THE SAN JUAN FRONTIER: SOCIO-HISTORICAL TRENDS DURING A BASKETMAKER III COLONIZATION IN THE NORTHERN SOUTHWEST

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Chapter 6. Social Adaptation and Emerging Social Institutions

Basketmaker II society was in an overall mobilized state during the colonization of the San Juan Frontier. Population increased and expanded, new technologies were implemented, and the social environment became fluid and diverse. If social adaptation in a mobilized state is structured across demographic scales, as it is in the institutionalized state (Nelson et al. 2011), then evidence of a mobilized state should be apparent at smaller temporal and spatial scales of organization during Basketmaker III. To test this hypothesis, I assess architectural and ritual feature diversity at three demographic scales: sub-regional (i.e. inside versus outside the San Juan Frontier), aggregated large site, and hamlet site.

Architecture as a Reflection of Social Organization

Architecture and ritual features provide a necessary range of functional and symbolic material culture to measure productive power and assess adaptive social states during the Basketmaker III period. I focus on two particular categories, pit structures and sipapu features, because trends in their ubiquity and diversity were dynamic, meaningful, and experiential for individuals during the colonization of the Frontier and reflect overall developments along the social adaptive cycle.

For this study, pit structures refer to both habitation pithouses and special use structures, however, structures too small for any other use than storage, or less than 1.5 m in diameter are excluded from the analysis. Most Basketmaker III pit structures served practical roles such as shelter for habitation or food preparation but they have also been proven to be closely associated with social signaling and integration (Chuipka 2008; Lipe

and Hegmon 1989; Potter and Chuipka 2010; Wilshusen and Ortman 1999). Young and Herr (2012:2) note that for "many groups, pit structures were not only for domestic purposes but also a symbolic representation of cosmology." Because pit structures embody both functional and symbolic roles in the ancestral Pueblo world, they are a fertile category for the examination of productive power.

Sipapu features appear in the San Juan region in the early Basketmaker III period and proliferate during colonization of the Frontier (Wilshusen 1989, 1999). These features take various forms at Basketmaker III sites. The most common is a small, but deep, circular pit filled with sand, or other light colored sediment, located behind the hearth on the floor of a pithouse. Sipapus were chosen for the study because they represent social/ritual behavior detached from direct material needs. They, therefore relate to conceptual production during Basketmaker III.

Sipapus are still incorporated into the plazas and communal structures, or kivas, at pueblos today. They are the architectural manifestation of the emergence narrative which is an origin story central to several southwestern Native American cultures including the Hopi (Hays-Gilpin 2010; Wilshusen 1989), Zuni (Rinaldo 2008), Rio Grande Pueblos (Fowles 2012; Ortman 2011a), and the Navajo (Klah 2008). For the Hopi, the current world is the fourth world (Clews Parsons 1994 [1926]:9-165; Hays-Gilpin 2010). Three previous underworlds were destroyed because the people forgot the command to honor their creator which led to war, greed, and corruption. In the Hopi version, the pure-of-heart were invited into the fourth world by Maasaw (the Earth Guardian). They climbed a reed up to the fourth world where they emerged out of a place referred to as the

sipapuni in the bottom of the Grand Canyon. They went to "Ma'asaw, but all he had was a planting stick, a gourd of water, and a bag of (corn) seeds, so they also would have to live by those three things. They would have to live a difficult life as humble farmers and stewards of this earth" (Hays-Gilpin 2010:2). Sipapus in archaeological contexts are recognized by both eastern and western Pueblo traditions as symbolic points of emergence and a connection to ancestors (Ortman 2012). I do not presume that sipapus had the same nuanced meaning for Basketmaker III people 1400 years ago. But as a non-utilitarian feature, sipapus provide a unique archaeological category to study the adoption and expression of a cultural concept.

Models of Expectation

Frontiers are often assumed to be places lacking "normative behavior and associated with patterns of expediency, diversity, and mobility" (Herr 2008:14). To assess if Basketmaker III society in the San Juan Region was in such a state of mobilization at all demographic scales, I compare evidence for social adaptation at each scale to expected patterns across the social adaptive cycle. Here I present models of expectation for the four adaptive states: scattered, mobilized, polarized, and institutionalized.

Scattered states occur in the aftermath of social system disintegration. The expectation for a scattered social state is that data in any category will show little patterning (Figure 23). Demographic patterns, such as population levels, may decrease and very little capital (social or otherwise) will be invested into the system. These trends would result in few sites and little investment in either architecture or ritual expression.

Data from this phase will be diffuse and un-patterned. Scattered states are often the shortest period in the adaptive cycle and therefore, difficult to detect in process.

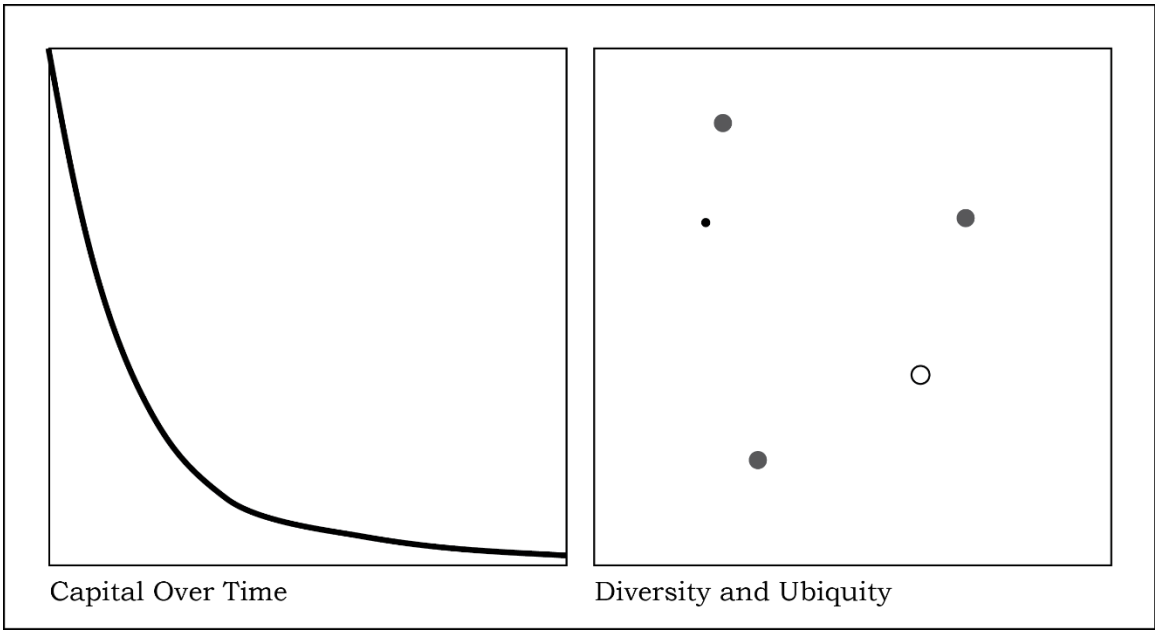

Figure 23. Expected patterns in a Scattered adaptive state. Capital input drops and levels of ubiquity and diversity are low.

A system in a mobilized state begins to organize and opportunistically expand around both productive factors that survived the Scattered state and novel concepts that address new circumstances (Folke 2006). A Basketmaker III mobilized state is expected to show a marked increase in social capital of all kinds (labor, innovation, expression) and a high level of variation in these categories (Figure 24).

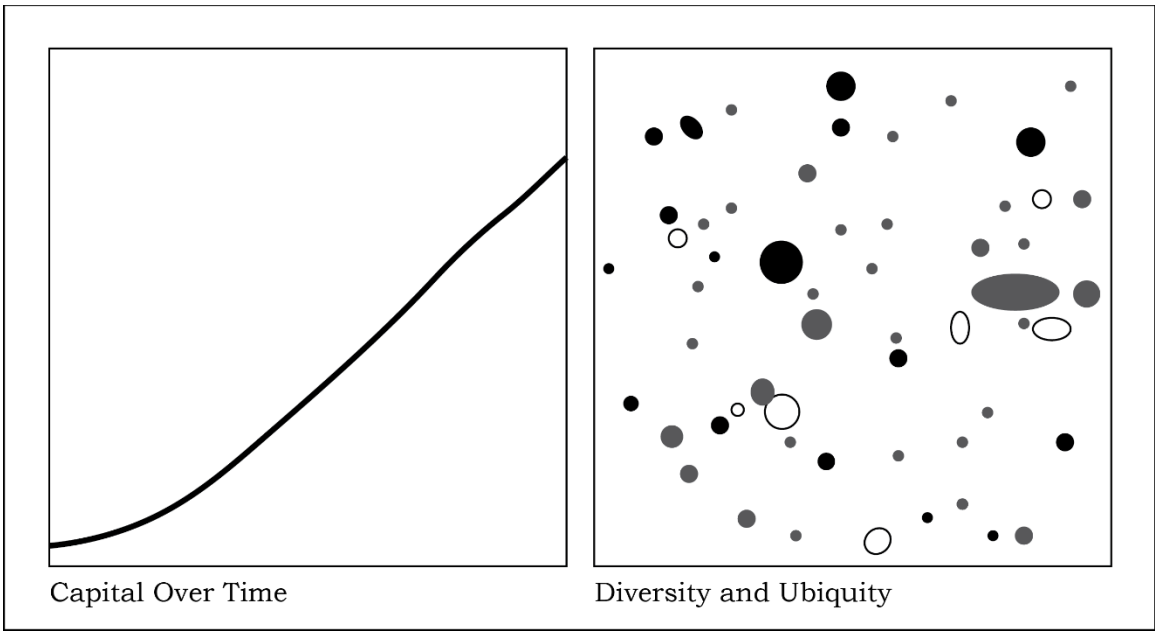

Figure 24. Expected patterns in a Mobilized adaptive state. Capital investment, ubiquity, and diversity all increase. Any patterns in the data are improvisational rather than structural.

The polarized state begins the front loop of the adaptive cycle, which is characterized by increasing levels of efficiency. Social capital in this phase is funneled into fewer and fewer competing categories and there is a general drop in levels of social capital such as new construction (Figure 25). For Basketmaker III society, this state would be evidenced by a decrease in the number of sites, structures, and/or sipapus. Diversity also decreases during this phase and growth slows as energy is invested in competing categories.

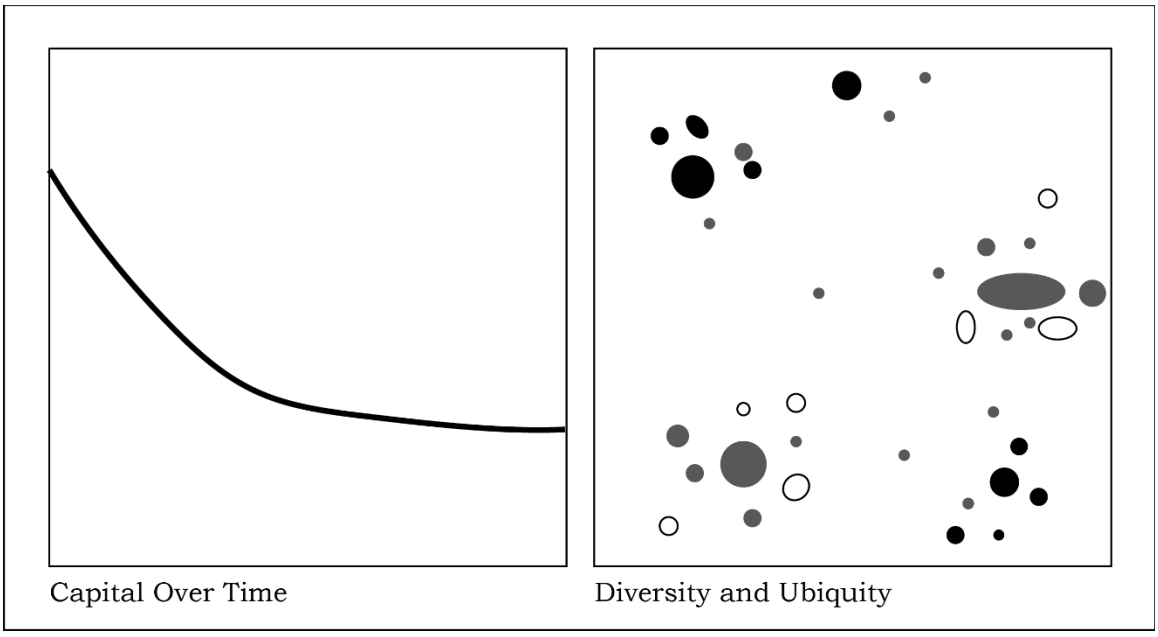

Figure 25. Expected patterns in a Polarized adaptive state. Capital investment decreases as competing categories form.

Finally, in the institutionalized stage social systems becomes very structured (Figure 26). For Basketmaker III society this stage would reflect decreasing diversity as certain competing categories win out over others. However, social capital investment would increase in those categories and society would grow overall. Strong patterns are expected in this phase as social behavior conforms to institutionalized concepts and practices. The institutionalized state is often the longest phase in the adaptive cycle, making it more readily recognizable in the archaeological record.

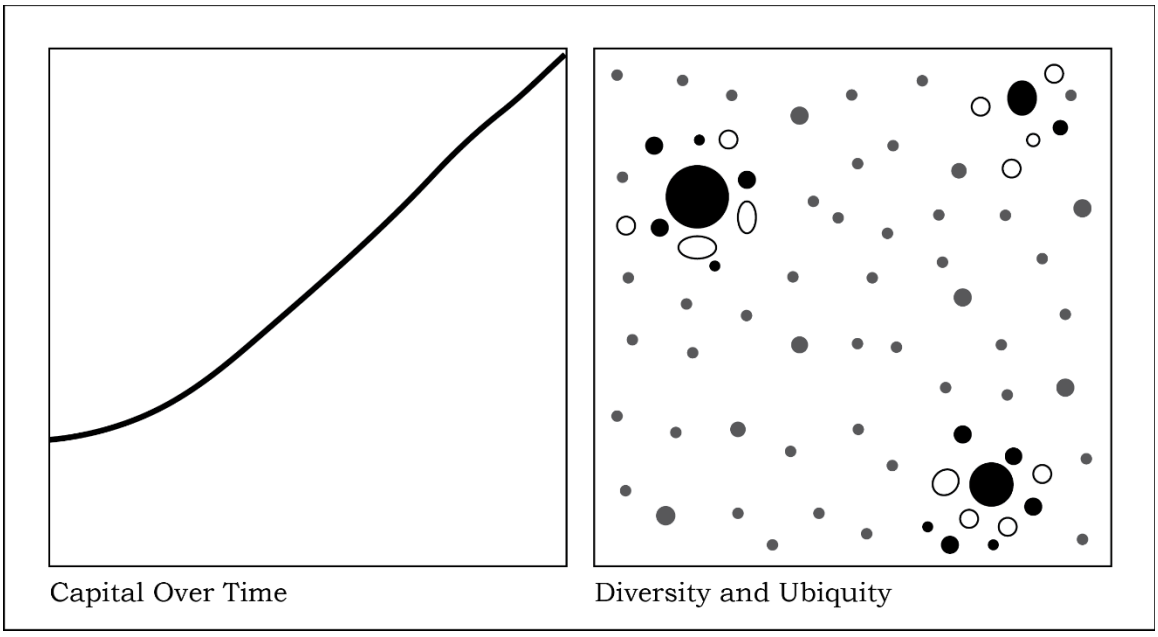

Figure 26. Expected patterns in the Institutional adaptive state. There is less diversity but the level of capital energy increases. Society grows in an organized fashion.

The nuances of social adaptation associated with different places and demographic scales in the San Juan region, can contribute to our understanding of how people related to and negotiated the Frontier during colonization. If society was in a mobilized state across scales, then there would be little continuity in the way families and communities behaved. The mobilized state comes with a high level of personal and societal freedom, but the lack of social continuity can be dangerous, especially in frontier contexts (Herr 1999:65). The potential for conflict in a fully mobilized frontier would have been high between all stakeholders: extant populations versus immigrants, eastern versus western culture groups, and first-comers versus new-comers. The lack of social continuity would also have left individual families vulnerable to localized agricultural failure, pests, and raiding.

Conversely, if Basketmaker III society comprises multiple adaptive states within the broader mobilized system, then it would suggest that Basketmaker III peoples were not stuck in a 'mobilization trap' but able to engage with their changing world and the Frontier on multiple adaptive levels. Variety in adaptive states could have mitigated the potential for conflict and vulnerability presented by mobilization at the regional level. For instance, signs of a scattered state would suggest that novel concepts are still being introduced into the social system while patterns of polarization and institutionalization would indicate that Basketmaker III people were engaged in social institutions and behavioral norms. The ability to engage in alternative forms of social adaptation at multiple scales would produce a unique adaptive signature in the San Juan Region and could have contributed to the level of cohesion and well-being during the colonization of the Frontier.

The Data Set

To test these ideas about the nature of adaptive behavior in the San Juan region, I compiled pit structure and sipapu data from 128 structures at 42 sites dating to the Basketmaker III period from the greater San Juan region. Most of this information was derived from 22 primary excavation reports and associated field notes (Appendix A). While this dataset is not an exhaustive list of all excavated Basketmaker III architecture in the San Juan region, it does include structures from all of the large excavated sites (Wilshusen et al. 2012; Young and Herr 2012), as well as an extensive sample

(approximately 80%) of small excavated sites (Figure 27) in the region (Lipe 1999).

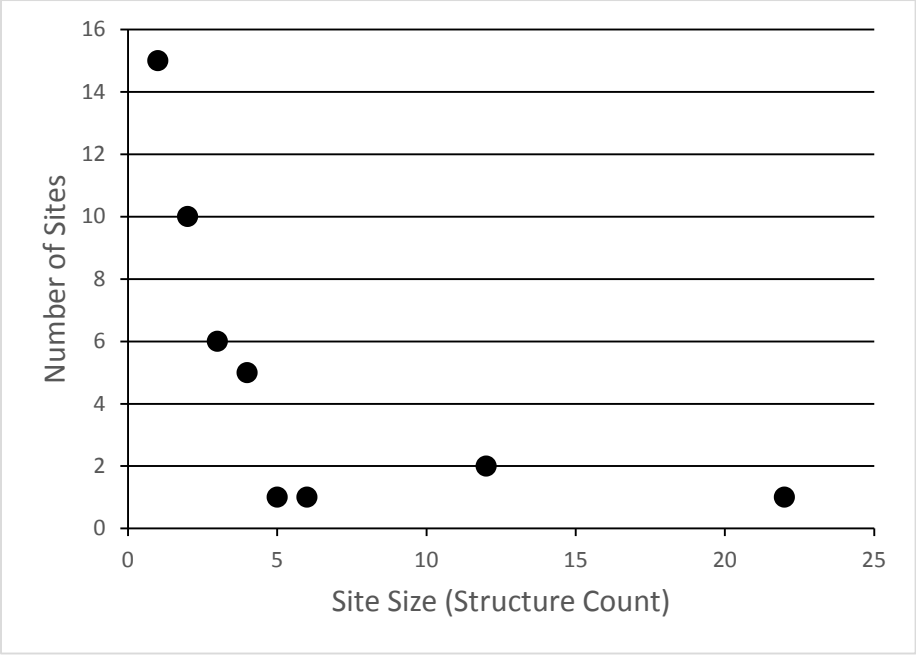

Figure 27. Number of sites of different sizes in this sample.

I accessed excavation reports through multiple sources including on-line digital archives, research libraries, and curation facilities (Table 2). Personal permission was granted for the use of individual libraries. Research applications were not required by most institutions, but I did submit professional qualifications to the Colorado Office of Archaeology and Historic Preservation to attain permission to access the COMPASS database.

Table 7. Location of and access to excavation reports on Basketmaker III habitation sites in the San Juan Region.

Sources of Data	*Data Access*
Colorado Office of Archaeology and Historic Preservation	COMPASS: On-line database
Woods Canyon Archaeological Consultants, Inc.	Research Library

Crow Canyon Archaeological Center	Research Library
Salmon Ruins	Research Library
Chaco Digital Initiative	Chaco Research Archive: On-line archives
University of Colorado Yellow Jacket Project	Yellow Jacket Project: On-line archives

Of the accessed documentation, some were published as early as the 1920s while the most recent works were published in 2015. The range of reporting and mapping methods presented limits on the types of data that could be compared in the study. In some cases, excavated sites were excluded from the analysis for lack of essential information such as pit structure dimensions. These studies were nevertheless useful in contextualizing and qualifying the results of the study. I collected data on 46 different variables but only focus on eight variables essential to assessing adaptive states during the Basketmaker III period (Table 8).

Table 8. Data categories collected.

Variable	*Data Type*
Site Type	Nominal
Pit structure Count per Site	Numeric
Pit structure Type Per Site	Nominal
Sipapu Presence per Structure	Numeric
Sipapu Type per Structure	Nominal
Public Architecture Presence per Site	Numeric
Public Architecture Type per Site	Nominal
Percent Excavated	Numeric

Scales of Analysis

According to Resilience Theory, variables of any system, natural or social, will cluster at critical structuring scales in space and time (Holling 2002). To account for this important component, I identified four embedded scales of analysis based on demography. The entire San Juan region is considered the largest scale. This scale is in an overall mobilized state creating a baseline for comparison at other demographic scales. At the sub-regional scale, I compare adaptive response trends inside the Frontier to those outside the Frontier. Most specifically, since settlement across the San Juan region occurs at the aggregated and hamlet site scales, these site types are analyzed in the context of the regional and sub-regional scales (Diederichs et al. 2015).

I use the term aggregate rather than village for sites ranging in size from 4 to 64 pit structures because these sites do not meet the two criteria currently used to identify ancestral villages in the Southwest (Wilshusen and Potter 2010). First, household architecture is built independently at aggregated sites rather than being incorporated into contiguous architectural units as is the case in later ancestral Pueblo villages (Chuipka 2008). Second, population at aggregated sites never exceeds the one-hundred-person population level considered the tipping point for supra-household social organization in the southwest (Wilshusen and Potter 2010). Instead, Basketmaker III aggregates consist of multiple independent household compounds in loose clusters of various sizes (Figure 28). They result from both large scale contemporaneous occupations (Reed 2000) and consecutive accumulation of small-scale groupings over multiple centuries (Wills 2012).

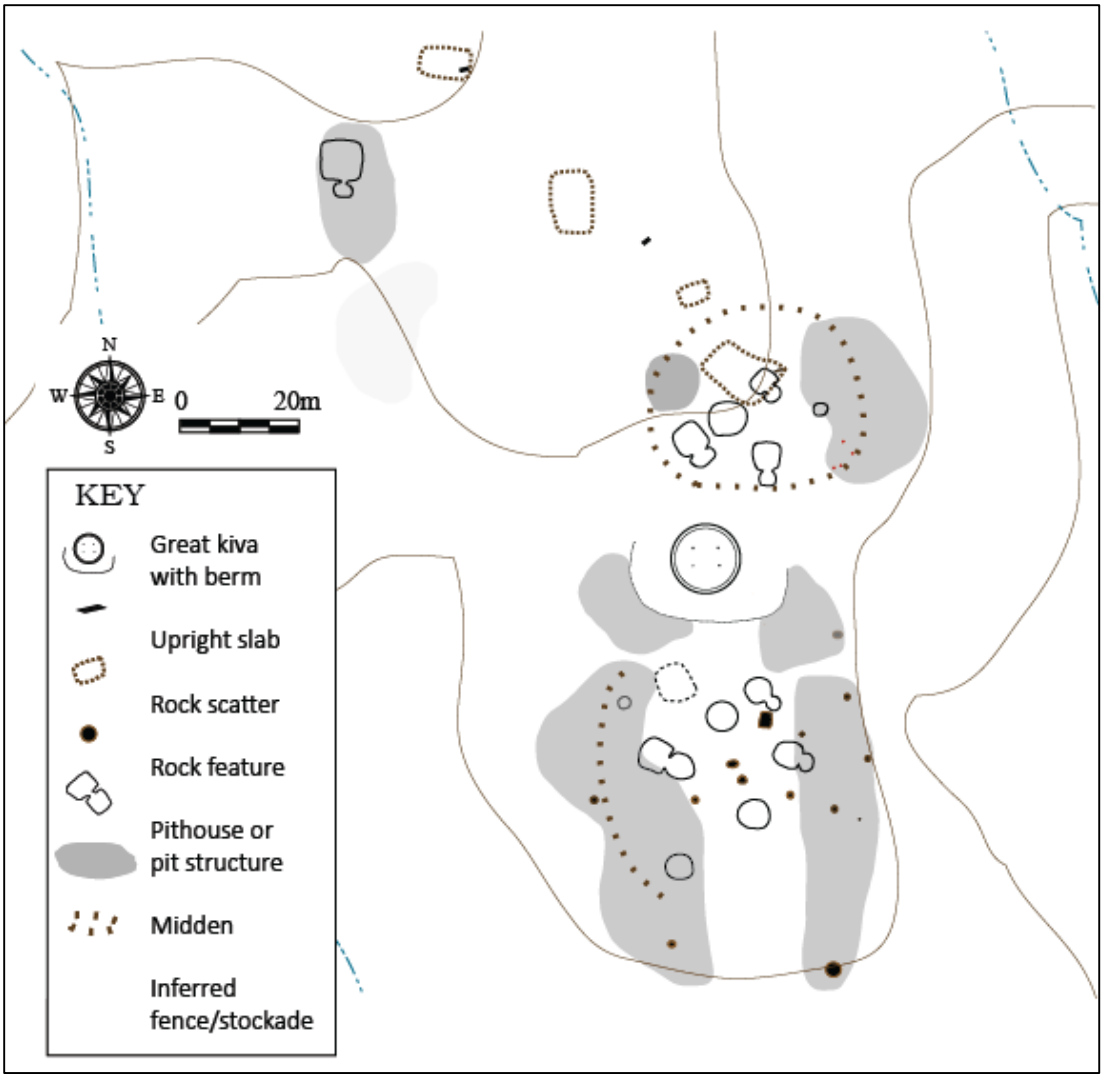

Figure 28. Example of an aggregated site, the Dillard Site in southwest Colorado. Based on Diederichs et al. 2015.

Aggregated sites are uncommon in the San Juan Region though they are documented both inside and outside of the Frontier. Although this category includes quite a range of site sizes, aggregates stand out from hamlets in terms of their overall size and configuration (Table 9). Nearly all aggregates range between 4 and 19 structures. The anomalous Shabik'eschee Village is included in the same category because Wills and colleagues (2008) demonstrate that the 64 pithouses at Shabik'eschee were not

contemporaneously occupied, but result from consecutive occupations over a 300-year span. Consequently, the momentary population at Shabik'eschee probably reflects the same general momentary populations at other aggregated sites with shorter occupation spans.

Table 9. Aggregated Basketmaker III Sites in the San Juan Region.

Site Number	Site Name	Pit Structure Count
29SJ1659	Shabik'eschee Village	64
LA80422, LA2506, LA2507	Tohatchi Flats: Aguila Caserio, Muddy Wash Site, Twin Lakes Site	19
Broken Flute Cave	Broken Flute Cave	17
5MT10647	Dillard Site	12
29SJ423	29SJ423	8
42SA8895, 42SA8889	Recapture: Villa Gavilan, Weaving House	8
42SA8545, 42SA8821, 42SA8543	Melloy Village: Altar De Aquila De Oro, Casa De Le Ostra Babosa, Pueblo Vaca Apestosa	7
Step House	Step House	7
LA4195	Sambrito Village	5
5MT1	Stevenson Site (Basketmaker III component)	4

Hamlets are defined as small residential sites consisting of one to three habitation structures (Figure 29). They are by far the most ubiquitous site type during the Basketmaker III period (Birkedahl 1976; Diederichs et al. 2003; Kleildon et al. 2003; Ortman and Diederichs 2011; Windes 2015). These sites are often occupied for a single generation or about 15 to 30 years before the structures are decommissioned and the occupants move to other locations (Varien 1999).

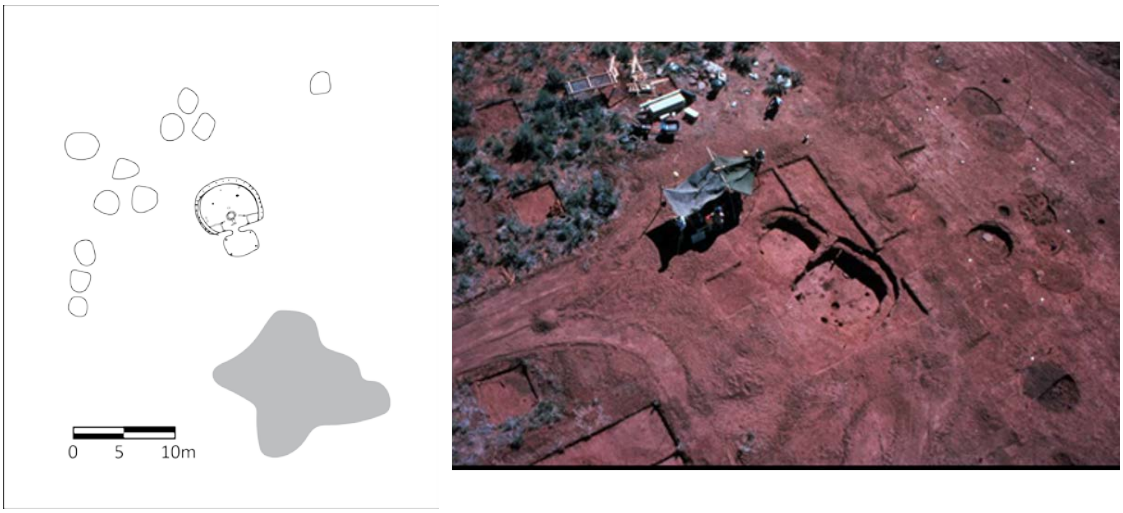

Figure 29. Example of a Basketmaker III hamlet, Tres Bobos site (5DL4545) in southwest Colorado. Adapted from Kane 1986:Figure 16.

Developing Architectural and Feature Typologies

Large-scale comparative analyses require systematic and reliable pit structure and sipapu typologies that can then be applied to assess ubiquity and diversity in the San Juan region. According to Walker and Salt (2006:886) social and ecological systems always include both functional and response diversity. Functional diversity in Basketmaker III society relates to the categorical roles of architecture and ritual features. For example, there are forms that address Basketmaker III social and logistical needs such as housing, communal gathering, and small scale ritual. Response diversity is the range of ways this function is met, which can be influenced by factors such as the way an individual learned to build a structure or feature, religious and ethnic identity associated with their practice, or even the personal artistic style they bring to the project. The difference between functional and response behavior is the difference between what is created and how it is created. The typological categories used here reflect both functional and response production channeled into different social scales during the colonization of San Juan

Frontier. Therefore, the ubiquity and diversity of these types measures both the range of functional needs in Basketmaker III society, and to a lesser degree, the range in which these functions were met.

It is with this broad understanding of variation that I established Basketmaker III pit structure and sipapu typologies using morphological differences in the data set. To ensure that these typologies are broadly applicable and replicable, each type is mutually exclusive and is consistently defined (Colton: 1954; Gifford 1960; Rice 1987). Conventional terms for types are used wherever appropriate; however, new descriptive terms are applied to types that have not been previously used.

Pit Structure Typology

In the American Southwest, pit structures are defined as semi to fully subterranean buildings with timber and earth super-structures (Young and Herr 2012:2). Archaeologists have documented various types of Basketmaker III pit structures over the last century (Hibben 1944; Miller 2015; Morris 1925; Roberts 1929) and standard terminology for these types is currently used in the field. However, even a cursory analysis of these terms reveal a mish-mash of concepts based on functional interpretation, regional markers, and/or distinctive features. Beyond these identifiers, many researchers have noted the variability in Basketmaker III architecture (Wilshusen et al. 2012; Miller 2016). Regionally, this has led to a lumping of all structures larger than surface storage cists into general habitation and/or public architecture categories.

Several simple attributes allow pit structure categorization into eleven architectural types (Table 10). Single- and double-chambered pit structures are typed

separately. Floor area is a reflection of the literal and social foot print of a building. Structure depth reflects the amount of labor investment and possible seasonality of pit structure use. The presence of a hearth distinguishes between habitation and storage structures because hearths are used in domestic activities such as heating and cooking.

Table 10. Attributes used to develop pit structure typology.

Attribute
Double vs Single Chamber
Floor Area
Depth
Domestic Features (Hearth and Storage)

Functionally the types can be grouped into four categories: public architecture, permanent year-round housing, temporary seasonal housing, and specialized use structures. Variations within the functional groups probably represent response, stylistic, variation.

Table 11. List of Pit Structure Types.

Structure Type	**Count**	**Details**	**Diameter m (main chamber)**	**Floor Area m^2**	**Depth m**	**Functional Category**
Great Kiva	3	Roofed communal architecture	>10	>80	>.5	Public architecture
Dance Circle	2	Unroofed communal architecture	>10	>80	<.50	Public architecture
Oversized Pithouse	14	Massive Permanent pithouses with domestic features and extra storage	>7	>130	>1	Public architecture / Permanent housing
Large Shallow Double	5	Seasonal Pithouse	>5	>30	<.5	Temporary housing

Large Single	9	Early BMIII Pithouse	>5	>20	>.5	Permanent housing
Large Single Shallow	8	Seasonal Pithouse	>5	>20	<.5	Temporary housing
Standard Double Pithouse	43	Common year round pithouse	<7	15-50	>.5	Permanent housing
Small Shallow Double	4	Cooking, ritual, etc.	<3.5	<15	<.50	Specialized use
Standard Single (Pocket Pithouse)	20	Year round Pithouse	2.3-4.6	6-20	.6-1.3	Permanent housing
Single Shallow	8	Seasonal Pithouse	4-5.5	17-18	<.5	Temporary housing
Pit Room	11	Milling, processing, etc.)	<3	<6	.2-.7	Specialized use
Total	128					

Pit Structure Types

Great Kiva

Great Kivas are large circular buildings 10 m or larger in diameter and are at least 1.00 m deep with an encircling bench and a range of internal features (Figure 30). They are a form of public architecture used for community-scale gatherings (Wilshusen et al. 2012).

In the San Juan region, the earliest Great Kivas were constructed just before the Basketmaker III period and continue as an architectural form for the next 800 years (Lipe 1999; Schachner et al. 2012). Great Kivas were introduced into the region from the Puerco Valley area, to the southwest of the San Juan region (Schachner et al. 2012:119), where they appear in the late Basketmaker II period (500 B.C.-500 A.D.). Thus, this community scale social institution likely had origins in the western Basketmaker II cultural sphere.

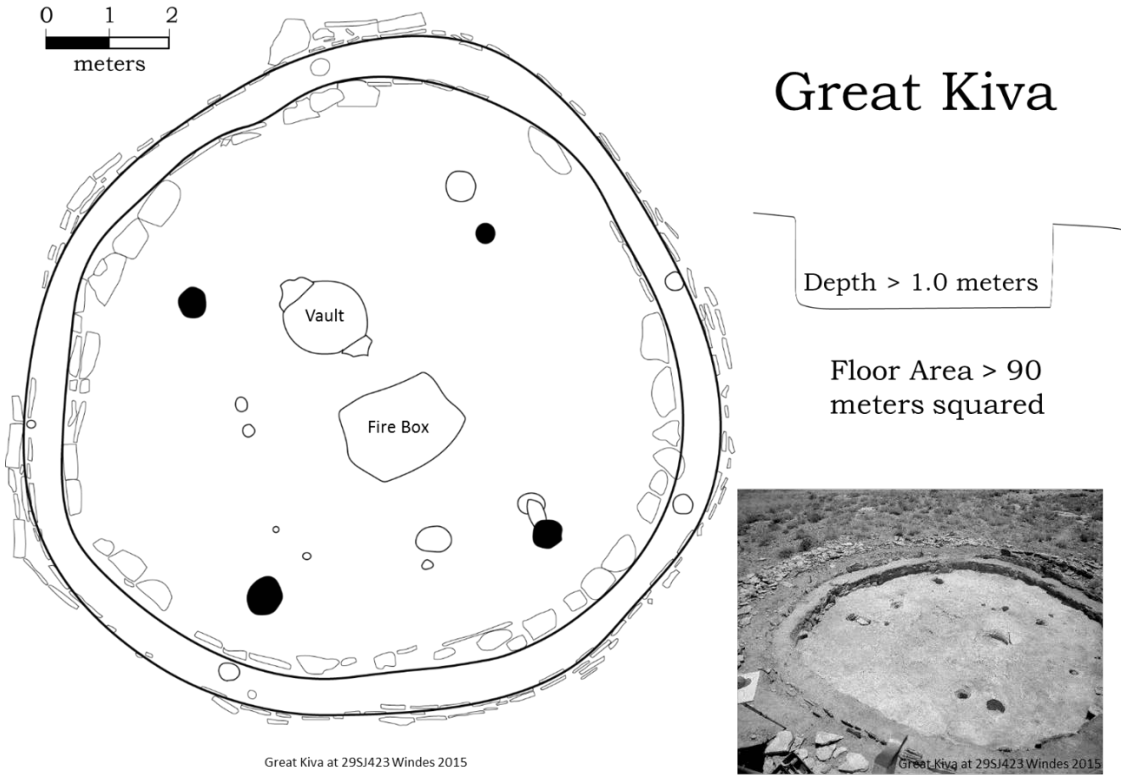

Figure 30. Great Kiva at Site 29SJ423 in Chaco Canyon. Plan view drawing adapted from Windes (2015:Figure 1.3.17) and final excavation photo on the right (2015:Figure 1.3.36).

The criteria for Great Kivas excludes several structures historically referred to as Basketmaker III Great Kivas (Wilshusen and Allison 2011; Wilshusen et al. 2011) including Broken Flute Cave Great Kiva and the Montezuma Creek School Site Great Kiva. These shallow, unroofed structures are retyped as small Dance Circles (see below). Two other structures referred to as Basketmaker III Great Kivas in recent literature (Salt Point Great Kiva and the Sambrito Village Great Kiva) are excluded from the data set because their associated architecture and ceramics suggest they post-date Basketmaker III (Wilshusen and Allison 2011. Though other probable unexcavated Great Kivas are suspected, there

are only three excavated Great Kivas in the San Juan region: Dillard Site Great Kiva, Shabik'eschee Great Kiva, and SJ423 Great Kiva.

Dance Circle

Dance Circles are the most enigmatic and least studied category of public architecture in Basketmaker III. Dance Circles are large unroofed circular structures measuring at least 10 m in diameter, but less than 50 cm deep. This definition differs from the previous convention of 20 m in diameter (Wilshusen and Ortman 2011) that was based on a single Pueblo I excavated Dance Circle at the Martin 1 site, which excluded smaller open air public structures. The two previously discussed structures at the Montezuma Creek School Site and Broken Flute Cave are the only Dance Circles in this study. Several other unexcavated Dance Circles have been attributed to the Basketmaker III period, including the Alden Hayes Dance Circle, Nancy Patterson Plaza, Cross Canyon Dance Circle, and Singing Shelter, but all appear to either pre-date, in the case of the Cross Canyon Dance Circle (Ortman and Diederichs 2014), or post-date the Basketmaker III period base on associated artifacts and/or architecture.

Oversized Pithouses

Oversized Pithouses, sometimes referred to as "greatsters" (Winston 2008; Van Dyke 2008), were built at a scale comparable to Great Kivas (Wilshusen and Ortman 2012). These double-chambered monstrosities often resemble Standard Pithouses based on interior features, but the scale and central location of these buildings suggest that they were a focal point of a given site. I consider pithouses as oversized when their floor area is 130 m^2 or more and the structure is at least 1 m deep (Figure 31). The largest example

in the dataset is Pit Structure 4 at 5MT1 in the Yellow Jacket community (Wheat 1955). A few Oversized Pithouses (5DL112 Pit structure 1 and 5MT1644 Pithouse B) have additional rooms adjacent to the main chamber, providing additional storage and workspace.

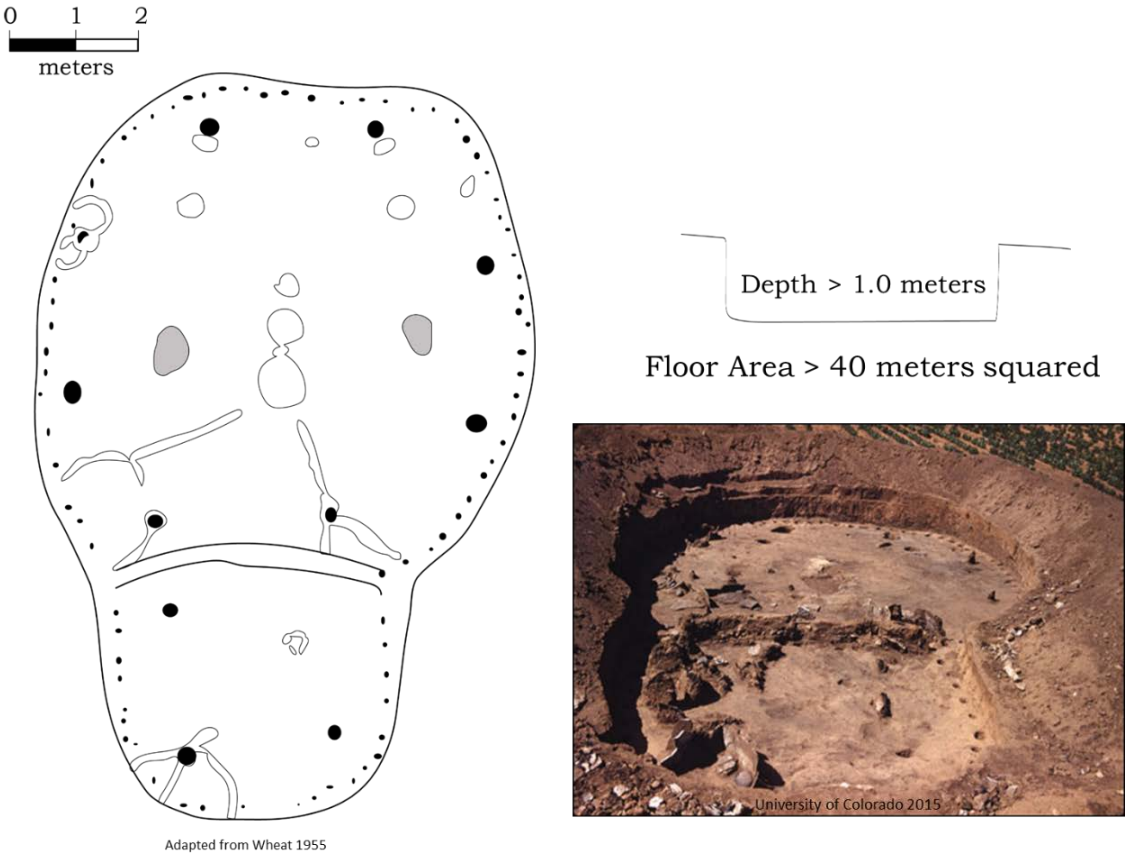

Figure 31. Example of Oversized Pithouse, Pit structure 4 at Site 5MT1. Adapted from Wheat 1955 (University of Colorado 2015).

Large Shallow Pithouse

Previously unidentified, Large Shallow Double-Chambered pithouses are slightly smaller than Oversized Pithouses with main chamber floor areas averaging about 30 rather than 40 m^2 (Figure 32) and less than .5 m deep. Their shallow construction would

have left as much as a 1.5 m of the structure above ground, making them unsuitable for occupation in high winds and freezing temperatures. Despite their shallow footprint, they retain most of the common floor features found in oversized and domestic pithouses. These combination of attributes suggest that they may have served as seasonal home sites for households. There are five of these structures in the dataset.

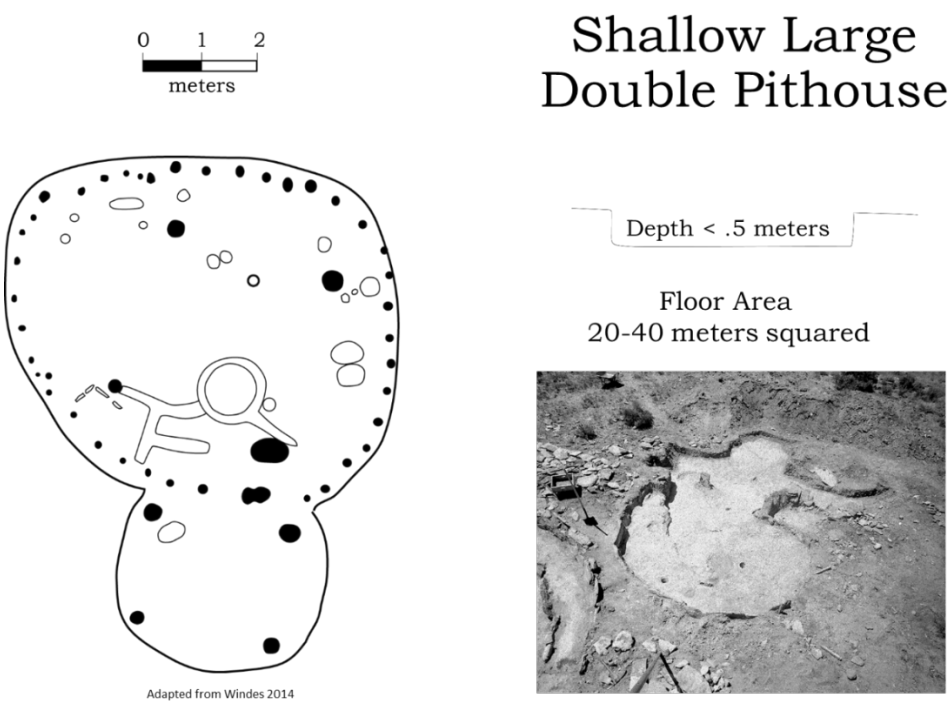

Figure 32. Example of large shallow pithouse, Structure 2 at Site 29SJ423. Adapted from Windes (2014:326).

Non-Public Architecture Pit Structure Types

Standard Pithouse

The most ubiquitous structure is the Standard Pithouse (Figure 33) with forty-three documented examples. Their main chambers vary in size from 6 to 30 m^2, but they are a consistently .5 to 1.0 m deep. These pithouses contain domestic features such as wingwalls, slab-lined bins, wall bins, storage pits, and mealing spaces. The variety of

associated features and the depth of Standard Pithouses suggest they served as year-round primary residences.

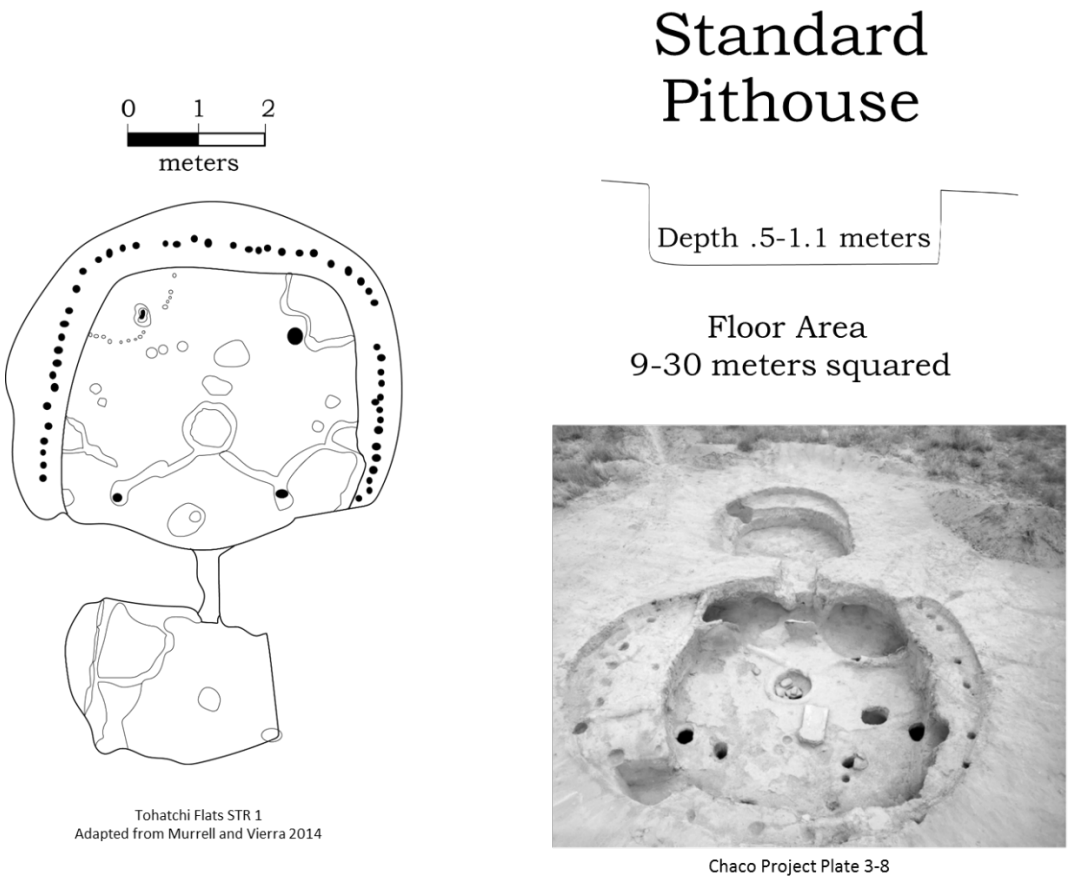

Figure 33. Example of Standard Double-Chambered Pithouse. Adapted from Murrell and Vierra (2014). Photo courtesy of Windes (2015 Plate 3-8).

Large Single-Chamber Pithouse

Except for the antechamber, Large Single-Chamber Pithouses are similar to the Standard Pithouse (Figure 34). They contain all the typical domestic features including sipapus. Three of the deepest large singe chamber pithouses are found at Shabik'eschee

village (Houses b, m, and q). They may represent an early pithouse style, before antechambers became the norm.

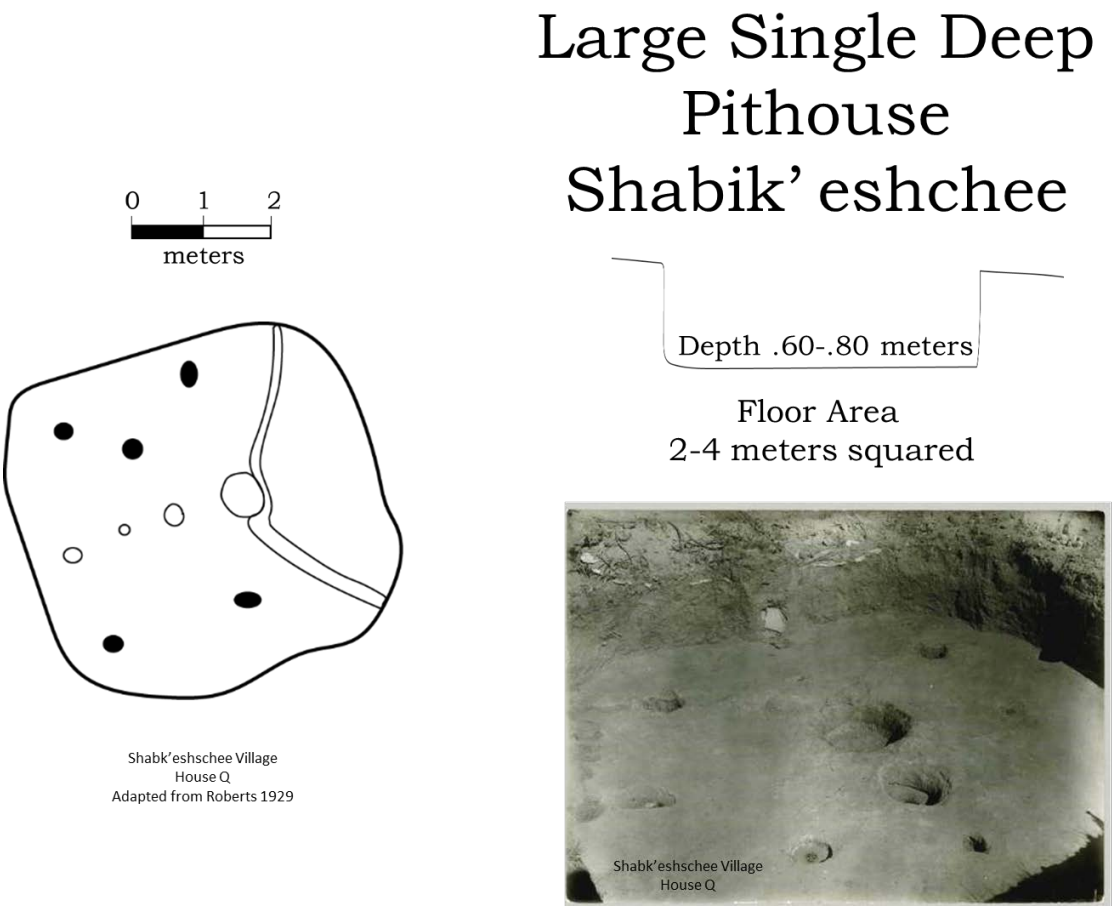

Figure 34. Example of a Large Single-Chamber pithouse. Adapted from Roberts 1929 (Chaco Digital Initiative 2015).

Large Shallow Single-Chamber Pithouse

Large Shallow Single-Chamber Pithouse also exist (Figure 35), but have rarely been discussed as a category of Basketmaker III architecture. The eight examples in this study lack domestic features such as storage pits or bins and sipapus. Pollen testing from two of these structures at the Dillard site in southwest Colorado found a complete lack of economic pollens essentially ruling out their use as storage or food preparation spaces.

Instead, these structures may have served as short-term housing (Smith 2013).

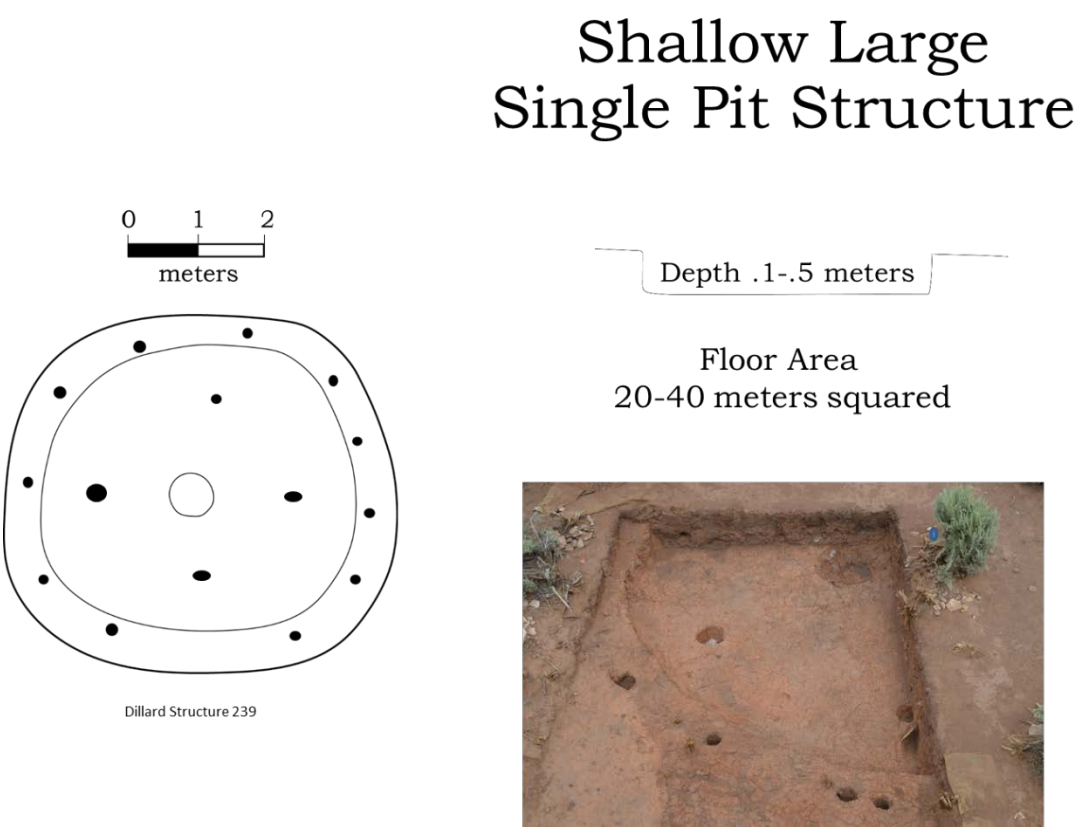

Figure 35. Example of shallow large ingle Pithouse, Structure 231 at the Dillard Site.

Pocket Pithouse

What are commonly referred to as Basketmaker III "pocket pithouses" (Reed 2000) have a floor area of less than 16 m^2 and range in depth from .2 to 1.3 m (Figure 36). There are thirteen of these structures, but only eight have hearths. Pocket pithouses are substantial enough for winter use but are generally too small for sleeping, ruling them out as residential structures. Instead they may represent added space for domestic activities such as cooking.

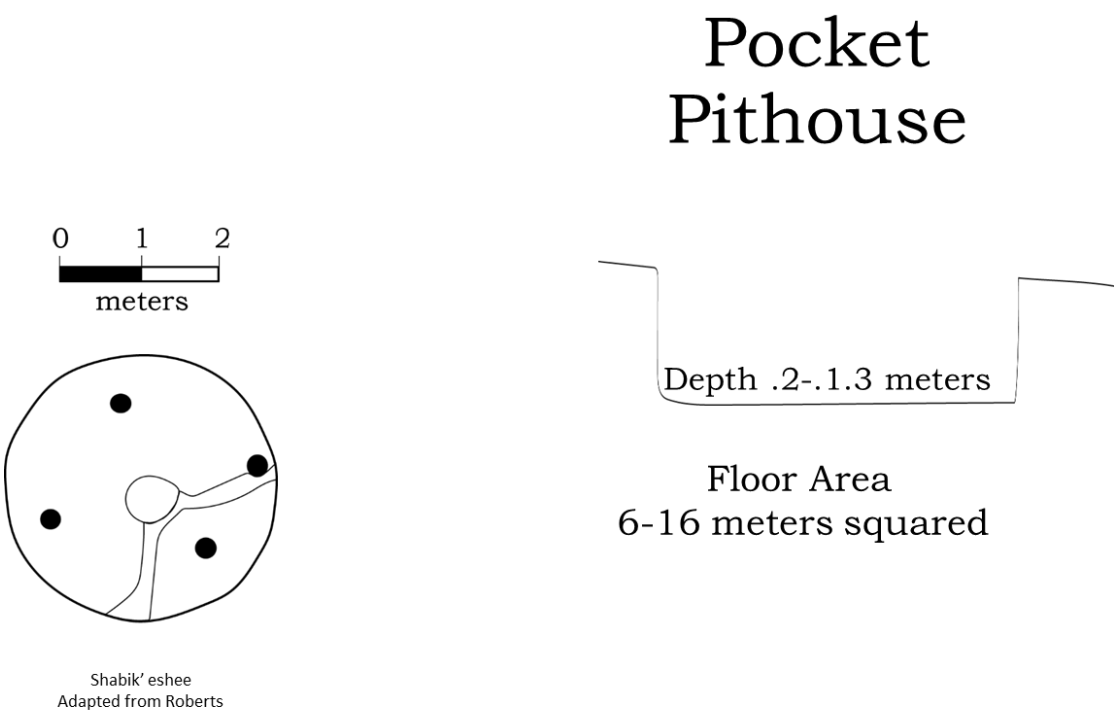

Figure 36. Example of pocket pithouse, House I at Shabik'eschee Village.

Small Double Pit Structure

Small Double-Chambered Pit Structures are also too small for sleeping and long term habitation (Figure 37). These structures often include sipapus, but never hearths. small double pit structures may have served a variety of functions, but many were used as ritual spaces. Structure 1 at Melloy village is a clear example of this (Hurst 2011). In the center of the main chamber is a vault containing portions of a buried eagle, other faunal remains, iron oxide nodules, gypsum, 54 glycymeris shell beads, and a shell pendant. In this case, the double chamber layout of the building may have restricted access to the back room of the building.

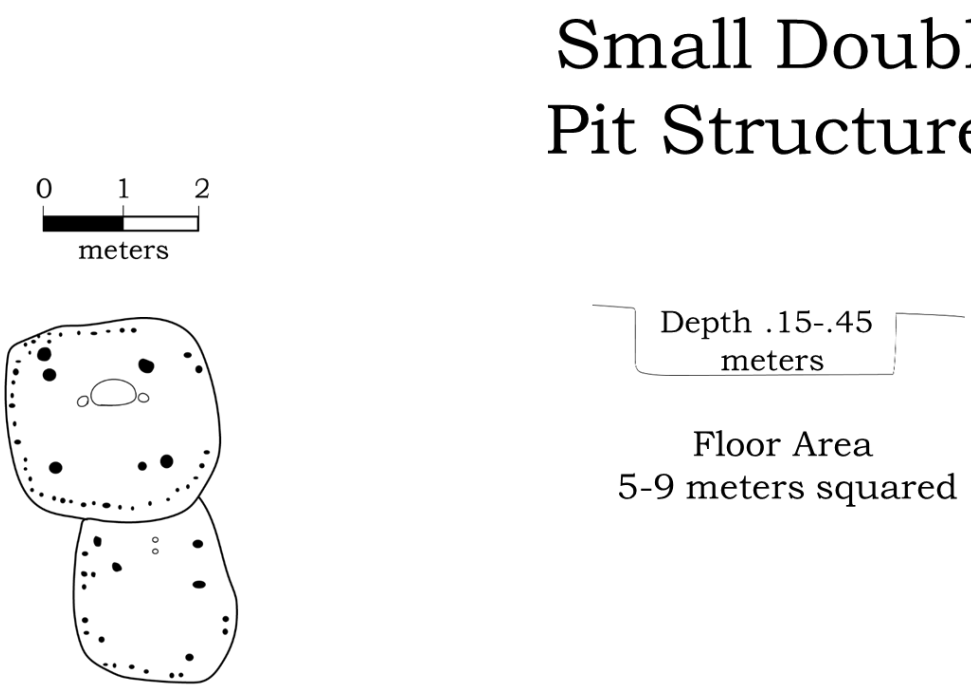

Figure 37. Example of Small Double-Chambered pit structure, Structure 1 at Melloy Village (42SA 8545). Adapted from Hurst 2011.

Structure Types Through Time

To determine if the variation in structure types is a reflection of architectural development through time rather than contemporaneous variation, I compiled and plotted the best estimate construction date for each pit structure in the sample. Construction estimates are based on tree-ring cutting dates from roofing whenever possible. In cases where tree-ring information was not available, the median of an AMS date range for the structure was used. While there is likely some error in this chronology, it nevertheless demonstrates that all pit structure types are generally contemporaneous. However, the chronology does suggest one possible evolution in public architecture. Of the three public architectural types, Great Kivas are no longer constructed after A.D. 600 while Small Dance Circles are generally constructed after A.D. 625. However, it must be

noted that though Great Kivas are not constructed during the latter half of the seventh century, they do not go out of use. All three of the Great Kivas in this study show signs of remodeling and use for nearly a century after their construction, making them contemporaneous on the landscape with both Oversized Pithouses and small Dance Circles.

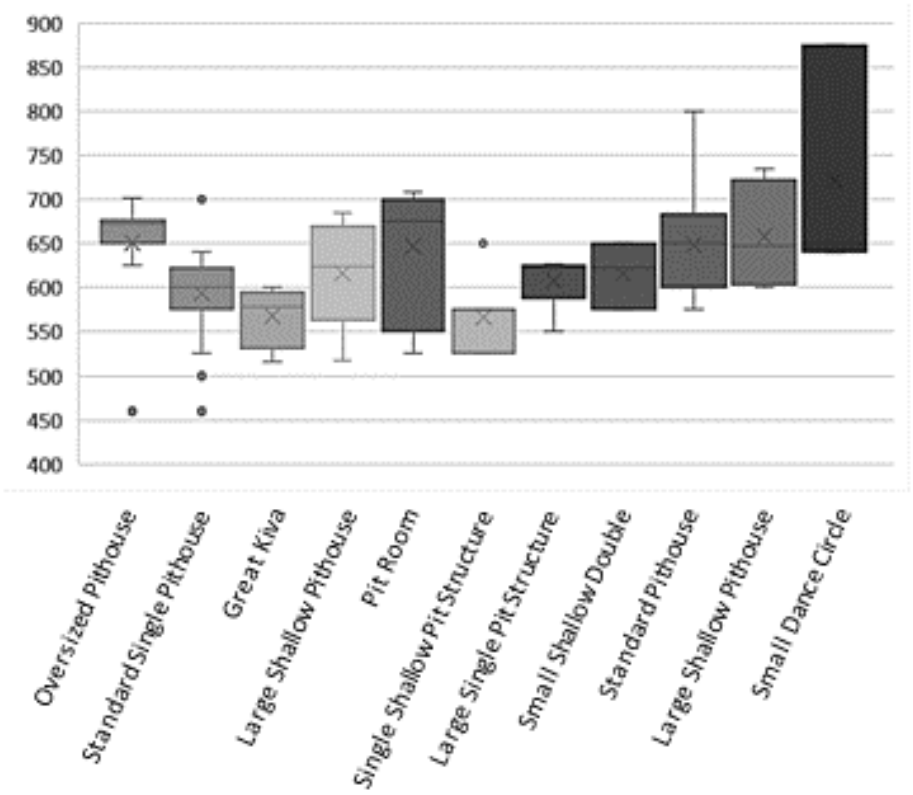

Figure 38. Box plot of best estimate construction dates for different pit structure types based on tree-ring. The X is the mean, the central horizontal bar is the median, the lower and upper limits of the shaded box are the first and third quartiles, and additional points are outliers.

Sipapu Typology

Early Ancestral Pueblo sipapus are notably more complex compared to later Pueblo time periods (Wilshusen 1986). For this study, sipapus are categorized by

Wilshusen's early Pueblo sipapu typology, which includes simple sipapus, complex sipapus, and vaults (Figure 39). Simple sipapus are small conical pits ranging from 6 to 40 cm deep. Vaults are oval to rectangular basins ranging in size from .30 to 1.2 m long and .10 to .60 m deep. They often have a slight shelf along the edge which supports wooden planks that 'roof' the vault feature. Complex sipapus combine elements of the vault and simple sipapu categories. They are the size and shape of vaults, but include an additional conical pit in the bottom of the basin creating a simple sipapu within a vault. In contrast to vaults, there is little evidence that any of the complex sipapus in this study were 'roofed'. About two thirds of the sipapus in this data set were filled with clean sand or other distinct sediment foreign to the site and in five cases raptor remains were buried in vaults.

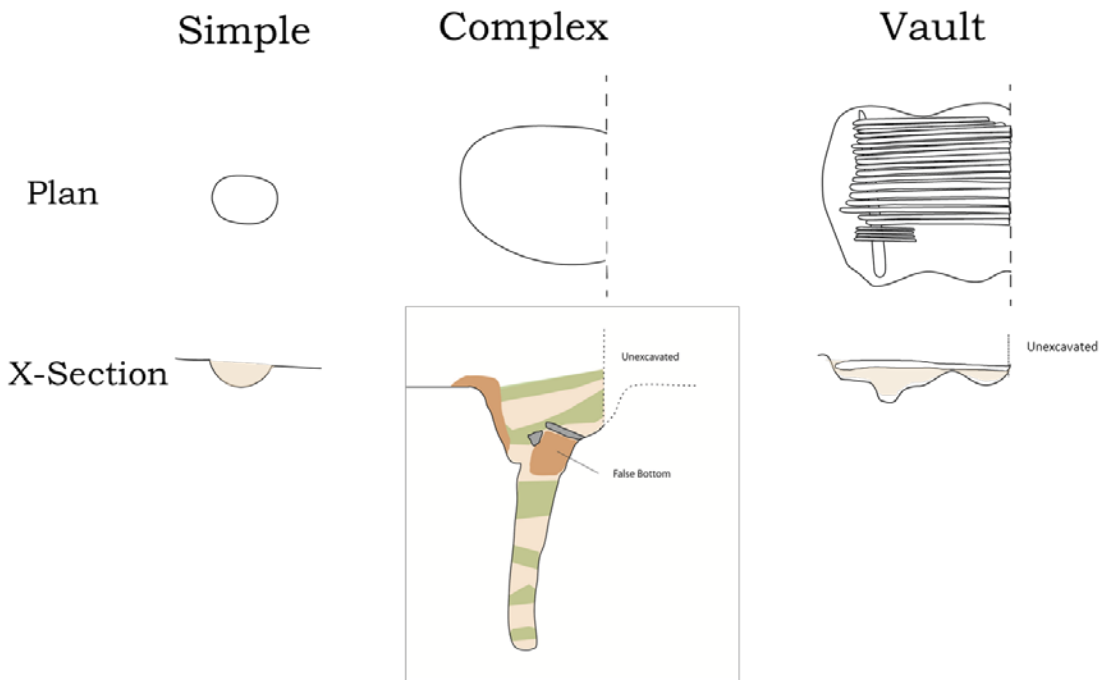

Figure 39. Primary sipapu types: simple, complex, and vault.

Simple, complex, and vault sipapu types occur in multiples and in various combinations within a pit structure (Table 12). I consider each of these combinations as an independent sipapu category. Consequently, eleven categories of sipapu were identified in the current dataset.

Table 12. Sipapu types.

Sipapu Types	Number of Simple Elements in Type	Number of Complex Elements in Type	Number of Vault Elements in Type	Count of Sipapu Type in Dataset
Complex		1		**5**
Complex and Triple Vault		1	3	**1**
Complex and Vault		1	1	**2**
Simple and Double Vault	1		2	**4**
Simple and Triple Vault	1		3	**1**
Simple and Vault	1		1	**9**
Simple Double	2			**5**
Simple Double with Vault	2		1	**1**
Simple Sipapu	1			**23**
Simple Triple	3			**2**
Vault			1	**8**

The most ubiquitous sipapu types are the Simple Sipapu (23) and the Simple Sipapu with Vault (9), which constitute two thirds of the sipapus in the dataset. These types appear equally as often at hamlet and aggregated sites and are common elements in Standard Single and Double pithouses, Large Shallow Doublestructures, and Oversized Pithouses. All variations of Complex sipapu are found in Standard Pithouses, the most common habitation structure type.

Very few public structures beyond Oversized Pithouses have sipapus. In fact, out of the three Great Kivas and three small Dance Circles in the data set, only the Dillard Site

Great Kiva has reported sipapu features. In that case, a very complex suite of features is present: Simple Double with Vault. The lack of sipapus in public structures and their ubiquity in habitation buildings indicate that Basketmaker III people engaged with ritual activity around the emergence concept at the household, if not the personal level.

As with the structure chronology, sipapu types were plotted using the best construction date estimate from their associated pit structure. As can be seen in Figure 41, most sipapu types are generally contemporaneous, and particularly rare types date to the end of the seventh century. This trend suggests that sipapu variation increased through time.

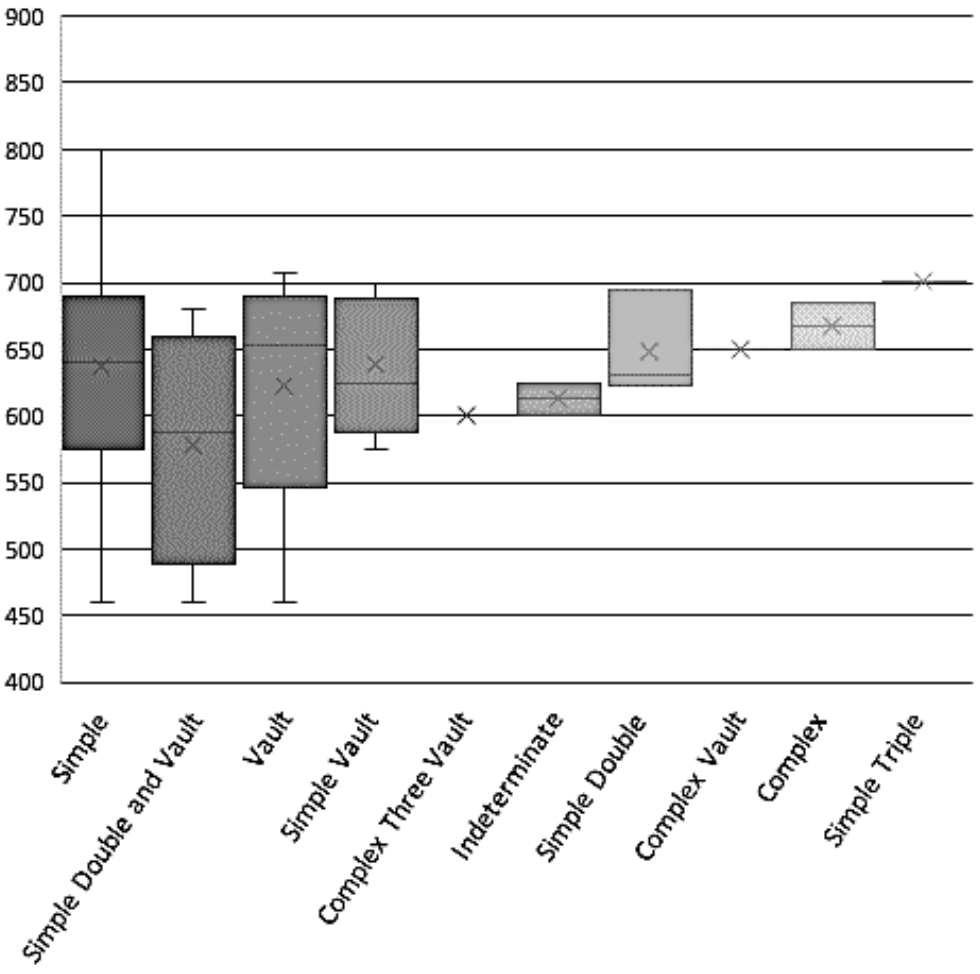

Figure 40. Box plot of best estimate construction dates for sipapu types based on construction dates for the associated pit structure. The X is the mean, the central horizontal bar is the median, the lower and upper limits of the shaded box are the first and third quartiles, and additional points are outliers.

Comparative Statistical Analyzes: Ubiquity and Diversity

I assess ubiquity and diversity separately at three of the four demographic scales (sub-regional, aggregated site, and hamlet) and use these values to gauge the phase of social adaptation at each demographic scale.

Ubiquity Analysis

As a ubiquity analysis, I consider a simple measurement of richness, i.e. number of site types, pit structure types, and sipapu types. The presence or absence of types in relation to the Frontier at any given social scale is considered a reflection of continued practices or experimentation of forms for new purposes, thus providing insight into both the use of traditional adaptation and situations requiring new adaptation.

Site Types

Site types are proportionally different inside and outside of the Frontier (Figure 41). There are proportionally more hamlets (80%) than aggregated sites (20%) inside the Frontier. Outside the Frontier the proportion of hamlets (47%) and aggregated sites (53%) is almost the same.

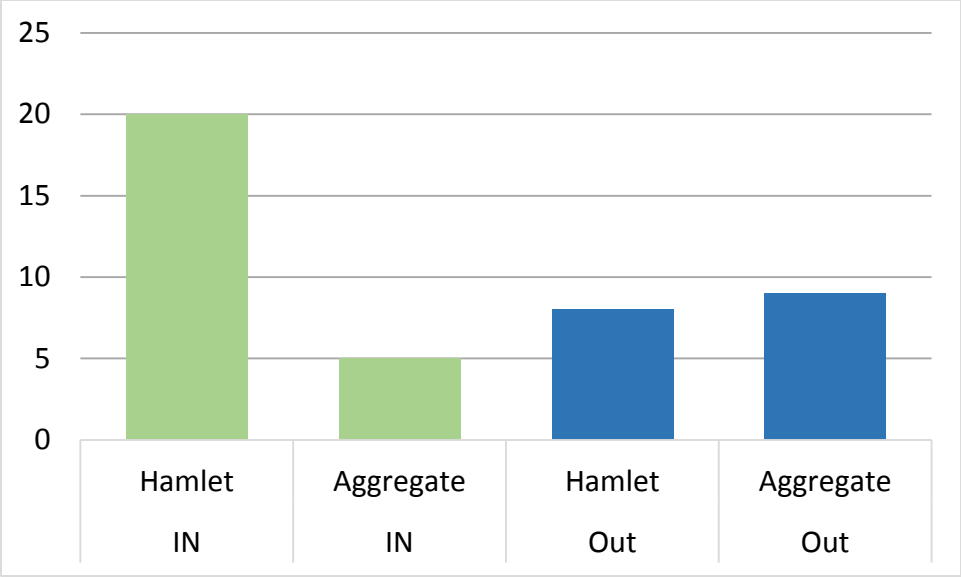

Figure 41. Count of each site type inside and outside of the Frontier.

Pit Structure Ubiquity

Of the 128 pit structures, 80 are located in the San Juan Frontier and 48 are external to it (Table 13). The richness of pit structure types in the Frontier (9) is comparable to the number of types outside the Frontier (10).

Table 13. Ubiquity of Pit Structure Categories by Site Type, inside and outside of the San Juan Frontier.

In Frontier	Site Type	Structure Category	Number of Structures
No	Aggregate	Large Shallow Double	1
No	Aggregate	Large Single	5
No	Aggregate	Large Single Shallow	2
No	Aggregate	Oversized Pithouse	4
No	Aggregate	Pit Room	2
No	Aggregate	Single Shallow	5
No	Aggregate	Small Dance Circle	1
No	Aggregate	Small Shallow Double	2
No	Aggregate	Standard Pithouse	10
No	Aggregate	Standard Single	4
No	Hamlet	Large Single	1
No	Hamlet	Large Single Shallow	1

In Frontier	Site Type	Structure Category	Number of Structures
No	Hamlet	Oversized Pithouse	1
No	Hamlet	Pit Room	1
No	Hamlet	Single Shallow	1
No	Hamlet	Standard Pithouse	2
No	Hamlet	Standard Single	3
Yes	Aggregate	Great Kiva	3
Yes	Aggregate	Large Shallow Double	2
Yes	Aggregate	Large Single	3
Yes	Aggregate	Large Single Shallow	4
Yes	Aggregate	Oversized Pithouse	2
Yes	Aggregate	Single Shallow	2
Yes	Aggregate	Small Shallow Double	2
Yes	Aggregate	Standard Pithouse	15
Yes	Aggregate	Standard Single	12
Yes	Hamlet	Large Shallow Double	2
Yes	Hamlet	Large Single Shallow	1
Yes	Hamlet	Oversized Pithouse	7
Yes	Hamlet	Pit Room	8
Yes	Hamlet	Small Dance Circle	1
Yes	Hamlet	Standard Pithouse	16
Yes	Hamlet	Standard Single	1

Except for Great Kivas, all pit structure types are found both within and outside of the Frontier. The three excavated Great Kivas in this study (Dillard site, Shabik'eschee, and 29SJ423) are all in the Frontier. However, because Great Kivas are so rare and dispersed, there is a strong possibility that there remain as of yet unknown Great Kivas outside of the Frontier. For example, circular depressions measuring over 15 m in diameter have been documented at several Basketmaker III sites in the Lower San Juan sub-region (Figure 42) (Arakawa personal communication 2014; Hurst, personal communication 2015; Schachner et al. 2012:120).

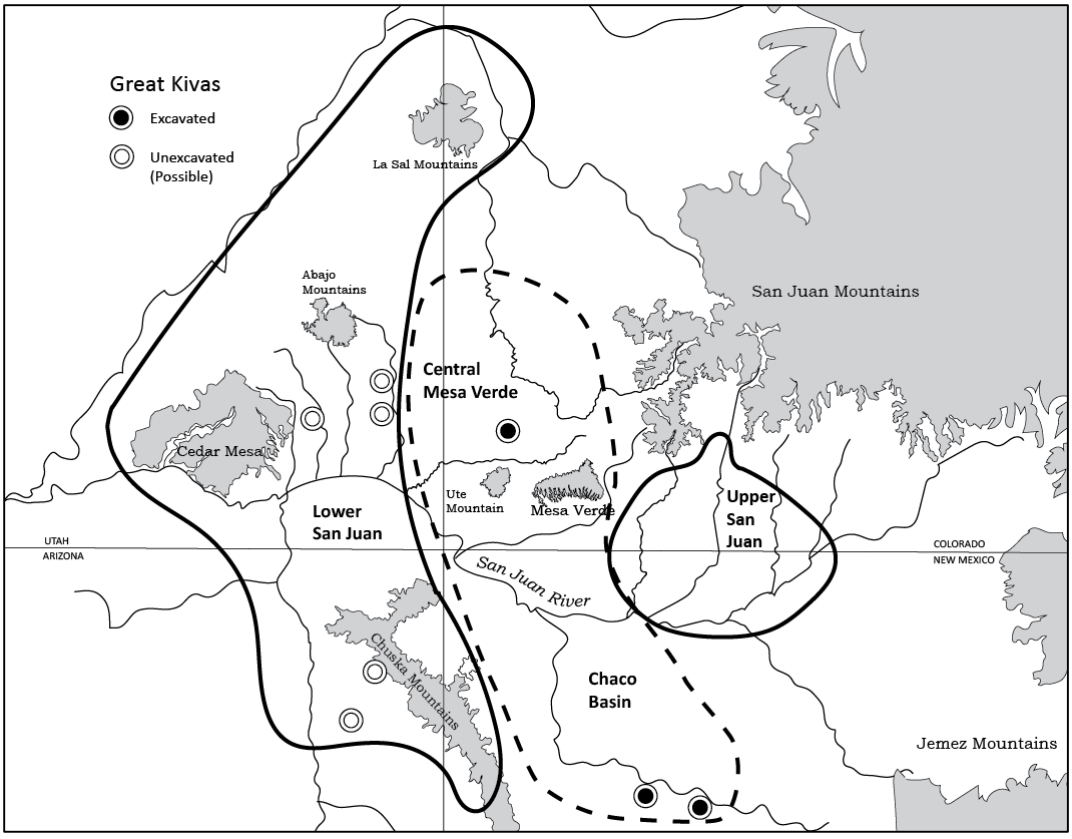

Figure 42. Distribution of known and probable Basketmaker III Great Kivas in the San Juan region.

Pit Structure Ubiquity at the Aggregated Site Scale

Several patterns in pit structure ubiquity are evident at the aggregated site scale. Two structure types are found only at aggregated sites: Great Kivas and Small Shallow Double-Chambered Pit Structures and importantly, these structures are the only architectural categories to have solely ritual functions. Great Kivas are interpreted as housing community scale events. Isolated Great Kivas have been documented outside of the San Juan region during Basketmaker III (Schachner et al. 2012) and inside the region in later ancestral Pueblo periods (Wilshusen and Ortman 1999). Their connection with aggregated sites in the Frontier context suggests that they were associated with and played important roles for particular communities.

Every aggregated site includes either an oversized pit structure or a Great Kiva, but they never occur together. This dichotomy reinforces the proposal that Oversized Pithouses served as public architecture either in place of or as an alternative to Great Kivas. In a Resilience Theory framework, this represents a polarization of social capital at the aggregated site scale and competing institutions at the community level during the Basketmaker III period (A.D. 500-725).

Small Double-Chambered Pit Structures are found at aggregated sites with either Oversized Pithouses or Great Kivas both inside and outside the Frontier: two at Shabik'eschee Village in Chaco Canyon, one in Tohatchi Village along eastern slope of the Chuska Mountains, and a fourth at found at Melloy Village in southeastern Utah. Small Double-Chambered Pit Structures are the smallest structures and they appear to have a ceremonial rather than a utilitarian function. This indicates that they were used for small scale ritual at aggregated sites.

Pit Structure Ubiquity at the Hamlet Site Scale

No pit structure type is unique to the hamlet social scale. However, there is more diversity in structure types at hamlets than previously thought. Some of this variation has its roots in functional diversity. All hamlets include at least one permanent, year-round habitation structure. Previously unrecognized are the various types of temporary housing (shallow, lightly built structures with few, if any domestic features). A quarter of the hamlets include temporary housing. There may be several reasons for this trend including signs of initial settlement, seasonal use of multiple sites, and kinship dynamics, but here,

suffice it to say that there is evidence for both permanent settlement and mobility at the hamlet level.

Sipapu Ubiquity

Sixty-seven (51%) of the 128 structures have sipapus (Table 14) and there are relatively more sipapus at aggregated sites than hamlet sites (Figure 43).

Table 14. Ubiquity of Sipapu Categories by Site Type, inside and outside of the San Juan Frontier.

In Frontier	Site Type	Sipapu Type	Count of Sipapu Types
Yes	Aggregate	Complex	1
Yes	Aggregate	Indeterminate	1
Yes	Aggregate	Simple	12
Yes	Aggregate	Simple Double	2
Yes	Aggregate	Simple Double and Vault	1
Yes	Aggregate	Simple Double Vault	1
Yes	Aggregate	Simple Vault	4
Yes	Aggregate	Vault	1
Yes	Hamlet	Complex	1
Yes	Hamlet	Complex Vault	1
Yes	Hamlet	Simple	9
Yes	Hamlet	Simple Double	3
Yes	Hamlet	Simple Double Vault	1
Yes	Hamlet	Simple Triple	1
Yes	Hamlet	Simple Vault	2
Yes	Hamlet	Vault	1
Yes	Hamlet	Wall Niche	1
No	Aggregate	Complex Three Vault	1
No	Aggregate	Indeterminate	1
No	Aggregate	Simple	2
No	Aggregate	Simple Double Vault	1
No	Aggregate	Simple Vault	1
No	Aggregate	Vault	4
No	Hamlet	Simple Vault	2

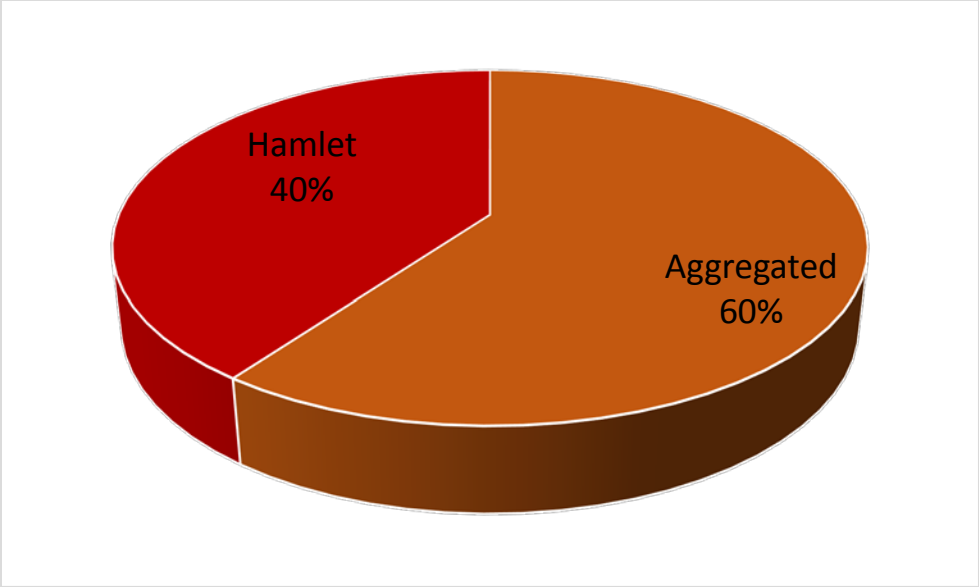

Figure 43. Percentage of sipapus recorded at aggregated and hamlet sites.

Sipapu Ubiquity at the Sub-regional scale

In the Frontier 45 out of 85 pit structures or (52%) have sipapus while outside the Frontier, 22 out of 37 pit structures (59%) have sipapus. These differences are marginal indicating that the Emergence concept is not positively or negatively associated with a household's relationship to the Frontier but is a phenomenon experienced in equal proportions across the region.

Sipapu Ubiquity at the Aggregated Scale

At the aggregate site scale the differences in sipapu ubiquity between the Frontier and the periphery are more distinct. Out of the eight aggregated sites in the Frontier only three have sipapus (38% of pit structures) while six out of the twelve aggregated sites outside the Frontier have sipapus (50% percent of structures).

Sipapu Ubiquity at the Hamlet Scale

Structures at hamlets inside the Frontier are more to likely to have sipapus than any other demographic group, inside or outside the Frontier. Out of the 25 hamlets in the Frontier, 15 have sipapus (60%) but only one out of the six hamlets outside the Frontier (17%) have sipapus.

Table 15. Sipapu Types at Hamlet Sites.

In Frontier	Site Type	Sipapu Type	CountOfSipapu Type
Yes	Hamlet	Complex	2
Yes	Hamlet	Complex Vault	1
Yes	Hamlet	Simple	8
Yes	Hamlet	Simple Double	2
Yes	Hamlet	Simple Double Vault	2
Yes	Hamlet	Simple Triple	2
Yes	Hamlet	Simple Vault	2
Yes	Hamlet	Vault	1
Yes	Hamlet	Wall Niche	1
No	Hamlet	Simple	1
No	Hamlet	Simple Vault	4

Diversity Analysis

Following Nelson et al. (2008), I calculated diversity of pit structures and sipapus in multiple steps. First, I generated a weighted average of diversity of pit structures and sipapu types for each site (Table 16). This average is the number of pit structure or sipapu categories at each site divided by the total number of pit structures, multiplied by 10. The average was multiplied by 10 to convert scores from fractions to whole numbers for easy comparison. The weighted average mitigates the impact of site size on site level diversity counts, creating a comparable diversity count for each site.

Table 16. Structure and sipapu category counts and weighted diversity calculations by site.

Site Number	Site Name	Site Type	Public Structure	Structure Count	Structure Category Count	Weighted Diversity Structures	Sipapu Category Count	Weighted Sipapu Diversity
29SJ1659	Shabik'eshchee Village	Aggregate	Great Kiva	22	5	2	6	3
29SJ299	Small Chaco	Hamlet		2	2	10	2	10
29SJ423	29SJ423	Aggregate	Great Kiva	3	3	3	1	3
42SA8543	Pueblo Vaca Apestosa	Aggregate	Oversize Pithouse	5	5	4	7	6
42SA8545								
42SA8821								
42SA8895	Villa Gavilan and Weaving House	Aggregate	Oversize Pithouse	5	2	4	3	6
42SA8889								
5DL1091	Casa Tejon	Hamlet		3	1	3	2	7
5DL1105	Casa Primero	Hamlet		1	1	1	1	1
5DL112	Palote Azul Stockade	Hamlet		4	3	8	4	10
5DL1138	Vinger Hamlet	Hamlet		2	1	5	2	10
5DL121	Cloud Blower Stockade	Hamlet		2	2	10	2	10
5DL310		Hamlet		1	1	1	1	1
5MT1	Stevenson Site (for Basketmaker III component)	Aggregate	Oversize Pithouse	4	1	2	2	5
5MT10647	Dillard Site	Aggregate	Great Kiva	12	4	3	5	4
5MT11431	5MT11431	Hamlet		1	1	1	1	1
5MT2162		Hamlet		1	1	1	1	1
5MT2848	Rusty Ridge Hamlet	Hamlet		1	1	1	1	1
5MT4545	Tres Bobos	Hamlet		4	1	2	2	5
5MT5458		Hamlet		1	1	1	1	1
5MT8899		Hamlet	Oversize Pithouse	1	1	1	1	1
5MT9540		Hamlet		3	0	0	1	3
5MV1677	Badger House	Hamlet		4	2	5	2	5
5MT1644								
Broken Flute Cave	Broken Flute Cave	Aggregate	Oversize Pithouse	6	3	5	4	7
Engineers	Engineers Limited Site	Hamlet		1	1	1	1	1
Limited Site								
LA11610	In-Between Site	Hamlet		2	1	5	2	10
LA2501	Casa De Viento	Hamlet		3	1	3	2	7
LA2506	Muddy Wash Site	Aggregate		12	5	4		
LA3035		Hamlet		1	1	1	1	1
LA4195	Sambrito Village	Aggregate		1	1	1	1	1
LA71610		Hamlet		2	0	0	1	5
LA72739		Hamlet		2	0	0	1	5
LA80422	Aguila Caserio and Twin Lakes Site	Aggregate	Oversize Pithouse	7	4	6	0	0
LA2507								
LA80934	Electric Raven Site	Hamlet		1	1	1	1	1
Montezuma	Montezuma School Site	Hamlet	Dance Circle	2	2	10	0	0
Creek Site								
Morris 19	Morris 19	Hamlet		1	1	1	1	1
Step House	Step House	Aggregate		4	0	0	1	2

Next, the average pit structure and sipapu feature diversity for each demographic scale of analysis was calculated and converted to a z-score (Table 17). These scores are a

measure of the material culture diversity at each demographic scale across the sample. Z-scores are calculated as:

$$z=(X-\mu)/\sigma$$

Where z is the z-score, X is the average weighted diversity at each demographic scale, μ is the sample mean, and σ is the standard deviation. Z-scores are conceptually helpful because they convert different variables, in this case weighted pit structure and sipapu diversity, into comparable scales where the mean is zero and the z-score (or standard score) measures how many standard deviations a particular value is from the sample mean.

Table 17. Averages and z-scores of pit structure and sipapu type diversity at various demographic scales.

Demographic Scale	Structure Count Average	Structure Category Count Average	Weighted Structure Diversity Average	Structure Z- score	Sipapu Category Count Average	Weighted Sipapu Diversity Average	Sipapu Z-score
All Sites	3.170	1.8048	**0.7738**	0	1.85366	**0.7855**	0
In Frontier	3.1538	1.6538	0.7876	0.0476	1.4706	0.7941	0.0289
Outside Frontier	3.2	2.0667	0.7250	-0.1692	1.9000	0.6683	-0.3932
Hamlets	1.8077	1.346	0.8461	.2292	1.4231	0.8526	.2052
Frontier Hamlets	1.7619	1.3333	0.8651	0.0743	1.4762	0.9048	0.2245
Hamlets Outside Frontier	2	1.4	0.7667	-0.3122	1.2000	0.6333	-0.9429
Aggregates	5.25	2.5	0.6704	-.4342	2.5	0.6900	-.3900
Frontier Aggregates	7.6667	2.6666	0.5518	-0.3809	2.6667	0.4621	-0.6264
Aggregate Out Frontier	3.8	2.4	0.7417	0.2285	2.4000	0.8267	0.3759

Weighted diversity and their related z-scores are a measure of whether Basketmaker III people had similar or different amounts of structure type and sipapu type

diversity at each social scale. Below these values (Figures 44 and 45) are compared to the overall diversity in the sample and to each other in order to elucidate quantitative differences between them.

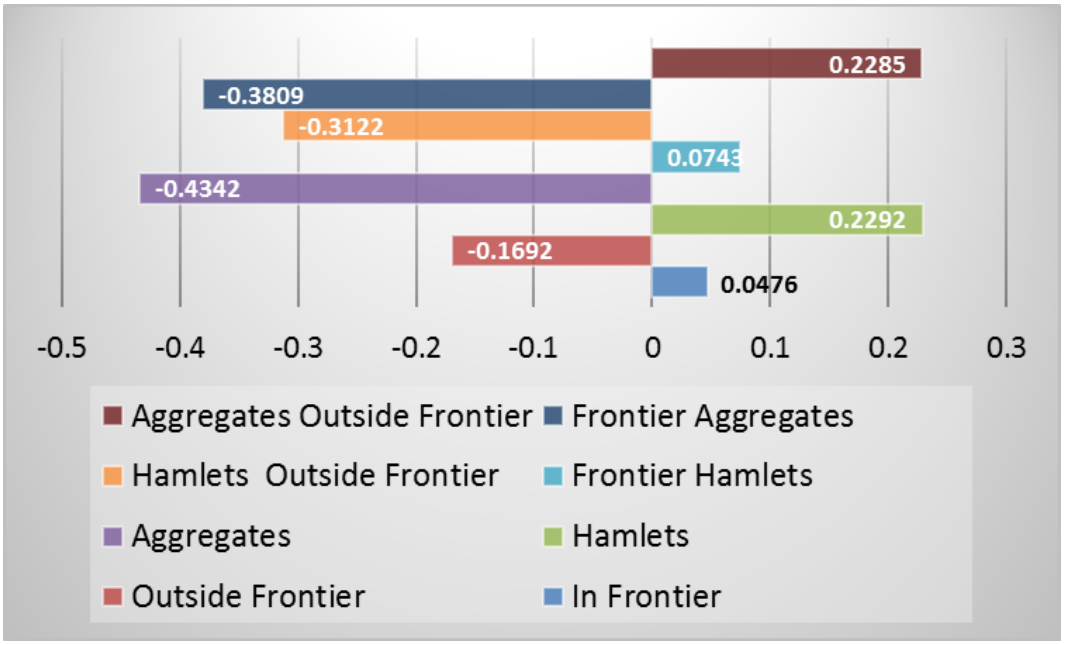

Figure 44. Average z-scores of pit structure diversity at different demographic scales.

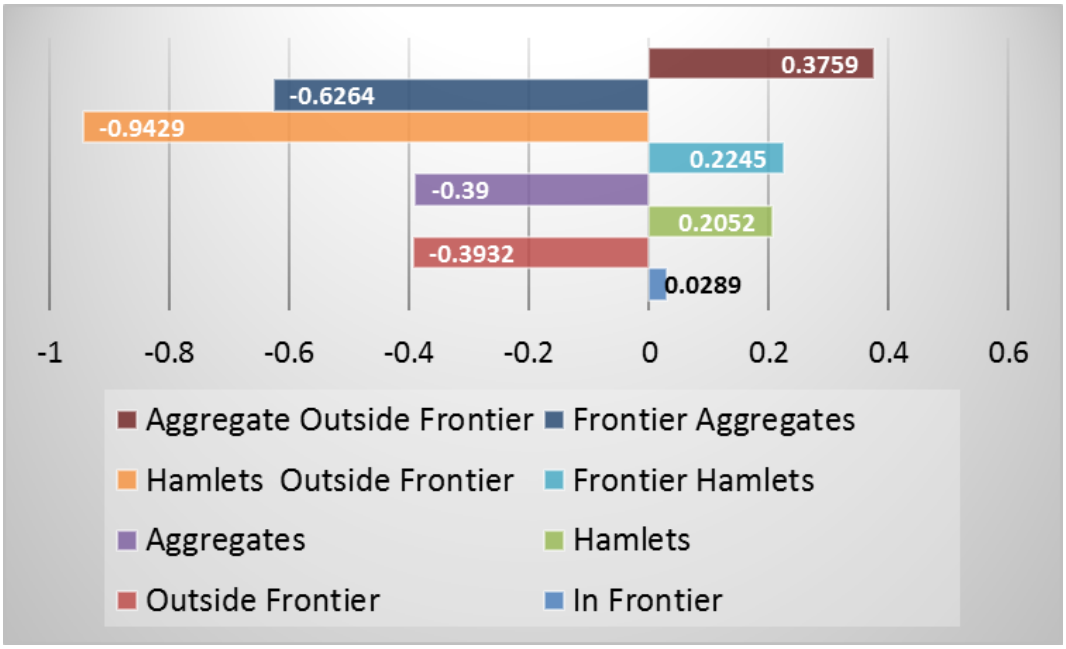

Figure 45. Average z-scores of sipapu diversity at different demographic scales.

Diversity at the Sub-Regional Scale

The number of pit structure and sipapu categories are comparable, 11 and 12 respectively. The overall weighted diversity of .7738 for pit structure and .7855 for sipapu categories suggest that both categories skew towards high diversity. Though these typological categories cannot be compared, it is fair to say that populations had about the same latitude with regards to sipapu and pit structure forms during the Basketmaker III period.

When the diversity z-score for sites inside the San Juan Frontier is compared with sites outside the Frontier (Table 18) a pattern becomes apparent. Both pit structure and sipapus types are more diverse inside the Frontier than outside of it.

Table 18. Diversity at the sub-regional scale.

	Pit Structure z-score	Sipapu z-score
In the Frontier	0.0476	0.0289
Outside the Frontier	-0.1692	-0.3932

Pit Structure Diversity at the Aggregated Site Scale

At aggregated sites a distinct contrast in diversity outside versus inside the San Juan Frontier is apparent. In the Frontier, pit structure and sipapu diversity are lower than average yet outside the Frontier, the diversity of pit structure and sipapu types is generally higher than average at aggregated sites.

Table 19. Pit structure diversity at the aggregated site scale.

	Pit Structure z-score	Sipapu z-score

Frontier	-0.3809	-0.6264
Outside the Frontier	0.2285	0.3759

Diversity at the Hamlet Scale

At hamlets, trends in diversity are opposite. Structures at hamlet sites are slightly more diverse than average inside the Frontier, but less diverse outside the Frontier. The pattern is even stronger in sipapu diversity. Sipapus are more diverse than average in the Frontier but far less diverse outside the Frontier.

Table 20. Sipapu diversity at the hamlet site scale.

	Pit Structure Diversity Count	Sipapu Diversity Count
In the Frontier	0.0743	0.2245
Outside the Frontier	-0.3122	-0.9429

Significance of Variance

To determine the significance in the variation of pit structure and sipapu diversity at aggregated and hamlet sites both inside and outside of the Frontier, I use a simple analysis of variance, or ANOVA test. Based on the weighted mean, pit structure diversity varies significantly between all demographic groups at the p=.05 level, with a result of $F_{(3,36)} = 2.89$, p=.048 (Figure 46). Sipapu diversity is also significantly different at the p=.05 level, $F_{(3,36)}= 7.26$, p=.0006 (Figure 47). These results demonstrate that Basketmaker III people built, experienced, and utilized significantly different scales of architectural and ritual feature diversity depending on the site they inhabited.

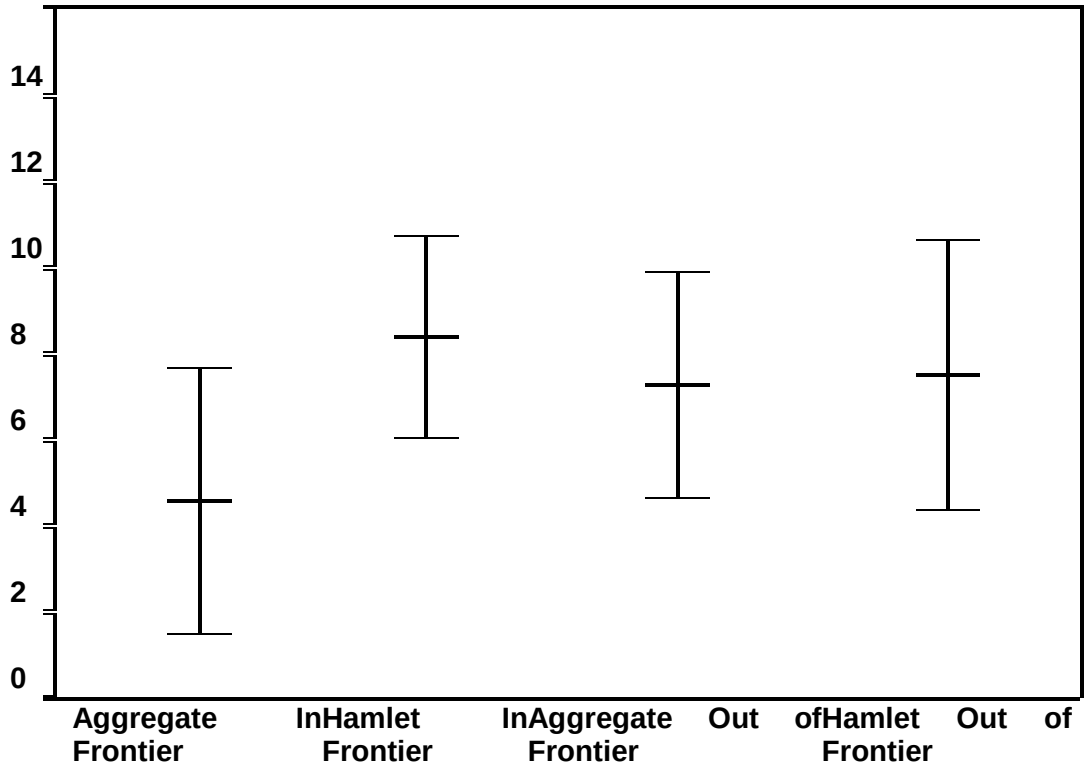

Figure 46. Whisker plot of Simple Analysis of Variance for pit structure diversity at aggregated and hamlet sites both in and outside of the Frontier.

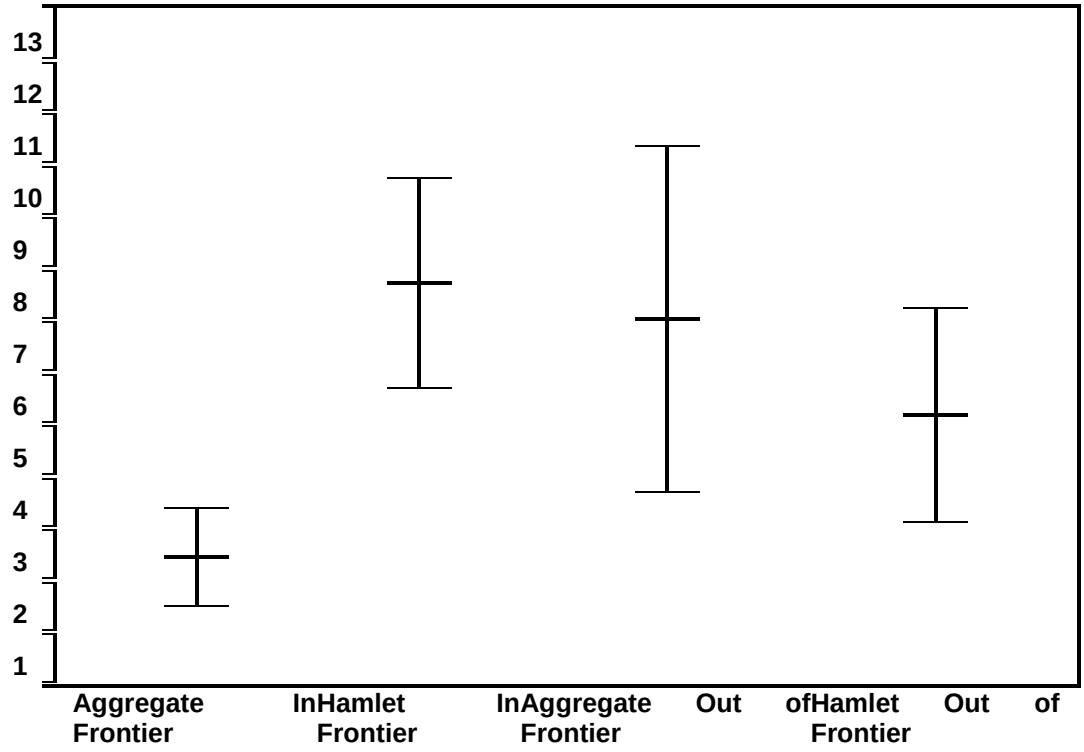

Figure 47. Whisker plot of Simple Analysis of Variance for sipapu diversity at aggregated and hamlet sites both in and outside of the Frontier.

Assessment of Adaptive States

Demographic growth and expansion in Basketmaker III society suggests the society was in a highly mobilized state at the regional level (Figure 45). Returning to the model of expectations for adaptive states presented in Chapter 3, I test the hypothesis that mobilization is structured across spatial and temporal scales by comparing the relative ubiquity and diversity measurements at the sub-regional, aggregated site, and hamlet demographic scales to the regional scale.

Each adaptive state manifests in a different pattern of ubiquity and diversity in a social system. Scattered states are diffuse, un-patterned, and often short-lived. A new adaptive cycle begins in the mobilized state as the system opportunistically expands and diversifies. Social capital is invested into competing categories in the polarized phase of the adaptive cycle and while diversity remains relatively high, social capital is invested in a just a few categories. Finally, in the institutionalized stage a social system becomes very efficient and structured. Diversity drops but the system grows in a structured fashion.

Sub-regional Assessment

At the sub-regional level, there are only slight differences between ubiquity and diversity inside versus outside of the Frontier. In the Frontier, all categories of analysis are slightly higher than the regional scale (Figure 48). This suggests that social development in the Frontier is approaching a fully mobilized state.

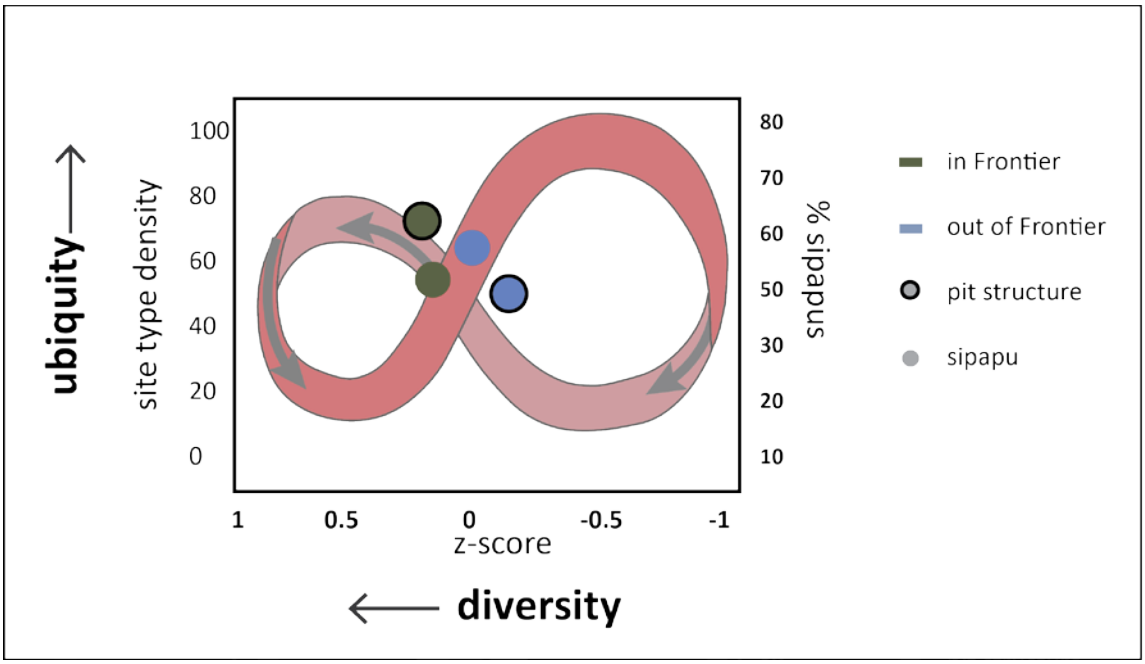

Figure 48. Relative adaptive states inside and outside of the Frontier. Ubiquity of site and sipapus types are arrayed against z-scores of sipapu and pit structure diversity.

Outside of the Frontier, sipapus are more often included in pit structures than inside the Frontier but they are less diverse than the regional average of diversity. Similarly, pit structures are also less diverse. Because pit structure and sipapu traditions are longer lived outside the Frontier, they may be less diverse because they are in a more polarized state of development.

Aggregate and Hamlet Site Assessment

To gauge the relative adaptation at hamlet and aggregated sites inside and outside of the Frontier, I arrayed the diversity of sipapus and pit structures in averaged z-scores against the ubiquity of each site and sipapu type (Figure 49). The results produced opposite patterns inside and outside of the Frontier.

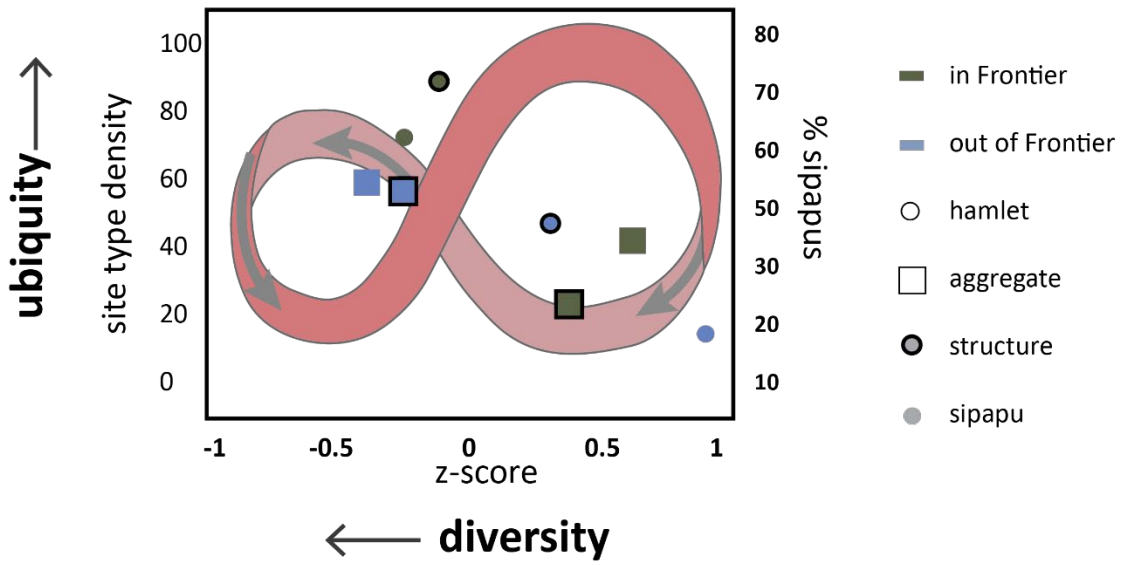

Figure 49. Relative adaptive states at the hamlet and aggregate demographic scales. Ubiquity of site types inside and outside of the Frontier and ubiquity of sipapus within each site type are arrayed against z-scores of sipapu and pit structure diversity.

Aggregated sites in the Frontier reflect a scattered state of adaptation. Sipapu ubiquity and diversity are below average and pit structure diversity is extremely low. Aggregated sites, themselves, are fairly rare, and there are only five known aggregated sites inside the San Juan Frontier. All but one of the aggregates was definitively settled during the early era of colonization prior to A.D. 625. This puts them at the forefront of the mobilization phase, both introducing traditions and adaptations to the Frontier and initiating the expansion into the region.

In this case, the lack of diversity at aggregated sites in the Frontier most likely reflects shared architectural traditions. This would be the case if groups of people from a common region moved to the Frontier together. Importantly, the low diversity signature at these sites was maintained for the duration of their occupation. This suggests that

multiple generations of occupants adhered to the pit structure and sipapu forms introduced by the *founding* population.

In contrast, the social adaptive state of aggregate sites outside the Frontier is fully mobilized. Both ubiquity and diversity factors are higher than regional levels at these sites. Both response and functional diversity factors may be responsible for this signature. For instance, diverse populations may actually be living together at aggregated sites outside of the Frontier and/or a wide variety of activities are taking place at any given site.

Hamlet sites in the Frontier are in a highly mobilized adaptive state (Figure 49). These sites have the highest structure and sipapu diversity and the highest percentage of sipapus per pistructure (60%) of any demographic category in the study. This puts them in stark contrast to aggregated sites in the Frontier which are in a marginally mobile state. As discussed in Chapter 5, the proliferation of small sites in the Frontier generally postdates the initial settlement of the region by groups living in aggregated sites. This trend represents a distinct demographic shift across the Frontier as it moves into a fully mobilized state in the seventh century.

The relatively high diversity in pit structures at hamlet sites is probably not due to functional diversity at these small sites, but it could be a reflection of response diversity in the form of diverse populations or a level of experimentation with pit structure form. The high ubiquity and diversity of sipapus also suggest a high level of experimentation and expression at the household level inside the Frontier.

Hamlet sites outside of the Frontier are in a less mobilized state. Sipapus are incorporated into just 17% of pit structures and those sipapus are dominated by a single type, the simple vault. Pitstructure diversity is similarly lower than regional levels. This is despite the fact that the number of hamlet sites increases dramatically in the seventh century outside of the Frontier just as it does inside the Frontier.

Conclusion

I tested the hypothesis that if a society is demographically mobilized at the regional level, social adaptation at smaller temporal and spatial scales will also reflect a mobilized adaptive state. Based on the ubiquity and diversity of pit structure and siapapu forms, social adaptation was demonstrated to be mobilized at the large regional and sub-regional scales. However, this mobilized adaptive state was not perfectly reflected at smaller demographic scales. Instead, ubiquity and diversity patterns in the San Juan Region appear to be significantly influenced by both the scale of a particular site and its relationship to the Frontier

The adaptive patterns inside the Frontier are especially unexpected. Basketmaker III populations at Frontier hamlet sites experienced a high degree of freedom to construct and diversify their homesteads. In contrast, only a small number of aggregated sites were founded in the Frontier and the diversity of sipapu and pithouse forms at these sites was relatively low.

Frontier aggregates represent the initial wave of colonization, and therefore the foundation for a new sub-regional system. These sites become what could be considered community centers with long occupation spans and public architecture. The relatively low

diversity at these sites suggests that as these sites grew, new generations of occupants conformed to the pit structure and sipapu forms introduced by the founding population. Though these sites were founded in a scattered state, the perpetuation of this signature indicates that the site occupants shifted to an institutionalized state in their adherence to that signature across time.

The appearance of public architecture, especially at aggregated sites, during the initial colonization phase, supports the proposal that supra-household social institutions are developed during Basketmaker III. This idea is consistent with findings from other parts of the world that suggest public architecture and communal ritual may have actually contributed to agricultural colonization as opposed to being a response to it (Hodder 2006; Vayda and McKay 1975).

Hamlets tend to post-date aggregated sites in the Frontier, infilling the region with a dispersed population during the seventh century. This population experienced a heightened level of diversity and possibly even a sense of increased opportunity. The variation in expression at these sites likely reflects diverse traditions as well as experimentations in functional forms and expression.

The dichotomy between adaptive states at aggregated versus hamlet sites in the Frontier sheds light on their relationship. In particular, it raises the question of whether the cultural elements brought to and developed in the Frontier at early aggregated settlements contributed to the extreme mobilization at the hamlet scale. One possibility is that social institutions, such as land tenure rights or religious principles, were adhered to at aggregated sites and represented by public architecture. These institutions could

have mitigated polarization in the diverse hamlet population during the latter phase of colonization. This would suggest that a certain level of conformity in a social system at one level may encourage and support diversity at another scale.

At the same time, a degree of polarization is evident in Basketmaker III public architecture. Great Kivas and Oversized Pithouses, appear to be mutually exclusive. Nearly every aggregated site in this study includes either a Great Kiva or an Oversized Pithouse, but these structure types never occur at the same site. In social adaptive systems, structural polarization, such as this, occurs when institutions begin to compete for limited resources such as physical or social capital. As suggested by several researchers (Wilshusen and Ortman 1999; Ware 2014), Oversized Pithouses may reflect development of non-residential lineage institutions. In contrast, Great Kivas as community scale architecture would naturally cross-cut kinship boundaries. The polarization of non-residential kinship organization and inclusive community-scale organization does not necessarily mean that individuals did not participate in both institutions, but it does suggest that the ideologies associated with these institutions may be incompatible enough that Basketmaker III populations found it incongruous to represent them side by side within the same settlement.

Finally, the presence, ubiquity, and innovation of sipapu types across the San Juan Region, particularly at hamlet sites in the Frontier, attest to the importance of an Emergence concept during Basketmaker III. Sipapus are not traditional elements for Basketmaker II societies in the San Juan Region, but in Basketmaker III they are incorporated into 50% of households. Over the course of the Basketmaker III period,

sipapus are most diverse in Frontier hamlets and aggregated sites outside of the Frontier. This connection should be further explored as it could represent an ancestral connection between hamlet immigrants and their origins at aggregated sites outside the Frontier.

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