none of the samples from the field component will be curated but will be processed at the geoarchaeology lab at ENMU.

The second component consists of geoarchaeological laboratory analyses that are designed to detail how each pit structure was buried and what processes were responsible for the archaeological context of the artifacts in the pit structures, whether that be of prehistoric people or natural processes that displaced artifacts from their original context. During my analysis, I plan to record characteristics such as sediment size, shape, sphericity, grain texture, the number of micro artifacts in each sample, and the amount of organic content in each sample. I will compare this suite of attributes to that of the new core samples to investigate discrepancies in the sequence of natural versus cultural episodes of deposition, stability, and erosion in the archaeological sites versus the national landform.

The final component of the analysis portion of my thesis involves the artifacts found at each site. Geographic Information Software (GIS) will be used to plot the location of each artifact to understand the spatial distribution of Gallina and Puebloan ceramics throughout each site by looking at both the horizontal and vertical position of ceramic artifacts. This data will be correlated with the stratigraphic data to understand if artifacts are in their original context or have moved vertically in the profile. Presence of patina[1] will be examined on chert and silicified wood lithics. This will inform upon how long artifacts might have remained on the surface prior to burial and the potential for them to have become mixed with archaeological materials from younger occupations. This will not be used as a stand-alone test, but rather will be used with data from the second component of this thesis project.

Results of my thesis project will be used to evaluate whether the curated sediment samples from Mesa Portales are useful for testing previous interpretations of the archaeological record. The project will also be used to produce protocols for using curated sediments to address new geoarchaeological problems and provide the discipline with information regarding the archaeological applications of curated sediments to aid in future collections-management decisions. Research questions will address whether the archaeological association of Gallina and Chacoan ceramics were due to post-depositional or cultural processes.

Early Results and Future Analysis

Approval for the field portion of the thesis has been approved by the New Mexico Bureau of Land Management and will be conducted during the summer of 2018. Data is currently being digitized for the spatial analysis and results will be quickly obtained once digitization is complete. Sediments from both pit structures have been chosen for analysis and processing of these samples will begin in May of 2018.

Outside of my thesis, I am working on other projects related to Mesa Portales. While collecting data for the patina analysis, I also recorded attribute data on the lithic assemblage and will present a paper at the Eastern New Mexico University Student Research Conference about raw material procurement at both sites on April 4, 2018. In addition to the presentation, I am conducting a more detailed lithic analysis of the materials from LA145165 and hope to present a paper about my findings sometime next year.

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Folsom Mobility and Technological Organization in Central New Mexico

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Introduction

North American Paleoindian groups are commonly thought to be among the most mobile hunter-gatherers. Consequently, a central theme in many Paleoindian studies has been the concept of mobility. And yet, due to the nature of the archaeological record, stone tools are often the only evidence of the Paleoindian presence on the landscape. As many lithic analysts are well aware, making behavioral inferences from lithic assemblages is an inherently difficult task. Recent work at the University of New Mexico (UNM) has attempted to make headway with this issue, studying the land-use strategies of Folsom groups at two sites in central New Mexico using previously unexamined and unreported assemblages recovered by UNM field schools.

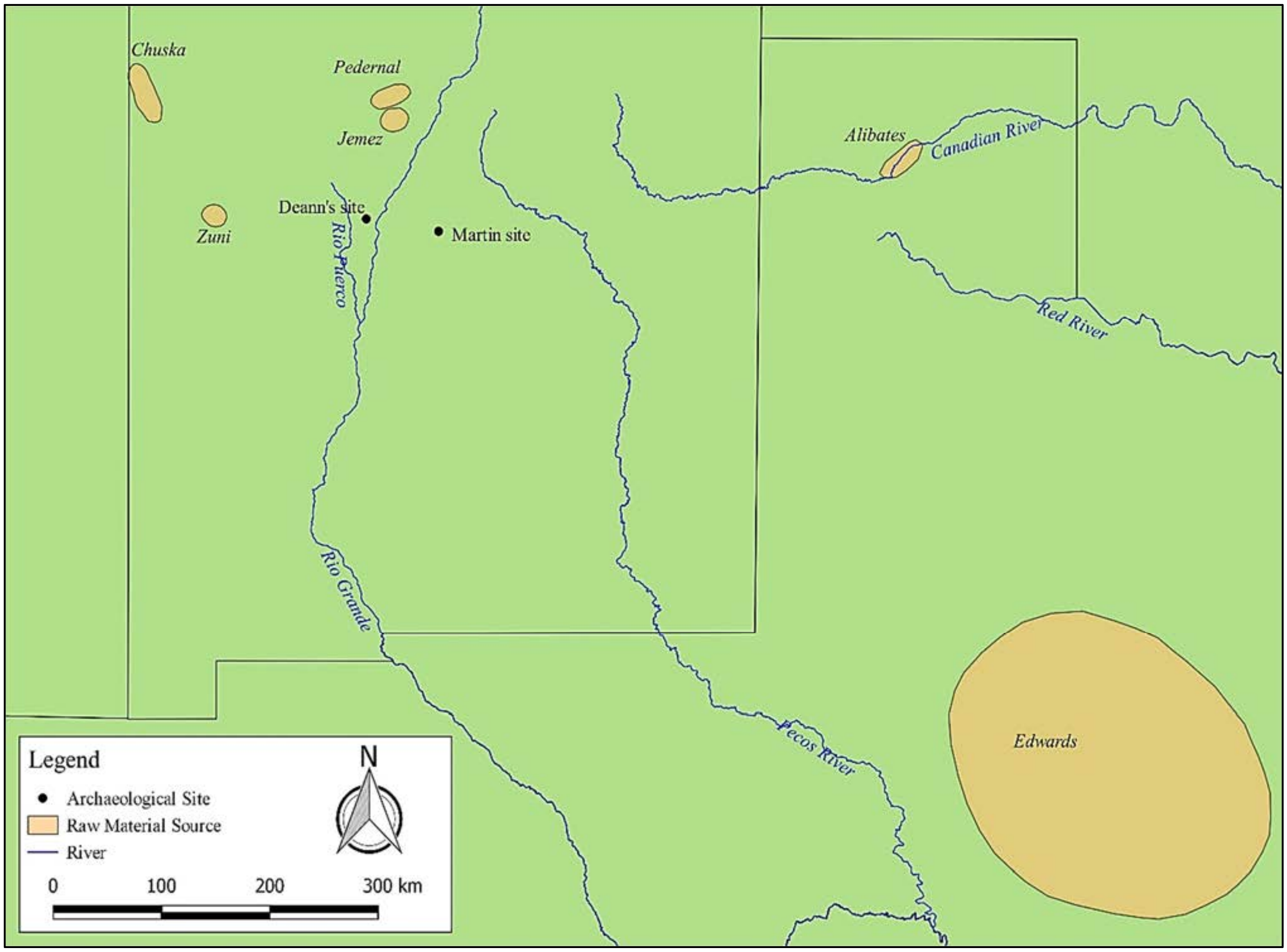
The Martin site is located in the Estancia Basin, approximately 60 km east of the Rio Grande (Figure 1). In the 1950s, UNM student William Roosa first examined the site during his dissertation fieldwork and conducted a nearly complete surface collection (Roosa 1967:122). Following Roosa's work the Martin site faded into relative obscurity until the early 21st century when renewed interest resulted in the re-examination of collected material (see Reitze et al. 2012). The site is situated near the northwestern margin of Paleolake Estancia, a Pleistocene lake basin. A small playa basin is located approximately 500 m to the northeast. The site itself measures approximately 150-by-100 m in size and is surrounded by a plains-mesa grassland. Re-examination of Roosa's collections indicated a preponderance of Edwards chert, suggesting group movements of over 600 km from the Edwards Plateau of southern Texas (Reitze et al. 2012:246). Field school excavations were conducted in 2011 and consisted of surface collection, as well as sixteen 1-by-1 m test units. In addition to the lithic assemblage, several hundred pieces of bison tooth enamel were recovered during field efforts, suggesting the site represents a bison kill and short-term camp. This paper examines the assemblage investigated by Reitze et al. (2012), as well as the previously unreported data from the 2011 field school.

Deann's site is located on the West Mesa of the Albuquerque basin (see Figure 1). It lies 60 m south of a small playa basin, and measures approximately 130-by-80 m in size. Originally recorded by James Judge (1973), Deann's site was later tested and excavated by UNM in 2002, 2006, and 2010. These field efforts consisted of surface collection, as well as fifty-two 1-by-1 m test units. Initial observations of the 2002 lithic assemblage revealed large amounts of Zuni china chert, plus a chert type that compared favorably to cobbles found in ancestral Rio Puerco gravels 10 km to the west (Huckell and Ruth 2004:49). Like the Martin site, several hundred pieces of bison tooth enamel were recovered during field efforts, suggesting the site represents a bison kill and short-term camp. This paper examines the assemblage investigated by Bruce Huckell and Susan Ruth (2004), as well as the previously unreported data from the 2006 and 2010 excavations.

Background

The concept of mobility is key to understanding hunter-gatherer adaptations and is best viewed as a continuum rather than discussed in typological terms. Many variables can influence mobility, but subsistence is typically considered to have been a primary factor (Kelly 1992:46). In many studies, mobility is assumed to have been a behavioral expression and a strategy utilized to maximize foraging returns. The implementation of specific mobility strategies subsequently influenced the composition of mobile toolkits (*sensu* Kuhn 1994), and by extension the lithic assemblages they produced.

Figure 1. Regional overview showing the Martin site and Deann's site, as well as chert sources mentioned.



Interpretations of Folsom lithic assemblages often assume that the organization of chipped stone technology reflected a conditioned response to environmental factors. This approach, termed *technological organization*, is frequently employed in North American Paleoindian studies. A key aspect of technological organization is understanding the interplay between humans and their environment, which influenced decisions relating to adaptive strategies. Studies guided by technological organization typically examine toolkit composition and mobility based on the utilization of curated and/or expedient technologies, as well as debitage assemblage characteristics. In the framework of technological organization, humans are viewed as decision makers whose decisions are conditioned by the ecological structure of a variable environment (Nelson 1991:60). Environmental conditions in central New Mexico during Folsom times encompassed a broad range of factors including climate, resource distribution, and resource predictability. The decisions made by Folsom groups can only be understood within the context of these environmental conditions.

The temporal extent of the Folsom technological complex occurred entirely within the Younger Dryas Chronozone (YDC), which is dated to approximately 12,900 to 11,600 cal yr BP (Ballenger et al. 2011:502). While there has been significant debate regarding the aridity during the YDC, paleoenvironmental reconstructions at both Paleolake Estancia (Allen and Anderson 2000:1457; Menking 2015:545–546) and the Albuquerque West Mesa (Holliday et al. 2006:796) suggest that the playas adjacent to the Martin site and Deann's site held water during the YDC, likely attracting grazing animals to these locales.

One of the animals often associated with Folsom sites was *Bison antiquus*, an ancestral variant of the modern bison. These bison were typically 15-20% larger than modern species and formed herds that followed variable seasonal migrations (MacDonald 1981:203–207). Folsom groups hunted these bison using spears tipped with stone points. Folsom groups typically utilized high quality lithic materials that exhibit both durability and excellent flaking characteristics, such as chert. A wide variety of chert sources are available throughout both the Southern Plains and Southwest (see Figure 1), many of which are macroscopically distinctive and can be identified during lithic analysis. These lithic raw materials form the basis of Folsom technology, which has been described as efficiently designed to support a highly mobile lifestyle. The organization of technology during the YDC is directly related to environmental conditions and can be analyzed to infer mobility and land-use strategies.

A central issue in assessing Folsom mobility and land-use strategies is the identification of archaeological indicators of mobility shifts within a system of technological organization heavily geared towards curation. There have been previous debates and discussions regarding the definition and usefulness of the term "curation" (see Nash 1996; Shott 1996). Here it is defined as a strategy of tool manufacture and design that anticipates tool transportation, multifunctionality, and/or multiuse. High mobility has been associated with a reliance on curated lithic technology, while reduced mobility has been associated with an increased reliance on expedient lithic technology (Kelly 1992; Parry and Kelly 1987). It is important to remember, however, that curation and expediency are best described as strategic options that are responsive to a variety of conditions, rather than delimiting a class of artifact or type of assemblage (Nelson 1991:62). They are not mutually exclusive and can be combined as an adaptation to specific environmental variables.

One important factor to consider in the examination of Folsom technological organization is the scheduling of tool manufacture, which can be expressed in terms of *anticipated mobility*. Mobility strategies such as anticipated mobility consider future group movement and have the potential to dictate archaeological assemblage composition (Sellet 2013:383). Often referred to as "gearing up," anticipated mobility manifests archaeologically in the form of projectile point production that outstrips replacement needs. The unique signature of Folsom point production in the form of channel flakes enables identification of specific instances of weaponry manufacture. Identification of primary channel flakes retaining striking platforms can provide a minimum number of flakes (MNF), controlling for artificial inflation due to channel flake fragmentation (see Sellet 2004). Incorporation of raw material types that exhibit only channel flakes lacking striking platforms should be included in this estimation, but no more than once per material type. Operating under the basic assumption that every fluted projectile point produced two channel flakes, the number of projectile points produced can be calculated as follows: MNF = (proximal primary channel flake fragments + unique material channel flake fragments)/2.

This basic approach is not without its flaws, however. It does not account for fluting failures, which have been estimated to be as high as 10-35 percent of all attempts (Ingbar and Hofman 1999:101). Such failures can occur with either the first or second fluting attempt. Despite these shortcomings, the MNF approach can still provide a rough approximation of projectile point manufacturing intensity at different localities.

In addition to the analysis of Folsom tools, examination of debitage assemblages can provide insight into the type of reduction activities that took place at a particular locality. Identification of an emphasis on specific modes of reduction can reflect technological strategies conditioned by both the environment and anticipated needs. Experiment-based results have suggested that debitage attributes such as flake completeness (Carr and Bradbury 2001:129; Baumler and Downum 1989:105; Prentiss 2001:171; Prentiss and Romanski 1989:91–92), dorsal cortex (Bradbury and Carr 1995:105; Magne 1989:17; Mauldin and Amick 1989:70), and platform type (Bradbury and Carr 1995:108; Carr and Bradbury 2001:134; Magne 1989:17–18) can all be linked to reduction strategy. By targeting specific flake attributes, questions regarding production mode and curation can be addressed.

Results

The Martin site assemblage contained significantly more evidence of projectile point production compared to Deann's site. This is seen in the number of projectile points, preforms, and channel flakes recovered at the two sites, with over ten times the number of these artifacts recovered at the Martin site (Table 1). Additionally, this pattern held for channel flake fragments as well, resulting in widely disparate reconstructions of projectile point manufacturing intensity (see Table 1). A majority of the projectile points/preforms and channel flakes at the Martin site were manufactured using non-local Edwards chert, while projectile points/preforms and channel flakes at Deann's site had a more equal split of local/non-local materials.

Tools recovered at the Martin site and Deann's site consisted of bifaces, scrapers, gravers, drills, retouched flakes, and utilized flakes. Retouched flakes and utilized flakes were classified as expedient tools, while all other tools were classified as formal tools. Tool assemblages at the two sites were markedly different, with tools classified as expedient being more numerous in the Deann's assemblage (Table 2). These informal flake tools were often expediently produced using local materials at Deann's site, whereas non-local material was preferred at the Martin site. Chi square tests confirmed that the Martin and Deann's assemblages have significantly different proportions of expedient tools and formal tools.

Debitage was unsurprisingly the most numerous artifact type in both assemblages. While sites produced relatively low proportions of debris, the Deann's assemblage had a significantly higher proportion than the Martin assemblage (Table 3). Significant differences in proportion of cortical flakes were present as well, with Deann's site containing more cortical debitage compared to the Martin site (see Table 3). Examination of platform types between sites revealed further differences; faceted platforms were more common at the Martin site than at Deann's site. All of these differences in proportions were determined to be statistically significant using chi square tests.

Table 1. Projectile Point Production

Site	Projectile Points	Preforms	Primary Channel Flakes	Secondary Channel Flakes	Points Produced
Martin site	**16**	**46**	**111**	**48**	**19**
Deann's site	**3**	**3**	**15**	**0**	**2**

Table 2. Lithic Tools

Site	Formal Tools	Expedient Tools
Martin site	39	36
Deann's site	8	39

Table 3. Lithic Debitage

Site	Flakes	Debris	Cortical	Non-Cortical	Faceted Platforms	Non-Faceted Platforms
Martin site	1,135	45	92	1,088	392	157
Deann's site	687	60	83	664	128	142

Predictably, both site assemblages had distinctive raw material compositions. Over 98% of raw material at the Martin site was classified as non-local (Table 4), a majority of which was Edwards chert. In contrast, over 50% of raw material at Deann's site was classified as local (see Table 4). A majority of the non-local material in the Deann's assemblage consisted of Zuni china chert, sourced to the Zuni Mountains west of the Albuquerque Basin.

Table 4. Lithic Raw Material

Site	Local Material	Non-Local Material	Indeterminate Material
Martin site	12	1,451	13
Deann's site	456	195	164

Discussion

While raw material distributions at both sites match previously reported patterning for the Southern Plains (Hofman et al. 1990; Reitze et al. 2012) and Basin and Range of New Mexico (Huckell and Kilby 2002; O'Brien et al. 2009), notable differences in both tool form and reduction strategies are present. These organizational differences are consistent with divergent mobility strategies employed by Folsom groups in Central New Mexico. While it is worth noting that specific technological strategies are not determined by any single characteristic of society (Bamforth 1991:217), mobility has been identified as a key conditioner of raw material availability, which in turn can influence the organization of technology (Andrefsky 1994; Ingbar 1994).

Occupants of the Martin site appear to have been primarily concerned with projectile point production, as evinced by the preponderance of projectile points, preforms, and channel flakes. The debitage assemblage supports this inference, containing high amounts of non-cortical flakes with faceted platforms. Raw material composition indicates group movements of over 600 km based on the presence of large amounts of Edwards chert. This suggests a Southern Plains origin for the Martin site occupants. These assemblage characteristics are consistent with employing a strategy of curation, seen in the form of tool transport, multifunctionality, and multiuse. Additionally, the emphasis on projectile point production suggests a strategy of anticipated mobility.

Occupants of Deann's site were less focused on projectile point production, instead emphasizing early stage reduction of local materials. This is reflected in the debitage assemblage in the form of increased amounts of cortical flakes and angular debris, as well as a majority of non-faceted platforms. All of these attributes are more common on flakes classified as local material. Additionally, over 80% of tools present were classified as expedient. These assemblage characteristics are consistent with an increased emphasis on a strategy of expedient tool production and less concern with the production of curated tools.

The raw material signature of Deann's site is consistent with an origin point in northwestern New Mexico. The presence of small amounts of Chuska chert, as well as larger amounts of Zuni china chert suggest a route swinging southward from the Chuska Mountains, then turning eastward to pass through the Zuni Mountains prior to arriving in the Albuquerque Basin. Closer examination of debitage characteristics reveals relatively high proportions of faceted platforms on non-local material, and significantly lower proportions on local material. This disjunction in reduction strategies coupled with lack of projectile point production could be reflective of a mobility shift upon arrival in the Albuquerque Basin, and is consistent with a lack anticipated mobility.

There are several assumptions underpinning these interpretations. First and foremost, within the context of technological organization it is assumed that efficiency was of paramount concern in prehistoric systems. It has been pointed out, however, that often what is represented in the archaeological record are not optimal, rational solutions, but rather adequate and provisional ones (Lyons and Casey 2016:11). In view of these difficulties, it is worth noting that the interpretations presented here likely represent a simplified view of Folsom technological organization.

An additional difficulty in the interpretation of lithic assemblages is the lack of modern ethnographic analogues allowing researchers to link stone tools to behavior (Kelly 1992:46; Larson 1994:57). Experimental research can help link specific reduction activities to physical characteristics of assemblages; however, these studies are inherently limited by their inability to view the organization and design of technological systems in a dynamic context (McCall 2012:161). Despite these limitations, it must be assumed that experimental research produces conclusions that are valid for interpreting prehistoric systems of technological organization.

Overall, these differing strategies of technological organization across both the Albuquerque and Estancia Basins can be interpreted as consistent with differing degrees of mobility. It is important, however, to keep several key factors in mind when evaluating this inference. The exploitation of local raw material at Deann's site possibly could have obscured the mobility signature of the occupants. By mere virtue of easily accessible raw material located in nearby ancestral river gravels, the Deann's assemblage contains a higher proportion of debitage indicative of early stage core reduction activities. If this were the only line of evidence for reduced mobility, it would be a tenuous inference at best. However, the distinct lack of formal tools combined with the relative absence of evidence for projectile point production, suggests that the occupants of Deann's site were not employing a strategy of curation in the maintenance of their toolkits, which is consistent with a comparatively reduced degree of mobility.

Another possibility is that both the Martin site and Deann's site do not represent full occupations, but rather are activity loci within a wider local occupational system. If this were indeed the case, the inference of reduced mobility at Deann's site could be a sort of "false positive," with the production of projectile points and discard of exhausted formal tools occurring elsewhere. Similarly, it is possible that initial core reduction of local materials and discard of expedient tools by occupants of the Martin site took place at a different locality.

Finally, it is a distinct possibility that the full range of reduction activities was not captured by archaeological field efforts. Both the Martin site and Deann's site were not fully excavated, but rather had multiple 1-by-1-meter test units judgmentally placed across their surface scatters. If these test units did indeed miss spatially patterned reduction activities, the above interpretations could be rendered invalid. Unfortunately, excluding full excavation of both sites, it is impossible to ameliorate this potential bias.

Issues of equifinality immediately arise when pursuing concrete conclusions, which is common in Paleoindian studies. As is often the case in archaeology, you can never tell *the* story of a place, but you can tell *a* story of a place. It would be misleading to suggest that the interpretations presented above are an entirely accurate picture of life in central New Mexico during the late Pleistocene. Instead, they represent a vastly simplified version of an inherently complex system of technological organization. These interpretations can serve, however, as a road map for future investigations. Investigations of mobility and technological organization are best conducted at regional scales with larger datasets, and it is hoped that the conclusions drawn from this study will assist with future refinements of models relating to Folsom technological organization in New Mexico.

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Ancestral Pueblo Fieldhouses: A View from Northern New Mexico

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Introduction

Fieldhouses played an important role in Ancestral Pueblo settlement and subsistence systems in northern New Mexico. While thousands of fieldhouses have been recorded, relatively few have been excavated. Consequently, much of what archaeologists know about these structures comes from ethnographic and survey data (Preucel 1990; Wilcox 1978). Here, we introduce a recently completed historic context document about fieldhouses (Dolan et al. 2018) that brings together survey and excavation data from the Pajarito Plateau and Jemez Mountains regions of northern New Mexico. We briefly describe some of the results, including trends in interior floor size and floor features.

What are fieldhouses?

Hiking in northern New Mexico in the Jemez Mountains or on the Pajarito Plateau in Bandelier National Monument around Los Alamos, you're likely to stumble across evidence of the Ancestral Pueblo people who lived here hundreds of years ago. You may see the remains of rather inconspicuous small architectural sites that consist of shaped or unshaped tuff blocks scattered with few pieces of pottery or chipped stone artifacts (Figure 1). These are the remains of one- to three-room structures, commonly referred to as fieldhouses. Thousands of fieldhouses exist in northern New Mexico, and they are also found in other areas of the American Southwest (Kohler 1992; Stone 1993; Ward 1978).

Figure 1. What a typical Pajarito Plateau (Bandelier National Monument) fieldhouse looks like on the surface.

Built from locally available perishable and nonperishable materials including stone, brush, wood, and adobe, farmers constructed fieldhouses for temporary shelter and storage near their agricultural fields, which are sometimes located far from their pueblo villages. Because northern New Mexico receives variable rainfall, protecting and tending crops is key for survival in this semi-arid environment. At fieldhouses, farmers tended, watched, and protected their crops from other people and unwanted garden pests like rabbits and insects.

On the Pajarito Plateau, fieldhouses were first built during the Coalition period (1200–1325 A.D./C.E.) around the same time that population increased (Ortman 2016), and their use continued into the Classic (1325–1600 A.D./C.E.) and Postclassic (after 1600 A.D./C.E.). People also used fieldhouses into the 1900s, and still use them today. For example, as documented by Goodman (2012:116)

> *In 2001, two Cochiti residents, each in their 50s, stated that a great many small fieldhouses had formerly occupied the terraces above the agricultural fields east of the Rio Grande. One of these individuals, as a young child, spent several summers with parents and grandparents living in their fieldhouse. This was an enjoyable time, as children, parents, and grandparents often worked and relaxed together in a less formal setting, away from the pueblo.*

During winter months, people lived in large pueblo villages but moved to fieldhouses for the summer agricultural season. This dual annual settlement pattern is practiced by many cultural groups around the world (e.g., Gilman 1987; Preucel 1990). In other words, a fieldhouse is the summer "home away from home" for farmers.

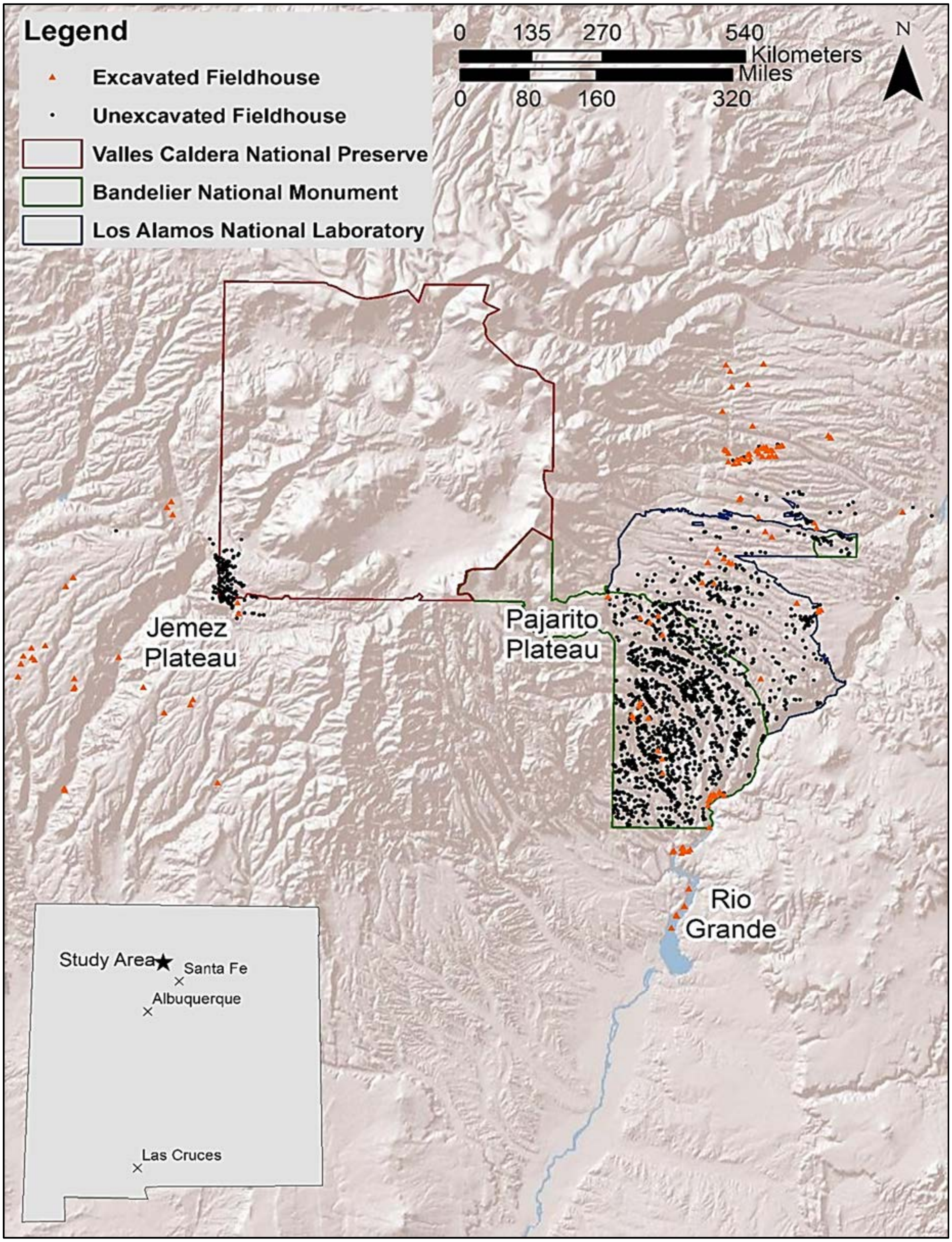
Project Scope

Our historic context document about fieldhouses focuses on Los Alamos National Laboratory, Bandelier National Monument, the Valles Caldera National Preserve, and surrounding lands (Figure 2). It brings together results that were widely distributed in reports from multiple individuals and agencies over several decades. The study includes a quantitative analysis of fieldhouse locations, features, artifacts, and structural data from over 2,000 fieldhouse sites, including 139 previously excavated structures (from 127 sites) dating between A.D. 1200–1600 and shortly after (Table 1).

Table 1. Number of Unexcavated Sites and Excavated Structures by Region and Time Period (from Dolan et al. 2018: Table 5.4).

	Unexcavated Sites			**Excavated Structures**		
Time Period	**Pajarito Plateau**	**Rio Grande**	**Jemez Plateau**	**Pajarito Plateau**	**Rio Grande**	**Jemez Plateau**
Developmental	4	0	0	0	0	0
Developmental/Coalition	34	0	0	0	0	0
Coalition	243	0	0	20	3	3
Coalition/Classic	352	0	7	18	4	0
Classic	286	0	15	36	27	10
Classic/Postclassic	5	0	5	0	0	13
Postclassic	0	0	0	0	3	2
Undetermined	820	0	113	0	0	0
Total	1,744	0	140	74	37	28

Figure 2. Fieldhouse sites analyzed in this study (from Dolan et al. 2018: Figure 1.10).



Excavated fieldhouses provide data on interior room size, artifact counts, and floor features, which can help to address questions on socio-economic activities at these structures. For example, if fieldhouses functioned as temporary residences and for crop processing and storage during the farming season, then we expect evidence of hearths and storage bins. Thermal features like hearths provide heat and fire, which are essential components of everyday cooking and comfort, and storage features like bins can be used to hold crops.

Results - Room Size and Features

Our dataset includes 98 one-room structures, 37 two-room structures, and 4 three-room structures. The average interior room size of a single room is 4.8 square meters (Dolan et al. 2018:73–78). This is about the same size as the small back storage rooms found in Coalition period pueblo roomblocks on the Pajarito Plateau. Fieldhouses on the Pajarito Plateau and Rio Grande (near Cochiti) are similar in size, but Jemez Plateau structures are twice as large. The presence of larger fieldhouses in the Jemez region suggests people there expended additional effort and resources to build fieldhouses.

In our study region, thermal features are the most common floor feature type (Dolan et al. 2018:82–91). Twenty-five percent of Pajarito Plateau fieldhouses have a thermal feature, but 89 percent and 61 percent of Rio Grande and Jemez Plateau fieldhouses, respectively, have thermal features. In some cases, additional time and effort were taken to construct formalized hearths (e.g., slab-lined, and collared).

Eleven percent of Pajarito Plateau fieldhouses have a storage feature, but 38 percent and 61 percent of Rio Grande and Jemez Plateau fieldhouses have storage features. Like thermal features, some storage features exhibit evidence for construction investment (e.g., slab-lined bins consisting of stacked rocks). Our results show that some fieldhouses took more time and effort to build than others, which could reflect differences in the duration of fieldhouse occupation, functional use of the structure, specific cultural practices, or other unknown factors.

Conclusions and Future Research

The fieldhouse context document includes additional data, multiple appendices including site summaries, images, and a full list of references cited. We hope this document serves as a starting point for cultural resource managers and other archaeologists working with fieldhouses in their project areas.

In many ways, our results simply question whether the term *fieldhouse* is appropriate for one- to three-room structures in the Ancestral Pueblo world. Ethnographic records indicate that some small structures may not be aligned strictly with agricultural pursuits. Ancestral Pueblo people also may have used small structures for hunting camps, places to stay overnight during long journeys, ceremonial shrines, sweat lodges, or even longer-term residences for bachelor males or those cast from society (Crown 1985; Wilcox 1978). Given that archaeological deposits in fieldhouses represent palimpsests of multiple seasons and years of use by one, or multiple, individuals and families, it is not surprising that artifact and architectural data do not describe a single fieldhouse story through time or across space.

Many of the broader research questions related to the origin and evolution of fieldhouses remain unanswered, but work is ongoing. What cultural and environmental factors led to the development and growth of fieldhouses? Why are there so few fieldhouses before the Coalition period in northern New Mexico, and did the influx of migrants, possible from Mesa Verde or elsehwere, provide a reason to change settlement-subsistence strategies? These questions hinge on understanding the relationships between fieldhouses and contemporaneous pueblo sites using large datasets and geographic information systems (GIS). Ethnographic evidence suggests that fieldhouses were built on or near agricultural fields, yet the challenge for archaeologists is to identify the locations of ancient fields after hundreds of years of land-use. GIS technology is a powerful tool for modeling the location and sustainability of agricultural fields in relation to fieldhouses (Buck and Sabol 2014; Schollmeyer 2009; Toney 2012), and we advocate for more similar studies in the future to help answer fieldhouse-related questions.

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encourage the legal protection of cultural resources, and encourage high standards for professional archaeology

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