A Spatial Analysis of Civic-Ceremonial Architecture in the Central Mesa Verde Region, United States

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ABSTRACT

This study analyzes the spatial and temporal patterning of civic-ceremonial structures in the central Mesa Verde region of the northern Southwest to assess changing patterns of leadership in Pueblo society. Great kivas, as the most ubiquitous and persistent form of Pueblo public architecture in the area prior to A.D. 1280, provide a durable means of assessing community membership and for analyzing how the introduction of other civic-ceremonial buildings may reflect shifts in public space and leadership strategies over time. It is suggested here that great kivas represent a fundamental and enduring symbol of community group assembly that underwent changes over time, the most profound of which occurred in the final decades prior to migration from the area in the late A.D. 1200s. The overall constellation of civic-ceremonial structures over time indicates altering leadership strategies just prior to the depopulation of the region.

Introduction

Large, formally built structures have attracted the attention of archaeologists since the beginning of the field. In the northern Southwest, some of the earliest excavations focused on large impressive structures in areas like Chaco Canyon, New Mexico and on Mesa Verde in southwestern Colorado (Nordenskiöld, 1979; Pepper, 1920; Roberts, 1929). This early work helped define the material culture of the early Pueblo period and illustrated important differences in the layout, scale, and inferred use of some structures. Particularly large and formally built structures were excavated at this time—structures that were later called great kivas and great houses—and these types of buildings seemed to represent distinct architectural forms that were produced widely across the northern Southwest. Their size, formality, and generally sparse numbers within communities indicate they were built using pooled community labor, and that this labor was organized through a shared belief system tied to ritual activities (Adler and Wilshusen, 1990; Vivian and Reiter, 1965). More recent interpretations suggest communities used these structures to order their social world by creating formalized spaces to conduct civic and ceremonial affairs, to promote social cohesion, and to reduce tensions (Van Dyke, 2007; Wilshusen et al., 2012). Spatial and artifact relationships among these structures have also been used to study synchronous and long-term social connections related to identity at a variety of spatial scales (Glowacki, 2015; Mills et al., 2015). The following study builds on this rich history of research by using the spatial and temporal relationships among these different structures to assess how Pueblo community leadership strategies changed over time.

Great kivas are present in the archaeological record of the northern San Juan region from the A.D. 600s through the late A.D. 1200s (Churchill et al., 1998; Diederichs et al., 2014; Lipe, 2006:267; Vivian and Reiter, 1965), and provide one line of evidence for looking at community formation and organization for almost all of the Pueblo period. These structures are large—10 meters or more in diameter—circular, usually subterranean or semisubterranean, and were constructed with massive roofs. Based on portrayals in rock art and features associated with these structures, archaeologists infer that ancestral Pueblo people used them (Fig. 1) for important events such as ceremonies and civic gatherings. The layout and size of great kivas are variable throughout this span, as is the placement of these structures as either spatially “isolated” (i.e., spatially separate from surrounding habitation sites [Wilshusen et al., 2012:217]), or incorporated into village architecture (Kuckelman et al., 2009; Ryan, 2013). Regardless of their specific location or construction, these large buildings must have been associated with particular communities, likely represented by spatially associated contemporary habitations, and are clearly an architectural indicator of coordinated community effort and cohesive identity linked to a shared ideology (Adler and Wilshusen, 1990:143; Herr, 1994; Lipe, 2006; Varien, 1999).

Analyzing where great kivas were built and used provides a means of assessing how this fundamental type of organization changed over time (Mahoney, 2000; Varien, 1999). As a symbol of community organization, great kivas and the spatial distribution of these structures provide one of the least ambiguous means of determining community scale, potentially a key variable in assessing other aspects of broader political and economic organization (Adler and Wilshusen, 1990; Herr, 2001; Ortman et al., 2014). Changes in where great kivas were built, as well as changes in how they were constructed and used, reflect decisions by community leadership. For example, whether there was open public access or private restricted access to these immense civic or ceremonial structures offers important evidence about the nature of leadership and leadership strategies in the past. It is widely accepted that the evolving nature of

community organization and its leadership fundamentally reshaped the cultural landscape at key points in the Pueblo past. By examining the design, distribution, and potential access to civic-ceremonial structures over a 700 year span, we hope to better understand how the leadership and organization of these communities changed over the course of the Pueblo occupation.

A basic tenant of this research is that the role of community architecture is not static and immutable through time; the social role of great kivas almost certainly changed as the populations and structuring ideals of associated communities changed. Because of this, it is important to assess how the spatial and temporal patterning of great kivas, as the most persistent and traditional form of public architecture, compares to that of other civic ceremonial structures, including great houses, D-shaped structures, and multiwalled structures at different points in time. Analyzing how the spatial distribution of great kivas changed when other public structures were introduced provides insights into how community leadership and organization transitioned to incorporate other formalized leadership strategies.

Background

Great kivas are one of the earliest examples of what archaeologists often refer to as public architecture, or structures that were built and used by more than one household or group. (Adler and Wilshusen, 1990; Wilshusen et al., 2012 [Fig. 1]). Following Glowacki (2015:65), we define great kivas as a form of civic-ceremonial architecture, meaning these structures were created by and for the entire community although only a portion of the overall community likely took part in the ceremonies held there at any given time. It is possible alternating groups used these buildings at different points in time as the entire community could not physically fit into these structures simultaneously (Artursson et al. 2016).

The size of great kivas indicates many households, or household representatives, participated in great kiva ceremonialism but the number of individuals who could attend often seems smaller than the entire population of the surrounding community (Adler and Wilshusen, 1990; Lightfoot, 1988; Wilshusen et al., 2012). Though this seems to preclude participation of the entire community in group assembly ceremonies (at least at the same time), these structures probably facilitated regular formal interactions amongst a subset of the community and physically structured how local leaders negotiated influence and broader civic matters.

Using an estimate of one square meter of floor space per person, Van Dyke (2007:119) postulates that approximately 250 people could fit in a great kiva with an 18 meter diameter floor, such as Casa Rinconada in Chaco Canyon, however this estimate does not account for the space occupied by floor features. A more realistic estimate can be derived by counting the number of individuals that could sit shoulder-to-shoulder on the bench of the kiva. In this case, approximately 75 individuals could occupy a kiva with an 18 meter diameter, leaving room in the center of the structure for performative activities (Van Dyke, 2007:119). Other estimates suggest groups of 130 to 250 people could actually attend group assembly ceremonies organized in great kivas, although the precise number of people participating in great kiva ceremonialism likely varied by community, time, and event (Adler and Wilshusen, 1990:142).

Other types of public structures were also built in the area at different points in time and these are interpreted as forms of civic-ceremonial architecture. Two of the most widely built and archaeologically visible forms are great houses and multiwalled structures. The construction of great houses in the study area was an important development locally and part of a broader regional trend in the Late Pueblo II

period (Lipe, 2006). Here great house architecture generally dates after A.D. 1075 and is typically characterized by large buildings, multi-story construction, architecturally enclosed kivas, and associated landscape features like roads and berms (Cameron, 2009; Lekson, 2007; Lipe et al., 1999; Ryan, 2015). Though these general characteristics help define great houses, or Chaco outliers as they are sometimes referred to outside of Chaco Canyon, there is significant variation in the construction details of these buildings across the region and through time (Cameron, 2009:23; Hurst and Till, 2009; Ryan, 2013; Vivian, 1990:299). In some way, these structures were architectural expressions of organizational ideas and traditions tied to Chaco Canyon and were meant to evoke ideologies codified by that regional system (Adler, 2002; Lekson, 1984; Ryan, 2013, 2015).

Multiwalled structures were built in the study area mainly in the Pueblo III period, from A.D. 1150 to 1280 (Fig. 2). They are often interpreted as a form of civic-ceremonial architecture and can exhibit variations in design; some are D-shaped in plan, some are circular, and some were built in other configurations (Glowacki, 2015). All are produced to a formalized plan at a scale suggestive of extradomestic use, and all are defined by at least one arcing row of rooms that frame a central structure or courtyard complex making a portion of the structure circular or semicircular (Kuckelman, 2003). Some multiwalled structures, called triwall structures, have two arcing rows of rooms framing a central structure (Glowacki, 2015; Vivian, 1990). In the study area, the D-shaped variant is the most common, although recent research demonstrates more variation on this architectural pattern than was previously recognized (Glowacki, 2015; Kuckelman et al., 2009).

The inferred extradomestic use of these multiwalled structures is supported by test excavations that have yielded artifacts and ceramic design elements different from nearby roomblocks yielding clear evidence of domestic activity or food storage (Kuckelman et al., 2004; Kuckelman et al. 2009). Archaeologists have suggested aspects of this building design may harken back to aspects of Chaco-influenced great house construction and reflect a revival, or revitalization, of some Chaco-based ideologies (Bradley, 1996; Glowacki, 2015; Glowacki and Ortman, 2012). Most multiwalled structures appear to have been built and used in the last few decades prior to regional depopulation, while the vast majority of great houses appear to have fallen out of use by the early-to-mid A.D. 1200s. This supports the idea that multiwalled structures were generally successive to great house architecture although both share architectural characteristics including large size, formal ground plans, and compartmentalized and restricted interiors. These architectural similarities suggest community leaders used these buildings in similar ways at successive points in time and that both types of structures owe aspects of their design and function to Chaco ideologies (Glowacki, 2015).

It is important to relay what is meant by the term ‘leadership’ in the context of this study. Others have used ethnographic, historical, and architectural data to infer how individual villages and larger communities may have structured local leadership at a variety of scales (Bernardini 1996; Ferguson 1989). Following Adler (1989:45), the focus of this study is on ‘higher level’ leadership represented by the civic-ceremonial structures assessed here. We support the idea that these types of community buildings “...are employed by decision-making units of a hierarchy to facilitate information flow and decision making...” and suggest that the varied layouts of these buildings indicate how leaders ordered decision making at the broadest community level (Bernardini 1996:387; Hegmon 1989:8). Clearly, leaders at different points in time used both group assembly and restricted-access venues to make decisions or disseminate information; however differences in the number of these structures through time,

as well as the spatial association among them, indicates changes in where and how leaders were making decisions. On a broad level, this indicates how leadership was organized and how leadership organization changed over time.

Both great houses and multiwalled structures were designed with more restricted access compared to the more open ceremonial venues such as great kivas. Labor from multiple households was needed to build and maintain these structures, but the compartmentalized and restricted space within these buildings limited access to a smaller group of people for more private ceremonies or restricted leadership gatherings (Glowacki, 2015; Kuckelman et al., 2009; Ryan 2013). This is a different type of use compared to the more inclusive great kivas where more people could have participated simultaneously in community sanctioned ceremonies. The presence of both types of structures on contemporary landscapes, and sometimes within the same village, indicates complimentary, and perhaps at times, competing forms of civic-ceremonial leadership strategies were in use in the study area (Glowacki, 2015; Van Dyke 2007; Vivian 1990). Whether inclusive or exclusive, all of these structures are thought to have legitimized community leadership and identity through ceremony and each were part of a dynamic suite of civic-ceremonial architecture.

The idea that ceremony was important in legitimizing leadership structure is based on contemporary and historic ethnographic information from Pueblo groups where the importance of ceremony in leader selection and legitimization are wide spread (Fowles, 2005; Lipe 1989; Ortiz, 1969; Van Dyke, 2007). More broadly, group ceremonies are important for creating and maintaining social ties and reducing tensions among societies that lack strong political institutions (Wilshusen et al., 2012:210). For group ceremony to develop as a meaningful means of mediating social relations there must first be some type of commonality or similarity between the basic social elements or groups participating (Durkheim 1933:219–220). In architectural terms, commonalities in the basic layout of ‘unit pueblos’ and the repeated and fairly uniform design of civic-ceremonial structures in the study area demonstrates widespread repetition of the built environment which reflects participation in a broader and mutually understood social framework (Lipe 1989; Lipe and Hegmon 1989; Ferguson 1989).

This shared understanding of the built environment as it relates to social organization and leadership is likely related to a historically contingent, shared memory of the development and design of architectural spaces. Connerton (1989) distinguishes between inscribed memory, involving material culture, and embodied memory, encompassing behavior, and suggests that social memory is found in commemorative ceremonies that they are only commemorative in so far as they are performative. Memory is embedded in and facilitates practice and practice is embedded in and facilitates memory. Architecture is one vehicle that embodies memory, facilitates practice, and allows the perpetuation of continued memory practices. Thus, civic-ceremonial architecture facilitates this community-level organization by providing a formal space for community sanctioned ceremony and associated civic decision making. The size and form of the structures reflects how leaders structured these events. Design elements of these structures influenced the number of people who could participate, the types of ceremonies that could be performed, the seasonality of the activity, and the ideological and physical boundaries between sacred and domestic space (Hegmon, 1989:7). The type of structure used promotes the persistence and repetition of ceremonies by formally fixing them in space and by providing a context for symbolically charged actions linked to shared organizational ideas. Decisions about the location, design, and utility of these buildings were negotiated

via local leadership, but also reflect broader cultural trends affecting much of the northern Southwest at different points though time.

Authors have forwarded explanations for how leaders organize integrative behavior via architectural space that is a product of shared memory. Following Durkheim (1933), Ferguson (1989:172) suggests two methods through which leaders in the study area organized architectural integration; structural repetition and structural differentiation. Under the repetition model, the social elements participating (i.e., groups of people) essentially shared a common architectural structure, tied to ideology and memory, and the common thread binding integration was a shared notion of the essential elements needed to produce and reproduce it. Under the differentiation model, the functional specialization of different social elements (i.e., groups of people) produced more formalized integrative or public structures with increasingly restricted access. In fact, Ferguson (1989:172) suggests “...the functional specialization and restriction of access in space used for religious activities is related to the structural differentiation of social groups.” Though both great kivas and other forms of civic-ceremonial architecture represent restricted ritual space (in that not all members of the community could participate at one time) the degree to which this is true varied considerably between structure types. The much more restricted internal space within great houses and multiwalled structures, compared to great kivas, indicates leaders were participants in an increasingly specialized or differentiated social groups operating at the community level.

In this way, how these structures were built illustrates the cultural conception of the role of community leadership—its place within the community, the powers that granted it, and where and possibly how it was legitimized. The co-occurrence of great kivas and other more restricted civic-ceremonial buildings likely indicates different types of leadership strategies were operating in tandem (whether cooperatively, or in different scales) to affirm a sense of community amongst groups of people with potentially different histories or social standings. The widespread use of great kivas throughout the Pueblo occupation of the study area indicates group assembly was part of the leadership structure of most communities through time, but the introduction of other more restricted civic-ceremonial structures suggests this fundamental form of leadership organization underwent transformations that were historically and regionally situated. At times, civic space became increasingly restricted indicating increased social differentiation, although open group assembly was consistently present in some form.

Methods

Survey or excavation data are available for 39 great kivas, 16 great houses, and 18 multiwalled structures in the study area (Tables 1, 2, and 3); this is the same size and area as that for Phase I of the *Village Ecodynamics Project* (VEP), a multi-year, collaborative project that examined human and environmental interaction for much of the Pueblo occupation (Kohler et al., 2007; Kohler and Varien, 2012) (Fig. 3). In all, site data for 1,817 km² are included in this analysis which contains much of southwestern Colorado, north of Mesa Verde, and south, or southwest, of the Dolores River (Ortman et al., 2007). These sites range in age from A.D. 600 to A.D. 1280 and reflect community formation and organization for approximately 680 years. The nature of the data available for each site is different and is largely a function of its current location (public or private land) and when the associated documentation was completed. Recently, the VEP has compiled data for each of these sites into a single database facilitating large-scale comparisons of the sites through time. Earlier studies, like the Crow Canyon Archaeological

Center's Community Center Survey (Glowacki and Varien, 2003), is the source of the data used in this study.

Geographic Information Systems (GIS) software was used to analyze the distribution of great kivas, great houses, and multiwalled structures through time in the study area. Data available in the VEP database includes information about the location, initiation, and terminal date of great kivas and other civic-ceremonial structures in the study area (Ortman et al., 2007). These data were used to assign individual structures to a specific period of time and to plot roughly contemporary structures throughout the study area. It should be noted that the surface signature of these sites is often complex and expansive, and undoubtedly future excavations will revise their use-histories and subsequent interpretations (see Coffey, 2014 for an example of this). This analysis applies the best chronological information we have at present to begin the process of assessing how the constellation of public structures may have signaled changes in leadership strategies across the study area.

As noted above, great kivas are the most widely constructed and longest-lived form of civic-ceremonial architecture in the study area. Great houses and multiwalled structures are two of the most archaeologically visible other forms of civic-ceremonial structures, however plazas, oversized pitstructures, and other nonresidential or extradomestic structures were also built in the study area as well (Glowacki, 2006; Kuckelman et al., 2009; Ryan, 2010). At particular times throughout Pueblo history, these various forms of public architecture may have been used instead of, or in tandem with, great kivas as the nexus of community organization (Van Dyke 2007). We also consider great houses and multiwalled structures in this analysis to better understand how the location of other civic ceremonial architecture relates to great kiva location. These structures were selected based on the uniformity of data available for these types of buildings compared to other forms of civic-ceremonial structures.

Individual great kivas and other types of civic-ceremonial architecture were placed in multiple analytical periods based on the range of use suggested for these structures in the VEP database. For instance, the great kiva at Yellow Jacket Pueblo was assigned to four different periods in the analysis below since that structure appears to have been utilized from the Late Pueblo II period through the Terminal Pueblo III period, an inference based on a combination of pottery and architectural data (Kuckelman 2003).

Once the structures in our sample were arranged by time period, spatial relationships were analyzed using two primary methods. The first method placed Thiessen polygons around each individual structure dating to a specific period. These polygons define an area as being closer to one structure than to another similar building (i.e., great kiva, great house, or multiwalled structure) during the same period of time. This method divided the study area into individual parcels defined by the spatial primacy of the nearest public structure of the same type. The cumulative extent of all Thiessen polygons drawn for any structure type was defined using the distribution of the public structures themselves; thus the scale of analysis shifted depending on where different types of structures were located within the study area at different points in time. The size and number of polygons also reflected how many individual structures were thought to have been used during a given period of time. This was a somewhat rudimentary way of partitioning the area around public structures, yet it allowed for the definition of areas spatially dominated by individual structures through time and provided a spatial division that could be compared to that of other public buildings. To compliment this approach a cost allocation surface was created from a 10 meter digital elevation model and the least cost of travel from each cell to the nearest civic-ceremonial structure was

calculated. This analysis used the elevation of the terrain, as well as the Euclidean distance, to parcel the study area around civic-ceremonial structures. Both techniques produced very similar results (see Fig.12).

The mean distances between nearest civic-ceremonial structures were also calculated by time period. This provides an estimate of the spacing between different structures in the study area, and allowed for a comparison of how much space individual structures commanded based solely on their location. It also provided a means of comparing the size of an area dominated by one form of public architecture to others through time. Another measure of the spacing of civic-ceremonial structures was produced by calculating the average distance from a great kiva, a great house, or a multiwalled structure to its nearest, contemporary neighboring structure (of the same type). Theissen polygon areas and nearest neighbor distances were then compared to examine how these different structure types articulated to create different scales of civic-ceremonial membership that operated simultaneously and with potentially different leadership strategies (i.e., group assembly or restricted-access).

The overall spatial patterning of contemporary structures was analyzed to identify statistically significant patterns of dispersion or clustering across the study area as part of a nearest neighbor analysis. The GIS software conducted an analysis to determine if the pattern of structure types varied significantly from a random distribution. Again, the overall size of the area analyzed was determined by the extent of the structures themselves, thus this space varies by structure type and through time. Differences in the observed distance between structures and the calculated expected distance, divided by the standard error, allowed for the calculation of Z-scores to assess if the overall distribution was more characteristic of a random distribution, clustering, or dispersion (for more information about this method see: <http://resources.arcgis.com/EN/HELP/MAIN/10.1/index.html#//005p0000000p000000>).

The changes recognized in the number, spacing, and the average size of areas around of civic-ceremonial structures were assumed to reflect how leaders organized activities at different times. Regional developments like the emergence and ascendancy of the Chaco regional system impacted the form and constellation of these structures across the landscape, as did population movement and growth within the study area (Glowacki and Ortman, 2012; Varien et al., 2007). Factors such as these are discussed for each time period below to contextualize the patterns proposed and provide potential inferences for why changes in the location, number, and spatial configuration of civic-ceremonial structures signaled changes in leadership strategies.

The following analyses assume that most great kivas, great houses, and multiwalled structures in the study area have been located and described to some extent. The size of these structures and their recognized importance to surrounding communities (Glowacki, 2015; Herr, 1994; Lightfoot, 1988) suggest most of them are likely recorded, especially in areas that have been systematically surveyed. However, the nature of the associated data is different from site to site, and it is likely that not all of them have been identified. Continued field work within the area will reveal additional structures and will change the metrics used in the following analysis; this is particularly likely for newly recognized great kivas dating to the Basketmaker III and Pueblo I periods (as these early structures may be covered or masked by subsequent cultural activity).. Nevertheless, these types of structures are generally some of the most recognizable forms of architecture (Glowacki, 2015; Kuckelman et al., 2009; Lightfoot, 1988); their size and distinctive surface expressions make it likely the vast majority of them have been recognized and described in the literature.

Edge effect is also a potential problem in assessing the overall size of areas associated with particular structures. As noted above, the spatial extent of Phase I of the *Village Ecodynamics Project* defines the study area for this research. Spatial analyses of structures nearer the edge of the study area are likely impacted (i.e., their associated areas larger or smaller than they might otherwise be) by the arbitrary boundary defined for the VEP project. This is particularly true for sites in the western and southern portions of the study area where other civic-ceremonial structures are known to exist outside the boundary. The analyses used here are dependent on the distribution of the structures themselves—the calculated distances and areas were used to assess the relative change in spacing of these structures through time. The following figures do represent a reasonable sample of structure patterning from the larger area.

Results

Basketmaker III (A.D. 600 to A.D. 725)

There is only one great kiva recorded in the database for which construction may predate A.D. 725. This site, the Dillard site (5MT10647) dates to the Basketmaker III period, and has been the focus of the Crow Canyon Archaeological Center's field research from 2011 through 2014 (Diederichs et al., 2014; Diederichs and Ortman, 2014).

The general lack of great kivas recognized for this time period, and the numerous habitation sites recorded throughout the area, hints that additional great kivas may not be recognized or are masked by later cultural activity. Alternatively, there are large, circular structures recorded near the study area described as “dance circles” that appear to be the location of community-based events (Wilshusen et al., 2012:202). These structures are restricted to this time period, and their functional relationship to later great kivas is still unclear; they could represent either a preceding or contemporary means of group assembly leadership during the initial use of great kivas. The presence of at least one great kiva in the study area during the Basketmaker III period demonstrates that great kivas were becoming an established component of community formation in the study area.

It seems unlikely that the Dillard site great kiva served the entire population living in the study area during the A.D. 600s (1,470 sites within the area have at least one household recorded for this period). This highlights the need for additional field research aimed at identifying and assessing Basketmaker III period civic-ceremonial architecture on a larger scale, as well as the need for relatively comprehensive spatial data when applying these techniques.

Pueblo I (A.D. 725 to A.D. 920)

There is a marked increase in the number of recorded great kivas and a wider distribution of these structures in the area during the Pueblo I period (Fig. 4). In all, eight great kivas were identified—two of the great kivas are near the Dolores River, and six are present in the eastern portion of the study area. Population estimates show a peak in momentary occupation during the A.D. 840 to 880 period when 1,030 households comprising about 6,181 people lived in the area (using a conversion of six people per household [Lightfoot, 1994; Varien et al., 2007:284]). This is the highest population density in the area until the late Pueblo II period and is also the time in which large aggregated villages became common in specific areas (Wilshusen et al., 2012).

Wilshusen and Ortman (1999) have pointed out the importance of great kiva presence or absence in recognizing potentially different social groups on either side of Dolores River during the Pueblo I period. This work builds on the results from the Dolores Archaeological Project (Breternitz et al., 1986) which documented and excavated numerous Pueblo I period sites in the area that is now McPhee Reservoir. They note that while several great kivas are located on the east side of the river during the Pueblo I period, large village sites on the west side of the river appear to generally lack great kiva architecture (though see Brisbin, [1988] for a description of a possible great kiva on the western side of the river). Villages on the western side of the river display “U-shaped” roomblocks and oversized pitstructures, and this architectural disparity may suggest different types of leadership structure in very close proximity. This overall pattern may indicate different groups of people—following unique concepts of ritually sanctioned community organization—were living very close to one another on the landscape.

The construction of large village sites that lack great kiva architecture is an important development that likely presaged the construction and use of other structures, like great houses, later in time. Wilshusen and Van Dyke (2006:246–247) suggest that the large “U-shaped” roomblocks, which incorporate more substantial stone masonry, may have been one of the first manifestations of a building tradition that would later be identified as Chaco great house architecture. The seed for this architectural design likely traveled south to Chaco Canyon with migrants during the late A.D. 800s and early 900s where some of the first Chaco-era great houses were built (Wilshusen et al., 2012:232). If so, the leaders of these early Pueblo I communities were organizing civic-ceremonial activities in a way that would leave a lasting regional legacy.

Village sites west of the Dolores River that display the first architecturally visible version of great house architecture represent the first time that restricted-access, civic-ceremonial architecture competed with, or complemented, group assembly structures like great kivas. Based on artifact and spatial data, it seems great kiva group assembly and early “proto-great houses” were mutually exclusive—or at least not as complementary or as spatially entwined as they were later in time (Van Dyke, 2007; Wilshusen and Ortman, 1999). Strong evidence of cultural differences between villages with great kivas and those without them support the idea of competing leadership strategies emerging amongst different groups in the Pueblo I period with perhaps the first major challenge to great kiva-centered, inclusive group assembly organization.

Large village sites on the west side of the Dolores River that lack great kivas (McPhee Village [5MT4475], Cline Crest [5MT2663], Windy Ruin [5MT4353] and the Holder site [5MT10]), as well as areas immediately around these centers, were excluded from the great kiva Theissen analysis for this period of time (an area of about 29.3 km²) and were analyzed individually using the same methods. Interestingly, within this excluded area, 82 habitation sites with 191 households were present during the Pueblo I period. If one uses a figure of six people per household (Varien et al., 2007), we estimate about 1,146 people lived in this area during the late Pueblo I period. When divided by the total size of the excluded area, this produces a robust figure of 39 people per square kilometer during the Pueblo I period. In contrast, for all Pueblo I great kiva Theissen polygons combined, an estimate of 2.3 people per square kilometer is produced for the same period of time. This indicates great kiva group assembly was developed in, and persisted longer, in areas with lower population densities. Moreover, it suggests that alternative restricted civic-ceremonial systems were developing or being introduced in areas with higher

local population densities. Increasing population has been linked to the proliferation of restricted-access architectural patterns later in time (Glowacki, 2015:83).

Excluding this area on the west side of the Dolores River, the average size of polygons associated with great kivas is 218 km² ($SD = 131.57$ km²) and the mean distance between nearest great kivas is 11.74 km. If this latter figure is divided by two to approximate the possible average distance separating nearby civic-ceremonial structures, a distance of 5.87 km is produced. This is over twice the ethnographically noted radius of residential communities indicating communities participating in great kiva-centered group assembly systems at this time were more dispersed on the landscape (Lipe, 1992; Varien, 1999). This holds true despite parts of the study area which were more densely occupied and appear to have adopted a form of restricted-access leadership that became more widespread in subsequent periods.

The overall spatial patterning of great kivas in the Pueblo I period is one of dispersion. Statistical analysis of the general distribution suggests there is less than a 1 percent chance that the pattern observed was random or that great kivas were clustered ($Z\text{-score} = 4.09$, $p = .00004$). This indicates communities using group assembly architecture were generally more autonomous and interacted less frequently in face-to-face activities.

Early Pueblo II (A.D. 920 to 1060)

This period of time represents movement of people back into the area after widespread depopulation in the A.D. 900s (Lipe et al., 1999; Wilshusen and Van Dyke, 2006). At this time individuals would have been entering a relatively open landscape where opportunities for settlement placement would have been less restricted compared to subsequent periods. This would have been equally true for the placement of civic-ceremonial structures. Population in the study area continued to slowly grow after the demographic trough in the early A.D. 900s with a peak in momentary population from A.D. 1020 to 1060 when about 671 households or 4,028 people occupied the area (Varien et al., 2007:284). Almost all of the population lived outside of community centers in small, residential sites of only one or two households.

More great kivas were built in the study area during this time than the Pueblo I period and the average space commanded is smaller than the previous period at 146.2 km² ($SD = 100.69$ km²) (Fig. 5). The average nearest neighbor distance also reduces to about half of what it was during the Pueblo I period, or to about 6.5 km. Great kivas were generally built closer together than in previous periods and that may reflect increasingly affiliated communities, organized through group assembly leadership. It seems unlikely that simple population pressure was the driver behind the closer spacing of great kivas at this time; the peak momentary population for this period is only about 65 percent of the peak from the previous period when great kivas were more dispersed. Rather, it seems great kiva groups were aligning relatively closer with one another, perhaps to solidify social alliances and encourage extracommunity interaction through spatial proximity. The overall spatial pattern of structures, however, was still one of slight dispersion ($Z\text{-score} = 1.72$, $p = .085$) indicating some social or environmental metrics were influencing where these structures were built.

It is possible some of the first Chaco-era great houses were built during this time in the study area. Great houses that potentially date to this period include Casa Negra, the Haynie site, and North Lowry (Adler, 1988; Ryan, 2013). There is a general absence, however, of conclusive evidence that the masonry structures defining these great houses were built prior to A.D. 1060 (Lipe, 2006; Ryan, 2013). As such, no

great houses are included for analyses in this period of time. It is likely, however, that the idea for great house organization, and an early form of later great house architecture, was present at this time.

Late Pueblo II (A.D. 1060 to 1140)

Many researchers have recognized the Late Pueblo II period as an important period of cultural change in the study area (Glowacki, 2015; Lipe, 2006; Ryan, 2013; Varien et al., 2007). The widespread construction and use of great house architecture after about A.D. 1080 powerfully signals the local acceptance of ceremonial authority codified in Chaco Canyon. The restricted-access leadership model represented by these structures could also extend back to the Pueblo I period villages west of the Dolores River (Wilshusen and Van Dyke, 2006). The widespread construction of restricted access civic-ceremonial structures across the area appears to have influenced where great kivas were built, reflecting a shift in how community leaders were organizing and interacting with others. Momentary population peaked in the study area from A.D. 1100 to 1140 when 1,940 households or about 11,641 people occupied the landscape (Glowacki and Ortman, 2012; Varien et al., 2007:282). It is also during this period that smaller habitation sites were increasingly occupied, around 40 years or so, indicating amplified residential stability tied to the development of land tenure and other social institutions made possible through sustainable community organization and less residential mobility (Adler, 1996; Varien, 1999; Varien et al., 2007).

During the late Pueblo II period there were more great kivas in use than before, and the spacing between great kivas was the least of any period (Fig. 6). The average Theissen polygon area for great kivas was 80 km², less than half of the same area for great kivas constructed during the Pueblo I period. This is likely due, in part, to an increased population concentrating in parts of the study area near productive agricultural land; however the close spacing of great kivas likely also reflects increased inter-community ties that were historically and/or opportunistically situated (Coffey, 2010; Lipe, 2002; Varien et al., 2007). The reduction in space between structures during the early Pueblo II period indicates groups and local leaders were coming into close contact, perhaps expressing the need to compete with others for influence at the local level. Though population grew to a high point (compared to previous periods) this population was highly dispersed on the landscape with over 80 percent of the total population living outside of community centers (Varien et al., 2007:284). This suggests civic-ceremonial structures were placed strategically by community leaders in response to social considerations such as the need for potential ritual, social, or political alliances amongst different but affiliated groups (Lipe, 2002).

Though community group assembly structures (i.e., great kivas) were constructed closer together in the late Pueblo II period than in any other, the nearest neighbor analysis of the overall pattern does not indicate that these structures were clustered on the landscape. Although the average nearest neighbor distance is 3.2 km, these structures do not display a statistically significant pattern of clustering that is different than a random distribution across the study area. In other words, though these structures are relatively close together, they are distributed across the study area in a way that doesn't support clustering. The reduced nearest neighbor distance might reflect close social relations between two affiliated great kiva groups, however the close spatial relationship did not extend to larger, clustered aggregates of more than two great kivas.

A spatial analysis of great house locations produces a very different pattern (Fig. 7). The average size of great house Theissen polygons is 108 km²; this is roughly a quarter larger than the average great kiva

Theissen polygon for this same period of time. The nearest neighbor analysis of these structures indicates the closest average spacing of any type of civic-ceremonial structure had an average distance of 2.56 km. A spatial patterning analysis indicates a very strong (Z-score = -2.59, $p = .0095$) pattern of clustering amongst great houses; there is less than a one percent chance that the location of great houses in the study area represent a type of spatial distribution different from a pattern of clustering (i.e., a random distribution or dispersion). In sum, although individual great houses commanded more space on average than great kivas, great houses themselves clustered on the landscape into areas where multiple great houses were relatively close together. There is the possibility that the clustering observed is the result of successive great houses built near the same locations as previous structures, not contemporary great houses interacting on synchronous landscapes (Fowler and Stein 1992). If successive great houses were placed above or near earlier decommissioned buildings, diachronic, as opposed to synchronic, clustering is evident.

It is interesting to note that at least one great kiva is within each great house Theissen polygon, and that seven great houses are built immediately near associated great kivas (within 200 meters). This suggests great kivas operated directly in tandem with more restricted-access great house architecture. Not all great kivas were built near great houses however, and some great house polygons contain multiple contemporary great kivas. Differences in the scale of influence between group assembly and restricted-access leadership may be reflected in this. The overall pattern does indicate that great kivas continued to serve as the most fundamental type of civic-ceremonial structure in the area while individual great houses (and perhaps great house clusters) exerted more spatially extensive ceremonial influence extending across multiple great kiva groups.

Early Pueblo III (A.D. 1140 to 1225)

This period witnessed continued population growth; around A.D. 1225, about 2,326 households or 13,958 people are thought to have lived in the study area (Varien et al., 2007:284). Most of the great houses established in the Pueblo II period continued to be used, thus more great kivas were in use at this time than in any other period in the Pueblo occupation of the study area (Ryan, 2015). An increase in population could partially explain the growth in the number of great kivas, however changes in the spatial patterning of these structures seems to point to a change in leadership structure from the previous period. It is also during the Early Pueblo III period that multiwalled structures were initially constructed, indicating there was a change in the form of restricted-access civic-ceremonial architecture as well. This transition likely entailed some competition from existing great house organization that, though still in place, appears to have been waning in importance across the study area (Glowacki, 2015).

During this period the average great kiva Theissen polygon area increased to 99.7 km², and average spacing between nearest great kivas increased to 4.5 km (Fig. 8). The increase in size of Theissen polygons and the greater distance between individual structures from the previous period suggests community leadership organized around group assembly was becoming more autonomous and that previous intercommunity alliances were decreasing. It is possible that previously allied great kiva groups were coalescing into more widely-spaced, larger, social aggregates.

The dating of both great houses and multiwalled structures indicate they were contemporary during this period and that some communities (Mitchell Springs, Yellow Jacket Pueblo and Yucca House) could have used both types of civic ceremonial architecture simultaneously. The vast majority of multiwalled

structures, however, appear to have been built later, and at large sites where previously established great house architecture did not previously exist (Glowacki and Ortman, 2012:244). Many newly formed communities adopted less traditional forms of restricted-access structures compared to sites with longer occupational histories.

Overall, this period witnessed a transition in the form and organization of restricted-access civic-ceremonial architecture from conventional and established great house structures to other forms. Arguably, many of the multiwalled structures utilized in this study were built slightly later than the early Pueblo III period, including those at Sand Canyon and Goodman Point Pueblos (Kuckelman, 2007; Kuckelman et al., 2009). Regardless of when multiwalled structures were initially constructed in the study area, existing data for great houses suggest none were built in the area after A.D. 1225, though many were still in use during the early Pueblo III period.

This transition has been discussed by others at a larger scale (Glowacki, 2015:78–79; Glowacki and Ortman, 2012:244) and it is generally believed that multiwalled structures succeeded great house forms following the decline of the Chaco regional system and during the ascendancy of the Aztec Ruins complex, in the middle San Juan region, as a regional center. Different multiwalled structure forms may signal affiliation with, or opposition to, the Aztec Ruins organization, however both great houses and multiwalled structures appear to be related, generally successive forms of restricted access civic-ceremonial architecture situated in an unfolding atmosphere of regional socio-political change.

Late Pueblo III (A.D. 1225 to A.D. 1260)

It is during the Late Pueblo III period that population peaked with 3,234 households, representing about 19,404 people in the study area (Varien et al., 2007:284). Around A.D. 1260, large canyon-head villages were built near springs in the study area, representing a profound shift in settlement patterning that occurred as part of broader population growth and social restructuring (Cameron and Duff, 2008; Glowacki, 2015; Kuckelman et al., 2009; Lipe, 1995, 2002; Varien et al., 1996; Varien and Wilshusen, 2002).

The average nearest neighbor distance between great kivas is larger than before at 7.9 km, and the average size of great kiva Theissen polygons also increased to about 145 km² (Fig. 9). Interestingly, the spatial location of great kivas across the study area supports a pattern of dispersion that is significant ($Z\text{-score} = 4.57, p = .0000005$). This strong pattern of dispersion belies changes in settlement patterning that likely impacted how group assembly structures were operating within and across communities. This pattern could be interpreted as reflective of less intercommunity interaction related to group assembly and the local political isolation of some groups in the study area. This increased dispersion reflects the use of fewer great kivas compared to previous periods, indicating great kiva-centered group assembly was less ubiquitous even though the number of newly constructed community centers seems to have peaked during the Late Pueblo III period (Glowacki and Ortman, 2012:232; Varien et al., 2007:285). This signals the first time that great kiva-centered group assembly was on the wane as a fundamental form of suprahousehold social organization.

Many great kivas built near the end of the late Pueblo III period were designed differently than in previous periods (Glowacki, 2015:172). The great kivas built at Goodman Point and Sand Canyon Pueblos around A.D. 1260 lacked fully-covered roofs—a fundamentally different design from the

previous six centuries when post or masonry-pillar supported roofs was an essential element of great kiva construction (Adler and Wilshusen, 1990; Lightfoot, 1988; Kuckelman et al., 2004; Kuckelman et al., 2009). The change in design reflects shifting ideas of how group assembly leadership was organized and perceived by communities. Roofless great kivas were more inclusive spaces that allowed additional people to witness and participate in rituals or ceremonies that promoted social cohesion and reduced local tensions. At approximately the same time, open plaza areas became more common in large, aggregated villages (Glowacki and Ortman, 2012:244).

Each type of multiwalled structure found in the study area was in use during the late Pueblo III period. Some—like the D-shaped structures at Castle Rock Pueblo, Goodman Point Pueblo, and Sand Canyon Pueblo—were constructed around A.D. 1260 when multiwalled structures, or at least the ideas behind their construction, were becoming an integral part of the overall cultural landscape (Glowacki, 2015; Kuckelman, 2000; Kuckelman et al., 2004; Kuckelman et al., 2009). The spatial patterning of these structures across the landscape reflects a pattern of dispersion that is very similar to that produced for great kivas. This pattern is statistically significant ($p = .00$), further indicating that some residential communities were increasingly spatially separated. The presence of these structures within community centers established during the Late Pueblo III period suggest leaders of relatively new villages were embracing this expression of restricted civic-ceremonial architecture—perhaps as a means of substantiating their position within communities (Glowacki and Ortman, 2012).

The increased construction of multiwalled structures and the overall decline in the number of great kivas represents an investment by local leaders in restricted-access, civic-ceremonial structures often at the expense of more traditional group assembly architecture. The restructuring of the form and function of civic-ceremonial architecture foretold widespread alterations in the organization of communities in the final decades prior to regional depopulation.

Terminal Pueblo III (A.D. 1260 to 1280)

Population declined in the study area to about 1,770 households, or 10,622 people, in the final decades prior to regional depopulation (Varien et al., 2007:284). The majority of the remaining population lived in large, aggregated community centers, or villages (Varien et al., 2007:285). Large villages, like Goodman Point Pueblo, appear to have been built and occupied briefly during this period indicating regional socio-political conditions were in a state of flux immediately prior to depopulation (Kuckelman et al., 2009). This instability may have been exacerbated by migrants coming into the study area around A.D. 1260, potentially bringing diverse populations with unique histories into close contact for the first time (Glowacki and Ortman, 2012:244; Varien et al., 2007). At approximately A.D. 1280, the entire area was depopulated when ancestral Pueblo people moved south to areas including the northern Rio Grande region, the Hopi mesas, and Zuni Pueblo (Lipe, 2010; Ortman, 2012).

The spacing of great kivas is generally similar to that noted for the previous period with the average nearest neighbor distance being 7.66 km and the average Theissen polygon area at 117 km² (Fig. 10). Both calculations are slightly reduced from the previous period indicating a decrease in the spacing between these structures. The overall spatial patterning of great kivas is still one of significant dispersion ($Z\text{-score} = 4.34$, $p = 0.000014$), and the declining number of great kivas in the study area overall supports a further decline in the prominence of these structures as a means for structured group assembly. It is possible that the reduced number of great kivas in the study area serviced more people than in previous

periods, especially at sites like Sand Canyon and Goodman Point Pueblos, where unroofed great kivas could have allowed additional people to participate in group assembly activities.

Except for the great kiva recorded at Yucca House, located in the southern portion of the study area, many of the largest villages in the eastern and southern portions of the study area appear to lack great kivas, although multiwalled structures were present at most of these centers (Fig. 11). Only two multiwalled structures in the dataset fell out of use prior to A.D. 1260, suggesting the distribution of these structures was largely unchanged from the previous period and that multiwalled civic-ceremonial organization persisted in some form until regional depopulation. As such, the spacing between individual structures and associated Theissen polygon areas remained largely the same.

If the majority of multiwalled structures persisted until regional depopulation, as the data indicate, it was the first time that restricted-access, civic-ceremonial structures outnumbered great kivas. This is striking in that most community leaders invested local social capital to construct restricted-access architecture instead of group assembly architecture. This appears to be true even though leaders of the largest and longest-lived centers appear to have retained the great kiva form (Glowacki, 2015; Lipe, 2002).

As others have noted, the change in great kiva architecture was likely related to an increase in the presence of plazas at many of the larger villages which have multiwalled structures but lack formal great kiva architecture (Glowacki, 2015; Glowacki and Ortman, 2012:244). Plazas were inclusive spaces where religious and political activities could be negotiated by local leadership through bringing people together in a mutually recognized, yet historically neutral, environment. This would have been important in villages where new immigrants could participate in communal gatherings without the pretense of historically situated great kiva symbolism (Glowacki and Ortman, 2012; Van Dyke, 2007).

Enclosed plazas and roofless great kivas offer analogous spaces for group assembly. Their physical similarities may be part of the reason for the lack of formally defined great kivas at many of the sites in the study area. The question then emerges: Why did some communities retain the great kiva form and others did not? In some of the largest villages, such as Goodman Point and Sand Canyon Pueblos, the retention of the great kiva form, even without the roof, may signal the need to reference local tradition and leadership legitimization. Earlier great kivas were present in both communities prior to the construction of the later villages, and in the Goodman Point Community the earlier great kiva (the Harlan Great Kiva) seems to have been used for generations as the central place for group assembly (Coffey 2014). The longevity of this structure reflects a time depth sufficient to have made great kivas central to the development of a durable leadership structure in that community. The retention of the great kiva form at Goodman Point Pueblo likely reflects this historically situated leadership strategy, and the absence of great kivas at other contemporary centers may signal a lack of this historic context. Plazas are also present at Goodman Point Pueblo, and the construction of a roofless great kiva at that site may represent an effort to socially integrate some migrants not invested in the traditional leadership structure. Balancing the need for a more inclusive group assembly space, in an atmosphere of social and demographic change, with a historically situated need for retaining local traditions would have been a challenge facing local leaders at this time (Glowacki and Ortman, 2012:245).

Thirty-four sites at this time have less formal, more historically “neutral” plazas for group assembly, compared to only 11 sites with great kivas. Plazas required less labor and oversight to build, and their lack

of traditional formality likely made them useful in promoting social cohesion among people with different histories. Sites with the greatest diversity of civic-ceremonial architecture tend to be the largest; however, the types of structures built across the study area varied. Some of the largest villages, with the longest recognizable local histories, had more diverse and distinctive forms of civic-ceremonial architecture. This may represent an attempt by local leaders to maintain established community traditions while integrating newly arrived groups via alternative types of civic-ceremonial spaces.

Some (Glowacki, 2015; Lipe, 2002) have suggested the absence of great kivas at sites with multiwalled structures could indicate several community centers were participating in multi-community confederacies that relied on affiliated larger centers for certain ritual or political needs. It is also possible that the absence of great kivas in late Pueblo III period community centers signaled ritually situated, leader-organized, competition between communities with longer histories and communities that coalesced at a time of ideological and demographic change.

Discussion

Throughout the ancestral Pueblo occupation of the study area, great kivas were built and used as part of a civic-ceremonial leadership structure that was based on group assembly. Beginning in the Pueblo I period, alternate, more restricted types of leadership were evidenced by villages that lacked great kivas. These sites did display formally planned, centrally-located structures that would have restricted participation in ceremonies or civic decision making (Fig. 12). A form of this more exclusive leadership persisted until depopulation of the area in the late A.D. 1200s.

During the initial introduction of restricted-access, civic-ceremonial architecture in the Pueblo I period there appears to have been a physical separation of village sites with great kivas and those with other types of structures. Architectural differences between contemporary village sites on either side of the Dolores River support a spatial, and likely social, distinction in leadership strategies between more traditional group assembly leadership and relatively new restricted forms (Wilshusen and Ortman, 1999). Wilshusen and others have suggested the use of restricted ceremonial space indicates the development of lineage-based leadership (Wilshusen et al., 2012:217). Important lineages may have maintained certain ceremonial knowledge and would have controlled access to this through more restricted spaces in sites that lack great kivas. This is an important transition from earlier group assembly ceremonies that were generally held in geographically central, yet presumably socially-neutral, great kivas. This type of social differentiation (along lineage lines) would support increasingly restricted ritual space evidenced in this period (Ferguson 1989).

Beginning in the Pueblo II period, great kivas and great houses were frequently found at the same sites, often in very close spatial association (Fig. 12). The presence of an integrated leadership structure that used both great kivas for group assembly and great houses for restricted-access ceremonies is supported by this spatial arrangement. This complimentary leadership structure indicates the Chaco and post-Chaco periods witnessed an important “melding” of lineage-based and group assembly leadership strategies. This is supported by the spatial and likely symbolic associations of these structures across vast areas (Glowacki, 2015; Van Dyke, 2007; Vivian, 1990). Whatever physical or symbolic boundaries that separated sites with different forms of leadership during the Pueblo I period seem to have been either entirely dismantled or greatly diminished. Rather, at this point the patterned co-occurrence of restricted

and open ceremonial structures represents an overt attempt to join previously spatially distinct, and presumably conceptually different, leadership strategies at many sites.

The spatial relationships of great houses indicate they were clustered on the landscape and that individual great houses commanded more space, on average, than contemporary great kivas. If a form of the lineage-based, restricted access leadership model postulated for the Pueblo I period persisted, this clustering could represent closely allied lineages that were ritually or ceremonially entwined and that these allied groups maintained broad ceremonial networks. Though the great houses themselves are clustered on the landscape, the large size of the area dominated by individual structures (compared to contemporaneous great kivas) supports a spatially expansive role for this type of leadership—a scale potentially much larger than it was in the Pueblo I period.

Great kivas, though closer at this time than any other, do not display clustering; this indicates a more general distribution of traditional group assembly leadership in the study area. The close-spacing of some nearby great kivas does indicate leaders of great kiva groups were allied in some manner. These alliances would have operated on a smaller geographic and demographic scale. Great house ceremonialism, which appears to have operated at a larger scale, could have been organized to attract or influence more dispersed communities for socio-political ends.

These data suggest that during the Pueblo II period group assembly and restricted-access ceremonialism were operating in tandem, though at different social and geographic scales. Allied great house groups or lineages seem to have operated at the broadest spatial scale, though it is unclear how much influence these groups had across the entire area. Group assembly facilitated through great kivas appears to have operated generally on a smaller spatial scale although the close spacing of many structures across the landscape may argue for local alliances among great kiva communities. Taken together, the spatial and temporal data support the development of a nested civic-ceremonial organization with restricted-access being the broadest, while group assembly organization was the most widespread and operating at relatively smaller scales. Clearly, these types of leadership strategies were no longer spatially or socially segregated, as they were in the Pueblo I period, but were different threads of a broader leadership fabric.

Over the course of the Pueblo III period, the spatial distribution of great kivas and new, multiwalled structures suggest an alteration in this hybrid leadership structure (Fig. 12). In the Early Pueblo III period more great kivas were in use than at any other time in the ancestral Pueblo occupation of the study area. There was a renaissance of group assembly facilitated through great kiva organization during and after the decline of the Chaco regional system. Yet most great houses remained in use at this time, and some multiwalled structures appear to have been built. This suggests a change in the form and structure of restricted-access leadership at the very time that great kiva-centered group assembly witnessed resurgence. Restricted-access ceremonialism appears more prone to innovation or reordering compared to more traditional group assembly rituals tied to great kivas at this time.

In the late and terminal Pueblo III periods, the overall number of great kivas declined; this coincides with the proliferation of multiwalled structures across the study area (Glowacki, 2015; Glowacki and Ortman 2012). During the late and terminal Pueblo III periods some newly built great kivas lacked roofs, producing more open structures in which additional people could observe and participate in group assembly ceremonies (Kuckelman et al., 2009). Several large sites had relatively well-defined plaza spaces suggesting less formally-constructed, and perhaps less historically-symbolic, spaces were

becoming a common context for group assembly. As others have noted (Glowacki, 2015:84; Lipe, 2002:220–224) this may have been an attempt by local leaders to attract new migrants into existing social groups using a neutral space that facilitated a larger scale of interaction.

During the terminal Pueblo III period more multiwalled structures were in use than great kivas; more large villages had some form of restricted-access leadership, at a local level, than had traditional great kivas (Fig. 12). Variation in the form and locations of these buildings could suggest increasing diversity in how different lineages structured restricted-access ceremonialism across the study area (Glowacki, 2015). Unlike the Pueblo II period, when restricted-access structures (i.e., great houses) were clustered on the landscape, multiwalled structures in the terminal Pueblo III period indicate a strong pattern of dispersion. Restricted, lineage-based leadership appears more fragmented and spatially discrete than the Pueblo II period with fewer probable alliances between lineage groups.

The traditional great kiva form declined in popularity near the end of ancestral Pueblo occupation in the study area (Glowacki and Ortman, 2012). Old alliances, or local, social hierarchies, that had developed over centuries were likely strained by the arrival of new populations with different concepts of ceremonially sanctioned leadership. As population in the area increased following an influx of migrants, ideas for how to ceremonially legitimize leadership diversified pressing local leaders to alter the long-standing means of local group assembly in favor of more “neutral” and inclusive plaza space. The proliferation of multiwalled structures at large sites near the end of occupation signals numerous, unaffiliated local leaders seeking to gain influence using increasingly restricted ceremonialism by incorporating Chaco-based ideologies through the use of architectural symbolism.

In the final decades prior to regional depopulation fewer great kivas were in use than multiwalled structures (Fig. 12). This represents a reversal of the spatial patterning of the late Pueblo II period when individual great houses, clustered on the landscape, commanded more space than contemporary great kivas. Formal group assembly architecture was more generalized across the study area earlier in time; however restricted-access architecture was more wide-spread just prior to depopulation. This represents unstable social conditions in the two decades prior to regional depopulation, a time when competing leaders or lineages were locally invested in legitimizing their influence via restricted-access ceremonialism and not through more traditional great kiva-based group assembly. Numerous and dispersed multiwalled structures near the end of occupation commanded generally less area per structure than most did previously, suggesting differentiated leadership groups were less tied into broader civic or ceremonial networks.

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Table 1. Great Kivas in the Study Area.

Site Number	Site Name	Initiation Date	Terminal Date	Time Periods	Map Reference
5MT10647	Dillard Site	600	725	BMIII	1
5MT296	Fortress Spur	725	920	Early/Late PI, Early PII	2
5MT23	Grass Mesa Village	725	920	Early/Late PI, Early PII	3
	Truelson Site	725	980	Early/Late PI, Early PII	4
5MT12936	Millard Site	800	980	Late Pueblo I, Early PII	5
5MT2108-1	Ackmen Site 1-1938	840	880	Late Pueblo I	6
5MT8888	Hartman Draw	880	1225	Late PI, Early PII, Late PII, Early P III	7
5MT4683	Singing Shelter	880	920	Late Pueblo I, Early PII	8
5MT10991O	Mitchell Springs	880	980	Late Pueblo I, Early PII	9
5MT11555	Stix and Leaves Pueblo	920	980	Early PII	10
5MT10581B	Carol's Ruin	920	980	Early PII	11
5MT5518	O'Brien Site	980	1225	Early PII, Late PII, Early P III	12
5MT4450	Reservoir Ruin Group	980	1260	Early PII, Late PII, Early P III, Late PIII	13
5MT10991D	Mitchell Springs	980	1020	Early PII	14
5MT3954	N/A	1020	1060	Early PII	15
5MT7414	N/A	1060	1180	Late PII, Early PIII	16
5MT5	Yellow Jacket Pueblo	1060	1280	Late PII, Early P III, Late PIII, Terminal PIII	17
5MT4803	Lancaster/ Pharo Ruin	1060	1280	Late PII, Early P III, Late PIII, Terminal PIII	18
5MT2766	N/A	1060	1225	Late PII, Early PIII	19
5MT2681	N/A	1060	1225	Late PII, Early PIII	20
5MT214	N/A	1060	1100	Late PII	21
5MT16805	Harlan Great Kiva	1060	1260	Late PII, Early P III, Late PIII	22
5MT1566	Lowry Ruin	1060	1180	Late PII, Early PIII	23
5MT11933	N/A	1060	1180	Late PII, Early PIII	24
5MT107	N/A	1060	1180	Late PII, Early PIII	25
5DL859	Hampton (Squaw Point) Ruin	1060	1280	Late PII, Early P III, Late PIII, Terminal PIII	26
5DL554	N/A	1060	1140	Late PII	27
5MT4126	Ida Jean	1100	1225	Late PII, Early P III	28
5MT5006	Yucca House	1140	1280	Early PIII, Late PIII, Terminal PIII	29
5MT4421A	Kristie's Site, Area A	1140	1280	Early PIII, Late PIII, Terminal PIII	30

5MT532	Kearns' Site	1180	1280	Early PIII, Late PIII, Terminal PIII	31
5MT4700	Rich's Ruin	1180	1280	Early PIII, Late PIII, Terminal PIII	32
5MT10991B	Mitchell Springs	1180	1225	Early PIII	33
5MT578	Brewer Canyon Pueblo	1180	1280	Early PIII, Late PIII, Terminal PIII	34
5MT4813	Lower Cow Canyon	1225	1260	Late PIII	35
5MT10853	Jackson's Hovenweep Castle	1225	1260	Late PIII	36
5MT1000	Seven Towers Pueblo	1225	1280	Late PIII, Terminal PIII	37
5MT765	Sand Canyon Pueblo	1260	1280	Terminal PIII	38
5MT604	Goodman Point Pueblo	1260	1280	Terminal PIII	39

Table 2. Great Houses in the Study Area.

Site Number	Site Name	Initiation Date	Terminal Date	Map Reference
5MT123	Albert Porter Pueblo	1060	1260	1
5MT136	Bass Site Complex	1060	1225	2
5MT3925	Casa Negra	920	1140	3
5MT2149	Escalante Ruin	1100	1225	4
5MT1905	Haynie Ruin	920	1225	5
5MT4126	Ida Jean	1020	1260	6
5MT4803	Lancaster/Pharo Ruin	920	1280	7
5MT1566	Lowry Ruin	1060	1180	8
5MT13041	Maxwell Community	840	1180	9
5MT10991B	Mitchell Springs	1060	1280	10
5MT10991A	Mitchell Springs	1140	1260	11
5MT839	North Lowry Great House (Bluestone Great House)	880	1225	12
5MT4450	Reservoir Ruin Group	1020	1180	13
5MT3807	Shields Pueblo	1020	1260	14
5MT6970	Wallace Ruin	1020	1260	15
5MT5	Yellow Jacket Pueblo	1060	1280	16
5MT5006	Yucca House	1225	1280	17

Table 3. Multiwalled Structures in the Study Area.

Site Number	Site Name	Initiation	Terminal Date	Map Reference
5MT1692	N/A	1140	1280	1
5MT36	N/A	1140	1280	2
5MT11055	N/A	920	1140	3
5MT338	Cannonball Ruins	1225	1280	4
5MT1825	Castle Rock Pueblo	1260	1280	5
5MT3793	Easter Ruin	1225	1280	6
5MT4447	Emerson/Sundial Ruin	1020	1180	7
5MT604	Goodman Point Pueblo	1225	1280	8
5MT7575	Hidden Spring	1140	1280	9
5MT875	Miller Pueblo	1140	1280	10
5MT10991A	Mitchell Springs	1140	1260	11
5MT4466A	Mud Springs A	1140	1280	12
5MT4450	Reservoir Ruin Group	1020	1180	13
5MT765	Sand Canyon Pueblo	1225	1280	14

5MT1000	Seven Towers Pueblo	1225	1280	15
5MT11842	Woods Canyon Pueblo	1225	1280	16
5MT5	Yellow Jacket Pueblo	1060	1280	17
5MT5006	Yucca House	1225	1280	18

Figure 1. Three-dimensional model and plan map of the Harlan Great Kiva, circa A.D. 1150. Courtesy of Crow Canyon Archaeological Center.

Figure 2. Three-dimensional model and plan map of multiwalled, D-shaped structure at Sand Canyon Pueblo, Block 1500 . Courtesy of Crow Canyon Archaeological Center.

Figure 3. Location of the Study Area.

Figure 4. Pueblo I great kivas locations also showing large village sites that lack great kivas (see Table 1 for key to numbered sites). Courtesy of Crow Canyon Archaeological Center.

Figure 5. Early Pueblo II great kivas (see Table 1 for key to numbered sites).
Courtesy of Crow Canyon Archaeological Center.

Figure 6. Late Pueblo II great kiva locations (see Table 1 for key to numbered sites).
Courtesy of Crow Canyon Archaeological Center.

Figure 7. Great House locations (see Table 2 for key to numbered sites).
Courtesy of Crow Canyon Archaeological Center.

Figure 8. Early Pueblo III great kiva locations (see Table 1 for key to numbered sites).
Courtesy of Crow Canyon Archaeological Center.

Figure 9. Late Pueblo III great kiva locations (see Table 1 for key to numbered sites).
Courtesy of Crow Canyon Archaeological Center.

Figure 10. Terminal Pueblo III great kiva locations (see Table 1 for key to numbered sites).
Courtesy of Crow Canyon Archaeological Center.

Figure 11. Multiwalled structure locations (see Table 3 for key to numbered sites).
Courtesy of Crow Canyon Archaeological Center.

Figure 12. Graph of Theissen polygon areas, cost-allocation areas, and nearest neighbor distances by structure type and period.

Average Theissen Polygon Area

Average Cost Allocation Area

Average Nearest Neighbor Distance

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0 1 2 3
Meters

KEY

- Doorway, beneath wall
- Doorway, floor level
- Doorway, raised sill
- Doorway, raised sill, plugged
- Niche
- Pass-through
- Socket
- Bedrock
- Architectural stone
- Hidden
- Inferred
- Limits of excavation