INCONSPICUOUS IDENTITY:

USING CORRUGATED POTTERY TO EXPLORE SOCIAL IDENTITY WITHIN THE HOMOL'OVI SETTLEMENT CLUSTER, A.D. 1260-1400

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"For the mind does not require filling like a bottle, but rather, like wood, it only requires kindling to create in it an impulse to think independently and an ardent desire for the truth."
– Plutarch, De Auditu

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ABSTRACT

This research explores the relationship between social identity, artifact style, and communities of practice in the late prehispanic U.S. Southwest, focusing on how domestic, utilitarian objects and contexts both shape and reflect social identities. During the A.D. 1200s and 1300s, large-scale migration and aggregation occurred over much of the U.S. Southwest, bringing diverse individual and community identities into contact and, potentially, conflict. Within this social context, this research focused on clarifying the relationship between social identities and utilitarian objects and domestic contexts, and how this relationship can elucidate the social history of a community. These issues were explored through analysis of corrugated utilitarian pottery from the sites of the Homol'ovi Settlement Cluster (HSC), a community of seven villages in northeastern Arizona occupied from around 1260 through 1400.

The social organization of corrugated pottery production in the HSC was approached from several angles. To identify the number and nature of the ceramic manufacturing communities present during the Pueblo IV occupation of the Homol'ovi area, sherds were submitted for instrumental neutron activation analysis and petrographic analysis. The results of the compositional analyses indicate that ceramic production groups in the Homol'ovi area were not primarily distinguished by access to specific raw material resources. What differentiation there is within the raw materials used by Homol'ovi potters appears to have been determined primarily by village, with the residents of a few villages preferring to use specific clay or temper sources. Both locally produced pottery and ceramics imported into the Homol'ovi area were incorporated into a typological and stylistic analysis. This analysis found evidence of two different production styles in the corrugated pottery assemblage. One appears stylistically similar to pottery produced in areas to the north around the Hopi Mesas; the other appears to be more akin to stylistic traditions practiced in the Puerco area and in the Chevelon drainage. This

diversity suggests the presence of multiple immigrant communities co-residing within the HSC. This social diversity is not reflected in the decorated ceramic tradition of the HSC, which largely conforms to the ceramic traditions of the Hopi Mesas.

Interrogating the disjuncture in the identities embodied through different categories of material culture, used in different social contexts, provides a framework through which to explore the complex social relationships that characterized Pueblo IV villages formed as individuals and communities negotiated the competing forces of integration and differentiation. This study demonstrates the value of approaching identity from multiple scales. If identity is understood as fundamentally multi-faceted and multi-scalar, even seemingly homogeneous cultural units are characterized by social diversity and the tension that accompanies such diversity. The patterns of production visible in utilitarian corrugated pottery provide a nuanced method of clarifying the complex identities of Ancestral Puebloan communities and assessing social connections and differences between groups.

CHAPTER 1: INTRODUCTION

This study explores the relationship between social identity, artifact style, and communities of practice, using archaeological data from the Homol'ovi Settlement Cluster (HSC) in northeastern Arizona. The primary goal of this research is to explore the ways in which people interact with different kinds of material culture. Specifically, I examine the different ways in which material culture represents social identity, and how these identities elucidate the social history of a community. People's identities are embodied through the material world, in objects they create and use, whether intentionally or unintentionally, consciously or unconsciously. Equally, identity is shaped by the relationships we develop with material entities: objects, spaces, and places. The identities embodied in material culture, and the identities shaped by our interactions with material entities, are highly contextual. Different identities are reflected in different material objects and different facets of identity are affected by our relationships with different classes and varieties of material entities. This dissertation explores the identities of the Pueblo IV potters of the HSC as they are reflected in the utilitarian ceramics they produced. More broadly, this research explores how a multi-scalar approach to social identity enriches our understanding of the complex social relationships that developed within socially diverse aggregated Pueblo IV settlement clusters such as the HSC.

Since 1985, the Homol'ovi Research Project (HRP) has focused on understanding the culture history of the Homol'ovi area (Adams 1996a, 2002, 2004a; Lange 1998; Young 1996, 1999a, 2007), especially emphasizing migration and aggregation in Pueblo IV period Homol'ovi communities (Adams 1996a, 2002, 2004a; Lyons 2003); using deposit-based approaches to explore ritual activities in its Pueblo IV period Homol'ovi villages (Adams and Fladd 2017; Adams and LaMotta 2006; LaMotta 2006; Strand 1998; Vonarx and Adams 2006; Walker 1995, 1998; Walker et al. 2000); and exploring the relationships between the HSC and surrounding areas, especially the Hopi Mesas (Adams et al. 2004; Lyons 2003; Young and Barker 2015). The research generated by the HRP over the last 30 years has elucidated the archaeological narrative of the Homol'ovi area, creating a solid foundation from which to explore more complicated research questions such as how the HSC communities were shaped by the complex interactions between social integration and differentiation prompted by the demographic upheaval that took place during the Pueblo IV period in the U.S. Southwest. Exploring these questions within the HSC not only increases our understanding of the Homol'ovi area, it illuminates Pueblo IV period social developments throughout the villages and settlement clusters of the Western Pueblo area (Adams and Duff 2004; Adams and Duff [editors] 2004) and demonstrates the importance of considering multiple scales of identity and material culture in constructing social narratives of archaeological communities, sites, and settlement clusters.

Migration on some scale occurred throughout the prehispanic occupation of the U.S. Southwest (Adams 1996b; Bernardini 2005; Bernardini and Fowles 2011; Cameron 1995; Clark 2001; Clark and Cabana 2011; Cordell 1995; Glowacki 2010; Herr 2001; Mills 2011; Mills et al. 2013, 2015; Ortman 2012; Varien 1999). During the Pueblo IV period (A.D. 1275-1400), the Colorado Plateau experienced widespread, large-scale migration and the subsequent aggregation of groups into large communities (Adams 2002; Adams and Duff [editors] 2004; Bernardini and Adams 2017; Crown and Kohler 1994; Duff 2002; LeBlanc 1998; Mills 1998; Peeples et al. 2017; Potter 1998; Schachner 2012). On a regional scale, these demographic changes profoundly altered the region's social environment. Aggregated settlements and settlement clusters were separated by large unoccupied areas (Adams and Duff 2004; Adams and Duff [editors] 2004; Cordell et al. 1994; Duff 1998, 2002, 2004; LeBlanc 1999; Plog 1983; Spielmann 1994, 2004; Wilcox 1981). Considering this demographic upheaval at a smaller scale, individuals and communities would have experienced profound change. Migrating across long distances and living in large, diverse settlements would have created both new opportunities and tensions. In such circumstances, it is easy to imagine the importance both of social differentiation—maintaining an individual identity based on a distinct social history—and social integration (Adams 1996b; Brandt 1994; Johnson 1982; Mills 2011; Neuzil 2008; Stone 2003).

In this study, I approach identity formation, maintenance, and transformation from a micro-regional, multi-scalar perspective. Focusing on a single site cluster, the Pueblo IV period occupation of the HSC, generates a fine-grained understanding of the social contexts of migration and aggregation as well as the impact of these processes on identity within aggregated settlements. These social processes are considered at the site and cluster scale, providing an opportunity to understand how larger demographic trends observed on a regional scale crystalize at a smaller scale. This study focuses specifically on utilitarian corrugated ceramics produced within the HSC. Exploring the social history of the HSC and its residents through analysis of everyday objects, the remnants of commonplace domestic activity, demonstrates the important contributions offered by utilitarian artifacts when constructing an archaeological narrative.

This exploration of social identity in aggregated communities draws on a large body of social theory including foundational literature on conceptions of social identity and ethnicity (e.g., Barth 1969; Bourdieu 1977; Comaroff 1987; Comaroff and Comaroff 1992; Connor 1978; Eller and Coughlan 1993; Geertz 1963; Giddens 1979; Isaacs 1974; Scott 1990; Shils 1957; Stack 1986) as well as more recent relational and contextual conceptions of identity (e.g., Casella and Fowler 2004; Díaz-Andreu and Lucy 2005; Fowler 2010, 2016; Gamble 2007; Knappett and Malafouris 2008; Latour 2005; Meskell 2001, 2002, 2005; Meskell [editor] 2005; Robb 2010). Identity has been variously described as actively constructed or passively received, the product of individual choice or subconsious enculturation (Barth 1969; Emberling 1997; Jenkins 1996, 1997; Stone 2003). More recently, theoretical trends in anthropology have emphasized the importance of social relationships and context in constructing identity. Identity is generated through the relationships between individuals and their surrounding social, material, and natural environment over the course of daily life (Dobres and Robb 2000; Hendon 2010; Meskell 2004). Thus, identity is fundamentally relational and contextual, constituted by interactions between people as well as the objects and spaces that surround them, and defined through relationships with others—both through similarities and differences—within specific social contexts (Casella and Fowler 2004; Díaz-Andreu and Lucy 2005; Duff 2002; Fowler 2004, 2010, 2016; Gamble 2007; Gell 1998; Hendon 2010; Knappett and Malafouris 2008; Latour 2005; Van Der Leeuw 2008; Meskell 2001, 2002, 2005; Meskell [editor] 2005; Robb 2004, 2007, 2010).

Social identity is visible archaeologically in material culture, the products of human practice. The relationship between social identity and material culture is outlined by practice theory (Bourdieu 1977; Giddens 1979). Practice theory links who people are (social identity) to the way they act (practice). Through the recursive relationship between material culture and identity, identity is embodied in material culture (Gell 1998; Hendon 2010). People embody their identity in objects and materials that they create both intentionally and unintentionally, consciously and unconsciously. The concepts of technological style (Dietler and Herbich 1989; Hegmon 1998; Lechtman 1977) and situated learning theory (Cordell and Habicht-Mauche [editors] 2012; Lave and Wenger 1991; Minar and Crown 2001; Roddick and Stahl [editors] 2016; Wenger 1998) are powerful tools for exploring identity as it is preserved in the products of labor. Technological style suggests that the stylistic behaviors used to produce artifacts are the physical expression of enculturative context (Lechtman 1977). Situated learning theory views artifacts as the products of learning and production situated within and structured by communities of practice (Lave and Wenger 1991). According to both theoretical perspectives, way in which artifacts are manufactured is delineated by culturally appropriate behaviors, communicated through participation in a broader group.

In this way, artifact production reflects a shared knowledge and an internalized understanding of appropriate cultural practices. To successfully produce an artifact, artisans must internalize the normative behaviors associated with the practices of production in their cultural group. This can only be achieved through socialization and enculturation within a community of practice, learning appropriate cultural practices by interacting with a community of fellow practitioners. Thus, studying the practices associated with artifact manufacture can help archaeologists understand the appropriate cultural behaviors and, by extension, explore the social identity of the individual and community responsible for the production of an artifact.

This study applies these theoretical principals to the occupants of the HSC villages using the locally produced utilitarian ceramic tradition to explore the social relationships that characterized socially diverse communities. The aggregated settlements characteristic of the Pueblo IV period were generally large, possessing distinctive public architecture in the form of enclosed plazas and evidence of increased ritual activity, including katsina iconography, a diversity in ritual structures, and abundant ritual deposits (Adams 2002; Adams and Duff [editors] 2004; Bernardini and Adams 2017; Crown and Kohler 1994; Duff 2002; Mills 1998; Peeples et al. 2017; Potter 1998; Schachner 2012; Spielmann 1998). The Homol’ovi area was no exception to these trends. The Pueblo IV period occupation of Homol’ovi was concentrated in seven villages, Homol’ovi I (H1), Homol’ovi II (H2), Homol’ovi III (H3), Homol’ovi IV (H4), Chevelon Pueblo (Chevelon), Jackrabbit Pueblo, and Cottonwood Creek Pueblo. Each of these villages possessed ritually integrative facilities including kivas and plazas. The later sites, most notably H2, are also characterized by an abundance of katsina imagery on ceramics and other media (Adams 2002; Cole 1992). Excavations at six of the Pueblo IV period aggregated pueblo settlements have revealed many similarities in their ceramic assemblages. All sites have yielded Winslow Orange Ware (WOW), the locally produced decorated ceramic tradition, as well as Homolovi Orange Ware (HOW) and Homolovi Gray Ware (HGW), locally produced utilitarian pottery. Nonlocal ceramics at all sites are dominated by northern wares and types (Adams 2002; Lyons 2003). Stylistic analysis of WOW led to the conclusion that the painted ceramics from this area were part of the Ancestral Hopi pottery tradition, an affiliation supported by architectural data from Homol'ovi as well as Hopi oral tradition (Lyons 2001, 2003).

Until this research, no corresponding analysis had been performed on the locally produced utilitarian tradition, represented by HOW and HGW. Although decorated pottery is commonly used to explore issues of social identity and cultural practice in archaeology, the social groups responsible for the production of decorated pottery likely do not accurately reflect the full spectrum of social identities present in any given area. A number of decorated wares in the prehispanic U.S. Southwest may have been produced by specialists (e.g., Crown 2016; Hays-Gilpin 1996; Kaldahl et al. 2004; Van Keuren 2006a; Van Keuren et al. 2013; LeBlanc and Henderson 2009; Lyons 2001, 2003). Cross-culturally, the production and use of symbolically charged vessels is more restricted than other, more utilitarian forms of material culture (Herbich and Dietler 2008:241). Utilitarian pottery, in contrast to decorated pottery, is typically produced and used locally (Duff 2002; Peeples 2011:355; Zedeño 1994; cf. Abbott 2000; Abbott et al. 2007; Arazi-Coambs 2016; Stoltman 1999; Van Keuren et al. 1997). Because utilitarian pottery is more likely indicative of informal, inconspicuous identities (Carr 1995a; Clark 2001; Duff

2002; Duff and Nauman 2010; Neuzil 2005a; Peeples 2011), analysis of locally produced utilitarian pottery may elucidate identities not expressed within the locally produced decorated corpus of a site or region. Therefore, the analysis of the locally produced utilitarian pottery of the HSC presented in this dissertation augments our current understanding of migration and identity at Homol'ovi. More broadly, this research demonstrates the value of exploring identity through multiple scales to create a more nuanced and complex view of identity and social history.

This dissertation is presented in 10 chapters. Chapters 2 and 3 outline the theoretical basis of this research. In Chapter 2, I begin by presenting an overview of foundational theoretical approaches to ethnic identity. Following this, I summarize more recent approaches to social identity research, emphasizing theoretical approaches that consider identity as fundamentally contextual and relational, embedded in social relationships with other people and with the material world. This chapter concludes with an overview of archaeological approaches to artifact style and the intersection of style and identity. Chapter 3 includes a synopsis of research on migration in the prehispanic U.S. Southwest. I discuss aggregation as a likely outcome of migration, and the tendency of aggregated communities towards both integration and differentiation.

Chapter 4 outlines the methodological approach of this study and the hypotheses that guide this research. This analysis focuses on utilitarian pottery as an analog for inconspicuous identities and close relationships, such as those that result from intermarriage (Duff 2002:26; Zedeño 1994:17), as a means to explore the social relationships developed during the Pueblo IV period in the U.S. Southwest, a time characterized by the joint processes of migration and aggregation. To evaluate the hypotheses outlined in this chapter, this analysis explores the ceramic recipes used to manufacture corrugated pottery within the HSC, identify ceramic manufacturing communities based on an assessment of technological style, affiliate these manufacturing communities with broader stylistic traditions, and explore the patterning of these stylistic clusters within the villages of the HSC to better understand the social history of this settlement cluster.

Chapter 5 presents the history of archaeological research at Homol'ovi, focusing on the occupation of Homol'ovi during the Pueblo IV period. This chapter also includes the individual histories of each site included in this research, discussed in chronological order: H4, H3, H1, Chevelon, and H2. This chapter concludes with a summary of overarching themes from the social history of the HSC that are most relevant to this dissertation: aggregation at Homol'ovi and the relationship between Homol'ovi and Hopi.

In Chapter 6, I focus on the compositional analysis of locally produced pottery from the HSC. This chapter begins by outlining the ware description of WOW, the locally produced decorated pottery tradition, including a summary of compositional analysis by Patrick Lyons (2001, 2003) on WOW which clearly established that WOW was produced by the residents of the HSC and the Petrified Forest. Next, I present the ware descriptions for HOW and HGW, specifically discussing the nature of the distinction between these two wares. I submitted specimens of locally produced utilitarian pottery recovered from ceramic assemblages in the HSC for instrumental neutron activation analysis and for petrographic analysis, augmenting the compositional analysis performed by Lyons (2001, 2003). This chapter briefly summarizes these two analytical techniques and concludes by discussing the results of these analyses.

Chapters 7, 8, and 9 discuss the stylistic characterization of locally produced utilitarian pottery from Homol'ovi. Chapter 7 begins by detailing the methods used to characterize the locally produced utilitarian assemblage from the HSC. I discuss the variables measured in this analysis and the sampling strategy I employed. Next I describe the results, detailing the attributes of the two stylistic categories identified in this study. Chapter 8 describes the broader regional affiliations of these stylistic clusters. First, I discuss the results of stylistic analysis performed on a sample of the utility wares most abundantly imported to the HSC: Awatovi Yellow Ware, Tusayan Gray Ware, and Mogollon Brown Ware. This analysis produced two stylistic categories, allowing a comparison of the stylistic categories identified within the locally produced and imported utilitarian pottery recovered from Homol'ovi. Chapter 8 places this research in regional context through a discussion of the regions surrounding the HSC: the Hopi Mesas, the Hopi Buttes, the Puerco area, the Upper Little Colorado River, Silver Creek, the Chevelon drainage, and Anderson Mesa. Based on extent literature and, when possible, assessment of corrugation technology, I identify potential regional affiliations between the HSC and the Hopi Mesas, Hopi Buttes, the Puerco area, and the Chevelon drainage. In Chapter 9, I explore the chronological and spatial patterning of these styles within the HSC, specifically discussing the distribution of these styles within different depositional contexts within sites.

Chapter 10 outlines the overall conclusions of this study. This chapter begins with a research summary—discussing how the various goals of this project were achieved—and draws overarching conclusions about the differential expression of identity, presenting a complex picture of social identity within the HSC. I discuss possible behavioral correlates for the patterns observed in the material culture and conclude by discussing the broader significance of this research, including the importance of studying social identity through everyday objects like utilitarian pottery and considering multiple scales of social identity in the archaeological record, placing this research within the wider context of migration studies in the U.S. Southwest.

CHAPTER 2: SOCIAL IDENTITY AND ARTIFACT STYLE

Social identity, constructed through the continual processes of social interaction, refers to the ways in which individuals and communities define themselves, and are defined by others, through similarities and differences, in relation to other individuals and communities (Barth 1969, 1981; Cohen 1994; Coupland 2007; Crown 2000; Jenkins 1996:4; Meskell 2001, 2002b:279–280; Voss 2005; Wylie 1998). Such identities are multi-scalar and multi-faceted: people are defined by multiple overlapping and cross-cutting social identities based on their participation in different social communities and networks (Cordell 2008; Ferguson 2004). Therefore, while identity is created on an individual basis, it is developed, demonstrated, reinforced, and contested through social practices and interactions with other social entities (Fowler 2004, 2010, 2016).

For such a widely used concept, social identity is difficult to conceptualize, largely because of the breadth of behaviors and social signifiers encompassed at the level of the individual and at the level of the community. Under the broad umbrella of social identity fall myriad more specific forms of identity including identities of self, community, gender, age, status, kinship, sodalities, and ethnicity (e.g., Crown 2000; Fowler 2004; Harris 1990; Hays-Gilpin 2000; Hegmon, Ortman, et al. 2000; Jenkins 1996; Jones 1997; Keesing 1975; Lyons et al. 2011, 2008; Lyons and Clark 2008; Mills 2000a, 2000b, 2007a; Plog and Heitman 2010; Potter and Perry 2000; Voss 2008). This chapter begins with an introduction to foundational concepts regarding social identity followed by a summary of practice theory and the theory of structuration. This discussion provides the groundwork for subsequent discussions of contemporary views on identity and the relationship between identity and material culture, as this framework for understanding identity underlies more recent developments in anthropological theory. A summary of archaeological approaches to the study of artifact style—a method by which archaeologists explore identity through material culture—follows, concluding with a discussion of situated learning theory as a method of conceptualizing the complex relationships between individual identity, material culture, and the structures governing social behaviors.

Foundational Approaches to Social Identity

Over the course of the twentieth century, scholarly debate on social identity emphasized ways to identify discrete group identities that clearly demarcated meaningful social boundaries (e.g., Bourdieu 1977; Burgess 1978; Connor 1978; Geertz 1963; Isaacs 1974; Isajiw 1974; Keyes 1976; Ross 1980; Shennan 1989; Shils 1957). Archaeologists studying the prehispanic U.S. Southwest translated these principals into identifiable archaeological culture areas, defined by material culture, and used them to explore changes in culture through time and space (e.g., Gladwin 1957; Haury 1985; Kidder 1924; McGregor 1965). Such approaches may be critiqued for not adequately addressing social diversity as they did not explicitly consider multi-ethnic communities or explore different scales of identity and the ways in which identities may overlap and interact within a group or a single individual. However, although more recent research has greatly improved our understanding of social identity, both archaeologically and anthropologically, this earlier body of work provides a crucial foundation for later studies. This section outlines those portions of the twentieth century debate on the nature of social identity most relevant to the research explored in this dissertation. More recent approaches to social identity which refine and, in some cases, contradict, these foundational approaches will be discussed in the following section.

Primordialism and Instrumentalism—Active and Passive Conceptions of Identity

Foundational debates on the nature of identity emphasized issues of structure and agency, specifically exploring whether social groups are based on shared cultural practices and socio-structural relationships that exist independently of the individuals concerned, or whether individual members construct social groups through perception and directed social organization (Jenkins 1997; Jones 1997; Voss 2008). In other words, do individuals construct their identity situationally and strategically, or are identities and the community membership associated with these identities fundamental and fixed, ascribed to an individual by others or the society at large? One discussion central to twentieth century conceptualizations of social identity, which encapsulates this broader debate between the emic and the etic in understanding social identity, was the debate between primordialist and instrumentalist perspectives on ethnicity. This literature on ethnic identity is helpful in understanding the broader body of research on social and group identities as the concepts discussed apply more broadly to conceptions of social identity and group identities as a whole, and it is in this broader sense that these concepts apply to the research discussed in this dissertation.

Anthropological research during the first half of the twentieth century emphasized the importance of structure in determining social behaviors (e.g., Connor 1978; Geertz 1963; Isaacs 1974; Keyes 1976; Levi-Strauss 1963; Radcliffe-Brown 1965; Shennan 1989; Shils 1957). The structural approach to identity is known as primordialism or objectivism. Primoridalists understand identity as static and instinctive, an inevitable byproduct of having been born into a particular community, speaking a particular language, and following particular social practices—ascribed at birth and constantly reinforced throughout the process of socialization (Emberling 1997; Jenkins 1996, 1997; Jones 1997; Stone 2003; Voss 2008). From the primordialist view, social groups are entities with distinct boundaries characterized by relative isolation and defined on the basis of clear socio-cultural differentiation (Jones 1997; Stone 2003).

During the latter half of the twentieth century, social theorists focused more on the power of agency to explain social behavior (e.g., Barth 1969, 1981; Bentley 1987; Cohen 1974, 1978; Comaroff 1987; Comaroff and Comaroff 1992; Gellner 1956; Goffman 1959, 1967; Goodenough 1963; Hodder 1979; Ortner 1984). The agency-based approach to identity, known as instrumentalism or subjectivism, views ethnic groups as more similar to interest groups. Both are individualistic strategies as well as systems of shared beliefs and practices that provide the organization needed to acquire and maintain socio-economic resources (Dietler and Herbich 1998; Hegmon 1998; Jenkins 1996, 1997; Jones 1997; Stone 2003; Voss 2008). From this perspective, identity is primarily constructed by the individual and is highly malleable. Individuals may choose to emphasize or suppress identity in order to receive the maximum benefit from specific situations (Emberling 1997; Jenkins 1996, 1997; Jones 1997; Stone 2003; Voss 2008).

Both of these perspectives have interpretive and analytical value. The primary strength of the primordial approach is that it emphasizes the strong emotions that may be associated with social identities (Jenkins 1997; Jones 1997). Primordialism also acknowledges the persistence of some identities over considerable periods of time, even when the identity appears to create social or economic disadvantages—a social phenomenon not adequately explained by instrumentalism (Jenkins 1997; Jones 1997; McKay 1982). However, primordialism may be critiqued as essentialist, removing identities from their social and historical context and considering identity as an abstract natural phenomenon. By attributing identity with primitive and atavistic attributes, primordialism mythologizes ethnic identity, treating this form of identity as the most natural and ideal method of human social organization (Connor 1978; Jones 1997; Kellas 1991; Stone 2003). Further, by privileging the social whole over the individual and stasis over social change, primordialism fails to explain the demonstrably situational nature of identity (Jones 1997; Scott 1990). Finally, primordialism ignores the complexities of social interactions, regarding social groups as bounded social groups characterized by isolation and a lack of interaction (Jenkins 1996; Jones 1997; Stone 2003).

In contrast, instrumentalism privileges individual agency over structure, emphasizing the social power self-definition and the ability of the individual to consciously construct and manipulate identity (e.g., Barth 1969; Bentley 1987; Cohen 1974, 1978; Comaroff 1987; Comaroff and Comaroff 1992; Deshen 1974; Schildkrout 1974). This perspective has merit, especially when considering the complex nuances of social relationships and explaining cultural change. However, instrumentalism can be criticized as reductionist—framing human agency as rational self-interest—as well as neglecting the cultural dimensions of identity in favor of the economic and political (Stone 2003). The assumption of rational self-interest ignores the dynamics of power in both inter- and intra-group relationships. Social groups are not merely interest groups and identity cannot be understood solely in terms of personal or community aggrandizement. Communities are not homogenous in interest and it cannot be assumed that members always act in unison. (Bentley 1987; Cohen 1974; Jones 1997; Ross 1980; Vincent 1974). Likewise, individuals are far from homogenous: individual actors possess a multitude of overlapping, intersecting identities which inform their actions (Casella and Fowler 2004; Fowler 2004, 2016). Further, the instrumentalist emphasis on the situational nature of identity fails to adequately explain the persistence of some identities over time (Jones 1997; Voss 2008).

The Dialectic of Structure and Agency: A Theory of Practice

The preceding debate over the primacy of structure and agency unnecessarily confined identity to dichotomies—active and passive, conscious and subconscious. The best way to understand social identity is by combining these two perspectives: primordialist and instrumentalist approaches to social identity describe different, complementary aspects of identity (Jenkins 1996, 1997; Jones 1997; McKay 1982; Voss 2008). Identity is comprised of both active and passive components; some facets may be the result of passive enculturation through socialization, while others are the result of active social construction (Hegmon 1998; Jenkins 1996; Jones 1997; Mills 2007a; Stone 2003; Voss 2008). This conception of identity is derived from twentieth century debates on the nature of social identity. However, it does not presume either consciousness or unconsciousness on the part of the participants in a community, as these states of awareness are neither unilateral nor mutually exclusive. The disjunctures and conflicts between these two perspectives provide an opportunity to explore the negotiations that shape identity, creating a more challenging and complex view of identity than either perspective alone can offer.

Possibly the most successful and broadly influential theoretical approach that bridged the divide between structure and agency is practice theory, based on the work of Pierre Bourdieu and Anthony Giddens (Dietler and Herbich 1998; Hegmon 1998, 2003, 2008; Jones 1997; Ortner 1984; Stone 2003). As suggested by the name, one of the central themes of practice theory is practices: learned and unconscious mechanisms by which one responds to one's social reality (Bourdieu 1977). Bourdieu's theory of practice rejects both primordialism and instrumentalism as overly simplistic explanations for the development of social identity (Bourdieu 1977, 1990, Jenkins 1996, 1997; Jones 1997). Rather, practice theory explores the relationship between the individual social actor and the social world within which the individual acts, situating individual agency within the structures of social action (Bourdieu 1977; Dietler and Herbich 1998; Dobres and Hoffman 1994; Hegmon 1998, 2008, Jenkins 1996, 1997). As individuals are enculturated into a social reality, they become incapable of acting outside of the structure of their social reality (Bourdieu 1977, 1990; Jenkins 1992). This is also known as a doxic experience. As explained by Bourdieu, the doxic experience is created by

> …the coincidence of the objective structures and the internalized structures which provides the illusion of immediate understanding, characteristic of practical experience of the familiar universe, and which at the same time excludes from that experience any inquiry as to its own conditions of possibility (Bourdieu 1990:20).

Thus, people are able to make their own choices; however, they make choices within circumstances dictated by the social structure, not of their own choosing (Bourdieu 1977; Jenkins 1992).

Within this general framework, the mechanism by which Bourdieu bridges the divide between structure and agency is habitus (Bourdieu 1977; Jenkins 1996; Jones 1997). Habitus refers to the socially constructed 'rules' of society, embedded subconsciously through the process of participating in society (Bourdieu 1977; Jenkins 1996, 1997; Stone 2003). Habitus predisposes individual actors to behave in certain ways, providing the basis for practice. Thus, habitus causes practice: practice is the physical manifestation of habitus in response to the doxic experience (Bourdieu 1977, 1990, Jenkins 1992, 1996, 1997). However, habitus is, in turn, the product of the social patterns and behaviors of life. Therefore, by engaging in practice, individual actors generate and reinforce habitus, creating a recursive relationship between habitus and practice (Bourdieu 1977; Jenkins 1996; Jones 1997).

Giddens' contribution to practice theory is the theory of structuration. This theory models the creation and reproduction of social systems based on the inseparable intersection of structure and agency (Giddens 1979). In contrast to Bourdieu (1977), Giddens emphasizes the role of agency rather than structure (Giddens 1979, 1984). According to Giddens, the reproduction of social systems is an active process. Agents are participants in as well as subjects of systemic social structures: the structure and the agent relate recursively to create and perform social systems (Giddens 1979). Social agents draw on structures, internalized normative behaviors, to perform socially appropriate actions. Structures are created, maintained, and reinforced by these actions (Giddens 1979, 1984). Thus, according to Giddens, "...structure is both medium and outcome of reproduction of practices. Structure enters simultaneously into the constitution of the agent and social practices and 'exists' in the generating moments of this constitution" (Giddens 1979:5).

In this way, the theory of structuration acknowledges the dualism between structure and agency and emphasizes the role of structures as both medium and outcome. Institutionalized or routinized actions by agents are responsible for the establishment and maintenance of social order (Giddens 1984). However, this social stability is not permanent. Agents always possess a dialectic of control which allows them to reject normative behaviors. Because agents produce structures, this dialectic of control may introduce change into the normative behaviors of a society (Giddens 1984). Thus, the recursive relationship between structure and agent does not result in a fixed social system. Rather, structures and agents constantly interact and evolve, introducing change to the social system (Giddens 1984). Although, according to Giddens (1979:5), "…every social actor knows a great deal about the conditions of reproduction of the society of which he or she is a member", some knowledge remains subconscious. Therefore, as individuals are enculturated into a social reality, they become less capable of acting outside the structure of their social reality. Although people are able to make their own choices, they make choices within circumstances dictated by the structure of society, not of their own choosing (Giddens 1979, 1984).

Due to the influence of practice theory and the theory of structuration, contemporary social theory has redefined the relationship between structure and agency, understanding structure as constantly evolving due to the actions of individual social agents acting within their cultural and historical contexts. This more nuanced view of the relationship between structure and agency recognizes that the tension between structure and agency does not necessarily indicate that these social forces are in conflict. Rather, the relationship between structure and agency is fundamentally recursive: agency cannot exist without structure and structure cannot exist without agency (Dietler and Herbich 1998; Duff 2002; Goodenough 1963; Hegmon 1998, 2003, 2008; Joyce and Lopiparo 2005; Ortner 1984; Varien and Potter 2008).

Relational and Contextual Identities

The preceding discussion outlined a small portion of the complex history of how conceptions of social identity within the social sciences evolved during the twentieth century, from debates on the nature of ethnicity through the détente represented by practice theory and the theory of structuration. Although contemporary social theory has moved past the divide between structure and agency, identity remains a contested term as theory has moved in a number of new directions. Of particular relevance to this research is the conception of identity as fundamentally relational and contextual, formed through interactions between people and the objects, spaces, and places that surround and encompass them (Casella and Fowler 2004; Díaz-Andreu and Lucy 2005; Duff 2002; Fowler 2004, 2010, 2016; Gamble 2007; Gell 1998; Hendon 2010; Knappett and Malafouris 2008; Latour 2005; Van Der Leeuw 2008; Meskell 2001, 2002, 2005; Meskell [editor] 2005; Robb 2004, 2007, 2010). This emphasis on the complex relationships that together constitute identity underscores the importance of the lived experiences of individuals and communities in developing social narratives. The literature accompanying this shift in social theory is extensive and diverse. The following section will provide a brief overview of contemporary theory regarding the relational and contextual nature of identity, focusing particularly on personhood and materiality.

In direct contrast to previous interpretations, which understood identities as discrete and bounded, contemporary social theory emphasizes multi-scalar aspects of identity. From this perspective, identity is considered as multi-faceted and situational; continually defined, redefined, and negotiated (Casella and Fowler 2004; Díaz-Andreu and Lucy 2005; Dobres 2000; Dobres and Robb [editors] 2000; Dobres and Robb 2000, 2005; Dornan 2002; Fowler 2004, 2010, 2016; Gamble 2007; Gardner 2004; Hendon 2010; Joyce and Lopiparo 2005; Meskell 2001, 2002, 2005; Meskell [editor] 2005; Robb 2004, 2007, 2010). Therefore, identity is fundamentally social—the product of interactions and relationships between people and their material and social context (Robb 2010). From this perspective, identity is conceptualized as accumulated over the course of lived experience, formed of an autobiographical archive of memories and experiences (Gamble 2007). This idea of the relational self, constituted over time through relationships between people, objects, and places, creates an understanding of identity as diffuse or distributed, in which identity is comprised of a wide array of biological events, memory events, and material objects (Fowler 2004, 2010, 2016; Gell 1998; Hendon 2010:149–150; Robb 2010). Some facets are fundamental and subconscious. Others may be stimulated or, conversely, suppressed as the result of interaction with specific people, objects, spaces, and places, or by specific events.

Thus, identity is defined and expressed through relationships with others—through both similarities and differences—within specific social contexts (Díaz-Andreu and Lucy 2005; Robb 2010). Because identities are defined through similarities and differences with others, identities by their nature are constructed around social boundaries as markers of social differentiation or commonalities between groups and individuals (Barth 1969; Jenkins 1996). However, social boundaries are not fixed, immutable entities. For example, one nuclear family may be subdivided by a number of other social units such as men, women, and children. Within a gathering of nuclear families, such as at a family reunion, these social units cross-cut nuclear families, forming broader social groups. The existence of these broader social groups does not invalidate the nuclear family unit; rather, the intersection of nuclear family identity and gender identity represents a number of social identities being expressed simultaneously: an individual may be concurrently a wife, mother, woman, friend, aunt, cousin, niece, daughter, and sister. Because social boundaries are fluid, identities are fundamentally relational and ever-changing; nested, cross-cutting, and intersecting each other (Meskell 2001; Robb 2010).

Identities are spatially and temporally contextual. As discussed in prior sections, within western society, and, thus, within archaeological literature, a person has traditionally been understood as a bounded, indivisible, and self-determining social actor who interacts with similarly bounded others (e.g., Barth 1969; Connor 1978; Geertz 1963; Gellner 1956; Goffman 1959, 1967; Goodenough 1963; Isaacs 1974; Keyes 1976; Ortner 1984; Shennan 1989; Shils 1957). Individuality is seen as arising from within each individual person (Cohen 1994). In his work on archaeological perceptions of personhood, Chris Fowler (2004, 2010, 2016) argues that this concept of a bounded, individual person is fundamentally rooted in western conceptions of personhood and, therefore, is not necessarily representative of personhood in the archaeological record. According to Fowler, a person consists of more than just a defined, bounded body (2004:7): a person is a composite of the body as well as memories, knowledge, and experiences (2004, 2010, 2016). Thus, individuality, that aspect of a person's identity which arises from that person alone, is only one aspect of personhood (Fowler 2004:9–10). Memories, knowledge, and experiences are relational and communal, defined through interactions with others and shared beyond one individual entity. Therefore, these dividual aspects of personhood are defined through the context in which identity is formed (Fowler 2004, 2016).

As identity is constituted of social relationships it can only be understood contextually, within the framework of these interactions (Fowler 2004, 2010, 2016; Robb 2010). These interactions in turn must be situated within their social and historical context (Fowler 2004, 2010, 2016; Robb 2010; Thomas 2015). To this end, it is important to consider what criteria people use to conceptualize their own and others' identities. Although certain principles may cross-cut many cultural spheres, others may not (Duff 2002; Fowler 2004, 2010, 2016; Robb 2010). Some identities may be tied to places or specific social contexts (Hendon 2010:54). Andrew Duff (2002:13–14) presents an example drawn from Pueblo communities in which historical time, marked by the passing of generations, is situated within a social landscape composed of important places where historical or mythological events occurred and where ancestors lived (Blau 1977; Cowgill 1993; Haas et al. 1994). As people go about their daily lives, they are constantly reminded of their history through repeated encounters with the landscape, which may include both natural landmarks such as geological or environmental features as well as social landmarks such as other villages or communities (Basso 1996; Cipolla 2008; Connerton 1989; Hendon 2010; Mills 2004; Mills and Walker 2008). In this way, identity is inextricably linked with physical space. Although an individual's experience of the landscape may be unique, knowledge of a social landscape is shared between members of a community. The identity shaped by constant interaction with the social landscape is an important component of social structure within a community (Basso 1996; Duff 2002:13–14).

Our ability to understand and interpret identity is constrained, therefore, by our understanding—or lack thereof—of the context within which that identity is formed. Similarly, our ability to understand identity is restricted by its ephemeral, ever-changing nature. Because it is continually transformed and negotiated, people are continually in the process of identity formation and re-creation. Thus, identity can only be understood temporarily and incompletely (Fowler 2004, 2010, 2016). It follows, then, that the material remains encountered by archaeologists do not embody encapsulated archives of complete past identities. Rather, they represent the objects through which people negotiated identities within specific temporal, spatial, and social contexts (Casella and Fowler 2004:8; Fowler 2010). Therefore, an appropriate goal for archaeologists is not to explore identities as a unitary whole, coterminous with an individual, but to consider the ways in which identities were understood, defined, and contested within different social circumstances and cultural contexts (Casella and Fowler 2004:3; Fowler 2004, 2010; Hendon 2010).

The notion that identity is centered in a bounded, indivisible, autonomous individual coterminous with a biological body is not universal—the concept of personhood is culturally variable (Fowler 2004, 2010, 2016; Gell 1998; Geertz 1983; Hendon 2010:150). Recent discourse on the nature of personhood has emphasized the dividual aspects of personhood rather than the individual (e.g., Fowler 2004, 2010, 2016). Dividual in this context refers to the composite nature of personhood—the aspects of identity that are held in common, shared between persons. This perspective views personhood as inherently manifold, as aspects of each person are shared with different groups and communities around them (Fowler 2004, 2010, 2016). Thus, while individual identity is often viewed as unique unto the individual in question, dividual identities are fluid and open.

By focusing on personhood as a composite of dividual identities, rather than a bounded individual, Fowler (2004, 2010, 2016) advocates for a holistic view of identity. According to this view, there is no division between social identity, those aspects of identity concerned with social rights, duties, and roles, and personal identity, an interiorized sense of self. Rather, the identity of an individual is formed as a composite of broader social identities (Díaz-Andreu and Lucy 2005; Fowler 2004, 2010, 2016) such as personhood, sex, gender, age, status, ethnicity, and social power—as well as many others (e.g., Appleby 2010; Connell 1987; Crown 2000; Gilchrist 2010; Gillespie 2008; Harris 1990; Hays-Gilpin 2000; Hegmon, Ortman, et al. 2000; Joyce 2001; Keesing 1975; Lustig 1997; Meskell 2002a; Mills 2000a, 2000b; Plog and Heitman 2010; Potter and Perry 2000; Voss 2008). The nature of this composite identity may vary from person to person, but similar attitudes towards and conceptions of these social forces are shared between members of a community (Fowler 2016). Rather than focusing on a single aspect of identity, therefore, scholars should consider the relationships between different aspects, emphasizing the interface between the individual and the dividual which together construct a person (Díaz-Andreu and Lucy 2005; Fowler 2010, 2016).

Fowler's (2010:353) definition of identity as "a shared similarity of character for several beings or things—the way in which they are identical—but [identity] also refers to the distinctiveness of any group, being, or thing—its specific identity" acknowledges that identity incorporates both 'similarity between' and 'differences among'. In this way, although identity is manifested individually, it demarcates relationships with other people, resulting in the demonstration of group membership through shared social practices. These practices are not merely reflections of group unity, but also develop, contest, and alter the composition and identity of the group itself (Fowler 2010). Therefore, social practices can be understood as the feedback between individuals or groups and the surrounding physical world—spaces, places, and objects. In this way, identity is fundamentally entangled with the material world. The negotiations between social groups directly impact material culture and the structuration of space and place (Fowler 2004, 2010, 2016).

Therefore, identity is not only formed through relationships with other people. The relationships between individuals and the material world are important contexts within which identity formation occurs. Rather than framing these relationships as essentially different than the relationships between people, scholars such as Alfred Gell (1998), Bruno Latour (1999, 2005), and John Robb (2004, 2010) disassociate agency from the bounded, autonomous individual and extend agency to the material world (Meskell 2005; Thomas 2015). Object agency was first described by Alfred Gell (1998:16), who defines agents as entities "who/which are seen as initiating causal sequences of a particular type, that is, events caused by acts of mind or will or intention, rather than the mere concatenation of physical events. An agent is one who 'causes events to happen' in their vicinity." Gell (1998) argues that if people attribute intentionality or personhood to an object, it exercises social agency.

More recently, Bruno Latour (1999, 2005) has proposed that objects intervene in human actions through the construction of relationships or networks between objects and people. For example, it isn't a gun that kills or a person who kills, but a network between the person and the gun which includes the qualities of both entities (Latour 2005; Robb 2010, 2004). Contemporary scholars have suggested further that, regardless of ascribed intentionality, in certain social settings, objects form the impetus for human action (Hendon 2010; Robb 2010, 2004; Thomas 2015). For example, if a group of individuals gathers together to make pottery, one could argue that the pottery itself—and, indeed, the individual components of the pottery such as clay and tempering materials—has agency in the relationship between these people as the motivating force behind their social practice. Approached from another perspective, “the shaping of the pot becomes an act of collaboration between the potter and the mass of wet clay rapidly spinning on the wheel” (Malafouris 2008:34).

These various perspectives are united by the argument that material objects are more than just tools, used for achieving tasks. Rather, material entities—including both objects and environments—shape society, participating in the construction, transformation, and reproduction of identities within specific social contexts (Boivin 2008; DeMarrais et al. 2004; Gell 1998; Hodder 2012; Hubert 2016; Latour 2005; Meskell [editor] 2005; Miller 2005; Robb 2010, 2004; Thomas 2015). Society exists because of the interactions of people and the material world (Latour 2005:4; Watts 2013). Material things mediate and form the context for relationships between people. Therefore, agency and identity are fundamentally material (Robb 2010). This emphasis on materiality embeds humanity within a relational landscape, where humans form relationships not only with other humans but also objects, animals, and places (Thomas 2015). Through their role as semiotic indexes, manifesting social relationships as a byproduct of their involvement in social actions with people and other objects, objects can be conceptualized as part of the construction of social memory and identity (Gell 1998; Hendon 2010:82–83; Preucel 2006). Rather than reducing objects to tools or technologies, engaging with the relational agency of objects recognizes the important role objects play within the creation, maintenance, and transformation of identity (Thomas 2015).

From the discussion of theory above, it is evident that identity is fundamentally tied to materiality: identity is shaped, reflected by, or expressed through material culture. The research presented in this study is based on identifying the processes by which people and groups signal differentiation or affiliation with others. I focus on the negotiation of identities in everyday life, taking the view that identities are primarily constructed and embodied through the daily practices of social interactions with other people, objects, places, and spaces (e.g., Díaz-Andreu and Lucy 2005; Hall 1990; Hendon 2010; Hubert 2016; Jones 1997; Robin 2013). Over the course of daily life, people become enmeshed in relationships with other people, materials, and objects, engendering intersubjective relationships that reflect culturally specific beliefs and social contexts (Dobres 2000; Hendon 2010; Meskell 2004). As these daily practices are mediated by material culture, evidence of identity negotiation may be seen in the archaeological record through objects that materialize the discourse of everyday life.

Archaeology and Style

Societies are created through individual interactions and relationships. Routine behaviors structure the communities in which individuals live as well as the distribution of social relationships between individuals across the landscape. These social networks that together constitute society are situated within a material world, where social interactions are negotiated through material culture (Díaz-Andreu and Lucy 2005; Hendon 2010; Hubert 2016; Jones 1997). Artifacts, the material evidence of social relationships, can be used to identify the multiple, overlapping, nested relationships in which individuals engage in the social processes of daily life (Duff 2002). Therefore, an important archaeological task is to recognize the continuities and discontinuities in social relationships indicated by material culture.

To this end, archaeologists have concentrated on material culture, in particular the style of material culture, in order to access and understand identity in archaeological contexts. Processual archaeology emphasized the adaptive value of material culture, encapsulating identities that were cultural responses to external, environmental conditions (e.g., Binford 1963, 1965). The post-processual movement brought a recognition that these previous perspectives were normative, and did not account for individual agency. Post-processual thought understood material culture as a means by which actively constructed identities were communicated between groups and individuals (e.g., Wiessner 1983, 1984; Wobst 1977). Practice theory introduced the idea of a dialectical relationship between identity and the material world. People produce material culture, and through the practices of production, people recursively create and reinforce the social relationships that constitute society (e.g., Lechtman 1977; Lemonnier 1986, 1992).

More recently, situated learning theory (Lave and Wenger 1991; Wenger 1998) has transformed archaeological understanding of the relationship between identity and material culture, recognizing the active role that material culture takes in the creation, maintenance, and transformation of inter-personal networks as well as the importance of learning in community formation (Blair 2016; Crown 2001, 2007, 2014, 2016; Eckert 2012; Fenn et al. 2006; Gilpin and Hays-Gilpin 2012; Gosselain 2016, 2008a, 2011a; Hendon 2010; Huntley 2006; Huntley et al. 2012; Joyce 2012; Kamp 2001; Lyons and Clark 2012; Mills 2016; Minar 2001; Roddick 2016; Sassaman and Rudolphi 2001; Schleher et al. 2012; Schoenbrun 2016; Snow 2012; Stark 2006; Stone 2016; Wallaert-Pêtre 2001). The following section will explore archaeological approaches to studying material culture and style, beginning with a summary of foundational literature and concluding with a discussion of situated learning theory: an approach to artifact style that engages with the relational, contextual, and multi-scalar nature of identity and style.

Foundational Approaches to Style in Archaeology

Archaeology has been focused on the study of style and technology almost since the inception of the discipline. Various theoretical approaches have been advanced which relate technology to production and reproduction of practice and social identity, placing emphasis on how the interactions between individuals and groups produce both continuity and change in social structures manifest in technology (Dietler and Herbich 1998; Dobres and Hoffman 1994; Hegmon 1992, 1998; Schiffer 1976, 2011). Dialogues on material culture style have largely paralleled those on social identity. Some scholars have argued that style in artifacts is primarily the result of individual agency and purposeful behavior, a form of active communication and conscious expression (Wiessner 1983, 1984; Wobst 1977). Others approached style from a structuralist perspective, suggesting that style in artifacts is largely the outcome of unconscious behavior instilled through enculturation. Any communication as a result of passive style is unintentional (Binford 1963, 1965; Sackett 1977, 1985, 1986, 1990).

Artifact variability was explained by Lewis Binford (1963) as cultural drift; variation in material culture that arises inevitably as the result of a lack of contact between groups. The appearance of an artifact was determined primarily by its function and use; the impact of cultural traditions on artifact variability was secondary. Because processual archaeology viewed the role of cultural traditions as secondary in determining the style of material culture (Binford 1963, 1965), the significance of cultural identity and ideology in shaping the appearance of artifacts remained largely unexplored until the advent of postprocessual archaeology.

A seminal article by Martin Wobst (1977) argued that the style of material culture was functional, a strategy of information exchange. Objects allow a unique form of information exchange. An individual actor can produce an object which conveys a message, thus allowing the message to be transmitted without requiring the physical presence of the actor. In other words, through objects messages can be received without the presence of an individual emitting a message. Wobst argues that once produced, the messages communicated by these objects stay consistent, changing far slower than messages transmitted via other modes of communication. This fostered the standardization of certain types of messages (Wobst 1977). Although the energy and matter costs are greater for information conveyed through material culture style than through other modes—requiring the production of the object in question—once the object is produced, the message can be broadcast multiple times at little further cost (Wobst 1977). Thus, objects link members of a community who are not in constant verbal contact, express emotional states, mark social identity, and convey messages of authorship and ownership, among many other uses (Wobst 1977).

Polly Wiessner (1983, 1984) echoed Wobst, suggesting that artifact style was primarily a means of expressing intentional messages regarding personal and communal social identity. Wiessner (1983) defines style as the variation in material culture that cannot be attributed to factors such as materials, technology, or function. From this perspective, style is a conscious construction of the individual actor, unrestricted by functional considerations and, therefore, fully intentional. According to Wiessner (1983), style associated with material culture can be either "emblemic" or "assertive" in nature. Emblemic style transmits a message about communal identity to a defined target audience while assertive style carries information regarding individual identity. Items that exhibit style are those that are naturally important to social identity, or otherwise efficient for transmitting messages of identity (Wiessner 1983).

In direct contrast to Wiessner, James Sackett (1977, 1985, 1990) proposed the isochrestic model, arguing that artifact style is largely the byproduct of normative structures evident in artifact manufacturing techniques. According to Sackett's model (1985, 1990), for every given technology there exists a spectrum of functional equivalents, referred to by Sackett as isochrestic variations. Artisans within any given group are aware of only a few of these isochrestic variations and often only select one of the options available to them. The variations available to the individual actor are dictated by the social boundaries instilled into the individual actor through enculturation. Thus, the choices that the artisans make are dictated in large part by the technological traditions of the society into which they have been enculturated. By picking the variations allowed by the technological traditions of society, the individual actor selects the style of the object and, through this selection of style, reveals the social boundaries governing individual behavior. In this way, the socially bounded act of selecting between these isochrestic variations is stylistic behavior and is diagnostic of social identity (Sackett 1985, 1990). Sackett (1985, 1990) acknowledges the existence of active style, which he describes as messaging generated by self-conscious and deliberate behavior by artisans to define and maintain boundaries between social groups; however, he argues that the majority of information carried by artifacts is latent, a residue of the isochrestic choices made unconsciously by artisans during the process of manufacture.

The ensuing debate between James Sackett and Polly Wiessner throughout the 1980s polarized discussions on the nature of artifact style to the extent that their approaches are often considered to be diametrically opposed (Dietler and Herbich 1998; Hegmon 1992, 1998; Wiessner 1990). However, both approaches can be critiqued for assuming an overly simplistic distinction between active and passive definitions of style and, by extension, objective and subjective definitions of social identity. Each of these perspectives focuses on a potentially complementary aspect of style. Active and passive models provide valuable insights into the true nature of style which, when combined, provide a more holistic understanding of material culture than either offers separately (Dietler and Herbich 1998; Dobres and Hoffman 1994; Hegmon 1992, 1998). Some scholars have integrated these two perspectives and merge elements of structure and agency within a single approach to artifact style. Several of these approaches have proved vital to anthropological understandings of material culture including Christopher Carr's (1995a, 1995b) unified middle range theory of artifact design, Heather Lechtman's (1977) technological style, and Pierre Lemonnier's (Lemonnier 1986, 1992, 1993) anthropology of technology.

Christopher Carr's (1995a, 1995b) unified middle range theory of artifact design proposes a strategy to differentiate between specific artifact attributes that communicate an active message and those that reflect enculturative identity. According to this theory, the attributes of artifacts are arranged hierarchically based on three criteria: artifact/attribute visibility, the position of the attribute in the design sequence of the artifact, and the position of the attribute in the artifact production sequence (Carr 1995a). Of these criteria, the visibility of the attribute or artifact in question is the most important in determining the potential of the attribute or artifact for communicating messages. The visibility of the artifact or attribute indicates the size and nature of the target audience of any message being communicated (Carr 1995a).

Physical visibility is influenced by several factors including the size of the attribute or artifact, the frequency with which an attribute occurs on an artifact, the degree of contrast between attributes, the complexity of the attribute, and the relative order in which the attribute is manufactured within the production sequence (Carr 1995a). Carr also considers the context in which an artifact is used; ubiquity, average viewing time and distance, viewer attentiveness, openness of setting, number of viewers, and lighting conditions all affect the visibility of an artifact or artifact attribute. The higher the physical and contextual visibility of the artifact or attribute, the greater its potential for communication. As high visibility artifacts and attributes are by nature more likely to become widely distributed through social processes other than migration, they are not reliable indicators of population movement (Carr 1995a). In contrast, artifacts and attributes with lower visibility have less message potential; rather, they reflect a shared enculturative background and settlement history. Therefore, these are less likely to be imitated and spread across the landscape without associated population movement. These attributes are also less subject to careful scrutiny and tend to be more stable through time (Carr 1995a).

The concept of technological style, as proposed by Heather Lechtman (1977), focuses attention on what technology can reveal about culture. Analysis of technological style is based on the premise that technologies are the product of cultural context and are shaped by the social settings in which they are developed (Lechtman 1977). According to Lechtman, technological style is the expression of cultural patterning, learned through enculturation. Artifacts are the products of these enculturative cultural practices (Lechtman 1977). Therefore, by studying the style of technology, scholars can learn about the behavioral patterns of the people who produced the technology (Dietler and Herbich 1998; Dobres and Hoffman 1994; Hegmon 1992, 1998; Lechtman 1977).

Lechtman (1977:4) defines style as "the manifest expression, on the behavioral level, of cultural patterning that is usually neither cognitively known nor even knowable by members of a cultural community." It is evident from this definition that Lechtman's theory of technological style is derived from the structuralist position. However, Lechtman also recognizes individual agency in the production of style. According to Lechtman (1977), although some messages do not operate at a conscious level, functioning rather as passive symbols of membership in a social group, other messages are actively communicated. Technological style does not consist simply of tradition-bound choices selected arbitrarily from all possible functional equivalents. Although Lechtman (1977) argues that normative structures do impact the techniques of manufacture, she also suggests that artisans and crafting communities operate with agency within the normative structures that dictate technological and stylistic choices (Bowser 2000; Dobres and Hoffman 1994; Gosselain 1992, 2000; Hegmon 1992; Hegmon, Nelson, et al. 2000; Lechtman 1977; Lemonnier 1986, 1992, 1993; Lyons et al. 2008; Neuzil 2005a, 2008; Pfaffenberger 1992; Schiffer 1976, 2011; Wallaert-Pêtre 2001).

Further, Lechtman argues that the production of technology within a cultural system reinforces the normative values and practices of the system. Not only the artifacts, but also the activities that produce the artifacts, are stylistic. Through engaging in productive activities, the manufacture of technology reinforces meaning and structure for the artisans involved (Hegmon 1992; Lechtman 1977). The production of technology, therefore, is best considered a recursive practice that simultaneously produces and is the product of normative cultural values (Dietler and Herbich 1998; Dobres and Hoffman 1994; Hegmon 1992, 1998; Lechtman 1977). By treating technological style as a symbolic system in which individual actors have some agency and recognizing the recursive relationship between technology and the normative values of a culture, Lechtman successfully bridges the dichotomy between structure-based and agency-based approaches to material culture.

Pierre Lemonnier’s (1986, 1992, 1993) anthropology of technology is similar in many respects to Lechtman’s technological style. According to Lemonnier, above all, technology is social production. The anthropology of technology links technology with techniques, human behaviors of technological production, in order to explicate human social relations. Like Sackett (1985, 1990), Lemonnier (1986, 1992, 1993) recognizes the existence of myriad functionally equivalent technologies. There are several restrictions on an individual's ability to choose among these functional equivalents. The first restrictions are physical and material constraints. Within the limits imposed by the physical world, choices may be dictated by social structures. Finally, within the structure of society, individual agents have the power to intentionally create symbolic images and representations (Lemonnier 1992).

The level of self-awareness associated with these technological behaviors can vary. According to Lemonnier, any technological action implies the existence of totally unconscious processes, such as those that guide the movement of the hands and fingers. Technological action may also involve specific technological knowledge, which may range from conscious to automatic, but still learned, knowledge. Finally, technology may include symbols and other consciously constructed informational content (Lemonnier 1992). Lemonnier acknowledges the importance of both conscious and unconscious actions in the production of technology and the creation of both active and passive social meaning. Thus, technology is the product both of a larger symbolic system and the enculturative processes of a society and, as such, can only be understood as part of the larger cultural context (Lemonnier 1986, 1992, 1993). According to Lemonnier, technology manifests a cultural worldview even as it shapes the world (Dietler and Herbich 1998; Dobres and Hoffman 1994; Hegmon 1998; Lemonnier and Pfaffenberger 1989).

Situated Learning Theory: A Relational Approach to Style

Situated learning theory, developed by Jean Lave and Etienne Wenger (Lave and Wenger 1991; Wenger 1998), has transformed archaeological understandings of artifact style (Joyce 2012; Minar and Crown 2001; Roddick and Stahl 2016). Situated learning theory models learning as a process situated in and structured by social relationships and participation in communities of practice (Lave and Wenger 1991; Wenger 1998). Central to situated learning theory are three concepts: situated learning—learning situated within and structured by social relationships and participation in everyday life; legitimate peripheral participation—the process through which learning occurs; and communities of practice—the locus of learning, constituted through mutual engagement of people in a joint enterprise and sustained through continuing practice (Lave and Wenger 1991; Wenger 1998). Together these concepts stress learning as a fundamentally social activity in which novices, through the development of relationships with experts and fellow novices, evolve from neophytes to full participants in the sociocultural practices of a community (Lave and Wenger 1991:29). This process of changing participation is accompanied by identity transformation, both for the individual and the community (Wenger 1998:11). Thus, situated learning theory uses the social processes of mutual engagement, joint enterprise, and shared repertoire to link practice, identity, and community (Wenger 1998).

The social structures within communities of practice create and define opportunities for learning both the knowledge and skills necessary to produce material culture and the appropriate cultural practices associated with the production of material culture (Lave and Wenger 1991; Wenger 1998). Learners join communities of practice through legitimate peripheral participation: a process by which novices acquire skills and knowledge by engaging in mutual practice with experts (Lave and Wenger 1991; Minar and Crown 2001; Roddick and Stahl 2016). Legitimate peripheral participants may participate in the practice of an expert only to a limited degree: apprentices often begin their training by performing the least dangerous, skilled, and complex tasks (Crown 2014; Lave and Wenger 1991:72). As novices participate peripherally in these communities, they master the knowledge and skills required to move towards full participation in the sociocultural practices of each community (Lave and Wenger 1991). This social process both includes and subsumes the learning of knowledge and skills. By participating in a community of practice in order to learn the appropriate knowledge and skills to create a technology, learners are also exposed to the social relationships and networks necessary to become active and successful members of that community (Lave and Wenger 1991). This approach emphasizes the social relationships inherent to technological production and the socially negotiated nature of material culture itself (Lave and Wenger 1991; Wenger 1998).

Communities of practice develop through mutual engagement in a collective endeavor. They are organized through shared histories of learning, communal ways of doing, and constituted by the ways in which people interact as they engage in daily activities (Wenger 1998:55–57, 73). In this way, situated learning theory defines community membership not as a byproduct of language or social structure, but through the engagement of individuals in a common enterprise (Hanks 1990:221; Hendon 2010:60). Communities of practice are usually informal; membership in a community may not be consciously or officially recognized. However, communities of practice are an integral part of daily life as a mechanism for the evolution of practice, the inclusion of newcomers, and the development of social identities (Wenger 1998). Learning appropriate knowledge and skills is not merely a condition of static membership in a community of practice; it is a form of social participation, an evolving membership which becomes a source of identity (Wenger 1998).

Participation in communities of practice shape identity by creating and maintaining relationships between artisans, objects, and places. Relationships within communities of practice aren't just between people, but also between people and the places they occupy, and the material culture they use and create (Hendon 2010:60; Lave and Wenger 1991; Wenger 1998). Thus, communities of practice are fundamentally local, tied to specific locations and landscapes, and material (Roddick and Stahl 2016; Wenger 1998). Although Wenger (1998) considered objects as the material manifestations of communities of practice rather than participants in communities of practice, recent research demonstrates the ways in which objects act as agents within communities of practice, structuring the relationships among human participants (Roddick and Stahl 2016; Roddick and Stahl [editors] 2016; Sassaman 2016; Schoenbrun 2016).

Like identities, communities of practice are not singular. People residing together participate in multiple communities of practices, some situated in residential places and others not (Hendon 2010; Lave and Wenger 1991:36; Neuzil 2005b; Roddick and Stahl 2016). Making ceramics, for example, requires many steps. These include gathering materials, requiring knowledge of how to recognize a workable clay, how to gather it, what types of inclusions work best, where to find and gather these, where to get water, and how to transport these materials to where pottery will be made. A potter needs to know how to process materials to make them into a workable clay, then form and decorate a vessel. Potters must gather fuel, create a firing structure, and appropriately fire the completed vessel. This may include learning the prayers and rituals associated with making pottery (Crown 2014). Each of these steps may involve participation in a different community of practice. Knowledge of the symbolic, ritual, political, and ideological meanings of decorative elements is likely not restricted to potters alone (e.g., Gilpin and Hays-Gilpin 2012), and may indicate participation in a broader social community. In contrast, knowledge of what constitutes a workable clay and the appropriate rituals associated with making pottery may be restricted to a much smaller community or working group.

A community is traditionally considered to be relatively small, a location of regular face-to-face social interaction (Duff 2002:12; Murdock 1949; Varien and Potter 2008:2, 19–23).

Consistent with this, communities of practice are typically understood to be small in scale, limited to people who engage with each other in person (Roddick and Stahl 2016; Wenger 1998). This definition of community emphasizes spatially proximal relationships. However, communities may be defined in other ways. Communities, when considered from a broader perspective, are not fixed social units defined solely by spatial proximity. Rather, a community is best understood as a process of interaction and negotiation that takes place between social actors within both physical and semiotic spaces (Isbell 2000; Schachner 2008:171–175; Varien and Potter 2008:2–6). Considering communities as fluid and changing rather than natural and arbitrary units of social organization underlines the importance of understanding how social organization changed and was contested. Rather than emphasizing the identification of static communities, this perspective focuses on understanding the ways that communities form and how membership in communities is negotiated.

When framing the concept of communities of practice, Wenger (1998:173–181) proposed that the processes of imagination and alignment allow the creation of social relationships that transcend direct face-to-face engagement. For example, communities may be formed through the creation of semiotic social spaces (Gee 2005:15) or spaces of experience (Gosselain 2008a:168): areas of social interaction not defined by physical space, but by participation in shared practices. Such communities may encompass people spread over large distances (e.g., Förster 2013:331–332; Gosselain 2008a:168, 2016:48–49; Harris 2016; Sassaman 2016; Schoenbrun 2016; Stahl 2016). In such cases, knowledge is shared within socially cohesive but spatially discontinuous communities. To address the role of such communities, Etienne Wenger (Wenger 1998:126–127) introduced the concept of constellations of practice, describing learning groups too broad, diverse, or diffuse to be treated as a single community of practice, but sufficiently similar to be acknowledged as a recognizable group (Mills 2016; Roddick 2016; Roddick and Stahl 2016; Roddick and Stahl [editors] 2016). Like communities of practice, constellations of practice may be informal, formed unintentionally (e.g., Gosselain 2016; Joyce 2004; Roddick 2016), or created with intent (e.g., Sassaman 2016; Schoenbrun 2016). From this perspective, learners belong to communities of practice that have independent histories but which are woven into broader learning traditions or networks (Collar et al. 2015; Jewson 2007; Knappett 2011; Mills 2016; Roddick and Stahl 2016). Communities of practice are essentially local, bound to specific locations. In contrast, constellations of practice are broad, even regional in scale (Roddick and Stahl 2016; Wenger 1998).

These two concepts—communities of practice and constellations of practice—allow archaeologists to explore the nature of communities and expression of identities at a variety of scales. Communities of practice, with its emphasis on the micro-processes of learning, explores how interactions between learners, experts, and the material world shapes identity, values, and knowledge networks, particularly within crafting communities (e.g., Chaiklin and Lave 1993; Dietler and Herbich 1998; Fenn et al. 2006:61; Gosselain 2016; Herbich 1987; Van Keuren 2006a:91; Schleher et al. 2012), permitting archaeologists to examine community boundaries at small scales of interaction. Simultaneously, however, communities of practice intertwined into a larger constellation of practice may cross-cut and encompass larger-scale social entities (e.g., Blair 2016; Curewitz and Goff 2012; Gilpin and Hays-Gilpin 2012; Gosselain 2016; Huntley et al. 2012; Mills 2016; Roddick 2016; Sassaman 2016; Schoenbrun 2016). Constellations of practice provide archaeologists with a way to conceptualize regional identities that can be recognized through material culture but cannot be tied to specific peoples or places: a social network encompassing a heterogeneous assemblage of crafters who, for example, recognized and used a shared corpus of motifs, without assuming complete homogeneity in practice (Joyce 2012; Roddick and Stahl 2016).

Archaeologists focused on craft production as a site of embodied cultural transmission use communities and constellations of practice as a way to conceptualize how social relationships are transformed or maintained through material culture, revealing spatial and social clustering through technological production (e.g., Blair 2016; Crown 2001, 2007, 2014, 2016; Eckert 2012; Fenn et al. 2006; Gilpin and Hays-Gilpin 2012; Gosselain 2008a, 2011a, 2016; Hendon 2010; Huntley 2006; Huntley et al. 2012; Joyce 2012; Kamp 2001; Lyons and Clark 2012; Mills 2016; Minar 2001; Minar and Crown 2001; Neuzil 2008; Ramenofsky 2012; Roddick 2016; Sassaman 2016; Sassaman and Rudolphi 2001; Schleher et al. 2012; Schoenbrun 2016; Snow 2012; Stark 2006; Stone 2016; Wallaert-Pêtre 2001). Among the most influential work on this subject have been studies by Olivier Gosselain (2008a, 2008b, 2011b, 2016) on African potters. These studies emphasize the interrelationship between the social contexts of learning and identity construction, so that ways of doing things become symbols of differentiation and belonging. Gosselain (2008a, 2008b, 2011b, 2016) also emphasizes the multi-faceted, multi-scalar, and situational nature of identities, focusing on the dynamic nature of the processes through which individuals construct, maintain, and negotiate identity.

Gosselain’s most recent work, which historicizes potting practices and social relations in the Niger River area in order to reconstruct the history of the Niger River Polychrome Tradition (NRPT) (2016), specifically emphasizes the fundamentally contextual nature of the relationships among identity, style, and technology. In this case study, Gosselain (2016) finds that, although the NRPT appears to be homogeneous and spatially bounded, several variations are present among its producers. These differences are most visible in the practices of production, ranging from minor variations in painting tools and recipes to important differences in vessel forming techniques (Gosselain 2016:41). This clearly illustrates that visually uniform ceramic traditions produced over a large area may be more appropriately considered to be constellations of practice and cannot be taken as emblematic of a unified social group; rather, they may comprise several smaller communities of practice. This forces us to question the integrity of homogeneous categories of identity, problematizing mapping social and political relationships in the past (Gosselain 2008a, 2016).

Gosselain (2016:46–48) also emphasizes the importance of geographic places and social spaces in mediating between these communities of practice and constituting a supra-communal constellation of practice. Potters in Nigerian villages use several different spaces in the course of ceramic practice including clay extraction sites, firing sites, and weekly markets. Casual or routine encounters between potters of different communities within these practice settings leads to homogenization in tool use, clay-processing techniques, and pottery styles which subsequently lead to the generation of constellations of practice (Gosselain 2016:46–48). This emphasizes the ways in which learning and knowing are shaped by multi-scalar interactions which, in turn, constitute communities and constellations of practice (Roddick and Stahl 2016:24)

A number of other recent studies have illustrated the value of considering multiple scales of practice by exploring the ways in which communities of practice share common historical roots, share certain practices, or engage in overlapping styles or discourses (e.g., Blair 2016; Curewitz and Goff 2012; Gilpin and Hays-Gilpin 2012; Huntley et al. 2012; Mills 2016; Roddick 2016; Roddick and Stahl 2016; Sassaman 2016; Schoenbrun 2016). A study of chemical and isotopic data collected from late prehispanic glaze pigments by Deborah Huntley, Thomas Fenn, Judith Habicht-Mauche, and Barbara Mills (Huntley et al. 2012) makes the point that there were probably many communities of practice, operating at different scales, involved in the procurement of materials and production of pigments. Further, the communities of practice involved in resource procurement may not have been the same as those who produced finished objects. Pigments have many uses other than decorating pottery (Huntley et al. 2012; Shepard 1965; Thomas 2012); therefore, the procurement of pigment for glaze production should be considered within a broader context than ceramic production alone, acknowledging the embedded and overlapping networks of practice involved in pigment acquisition (Huntley et al. 2012).

In a similar vein, Elliot Blair (2016) considers the many communities of practice involved in the production, distribution, consumption, and disposal of glass beads recovered from the seventeenth century Mission Santa Catalina de Guale. Elemental analysis of beads from Mission Santa Catalina de Guale revealed at least six compositional groups that appear to have temporal connections. Blair (2016:115–116) also identified several bead manufacturing communities of practice—characterized by the use of different finishing techniques—and a number of different groups that consumed and disposed of these glass beads. Each bead, over the course of its use-life, interacted with several different, overlapping communities of practice. The intersection of these manifold communities of practice forms a complex constellation of practice responsible for the production of glass, the manufacture of glass into beads, the transport of beads to the Mission Santa Catalina de Guale, and the consumption and disposal of these beads (Blair 2016). In this study, Blair (2016) successfully links micro- and macro-scales of analysis by identifying the relationships between individual communities of practice and the broader constellation of practice.

Other studies have concentrated on the micro-processes of learning in communities of practice. In her article “Motor Skills and the Learning Process: The Conservation of Cordage Final Twist Direction in Communities of Practice” C. Jill Minar addresses the question of why and how cordage production processes, expressed through cordage twist direction visible in cord impressed pottery, were so conservative in the eastern United States. Minar (2001) found that the pattern of distribution in final twist direction differed from the distribution of other ceramic attributes: it was not coterminous with the distribution of ceramic types and it persisted unchanged through time and across large areas, despite changes in other aspects of ceramic technology such as temper type (Minar 2001). In order to understand the archaeological distribution of cordage attributes, Minar (2001) embarked on a survey of modern spinners and found that the learning process was important in the conservation of final twist direction in these communities of practice. Final twist direction was not found to be an active indicator of identity; some spinners were not even aware that twist direction was visible on the finished product. Minar (2001) concludes that the material culture attribute of final twist direction is a byproduct of shared cultural practices, not a deliberate production.

Minar (2001) infers that the conservation of a particular attribute of material culture is a byproduct of the cultural context of the learning process. The conserved attribute is not significant, rather the shared productive action contains social meaning. When a new spinner imitates a teacher, copying the teacher's body position and actions, this causes the learner to produce cordage with the same twist direction as the teacher. When these motor skills become automatized, they are highly unlikely to change without conscious effort. Therefore, without pressing need for change, patterned motor responses engrained through the social contexts of learning help to conserve behavior and the material culture attributes produced by that behavior

(Minar 2001). Based on this, Minar (2001) suggests that distribution of final twist direction in cordage is more likely to indicate cultural interaction groups and social relations than merely the presence of cord-marked ceramic types, as final twist direction both cross-cuts and subsumes cultural groups traditionally defined by ceramic associations (Minar 2001). By identifying the heterogeneous communities of practice within the larger, homogeneous regional technological tradition, this case study illustrates the ways in which considering communities of practice adds nuance and complexity to the archaeological narrative.

Summary

Recent theoretical trends in anthropology have shifted from a focus on objects and structure to an emphasis on agency and, most recently, the multi-scalar relationships between people, objects, and places. The theory discussed in this chapter underscores the importance of social relationships and context in constructing identity. Identity is formed out of relationships with other people, objects, and places. Over the course of daily life, people become enmeshed in relationships with their surrounding social and material environment. The intersubjective relationships engendered by daily practices reflect culturally specific beliefs and social contexts (Dobres 2000; Hendon 2010; Meskell 2004). Through the recursive interactions between material culture and identity, identity becomes embodied in objects as relationships between people and objects constitute identity (Gell 1998; Hendon 2010). In this way, identity is preserved in the products of labor. The concepts of technological style (Dietler and Herbich 1998; Hegmon 1998; Lechtman 1977) and, especially, situated learning theory (Lave and Wenger 1991; Wenger 1998) are powerful tools for exploring the specific ways of crafting, using, and discarding objects in a variety of contexts, allowing archaeologists to more fully explore identity in past societies.

The research presented here will draw on these diverse threads to explore the ways in which people interact with different classes of material culture, focusing on the identities reflected in domestic, utilitarian pottery produced during the A.D. 1200s and 1300s in the U.S. Southwest. People express their identity in the objects and materials they create, whether intentionally or unintentionally, consciously or unconsciously. Equally, identity is shaped by relationships that are developed with material entities. The identity embodied in material culture and the identity shaped by interactions with material entities is highly contextual. Different identities are embodied in different material objects, and diverse facets of identity are affected by relationships with various classes and varieties of material entities. By engaging with domestic, utilitarian material culture this research emphasizes that, although we cannot hope to understand a community without exploring the ways and reasons people construct and interact with beautiful, important, and valuable material entities, we equally must not lose sight of the importance of interactions between people and mundane, domestic contexts and objects. Because identities are contextual and situational, we cannot simply focus on the most highly visible categories of material culture to explore identity: different identities are reflected in and shaped through interactions with utilitarian objects. By considering the diverse identities embodied in different classes of material culture, as well as those revealed at different scales of social organization, this research will engage with the complex identities formed, transformed, and embodied within the Pueblo IV aggregated communities of the Homol'ovi Settlement Cluster.

CHAPTER 3: PATTERNS IN POPULATION MOVEMENT

Population movement is a central theme in the social history of the U.S. Southwest. Migration and movement permeate the oral histories of Puebloan groups (e.g., Bernardini and Fowles 2011; Dongoske et al. 1997; Ferguson et al. 2000; Ferguson and Hart 1985; Ferguson and Loma'omvaya 1999; Kuwanwisiwma and Ferguson 2004, 2009). The Hopi believe that they entered this world after travelling through earlier worlds characterized by disorder and chaos. Máasaw instructed the ancestors of the Hopi to journey to the Hopi Mesas, leaving footprints to mark their migration (Bernardini 2005:26; Dongoske et al. 1997; Ferguson et al. 2000; Ferguson and Colwell-Chanthaphonh 2006:95; Kuwanwisiwma and Ferguson 2004, 2009; Malotki 1993:445). Zuni oral traditions describe their ancestors emerging from the underworld near Ribbon Falls in the Grand Canyon. From here they journeyed in search of the Middle Place (Dongoske et al. 1997:603–604; Ferguson and Hart 1985:22; Hedquist 2017:219). Thus, for Puebloan groups, movement is an essential part of identity, both in the past and in the present.

Similarly, population movement has featured prominently in archaeological narratives of the prehispanic U.S. Southwest (e.g., Adams 1996a; Bernardini 2005; Cameron 1995; Clark 2001; Duff 2002; Glowacki 2010; Haury 1958; Herr 2001; Lindsay 1987; Lyons 2003; Mills 2011; Mills et al. 2013, 2015; Neuzil 2008; Ortman 2012; Schachner 2012; Varien 1999). These archaeological studies echo the themes evident in Puebloan oral traditions, showing that population movement, migration, and aggregation occurred throughout the U.S. Southwest—at varying scales, over large and small distances—and shaped how people created and maintained social relationships. This chapter discusses archaeological approaches to the study of migration and aggregation, exploring the ways that these patterns in population movement are understood through the archaeological record.

Archaeological Approaches to Migration

The joint processes of migration and aggregation are themes that pervade archaeological research on the U.S. Southwest (Adams 1996a; Bernardini 2005; Cameron 1995; Ciolek-Torrello 1997; Clark 2001; Cordell 1995; Dean 1996; Duff 1998, 2002; Ennes 1999; Fewkes 1900; Fish et al. 1994; Gilman 1997; Haury 1958; Herr 2001; Hill et al. 2004; Lindsay 1987; Lyons 2003; Mills 1998, 2011, Mills et al. 2013, 2015; Nelson 1999; Ortman 2012; Reid 1989, 1997; Reid and Whittlesey 2007; Rice 1998; Schlanger and Wilshusen 1993; Spielmann 1998, 2004, Stark et al. 1995a, 1995b; Stone 2016; Stone and Lipe 2011; Upham and Reed 1989; Varien 1999; Woodson 1999). Haury's (1958) exploration of migration at Point of Pines Pueblo (AZ W:10:50[ASM]) is among the earliest and most influential studies of immigrant communities in the U.S. Southwest. His work at Point of Pines has been built upon and expanded by many studies (e.g., Clark 2001; Herr and Clark 1997; Hill et al. 2004; Lyons 2003; Lyons and Lindsay 2006; Neuzil 2005a; Riggs 2005; Stone 2016, 2002, 2003, 2005; Thompson 2000; Woodson 1999).

Haury delineates general principles for detecting migration through the archaeological record, arguing that archaeologists must be able to distinguish between evidence of population movement and other cultural processes. The primary conditions by which archaeologists may identify migration are: 1) if a cultural complex appears in the archaeological record which is easily identifiable as new and different from the local cultural complex, and 2) if this cultural complex both reflects borrowed elements from the local community and maintains continuity with its own cultural pattern (Haury 1958:1). Although these two conditions may be indicative of cultural processes other than migration, the likelihood that they reflect population movement is increased if it is possible to identify: 1) an area in which the intrusive cultural traits are the normal pattern, and 2) a time equivalency between the manifestation of the cultural complex both in its area of origin and in its area of displacement (Haury 1958:1).

Haury illustrates these principles at the site of Point of Pines, AZ W:10:50 (ASM), arguing that a large room block, built at the site during the thirteenth century, was constructed by immigrants. An array of evidence supports his hypothesis. The room block has been tree-ring dated to A.D. 1262-1293, with clustering between 1280 and 1285, indicating that this was likely the period in which the majority of rooms were built. These dates coincide with a period of climatic stress in northern Arizona that is associated with the depopulation of the Kayenta area (Haury 1958:4–5). The architecture of this room block is substantially different from that of the rest of the site, featuring larger rooms that lacked features such as formal the stone-lined fire boxes and built-in masonry storage cubicles which occur in the other room blocks at Point of Pines (Haury 1958:2).

The ceramics found in this distinctive room block also differ from those found in the rest of the site. Although the utility wares were manufactured in the local tradition using local materials, the decorated assemblage is dominated by Maverick Mountain Series pottery—vessels made of local materials but manufactured in the Tsegi Orange Ware tradition of the Kayenta region (Haury 1958:2–3; Lindsay 1987; Lyons 2012; Lyons and Lindsay 2006:23–25). There is other clear evidence of objects being transported into the Point of Pines region from the Kayenta area. Seeds from the squash *Cucurbita mixta*, a plant most commonly recovered in the cliff dwellings of the Mesa Verde area in the San Juan Basin, were found in this room block. Also, corn recovered from this room block was more similar to corn from the Kayenta area than it was to corn recovered from elsewhere in the Point of Pines area (Haury 1958:3). Haury also argued that wooden artifacts from this room block have tree growth patterns which do not occur in the Point of Pines region; however, this claim has since been refuted (Parker 1967).

Many of the rooms in this room block were destroyed by fire. Haury argues that they were occupied at the time of burning, as several were full of corn, suggesting that the indigenous occupants of Point of Pines were hostile to the immigrants (Haury 1958:2, 6). Haury's assertion that the immigrants were driven out by the indigenous occupants of Point of Pines may be incorrect (Lyons et al. 2017). Although burning may be evidence of conflict (Kuckelman et al. 2002; LeBlanc 1999), research throughout the U.S. Southwest suggests that pueblos and ritual spaces may also be intentionally burned by the occupants as a form of closure (Adams 2016a; Duff 2002:74–75; Eddy 1974; Lightfoot 1993; Montgomery 1993; Steward 1933; Walker 1995; Wilshusen 1986). Ethnographic information from the Hopi Mesas suggests that, although burning is not a normal closure event, it may be used to purify sites associated with the abandonment of the proper Hopi lifestyle (Adams 2016a; Brew 1949; Courlander 1982; Parsons 1939; Walker 1998; Whiteley 1998). Pueblo structures are not especially flammable; therefore, corn was likely added deliberately to rooms in order to facilitate the burning process (Adams 2016a; Icove et al. 2006; Vonarx and Adams 2006).

Northern style ground stone technologies, first introduced to the Point of Pines area by Kayenta immigrants, produced using local materials and recovered from contexts that post-date this burning event (J. Adams 1993, 1994, 2010) suggest the continuing presence of Kayenta cultural traditions at Point of Pines after the destruction of the immigrant room block. Although the presence of technology does not in and of itself indicate the presence of Kayenta people—indigenous people could have learned Kayenta technology and reproduced it themselves—it does clearly indicate that Kayenta cultural traditions were still valued at Point of Pines after the immigrant room block was burned. Recent research on burials from the Point of Pines region found that people identifiable as Kayenta immigrants, based on the presence of cradleboard-induced cranial deformation and the practice of burying people in a flexed rather than extended position, were present in the Point of Pines area—albeit in small numbers—more than 100 years prior to the construction of the Kayenta room block identified by Haury, and these Kayenta burial traditions continued alongside the local tradition until the depopulation of the region in the 1400s (Rodrigues 2008). Further, analysis by Patrick Lyons suggests that the room block identified by Haury more likely functioned as a "structure of orientation" or a communal structure than as a residential structure and that this structure was burned as an act of ritual decommissioning (Lyons et al. 2017). Lyons and his co-authors (2017) suggest that Kayenta immigrants resided in other parts of Point of Pines Pueblo, a suggestion supported by burial evidence indicating that all but three burials containing the remains of Kayenta individuals were interred in cemetery areas containing local individuals associated with other room blocks.

If the Kayenta immigrants had been driven out of Point of Pines, as Haury suggested (1958:6), the continuation of Kayenta technological and funerary traditions by the indigenous community would have been unlikely. These lines of evidence call into question Haury's interpretation of the burning of this room block as evidence that the people from the Kayenta region who migrated to Point of Pines were driven out. Nonetheless, the evidence presented by Haury convincingly demonstrates a small scale migration from northern Arizona to the Point of Pines region at the end of the thirteenth century. The various lines of evidence from Point of Pines fulfill the conditions Haury proposes for detecting migration in the archaeological record. The architecture and ceramics represent a new cultural complex that was rapidly introduced into the area and subsequently maintained. The source area of these architectural and ceramic complexes can be identified as the Kayenta region, an area depopulated at the same time as these intrusive cultural elements arrived at Point of Pines (Haury 1958:4–6).

David Anthony's (1990) influential work "Migration in Archaeology: The Baby and the Bathwater" outlines a general theory of migration applicable to archaeology. Unlike earlier approaches which focused on migration as a single event, Anthony (1990) discusses migration as a process, predictable and constrained by specific factors such as social organization, exchange relationships, and transportation technologies. He considers both long and short distance migrations and describes several patterns of population movement associated with long distance migration specifically. These include leapfrogging, migration streams, and return migrations (Anthony 1990:899–905).

Anthony (1990:899–891) also discusses the various conditions that favor migration. He proposes that migration is most likely to occur when there are negative stresses in the home region (push factors) and positive attractions in the destination region (pull factors), and the transportation costs between the two regions are acceptable. This is known as the push-pull model of migration. Migration, therefore, becomes more likely as both the home negatives and destination positives increase, and as the transportation costs decrease. Additionally, the flow of information is vital to the process of migration. Access to information about potential destinations can either restrict or increase the mobility of migrants. Pull factors, for example, are only relevant when information is available about destinations. Push factors can often only be conceptualized by comparison to the opportunities at another location. Therefore, people tend to migrate only to areas where they have sources of information, such as relatives, friends, or former residential experience. Anthony (1990:904–905) suggests that people are more likely to migrate if they migrated before; a history of mobility predisposes communities towards further migration.

Anthony was among the first scholars to develop a general theory of migration based on data from other disciplines such as sociocultural anthropology and demographic studies (Lyons 2003). As such, Anthony's work had the effect of reviving migration research in the archaeology of the U.S. Southwest (e.g., Clark 2001; Lyons 2001, 2003). Influences from Anthony's article are seen in many migration studies in the region (e.g., Adams 1996b; Cameron 1995; Ciolek-Torrello 1997; Clark 2001; Dean 1996; Duff 1998; Lyons 2003; Mills 1998; Reid 1997; Rice 1998; Spielmann 1998). However, Anthony's model was not without flaws. Anthony may be criticized for not fully exploring the possible causes for population movement. He explains large scale, long distance movements with reference to economic and environmental issues (Anthony 1990:902); however, the decision to migrate may be based on other factors such as conflict, persecution, disease, resource over-exploitation, population pressure, or factional disputes (e.g., Herr and Clark 1997; Ortman and Cameron 2011; Stanislawski 1973). Population movement itself may exert strong pushes and pulls: migration creates areas of population density and scarcity across the landscape which, along with associated developments in socioeconomic conditions, may trigger further migration (e.g., Clark 2001).

Another weakness of Anthony's theoretical model of migration is that it did not focus on material culture correlates of migration. Because of this shortcoming, Anthony's theoretical model is often used in conjunction with other theories and models that address the relationship between population movement and material culture. One such model is the enculturation and co-residence model developed by Jeffery J. Clark (2001). Clark's model focuses specifically on the detection of migration in the archaeological record and the traits of material culture most useful for tracking population movement (Clark 2001; Lyons 2003). Clark (2001:2) defines migration as "long-term residential relocation beyond community boundaries by one or more discrete social units as a result of a perceived decrease in the benefits of remaining residentially stable or a perceived increase in the benefits of relocating to prospective destinations." This definition offers a number of advantages: it filters out non-migration population movement, focuses attention on population movements that are likely to have a significant social or cultural impact, and emphasizes the fact that migrations are a process, not an event. Clark (2001) states that although it is relatively simple to detect migration resulting in regional depopulation or population movement into sparsely populated areas, demonstrating migration into regions that are already substantially occupied is more difficult. In order to be detectable archaeologically, such migrations must be accompanied by assemblages that are discernibly different from those of local groups. However, the appearance of new forms of material culture within a region can be the product of processes other than migration, such as exchange and emulation (Clark 2001).

Clark suggests that the material remains of migration may be distinguished from material culture associated with emulation and exchange through an understanding of enculturation and ethnicity. Clark (2001:8–9) subscribes to the instrumentalist definition of ethnicity, describing it as "a conscious and active display of group identity based on common heritage (real or perceived)." Enculturation encompasses more passive aspects of social identity, "the process by which groups transmit culture knowledge between generations, both consciously and unconsciously" (Clark 2001:9). Drawing on an array of concepts such as cultural drift (Binford 1963, 1965), *chaîne d'opératoire* (Lemonnier 1986; Leroi-Gourhan 1964), isochrestic variation (Sackett 1977, 1985, 1990), technological style (Lechtman 1977), and Christopher Carr's (Carr 1995a, 1995b) unified middle range theory of artifact design, Clark (2001) suggests that style in artifacts may result from both ethnicity and enculturation: style may be a conscious or unconscious expression of identity. Objects with higher physical and contextual visibility likely convey ethnic identity, while objects with low physical and contextual visibility reflect enculturative identity.

Clark (2001) argues that in order to track migration, archaeologists should focus on artifacts and attributes with low physical and contextual variability by emphasizing everyday domestic contexts over public and ritual contexts. The enculturative identity expressed by these objects and attributes is more stable over time and space, and less likely to be intentionally altered or manipulated than more active forms of style and social identity. Therefore, enculturative identity is a more reliable indicator of population movement than other types of identity. An analysis of the material culture and architecture associated with 61 ethnographically and ethnoarchaeologically recorded migrations revealed strong evidence of this association and several indicators useful for tracking population movement were identified, including "domestic spatial organization, floodways, and embedded technological styles reflected in the nondecorative production steps of ceramic vessels, textiles, walls, domestic installations, and other utilitarian items" (Clark 2001:18). Clark (2001) finds evidence for the presence of Puebloan immigrants in the eastern Tonto Basin, Arizona based on differing domestic spatial organization, village construction sequence, and aggregation patterns between indigenous and immigrant communities; wall construction methods; selection of materials for architectural elements; and different patterns in the distribution of corrugated pottery and polished red ware pottery.

Although compositional analysis is typically used to identify ceramic exchange, it may also be used by archaeologists to detect population movement through material culture. Anna

Shepard (1956) suggested that one might distinguish between local ceramic production and foreign intrusions through the study of multiple lines of evidence such as manufacturing techniques, decorative styles, and the sources of raw materials. Migration might result in the local production of ceramic vessels in the manner of a nonlocal ceramic tradition as well as an influx of nonlocal vessels. She presents a matrix which outlines ways in which one may distinguish the social and technological processes that led to the manufacture of an artifact, allowing an accurate assessment of its likely provenance (Shepard 1956:Table 11).

Building on the formative work of Shepard, using the life history model central to behavioral archaeology (Schiffer 1976; Schiffer and Skibo 1987), María Nieves Zedeño (1994, 1998) proposed a multidimensional approach to ceramic variability by evaluating the juxtaposition of patterns in ceramic composition with information about ceramic design and depositional context, which correlates behavioral mechanisms of ceramic circulation with material culture (Lyons 2003). Zedeño (1994, 1998) argues that population movement may be tracked by ceramic provenance: the presence of nonlocal pottery at an archaeological site may be explained by the movement of pots, people, or raw materials. Distinguishing among these behavioral mechanisms depends both on the identification of raw materials through compositional analysis and on the skillfulness with which the artifact was produced. Skillful execution of vessel forms, methods of production, and decorative styles associated with a nonlocal ceramic tradition in combination with local raw materials are most likely the result of enculturation and suggest population movement. In contrast, less skillful work, indicated by errors in vessel production or the execution of decoration, in combination with local raw materials is likely indicates imitation (Zedeño 1994). An adapted version of this matrix is presented by Lyons (2003:Table 1.1), and an updated matrix is reproduced here (Table 3.1).

	Behavioral Mechanisms	Material Correlate(s)
I. Movement of Pots	A. Trade/Exchange	Distinctive raw materials, techniques, and styles
II. Movement of People	A. Non-local people bringing pots produced elsewhere	Indistinguishable from IA, unless rate and timing of occurrence and contextual associations are controlled
	B. Non-local people making pots in their own tradition with imported raw materials	Same as above
	C. Non-local people making pots in their own tradition with local raw materials	Identifiable on the basis of non-local tradition and raw materials
	D. Non-local people making pots in the local tradition with local materials	Indistinguishable from pots made by local people if imitation of local tradition is faithful
	E. Non-local people combining both traditions and using local raw materials	Identified on the basis of raw materials and elements of the local tradition
	F. Non-local people combining both traditions and using imported raw materials	Identified on the basis of raw materials, nature of borrowed elements, and execution of elements from both traditions
III. Movement of Raw Materials	A. Local people making pots in the local tradition and using imported raw materials	Identifiable on the basis of raw materials
	B. Local people making pots in the foreign tradition and using imported raw materials	Distinguishable from imported pots depending on the faithfulness of the imitation
	C. Local people combining their own and foreign traditions and using imported raw materials	Very difficult to distinguish from IIF; identifiable based on raw materials, nature of borrowed elements, and execution of elements from both traditions

Table 3.1: Mechanisms of ceramic circulation and associated patterning in material culture (adapted from Lyons 2003:Table 1.1; following Shepard 1956:Table 11; Zedeño 1994:Table 3.1).

One challenge of using compositional analysis to identify population movement is distinguishing between evidence of ceramic exchange and population movement. Although the approach developed by Zedeño (1994, 1998) successfully identifies relationships between social behaviors and material culture, using this method to identify population movement depends on immigrants utilizing local raw materials when producing their indigenous technologies in a new area. This approach does not distinguish between exchange and population movement in cases where non-local raw materials are used, since such artifacts may be present due to exchange or may have been brought by non-local people over the course of migration.

Studying Aggregation in the U.S. Southwest

One common byproduct of migration is aggregation, defined variably as "groups of people coming together" (Cordell 1994:79); as "the processes that produce spatial clustering of households, communities, or archaeological habitation sites" (Cordell et al. 1994:109); or as a process that results in a measurable increase in the number of people inhabiting a defined unit of space, specifically a settlement, for more than a single event or season (Adler et al. 1996). Aggregation has been explained as a response to various phenomena such as environmental change or degradation, increased population density leading to increased competition over resources, emulation and peer competition, factional leaders trying to consolidate power, or the development of religious practices that are attractive to prospective immigrants (Adams 2002; Cameron and Duff 2008; Kintigh 1994; Lekson and Cameron 1995; Longacre 1966; Plog 1989; Sebastian 1992; Upham 1982). Aggregation may also be a motivating force behind migration in order to maintain or enhance an existing social relationship, to counter a perceived threat through numbers, or as a byproduct of ritual elaboration requiring a large population (Adams 1996a, 2002; Adler 1994; Braun and Plog 1982; Cameron 1996; Glowacki 2010; Gumerman and Dean 1989; Haas and Creamer 1993; Kaldahl et al. 2004; LeBlanc 1999; Leonard and Reed 1993; Plog 1989; Spielmann 2004).

Aggregation may be temporary or permanent. Small, temporary aggregations may occur in response to specific social or environmental circumstances. For example, groups may congregate together in order to arrange marriages between groups, to trade, or to cope with major environmental changes. Groups may temporarily relocate in response to environmental factors such as natural disasters, such as flooding or drought, or to take advantage of specific, seasonal resources (Adams 2002; Gilman 1987:552–554; Johnson 1982, 1989; Young 1996). Such aggregations are not necessarily enduring social fixtures; once marriages have been arranged or seasonal resources have been collected, groups may disperse again (Adams 2002; Kane 1989). In some cases, however, aggregation may be permanent (Adams 2002; Johnson 1982), reshaping the social organization of the aggregated social groups. The decision to aggregate into one settlement or settlement cluster, no matter what the underlying motivation, doubtless had a great impact on the diverse individuals and social groups involved. As people who had previously lived in more dispersed settlements chose to aggregate and live in close proximity to one another, possibly in a new landscape, many different subgroups, each possessing its own social identity, would come into contact and, potentially, into conflict (Abbott 2000; Adams 1996a; Brandt 1994; Johnson 1982; Mills 2011; Neuzil 2008; Stone 2003).

Aggregation occurred multiple times in the Pueblo Southwest; however, in most cases, aggregated settlements did not persist, due to changes in underlying conditions (Adams 2002; Adams and Duff 2004; Adler 1996; Crown and Judge 1991; Johnson 1989; Ware and Blinman 2000). The period of aggregation during the fourteenth century was more successful than earlier episodes. Although many settlements that coalesced during this time later dispersed, this period of aggregation produced many settlements that are still inhabited today (Adams 2002). The Pueblo IV aggregation during the fourteenth century was characterized by explosive growth in settlement size, with a single village typically exceeding 500 rooms (Adams 2002; Adams and Duff 2004).

This period was also marked by the emergence of settlement clusters—groups of large aggregated villages which are founded in close proximity to each other, and isolated from other clusters by large areas of unoccupied space (Adams and Duff 2004; Cordell et al. 1994; Duff 1998, 2002, 2004, LeBlanc 1998, 1999; Plog 1983; Spielmann 1994, 2004; Upham 1982; Upham and Reed 1989; Wilcox 1981). Clusters may be identified through shared geography, shared social history and/or social identity, commonalities in material culture, and, during the historic period, linguistic differences (Whiteley 2004). However, sites within clusters may also exhibit significant differences, especially in terms of social and political organization (Duff 2002; Graves 2004; Spielmann 2004; Whiteley 2004). Further, spatial proximity alone is not an indicator of collaboration. Although communities may aggregate into a cluster voluntarily, communities may also be forced into proximity due to economic and ritual ties to the land or a fear of trespassing onto the territory of other groups (Fowles 2004).

The Pueblo IV period of aggregation has been explained variously as a response to warfare (Haas and Creamer 1993; LeBlanc 1999; Plog and Solometo 1997; Wilcox and Haas 1994) or environmental stress (Cordell 1984, 1997; Kaldahl and Dean 1999; McGregor 1965; Willey 1966). There is abundant evidence of immigrant groups moving into extant communities following population decline in the Four Corners area (e.g., Adams 2002, 2004a; Cameron 1995; Clark 2001; Glowacki 2015; Haury 1958; Hill et al. 2004; Kaldahl et al. 2004; Lindsay 1987; Lyons 2003, 2001; Lyons and Clark 2008; Mills 1998; Mills et al. 2013, 2015; Neuzil 2005, 2008; Reid and Whittlesey 1982; Schwindt et al. 2016). Migration influenced the emergence of large, aggregated Pueblo settlements characteristic of the Pueblo IV period. It is also likely that, in turn, this migration initially resulted in an increase in conflict, economic stress, and negative environmental impact due to higher population density (Fowles 2004).

Neither warfare nor environmental stress accounts for the permanence of aggregated villages. Many social or environmental factors may prompt people to form aggregated settlements. However, when circumstances change—for example, when a period of conflict or warfare ends—the aggregated groups would likely disperse, as they had prior to the Pueblo IV period (Adams 2002). The persistence of some Pueblo IV aggregated settlements suggests that social changes must have taken place to encourage integration. Prior to the Pueblo IV aggregation, residential communities were relatively small (Adler 1994). Following aggregation, these smaller groups were living with, and potentially competing with, other groups within one residential community (Adams 2002). Therefore, the social changes that occurred in order to encourage and maintain integration within the aggregated settlements must have effectively situated the needs of these groups within the needs of the larger community (Adams 2002:101, 107–113, 154; Adams and Duff 2004:11–12; Brandt 1994:19–21; Fladd 2012:94–96; Neuzil 2008:94–96; Rautman 2000:278–279; Stone 2002:389–391).

Social differentiation, like integration, is a byproduct of aggregation. Individuals and groups choose to join a community in order to secure the advantages of a larger aggregated settlement, such as stability and protection. However, alliances and interactions within the aggregated settlement can lead to social differentiation (Blitz 1999). One possible result of increased differentiation is the creation of competing factions (Kaldahl et al. 2004). Social differentiation does not always result in conflict. Rather, it may enhance the stability of an aggregated community through the creation and maintenance of diverse social networks. The presence of varied social groups within a community provides advantages (Stone 2002:390) such as unique trade relationships and social knowledge (Clark 2001; Lyons 2003; Lyons et al. 2008, 2011, Lyons and Clark 2008, 2012). This is illustrated by the development of expanded exchange networks in the San Pedro Valley after the arrival of Kayenta immigrants. Before Kayenta immigrants arrived in the San Pedro Valley, obsidian was extremely scarce. After immigrants settled in the area, obsidian became more abundant. Obsidian was most common at sites that had been occupied by Kayenta immigrants, suggesting that exchange networks associated with the Kayenta immigrants were responsible for this influx of this material. Obsidian was subsequently exchanged between Kayenta and indigenous groups (Lyons and Clark 2012).

Ethnographic and Ethnohistorical Perspectives on Puebloan Social Organization

Although it is impossible to determine the exact nature of the social relationships and community organization that developed during the Pueblo IV period at aggregated settlements, it is possible to better understand these issues through comparison with the contemporary and historical Puebloan societies of the U.S. Southwest (Ware 2014; Whiteley 2004). The Pueblo IV period is a distinct moment in time. However, there are both cultural antecedents and descendants. The most direct descendants of the Pueblo IV aggregated communities are the historic and contemporary Pueblos. Thus, the social developments associated with Pueblo IV settlement patterns can be more fully understood by what we can learn from these later groups through a practice often referred to as 'upstreaming'—in which "historically known…social and cultural forms may be tracked back to earlier phases where there are no documents to explicitly substantiate them, but where other evidence—including archaeological—points indirectly to their presence, in a pattern of long-term continuity" (Whiteley 2004:152).

This is not to suggest that modern Pueblos can be used as a direct analogy for ancient people: modern groups are not simply ancient people frozen in time. There are perils associated with the uncritical use of ethnographic analogy or oral traditions to interpret archaeological narratives. A great deal of time and many significant events have occurred between the Pueblo IV period and the present. Although there is a great deal of continuity between modern indigenous people and their ancestors, events such as contact with the Spaniards, the Pueblo Revolt, and the introduction of the reservation system have undeniably impacted modern Puebloan groups. Further, it is important to bear in mind that both oral traditions and ethnographies are products of the time in which they are narrated or recorded. Oral traditions are best understood as a combination of past events and present contexts. Both aspects of oral traditions must be considered when these accounts are used to interpret historical research (Mason 2000:241–242; Vansina 1985:3–27). Similarly, ethnographic texts must be considered as historical documents. As in all historical documents, the information contained in ethnographies was written by a subjective, not an objective, individual. Thus, the data preserved in ethnographic documents may be biased, structured, or idealized by an ethnographer who consciously or subconsciously created a specific narrative.

It is vital, therefore, to approach interpretation of the archaeological record from multiple angles. ‘Upstreaming’ ethnographic analogy and information from oral traditions to shed light on social developments of earlier periods is an important method of interpreting the archaeological record. Equally, however, it is important to ‘downstream’—to use the salient archaeological past to interpret later social developments and explore continuities and discontinuities with groups further in the past (Whiteley 2004:151–153). Whiteley (2004:152) suggests that in order to explore the Pueblo IV period “we may combine downstreaming from the Pueblo III with an upstreaming from the historic Pueblos…if we employ selected data *genealogically*, in Foucault’s sense (e.g., 1984), seeking ancestral social forms from known successors, we might avoid problems created by wholesale analogical interpolation across a large temporal gap.” From this perspective, the Pueblo IV period is best viewed as a temporal bridge between the Pueblo III period and the later historic Pueblos (Whiteley 2004:153). Previous sections have explored the archaeological context of the migrations and aggregations of the Pueblo IV period. This section will summarize ethnographic and ethnohistorical data that may illuminate the social developments that took place over the course of population movements and social reorganizations during the Pueblo IV period.

Literature on the U.S. Southwest is rich in ethnographic and ethnohistoric information on Puebloan societies (e.g., Beaglehole 1936, 1937; Beaglehole and Beaglehole 1935; Connelly 1979; Courlander 1971, 1982; Dockstader 1954; Dozier 1970; Eggan 1950, 1967, Ellis 1967, 1974; Harrington 1916; Ortiz 1969; Ortiz [editor] 1979; Parsons 1929, 1936, 1939; Parsons [editor] 1936; Powell 1972; Titiev 1944; Voth 1905, 1912; Ware 2014; Waters 1963; Whiteley 1988, 1998). By upstreaming based on this information, it is possible to better understand the social structures of Pueblo IV settlements and their methods of integration and differentiation (Whiteley 2004). This research will rely primarily on Hopi ethnography, based on numerous lines of evidence including oral tradition and archaeological material culture that support a close relationship between the modern Hopi and the Pueblo IV occupants of the Homol'ovi Settlement Cluster (Adams 2002; Fewkes 1898a, 1904; Lyons 2003).

Within the Hopi community, kinship and descent groups are matrilineal. Ideologically, society is envisioned as broadly egalitarian, a social principle embodied by the plaza. Plazas are integrative structures, places of domestic and ritual communal activity: all community members join in the activities that take place in the plaza (Adams 2002). This communal identity is subdivided by an elaborate and hierarchical ritual system, largely based on connections among men (Whiteley 2004:152). Ritual societies are centered on specialized ritual structures such as kivas and clan houses. Kivas, unlike plazas, are highly restricted. Entry is usually limited to members of the society, the esoteric activities that take place in kivas are under the control of small groups of individuals (Adams 2002). This dualism between differentiation and integration permeates Hopi society. Differentiation is maintained through social specialization. The participation of each group is necessary for the stability of the community, leading to integration. For example, the Greasewood clan provides firewood for kivas, the Sand clan brings sand for altars, and the Coyote clan is responsible for military defense (Whiteley 2004:154). On the surface this creates differentiation rather than integration, but it also creates interdependence (Whiteley 2004).

Among the Western Pueblos, katsina ritual appears to have emerged and spread during and following the population aggregations that took place during the Pueblo IV period; the increase of katsina iconography in rock art, pottery, and murals during this period is evidence of the rapid spread of katsina ritual (Adams 1991, 1994, 2002). Within modern Hopi society, katsina ritual serves as the primary form of social regulation and integration (Dockstader 1954; Dozier 1970; Eggan 1950; Parsons 1939; Titiev 1944). Katsina ritual creates a pan-village identity which cross-cuts basic kinship units; all members of a community participate in katsina ritual, integrating these members through a unifying ideology. Social regulation via katsina ritual is achieved by various means including the redistribution of food as presents offered by katsinam, public feasting, and the reinforcement of positive social behavior during katsina ceremonies (Ford 1972; Titiev 1944).

However, katsina ritual also contains evidence of social differentiation. There is remarkable diversity of subject matter observed in media depicting katsinam such as kiva murals (Crotty 1995) and rock art (Cole 1989), which indicates that the beliefs and practices associated with katsina ritual may have been highly diverse and locally contingent (Plog and Solometo 1997). Further, although public katsina ritual involves the participation of the whole community, it is not egalitarian. Aspects of katsina ritual are also highly restricted and controlled by a small sodality within the larger katsina society. Thus, katsina ritual simultaneously integrates all members of the community within a common ideology expressed through initiation and public performance (including dances and feasting); differentiates society through concentrations of social power within the community; and fosters cooperation. Social stability requires the participation of all community members and sodalities (Adams 1991, 2002; Potter and Perry 2000).

The relationships among the villages of each mesa at Hopi are highly structured. Some are mother villages, some are colony villages (also called daughter villages), and others are guard villages (Adams et al. 2004; Connelly 1979; Nagata 1970). The mother village is the oldest settlement in a cluster. It is also the only village within a cluster to perform the full array of religious rituals and initiations that make up the Hopi ceremonial calendar. When the population of the mother village overburdens the carrying capacity of the local resources or creates competition over ceremonial roles, colony villages will be founded. Colony villages may also be founded by groups of immigrants. Often these immigrant villages function as guard villages, forming a defensive buffer for the other villages (Adams et al. 2004; Connelly 1979; Dozier 1966; Eggan 1950). Colony villages do not perform the full ritual calendar, creating a relationship of dependency between the colony village and the mother village. Guard villages are responsible for the defense of the cluster (Adams et al. 2004; Nagata 1970). This differentiation creates interdependence: the stability of the cluster depends on the participation of each village (Adams et al. 2004; Whiteley 2004).

These inter-village relationships, so characteristic of the modern Hopi, apparently have great time depth (Adams 1996b; Adams et al. 2004). Although these methods of social and community organization came to fruition in the historic period, the precursors of these relationships are visible in much earlier prehispanic Pueblo communities (Adams 1996b; Adams et al. 2004). These social systems may or may not apply to all archaeological sites or to non-Hopi settlement clusters. However, this management of the human tendency towards both integration and differentiation exemplifies the ways in which archaeological settlement clusters may have formed and operated, and how the relationships among villages may have functioned. Social relationships and community organization are not preserved directly in the archaeological record; however, elements are preserved in material remains.

Archaeologically, both integration and differentiation are often expressed through religious ritual activity. Ritual can integrate a community through the public performance of shared religion, as the activities that take place in the plaza integrate the modern Hopi. Equally, as exemplified by highly restricted religious societies of the Hopi, ritual legitimizes social hierarchy by controlling participation, the symbols used to convey ideology, and presenting leadership in authoritative positions within the ritual performance (Adams 1991, 2002; Adams and LaMotta 2006; Adler 1989; Crown and Kohler 1994; Dungan 2017; Fowles 2004; Haury 1958; Hegmon 1989; Lipe and Hegmon 1989; Longacre 1966; Lyons and Clark 2012; Mills 1998; Potter 1998; Potter and Perry 2000; Rautman 2000; Stone 2002; Whiteley 2004). Thus, the public performance of religious ritual simultaneously integrates a community through participation—all members of the community may participate in a public performance—and codifies social power through a restriction of access to knowledge, objects, and places (Adams 2002; Potter and Perry 2000).

The evolution of ritual structures provides evidence of social relationships that developed during the Pueblo IV period (Adams 1991, 2002). At the beginning of the Pueblo IV aggregation, plaza areas were unbounded and contained several kivas. Over the course of aggregation, plazas grew larger and became enclosed (Adams 1989a, 2002; Lipe 1989). These plazas were communal places, a setting for both domestic and religious activity. The building of large plazas indicates the development of village-wide religious and social events intended to provide all members a sense of belonging, as well as encouraging interaction on a daily basis (Adams 2002). This suggests the development of social structures which cut across segmentary social units. Within the Western Pueblos, these cross-cutting organizations are typically sodalities (Eggan 1950).

Kivas can be interpreted as exclusionary spaces: places associated with restricted sacred knowledge and performance (Adams 1991, 2002; Dungan 2017; Potter and Perry 2000), suggesting a segmentation of social structure (Adams 2002). However, kivas are also integrative structures. The segments of the community associated with kivas (sodalities) cross-cut and integrate different kinship and descent groups (Eggan 1950). A dramatic increase in the number of social roles open to individuals, including memberships in religious organizations and gender-specific roles, is suggested by the construction of diverse, specialized structures such as communal corn roasting features, piiki houses, and an array of kivas and ritual structures (Adams 2002). This increased diversity of ritual structures along with abundant ritual deposits and the efflorescence of katsina iconography in rock art, ceramic decoration, and kiva murals are further evidence of an elaboration and specialization of ritual activities in Pueblo IV aggregated villages (Adams 2002, 2016a; Adams and Duff 2004).

Despite the development of socially cross-cutting organizations and the proliferation of specialized groups, the social and ritual histories of individual immigrant groups were clearly valued and maintained. The importance of these relationships is visible archaeologically in the strong correlation of ritual structures with spinal room blocks, suggesting the persistence of rituals limited to segmentary kin groups, probably clans or lineages (Adams 2002). The accretional nature of many aggregated settlements suggests that there were first or primary groups. Such primary groups are present within the modern Hopi. These primary lineages control the best land and the major ceremonies and ceremonial objects (Adams et al. 2004; Levy 1992; Whiteley 1988). Archaeologically, these groups would likely have allotted all land controlled by the individual villages and established the ritual calendar. However, given the diversity of the ritual calendar (evidenced by the increased diversity in ritual structures, deposits, and iconography during this period), social power would have remained largely diffuse. No individual or group controlled the entire ritual cycle. This heterarchical style of social organization encouraged kin-groups to remain in aggregated villages and situated these groups within a larger community (Adams 2002; Johnson 1982, 1989).

Aggregation is marked by periods of integration and differentiation, fission and fusion. Integration is neither absolute nor inexorable. The history of an aggregated community is inevitably marked by periods of greater integration and increased differentiation. Attempts at integration may succeed for a time, followed by a period of increased factionalism, and vice-versa. A historical example of this process can be found in the fragmentation of Orayvi, a Hopi village on Third Mesa. During the Pueblo IV period, Orayvi was the only village on Third Mesa, a state of affairs that continued into the twentieth century (Adams et al. 2004). Currently, Third Mesa is home to two village clusters: the “Old Orayvi” cluster, consisting of Orayvi, Hotvela, and Lower Mùnqapi; and the "New Orayvi" cluster of Kiqötsmovi, Paaqavi, and Upper Mùnqapi (Adams et al. 2004). This efflorescence of villages on Third Mesa can be traced to 1906, when the residents of Orayvi split into two groups: those who were hostile to the American government (Hostiles) and left Orayvi, and those who were friendly to American governance and remained in Orayvi (Friendlies). However, the roots of this schism are far more complicated than this simple summary would suggest (Levy 1992; Whiteley 1988, 1998, 2008).

The Orayvi split was triggered by multiple issues including political dissention, environmental degradation, and overpopulation (Adams et al. 2004). Ethnographers, including Eggan (1966), Whiteley (1988, 1998), and Levy (1992), have noted that factions develop situationally, as a response to the possibility of major change. In the late nineteenth and early twentieth centuries, there were many pressures on the Hopi that could have led to major change. Various European diseases, notably smallpox, reduced the Hopi population (Levy 1992). A prolonged drought exerted pressure on environmental resources (Levy 1992; Whiteley 1988). Substantial erosion of the mesas depleted agricultural land (Bradfield 1971; Levy 1992).

Orayvi was affected by all these factors; however, it was less affected than other Hopi communities. Therefore, Orayvi both attracted refugees from other communities and maintained a higher birth rate than other Hopi villages. This resulted in a ballooning population that placed great stress on the agricultural capacity of the village (Levy 1992). This, in turn, strained the socio-political organization of Orayvi. Within Hopi society, the founding social groups of a settlement maintain their status as political and religious leaders, responsible for the allocation of land and the establishment of a religious calendar (Adams et al. 2004; Levy 1992). This concentration of authority can lead to social conflict. As the population of a community increases, internal competition for limited resources—both social and economic—also increases, leading to competing factions, each pursuing their own socioeconomic goals (Adams et al. 2004; Johnson 1989; Plog 1990). The competing goals of these different factions divided Orayvi both politically and economically (Levy 1992; Schlegel 1992; Whiteley 1988). In this fraught environment, the actions of the political leadership of Orayvi in response to United States government policies regarding Hopi provided a *casus belli* for the landless and politically marginalized faction (Levy 1992; Whiteley 1988). The social complexity of the Orayvi split is evidenced by the composition of the factions involved in the split: the prime, founding lineages tended to remain in the Friendly camp, while landless clans and marginal lineages joined the Hostiles (Levy 1992).

This case study demonstrates that integration and differentiation are both culturally contingent and continuous. Integration is not absolute or inevitable. Despite the traditional view that social differentiation undermines integration, integration and differentiation are not opposite ends of a continuum. Rather, they are both inevitable byproducts of aggregation, resulting from different social motivations and leading to different outcomes. These social forces can co-exist and may even be necessary for successful aggregation, as both serve important functions related to individual and group expression. While the development of integrative mechanisms is necessary to accommodate the needs of competing factions within the larger community, the maintenance of social differentiation acknowledges the diversity of an aggregated community. Thus, aggregation is a highly variable process with a full spectrum of possible outcomes. Archaeological interpretation of aggregated settlements must be constructed within the cultural and historical context of the settlement in question (Pauketat 2001).

The discussion of migration and aggregation presented in this chapter has provided an overview of the ways in which archaeologists consider patterns in population movement, and associated changes in social organization, during the Pueblo IV period. Movement, migration, and aggregation are themes that characterize the social history of Puebloan groups. These demographic shifts demonstrably reshaped the social environment of the U.S. Southwest on a regional scale (e.g., Hill et al. 2004; Lyons et al. 2008; Lyons and Clark 2008, 2012; Mills et al. 2013; Neuzil 2005b, 2008; Peeples 2011). On a smaller scale, individuals and groups experienced profound change as they migrated across long distances and settled in large, diverse settlements. These migrations created new opportunities and pressures, resulting in increased integration as well as differentiation (e.g., Neuzil 2008; Rautman 2000; Stone 2002). This research engages with these concepts to explore how these regional demographic shifts impacted the lived experience of groups and individuals, shaping how people created, maintained, and negotiated social relationships.

CHAPTER 4: METHODOLOGY AND EXPECTATIONS

Illuminating Identity at Aggregated Communities

Social identity is derived in part from the communities and social relationships in which an individual participates. How, then, is social identity shaped and transformed by alterations in the composition of the residential community, or the communities of practice in which one participates? Migration, by its very nature, upsets the stability and status quo of a community (Mills 2011). During periods of aggregation, communities were interacting in new ways, creating a situation in which differing individual and group identities were coming into contact and, potentially, conflict (Rautman 2000; Stone 2002). Interactions between host populations and immigrants may take a number of forms, from complete integration to open conflict between groups (Neuzil 2008; Stone 2003). During the processes of migration and aggregation, the interests of many different subgroups, each with its own identity, must be accommodated (Abbott 2000; Brandt 1994; Johnson 1982). Studying the expression of identity during this period may reveal the ways in which these new relationships were being negotiated.

Archaeologically, identity is commonly explored through analysis of artifact style. Style, in its broadest definition, reflects a shared social and cultural history (Clark 2001; Colton 1939; Hegmon 1992; Lechtman 1977; Lyons 2003; Stark 1998). Style can reinforce cultural values, foster group competition, and act as a social marker of difference or belonging (Hegmon 1992, 1998). Further, style reflects both conscious and unconscious choices about all of these things (Stark 1995). Drawing on practice theory, situated learning theory, and technological style, artifact production can be viewed as one way in which individuals negotiate their identities (e.g., Bourdieu 1977; Clark 2001; Crown 2001; Giddens 1979; Gosselain 2008a, 2016; Hegmon 1992; Lave and Wenger 1991; Lechtman 1977; Lemonnier 1992; Minar and Crown 2001; Wallaert-Pêtre 2001). Identity is fundamentally social, derived at least in part from the participation of an individual in social relationships with other individuals and communities. Membership in a community shapes the identity of the individual, the participation of the individual recursively reinforces or transforms the identity of the community.

When artisans participate in a community of practice, manufacturing objects such as pottery, the practices and techniques used by that community are embodied in the objects they produce (e.g., Gilpin and Hays-Gilpin 2012; Gosselain 2008a, 2016; Huntley et al. 2012; Joyce 2012; Sassman and Rudolphi 2001). Underlying the physical practices of production are the social and cultural values that influence and shape technological choices (Bourdieu 1977; Giddens 1979; Lave and Wenger 1991; Lechtman 1977; Lemonnier 1992). The shared motor skills and manufacturing practices associated with different production traditions become reflexive when learned through participation in communities of practice and are unlikely to change (Crown 2014; Gosselain 1998; Lave and Wenger 1991; Lechtman 1977; Lemonnier 1992; Minar 2001; Minar and Crown 2001; Nicklin 1971; Roux 2010; Wallaert-Pêtre 2001; Wallaert 2008). Because manufacturing reflects shared technical knowledge and an internalized understanding of the practices of production learned through participation in a community, analysis of artifact production techniques allows archaeologists to understand dynamics of the manufacturing community.

In archaeology, the study of social identity and cultural practice through ceramics has largely focused on the analysis of decorated pottery. There is good reason for this: decorated ceramics are thought to represent a higher time investment than utility wares and certain aspects of their designs, motifs, and colors are often considered to be iconographic signs that encode the values of the society in question (Bowser 2000; Crown 2001; Eckert 2012; Fenn et al. 2006; Friedrich 1970; Hays-Gilpin 1996; Hegmon 1992; Huntley et al. 2012; Mills 1995a, 2002;

Wiessner 1983). Other aspects of decorated vessel design, such as design layout, are low in visibility. Thus, they inform our understandings of enculturative identities (Carr 1995a, 1995b, Hardin 1983, 1984, Lyons 2001, 2003). In this way, analysis of decorated pottery provides insights into both actively constructed and enculturative aspects of the identities of the potters that created them.

However, it has been argued that the production of certain decorated wares in the prehispanic U.S. Southwest—for example Roosevelt Red Ware (Lyons 2001, 2003), Jeddito Yellow Ware (Hays-Gilpin 1996; LeBlanc and Henderson 2009), and White Mountain Red Ware (Crown 2016; Kaldahl et al. 2004; Van Keuren 2006a; Van Keuren et al. 2013)—may have been restricted to specialists or certain social groups (see chapters in Mills and Crown 1995). Patricia Crown (2016:86) argues that knowledge surrounding the production of White Mountain Red Ware, polychrome types of Roosevelt Red Ware, and Chihuahuan Polychrome vessels during the fourteenth century was restricted, possibly indicating that the production of symbolically charged vessels in ancient Puebloan society was more restricted than vessels produced for domestic contexts. The ethnographic record shows that potters in some Pueblos restrict knowledge of clay sources, production techniques, and the rituals associated with pottery production (Lanmon et al. 2007:116–117; Nahohai and Phelps 1995:66; Wallaert 2012:33). Archaeologically, we see indications of secrecy among Pueblo potters around clay sources (Bishop et al. 1988:332) as well as control of knowledge about and access to ritually important decoration (Crown and Wills 2003; Spielmann et al. 2006). Cross-culturally, the production and use of symbolically charged vessels—such as the polychrome complexes of the late prehispanic U.S. Southwest (Crown 1994, 2016)—is more restricted than less symbolically active forms of material culture (Herbich and Dietler 2008:241). It is evident that ritual knowledge as a social resource was not uniformly distributed within historic Pueblo communities (Brandt 1994; Duff 2002).

Thus, it would be unwise to assume that the social groups responsible for the production of decorated pottery accurately reflect the full spectrum of social identities resident in any given area. While it may be the case in some areas that the community of potters producing decorated pottery was open and inclusive, it is equally possible that membership in communities of practice centered on the production of decorated pottery was more restricted. In contrast to decorated pottery, archaeologists typically assume that utilitarian ceramics were produced and used locally and that production of utilitarian ceramics was likely not as restricted as that of decorated pottery (Duff 2002; Neuzil 2005a, 2008; Peeples 2011; Reid and Montgomery 1998; Zedeño 1994)—although certainly this is not always the case (Abbott 2000; Abbott et al. 2007; Arazi-Coambs 2016; Stoltman 1999; Van Keuren et al. 1997). The long-distance exchange of utilitarian pottery may indicate close social relationships between people in different communities, such as those relationships that result from intermarriage (Duff 2002:26; Zedeño 1994:17). Utilitarian vessels that are exchanged over long distances were likely brought to a new location with a migrating group. Such vessels are gradually replaced by locally produced vessels (Duff 2002:26; Triadan 1997), likely manufactured in the same style as imported vessels but using local raw materials.

Because utilitarian pottery is more likely indicative of informal, inconspicuous identities, the analysis of locally produced utilitarian pottery may elucidate identities not expressed within the locally produced decorated corpus of a site or region. Exploring identity through multiple scales allows evaluation of the different interests being pursued through social relationships between different individuals and groups. Relationships at different scales may represent different behaviors and are associated with different suites of material culture (Duff 2002).

Utilitarian objects, although they do not intentionally communicate social messaging through decoration or symbolism, are simultaneously necessary and unnoticed—indexing social practices integral to everyday actions (Hendon 2010:88).

Corrugated pottery is the most common kind of undecorated utilitarian pottery found in the northern U.S. Southwest, produced throughout the region between around A.D. 825 and 1450 (Colton 1955; Mills et al. 1993, 1999). Corrugated vessels are uniquely suited to studies of ceramic manufacture. The majority of pottery in the northern U.S. Southwest was produced using the coil-and-scrape technique (Gifford and Smith 1978), although the paddle and anvil technique was prevalent in certain areas (Colton 1958:Ware 14; Crown 1994:37–42, 2001; Henss 1990). In this method of ceramic manufacture, potters shape clay into coils of uniform thickness. These coils are placed successively around the circumference of the vessel (Gifford and Smith 1978; Rye 1981; Sinopoli 1991). Often, the ridged surface produced by this technique is smoothed (Rye 1981). This is not the case in the production of corrugated pottery. The patterned surface characteristic of corrugated pottery is created by pressing the upper coil against the lower between the fingers, leaving successive indentations along the exterior surface of the vessel. These indentations must be created during the construction of the vessel. Any attempts to remove or mask the marks of production would obliterate the corrugations as well. Therefore, it is possible to observe and measure attributes indicative of manufacturing techniques by studying these corrugations.

Research Questions and Methodology

The discussion of social theory and interpretative mechanisms presented here will inform the interpretation of data in the following chapters. Broadly, this study will address the question of how technological style and situated learning theory may illuminate the construction and maintenance of social identity in aggregated communities in the late prehispanic U.S. Southwest, exploring the differential representation of social identity at public and private scales in communities that have experienced migration and aggregation events. This research will focus on three broad questions. How powerful was the process of social integration in aggregated communities? How are different identities embodied in material culture? Is identity differently represented at sites whose occupants followed different migration pathways? These questions will be addressed through analysis of technological style in corrugated pottery dating to the thirteenth and fourteenth centuries produced in the Homol'ovi Settlement Cluster (HSC), located in northeastern Arizona near the town of Winslow.

Stylistic analysis by Patrick Lyons (2001, 2003) targeting the vessel layouts of Winslow Orange Ware (WOW)—the decorated pottery tradition manufactured in the Homol'ovi area during the thirteenth and fourteenth century—demonstrates that WOW was a part of the Ancestral Hopi pottery tradition. Vessel layouts, though visible, are low visibility in that they are complex and relational and, therefore, are not susceptible to emulation. Rather, vessel layout is more likely to reflect enculturative processes (Carr 1995a:192; Lyons 2003:12, 2015:42–43). Lyons (2001, 2003) found that vessel layouts were shared between WOW and Jeddito Yellow Ware, produced on the Hopi Mesas during the same time period, suggesting that the potters of Homol'ovi learned to make pottery within a Hopi cultural context. That WOW was nearly uniformly produced in the Hopi stylistic tradition suggests that this association with Hopi was present across the cluster and throughout the occupation of the HSC, and likely formed an important facet of identity for the cluster's residents.

Although it is likely that the initial occupants of the cluster migrated from the Hopi Mesas (Adams 2002, 2004a, Lyons 2001, 2003), based on a number of lines of evidence that will be discussed in the following chapter, it is impossible that all residents of the HSC immigrated directly from Hopi. As the HSC was occupied over several generations (Adams 2002), a large number of residents must have been born at Homol'ovi. Some facets of identity may be tied to specific places and physical contexts (Hendon 2010:54). Within Pueblo communities identity is inextricably linked with physical space, as it is situated within a social landscape (Blau 1977; Cowgill 1993; Duff 2002:13–14; Haas et al. 1994). It is likely, therefore, that the identities of the HSC's residents were entwined with the landscape of Homol'ovi, a place physically distinct from the Hopi Mesas. Nevertheless, the preservation of this Hopi cultural identity, evident in the enculturative learning traditions associated with the production of WOW, clearly indicates that the association with Hopi was also an important facet of cultural identity for the occupants of the Homol'ovi area.

This research will explore the social relationships embodied in the technological style of locally produced utilitarian pottery, Homolovi Orange Ware (HOW) and Homolovi Gray Ware (HGW), referred to together as Homolovi Utility Ware (HUW). Will the identities expressed in the utilitarian assemblage mirror uniformity in the Hopi cultural affiliation evident in WOW? Or will the narrative presented by domestic ceramics be more complex, suggesting greater heterogeneity in manufacturing practices? To what extent is it possible to affiliate the communities of practice producing utilitarian pottery within the HSC with broader, constellated production practices? And, how will the social relationships evident within the utilitarian assemblage shape our understanding of the social history of the HSC? These queries form the basis of the criteria used in testing the four hypotheses proposed here.

1) Corrugated HUW from all the sites within the HSC will be entirely technologically uniform, conforming to one ceramic manufacturing tradition similar to the near

uniformity exhibited by WOW. Such homogeneity would indicate a widespread manufacturing tradition shared throughout the HSC, suggesting all the occupants of these sites shared the same migratory history and cultural traditions (or, at least, all occupants involved in the production of pottery: it is possible that ceramic production was a restricted activity; however, there are no manifestations of social authority within the sites of the HSC sufficient to suggest the dominance of one immigrant group by another).

2) Corrugated HUW will be heterogeneous among sites and homogeneous within sites. This would indicate the presence of manufacturing traditions shared internally within sites but diversity in manufacturing traditions among sites. Such a situation could imply that the occupants of each site shared the same migratory history and cultural traditions, but social history differed within the HSC. The HSC as a whole shared a somewhat homogenous identity, evidenced by the technological uniformity of the locally produced decorated pottery. However, the identity of each individual site is reflected in the technological style of utilitarian pottery.

3) Corrugated HUW will be heterogeneous across the settlement cluster but uniform within groups of sites. Evidence of manufacturing traditions shared between sites indicates the existence of inter-site ceramic manufacturing communities. This suggests associations and divisions among sites within the Homol'ovi cluster despite the more uniform identity expressed by WOW. These variances could be based on differences in migratory history or cultural traditions. Alternatively, because not all of the sites within the Homol'ovi cluster were occupied contemporaneously, such patterning may suggest the movement of people between sites.

4) Corrugated HUW will be heterogeneous both within sites and among sites, indicating the presence of multiple manufacturing traditions both at the site and the cluster level. This would suggest that the manufacture of corrugated pottery was not part of a large, widespread learning tradition shared throughout the HSC. Rather, the manufacturing traditions associated with corrugated pottery were learned on a smaller scale. These communities of practice would likely be associated with manufacturing traditions brought to Homol'ovi by immigrant groups. The continuing presence of these traditions would indicate the continuing power of connections to a diversity of ancestral landscapes despite the social integration evident in the uniformity and widespread use of WOW.

To explore these hypotheses, this research undertakes the following goals: 1) identify the manufacturing techniques that were used to produce corrugated pottery within the HSC; 2) recognize possible affiliations between local traditions and broader, constellations of practice based on similarities in corrugation technology and style with ceramics produced outside of the HSC; 3) identify the time frame of the production for these corrugation styles, thus elucidating the sequence or timing of migration events and processes within the Homol'ovi area; 4) and explore the spatial distributions of these corrugation styles in order to better understand the social elements of production and processes of integration in aggregated communities.

Identifying the manufacturing techniques used to produce corrugated pottery within the HSC will involve a number of different steps. Initially, I will explore the ceramic recipes used to manufacture corrugated pottery within the HSC using instrumental neutron activation analysis and petrography. The materials used to produce ceramics are determined in part by the raw materials available to potters. From among the available raw materials, potters may select specific materials in order to affect the functionality of the finished ceramic vessel (Arnold 1985;

Arnold et al. 2000; Bronitsky and Hamer 1986; DeBoer and Lathrap 1979; Rice 2015; Rye 1981; Rye and Evans 1976; Sassaman and Rudolphi 2001; Shepard 1965). The selection of raw materials may also be affected by social and cultural processes; certain “recipes” may be preferred by different social groups. Thus, ceramic recipes may be indicative of participation in communities of practice (e.g., Curewitz and Goff 2012; Eckert 2012; Fenn et al. 2006; Huntley 2006; Huntley et al. 2012; Joyce 2012; Schleher et al. 2012; Thomas 2012). By exploring variations in raw materials used to produce utilitarian pottery in the Homol’ovi area, this research will attempt to identify a number of pottery manufacturing communities of practice operating within the HSC during the thirteenth and fourteenth centuries.

Over the course of this study, I will also explore how the ceramic manufacturing communities of the HSC are delineated through technological style. A number of studies have focused on the analysis of the technological style of corrugated pottery (Duff 2005; Duff and Nauman 2010; Elkins 2007; Hegmon, Nelson, et al. 2000; Nauman 2007; Neuzil 2001, 2005a, 2005b, 2008; Peeples 2011; Pierce 1999, 2005; Reid and Montgomery 1998; Schleher and Ruth 2005; Snow 1983; Stone 1986; Wichlacz 2009; Zedeño 1994). These studies, although varied, all explore how the technological style conveyed in everyday, utilitarian ceramics can be an indicator of a larger social identity. While a complete summary of this body of research is beyond the scope of this dissertation, each of these studies successfully demonstrates the benefit of using corrugated pottery to examine social interaction, population movement, and technological changes across the U.S. Southwest. By investigating social identity during periods of demographic and social upheaval within and between regions, these studies have improved our understanding of social transformation and the multi-dimensionality of identity.

Of these studies, Matthew Peeples' (2011) dissertation *Identity and Social Transformation in the Prehispanic Cibola World: A.D. 1150-1325* and Anna Neuzil's (2001, 2005a) work using corrugated pottery to study demographic changes in the Silver Creek area, located to the south-east of the HSC, were the most influential in developing the methodology used in this research. Peeples' dissertation explores the relationship between periods of regional social and demographic change and identity, focusing on the Cibola region of the U.S. Southwest, east of the HSC, A.D. 1150-1325. This period in the Cibola area is characterized by a gradual transition in community organization from many isolated hamlets to fewer large aggregated settlements. In order to study alterations in social identity during this period of reorganization, Peeples drew on a wide array of data including ceramic compositional analysis, the technological characterization of utilitarian ceramic vessels and stylistic comparison of polychrome ceramic vessels, as well as the distribution of domestic architectural features and characterization of public architectural spaces. Of specific relevance to this dissertation, Peeples (2011:181) outlined an array of variables for characterizing utilitarian ceramic vessels, including both qualitative and quantitative measures of technological style. Through his research, Peeples successfully demonstrates that the identities expressed by these various social markers are not necessarily coterminous: the identity expressed by utilitarian ceramic vessels and polychrome ceramic vessels are not the same.

Anna Neuzil (2001, 2005a) has used corrugated pottery to study settlement reorganization and social restructuring in the Silver Creek area during the Pueblo III to Pueblo IV transition (A.D. 1250-1300). She discusses the social consequences of migration and aggregation with reference to corrugated pottery because previous research suggested that corrugated vessels were likely produced on a household level. Therefore, the technological style of these vessels was passed down within discrete household groups. She used the technological style of corrugated ceramics as a means to identify discrete household level social groups within the study area. Neuzil consider four attributes of corrugated pottery in her analysis: coil width, indentation width, indentation depth, and obliteration. Her research clearly demonstrates that differences exist in the technological style of corrugated pottery across the study area. These likely reflect the presence of different manufacturing processes and, by extension, manufacturing communities. Neuzil (2001, 2005a) suggests that these differences can be interpreted as a reflection of the differences in the enculturative backgrounds of the individual artisans who produced the pottery, demonstrating migration into the Silver Creek area, likely from elsewhere on the Colorado Plateau.

In order to characterize the technological attributes of corrugated pottery produced in the HSC, I recorded over 20 variables describing technological choices made by the potter over the course of production. These variables relate to the production sequence of a corrugated vessel, focusing on manufacturing practices that are most likely to be subconscious and reflexive rather than intentional and deliberate (Lemonnier 1992; Minar 2001; Minar and Crown 2001). Similarities in such manufacturing practices are most likely to indicate that the potter who produced the vessel participated in a shared manufacturing tradition, while differences likely indicate the presence of diverse manufacturing communities within one production area. By using statistical analysis to identify clusters within these variables, I hope to identify production groups within the ceramic manufacturing community of the HSC.

In order to explore the regional associations of stylistic clusters identified in the locally produced corrugated pottery of the HSC, a comparable dataset was recorded for corrugated utilitarian ceramics from the wares most abundantly imported to the Homol’ovi area: Tusayan

Gray Ware, Awatovi Yellow Ware, and Mogollon Brown Ware. By comparing clusters identified in the locally produced utilitarian assemblage with imported utilitarian pottery, I hope to identify broader constellations of practice into which the Homol'ovi potters were integrated, based on similarities in corrugation technology and style. I will also use extant literature as well as my observations on locally produced corrugated pottery to characterize the corrugated ceramic traditions of the regions that surround the HSC—the Hopi Buttes, the Puerco area, the Upper Little Colorado River region, the Silver Creek area, the Chevelon drainage, Anderson Mesa, and the Hopi Mesas—in order to regional associations more broadly.

To explore the social meaning of these stylistic clusters within the Homol'ovi area, I will explore the chronological and spatial distribution of these technological traditions and, by extension, the people who practiced them, within the HSC. This discussion will emphasize the depositional patterning of locally produced corrugated utilitarian pottery within the individual structures of each site included in this analysis. In order to explore the chronological distribution of these deposits, this research relies on a system of ceramic chronology developed by the Homol'ovi Research Program, which provides a framework for dating and seriating the Pueblo IV cultural deposits excavated at Homol'ovi (LaMotta 2006:41). The cultural sequence associated with the Pueblo IV period at Homol'ovi begins around 1260 and ends when the Homol'ovi area was depopulated (Adams 2002:59-87). This cultural sequence has been subdivided into two phases: the Tuwiuca Phase (1260-1325/1330) and the Homol'ovi Phase (1330-1400). The Tuwiuca Phase is subdivided into Early (1260-1290) and Late (1290-1325/1330). The Homol'ovi Phase is broken down further into three phases: Early (1330-1365), Middle (1365-1385), and Late (1385-1400). Table 4.1 outlines these various phases.

Phase		Approximate Dates (A.D.)	Jeddito Yellow Ware Index (%JYW)
Homol'ovi Phase	Late	1385-1400	60-100
	Middle	1365-1385	40-59.9
	Early	1325/1330-1365	1-39.9
Tuwiuca Phase	Late	1290-1325/1330	<1
	Early	1260-1290	0

Table 4.1: Phases of occupation in the Homol'ovi area during the Pueblo IV period (adapted from Adams 2016a:Table 3.1).

These phases were defined based on the proportion of yellow colored Jeddito Yellow Ware pottery within the total decorated ceramic assemblage, a statistic referred to as the Jeddito Yellow Ware index (%JYW). Based on stratigraphy, it was established that the frequency of Jeddito Yellow Ware strongly correlates with the passage of time within the HSC, with the proportion of yellow colored Jeddito Yellow Ware relative to total decorated pottery increasing over time (Adams 2016a:30–31; Cutright-Smith and Barker 2016:127–131; LaMotta 2006:41–42). As a result, within Pueblo IV deposits in the HSC, the percent of Jeddito Yellow Ware within the total decorated ceramic assemblage of a deposit is an accurate predictor of the relative age of the deposit that contains it. This principle has been demonstrated at several sites within the HSC with greater than 95 percent accuracy (Adams 2016a:30). This principle was used to seriate the deposits in this analysis from which samples were drawn, which allows a detailed exploration of the chronological patterning evident in the stylistic clusters identified by this analysis.

The majority of the pottery included in this analysis was collected from deposits placed in structures during the process of room closure (Adams 2016b). As with other social practices, the disposal of trash is structured by a number of social relationships including individual and group identities as well as cultural beliefs (Hodder 1987; Joyce and Pollard 2010; Moore 1982, 1996). Therefore, while it would be inaccurate to assume that objects found in a structure were the byproduct of that structure's use (Schiffer 1987), it is equally inaccurate to assume that trash deposition was random. The location of trash disposal and what materials are placed in which disposal contexts represent intentional decisions on the part of social actors (Fladd et al. 2017). Thus, deposits placed in a structure may shed light on the group and individual identities of the people who deposited the material (Beck and Hill 2004; Fladd 2012; Fladd et al. 2017; Gifford-Gonzalez 2014; Kassabaum and Nelson 2016; Martin et al. 2000; McNiven 2013; Rosenswig 2009).

Therefore, although this research does not assume that the locally produced corrugated utilitarian sherds recovered from structures within the HSC villages were deposited by the people who used or resided in these rooms, it does assume that these sherds and the context in which they were placed are indicative of the identities of the people who deposited them. In other words, the spatial and chronological distribution of these sherds across a site is indicative of broader relationships between different social groups and constructed spaces. Exploring the distribution of stylistic clusters identified in locally produced corrugated utilitarian sherds within the structures of a site can elucidate the ways in which groups who produced and used ceramic vessels interacted with each other, and how these relationships evolved over time. Applying these principles more broadly, on the site and cluster level, will shed light on the ways in which these social relationships played out on larger scales, hopefully illuminating the sequence or timing of migration events and processes within the Homol'ovi area.

By exploring the manifestation of social identities in the HSC during the Pueblo IV period—a time characterized by migration, aggregation, and population on both large and small-scales—this research will examine the social relationships that characterized the Homol'ovi villages and the role of social diversity in shaping these communities. Through the data explored in this analysis, this research will draw conclusions about the social organization of Pueblo IV aggregated villages through the juxtaposition of identities expressed through domestic objects and contexts with those identities embodied in objects that are imbued with ritual meaning or used in public contexts. Because identities are contextually specific—different types of material culture express different identities, and different identities are evoked within different social contexts—exploring the expression and negotiation of identity through objects associated with different social scales may allow the identification of a greater diversity of social identities. By contrasting the identities expressed in high and low visibility contexts, this research will illustrate that analysis of domestic contexts and utilitarian artifacts is a valuable tool for exploring the social intricacies of ancient migrations. The information presented in this study will contribute towards our understanding of the social diversity present within Pueblo IV settlement clusters, highlighting the importance of research emphasizing social interactions on multiple scales.

CHAPTER 5: THE HOMOL'OVI SETTLEMENT CLUSTER

The word Homol'ovi, derived from the Hopi word meaning "be mounded up," refers to the small hills and buttes that surround the modern town of Winslow, Arizona (Adams 2002:3; Hill et al. 1998:92; Lyons 2003:39). The Homol'ovi area, 84 kilometers south of the Hopi Mesas, has been a gathering place for diverse cultures since about 800 B.C. through the present day (Adams 2002; Lange 1998). This long history of use and episodic occupation is directly related to the environment. Other than the eponymous small buttes and hills dotting the landscape, the primary geographic feature of the Homol'ovi area is the Little Colorado River. The Little Colorado River drains a vast basin, totaling 69,837 square kilometers, covering most of northeastern Arizona (Adams 2002:41; Lange 1998:1–9). The floodplain of the river is more than four kilometers wide in the Homol'ovi area, wider than in any other area over the course of the Little Colorado River (Adams 2002). This floodplain provides a diverse array of resources including farmland, numerous grasses, driftwood, birds, and aquatic animals such as fish and turtles—used by both ancient and modern peoples in an otherwise water-scarce landscape (Lange 1998:1–9).

Defining the Homol'ovi Settlement Cluster

Archaeological research at Homol'ovi began in 1896, when Jesse Walter Fewkes excavated at Homol'ovi I (H1), Homol'ovi II (H2), Homol'ovi III (H3), and Chevelon Pueblo (Chevelon) (Adams 2002; Fewkes 1898a, 1904; Lyons 2001). Between 1897 and 1900, the Field Museum of Natural History in Chicago conducted excavations at H1 and Chevelon under the direction of George Dorsey, J. A. Burt, and Charles L. Owen (Adams 2002; Lyons 2001). Surface collection at Homol'ovi occurred sporadically throughout the twentieth century (Adams 2002; Colton 1956; Colton and Hargrave 1937; Lyons 2001; Spier 1918). During the late 1970s and early 1980s, concern about increased vandalism at Homol'ovi prompted a series of archaeological assessments at all the sites in the cluster other than Jackrabbit Pueblo, as well as a small testing and interpretative program at H2 (Adams 1980, 2002; Adams and Hays 1991; Andrews 1982; Dosh 1982; Hantman 1982; Weaver et al. 1982). In 1985, E. Charles Adams and Richard C. Lange launched the Homol'ovi Research Program (HRP) at the Arizona State Museum. Following the creation of the HRP, in 1986 the Homolovi Ruins State Park (later renamed the Homolovi State Park) was established to preserve and interpret H1, H2, H3, and Homol'ovi IV (H4) (Adams 2002).

Ongoing research through the HRP has focused on understanding the process of aggregation associated with the transition from the Pueblo III to the Pueblo IV period in the Homol'ovi area (Adams 1989b, 2002; Lyons 2003). To date, six Pueblo IV villages have been excavated or tested (H1, H2, H3, H4, Chevelon, and Jackrabbit Pueblo). Additionally, excavation or testing has been carried out at the Adobe Pueblo, a thirteenth to fourteenth century hamlet adjacent to H1; two fourteenth-century field houses between H1 and H2; Creswell Pueblo, a Pueblo III village near H2; and AZ J:14:36, a pit house village occupied during the Basketmaker III/Pueblo I and Pueblo III periods (Adams 1996a, 2002; Barker and Young 2017; Young 1990, 1996, 1999a, 1999b; Young and Barker 2015). A survey of the region in the vicinity of the Homol'ovi pueblos covering 78 square kilometers has been completed, which recorded 350 sites dating from the Archaic through the Historic periods (Lange 1998).

This intensive archaeological research has revealed three primary periods of occupation in the Homol'ovi area: an early period from A.D. 620 to 890, a middle period from 1000 to 1225, and a late period from 1260 to 1400, and has outlined the occupational history of this region (Adams 2002; Lange 1998). Use of the Homol'ovi area began in the Archaic period, evidenced through isolated projectile points dating to the Paleo-Indian and Archaic periods recovered from the vicinity of Homol'ovi (Lange 1998:146–147). People continued to occupy Homol'ovi on a seasonal basis through the Basketmaker II period. The identification of maize dating to 781 B.C. indicates long-term use of this area for more than just periodic hunting (Lange 1998:147). Occupation of this area intensified with the establishment of pit house loci on the east side of the Little Colorado River in the A.D. 600s and 700s (Lange 1998:148). The earliest known pit houses in the Homol'ovi area, which were occupied from 620-850, occur at the site AZ J:14:36 (ASM) (Lange 1998:149; Young 1990, 1996).

AZ J:14:36 was reoccupied during the Pueblo III period, from 1050-1225 (Lange 1998:154; Young 1990, 1996). A number of other pit house communities were occupied in the Homol'ovi area during this period. Indeed, pit house villages were the most common type of habitation site in this area at this time, although the primary form of residence in most other areas in the Little Colorado River basin had shifted from pit houses to above-ground structures (Adams 1996b; Barker and Young 2017; Lange 1998:154–157). The sole exception to this trend is the village Creswell Pueblo, AZ J:14:282 (ASM), which was occupied sometime between 1150 and 1250, based on ceramics recovered from this site (Barker and Young 2017). Following the depopulation of AZ J:14:36 and Creswell Pueblo in the early to mid-1200s, the Homol'ovi area remained unoccupied until around 1260, when the earliest village in the Homol'ovi Settlement Cluster (HSC) was founded. The HSC persisted until around 1400, when prehispanic occupation of the Homol'ovi area ceased, although Homol'ovi continues to be an important part of the Hopi cultural landscape through the present day (Adams 2002:1–10).

This study focuses on the late period at Homol'ovi, which encompasses the Pueblo IV period. During this time, occupation was concentrated in seven major sites (Figure 5.1), listed

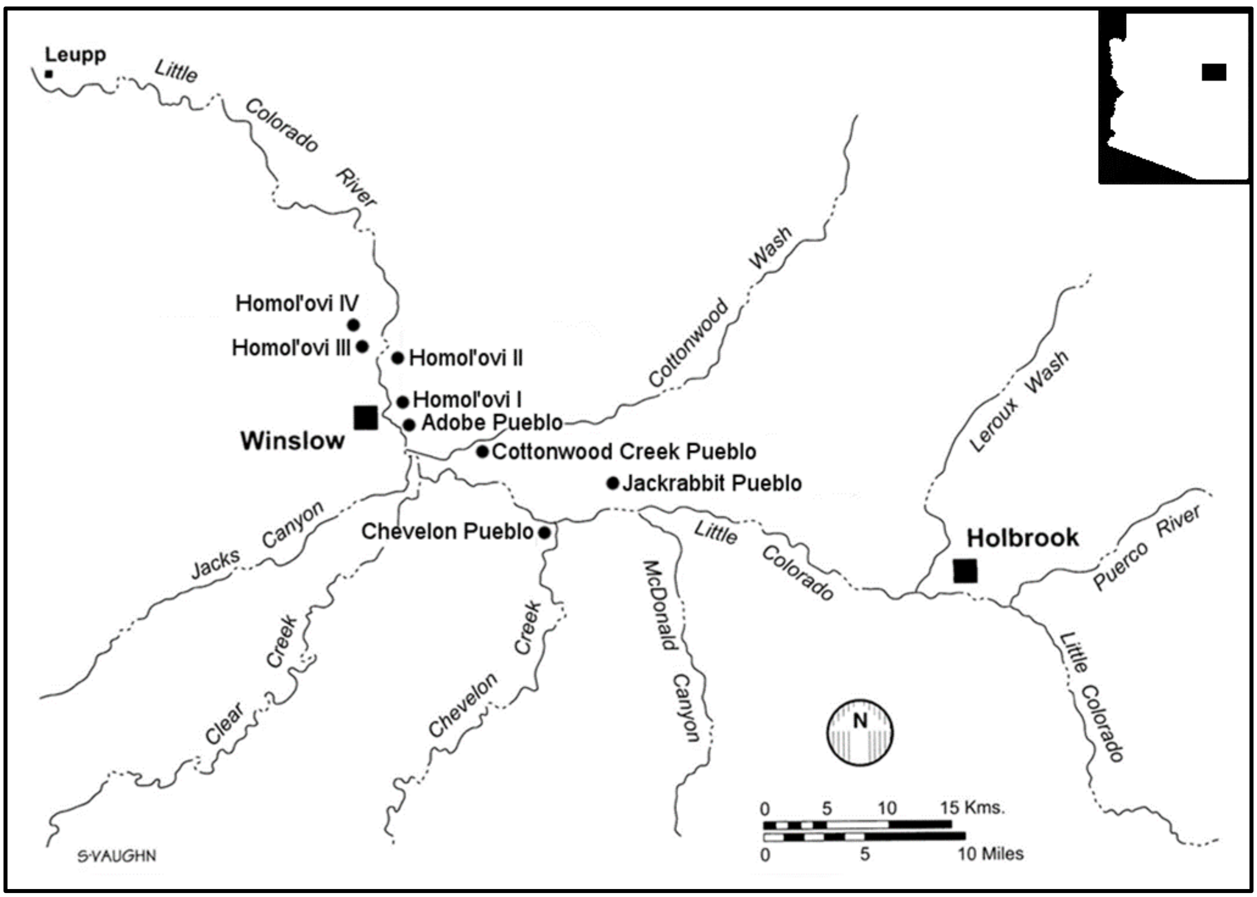

Figure 5.1: Location of the Homol'ovi Settlement Cluster and the individual sites within the Homol'ovi Settlement Cluster (image adapted from Adams 2004:Figure 12.1).

here from west to east: H4, H3, H2, H1, Cottonwood Creek Pueblo, Chevelon, and Jackrabbit Pueblo. These sites together comprise the HSC. The Pueblo IV period at Homol'ovi is treated as a single developmental sequence, beginning around 1260 with the establishment of H4 and ending around 1400 when the Homol'ovi area was depopulated (Adams 2002). This sequence can be subdivided into various phases, outlined in Table 5.1. The Tuwiuca phase, 1260-1330, is characterized by small-to medium-sized villages, focused on floodplain agriculture, that lack large enclosed plazas and yellow pottery made on the Hopi Mesas. The Homol'ovi phase, 1330-1400, in contrast, is characterized by medium-sized to large villages with large enclosed plazas and abundant yellow Hopi pottery (Adams 2002). The Homol'ovi Phase is broken down further into three phases: Early (1330-1365), Middle (1365-1385), and Late (1385-1400).

There is an abundance of evidence suggesting cooperation among the sites of the HSC (Adams 2002). For example, H3, H1, Cottonwood Creek Pueblo, Jackrabbit Pueblo, and Chevelon were all established around 1290. The distance between these villages is very regular, suggesting their placement was coordinated, and villages cooperated in managing water resources (Adams 2002:174–178). Items such as ceramics, ground stone, petrified wood, axes, and shell were likely exchanged between villages (Adams 2002:194–197). All HSC sites used Winslow Orange Ware (WOW), which is evidence of a commonality of heritage (Lyons 2003). However, there are differences in the earliest ceramics recovered from these sites that suggest possible cultural differences (Adams 2002; cf. Lyons 2003). This variation serves as an important reminder that the villages comprising a cluster may have separate, individual histories (Adams 2002; Adams and Duff 2004; Duff 2002; Graves 2004; Spielmann 2004; Whiteley 2004). Below, I discuss the five sites that provided data for this research H4, H3, H1, Chevelon, and H2, and present an overview of the processes that shaped all of the pueblos in the HSC.

Phase		Approximate Dates (A.D.)
Homol'ovi Phase	Late	1385-1400
	Middle	1365-1385
	Early	1325/1330-1365
Tuwiuca Phase	Late	1290-1325/1330
	Early	1260-1290

Table 5.1: Dates of occupation in the Homol’ovi area during the Pueblo IV period (adapted from Adams 2016a:Table 3.1).

Homol’ovi IV

Homol’ovi IV (AZ J:14:13[ASM]) is the earliest pueblo in the HSC, established around 1260 on top of a small butte on the west site of the Little Colorado River (Adams 1996a, 2002, 2004c) (Figure 5.2). This village was occupied for around 20 years, until the 1280s (Adams 2002, 2004d). H4 was largely physically isolate: occupation at this village ceased around the time the other Homol’ovi villages were established. However, based on the ceramic assemblage, the inhabitants of this site maintained robust relationships with groups in surrounding areas. The H4 ceramic assemblage is dominated by undecorated pottery, largely Tusayan Gray Ware, with smaller amounts of Little Colorado Gray Ware, Alameda Brown Ware, and locally produced utilitarian pottery (Bubemyre 2004). The decorated pottery found at the site largely consists of locally produced WOW and Jeddito Black-on-orange, a type manufactured on or near the Hopi Mesas (Bubemyre 2004; Lyons 2001, 2003; Lyons and Hays-Gilpin 2001:157). The ceramics present at H4 represent a broad array of wares produced on the southern portion of the Colorado Plateau and throughout the Little Colorado River valley during this period, clearly illustrating the strong ties maintained by the occupants of H4 with the Hopi Buttes, the Hopi Mesas, the White Mountains, areas south of the Mogollon Rim, Anderson Mesa, and the Flagstaff area (Bubemyre 2004).

Figure 5.2: Map of Homol’ovi IV, AZ J:14:13 (ASM).

The establishment of H4 marks the beginning of WOW production (Lyons 2001). The most common WOW type at H4 is Tuwiuca Black-on-orange, a locally produced version of Jeddito Black-on-orange (Hays-Gilpin et al. 1996; Lyons 2001, 2003). The close stylistic and technological relationship between these two types suggests that the immigrants who founded H4 originated in the vicinity of the Hopi Mesas. Similarities in kiva architecture, room size, and village layout support this suggestion (Adams 2002; Bubemyre 2004; Lyons 2001, 2003). Also, the establishment of H4 on top of a butte suggests a northern origin for the original settlers—contemporary villages at Hopi and in the Kayenta region were also located on top of buttes (Adams 2002).

Although H4 began as a small site with around 20 rooms, it grew rapidly to about 200 rooms (Adams 1996a, 2002, 2004c). While the first settlers occupied the top of the butte, later immigrants occupied areas downslope, on the south and east sides of the butte. Thus, the village grew accretionally from top to bottom, with the oldest rooms on the top and the latest rooms constructed at the base of the butte, on top of middens that had been deposited by earlier occupants (Adams 2002). An unbounded plaza containing at least two kivas was located at the base of the butte (Adams 2002, 2004c). Numerous large roasting pits were located south of H4, and a cemetery area was to the east (Adams 2004c). On the west side of the site are large boulders with petroglyphs whose style and iconography suggest they were made by the inhabitants of H4 (Cole 1992). The occupants of H4 left the village in the 1280s (Adams 2002, 2004d). Around this time the sites of H3, H1, Cottonwood Creek Pueblo, Jackrabbit Pueblo, and Chevelon were founded (Adams 2002). Although it is possible that the occupants of H4 left the Homol’ovi area, it is more likely that they relocated to one of these newly established villages, most likely H1 (Adams 2002).

Homol'ovi III

Homol'ovi III (AZ J:14:14[ASM]) is located on the west bank of the Little Colorado River, about 200 meters west of the modern river channel (Figure 5.3). This village was established around 1280/1290 and was occupied until around 1300/1310 (Adams 1996a, 2001a, 2002). The initial occupants of the site, likely six or seven households, built 13 masonry rooms. Two small kivas and one very large kiva (Structure 38) were associated with the early room block, suggesting that the founding occupants consisted of two groups of related people who cooperated in the construction of H3, each of whom built and used a smaller kiva (Adams 2002). Soon after initial construction, a second row of about seven rooms was added to the site, for a total of 20 rooms. Over the course of 20 years, H3 doubled in size, totaling 40-45 rooms (Adams 2001b, 2002). An unbounded plaza area is located to the southeast of the room block, which ultimately contained at least five kivas (Adams 2001c, 2002). The various structures at H3 were constructed using a mix of stone and adobe architecture; the earliest rooms were made of stone masonry, fourteenth century additions were made of coursed adobe or adobe brick (Adams 2002).

The decorated ceramic assemblage from H3 is dominated by locally produced WOW, with lesser amounts of Jeddito Yellow Ware, White Mountain Red Ware, Jeddito Orange Ware, and assorted white wares (Adams 2002:Table 7.1; Lyons and Hays-Gilpin 2001:Table 8.1). Jeddito Yellow Ware is wholly absent in the earliest contexts at H3. Although they are more abundant in later deposits, they never account for more than 20 percent of all decorated ceramics (Lyons and Hays-Gilpin 2001:Table 8.2 and 8.6). The presence of Pinedale Polychrome, Cedar Creek Polychrome, and Pinedale Black-on-white, taken in conjunction with the absence of St. Johns Polychrome, Fourmile Polychrome, and Jeddito Yellow Ware in the earliest deposits at H3

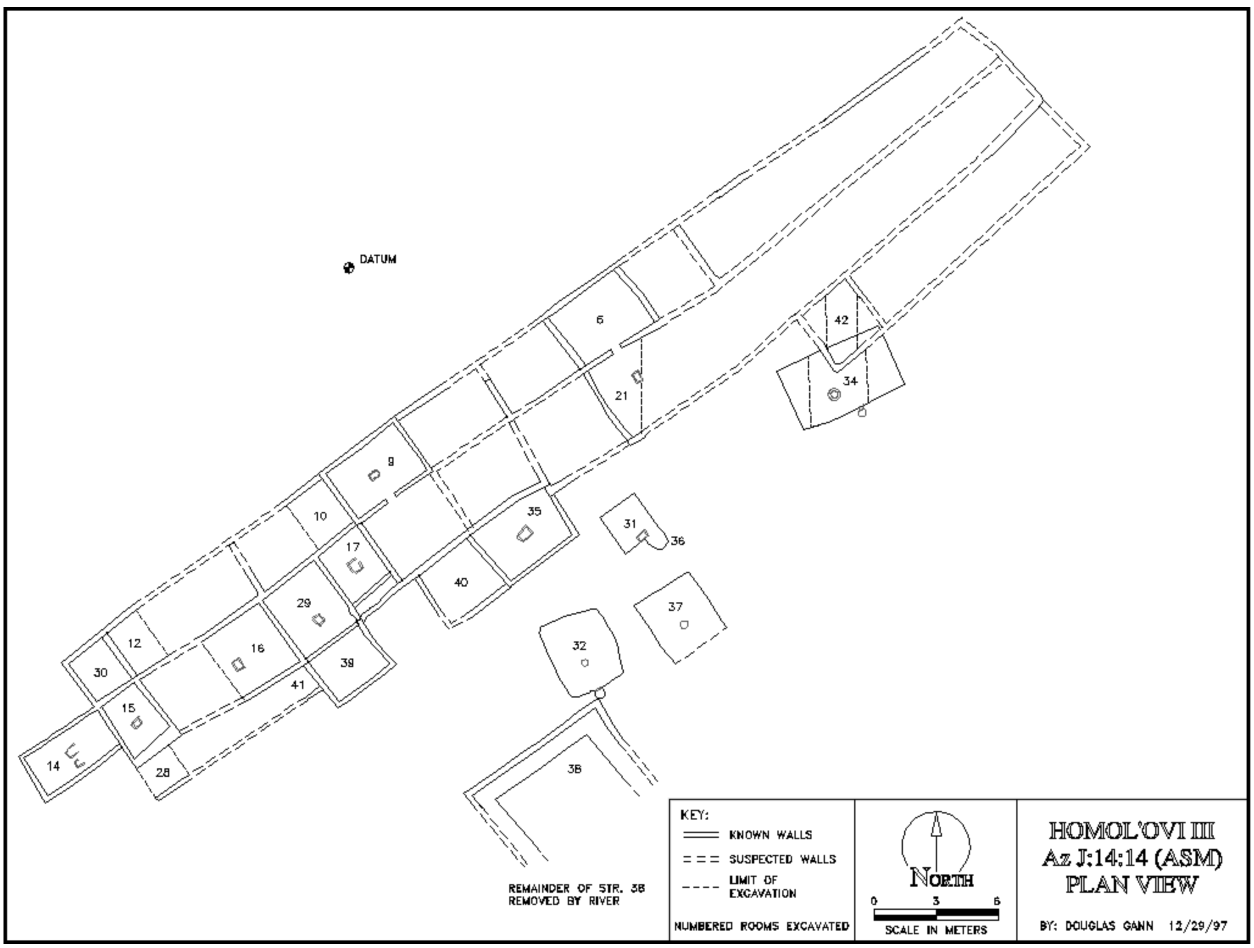

Figure 5.3: Map of Homol'ovi III, AZ J:14:14 (ASM).

suggest that the village was founded in the 1280s and depopulated in the early 1300s (Adams 1996a, 2001a, 2002).

There are several architectural features at H3 which suggest a unique cultural history for the founders of the site. The average room size at H3 was significantly larger than H4 and slightly larger than the average room size at H2 and H1. Larger room size is traditionally associated with areas south and east of the HSC (Adams 2002). The large kiva at H3 (Structure 38) has been interpreted as a great kiva, a variety of structure typically associated with the southeast (Adams 2001c, 2001d, 2002). The presence of large, deep, clay-lined hearths in the kivas is also more typical of Silver Creek populations than Hopi groups (Adams 2002). In addition, the potters of H3 and H4 occasionally applied a red slip to the orange paste of WOW, establishing the types Chavez Pass Black-on-red and Polychrome (Bubemyre 2004; Lyons and Hays-Gilpin 2001). Slipping pottery red is a preferred technology of producers of White Mountain Red Ware (Carlson 1970). In contrast, red slip is quite rare in the Hopi area (Smith 1971). These factors suggest that the occupants of H3 migrated into the area from a different location than the occupants of other sites in the HSC, possibly from Silver Creek or the Upper Little Colorado River (Adams 2001d, 2002).

However, there is also substantial evidence suggesting that the founders of H3 migrated from the vicinity of the Hopi Mesas. The technological and stylistic characteristics of locally produced decorated ceramics recovered from H3 are consistent with the enculturative practices of the Hopi Mesas, indicating that these vessels were produced by potters trained within the Hopi ceramic manufacturing tradition (Lyons 2001, 2003). Some WOW vessels also show influence from the Reserve-Tularosa tradition, however, as do vessels made on the Hopi Mesas (Lyons 2001). Although red slip is associated with White Mountain Red Ware, red slip also appears on northern ceramics including certain types of Tsegi Orange Ware (Kiet Siel Black-on-red and Kiet Siel Polychrome), as well as red slipped Jeddito Black-on-orange (Lyons 2001). Therefore, the presence of Reserve-Tularosa stylistic traditions and the use of red slip at H3 are not, in and of themselves, evidence for southern potters among the residents of the site (Lyons 2001). Pottery imported from the north is more abundant than southeastern pottery throughout the occupation of H3. This patterning is strongest in the earliest period of occupation at the site. In Founder Phase deposits at H3, sherds of decorated wares imported from the north (such as Jeddito Orange Ware) are almost twice as common as sherds of decorated wares made in the southeast (Lyons 2001). Finally, although the large size of Structure 38 is reminiscent of a great kiva, a type of structure traditionally associated with the southeast (Adams 2001c, 2001d, 2002), it contains features indicative of northern origins including a northern style sipapu (Adams 2001d; Lyons 2001; Smith 1972) and loom holes (Lyons 2001).

Thus, the archaeological evidence from H3 can be used to support narratives of both direct migration from the Hopi Mesas to H3 and indirect migration from Hopi through Silver Creek or the Upper Little Colorado River then to H3 (Adams 2001d). Although the ceramic evidence from H3 suggests a northern origin for the site's occupants, certain architectural features of the site are more typically associated with areas to the south and/or east. While the exact migration pathway of the residents of H3 remains ambiguous, it is clear that the occupants of H3 were influenced by both northern and southeastern cultural traditions. The relative extent and source of these influences remains unclear.

Because H3 is located in the active floodplain, the site is subject to extensive flooding. The presence of the Little Colorado River attracted people to the Homol'ovi area; however, the dynamic nature of the river would have presented challenges (Adams 2002; Kolbe 1991; Lange

1998; Young 1996). Environmental reconstruction has shown that river discharge increased substantially beginning in the early 1300s due to increased rainfall (Kolbe 1991). This would have substantially increased the probability of flooding at H3, especially in the kivas. Thick mud deposits on the floors of Structure 38 and one small kiva provide evidence that such flooding occurred. These flood events likely forced the inhabitants of H3 to leave the pueblo. The depopulation of H3 coincides with a period of accelerated growth at the site of H1, located six kilometers upstream from H3, suggesting that residents of H3 probably relocated to H1 (Adams 1989a, 2001d, 2002).

After depopulation, the site of H3 remained unused until the early 1330s. Between the 1330s and 1350s H3 was used sporadically as a field house, likely by occupants of H1. During the 1360s and 1370s, H3 became a seasonal farming village, occupied by multiple families from H1 (Adams 2001a, 2001d, 2002). It is possible that H3 also served a unique religious function during this time: the construction of a small kiva dates to this period as do two macaw burials, three turkey burials, and three neonate burials (Adams 2001d). This later use of H3 is also characterized by the predominance of imported Jeddito Yellow Ware, rather than the locally produced WOW typical of the earlier period of occupation (Adams 2001a, 2001d).

Homol'ovi I

Homol'ovi I (AZ J:14:3[ASM]), shown in Figure 5.4, was the largest village in the HSC until the founding of H2. The site is situated in the widest portion of the Little Colorado River floodplain. H1 was occupied for about 100 years, between 1280/1290 and 1390/1400 (Adams 2002). At its maximum, H1 contained four plazas and around 1100 rooms; however, no more than about 600 rooms were in use at the same time (Adams 2002). The layout and history of the

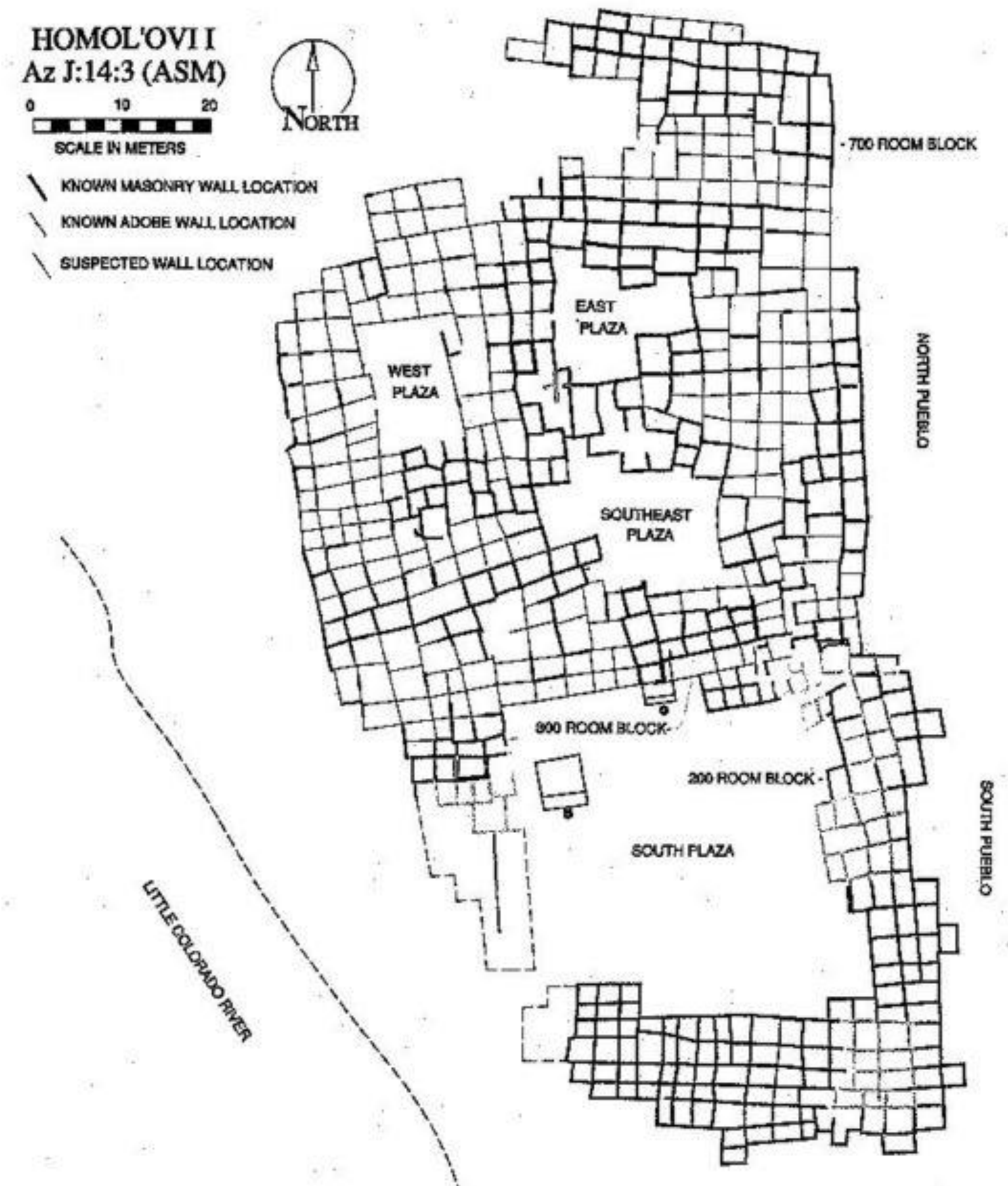

Figure 5.4: Map of Homol'ovi I, AZ J:14:3 (ASM).

northern and southern portions of H1 differ dramatically. The northern half of the site is known to be the oldest (Adams 2002; LaMotta 2006). Initial construction in the northern part of H1 consisted of four spinal room blocks, similar to the room block at H3, each likely associated with independent ritual structures (Adams 2002). H1 grew accretionally and population increased gradually as various groups immigrated to H1. Ceramic evidence suggests that most immigrants came from the Hopi Mesas area. The presence of White Mountain Red Ware and Roosevelt Red Ware produced in the Silver Creek area suggest contact with the Silver Creek and Upper Little Colorado River areas, located 100 kilometers or more to the southeast of Homol'ovi (Adams 2002; Duff 2002:149–156; Herr et al. 1999; Triadan 1997; Triadan et al. 2002). Whether this relationship was primarily one of exchange or population movement is unclear; however, the presence of Roosevelt Red Ware produced locally within the HSC suggests the possibility that at least some Roosevelt Red Ware producing groups migrated to H1. It is likely that populations from other villages in the HSC such as H4, H3, and, possibly, Jackrabbit Pueblo relocated to H1 as well.

As the population of H1 increased, rooms were added to these initial spinal room blocks in an agglomerative fashion. Over time, all four room blocks were connected and, eventually, incorporated into a single large pueblo structure (Adams 2002). After the earliest period of growth at H1, there were few open spaces within these room blocks. Communal spaces were located outside of the village (Adams 2002). By 1325, H1 had grown to around 600 rooms. After the appearance of yellow-firing Jeddito Yellow Ware at the site, H1 underwent extensive remodeling (Adams 2002; LaMotta 2006). The southern part of H1 was constructed, using adobe bricks (Adams 2002; LaMotta 2006). Unlike the organic growth visible in the construction of the northern half of H1, the southern half appears to have been planned and constructed according to a preconceived village layout. This part of H1 consists of three room blocks which together define a large plaza, containing several large kivas (Adams 2002; LaMotta 2006). Around this time, three sections of the northern portion of the village were demolished and filled, creating small courtyards or plazas (Adams 2002). H1 continued to experience increases in population until nearly the end of its occupation. Due to this gradual growth, boundaries of the plaza areas shifted often, as surrounding room blocks expanded or fell into disuse (Adams 2002; LaMotta 2006).

Chevelon Pueblo

Chevelon Pueblo (AZ P:2:11[ASM]), occupied from 1290 through the 1390s (Adams 2016a), is situated on a small hill at the junction of Chevelon Creek and the Little Colorado River. At its largest extent, shown in Figure 5.5, Chevelon contained 500 rooms and four plazas (Adams 2002, 2016c). The earliest occupation at the site occurred around 1290, with the construction of a small room block and plaza containing two kivas on top of the hill that forms the highest point of the site. It is likely that the group who established Chevelon migrated from the Hopi Mesas, based on the ceramics found in the earliest midden contexts (Adams 2016c, 2016d). The addition of rooms to both the interior and exterior of the initial room block indicate subsequent growth. This early room block remained in continuous use, suggesting that the leadership of the founding group was maintained and acknowledged throughout the occupation of Chevelon (Adams 2016d). Construction began on a second room block, built on a flat hill east of the initial room block, and an associated plaza around 1300, marking the first major expansion of Chevelon (Adams 2016d). A later expansion of Chevelon between 1360 and 1370 is marked by the construction of four spinal room blocks at the base of the hill, delineating a large plaza

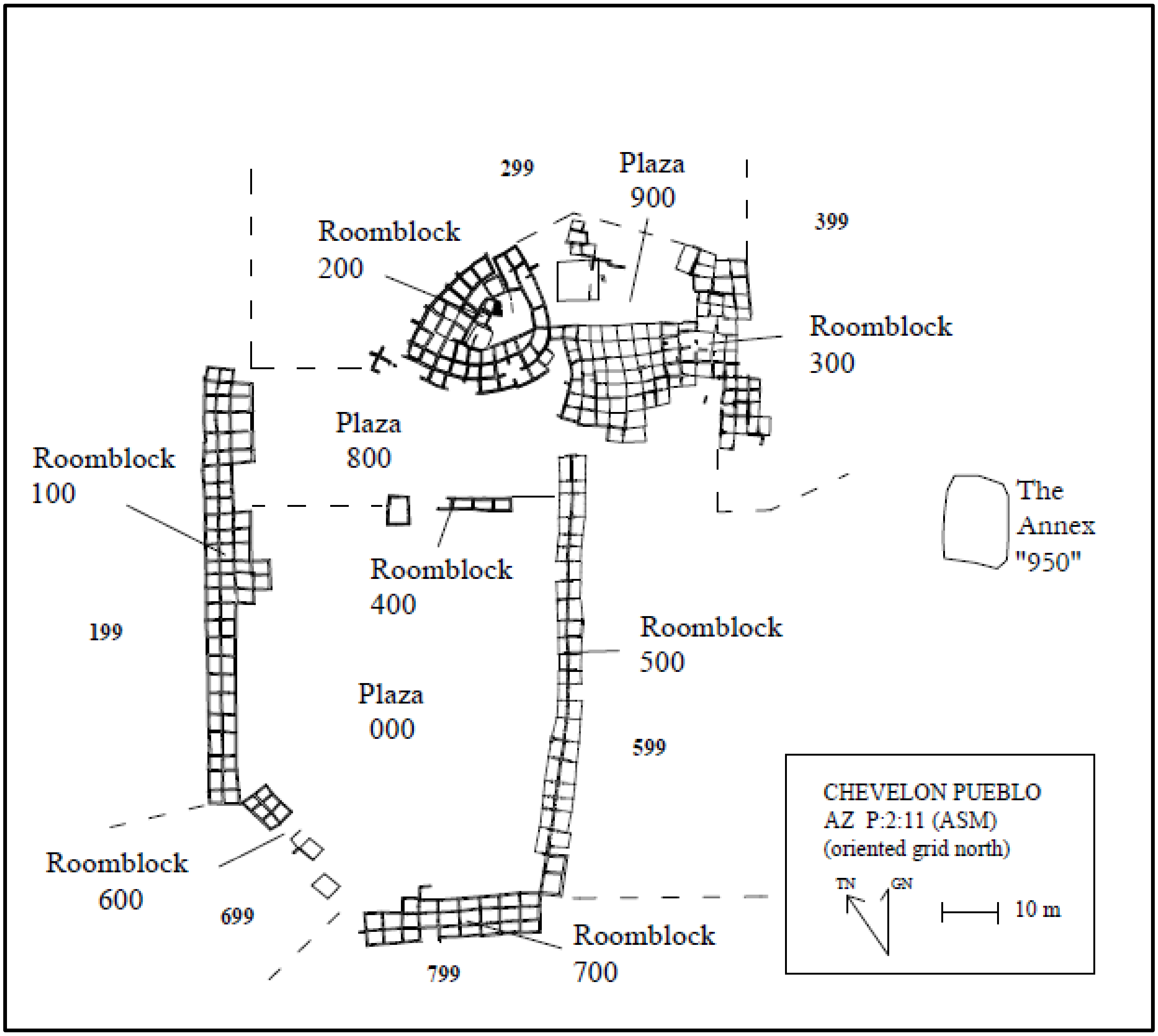

Figure 5.5: Map of Chevelon Pueblo, AZ P:2:11 (ASM).

(Adams 2016c, 2016d). Chevelon was depopulated before 1400, likely during the 1390s (Adams 2016a).

Although the ceramic assemblage from Chevelon clearly indicates that occupants of the site were preferentially consuming pottery produced on the Hopi Mesas—Jeddito Yellow Ware represents 47 percent of the Chevelon ceramic assemblage—it also offers evidence of contact with other settlement clusters. Mogollon Brown Ware, produced over a large area south of the Little Colorado River (Colton 1939, 1956; Crown 1981; Danson 1957; Duff 2005; Hagopian et al. 2004; Haury 1936; Mills 2007b; Mills, Herr, et al. 1999; Solometo 2004; Wheat 1955), represents an exceptionally high percentage of the Chevelon ceramic assemblage. Mogollon Brown Ware comprises 15 percent of the Chevelon assemblage, while locally produced utilitarian pottery represents 7 percent, Tusayan Gray Ware 8 percent, and Awatovi Yellow Ware less than 1 percent (Cutright-Smith and Barker 2016). Given the abundance of Jeddito Yellow Ware at Chevelon, it is striking that utility wares imported from the Hopi Mesas—Awatovi Yellow Ware and Tusayan Gray Ware—represent such a relatively small amount of the Chevelon ceramic assemblage compared to Mogollon Brown Ware.

The ceramic assemblage from Chevelon contains a higher amount of White Mountain Red Ware than other sites in the HSC: White Mountain Red Ware represents over three percent of the Chevelon assemblage, nearly double the amount present in contemporaneous deposits at H1 (Cutright-Smith and Barker 2016). The Silver Creek area is traditionally identified as the primary locus of late White Mountain Red Ware production (Carlson 1970; Graves 1984; Mills, Herr, et al. 1999; Triadan 1997; Triadan et al. 2002). Compositional analysis of White Mountain Red Ware recovered from the sites of H1, H2, and H3 confirmed that samples recovered from the HSC were produced using clays from the Silver Creek area (Duff 2002:142; Triadan 1997).

The relative abundance of White Mountain Red Ware at Chevelon suggests that residents of this site, or some portion of the residents, maintained stronger ties to the Silver Creek area than did other HSC villages. It is unclear whether these ties were created by the migration of people from the Silver Creek area into the HSC or exchange between the two areas. Regardless, this preference for White Mountain Red Ware may represent the expression of a group identity by residents of Chevelon, or by a segment of the population of Chevelon, distinct from the other villages in the HSC (Adams 2016d; Cutright-Smith and Barker 2016).

The distribution of White Mountain Red Ware at Chevelon is chronologically dependent. White Mountain Red Ware was most abundant during the Early Homol'ovi Phase (1330-1365), representing 15 percent of the Chevelon ceramic assemblage from this phase, and became less frequent beginning around 1365 (Cutright-Smith and Barker 2016). At this same time, the amount of Jeddito Yellow Ware imported to the HSC began to increase dramatically. It is likely that the relative frequencies of White Mountain Red Ware and Jeddito Yellow Ware represent a broader social shift at Chevelon. Exchange during the earlier period of occupation at the site was more focused on the south. Later, as exchange with Hopi becomes more of an emphasis within the HSC, the residents of Chevelon also increased their interactions with the Hopi Mesas (Cutright-Smith and Barker 2016).

Roosevelt Red Ware represents two percent of the Chevelon ceramic assemblage. Although this is a relatively small proportion of the assemblage compared to Jeddito Yellow Ware, Roosevelt Red Ware is four to six times more abundant at Chevelon than at any other village in the HSC (Cutright-Smith and Barker 2016). Roosevelt Red Ware recovered from HSC villages tends to have been produced either in the Silver Creek area (Duff 2002:155–156) or locally in the Winslow area (Lyons and Hays-Gilpin 2001:156). As demonstrated by Patrick

Lyons (Lyons 2001, 2003), Roosevelt Red Ware production is closely associated with groups that migrated out of the Kayenta region of Northern Arizona into the river drainages of eastern Arizona in the late 1200s. The local production of Roosevelt Red Ware throughout East-Central and Southeastern Arizona and Northern Mexico closely tracks the movement of these Kayenta groups throughout the region (Lyons 2003).

Although Roosevelt Red Ware was produced in a large number of locations across the U.S. Southwest (Crown 1994; Danson and Wallace 1956; DiPeso 1958, 1976, Duff 1999, 2002; Franklin 1980; Hill 1998; Lightfoot and Jewett 1984; Lyons 2003, 2001; Martin and Rinaldo 1960; Mills, Herr, et al. 1999; Stinson 1996; White and Burton 1992; Zedeño 1994), the strongest evidence for the earliest production of Roosevelt Red Ware types is found at pueblos in the Mogollon Rim area, specifically Bryant Ranch and Chodistaas (Crown 1994; Lyons 2001, 2003; Mills et al. 2016; Zedeño 1994), as well as the Silver Creek pueblos (Lyons 2001, 2003; Mills 1998; Mills, Herr, et al. 1999; Stinson 1996). Thus, the Roosevelt Red Ware tradition appears to have arisen in these areas and moved outwards along with Kayenta immigrants.

Other than locally produced Roosevelt Red Ware, Roosevelt Red Ware recovered from the HSC was largely imported from the Silver Creek area (Duff 2002:155–156). It is unclear whether the Roosevelt Red Ware produced in the Silver Creek area arrived in the HSC as the byproduct of exchange between residents of the HSC and Roosevelt Red Ware producing groups around Silver Creek or as the result of population movement from Silver Creek to the HSC. As Roosevelt Red Ware was produced locally in the Homol'ovi area, it is evident that Roosevelt Red Ware producing groups did migrate to the HSC. As yet there is no evidence of a relationship between Homol'ovi residents and Roosevelt Red Ware producing groups in areas other than Silver Creek (Duff 2002:155–156). Therefore, it seems possible that at least some of the

Roosevelt Red Ware produced in the Silver Creek area recovered from Homol'ovi ceramic assemblages accompanied immigrants from Silver Creek to the HSC. Thus, the relative density of Roosevelt Red Ware at Chevelon suggests a relationship between Chevelon and Roosevelt Red Ware producing groups, likely from the Silver Creek area, and may indicate the migration of groups from the Silver Creek area to the HSC (Cutright-Smith and Barker 2016). If such migration did occur, it likely took place around 1365: the amount of Roosevelt Red Ware recovered from Chevelon deposits increased during the Middle Homol'ovi Phase (1365-1385).

Homol'ovi II

Homol'ovi II (AZ J:14:15[ASM]), shown in Figure 5.6, is the latest site of the HSC. The high frequencies of Jeddito Yellow Ware suggest that H2 was founded around 1360, long after the establishment of the other sites in the cluster, and depopulated around 1400, after occupation had already ceased elsewhere in the cluster (Lange 2017). H2 is also the largest site in the HSC, with an estimated 1200 rooms organized around three plazas that together contain 40 plaza kivas (Adams 2002). Ceramic dating indicates that the village was constructed over a short period, suggesting it was a planned settlement rather than the product of accretional growth. This is supported by the formal layout of the room blocks and plazas (Adams 2002; Lange 2017).

H2 is located on the west end of the HSC, on the east side of the river, opposite where the villages of H4 and H3 had been located (see Figure 5.1). This would have brought the occupants of H2 into close proximity (6 km) and potential conflict with the residents of H1. The fact that no apparent conflict occurred suggests that the occupants of H1 welcomed, or at least tolerated, the establishment of H2 (Adams 2002). This is not to suggest that the establishment of H2 had no

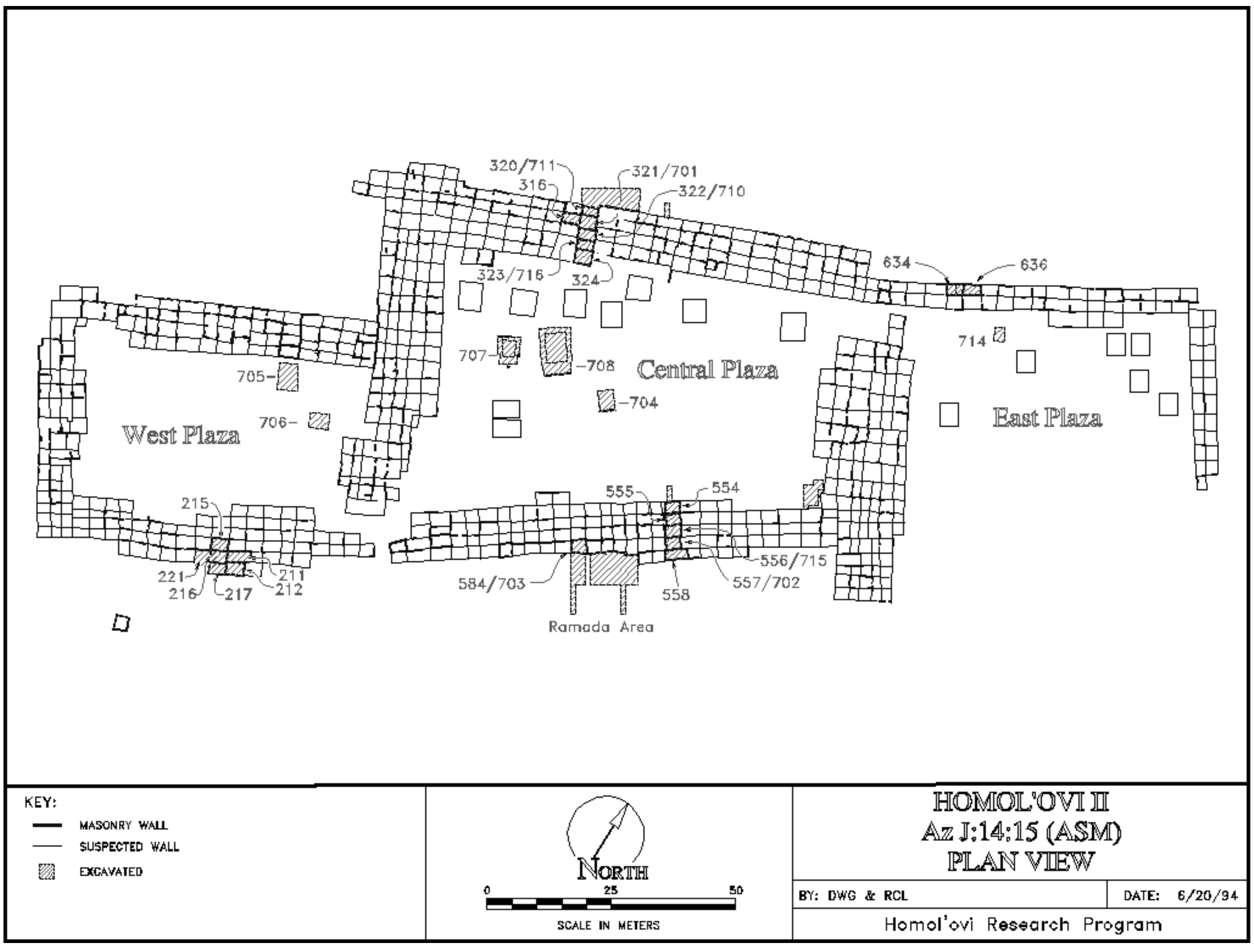

Figure 5.6: Map of Homol'ovi II, AZ J:14:15 (ASM).

effect on the other sites of the HSC. To the contrary, the construction of H2 roughly coincides with periods of remodeling at other HSC villages, which included a transition from unbounded plazas to large, enclosed plazas; fewer and larger kivas; greater differentiation of ritual structures; an increase in the scale and variety of ritual deposits; and the appearance of katsina iconography on rock art, ceramics, and kiva murals (Adams 1991, 2002; LaMotta 1996; Reed 1956; Strand 1998; Walker 1995). The architectural changes that took place at the Homol'ovi villages clearly indicate the increased importance of communal areas and the differentiation of public and private spaces (Adams 1991, 2002; Adams and LaMotta 2006; Hays-Gilpin 2000). The large, enclosed plazas that were constructed during this period likely indicated the creation of inclusive, cross-cutting social practices. The multiple kivas and ritual structures, communal corn roasting features, mealing rooms, and piiki houses that were constructed suggest that the number of social roles open to individuals expanded, and the number of paths to social power increased (Adams 2002).

The ceramics from H2 are dominated by Jeddito Yellow Ware, which represents about 50 percent of the total assemblage (Barker 2017; Hays 1991). Although Jeddito Yellow Ware is the most abundant decorated ware at all Pueblo IV sites in the HSC (except H4, which predates the manufacture of Jeddito Yellow Ware), the degree to which the ceramic assemblage at H2 is dominated by pottery from the Hopi Mesas is unique. This, along with the architectural characteristics of the site, indicates that H2 was almost certainly founded by a group from the Hopi Mesas (Adams and Hays 1991; Barker 2017; Lange 2017). It is interesting that the predominance of pottery from the Hopi Mesas did not extend to the utilitarian pottery recovered from H2. Locally produced utilitarian pottery is more than three times as abundant at H2 as

Awatovi Yellow Ware, and more than twice as common as the two most commonly imported utility wares (Awatovi Yellow Ware and Tusayan Gray Ware) combined (Barker 2017).

Migration and Aggregation in the Homol'ovi Settlement Cluster

Settlement clusters are composed of villages and individuals with distinct histories: all members of a cluster may not share the same history (Duff 2002; Graves 2004; Spielmann 2004; Whiteley 2004). The HSC is no exception. Each village in the cluster is unique (Adams 2002). However, several patterns are evident throughout the history of the HSC, shaping each of the Homol'ovi villages. Homol'ovi was clearly an attractive location for human occupation. The permanent water flow and wide floodplain in this area created a prime region for agriculture (Adams 1996a, 2002). Abundant resources such as riparian flora and fauna as well as large amounts of driftwood for construction would also have drawn people to Homol'ovi (Adams 2002). The earliest AMS dates of maize from Basketmaker II sites in the Homol'ovi area demonstrate that farming began by 800 B.C. Prehispanic use continued intermittently through A.D. 1400 (Adams 2002).

Reconstruction of ancient stream flow (Kolbe 1991; Van West 1996) has demonstrated that the earliest pueblos of the HSC were established around the same time as major periods of drought in the surrounding region (Dean et al. 1985; Kolbe 1991). This is consistent with a long-standing pattern noted by Carla Van West (1996), suggesting a correlation between movement to upland areas during times of above average precipitation and movement to the river during periods of drought. Thus, periods of occupation in the Homol'ovi area are associated with drier climatic conditions during which people are drawn to the abundant riparian resources of the Little Colorado (Lange 1998:138–145). This correlation between periods of drought and intensive occupation in the Homol'ovi area breaks down during the fourteenth century, when the large pueblos of the HSC were occupied and expanded during the period of above average precipitation between 1300 and 1335 (Kolbe 1991; Van West 1996), as well as other subsequent periods of high precipitation during the 1300s (Adams 2002:57).

A brief occupational hiatus of the Homol'ovi area occurred immediately prior to the founding of H4 (Adams 1996a, 2002, 2004b; Barker and Young 2017; Lange 1998; Young 1996, 1999b; Young and Barker 2015), consistent with the climatic pattern outlined above (Adams 2002; Lange 1998; Van West 1996). Extensive excavations at AZ J:14:36 and Creswell Pueblo, both occupied during the middle period (1000-1225), were carried out by Lisa Young (Barker and Young 2017; Young 1990, 1996, 1999a, 1999b, 2004, 2007; Young and Barker 2015). A comparison of the artifact assemblages from these villages and the large pueblos of the late period (1260-1400) reveals that there is no overlap in the ceramics or stratigraphy (Adams 2002; Young 1996).

This suggests that the earliest Pueblo IV occupants of the area, who founded H4, were immigrants to the area (Adams 2002). This comparison of artifact assemblages also suggests that this middle occupation of the Homol'ovi area was likely more heterogeneous than the pueblos of the HSC, which were all likely founded by immigrants from the Hopi Mesas (Adams 2002; Lyons 2003). The ceramic assemblage from Creswell Pueblo, the earliest pueblo occupied in the Homol'ovi area, was dominated by wares imported from areas to the south and southeast (Barker and Young 2017; Young and Barker 2015). In contrast, the ceramic assemblage of the contemporaneously occupied pithouse village AZ J:14:36 contained a disproportionately high frequency of ceramics imported from the Hopi area (Barker and Young 2017; Young and Barker 2015).

Evidence of migration and aggregation permeates the Pueblo IV period archaeological record of northeastern Arizona. In the late 1200s, a massive dislocation of Pueblo people occurred in the Four Corners region (Adler 1996; Cameron 1995; Dean et al. 1985; Glowacki 2010; Ortman 2012). Emigration of groups from northeastern Arizona into the upper reaches of the Little Colorado River and below the Mogollon Rim has been well documented (Cameron 1995; Clark 2001; Glowacki 2015; Haury 1958; Kaldahl et al. 2004; Lindsay 1987, 1992; Lyons 2001; Lyons et al. 2008; Mills 1998; Neuzil 2008; Reid and Whittlesey 1982; Schwindt et al. 2016). Demographic pressure exerted by this exodus may be responsible for the immigration of groups into the HSC. However, the earliest occupants of the HSC were not Kayenta groups from the Four Corners. Research by HRP has revealed extensive archaeological evidence suggesting that the immigrants who settled in the Homol'ovi area were primarily from Hopi communities. This evidence includes similarities between the two areas in the size and layout of villages, the presence of Hopi style kivas at Homol'ovi, evidence of katsina religion in both areas, and the relative abundance of pottery from Hopi in Homol'ovi ceramic assemblages (Adams 2002; Lyons 2003).

A stylistic analysis of WOW, the locally produced decorated pottery tradition of the HSC, supports this association between the Hopi Mesas and the HSC. In this study, Lyons (2001, 2003) considered 466 whole WOW ceramic vessels recovered from the HSC. This analysis of shared styles and layout demonstrated that virtually all WOW vessel layouts are shared by Jeddito Orange Ware and Jeddito Yellow Ware. As vessel layout is a residue of enculturation, this signifies that WOW was produced by potters who were participants in the Ancestral Hopi pottery tradition. Additionally, ceramic technologies associated with the Hopi Mesas such as perforated plates, ladles with rivet-attached handles, colanders, and babe-in-cradle ladles were found at Homol’ovi sites made using local materials (Lyons 2003), suggesting substantial population movement between Hopi and the HSC. The production of artifacts closely associated with Hopi culture and the use of technological styles characteristic of Hopi craft production implies that the producing artisans learned their craft within a Hopi manufacturing community (Carr 1995a, 1995b; Clark 2001; Lave and Wenger 1991; Lyons 2001, 2003; Minar and Crown 2001; Shepard 1956; Zedeño 1998). That these artifacts were made using local materials indicates that artists trained in Hopi traditions migrated to the Homol’ovi area and continued practicing their craft (Lyons 2001, 2003; Shepard 1956; Zedeño 1998). On the strength of this evidence, Lyons suggests a northern origin for the immigrants who founded the Homol’ovi villages (Lyons 2003).

Hopi oral tradition recounts that the ancestors of many modern Hopi clans either established villages in the Homol’ovi area or passed through Homol’ovi during migrations toward the Hopi Mesas (Adams 2002; Bernardini 2005; Lyons 2003; Mindeleff 1891:29; Voth 1905:47). Origin accounts differ within Hopi oral traditions (Mindeleff 1891:16–17). According to some narratives, people emerged into this world, the fourth world, near the Grand Canyon (Ferguson and Loma’omvaya 1999). According to the traditions of other clans, however, some Hopi migrated from the south, near the Valley of Mexico (Ferguson and Loma’omvaya 1999). The Hopi have maintained connections to Homol’ovi, visiting shrines in the area and collecting natural resources for use in ritual activities (Beaglehole 1936:22–23; Fewkes 1898:525–526; Hantman 1982:102, 106–107, 112; Hough 1915:177; Lyons 2003; Parsons [editor] 1936:1008, 1155; Titiev 1944:246). Homol’ovi remains a place with strong emotional and ancestral connections to the Hopi through the present day.

It is unlikely that Hopi groups would have left the mesas due to over-crowding caused by an influx of immigrants. Rather, they would have directed new immigrants to settle in the Homol'ovi area. The ceramic record in the Homol'ovi area indicates use of this area by Hopi ancestors dating back to the 600s (Adams 2002, 2004b, 2004c). The establishment of H4 may have been intended to secure ownership of Homol'ovi, precluding any claim by immigrants from other areas (Adams 2004b, 2004c). Settling in the area was a visible claim to Homol'ovi, ensuring continued access to an economically and ritually important area that would have been desirable to the many and varied immigrant groups that were relocating to regions with agricultural potential (Adams 2002).

Possibly most importantly, the floodplain in the Homol'ovi area was ideally suited for cotton agriculture (Adams 2002). In murals depicting katsina dancers, such as those at found at H2, Awat'ovi, Kawaika'a, and Pottery Mound Pueblo, dancers are dressed in regalia made of cotton (Adams 2002; Crotty 1995, 2007; Pond 1966; Smith 1952; Webster 2007). As katsina religion spread and the need for ritual paraphernalia increased, it is likely that demand for cotton increased (Adams 2002; Webster 1997). The riparian environment of the Little Colorado River floodplain, so well-suited to cotton agriculture, would have been an important resource for the Hopi (Adams 2002). Flotation samples taken from H1, H2, H3, and H4 show the frequency of cotton in the Homol'ovi area increasing steadily over time; from 5 percent at H4 to 10 percent during the late 1200s occupation of H3, 25 percent during the 1300s occupation of H3, 28 percent at H1, and 57 percent at H2 (Adams 2002). Much of this cotton was likely exported to the Hopi Mesas in exchange for pottery (Adams 1991, 2002, 2013).

Jeddito Yellow Ware was imported to Homol'ovi in extremely large quantities soon after it became available for exchange (Adams 2002; Barker 2017; Benitez 1999; Hays 1991; Lyons and Hays-Gilpin 2001; Hays-Gilpin et al. 1996). As discussed above, Jeddito Yellow Ware accounts for half of the total ceramic assemblage at H2 (Hays 1991; Barker 2017). This is unusual—within the U.S. Southwest, the most frequently represented ware at a site tends to be locally manufactured (Bishop et al. 1982; Rands and Bishop 1980; cf. Abbott 2000; Abbott et al. 2007; Arazi-Coambs 2016; Stoltman 1999; Van Keuren et al. 1997). Patterning such as this is likely indicative of production specialization (Hays-Gilpin 1996; LeBlanc and Henderson 2009). This abundance of Jeddito Yellow Ware indicates a well-established and valued relationship between Homol'ovi and Hopi villages. Access to Jeddito Yellow Ware may have become a necessity for the residents of the Homol'ovi sites. The manufacture of locally produced decorated pottery greatly diminished by the mid-1300s, possibly the result of fuel scarcity (Adams 1989b, 2002, 2004b, 2013; Hays-Gilpin et al. 1996). Therefore, the exchange of cotton for pottery between Homol'ovi and the Hopi Mesas was symbiotic; each provided the other a highly valuable commodity, restricted in its area of production.

Jeddito Yellow Ware was produced at eight to ten villages on three out of the four Hopi Mesas: Antelope Mesa, First Mesa, and Second Mesa (Adams et al. 2004; Bernardini 2005; Bishop et al. 1988; Duff 2002; Hack 1942; Smith 1971). However, not all of these villages were necessarily involved in exchange with the HSC. Sourcing of Jeddito Yellow Ware from the HSC indicates that the Jeddito Yellow Ware imported to Homol'ovi was primarily produced on Antelope Mesa, at the villages of Awat'ovi and Kawàyka'a specifically (Bernardini 2005; Bishop et al. 1988). Between 17 and 54 percent of the Jeddito Yellow Ware at each site of the HSC was imported from Awat'ovi, while 11 to 42 percent of the Jeddito Yellow Ware from each site was imported from Kawàyka'a (Bernardini 2005:151). This suggests that the relationship between Hopi and Homol'ovi may perhaps more accurately be described as a link between

Antelope Mesa and Homol'ovi (Adams 2002, 2013; Bernardini 2005; Lyons 2014). Possibly, the HSC was primarily settled by groups who emigrated from Antelope Mesa.

The Pueblo IV occupation of Homol'ovi persisted until about 1400; however, depopulation of the area began around 1375-1385. This depopulation may have been due to environmental factors. The 1380s were cooler and wetter than normal, with an increased likelihood of severe flooding. The 1390s brought drought conditions (Adams 2002). The movement of maize agriculture from the floodplain to the upland during this period, to accommodate growing cotton in the flood plain, made the maize more vulnerable to drought conditions; upland agriculture would have relied largely on rainfall for water (Adams 2002). Social factors also likely contributed to the depopulation of the HSC. Surrounding areas were also depopulated around the same time: settlement clusters at Anderson Mesa, Silver Creek, the Upper Little Colorado River, Puerco, and Bidahochi were all depopulated between 1350 and 1400. This would have disrupted the complex exchange network that sustained the HSC throughout its occupation (Adams 2002). Finally, a changing political climate on the Hopi Mesas may have made the continuing occupation of the Homol'ovi area less important (Adams 2002).

Research in the Homol'ovi area has resulted in a wealth of archaeological data, summarized above. The decades of research since the inception of the HRP in 1985 have delineated the broad outlines of the history of the HSC. However, subtle and important details of individual village histories as well as inter-village and intra-village social relationships remain less clear. By studying the ways in which social identity is embodied within the locally produced utility ware of the Pueblo IV communities of the HSC, this dissertation will explore the ways in which the new relationships necessitated by the processes of migration and aggregation were negotiated, contributing to a more complete understanding of the social history of the HSC.

CHAPTER 6: CHARACTERIZING THE UTILITARIAN POTTERY OF THE HOMOL'OVI SETTLEMENT CLUSTER

Locally Produced Pottery of the Homol'ovi Settlement Cluster

Winslow Orange Ware

Winslow Orange Ware (WOW) is the decorated ceramic tradition of the Homol'ovi Settlement Cluster (HSC). WOW is characterized by coarse, crumbling paste and abundant, gritty temper—typically clear and colored sand and, often, crushed sherd (Hays 1991; Lyons and Hays-Gilpin 2001). Surface color is usually orange; but yellow, buff, pink, tan, and red may also occur (2.5YR 5/4-6/8, 5YR 5/2-8/4, 7.5YR 6/1-8/2, 10YR 5/1-8/3). The soft paste, fire clouding, and extreme color variation often observed in WOW may be caused by the use of unsuitable fuel, such as cottonwood and driftwood, to fire the pottery (Hays-Gilpin et al. 1996). Painted designs on WOW are usually executed in thin dark-brown mineral paint. In some types, white mineral paint is used to create polychrome designs—typically through outlining, although areas of massed white are occasionally seen. This white paint is quite variable but is often thick and somewhat fugitive (Hays-Gilpin et al. 1996). An example of WOW is illustrated in Figure 6.1.

Historically, the stylistic affinity of WOW was the subject of some debate (e.g., Colton and Hargrave 1937; Mera 1934; Upham 1982). The WOW type Homolovi Polychrome was initially identified as part of the east-central Arizona brown ware tradition (Mera 1934). Later, Colton and Hargrave saw a kinship between WOW and the prehispanic ceramics of the Hopi Mesas (1937:136–138). More recent analysis by Patrick Lyons has confirmed that WOW is associated with prehispanic Hopi ceramic traditions (Lyons 2003). Lyons's analysis of 1,135 whole ceramic vessels recovered from the HSC concluded that virtually all WOW vessel layouts are shared by Jeddito Orange Ware and Jeddito Yellow Ware. Based on this association, Lyons argues for a strong and persistent connection between the residents of the Homol'ovi area

Figure 6.1: Winslow Orange Ware bowl from the site of Homol'ovi I (ASM 2004-1081-7).

and the Hopi Mesas, suggesting a northern origin for the immigrants who founded the Homol'ovi villages (Lyons 2003).

Prior to compositional analysis, identification of the primary area of production for WOW was also contentious. WOW is most frequent in assemblages from the Homol'ovi area, Anderson Mesa, and the Puerco area (Lyons 2001, 2003). Colton and Hargrave suggested that the unslipped WOW types with lighter paste were made in the Homol'ovi area and that types with darker paste were made in the Puerco and Homol'ovi areas (Colton and Hargrave 1937). In contrast, Upham suggested that all WOW types were produced at Chavez Pass (Upham 1982). Excavation at Homol'ovi provided extensive evidence that WOW was produced at villages in the HSC (Adams 2002; Lyons 2003). This evidence included the presence of unfired WOW vessels at Homol'ovi I (H1), Homol'ovi III (H3), Homol'ovi IV (H4), and Jackrabbit as well as unfired clay coils and patties, pottery manufacturing tools, and a large number of misfired, warped, fire-clouded, and vitrified sherds and whole vessels of WOW recovered from many excavated Pueblo IV sites in the HSC (Lyons 2003). Such production errors typically remain close to their area of production (Hegmon et al. 1995), supporting the suggestion that WOW was primarily manufactured in the Homol'ovi area. Additionally, sourcing studies indicate that WOW was manufactured at Homol'ovi. Petrographic analysis suggested a local origin for WOW tempering materials (Hays-Gilpin et al. 1996; Hays 1991). Several local clays match those used to make WOW: WOW has been replicated using clays and sand local to the Homol'ovi area (Vaitkus 1986).

Compositional analysis by Patrick Lyons clearly established that WOW was produced by the residents of the HSC and the Puerco area (Lyons 2003). Lyons selected 422 samples of pottery and clays for instrumental neutron activation analysis (INAA) at the research reactor facility at the University of Missouri (MURR). The sherds for this analysis were drawn from 27 sites in the HSC, Puerco area, Anderson Mesa, Verde Valley, Tonto Basin, and the Silver Creek Drainage. Lyons targeted WOW, but other wares were included in this analysis. The clays came from deposits located within 0.8 kilometers of H1, Homol'ovi II (H2), H3, and H4. Twelve samples of unfired clays were recovered from archaeological deposits at H1, H2, and Puerco Pueblo. This analysis resulted in the identification of three primary compositional groups—local, Puerco, and Hopi—as well as a Little Colorado group made up of samples of Little Colorado White Ware and Little Colorado Gray Ware. The local group consisted primarily of WOW, but also included several sherds that were identified as locally produced versions of Roosevelt Red Ware, Tsegi Orange Ware, Jeddito Orange Ware, and Tusayan Gray Ware. The Hopi group consisted of fragments of Jeddito Orange Ware and Jeddito Yellow Ware vessels, made on the Hopi Mesas.

The Puerco group was comprised almost exclusively of WOW specimens recovered from Puerco Pueblo and Wallace Tank Pueblo, indicating production of WOW by the Pueblo IV inhabitants of the Puerco area. These INAA data support multiple lines of evidence, including the criterion of abundance as well as oxidation and temper analysis (Vint 1990), suggesting that WOW was manufactured in the Puerco area as well as within the HSC itself. Puerco Pueblo and Wallace Tank Pueblo, two sites comparable to and contemporary with the HSC sites, specifically appear to have been loci of WOW production in the Puerco area. The presence of one WOW specimen from the Puerco group recovered from the HSC indicates that pottery moved from the Puerco area to the HSC; however, there is no evidence suggesting this exchange was two-directional (Lyons 2001, 2003).

Homolovi Orange Ware and Homolovi Gray Ware

Homolovi Orange Ware (HOW) and Homolovi Gray Ware (HGW) represent the locally manufactured utility tradition of the HSC. Examples of HOW and HGW vessels are illustrated in Figure 6.2 and Figure 6.3. HOW, first defined by Colton and Hargrave (1937), is characterized by a coarse, crumbling paste tempered with abundant, poorly sorted mix of clear and colored sand and, often, crushed sherd. The colored sand temper typically includes red, yellow, white, and black fragments (Colton and Hargrave 1937; Hays 1991; Lyons and Hays-Gilpin 2001). HOW typically has orange paste (2.5YR 5/4-6/8), although colors may range from tan to pink to buff (5YR 7/3, 7.5R 7/4, 10YR 7/2). HGW was first defined by Kelley Hays (1991). HGW possesses abundant multicolored and temper, crumbling fracture, and a dark to light gray (GLEY 1 8/N-4/N) surface and core (Hays 1991; Lyons and Hays-Gilpin 2001). Both HOW and HGW are variable in surface treatment: surfaces may be indented or obliterated corrugated, plain, or, rarely, polished (Hays 1991; Lyons and Hays-Gilpin 2001). Fire clouds are very common on both wares (Hays 1991; Lyons and Hays-Gilpin 2001).

The primary difference between HGW and HOW is paste color. However, the surface color of both wares is highly variable, ranging from dark gray to orange on a single sherd (Hays 1991; Lyons and Hays-Gilpin 2001). In some instances, the paste of a reconstructible vessel may be both gray and orange (Lyons and Hays-Gilpin 2001). This co-occurrence of gray and orange paste suggests that the variation in color of locally produced utilitarian pottery is primarily a byproduct of irregular firing practices and the dependence on sub-par fuel sources, such as cottonwood and driftwood, for firing rather than a deliberate choice by Homol'ovi potters. An oxidation analysis targeting HOW and HGW suggests that the HGW may be an incompletely oxidized version of HOW (Lyons and Hays-Gilpin 2001). Based on these similarities, it has been

Figure 6.2: Homolovi Orange Ware jar from the site of Homol'ovi I (ASM 2004-1081-107).

Figure 6.3: Homolovi Gray Ware jar from the site of Homol’ovi I (ASM 2004-1081-115).

suggested (Cutright-Smith and Barker 2016:118; Lyons and Hays-Gilpin 2001:162) that these wares are more appropriately considered as part of the same ceramic category, referred to under the more general sobriquet of Homolovi Utility Ware or Homol'ovi utility wares (HUW). Although this moniker does not wholly conform to the ceramic naming system established by Colton (Colton 1953), it more accurately describes the corpus of utilitarian ceramics produced within the HSC than either HOW or HGW. As such, HUW is used in this study to refer to the locally produced utilitarian assemblage of the HSC, regardless of paste color. That said, paste color has been recorded for all sherds included in this study using the traditional HOW/HGW terminology. In their analysis of ceramic distribution at H3, Lyons and Hays-Gilpin (2001:162) found that orange corrugated pottery increases relative to gray corrugated pottery over time. Later deposits at H3 contain more HOW than HGW. This study will explore other possible cultural patterning associated with the distribution of paste color within HUW.

Over the course of this research, additional characteristics of HUW were observed that expand upon the typological descriptions present in extant literature. The typological descriptions of HOW and HGW state that sherds of both wares contain multi-colored sand temper. However, this is unhelpfully generic given the great diversity of temper observed in HUW. Generally speaking, the sand in HUW tends to be fine, angular, and largely composed of colorless quartz—translucent or opaque. Colored sand found in HUW typically includes red-orange fragments and black fragments, either dull or shiny. Gray-green fragments may also be present. The proportion of multicolored sand to colorless sand varies, as does the coarseness of the sand. The multi-colored sand used to temper HUW is typically finer than the sands used to temper the other utility wares produced in this region, although larger sand is occasionally present. Grain size is rarely uniform, often coarser and finer sand appear together in the same sherd. Other than multi-colored sand, HUW tempering materials also often include soft white fragments which do not appear to be clay or crushed sherd. Crushed sherd temper, typically orange or white, does occur relatively frequently within HUW: sherd temper was added to just less than half of all HUW vessels.

HUW paste is highly variable. Although many sherds exhibit the classic orange or gray paste, HUW paste may also be brown, buff, or tan. Although the paste color on the surface and at the core of HUW tends to be similar, the core of a sherd may be somewhat darker and browner than the surface. The Munsell© values typically seen on HUW are shown in Table 6.1. HUW also exhibits great diversity in exterior surface treatment. Although HUW may be plain, typically the exterior surface is corrugated—indented, obliterated, plain, or flattened. Zoned, patterned, and painted corrugation do not seem to be present within the HUW assemblage, likewise there are no examples of vessels with applique designs. Although it is more difficult to determine the presence or absence of intentional smudging on sherds than on whole vessels, it appears that intentional smudging occurred rarely, if at all, on HUW vessel interiors. Polished vessel interiors are entirely absent, suggesting that the possible smudging evident on vessel interiors is more likely the result of use alteration.

The production location of HUW is somewhat more nebulous than WOW, as no compositional analysis has specifically targeted HUW until this study. Colton suggested, based on the geographical distribution of HOW and WOW, that both were produced in the Middle Little Colorado River Valley (Colton 1956). The many similarities between HUW and WOW support this suggestion (Lyons and Hays-Gilpin 2001), as does the fact that HUW does not fit within any other previously established ware (Hays 1991). Lyons's compositional analysis of WOW included several sherds of HOW and HGW. This INAA analysis confirmed that HGW

	Surface		Core	
Munsell© Values	2.5YR 5/4-6/8	reddish brown-light red	2.5YR 6/1-6/6	reddish gray-light red
	5YR 5/2-6/8	reddish gray-reddish yellow	5YR 6/1-6/4	gray-light reddish brown
	5YR 7/2-7/4	pinkish gray-pink	5YR 7/3-7/6	pink-reddish yellow
	7.5YR 6/1-7/4	gray-pink	7.5YR 5/3-7/4	brown-pink
	7.5YR 5/2-5/4	brown	GLEY 1 4/N	dark gray
	10YR 7/2-7/4	light gray-very pale brown	GLEY 1 5/N	gray
	GLEY 1 4/N	dark gray	GLEY 1 6/N	gray
	GLEY 1 5/N	gray	GLEY 1 7/N	light gray
	GLEY 1 6/N	gray		
	GLEY 1 7/N	light gray		
	GLEY 1 8/N	white		

Table 6.1: Munsell© values most commonly observed in Homolovi Orange Ware and Homolovi Gray Ware.

and HOW were made using materials local to the Winslow area (Lyons 2001, 2003). The local compositional group, dominated by WOW, included specimens of HGW and HOW as well as a sherd from an unfired utility vessel found at H4 (Lyons 2001).

Establishing the Local Production of Homolovi Utility Ware

In order to confirm that HUW was produced locally throughout the HSC, sherds were submitted to the Archaeometry laboratory at the University of Missouri Research Reactor (MURR) for instrumental neutron activation analysis (INAA). INAA is a precise, sensitive, and accurate method used to characterize clays from various regions and to identify the likely source area of ceramic vessels (Bishop et al. 1990; Neff 1992; Sinopoli 1991). This process uses a nuclear reactor to bombard a powdered sample of pottery with neutrons, changing the elements in the powdered pottery to unstable radioactive isotopes—radioisotopes (Glascock 1992; Parry 1991; Rice 2015:299-301). These radioisotopes decay at known rates. Gamma ray emission counters measure the energy levels and intensities of the gamma rays emitted during decay, allowing the identification of individual elements and their concentrations in the powdered pottery sample (Parry 1991; Rice 2015:299-301).

Sampling Strategy

The quantity and contexts of the sherds included in this analysis are shown in Table 6.2. The sample of HUW submitted for INAA was restricted spatially and temporally. HUW sherds were selected from the ceramic assemblages of H1, H2, H3, H4, and Chevelon Pueblo (Chevelon). Sampling at H2, H3, H4, and Chevelon emphasized early contexts, in order to target founding groups. Ceramics from the full range of occupation at H1 were targeted for INAA. The occupation of H1 partially overlapped with the other sites considered in this analysis; therefore, broad temporal sampling at this site allows comparison between sites. Twenty-five ceramic samples each were submitted from Chevelon, H2, H3, and H4, and 28 samples were submitted from H1, for a total of 128 samples.

For each of these five sites, sherds were selected from as wide a variety of structures as possible, to explore site-wide diversity. The primary limiting factor was sherd size. A portion of each sherd submitted for INAA was retained to allow for later analysis and characterization. It is difficult to subdivide a small sherd; therefore, this sampling strategy favored larger sherds. Every effort was made to identify matches and refits between sherds from the same site. Sherds from the same vessel were grouped together and considered as a single vessel. Often, a single small fragment of these sherd groups was submitted for INAA in order to avoid breaking a larger sherd. The analysis of these samples was conducted by Michael D. Glascock and Jeffery R. Ferguson at MURR. The report detailing this analysis is contained in Appendix A.

Homol'ovi I				Homol'ovi II				Homol'ovi III				Homol'ovi IV				Chevelon Pueblo			
STR	Context	Phase	#	STR	Context	Phase	#	STR	Context	Phase	#	STR	Context	Phase	#	STR	Context	Phase	#
651	Room	TP/EHP	1	324	Kiva	LHP	1	34	Kiva	TP	8	0	Plaza	TP	25	288	Room	TP/EHP/MHP	2
489	Room	EHP	1	558	Room	LHP	2	37	Kiva	TP	17					227	Room	TP/EHP/MHP	1
490	Room	EHP	2	704	Kiva	LHP	3									248	Kiva	EHP	2
652	Room	EHP	1	706	Kiva	LHP	5									266	Room	EHP/MHP	1
558	Kiva	TP/EHP/MHP	5	707	Kiva	LHP	5									279	Kiva	EHP/MHP	10
210	Room	TP/LHP	5	714	Kiva	LHP	2									120	Room	EHP/MHP/LHP	1
209	Piiki House	LHP	2	999	Ramada	LHP	7									274	Room	EHP/MHP/LHP	2
501	Room	LHP	2													268	Room	MHP/LHP	1
502	Room	LHP	2													901	Kiva	MHP/LHP	3
504	Room	LHP	7													159	Room	LHP	1
																264	Room	LHP	1
		Total:	*28*			*Total:*	*25*			*Total:*	*25*			*Total:*	*25*			*Total:*	*25*

Table 6.2: The depositional contexts of Homolovi Orange Ware and Homolovi Gray Ware sherds submitted to MURR for INAA, subdivided by site. Phase refers to the period in which each structure sampled was primarily used. TP refers to the Tuwiuca Phase, EHP refers to the Early Homol'ovi Phase, MHP refers to the Middle Homol'ovi Phase, and LHP refers to the Late Homol'ovi Phase. Approximate calendar dates for each phase can be found in Table 4.1. Contexts for which multiple phases are indicated were used during all phases listed.

Results of INAA

The 128 samples in this dataset were compared with the decorated and utilitarian samples previously analyzed by Patrick Lyons (2001, 2003). These two datasets exhibited significant overlap, justifying their aggregation into a single analysis (Ferguson and Glascock 2016). The initial study by Lyons (2001, 2003) identified a number of compositional groups. These included a local group associated with the HSC as well as Hopi, Puerco, and Little Colorado groups which were chemically distinct from the locally group. The distribution of samples submitted for this research and Lyons’ samples by compositional group assignment is shown in Table 6.3. Thirteen of the samples submitted by this project were clear outliers from all these groups and are, therefore, classified as unassigned. The non-local groups—Hopi, Puerco, and Little Colorado—remain largely intact except for the addition of 1 sample from H3 to the Hopi group and 19 samples to the Puerco group, illustrated in Figure 6.4 (Ferguson and Glascock 2016).

Site	Compositional Group									
Site	1	2	3	34	4	Hopi	LCW	Puerco	Unassigned	*Total*
Adobe Pueblo									1	*1*
AZ O:15:54						1				*1*
Bailey Pueblo						2			2	*4*
Chavez Pass	1	2	4						3	*10*
Chevelon Pueblo		2	7		1			8	10	*28*
Holiday Inn									1	*1*
Homol'ovi I	19	8	20	8	16	5		9	45	*130*
Homol'ovi II		6	18	3	1			1	7	*36*
Homol'ovi III	10	5	21	15	32	5		1	23	*112*
Homol'ovi IV			9	5	4	55			35	*108*
HP 36							1			*1*
HP 36B							3			*3*
HP 36C							2			*2*
HP 51B							2			*2*
PEFO 1998B1							3			*3*
PEFO 1998B13							2			*2*
PEFO 1998B19							1			*1*
PEFO 1998B39							2			*2*
PEFO 1998B7							2			*2*
PEFO Wacc 6229							1			*1*
Puerco Pueblo								23	2	*25*
Rye Creek Pueblo									2	*2*
Verde:3:3		1	3						3	*7*
Verde:5:11									1	*1*
Verde:5:17									1	*1*
Verde:5:21			1							*1*
Verde:5:3		1								*1*
Verde:5:31									1	*1*
Verde:6:9									3	*3*
Wallace Tank								15		*15*
Total	*30*	*25*	*83*	*31*	*54*	*68*	*19*	*57*	*140*	*507*

Table 6.3: Breakdown of compositional group assignment by site, including sites from across the region. This table includes samples of decorated and utilitarian pottery produced in the HSC submitted by Patrick Lyons (2001, 2003) and samples of utilitarian pottery submitted for this dissertation (adapted from Ferguson and Glascock 2016:Table 3b).

The addition of any samples to the Hopi group is somewhat surprising. Lyons' research included specimens of ceramic wares and types assumed to have been produced on the Hopi Mesas: these sherds formed the initial Hopi group. However, Lyons' (2001, 2003) analysis did not include specimens of Awatovi Yellow Ware or Tusayan Gray Ware, the corrugated ceramic wares produced in the Hopi area during this period. The identification of a single sherd which matches the criteria used to designate HUW—multi-colored sand temper, brown-gray paste—as a member of the Hopi group may indicate that some raw clay was transported from the Hopi area to Homol'ovi and was used to make pottery, or possibly that the corpus of pottery produced in the Hopi area during this period was more diverse than typologies indicate (e.g., Colton and Hargrave 1937; Gifford and Smith 1978).

The addition of 19 samples to the Puerco group is less surprising. Lyons (2001, 2003) analysis identified a number of WOW sherds that were produced in the Puerco area. The identification of HUW sherds produced in the Puerco area is, therefore, expected. Based on the criterion of abundance, it appears that the Puerco group was produced primarily at Puerco Pueblo and/or Wallace Tank (Table 6.3). Less expected is the relative abundance of Puerco group HUW recovered from the HSC. Lyons' (2001, 2003) analysis only identified 1 specimen of Puerco group WOW recovered from the HSC. My analysis identified 19 HUW sherds from the Puerco group. This abundance supports Lyons' (2001, 2003) suggestion that ceramics were exchanged between the residents of the Puerco area and the HSC.

The discrepancy between the relative abundance of Puerco group HUW and the scarcity of Puerco group WOW recovered from the HSC is intriguing. Not only was utilitarian, corrugated pottery being exchanged between groups more than 60 km apart—a not insignificant

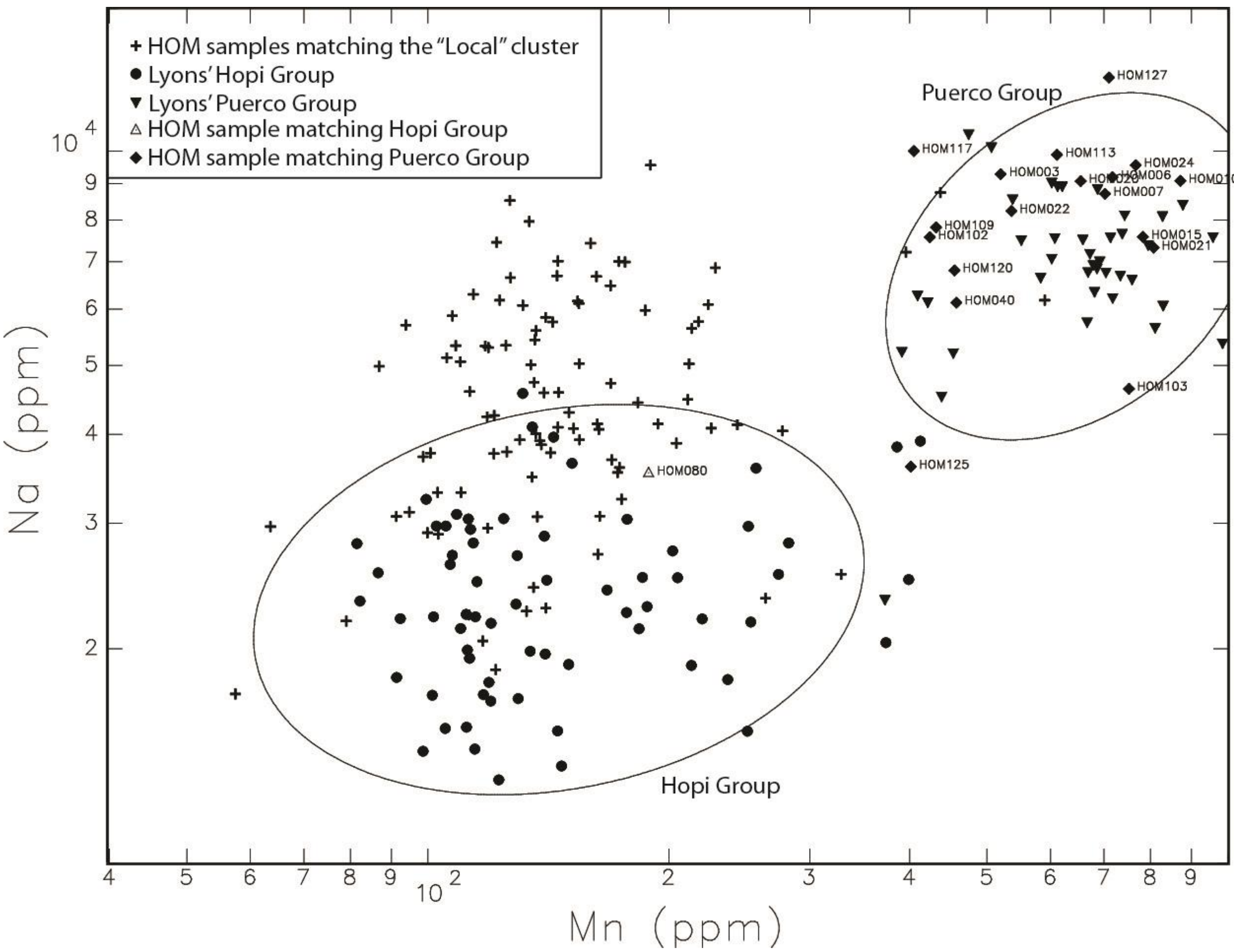

Figure 6.4: A bivariate plot of manganese and sodium showing the relationships between the samples submitted for this research (HOM samples) and the Hopi and Puerco Groups. The samples from this research assigned to the Hopi and Puerco Groups are individually labelled (HOM#), while the samples submitted by Patrick Lyons (2001, 2003) and those matching the local cluster are simply plotted. The ellipses represent 90% confidence intervals for membership in the groups. Figure by Ferguson and Glascock (Ferguson and Glascock 2016:Figure 1).

distance—it was being exchanged in greater quantities than the associated decorated pottery. One possible explanation for this patterning is that the vessels themselves were not the primary object of exchange; rather, they served as containers for another product. Corrugated jars can typically hold a greater volume than decorated bowls, and it is easier to seal the mouth of a restricted vessel such as a jar than an open vessel like a bowl. It is unclear what resource might have been contained in these vessels and transported from the Puerco area to Homol'ovi. Possibly these vessels were brought to the HSC by people migrating from the Puerco area and are an indication of a continuing social relationship. Equally intriguing, there is no evidence to suggest that this ceramic exchange was bi-directional: no sherds from the HSC group were identified at Puerco Pueblo or Wallace Tank (Lyons 2001, 2003). This begs the question, what was being transported from the HSC to the Puerco area? A great deal of evidence suggests that the HSC produced cotton and exported it to other areas of the U.S. Southwest, especially Hopi (Adams 1991, 2002, 2013). Possibly cotton grown in the HSC was exported to the Puerco area as well. A further exploration of the exact nature of the relationship between the sites of the HSC and the Puerco area would doubtless provide fertile ground for future research.

The majority of the sherds submitted for this analysis fit into the local group previously identified by Lyons (Ferguson and Glascock 2016). Lyons' local group was subdivided into two groups: Hom1 and Hom2. A small number of samples remained in the broader local group rather than being included in either of these subgroups (Lyons 2001, 2003). However, the addition of these new samples rendered the distinction between Hom1 and Hom2 ambiguous. This suggested additional clustering within the local group (Ferguson and Glascock 2016). In order to explore this, Lyons' samples belonging to the local group were combined with the 96 new samples not assigned to non-local compositional groups or removed as outliers. INAA identified four compositional groups and one group of outliers within this large cluster. The association between INAA group and site for the samples submitted as part of this research is shown in Table 6.4. Groups 1 and 2 were identified based on concentrations of rubidium and cobalt (Ferguson and Glascock 2016). The separation of these groups is shown in Figure 6.5. Most of Group 1 consisted of Lyons' Hom1 group. No specimens belonging to Group 1 were identified within the samples submitted for this research; therefore, this group will not be discussed further. Four specimens submitted for this research were identified as belonging in Group 2 (see Table 6.4).

From within the large cluster that remained after splitting off Groups 1 and 2, Groups 3 and 4 were identified on the basis of concentrations of neodymium and rubidium and refined using Mahalanobis distance probabilities and bivariate plots (Ferguson and Glascock 2016). A number of additional specimens were found to be similar to Groups 3 and 4, but exhibited significant statistical deviations or created too much overlap between these two groups. These specimens were assigned to Group 34, a compositionally diverse group similar to Lyons' Local Group (Ferguson and Glascock 2016). Rather than being totally separate groups, Groups 3 and 4 may be best understood as two ends of a continuum of variability, with Group 34 falling in the middle (Ferguson and Glascock 2016). Groups 3, 4, and 34 are shown in Figure 6.6. From within the specimens submitted by this research, 33 belong to Group 3, 20 belong to Group 4, and 14 belong to Group 34 (see Table 6.4). The remaining 37 samples submitted for this research remain unassigned to any of the compositional groups described above. Upon receipt of the INAA results, I revisited these 37 sherds to explore whether visual and binocular analysis would reveal any shared qualities or unusual attributes. I found that these sherds did not vary in any

			Site					*Total*
			H1	H2	H3	H4	Chevelon	
INAA Cluster	g2	Count	2	0	0	2	0	*4*
		% INAA Cluster	50.0	0.0	0.0	50.0	0.0	*100.0*
		% Site	7.1	0.0	0.0	8.0	0.0	*3.1*
		% Total	1.6	0.0	0.0	1.6	0.0	*3.1*
	g3	Count	13	2	7	6	5	*33*
		% INAA Cluster	39.4	6.1	21.2	18.2	15.2	*100.0*
		% Site	46.4	8.0	28.0	24.0	20.0	*25.8*
		% Total	10.2	1.6	5.5	4.7	3.9	*25.8*
	g34	Count	3	5	3	0	3	*14*
		% INAA Cluster	21.4	35.7	21.4	0.0	21.4	*100.0*
		% Site	10.7	20.0	12.0	0.0	12.0	*10.9*
		% Total	2.3	3.9	2.3	0.0	2.3	*10.9*
	g4	Count	3	11	2	1	3	*20*
		% INAA Cluster	15.0	55.0	10.0	5.0	15.0	*100.0*
		% Site	10.7	44.0	8.0	4.0	12.0	*15.6*
		% Total	2.3	8.6	1.6	0.8	2.3	*15.6*
	Hopi	Count	0	0	1	0	0	*1*
		% INAA Cluster	0.0	0.0	100.0	0.0	0.0	*100.0*
		% Site	0.0	0.0	4.0	0.0	0.0	*0.8*
		% Total	0.0	0.0	0.8	0.0	0.0	*0.8*
	Puerco	Count	3	0	2	6	8	*19*
		% INAA Cluster	15.8	0.0	10.5	31.6	42.1	*100.0*
		% Site	10.7	0.0	8.0	24.0	32.0	*14.8*
		% Total	2.3	0.0	1.6	4.7	6.2	*14.8*
	Unassigned	Count	4	7	10	10	6	*37*
		% INAA Cluster	10.8	18.9	27.0	27.0	16.2	*100.0*
		% Site	14.3	28.0	40.0	40.0	24.0	*28.9*
		% Total	3.1	5.5	7.8	7.8	4.7	*28.9*
Total		*Count*	*28*	*25*	*25*	*25*	*25*	*128*
		% INAA Cluster	*21.9*	*19.5*	*19.5*	*19.5*	*19.5*	*100.0*
		% Site	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*
		% Total	*21.9*	*19.5*	*19.5*	*19.5*	*19.5*	*100.0*

Table 6.4: The association between INAA group and Homol'ovi Settlement Cluster site for samples submitted for this research. Samples submitted by Patrick Lyons (2001, 2003) are not included in this table. INAA Group 1 is composed solely of sherds submitted by Patrick Lyons and, thus, is omitted from this table. A complete tabulation of samples, including those submitted by Lyons, can be found in Appendix A.

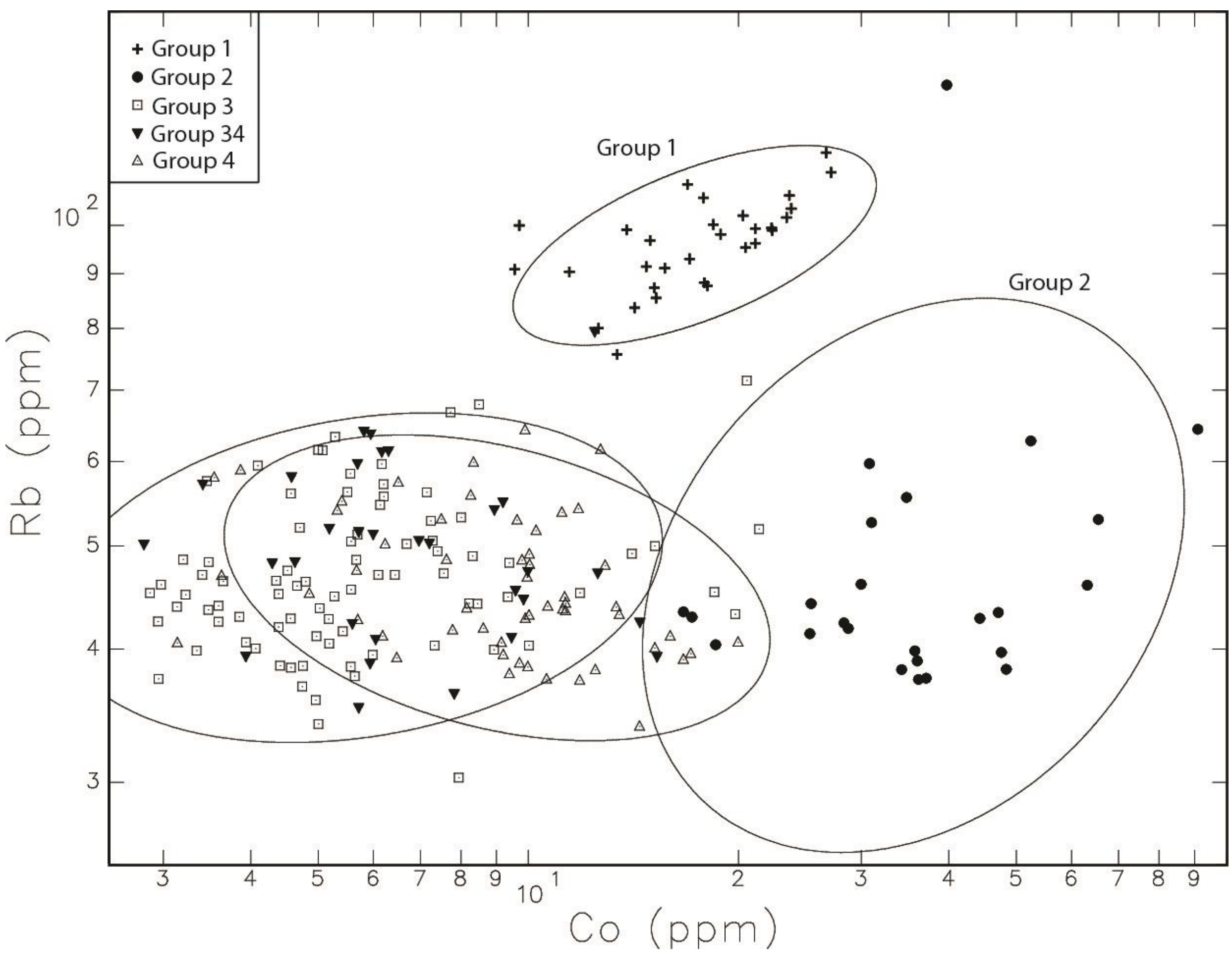

Figure 6.5: Bivariate plot of cobalt and rubidium showing the four local groups, specifically the separation of Groups 1 and 2. This figure includes samples submitted by Patrick Lyons (2001, 2003) and samples submitted for this research. The ellipses represent 90% confidence intervals for membership in the groups (Ferguson and Glascock 2016:Figure 2).

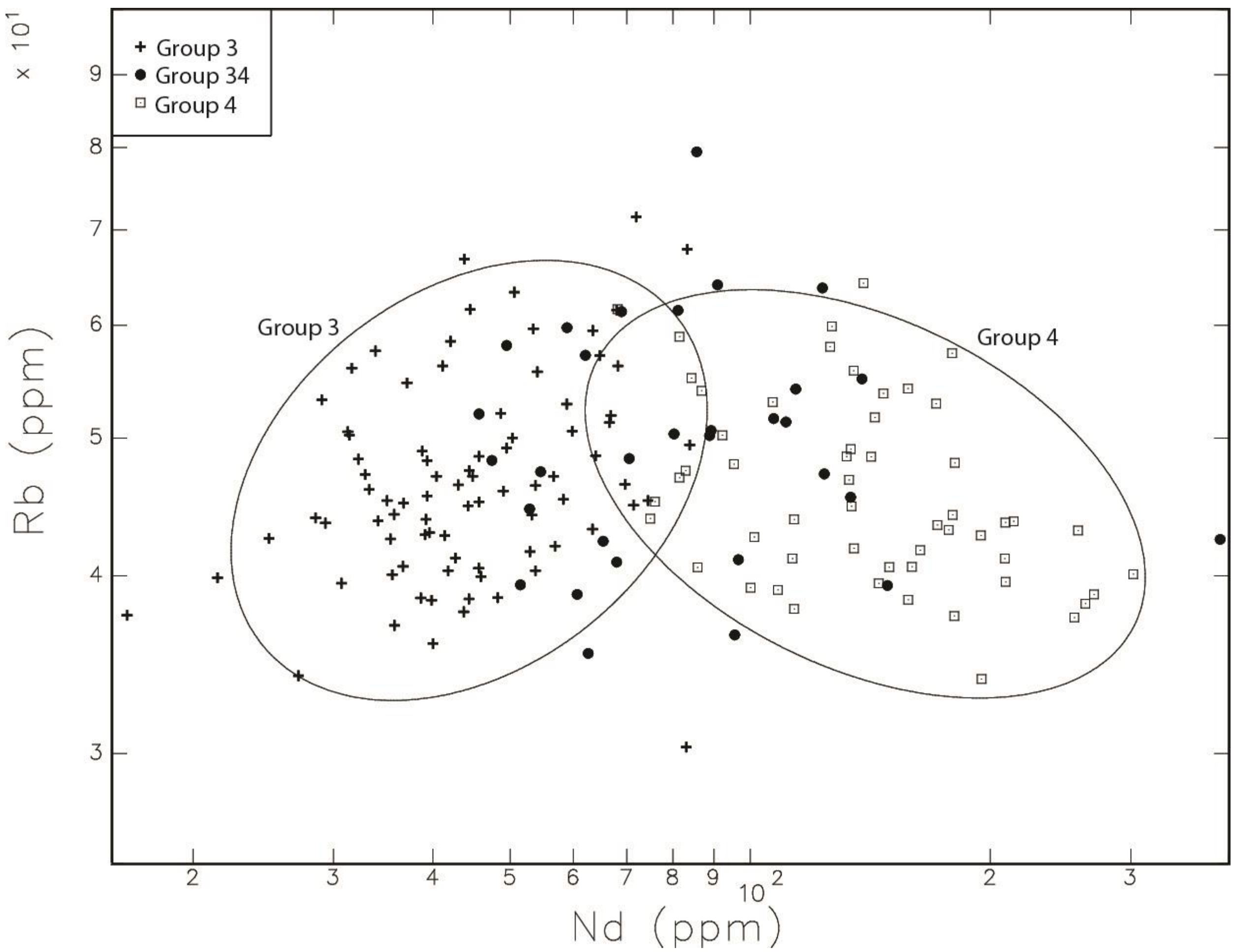

Figure 6.6: Bivariate plot of neodymium and rubidium showing the separation of Groups 3 and 4, as well as the distribution of Group 34. This figure includes samples submitted by Patrick Lyons (2001, 2003) and samples submitted for this research. The ellipses represent 90% confidence intervals for membership in the groups. Figure created by Ferguson and Glascock (2016:Figure 3).

meaningful way from the other sherds sampled from this analysis, and that these sherds did not share any distinctive qualities with each other.

Figure 6.7 depicts the distribution of compositional groups within the HSC by site. A chi-square test explored the strength of these relationships. The connection between INAA group and site was statistically significant (P=0.000). Specifically, Group 3 appears to be most commonly used by the occupants of H1, while Group 4 was utilized most frequently by the residents of H2. The sherds from H3, H4, and Chevelon do not exhibit the same strong relationship with INAA group, although potters from all three of these sites appear to have preferred clay from the Group 3 source. Clearly, different sites were drawing on different clay sources within the HSC. However, no clay source is associated exclusively with one site: each of these clay sources was used by a number of different sites. This suggests that no site had unilateral access to a clay source, although clearly some resources were more abundant at some sites than others. The most likely explanation for this patterning is that the occupants of each site were using a range of clay sources with some sites focusing on a specific clay source, possibly the one most readily available to them. As many of these sites are relatively close together, it is logical that a number of clay sources would be available to the residents of multiple sites.

The patterning of HUW sherds from the Puerco area as shown in Table 6.4 and Figure 6.7 is intriguing. Puerco group sherds were most abundant at Chevelon and H4. Indeed, the vast majority of new samples assigned to the Puerco group were recovered from these two sites. This may indicate movement of ceramics from Puerco Pueblo and/or Wallace Tank to H4 and Chevelon specifically. Also noticeable is the absence of Puerco group sherds from H2. The most obvious explanation for the dearth of Puerco group sherds at H2 is simple chronology. H2 was established latest within the HSC chronology, possibly the residents of this site lacked the

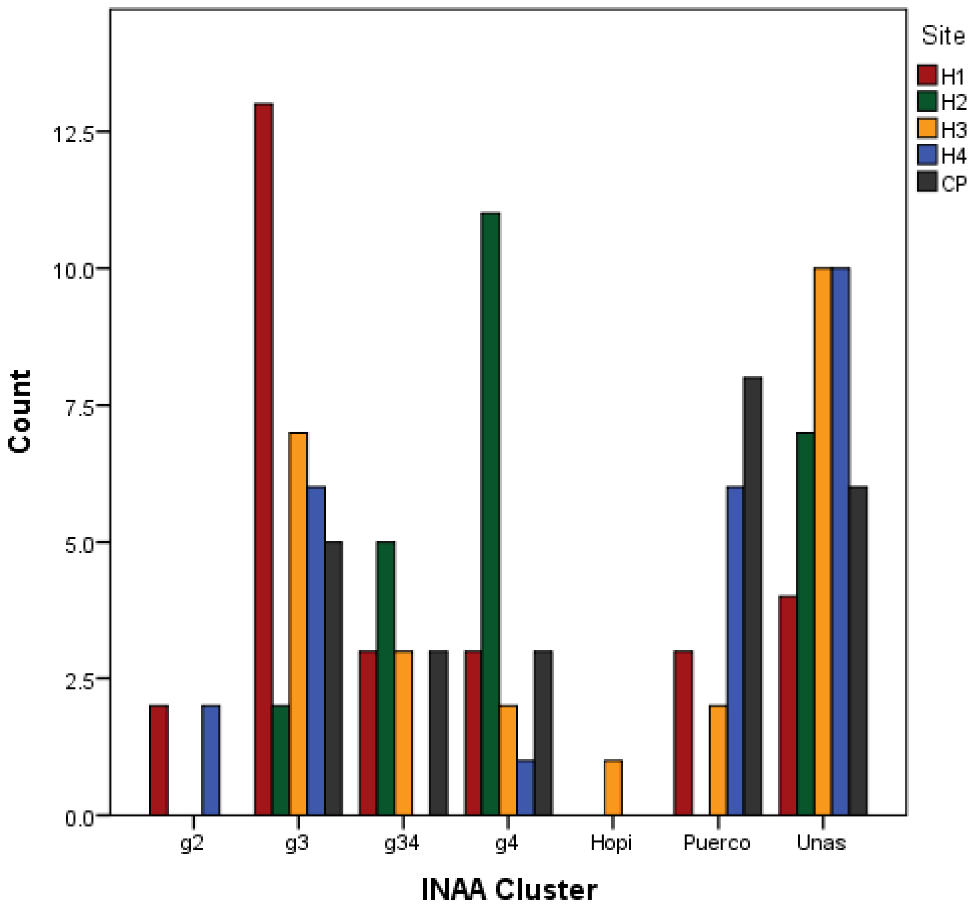

Figure 6.7: The association between INAA group and site for samples submitted for this research. CP refers to Chevelon Pueblo. Samples submitted by Patrick Lyons (2001, 2003) are not included. As Group 1 is composed solely of sherds submitted by Patrick Lyons, it is not represented here. A complete tabulation of samples, including those submitted by Lyons, can be found in Appendix A.

opportunity to participate in a relationship with the Puerco area. An exploration of the context of Puerco group sherds recovered from Chevelon and H1 complicates this chronological explanation.

Chevelon yielded the highest frequency of Puerco group sherds in the HSC. Within the site, these sherds were concentrated primarily in Structure 279, a kiva, which contained six Puerco group sherds. A single Puerco group sherd was also present in Structure 901, a kiva, and Structure 268, a habitation room. Structure 279 was constructed relatively early within the occupational sequence of Chevelon, by around 1300. Active use of this kiva ceased around 1340-1350, and it was subsequently filled with trash until around 1385 (Adams 2016:63-64). Puerco group sherds were found in a number of different contexts throughout the trash fill of this structure, in both early and later levels, suggesting that they could have been deposited at any point after around 1340/1350. Structure 901 was constructed around 1300-1325, use of this structure ceased around 1360-1370. Structure 901 subsequently was used as a midden (Adams 2016a:50–59).

Structure 268 was built as part of a habitation suite very early in the occupation of Chevelon, around 1300. Its location, overlooking a kiva and associated plaza space, suggest that the occupants of this household had religious and social authority (Adams 2016a:108–110). Unlike Structures 279 and 901, this room remained in use until relatively late in the occupation of Chevelon, ending after 1385 (Adams 2016a:361). Subsequently, this room was used as a midden for a brief period of time before Chevelon was depopulated in the 1390s (Adams 2016a). Thus, the Puerco group sherds from Structures 278, 901, and 268 appear to be from contexts that largely post-date 1360. Fewer Puerco sherds were identified in the assemblage from H1. A single sherd each was recovered from Structures 489, 501, and 502. As yet, chronological analysis has not been completed on Structures 489 and 501. Structure 502, however, is known to be associated with the late phase of occupation within the HSC, around 1385-1400. Therefore, the Puerco group sherd recovered from this context cannot have been deposited prior to around 1385.

This contextual data from Chevelon and H1 suggests that the absence of Puerco group sherds at H2 cannot be explained by simple chronology. H2 was founded around 1360. Puerco sherds from both Chevelon and H1 are present in contexts post-dating the establishment of H2. There were available trading partners in the Puerco area throughout the occupation of H2. Although Puerco Pueblo was depopulated by 1380 (Burton et al. 1990:328; Theuer 2011), Stone Axe Pueblo was occupied until around 1450 (Burton 1993:25–26; Schachner et al. 2016b). H2 was occupied between 1360 and 1400 (Adams 2002). Clearly, H2 did not lack the opportunity to participate in the exchange network between the HSC and the Puerco area. Therefore, this diversity in the relative proportions of Puerco group sherds among the sites of the HSC may indicate a similar diversity in exchange relationships, with some sites choosing to emphasize exchange with certain areas.

Unlike the distribution evident within the Puerco group, the five subgroups within the local cluster do not correlate with other clear differences in the HUW assemblage. Refiring experiments on HOW and HGW from H3 suggested that the color variability between these two wares is the result both of different degrees of oxidation in the firing process and, in some cases, the use of different clays (Lyons and Hays-Gilpin 2001:171–174). However, as shown in Table 6.5 and Figure 6.8, no chemical differences were found between the clays used to make HOW and HGW. This supports the suggestion that the color differences observed within HUW are due more to firing conditions than composition. Of the more than 40 clays analyzed by Lyons

			Homolovi Gray Ware	**Homolovi Orange Ware**	*Total*
Compositional Group	2	#	1	3	*4*
		%	1.6	4.5	*3.1*
	3	#	17	17	*34*
		%	27.4	25.8	*26.6*
	34	#	9	5	*14*
		%	14.5	7.6	*10.9*
	4	#	15	5	*20*
		%	*24.2*	*7.6*	*15.6*
	Hopi	#	1	0	*1*
		%	1.6	0.0	*0.8*
	Puerco	#	5	13	*18*
		%	8.1	19.7	*14.1*
	Unassigned	#	14	23	*37*
		%	22.6	34.8	*28.9*
	Total		*62*	*66*	*128*

Table 6.5: Breakdown of the Homol'ovi utility wares by paste color (Homolovi Orange Ware and Homolovi Gray Ware) and compositional group (Ferguson and Glascock 2016:Table 1).

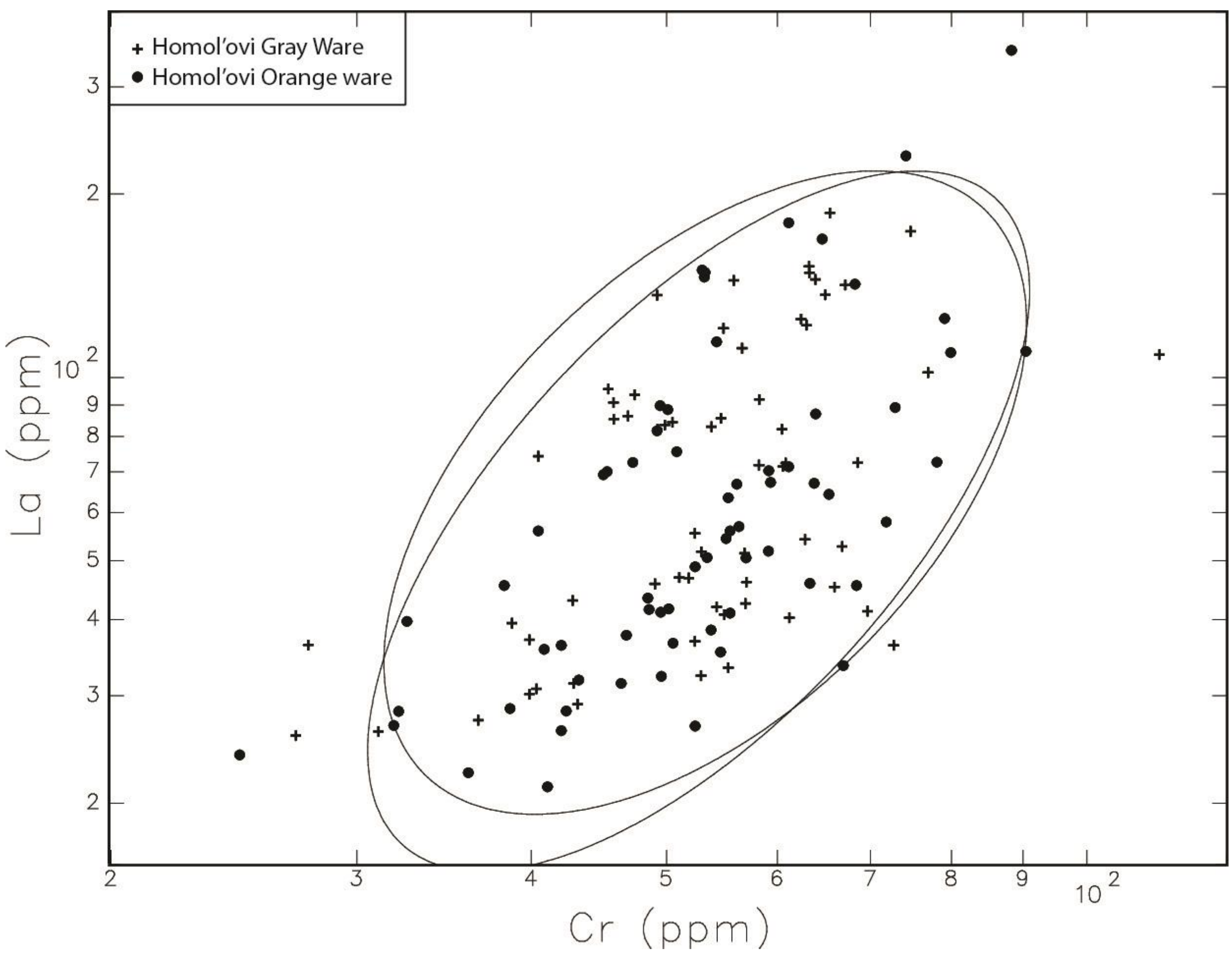

Figure 6.8: Bivariate plot of chromium and lanthanum showing the lack of separation between Homolovi Orange Ware and Homolovi Gray Ware. The ellipses represent 90% confidence intervals for membership in the groups (Ferguson and Glascock 2016:Figure 4).

(2001, 2003), none showed any statistically significant similarity to the compositional groups identified in this analysis. One explanation may be that potters altered clays during the ceramic production process. The addition of sand temper may have introduced variability between the clays and the sherds. Possibly, multiple clays were mixed during the manufacturing process.

Alternatively, there may be other clays present on the Homol'ovi landscape not sampled by Lyons. The most likely explanation is that the clays used to produce utilitarian pottery within the HSC were alluvial, deposited by the Little Colorado River. Lyons (2001, 2003) suggested these same materials were used to make WOW. If this was the case, these clay sources may no longer be present on the landscape, or at least be substantially altered by subsequent fluvial events. Therefore, the best evidence of production location in this instance is provided by the criterion of abundance. The Puerco and Little Colorado groups each have a dense distribution that likely correlates with production loci (see Table 6.3). In contrast, groups 1, 2, 3, 4, and 34 appear to be concentrated in the HSC (Table 6.3). These groups likely reflect differences in raw material use within a larger ceramic manufacturing tradition common to the HSC.

Exploring Temper Variability within Homolovi Utility Ware

Binocular and macroscopic analysis during the data collection phase of this research revealed a high degree of variability in the temper of HUW. The tempering materials in ceramics are determined in part by the raw materials available to the individuals manufacturing the pottery. From among the available materials, potters may select specific tempering materials in order to affect the performance of the finished product (Arnold 1985; Arnold et al. 2000; Bronitsky and Hamer 1986; DeBoer and Lathrap 1979; Rice 2015; Rye 1981; Rye and Evans 1976; Sassaman and Rudolphi 2001; Shepard 1965). However, temper selection may also be affected by enculturative processes; thus, ceramic "recipes" may be indicative of communities of practice (e.g., Curewitz and Goff 2012; Eckert 2012; Fenn et al. 2006; Huntley 2006; Huntley et al. 2012; Joyce 2012; Schleher et al. 2012; Thomas 2012). The variability in temper within HUW may indicate the use of different recipes to make HUW. Although HUW is similar enough between the sites of the HSC that it has all been grouped into the same typological category, there has been no analysis specifically targeted at revealing diversity or confirming uniformity within HUW. If multiple composition groups are present within the HSC, it would revise our current understanding of ceramic production at the HSC as well as create a more nuanced view of the communities of practice manufacturing pottery in the Homol'ovi area.

Binocular analysis over the course of this study identified four different temper groups in HUW, similar to the groups identified by Lyons and Hays-Gilpin (2001) in their analysis of Homolovi Orange Ware and Homolovi Gray Ware. The differences between these groups are largely of degree: all HUW contains multicolored sand temper. These groups are defined based on the relative coarseness and fineness of the sand grains and the proportion of colorless and colored sand. In all temper groups, colored and colorless sand may be either translucent or opaque. Each of these four temper categories occurs both with and without the addition of crushed sherd temper. Therefore, each of these groups was subdivided based on the presence or absence of sherd temper in conjunction with sand. Sherds in temper group A typically contain a roughly equal amount of colorless and colored sand. Both colorless and colored sand tend to be coarse. Fine colorless and/or colored sand may be present; however, fine sand never represents more than half of the temper. Temper group B is characterized by large amounts of fine colored sand, mixed with a smaller amount of fine colorless sand. Occasionally, some coarse colorless or colored sand may also be present. Temper group C is dominated by coarse colorless sand. Sherds in this group do not contain any fine colored sand; however, sherds may contain a few large

Temper Group	A		B		C		D		*Total*
	#	**%**	**#**	**%**	**#**	**%**	**#**	**%**	
Homol'ovi I	76	53.9	7	5.0	55	39.0	3	2.1	*141*
Homol'ovi II	75	75.0	11	11.0	13	13.0	1	1.0	*100*
Homol'ovi III	77	67.5	4	3.5	32	28.1	1	0.9	*114*
Homol'ovi IV	18	18.0	3	3.0	73	73.0	6	6.0	*100*
Chevelon Pueblo	47	46.1	5	4.9	48	47.1	2	2.0	*102*
Total	*293*	52.6	*30*	5.4	*221*	39.7	*13*	2.3	*557*

Table 6.6: The occurrence of four temper groups identified by binocular analysis within the assemblage of Homolovi Utility Ware from each site.

colored sand fragments. Black sand appears to be over-represented in this temper group compared to the mix of colored sand visible in the other temper groups. Temper group D is characterized by an abundance of fine, colorless sand. Smaller amounts of coarse colorless and/or colored sand may also be present.

These temper groups were present at different frequencies across the HSC (see Table 6.6). The HUW assemblage from H1 consisted largely of temper groups A and C, although all four groups were represented. Around one third or one half of the sherds in groups A and C were also tempered with crushed sherd. The assemblage from H3 was very similar, dominated by temper groups A and C with between one third and one half of each group also containing sherd temper. HUW from H4 largely fell into temper group C, with a minority of sherds classified as temper group A. About one third of each group also contained sherd temper. Few specimens of temper groups B and D were found in the H4 assemblage.

The Chevelon assemblage was similar to H3 in that it was dominated by temper groups A and C. Unlike other sites in the HSC, however, the majority of HUW sherds from Chevelon contain crushed sherd temper, regardless of temper group. Unique to the Chevelon HUW assemblage is the presence of large, white crushed rock fragments as well as orange fragments of indeterminate composition. These were distributed comparably to colored sand: abundant in

Temper Group	Compositional Group							
	2	3	34	4	Hopi	Puerco	Unassigned	*Total*
A		7	4	3		2	12	*28*
AS	2	9	4	3			10	*28*
B				1		2	3	*6*
BS	1	5		1		3	3	*13*
C		2	1	7		4	5	*19*
CS	1	10	2	5	1	3	3	*25*
D							1	*1*
DS		1	3			4		*8*
Total	*4*	*34*	*14*	*20*	*1*	*18*	*37*	*128*

Table 6.7: The distribution of four temper groups identified through binocular analysis by compositional group assignment (Ferguson and Glascock 2016:Table 2). 'S' indicates the presence of sherd temper.

temper group A, sparse in temper group C. Very rarely, HUW sherds from Chevelon appear to contain fragments of petrified wood. The HUW assemblage from H2 largely consisted of sherds from temper group A, many of which also contained crushed sherd temper. H2 temper group A sherds regularly contained rusty looking orange-brown fragments of indeterminate composition unique to this assemblage. Sherds belonging to each of these temper groups were submitted to MURR for INAA. MURR found no difference in chemistry between sherds belonging to these four observed temper groups (Table 6.7 and Figure 6.9).

In order to more fully explore the observed variability in HUW temper, 25 HUW sherds were submitted for petrographic analysis (Table 6.8). Petrography is the principal method of identifying mineral inclusions in archaeological pottery, which may be naturally present in the clay matrix or intentionally added as temper (Rice 2015:292-296). In petrographic analysis, minerals are identified by their optical properties. Minerals may be studied optically through the preparation of thin sections. Thin sections are slices taken from fired clay and ground down to 30 microns, allowing the identification of translucent minerals present as well as their

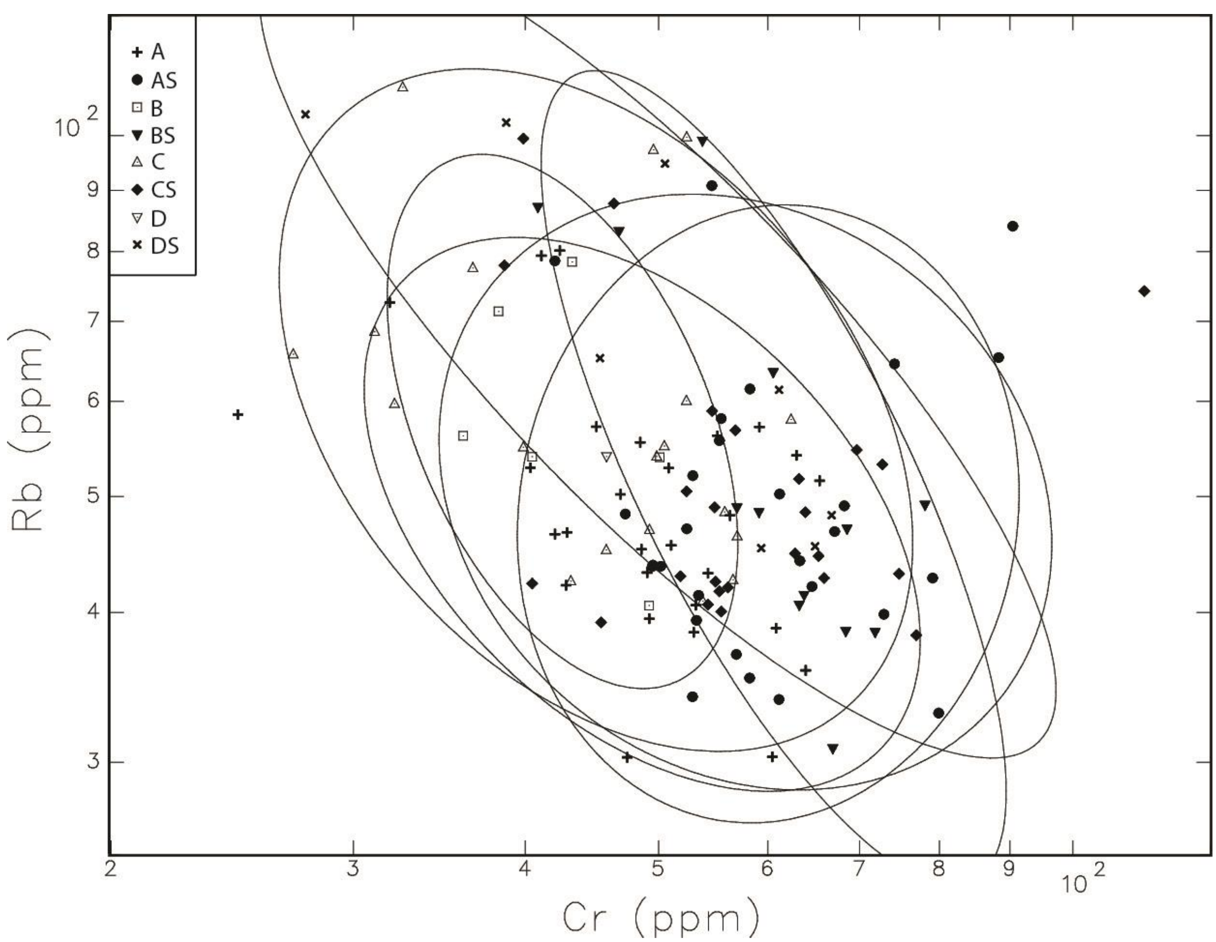

Figure 6.9: Bivariate plot of chromium and lanthanum showing the lack of separation between the different temper groups identified by binocular analysis. The ellipses represent 90% confidence intervals for group membership (Ferguson and Glascock 2016:Figure 5).

Site	Structure	Context	Phase	Temper Group			
				A	B	C	D
Homol'ovi I	651	Room	THP/EH				1
	210	Room	TP/LHP		1		
	489	Room	EHP	1		1	
	502	Room	LHP			1	
Homol'ovi II	324	Kiva	LHP		1		
	704	Kiva	LHP	1			
	706	Kiva	LHP			1	1
	707	Kiva	LHP		1		
Homol'ovi III	34	Kiva	TP	1			
	37	Kiva	TP	1		2	1
Homol'ovi IV	0	Plaza	TP	1	1	2	1
Chevelon Pueblo	288	Room	TP/EH/MHP			1	
	279	Kiva	EHP/MHP				1
	120	Room	EHP/MHP/LHP		1		
	159	Room	LHP	1			
	264	Room	LHP	1			
			Total	7	5	8	5

Table 6.8: The depositional contexts of Homolovi Utility Ware sherds submitted for petrography, subdivided by site. Phase refers to the period in which each structure sampled was primarily used. TP refers to the Tuwiuca Phase, EHP refers to the Early Homol'ovi Phase, MHP refers to the Middle Homol'ovi Phase, and LHP refers to the Late Homol'ovi Phase. Approximate calendar dates for each phase can be found in Table 4.1. Contexts for which multiple phases are indicated were used during all phases listed.

granulometrics and characteristics through a polarizing microscope (Freestone 1995; Middleton and Freeston 1991; Quinn 2013; Rice 2015; Rye 1981; Stoltman 1989, 2001; Whitbread 2001). Petrographic analysis can be used to distinguish ceramic types, to explore variability within a ceramic type through time and space, and to identify regionally distinctive tempering materials (Sinopoli 1991; Whitbread 2001). However, petrography is less effective if geology is relatively uniform throughout a study area, undermining the regional characterization of raw material sources (Rice 2015:292–296).

Sherds submitted for petrographic analysis were selected from among those submitted for INAA, in order to allow comparison between these different types of compositional analysis. Five sherds were selected per site, for a total of 25 samples. Sherds from each of the temper groups identified by microscopic analysis were included. The temper groups and contexts represented by the sherds submitted for petrographic analysis are shown in Table 6.8. Slides for petrographic analysis were manufactured by Quality Thin Section. The analysis of these samples was carried out by Emma Britton using a Nikon Labophot T2-Pol optical mineralogy microscope. Analysis included a 100-click point count, using an arbitrary, absolute scale (Britton 2016). A complete copy of the report provided by Emma Britton, with descriptions of groups and sub-groups as well as point counts, can be found in Appendix B.

Results of Petrography

Petrographic analysis of HUW found that almost all of the thin sections were composed of quartz-based sand, typically mono-crystalline. This is consistent with the typological description of HUW as being tempered with multi-colored sands. Lithic fragments were present as well; however, these fragments tended to be quite small (Britton 2016). Typically, after completing point-counts, samples are arranged into broad mineralogical-based categories and subdivided based on texture and inclusion size-distributions. In this case, however, the mineralogical composition of these samples was relatively uniform. Most of the sherds are dominated by quartz-based sands, and the presence of absence of sherd temper was not helpful in distinguishing groups within the sample set. Therefore, the grouping of this sample set was based on inclusion size, distribution of sizes, and the presence of colored and translucent sands—similar criteria to that used to create the binocular groupings discussed above (Britton 2016).

Petrographic Group		Description
	1	Dominated by coarse, quartz sand. Inclusions are sub-angular to sub-rounded.
	2	Mixed coarse and fine quartz-dominated sand. Coarse inclusions are sub-angular to sub-rounded, fine inclusions are sub-angular to angular.
	3	Fine quartz-dominated sand with a small amount of coarse inclusions. Coarse inclusions are sub-angular to sub-rounded, fine inclusions are sub-angular to rounded.
	4	Inclusions are uniform in size, tending towards coarseness. Quartz sand and feldspar inclusions.
	5	Temper is dominated by angular sherd fragments rather than mineralogical inclusions.

Table 6.9: The characteristics of the groups identified by petrographic analysis.

	Petrographic Group										
	1		**2**		**3**		**4**		**5**		*Total*
Site	**#**	**%**	**#**	**%**	**#**	**%**	**#**	**%**	**#**	**%**	
Homol'ovi I	1	20.0	0	0.0	0	0.0	4	80.0	0	0.0	*5*
Homol'ovi II	1	20.0	1	20.0	3	60.0	0	0.0	0	0.0	*5*
Homol'ovi III	1	20.0	3	60.0	0	0.0	1	20.0	0	0.0	*5*
Homol'ovi IV	1	20.0	3	60.0	1	20.0	0	0.0	0	0.0	*5*
Chevelon Pueblo	1	20.0	2	40.0	1	20.0	0	0.0	1	20.0	*5*
Total	*5*	*20.0*	*9*	*36.0*	*5*	*20.0*	*5*	*20.0*	*1*	*4.0*	*25*

Table 6.10: The distribution of petrographic group by site.

Using these criteria, five groups (shown in Table 6.9) were identified. The distribution of these groups by site is shown in Table 6.10. A number of sub-groups within these categories were also identified, based on textural differences. These subgroups are described in Appendix B.

Group 1 largely consists of coarse quartz-dominated sands. The majority of inclusions are sub-angular to sub-rounded. Fine sands are largely absent in this group; however, the presence of a small amount of finer-grained sands is not sufficient to exclude sherds from Group 1 (Britton 2016). Group 2 is different from Group 1 in that fine-grained sands are present at a much higher frequency. Coarse inclusions are still prevalent within Group 2, but fine sands make up a larger percentage of each slide. Coarse inclusions may be sub-angular to sub-rounded, while most of the finer-grained sand particles are sub-angular to angular. Rarely, samples within Group 2 contain small amounts of fine-grained igneous rock and other unidentified sub-rounded lithic fragments. One slide within this group contained poly-crystalline inclusions and a relatively abundant amount of microcline. It is likely that the differences between Groups 1 and 2 are largely arbitrary and that these two groups are simply different ends of a continuum (Britton 2016). Group 3 contains finer inclusions than Groups 1 and 2. Although coarse inclusions are present, they are fewer in number. Such coarse inclusions as are present tend to be sub-angular to sub-rounded. The more abundant fine inclusions tend to be sub-angular to rounded. One sample within this group contains a few lithic inclusions, possibly igneous, while another contains several plagioclase inclusions (Britton 2016).

Group 4 is the most uniform within this sample set. The inclusions within this group are all very similar in size, tending to be coarse, and all slides contain a large number of feldspar inclusions in addition to quartz sands. One slide also contains a few crystals of microcline. The relative abundance of feldspar inclusions in this group suggests that the raw source for this tempering material may be slightly less mature than Groups 1, 2, or 3. Group 4 is also unique in that no samples from this group contain sherd temper (Britton 2016). Group 5 consists of a single slide. The temper in this slide is dominated by angular sherd fragments, rather than mineralogical inclusions. Sub-angular mono-crystalline sands comprise a minority of the inclusions. The relative lack of mineralogical tempering materials sets this slide apart from the other groups. Although sherds are present in specimens of all of the other groups, excepting Group 4, they do not comprise a majority of the inclusions in any other slide (Britton 2016).

Sherds from the Puerco and Hopi groups identified by INAA were included in the petrographic sample: three from the Puerco group and one from the Hopi group. Interestingly, these sherds appear to conform, roughly, to the groups identified above. None of these sherds were identified as singular or anomalous, inconsistent with the temper groups identified within the HUW assemblage produced within the HSC. Possibly, this may be reflective of broader regional geological similarities between production areas. More likely, this lack of differentiation may be a byproduct of the small sample size.

Given the small sample size available, a Fisher's exact test was used to explore the relationship between petrographic group and site. Sherds belonging to the Puerco and Hopi INAA groups were not included, as they were not produced locally. Results of this test are shown in Figure 6.10. This test found that site and petrographic cluster may be associated, although this relationship is not very strong (P=0.041). Specifically, it appears as though Group 4 is associated with H1. Groups 1, 2, and 3 are more evenly distributed across the HSC, although Group 3 may be more abundant at H2. The association between Group 4 and H1 is similar to the patterning evident in the INAA data, which suggested that the potters residing at different sites were using different sources to acquire tempering materials. Although no temper source seems to

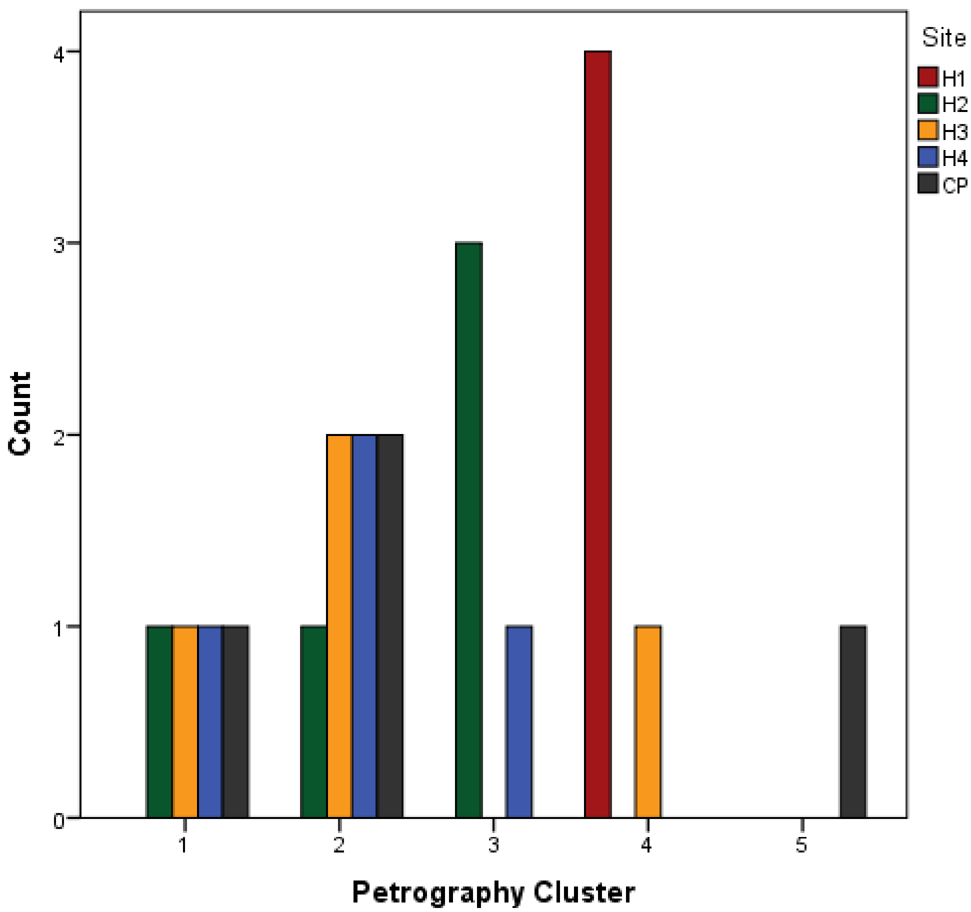

Figure 6.10: The relationship between petrographic group and site. CP refers to Chevelon Pueblo.

be used exclusively by the occupants of one site, clearly temper Group 4 is strongly associated with H1—only one sherd from this temper group was found from a site other than H1—and temper Group 3 was preferred by the potters of H2.

The most likely explanation for this patterning is that the geology of the HSC is relatively homogenous and tempering materials from one area do not differ substantially from those adjacent to another. Because of this homogeneity, the different temper sources used by the potters of most sites are not sufficiently distinct to be apparent through petrographic analysis. A clear exception to this is the relationship between H1 and Group 4. Group 4 was clearly distinguishable from the other temper groups identified by this analysis, and was used almost exclusively by residents of H1. The Group 4 temper source appears to have been slightly better than other available materials as it was coarser and did not apparently necessitate the use of sherd temper. The quality of this temper source may be why it was strongly preferred by the potters of H1. It is significant that the only other site using this temper source is H3: it is likely that the occupants of H3 moved to H1 following extensive flooding. Later, H3 became a seasonal farming village for groups from H1 (Adams 2002). Therefore, it is possible that the groups who relocated from H3 to H1 utilized this temper source and shared their knowledge of it with the potters of H1.

Utilitarian Ceramic Production in the Homol'ovi Settlement Cluster

Making pottery is a complex process, requiring many steps. Each step requires the appropriate tools, materials, skills, and knowledge (Shepard 1956:49–94). One of these steps is gathering raw materials, which requires knowledge of how to recognize and locate a workable clay, how to extract and prepare clay for use, what types of tempering materials work best with that clay or for the intended use of the finished vessel, and how to locate and extract these tempering materials (Crown 2014). Other steps relate to the manufacturing processes associated with vessel production and decoration, as well as knowledge of appropriate cultural practices, prayers, rituals, and taboos (Crown 2014). Although the raw materials used to produce pottery may be selected in order to affect the functionality and performance of the finished vessel (Arnold 1985; Arnold et al. 2000; Bronitsky and Hamer 1986; DeBoer and Lathrap 1979; Rice 2015; Rye 1981; Rye and Evans 1976; Sassaman and Rudolphi 2001; Shepard 1965), the raw materials used by potters may also be indicative of enculturative practices and manufacturing communities. The use of manufacturing materials in common indicates the presence of ceramic 'recipes' shared by members of the same community of practice (e.g., Curewitz and Goff 2012; Eckert 2012; Fenn et al. 2006; Huntley 2006; Huntley et al. 2012; Joyce 2012; Schleher et al. 2012; Thomas 2012).

Communities and social identities are complex entities—fluid, nested, and multi-faceted (Gosselain 2016; Hendon 2010; Lave and Wenger 1991; Roddick and Stahl [editors] 2016). Each different step in the production of pottery may involve participation in a different community of practice. For example, knowledge of symbolic, ritual, political, and ideological meanings of decorative designs may not be restricted to potters. Motifs used in Sikyatki Polychrome also appear in kiva murals and, rarely, rock art (Gilpin and Hays-Gilpin 2012:53). Likewise, the acquisition and use of certain raw materials may also not be restricted to potters (e.g., Huntley et al. 2012). Therefore, while the communal use of certain raw materials may identify a community of practice, one must remain aware that the community of practice utilizing this shared resource may not be restricted solely to the production of pottery.

Further, the members of the community of practice who use these raw material sources may not correlate exactly with the individuals who produce the ceramic vessels recovered by archaeologists. For example, within all Puebloan communities, women traditionally formed pottery (Babcock 1993; Blair and Blair 1999; Crown 2014; Dennis 1940; Hill 1982; Marriott 1948; Mills 1995b; Nahohai and Phelps 1995; Naranjo 1992; Peterson 1997; Wycoff 1985). However, within some Puebloan communities, mining clay was a family chore in which men assisted (Babcock 1993:87; Bunzel 1929; Crown 2014:77; Guthe 1925:69; Ortiz 1979:288). In such cases, therefore, a finished vessel is the byproduct of interactions between several communities of practice in which the members acquiring the raw materials for ceramic production were not necessarily the same as the individuals who shaped and formed the vessel itself. Potters involved in the acquisition of raw materials would also have participated in other communities of practice related to the production of pottery, as well as broader constellations of practice associated via shared stylistic and technological practices.

Compositional analysis of HUW using INAA clearly established the local production of HUW, finding substantial overlap in raw material sources between HUW and WOW. Both INAA and petrographic data suggest a relationship between the raw materials used to produce HUW—both clay and temper—and site. Both also suggest a certain degree of geological uniformity across the HSC: the raw materials available to the residents of one site did not differ substantially from those available to other sites, with a few notable exceptions. Although no site had unilateral access to any resource, clearly some resources were preferentially used by the occupants of different settlements. In particular, the raw materials used by the potters of H1 and H2 appear to be relatively distinct.

The evidence provided by INAA and petrography suggest that the communities of practice focused on acquiring materials for pottery production were essentially local, with residents of each HSC village utilizing different raw material sources. This is most clearly seen within the assemblages of H1 and H2. There is greater uniformity between the ceramic assemblages of H3, H4, and Chevelon. However, this uniformity is likely due to geological homogeneity—H3, H4, and Chevelon are all located on or around deposits of Mokenkopi sandstone, while H1 is located near both Moenkopi and Chinle Formation deposits and H2 was constructed on a small mesa of Shinarump conglomerate adjacent to Chinle outcrops (Adams 2002:41–45; Lange 1998:1–9)—and the use of alluvial clays. Both INAA and petrography revealed a great deal of uniformity within the HUW assemblage. INAA identified two distinct groups: Group 1 and Group 2. Although Groups 3, 4, and 34 were distinct from Groups 1 and 2, they were less distinct from each other. Indeed, Groups 3 and 4 may be described as the ends of a continuum, with Group 34 squarely in the middle (Ferguson and Glascock 2016). The petrographic results are similar. Although five groups were identified, Groups 1, 2, and 3 also appear to be a continuum, with membership in each of these groups based on relative sand grain size and angularity (Britton 2016). Thus, it appears that the potters of the HSC were using the raw materials most easily available to them, likely those closest to their village of residence.

INAA data also indicated a significant exchange relationship between the HSC and the Puerco area. This relationship is supported by INAA evidence from both HUW and WOW. Ethnographically, unpainted utilitarian ceramics are typically exchanged between people and groups with close social or kin ties (e.g., Bohannon 1955; David and Hennig 1973; Duff 2002; Graves 1991; Peeples 2011:355; Zedeño 1994:17, 1998), although this is not always the case (Abbott 2000; Abbott et al. 2007; Arazi-Coambs 2016; Stoltman 1999; Van Keuren et al. 1997). For the most part, utilitarian vessels in the Western Pueblo area seem to have been exchanged in relatively small quantities, even between proximate settlements and clusters (Duff 2002). The circulation of utilitarian vessels appears to reflect informal, local relationships and interactions

(Duff 2002). When exchanged over long distances, the circulation of utilitarian vessels may indicate ongoing close social relationships between individuals in different communities, such as the relationships resulting from intermarriage or migration (Duff 2002; Zedeño 1994:17, 1998). Thus, the presence of HUW imported to the HSC from the Puerco area is likely indicative of close social relationships between these two areas, possibly as a byproduct of intermarriage or population movement between the two settlement clusters. Future research on both the HSC and the Puerco area should seek to explore the nature and extent of the relationship between these two settlement clusters.

CHAPTER 7: TECHNOLOGICAL STYLE AND CORRUGATED POTTERY IN THE HOMOL'OVI SETTLEMENT CLUSTER

Measuring the Technological Style of Corrugated Pottery

The local production of the primary ceramic wares considered in this analysis, Homolovi Orange Ware (HOW) and Homolovi Gray Ware (HGW) together referred to as Homolovi Utility Ware (HUW), has been confirmed by instrumental neutron activation analysis (INAA) and petrography. Thus, the technological attributes of these locally produced corrugated vessels recovered from the HSC are a realistic representation of the technological decisions and manufacturing practices of local potters. In this way, similarities in corrugation technology across HUW may be indicative of participation in one manufacturing community, while differences may indicate the presence of multiple manufacturing communities within one production area.

This dissertation draws on several preceding studies (Neuzil 2001, 2005a, 2005b, 2008; Peeples 2011; Pierce 1999, 2005; Zedeño 1994), as well as a pilot study focused on whole vessels from the site of Homol'ovi I (H1), and experimental replication of corrugated pottery to develop the methodological approach presented here. Twenty variables were recorded for all sherds (Table 7.1). These variables fall into three broad categories: variables describing vessel type and composition, variables qualitatively describing a vessel's technological style, and variables quantitatively describing technological style. Additional variables were recorded for vessel rims (three variables), bases (one variable), and whole vessels (three variables). A copy of the coding sheet and key used for this analysis can be found in Appendix C.

Some attributes, such as paste color and temper, are in part determined by the raw materials available to the individuals manufacturing pottery in the Homol'ovi area. The decision to use specific clays or tempering materials may also be affected by the performance

	Variable	Possible Responses
All Sherds	Temper type 1	Fine paste (temperless), Fine colored fragments, Burned (indeterminate), Yellow sherd, Gray sherd, Orange sherd, White sherd, Fine clear sand, Coarse clear sand, Colored sand, Limestone, Cinder, Tuff, Crushed rock, Mica, White angular fragments, Augite, Clear and colored sand (local mix), Red fragments, Mixed colorless sand (clear and opaque, coarse and fine), Black fragments (not burnt or volcanic), Other, Unapplicable
	Temper type 2	See options above
	Temper type 3	See options above
	Paste color	White, Light gray, Medium gray, Steel gray, Dark gray, Brownish-gray, Brown, Rust (Orange-brown), Orange, Yellow, Buff, Other, Indeterminate
	Ware	Awatovi Yellow Ware, Homolovi Orange Ware, Tusayan Gray Ware, Little Colorado Gray Ware, Mogollon Brown Ware, Homolovi Gray Ware, Puerco Valley Utility Ware, Other, Indeterminate
	Vessel portion	Body, Rim, Base, Rim and body, Base and body, Complete/nearly complete vessel, Other, Indeterminate
	Vessel form	Jar, Bowl, Ladle/scoop, Seed jar, Effigy, Pitcher, Miniature vessel, Other, Indeterminate
	Sooting	Exterior, Interior, Exterior and interior, Broken edges of sherd, None
	Smudging	Present, Absent
	Interior surface treatment	Rough, Scraped, Smoothed, Polished, Other, Indeterminate
	Exterior surface treatment	Indented, Zoned, Patterned, Plain, Clapboard, Plainware, Obliterated, Wiped obliterated, Semi-obliterated, Heavily obliterated, Flattened, Other, Indeterminate
	Indentation type	Finger/finger nail, Tool, Other/multiple, Indeterminate
	Indentation direction	Parallel, Perpendicular, Oblique, Indeterminate
	Indentation alignment	Aligned, Unaligned, Diagonally Aligned, Indeterminate
	Surface elaboration	None/indeterminate, Incised, Punctate, Applique, Other/multiple
	Vessel wall thickness	Average thickness of sherd (3 measurements per sherd)
	Indentation width—Wide	Average width of indentation at the widest point (3 measurements per sherd)
	Indentation width—Narrow	Average width of indentation at the narrowest point (3 measurements per sherd)
	Indentation width—Difference	Difference between average indentation width wide and narrow
	Indentation depth	Average depth of indentations at coil juncture (3 measurements per sherd)
	Coil width	Average width of coil, from juncture to juncture (3 measurements per sherd)
	Indentations per square cm	Measured using a 3x3 cm template
	Degree of Obliteration	Percentage of coils in 3x3 cm square that are fully obliterated
Rim	Rim radius	Measured using standard rim radius template
	Distance to first coil	Distance from the top of the rim to the first corrugated coil
	Rim form	Short flare-rim jar; Tall flare-rim jar; Short, straight-collared jar; Tall, straight-collared jar; Incurving, short, straight-collared jar; Semi-flaring, short, straight-collared jar; Semi-flaring, tall, straight collared jar; Semi-flaring, angled, long-collared jar; Straight sided bowl; Slightly incurved bowl; Incurved bowl; Recurved bowl; Other; Indeterminate
Base	Direction of coils	Clockwise, Counter-clockwise, Indeterminate
Whole Vessel	Vessel profile	Narrow middle shoulder jar, Wide middle shoulder jar, Seed jar, Neckless jar, Plate, Hemispherical bowl, Slightly incurved bowl, Incurved bowl, Recurved bowl, Other, Indeterminate
	Vessel aperture	Restricted, Medium, Wide, Other, Indeterminate
	Vessel size	Small, Medium, Large, Extremely Large, Other, Indeterminate

Table 7.1: All variables measured along with possible variables states (Adapted from Peeples 2011:Table 7.2). Highlighted variables are those included in primary analysis.

requirements of the finished product. For example, different temper types may exhibit different performance characteristics. A vessel with more abundant temper will have different mechanical attributes than a sparsely tempered vessel (Arnold 1985; Arnold et al. 2000; Bronitsky and Hamer 1986; DeBoer and Lathrap 1979; Rice 1987; Rye 1981; Rye and Evans 1976; Sassaman and Rudolphi 2001; Shepard 1965; Skibo et al. 1989; Skibo 1992). However, these choices also may be affected by enculturative processes: ceramic "recipes" may be indicative of communities of practice (e.g., Eckert 2012; Huntley 2006; Schleher et al. 2012). A similar caution must be applied to attributes such as vessel size, vessel form, interior smudging, and vessel wall thickness. Although these attributes can be related to vessel use and performance (Hally 1986; Rice 1987; Schiffer 1990, 2013; Schiffer et al. 1994; Skibo 1992) or the social contexts of food preparation and consumption (Blitz 1993; Lesure 1998; Mills 1999a; Shapiro 1984), they also may be influenced by the community of practice. Dismissing such attributes as entirely functional would be ill-advised; however, the functional aspects of such choices cannot be denied.

Variables such as exterior surface treatment, indentation width (wide and narrow), and indentation depth, in contrast, are most likely to be associated solely with technological style rather than function (Peeples 2011). Therefore, in order to avoid conflating choices made among functional equivalents with choices made about vessel performance characteristics, the variables identified as being most likely to relate to technological choices between attributes with equivalent performance characteristics (highlighted in Table 7.1) were selected for preliminary analysis. Variability within attributes possibly associated with decisions about performance characteristics, such as paste color and temper, were explored within the stylistic clusters identified by preliminary analysis.

Sampling Strategy

The quantity and context of the sherds included in this analysis are shown in Table 7.2. This analysis included 537 HUW sherds. Local production of these sherds was confirmed by compositional analysis, described in Chapter 6. The sample for this research was restricted spatially, temporally, and by ceramic ware. Spatially, the sample focused on ceramic assemblages from the sites of H1, Homol'ovi II (H2), Homol'ovi III (H3), Homol'ovi IV (H4), and Chevelon Pueblo (Chevelon). Because H1 was occupied contemporaneously with other sites considered in this analysis, sampling at this site was broad temporally in order to provide appropriate comparisons. Sampling at the remaining four sites focused on the earliest contexts, although contexts dating throughout the occupation of each site were included in this analysis.

Whole, reconstructible, and partially reconstructible vessels were included in this analysis whenever they were available. Every effort was made to identify matches and refits between sherds from the same vessel. Any sherds that came from the same vessel were grouped together and considered as a single vessel. For each site, sherds were selected from as many different structures as possible, in an attempt to characterize site-wide diversity. The primary limiting factor was size. Several of the variables considered in this study require relatively large sherds. For example, the variable indentations per square centimeter requires sherds that are a minimum of three centimeters square in area. Unfortunately, a large majority of the sherds from these sites were smaller than this minimum. Although this research attempted to exclusively include sherds of sufficient size, in the interests of sampling as widely as possible, some sherds smaller than the required three centimeters square were included. All variables other than indentations per square centimeter were measured on every sherd (537 sherds), indentations per square centimeter was measured whenever possible (419 sherds). All measurements were collected by the author using a uniform set of tools for maximum standardization in the data set.

Homol'ovi I				Homol'ovi II				Homol'ovi III				Homol'ovi IV				Chevelon Pueblo			
STR	Context	Phase	#	STR	Context	Phase	#	STR	Context	Phase	#	STR	Context	Phase	#	STR	Context	Phase	#
651	Room	TP/EHP	24	324	Kiva	LHP	2	32	Kiva	TP	1	0	Plaza	TP	87	248	Kiva	TP/EHP	14
558	Kiva	TP/EHP/MHP	32	558	Room	LHP	3	34	Kiva	TP	33	4	Room	TP	3	200	Plaza	TP/EHP/MHP	4
210	Room	TP/LHP	5	704	Kiva	LHP	4	37	Kiva	TP	63	5	Room	TP	1	227	Room	TP/EHP/MHP	4
3	Room	EHP	1	706	Kiva	LHP	14	38	Kiva	TP	14	201	Room	TP	2	288	Room	TP/EHP/MHP	2
489	Room	EHP	20	707	Kiva	LHP	20					301	Room	TP	1	222	Piiki House	EHP	2
490	Room	EHP	1	714	Kiva	LHP	19									266	Room	EHP/MHP	1
652	Room	EHP	9	999	Ramada	LHP	38									279	Kiva	EHP/MHP	19
734	Room	EHP	1													120	Room	EHP/MHP/LHP	5
503	Room	EHP	1													252	Kiva	EHP/MHP/LHP	1
103	Room	EHP/MHP	2													274	Room	EHP/MHP/LHP	10
401	Room	EHP/MHP/LHP	18													900	Plaza	EHP/MHP/LHP	2
203/215	Kiva	EHP/LHP	2													268	Room	MHP/LHP	1
739	Room	EHP/LHP	1													901	Kiva	MHP/LHP	19
209	Piiki House	LHP	5													157	Room	LHP	1
311	Room	LHP	4													159	Room	LHP	1
416	Room	LHP	1													264	Room	LHP	7
417	Room	LHP	1													265	Room	LHP	1
501	Room	LHP	2																
502	Room	LHP	2																
504	Room	LHP	6																
		Total:	*138*			*Total:*	*100*			*Total:*	*111*			*Total:*	*94*			*Total:*	*94*

Table 7.2: The depositional contexts and quantities of Homolovi Utility Ware sherds from each site selected for analysis. Phase refers to the period in which each structure sampled was primarily used. TP refers to the Tuwiuca Phase, EHP refers to the Early Homol'ovi Phase, MHP refers to the Middle Homol'ovi Phase, and LHP refers to the Late Homol'ovi Phase. Approximate calendar dates for each phase can be found in Table 4.1. Contexts for which multiple phases are indicated were used during all phases listed.

Clustering of Technological Attributes within Homolovi Orange Ware and Homolovi Gray Ware

The variables measured in this analysis relate to the production sequence of a corrugated vessel, specifically those manufacturing practices that are likely reflexive and subconscious (Lemonnier 1992; Minar 2001; Minar and Crown 2001). Similarities in these manufacturing practices likely indicate participation in a shared manufacturing tradition, while differences indicate the presence of diverse manufacturing communities. In order to identify the manufacturing traditions utilized by HSC potters during the Pueblo IV period, I performed a two-step cluster analysis using Schwarz's Bayesian Criterion of all HUW sherds produced locally within the HSC from which data had been collected. The eleven variables most likely to describe non-functional attributes of corrugated pottery—referred to as primary variables—are highlighted in Table 7.1. One of these variables, surface elaboration, was eliminated from this statistical analysis because no sherds sampled in this analysis had been elaborated. Based on the remaining ten inputs, two-step cluster analysis revealed two clusters with good cohesion and separation. Cluster 1 represents 26.6 percent of all locally produced HUW sampled for this research (143 sherds), while Cluster 2 represents 73.4 percent of all locally produced HUW sampled for this research (394 sherds). The attributes of these clusters are described in Table 7.3. Representative sherds from each cluster are illustrated in Figures 7.1 and 7.2.

The most important variable in determining cluster membership was indentation direction. Because of this, these clusters will be referred to by their associated indentation direction: oblique and parallel. Figure 7.3 describes the distribution of indentation direction within the local parallel and oblique clusters. Cluster 1 (Figure 7.1), referred to as the local oblique cluster, consists almost entirely of oblique indentations (96.5%), with a small number of perpendicular indentations as well. Cluster 2 (Figure 7.2), referred to as the local parallel cluster, consists entirely of parallel indentations. Given the primary importance of indentation direction in determining cluster membership, it is possible that these few sherds with a perpendicular indentation direction ought properly to be considered as representative of a separate, third technological tradition. However, the sample size is insufficient to differentiate these sherds from the local oblique cluster.

Other important variables in determining cluster membership are the difference in width between the top and bottom of the indentation (indentation width—difference) and exterior surface treatment. Figure 7.4 shows that the difference between the narrowest and widest indentation measurements for the local oblique cluster tends to be small, whereas the difference within the local parallel cluster tends to be larger. In other words, while the width of an oblique indentation is relatively uniform, the width of a parallel indentation varies greatly: the widest

Cluster	1	2
Name	Local Oblique	Local Parallel
Description	Characterized by oblique indentations (slanted across coils, shaped like parallelograms). Width of indentation is relatively uniform.	Characterized by parallel indentations (parallel to coils, forming U-shapes). Width of indentation varies greatly between narrowest and widest measurement.
Size	26.6% (143)	73.4% (394)
Variables	Indentation Direction: Oblique (96.5%)	Indentation Direction: Parallel (100%)
	Indentation Width - Difference: 1.5	Indentation Width - Difference: 4.6
	Exterior Surface Treatment: Obliterated (47%)	Exterior Surface Treatment: Indented (90.9%)
	Average Indentation Width - Narrow: 3.7	Average Indentation Width - Narrow: 2.5
	Average Indentation Width - Wide: 5.2	Average Indentation Width - Wide: 7.1
	Average Indentation Depth: 0.5	Average Indentation Depth: 0.8
	Average Coil Width: 7.1	Average Coil Width: 5.9
	Average Vessel Wall Thickness: 5.5	Average Vessel Wall Thickness: 5.9
	Indentation Alignment: Unaligned (97.9%)	Indentation Alignment: Unaligned (100%)
	Indentation Type: Finger/Fingernail (99.7%)	Indentation Type: Finger/Fingernail (99.7%)

Table 7.3: The two stylistic clusters present within the Homol'ovi Settlement Cluster, based on two-step cluster analysis. Variables are arranged in order of importance in determining cluster membership.

Figure 7.1: Homolovi Orange Ware sherd from Chevelon Pueblo, belongs to Cluster 1—the local oblique cluster.

Figure 7.2: Homolovi Orange Ware sherd from Chevelon Pueblo, belongs to Cluster 2—the local parallel cluster.

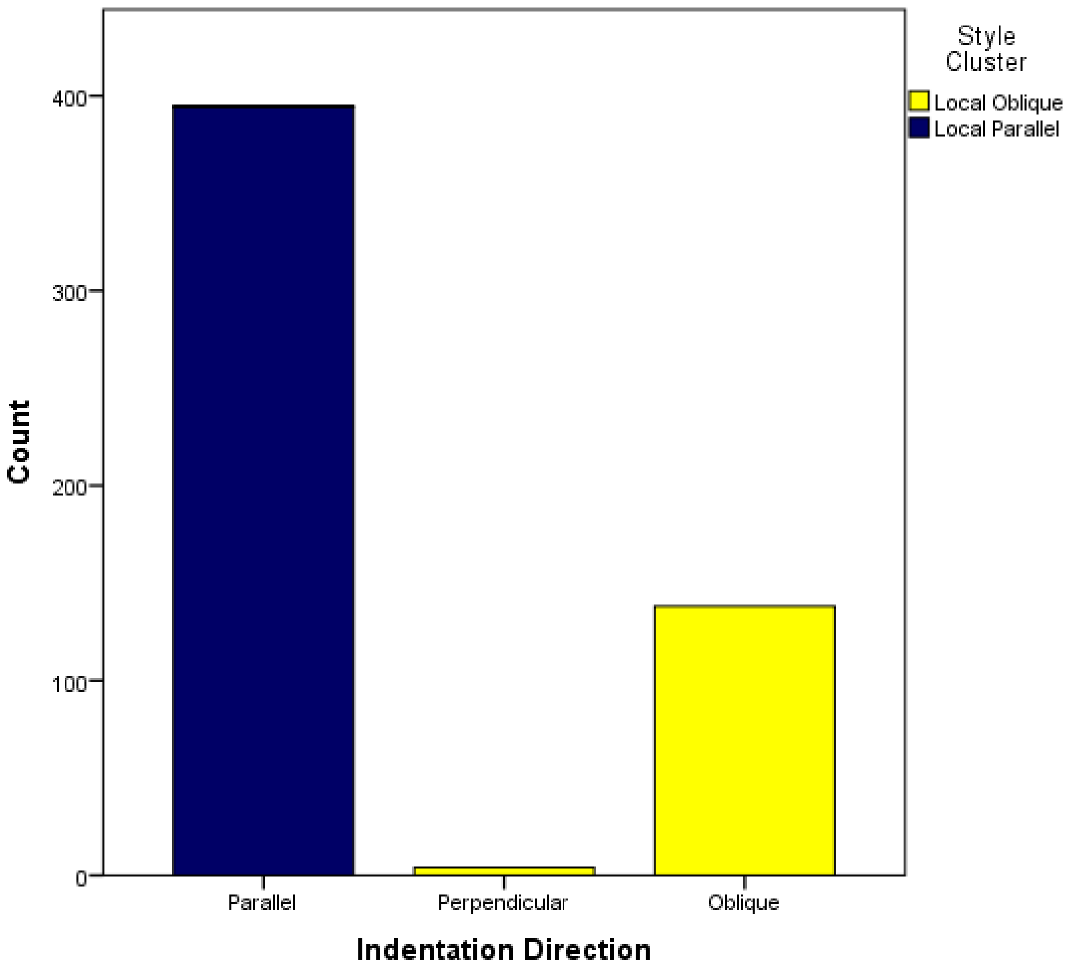

Figure 7.3: The distribution of indentation direction within the local oblique and local parallel clusters.

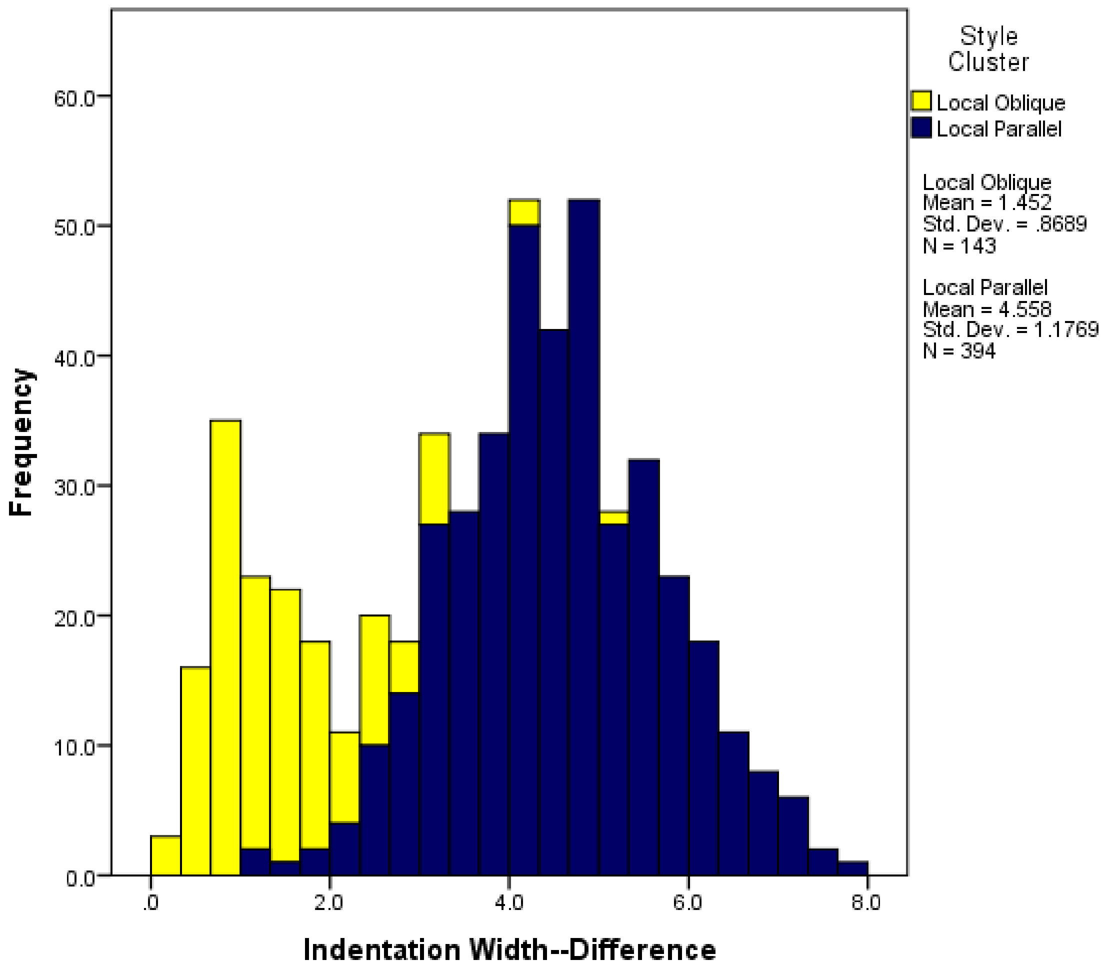

Figure 7.4: The distribution of the indentation width—difference variable (the difference between the narrowest and widest indentation measurements) within the local oblique and local parallel clusters.

measurement is substantially larger than the smallest measurement. Figure 7.5 shows the distribution of exterior surface treatments. Both clusters exhibit some diversity in exterior surface. Although the local oblique cluster tends to be obliterated (47%), it may also be semi-obliterated, indented, heavily obliterated, or flattened. The local parallel cluster is far more homogenous: 91% of sherds in this cluster are indented. The remaining sherds may be zoned, obliterated, semi-obliterated, or flattened.

The smallest measurement of indentation width (indentation width—narrow), the largest measurement of indentation width (indentation width—wide), indentation depth, and coil width were less important predictors of cluster membership. Figure 7.6 shows that within the local parallel cluster the narrowest measurement of indentation width tends to be quite small, while this measurement is more variable within the local oblique cluster. The widest measurement of indentation width is also highly variable within the local oblique cluster and tends to be narrower than this measurement in the local parallel cluster (Figure 7.7). Figure 7.8 shows indentation depth by cluster. Indentations within the local oblique cluster tend to be shallower while local parallel cluster indentations tend to be deeper. However, there is a great deal of overlap between the two clusters. Coil width does not differ dramatically between these two clusters. However, as shown in Figure 7.9, coil width tends to be larger within the local oblique cluster whereas the local parallel cluster tends to have smaller coils. Vessel wall thickness, indentation alignment, and indentation type were poor predictors of cluster membership and are not discussed further.

Following the identification of these two clusters, I explored correlation between cluster membership and secondary variables—variables which may be associated with function as well as style—using a series of chi-square tests. I did not find any correlation between cluster membership and either smudging or interior surface treatment. The number of indentations per

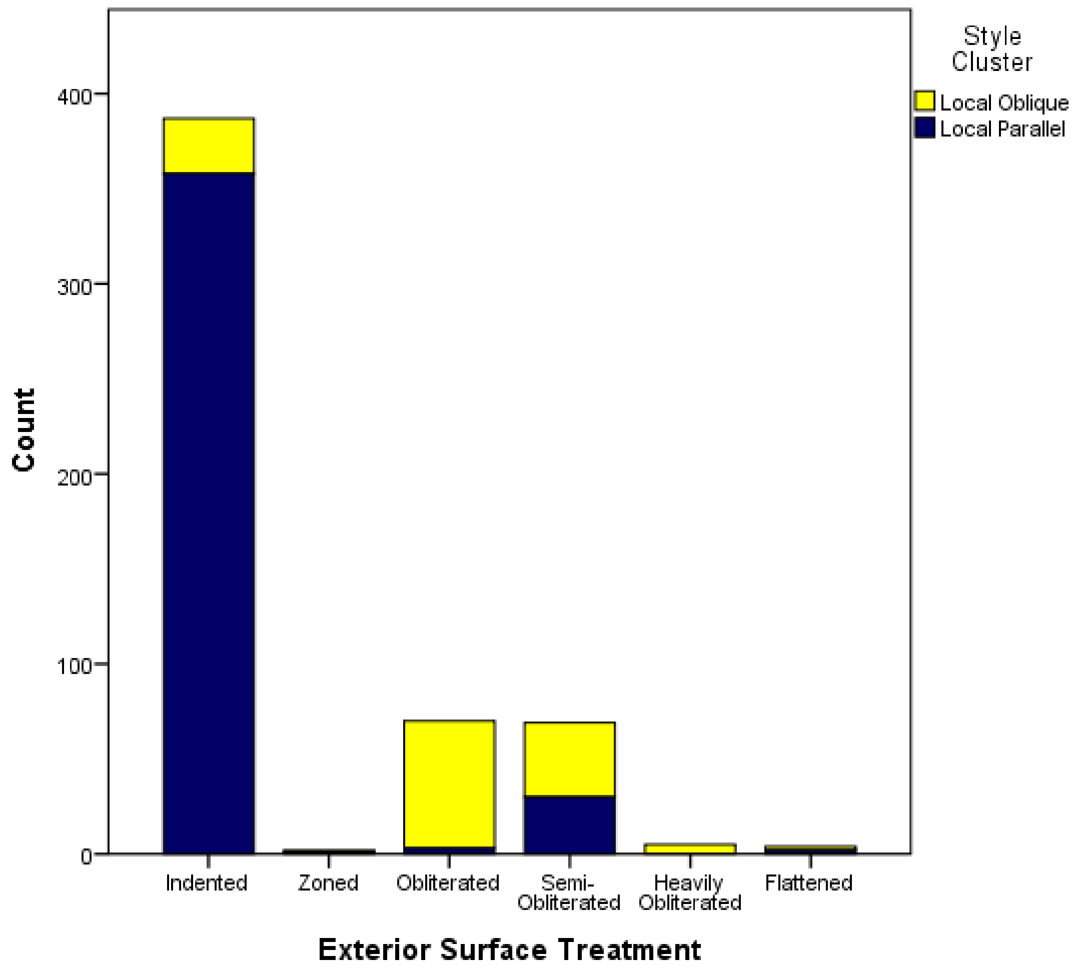

Figure 7.5: The distribution of exterior surface treatment within the local oblique and local parallel clusters.

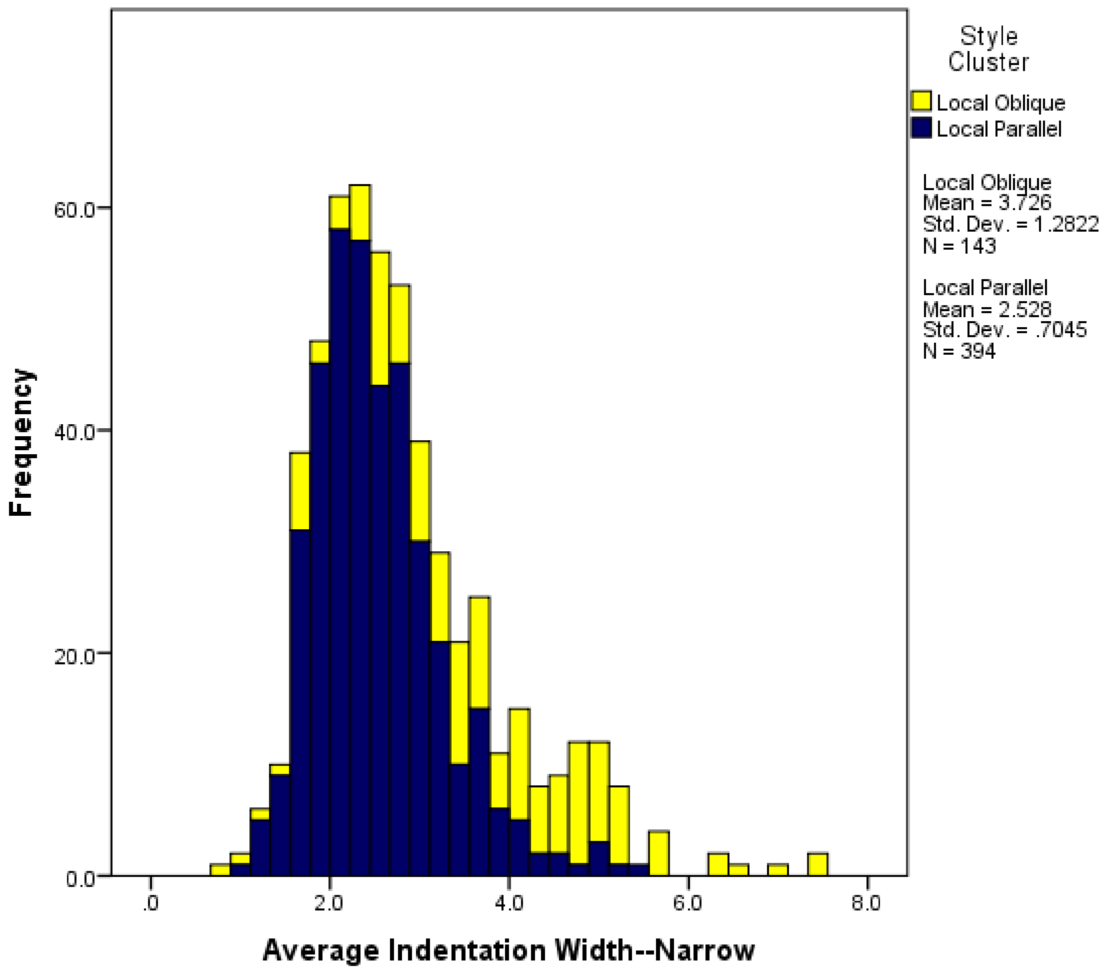

Figure 7.6: The distribution of the indentation width—narrow variable (the narrowest indentation measurement) within the local oblique and local parallel clusters.

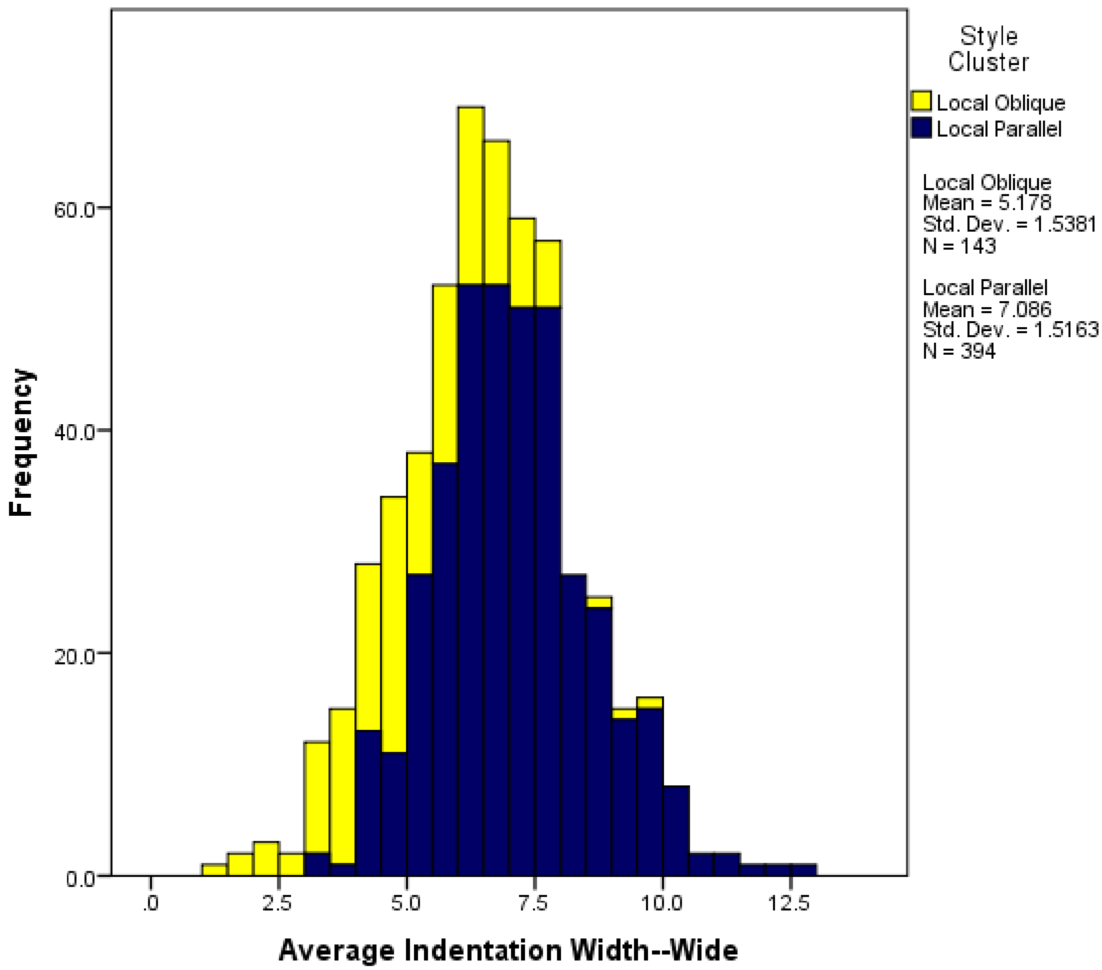

Figure 7.7: The distribution of the indentation width—wide variable (the widest indentation measurement) within the local oblique and local parallel clusters.

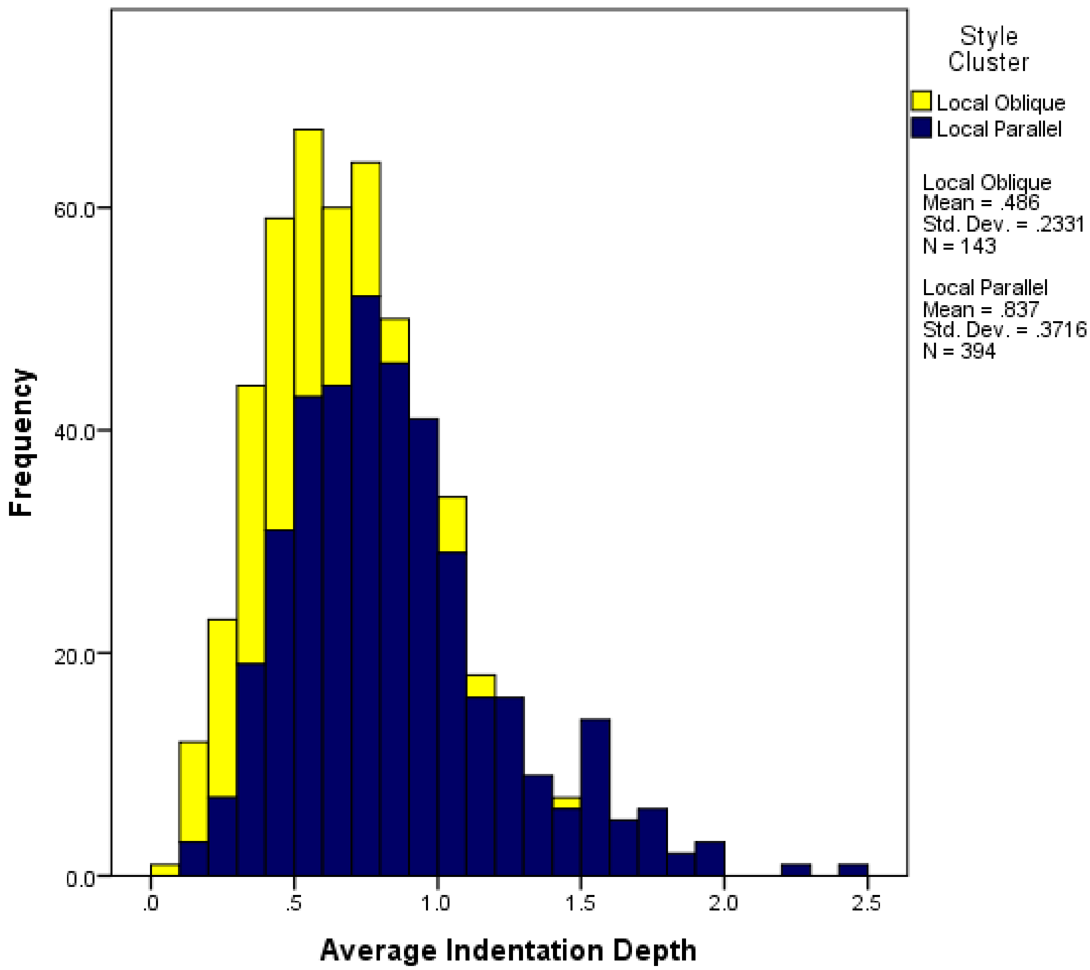

Figure 7.8: The distribution of indentation depth within the local oblique and local parallel clusters.

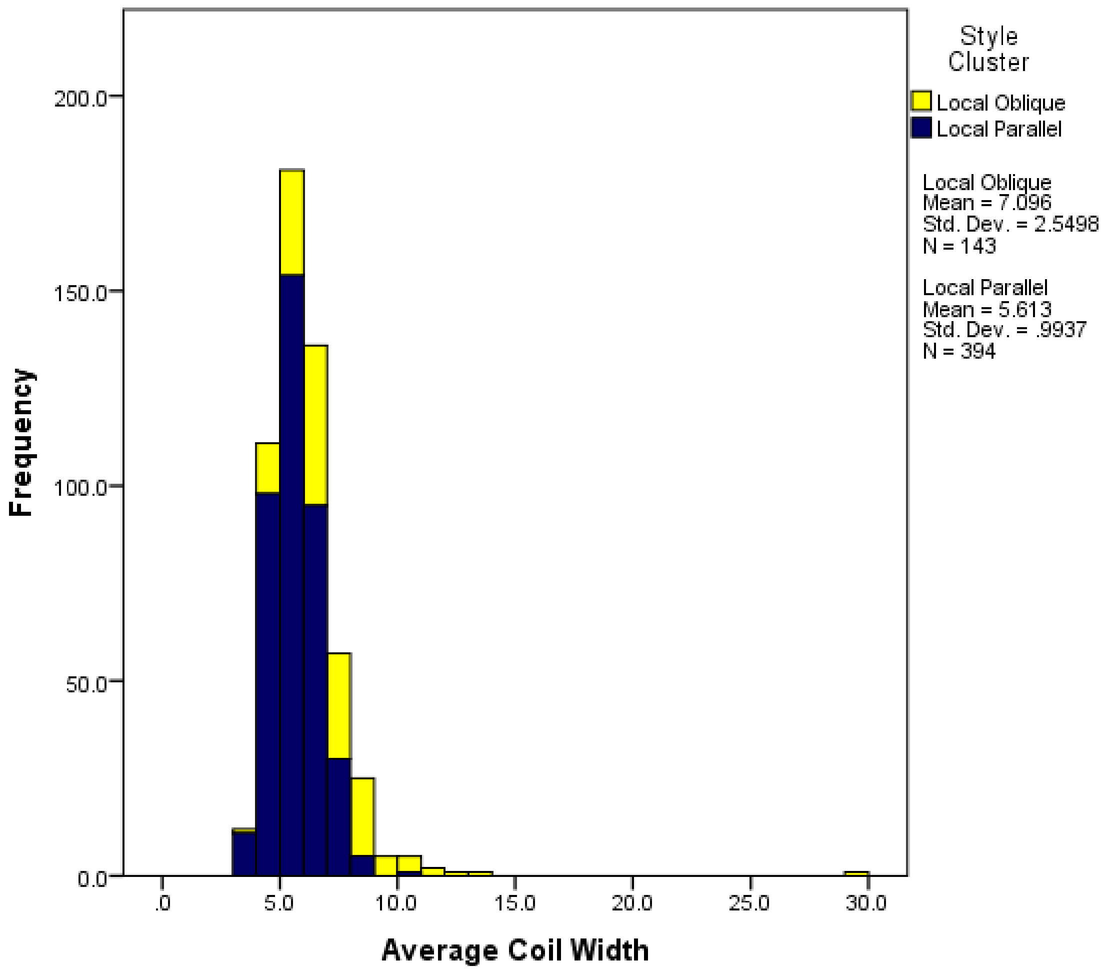

Figure 7.9: The distribution of coil width within the local oblique and local parallel clusters.

square centimeter was correlated with cluster membership (P=0.000). The local parallel cluster tends to have more indentations per square centimeter than the local oblique cluster. Because the local parallel cluster typically has a smaller mean coil width than the local oblique cluster, this correlation is expected. The degree of obliteration is also correlated with cluster membership (P=0.000). This correlation is likewise to be expected; the local parallel cluster is rarely obliterated while the local oblique cluster is frequently obliterated.

Stylistic Clusters and Ceramic Recipes within the Homol'ovi Utility Wares

As discussed in the previous chapter, one way communities of practice may be distinguished is through the recipes they use to make pottery: different manufacturing groups may utilize raw materials from different sources (e.g., Curewitz and Goff 2012; Eckert 2012; Huntley 2006; Huntley et al. 2012; Schleher et al. 2012). The INAA and petrographic compositional analyses explored in the prior chapter established the local production of HUW within the HSC and suggested the presence of ceramic manufacturing communities of practice which operated on a site-by-site basis. These communities of practice likely used the clay and temper sources most readily available on the landscape. It is possible that these different communities of practice were also distinguished by their use of different technological and stylistic traditions in their ceramic manufacturing practices.

A series of chi-square tests exploring the relationships between these stylistic clusters and the groupings identified by petrography and INAA (shown in Appendix D) found no statistically significant relationships. In other words, stylistic cluster and raw material appear to be independent. Rather, these stylistic categories cross-cut the groups identified by compositional analysis. This suggests that the two stylistic traditions identified in this study may more properly be considered as constellations of practice. Constellations of practice refer to learning groups sufficiently similar to be identified as recognizable groups of practice, but too diffuse to be treated as a single community (Roddick and Stahl [editors] 2016; Wenger 1998:126–127). While communities of practice are essentially local, associated with specific sites or locations, constellations of practice are broader in scale (Roddick and Stahl [editors] 2016; Wenger 1998). Constellations of practice may cross-cut and subdivide the communities of which they are comprised (Blair 2016; Curewitz and Goff 2012; Gilpin and Hays-Gilpin 2012; Gosselain 2016; Huntley et al. 2012; Mills 2016; Roddick 2016; Roddick and Stahl [editors] 2016; Sassaman 2016; Schoenbrun 2016).

In the case of the HUW assemblage, compositional analysis suggested that manufacturing communities were likely local: membership appears to be determined primarily by site of residence. Crosscutting these communities are two broader stylistic traditions, defined on the basis of technological attributes of ceramic manufacture. Thus, potters from each site participated in one of these two cluster-wide stylistic constellations. The presence of two stylistic constellations indicates the existence of at least two broad, overarching categories of social identity among the potters of the HSC. That members of both constellations participate in the same manufacturing communities suggests that these stylistic constellations were likely not considered to be boundary markers or indicators of social differences sufficiently important to justify division. Possibly the identities associated with these constellations of practice were subconscious or considered less important than other identities such as those indicated by site residence and membership.

Although no relationship was found between stylistic cluster and the groups identified by compositional analysis, a relationship may exist between stylistic cluster and the use of sherd tempering materials (P=0.076). The distribution of sherd temper within HUW is shown in Table

7.4 and Figure 7.10. Local oblique cluster sherds are more likely to have been tempered with sherds than local parallel cluster sherds. Despite this patterning, the presence or absence of sherd temper is not a predictor of cluster membership. A large proportion of both local oblique and local parallel cluster sherds contain sherd temper. Clearly, the addition of sherd temper was not exclusive to the manufacturing practices associated with either stylistic tradition. A likelier explanation for the presence or absence of sherd temper may be functional. Although, as discussed in the previous chapter, some HUW sherds contain relatively coarse sand temper, generally speaking the sand available in the HSC is relatively fine compared to the sand temper observed in other utility wares such as Tusayan Gray Ware or Awatovi Yellow Ware. It is possible that potters in the HSC added sherd temper to compensate for the relatively poor tempering materials available in the HSC.

This explanation is consistent with available petrographic data. Petrographic analysis of 25 HUW sherds identified five temper groups. Groups 1-3 were distinguished on the basis of temper grain size and texture, Group 4 is defined by the number of feldspar inclusions, and Group 5 consists of one sherd that appears to have been tempered primarily with crushed sherd. A Fisher's exact test of the relationship between the presence or absence of sherd temper and petrographic group found that these variables were likely related ($P=0.053$). This relationship is shown in Table 7.5 and Figure 7.11. Specifically, Groups 2, 3, and 5 are more likely to be associated with the presence of sherd temper than the other groups. The association between sherd temper and Group 5 is unsurprising, given the composition of Group 5. Groups 2 and 3 are distinguished from Group 1 primarily based on grain size. While Group 1 is dominated by coarse quartz sand, Group 2 contains a higher proportion of fine-grained quartz sand. Although coarse sand is present in Group 2, fine sand represents a larger proportion of the tempering materials.

Sherd Temper	**Stylistic Cluster**				*Total*	
	Local Oblique		Local Parallel			
	Count	%	Count	%	Count	%
Absent	62	43.4	205	52.0	267	49.7
Present	81	56.6	189	48.0	270	50.3
Total	*143*	*100.0*	*394*	*100.0*	537	100.0
Pearson Chi-Square Value: 3.158			P-Value: 0.076			

Table 7.4: The relationship between stylistic cluster and sherd temper within Homolovi Utility Ware.

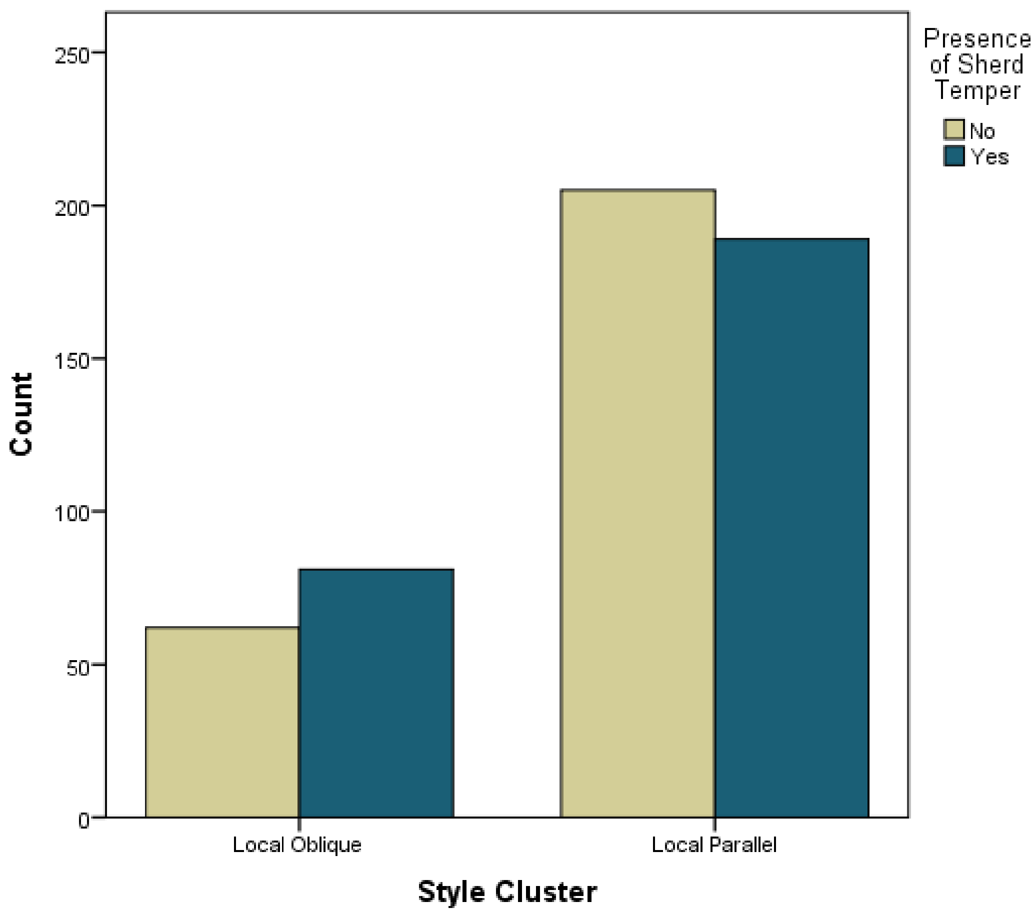

Figure 7.10: The distribution of sherd temper within Homolovi Utility Ware.

			Sherd Temper		*Total*
			Absent	Present	
Petrographic Group	1	#	2	2	*4*
		%	50.0	50.0	*100.0*
	2	#	1	6	*7*
		%	14.3	85.7	*100.0*
	3	#	0	4	*4*
		%	0.0	100.0	*100.0*
	4	#	4	1	*5*
		%	80.0	20.0	*100.0*
	5	#	0	1	*1*
		%	0.0	100.0	*100.0*
Total		#	*7*	*14*	*21*
		%	*33.3*	*66.7*	*100.0*

Table 7.5: The distribution of sherd temper within the petrographic groups.

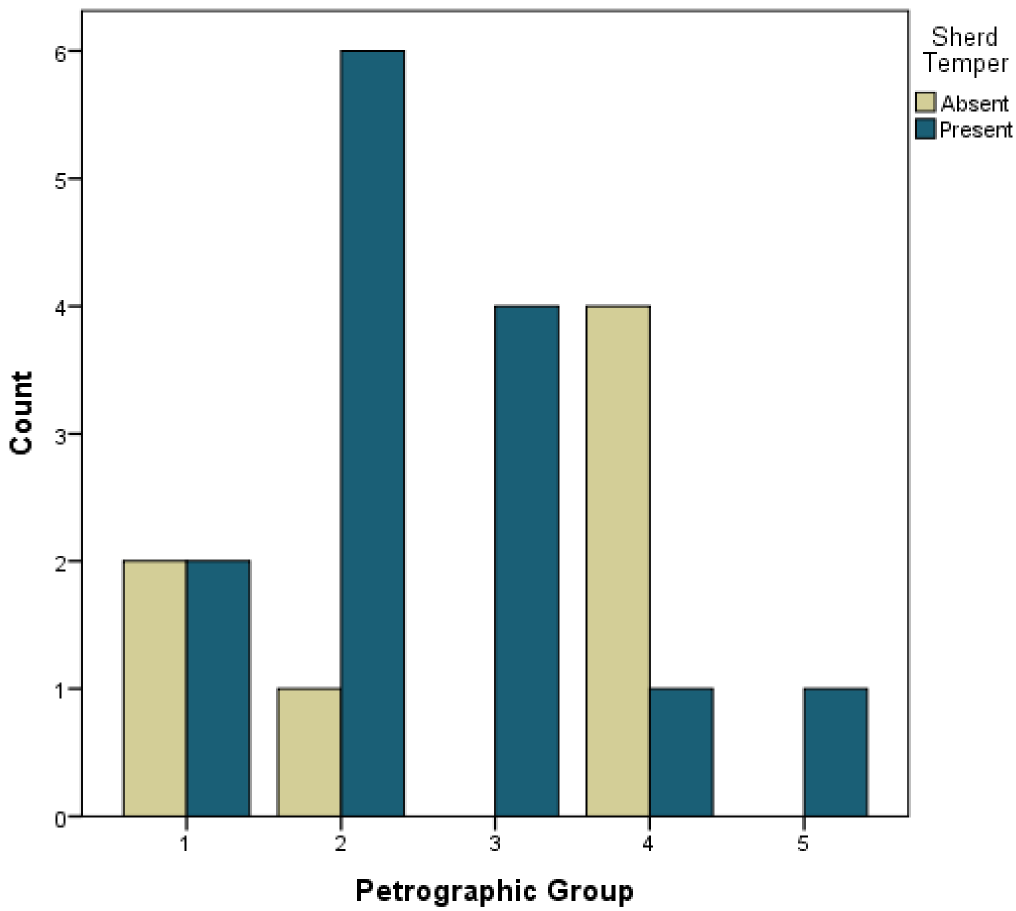

Figure 7.11: The distribution of sherd temper within the petrographic groups.

Group 3 consists almost exclusively of fine-grained quartz sand. Coarse inclusions are present, but are few in number. In summary, within the HUW assemblage, sherd temper is disproportionately associated with fine sand temper. Sherds containing coarse sand temper are less likely to also contain sherd temper. A comparable test of the relationship between INAA group and sherd temper found no association, suggesting that clay source was not a factor in the decision to use sherd temper. Rather, the use of sherd temper appears to have been largely determined by the available sands. This association between sherd temper and fine-grained sand supports the hypothesis that the addition of crushed sherd to HUW was likely a choice related to vessel performance.

Interestingly, a correlation exists between paste color—indicative of either clay source and/or firing technologies—and stylistic cluster membership (P=0.000), shown in Table 7.6 and Figure 7.12. Orange paste is far more common within the local oblique cluster than gray paste—68 percent and 32 percent respectively. Orange and gray paste are more equally represented within the local parallel cluster—44 percent and 56 percent respectively. INAA data collected from HUW sherds did not reveal any chemical differences between orange and gray paste, suggesting that the color differences within HUW were due more to firing conditions than composition. The correlation between paste color and cluster membership is, therefore, unlikely to be due to any difference in recipe. It is possible that potters participating in these two different manufacturing groups fired their vessels separately or used different firing technologies leading to this differential distribution of paste color.

Paste color may be a stylistic choice. Possibly the people producing pottery in the local oblique tradition preferred the appearance of oxidized pottery, which is typically orange-brown, while those producing local parallel cluster pottery preferred vessels fired in a neutral

Paste Color	Stylistic Cluster			
	Local Oblique		Local Parallel	
	#	%	#	%
Orange	97	67.8	173	43.9
Gray	46	32.2	221	56.1
Total	*143*	*100.0*	*394*	*100.0*
Pearson Chi-Square Value: 24.021			P-Value: 0.000	

Table 7.6: The correlation between paste color and stylistic cluster.

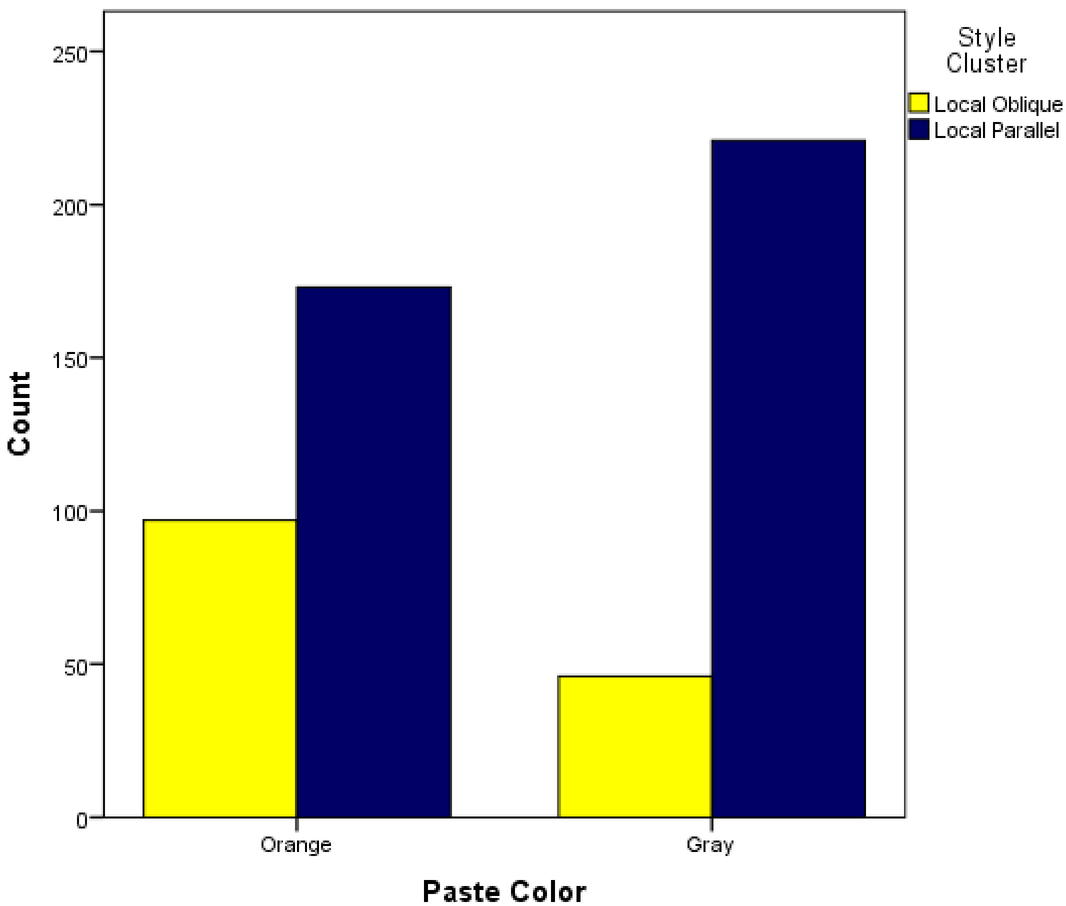

Figure 7.12: The relationship between stylistic cluster and paste color.

environment, producing gray pottery. A similar difference in paste color occurs in the utilitarian tradition of the Puerco area (Hays-Gilpin and van Hartesveldt 1998), suggesting that these color preferences may be more regionally distributed. Another possibility is that this patterning is chronological. Based on analysis of HOW and HGW from H3, Lyons and Hays-Gilpin (2001) suggest that gray utilitarian pottery was more abundant earlier and orange utilitarian pottery was more common later in the occupational sequence of the HSC. These possibilities will be evaluated in more detail in subsequent chapters.

Summary

The goal of this analysis was to identify different manufacturing groups within the HSC in order to explore the social history of the settlement cluster. This research successfully identified two different clusters of corrugation style within the locally produced assemblage, parallel and oblique, based on both qualitative and quantitative variables. The existence of two stylistic clusters within the HSC indicates the presence of two ceramic manufacturing traditions. Potters in the Homol'ovi area produced two different styles of corrugated pottery following the enculturative traditions of two different social groups. Compositional analysis suggested the presence of a number of local production groups within the HSC, which likely correlate with site of residence. Although the stylistic groups identified in this analysis are clearly distinguishable through an analysis of technological style, they do not correlate with the groups revealed through compositional analysis. In other words, the two manufacturing traditions identified by stylistic analysis cross-cut local production communities. This suggests that these manufacturing traditions might be more properly considered as local iterations of constellations of practice: learning groups similar enough to be identified as groups of practice, but too widely distributed to be treated as a single community. The broader social affiliations of these constellations of practice will be considered in the next chapter. The fact that members of both constellations of practice participated in the same manufacturing groups indicates that these stylistic traditions were likely not considered to be boundary markers or indicators of social difference significant enough to justify division. Possibly the identities associated with these constellations of practice were subconscious or considered less important than the identities formed by site residence.

CHAPTER 8: STYLISTIC CLUSTERS IN A REGIONAL CONTEXT

The stylistic clusters identified within the locally produced corrugated assemblage of the Homol'ovi Settlement Cluster (HSC) did not emerge from a vacuum. The villages of the HSC were occupied over the course of widespread migrations that shaped the social landscape of the U.S. Southwest. According to the oral traditions of contemporary Puebloan people, their ancestors temporarily settled in villages as they journeyed across the landscape (Dongoske et al. 1997; Ferguson et al. 2000; Ferguson and Hart 1985; Ferguson and Loma'omvaya 1999; Kuwanwisiwma and Ferguson 2004, 2009). Over the course of these migrations, the ancestors of the modern Puebloan groups resided in a number of different areas. For example, Hopi oral traditions describe migrations to Homol'ovi from a place known as Palatkwapi, translated as "Red-Walled City" (Hill et al. 1998:383) or "Red Land of the South" (Mindeleff 1891:25). Although the exact location of Palatkwapi is unknown, places such as the Verde Valley (Byrkit 1988; Fewkes 1898b:529–531), Paquimé (Waters 1963:68), or areas farther to the south have been suggested (Bernardini 2005:74). Hopi scholars and cultural advisors have indicated that Palatkwapi is better understood as including a number of areas south of the Hopi Mesas where Hopi ancestors resided over the course of their migrations (Bernardini 2005:74; Ferguson and Loma'omvaya 1999:78).

This history of migration is evident in archaeological narratives as well (e.g., Adams 1996b; Bernardini 2005; Cameron 1995; Clark 2001; Duff 2002; Glowacki 2010; Lindsay 1987; Lyons 2003; Neuzil 2008; Ortman 2012; Schachner 2012). Archaeological evidence from the Homol'ovi area indicates that the region was temporarily unoccupied prior to the establishment of Homol'ovi IV (H4) (Adams 2002:88–91). The people who moved into the Homol'ovi area and established the HSC villages brought their technological practices into the region with them. Therefore, the stylistic clusters identified in this research are better understood as local iterations of broader technological traditions, or constellations of practice, that were embodied in the locally produced ceramic assemblages of many areas. Exploring the ways in which the stylistic clusters identified within the locally produced ceramic assemblage of the HSC articulate with broader regional patterns in corrugation technology may provide a different lens through which to interpret the social history of the area. Unfortunately, until recently, archaeological researchers did not fully appreciate the analytical value of corrugation technology and, thus, the variables necessary to characterize corrugation technology in the manner presented here were not recorded. In the absence of comparable regional datasets, it is impossible to definitively associate the corrugation patterns identified within the HSC with those of other regions. However, it is possible to identify some potential regional affiliations.

The present chapter will approach this issue from two angles. The first section will describe a statistical analysis comparing the stylistic clusters identified within the locally produced corrugated assemblage of the HSC with the utility ware traditions most abundantly imported into the HSC—Tusayan Gray Ware, Awatovi Yellow Ware, and Mogollon Brown Ware—in an attempt to identify analogous technological traditions within these wares. The next section will use extant literature to characterize the utilitarian ceramic traditions of the regions that surround the HSC—the Hopi Buttes, the Puerco area, the Upper Little Colorado River region, the Silver Creek area, the Chevelon drainage, Anderson Mesa, and the Hopi Mesas—emphasizing archaeological contexts that overlap chronologically with the Pueblo IV occupation of Homol'ovi. The regions explored in this section are illustrated in Figure 8.1. This chapter will conclude by synthesizing these lines of evidence through a discussion of the regional context of corrugated pottery production.

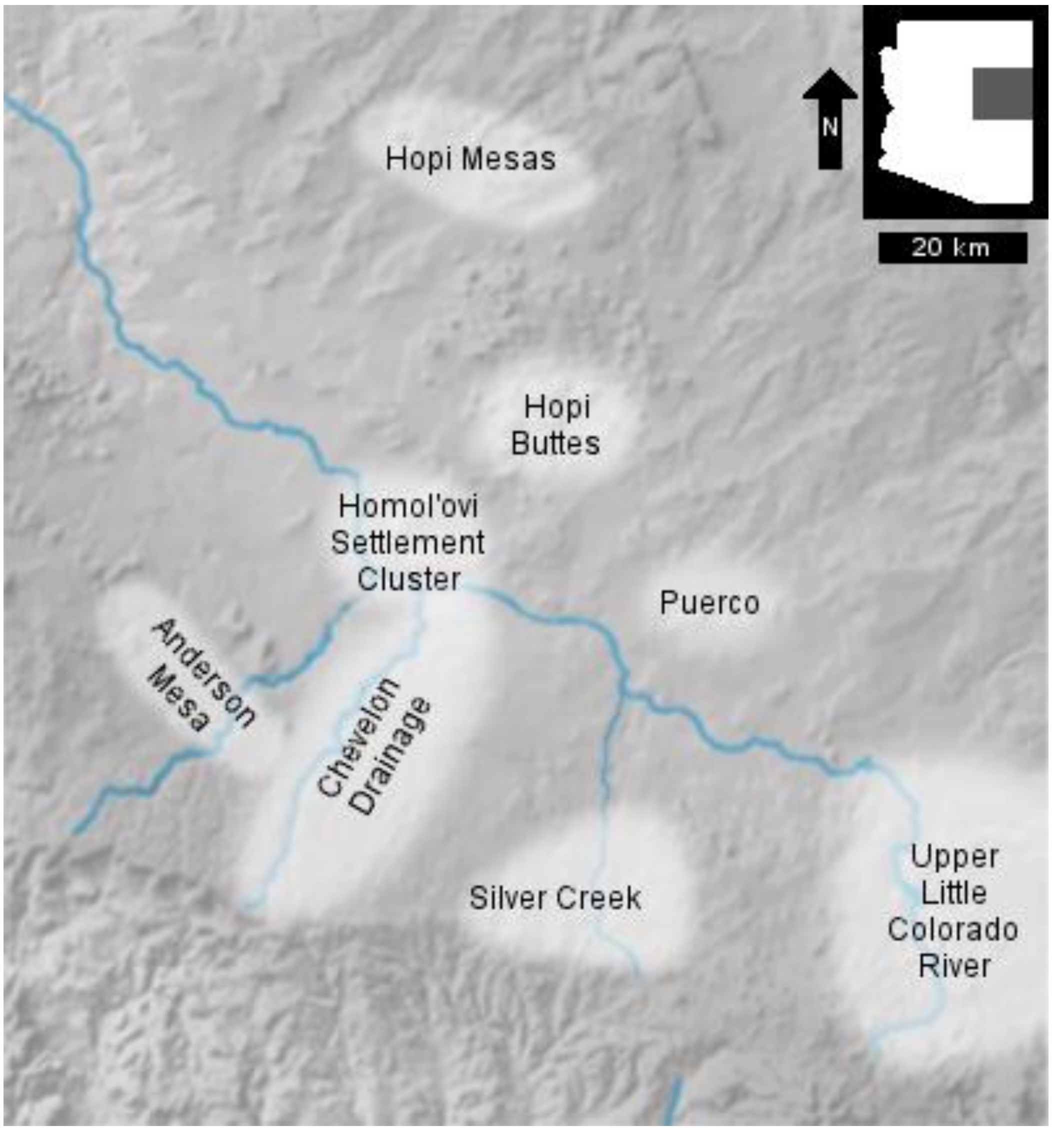

Figure 8.1: The regional context of the Homol’ovi Settlement Cluster.

Clustering of Technological Attributes within Utility Wares Imported to the Homol'ovi Settlement Cluster

Generally, the circulation of utilitarian pottery across great distances is considered unlikely (Duff 2002:26). However, when utility wares are exchanged over long distances, archaeologists consider these exchanges to indicate the existence of close social relationships between people in different communities, such as the relationships that result from intermarriage (Duff 2002:26; Peeples 2011:355; Zedeño 1994:17). Utilitarian vessels exchanged over long distances likely were brought to a new location along with people relocating to that area. Such vessels were gradually replaced by locally produced vessels manufactured in the same style as imported vessels but using local raw materials (Duff 2002:26; Triadan 1997). Thus, technological similarities between utilitarian pottery produced locally and utilitarian pottery imported into an area may indicate close social relationships between the residents of the two production areas.

To explore these social relationships, this analysis includes sherds from the wares most commonly imported to the HSC: Tusayan Gray Ware, Awatovi Yellow Ware, and Mogollon Brown Ware. These wares are described in typologies presented by James Gifford and Watson Smith in *Gray Corrugated Pottery from Awatovi and Other Jeddito Sites in Northeastern Arizona* (1978), *Pottery Types of the Southwest* edited by Harold Colton (1955, 1956), Harold Colton and Lyndon Hargrave's *Handbook of Northern Arizona Pottery Wares* (1937), and *Prehistoric Ceramics of the Puerco Valley: The 1995 Chambers-Sanders Trust Lands Ceramic Conference* edited by Kelley Hays-Gilpin and Eric van Hartesveldt (1998). Brief summaries of the description of each ware will be presented here, followed by a technological analysis of ceramic sherds imported to the HSC.

Tusayan Gray Ware

Tusayan Gray Ware, illustrated in Figure 8.2, was produced over a wide geographic area, including northwestern New Mexico, southern Utah, and northern Arizona (Colton and Hargrave 1937:189–203; Goetze and Mills 1993:57). Tusayan Gray Ware typically has a light gray paste, due to the use of an iron-poor clay fired in a reducing atmosphere. Carbon streaking is fairly frequent in some types (Colton and Hargrave 1937:189–203; Hays-Gilpin and van Hartesveldt 1998:120). Munsell© values for the Tusayan Gray Ware paste colors observed during the collection of data for this study are presented in Table 8.1. Within Tusayan Gray Ware, temper is usually conspicuous, visible through the wall of the vessel (Colton and Hargrave 1937:189–203; Gifford and Smith 1978:45; Hays-Gilpin and van Hartesveldt 1998:120). Although fracture is varied, Tusayan Gray Ware tends to be relatively strong. Exterior surfaces may be plain, corrugated, or tooled (Colton and Hargrave 1937:189–203; Hays-Gilpin and van Hartesveldt 1998:120).

Temper typically consists of abundant quartz sand, varying from medium fine to very coarse (Colton and Hargrave 1937:189–203; Hays-Gilpin and van Hartesveldt 1998:120). Within the HSC assemblage, Tusayan Gray Ware was quite uniform, consistently tempered with coarse colorless sand. Although there is variation in size, temper tends to be uniform within a single sherd or vessel. Colored inclusions are occasionally present (Colton and Hargrave 1937:189–203; Hays-Gilpin and van Hartesveldt 1998:120). Colored inclusions within the Tusayan Gray Ware assemblage from the HSC were typically small black fragments, possibly augite; however, red angular fragments have also been observed. These red fragments are not crushed sherd. Possibly they are composed of hematite, red clay, or, in some cases, crushed sandstone.

	Munsell Values			
Ware	Surface		Core	
Tusayan Gray Ware	10YR 7/1-7/2	light gray	2.5Y 3/1	very dark gray
	10YR 8/1-8/2	white-very pale brown	2.5Y 4/1	dark gray
	2.5Y 5/1	gray	2.5Y 5/1	gray
	2.5Y 6/1	gray	2.5Y 6/1	gray
	2.5Y 7/1	light gray	2.5Y 7/1	light gray
	2.5Y 8/1	white	2.5Y 8/1	white
Awatovi Yellow Ware	5YR 8/2-8/4	pinkish white-pink	5YR 8/2-8/4	pinkish white-pink
	7.5YR 6/2-8/6	pinkish gray-reddish yellow	5YR 7/4-7/8	pink-reddish yellow
	10YR 7/3-8/3	very pale brown	7.5 YR 8/1-8/6	white-reddish yellow
			10YR 8/2-8/4	very pale brown
Mogollon Brown Ware	2.5YR 5/2-5/4	weak red-reddish brown	2.5Y 4/1	dark gray
	5YR 3/4	dark reddish brown	2.5YR 4/1-4/4	dark reddish gray-reddish brown
	5YR 4/3-4/6	reddish brown-yellowish red	2.5YR 5/2-5/6	weak red-red
	7.5YR 4/2-4/6	brown-strong brown	5YR 3/1-4/6	dark reddish gray-red
			7.5YR 3/3-4/6	dark brown-strong brown

Table 8.1: Munsell© values most commonly observed in Tusayan Gray Ware, Awatovi Yellow Ware, and Mogollon Brown Ware.

Awatovi Yellow Ware

Sherds of Awatovi Yellow Ware recovered from the HSC are shown in Figure 8.3. Awatovi Yellow Ware was produced on the Hopi Mesas beginning around 1300, emerging out of the Tusayan Gray Ware tradition (Colton 1956; Colton and Hargrave 1937:143). The primary technological shift associated with the emergence of Awatovi Yellow Ware is a change from a reducing to an oxidizing firing atmosphere (Colton 1956). Awatovi Yellow Ware has yellow paste, occasionally with a black or gray core (Colton 1956; Colton and Hargrave 1937:143). Munsell© values for the Awatovi Yellow Ware paste colors observed during the collection of data for this study are presented in Table 6.8.

Temper in Awatovi Yellow Ware typically consists of fine to coarse quartz sand, which is often visible through the wall of the vessel. Occasionally reddish angular fragments are also present (Colton 1956; Colton and Hargrave 1937:143). Within the HSC ceramic assemblage,

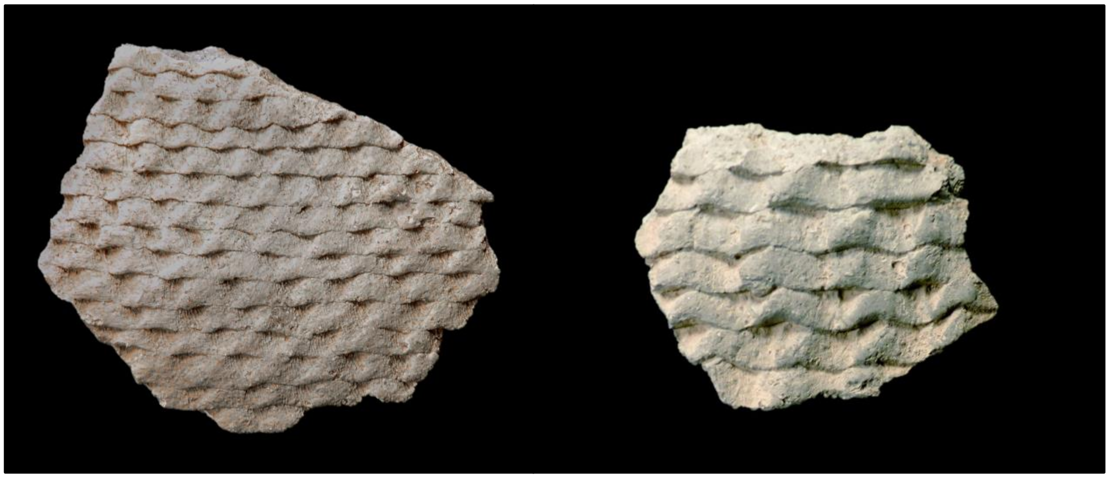

Figure 8.4: Tusayan Gray Ware sherds, both indented corrugated. The sherd on the left is from Homol'ovi I, the sherd on the right is from Homol'ovi II.

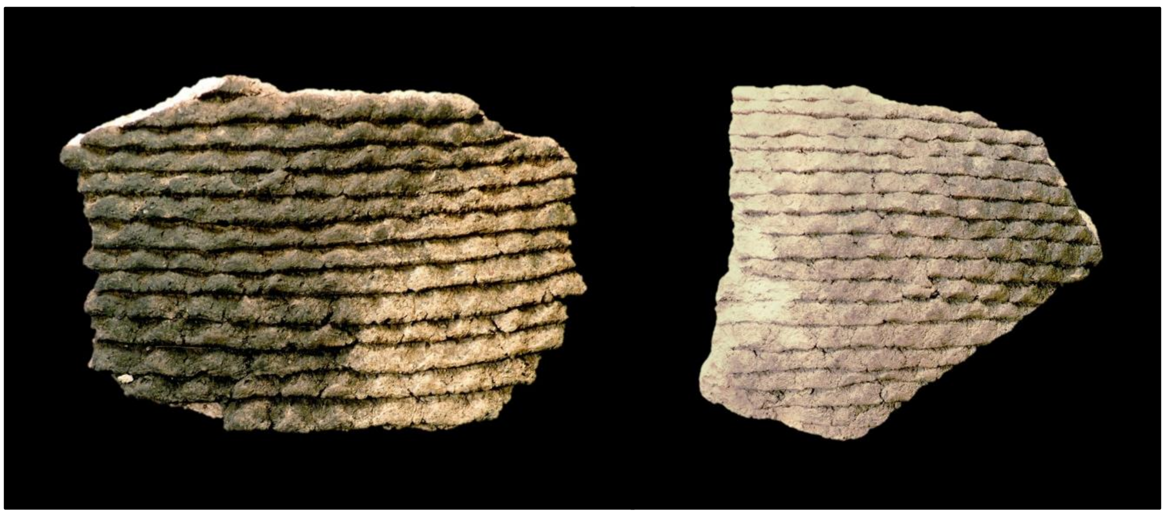

Figure 8.2: Awatovi Yellow Ware sherds from Homol'ovi I, both indented corrugated.

Figure 8.3: Mogollon Brown Ware sherds, both from Homol'ovi I. Indented corrugated is shown on the right, obliterated corrugated on the left.

temper in Awatovi Yellow Ware tended to be uniform within one sherd or vessel: coarse and fine temper rarely co-occur. Clear quartz sand was frequently accompanied by orange or peach sand as well as fine red fragments: possibly hematite, red clay fragments, or crushed sandstone. Occasionally, black fragments are included in Awatovi Yellow Ware temper—possibly augite or manganese. Rarely, Awatovi Yellow Ware recovered from the HSC was found to be tempered with crushed white sherds. Fracture within Awatovi Yellow Ware tends to be crumbling or shattering. Vessel walls are quite strong. Surface treatments include plain, corrugated, and tooled (Colton 1956; Colton and Hargrave 1937:143).

Mogollon Brown Ware

The typological categorization of Mogollon Brown Ware is more complex than that of either Tusayan Gray Ware or Awatovi Yellow Ware. Mogollon Brown Ware was first described by Harold Colton and Lyndon Hargrave in 1937. According to Colton and Hargrave (1937:44–45), Mogollon Brown Ware is characterized by a coiled construction and fired in an oxidizing atmosphere. Vessel cores are typically gray or brown, sometimes almost black. Temper varies depending on the series (Colton and Hargrave 1937:44–45). Mogollon Brown Ware may have a smoothed, polished, or corrugated exterior, while interiors are typically smoothed or polished and, possibly, smudged (Colton and Hargrave 1937:49–64). This ware was produced in Arizona south of the Little Colorado River to the north edge of the southern desert, as well as in west-central and southwestern portions of New Mexico, and the northern area of Chihuahua, Mexico (Colton and Hargrave 1937:44–45). Given the great diversity of the pottery included in Mogollon Brown Ware by Colton and Hargrave, the primary defining characteristic of Mogollon Brown Ware was often considered to be the brown paste color. Because of this, the category

Mogollon Brown Ware has been used to refer to a diverse array of brown ware ceramics (Duff 2002; Hays-Gilpin and van Hartesveldt 1998:136).

Mogollon Brown Ware has also been more narrowly defined. For example, Mogollon Brown Ware was described by Rinaldo and Bluhm (1956) based on the ceramics of west-central New Mexico. Ceramics from this region are characterized by finely executed corrugations and a dark brown paste with crushed rock and sand temper. A number of different surface treatments may be present including polishing, smudging, corrugations, and rim fillets. Mogollon Brown Ware has also been used to refer specifically to pottery made from self-tempered, volcanic derived clays that are common throughout the Mogollon Highlands (Wilson 1999). According to this definition, Mogollon Brown Ware may be polished or unpolished, smudged, and exhibit a wide variety of exterior surface textures which are used to define types. These narrower definitions of Mogollon Brown Ware allow greater precision of terminology; however, these definitions do not encapsulate the variety of corrugated brown ware pottery produced throughout east-central Arizona. In response to this issue, Puerco Valley Brown Ware was introduced into the ceramic typological system (Goetze and Mills 1993; Hays-Gilpin and van Hartesveldt 1998). Puerco Valley Brown Ware is tempered with sand or a combination of sherd and sand. Paste color may include shades of gray-brown, light brown, and reddish-brown.

Although introducing Puerco Valley Brown Ware mitigated the typological issues caused by narrower definitions of Mogollon Brown Ware, the question of how to categorize corrugated brown ware ceramics that are not encompassed by any of these definitions remains. In some cases, these corrugated brown ware ceramics are locally produced and may be referred to as such. In other cases, such as in the Homol'ovi area, corrugated brown ware pottery that does not meet the narrower definitions of Mogollon Brown Ware laid out by Rinaldo and Bluhm (1956) or Wilson (1999) or Puerco Valley Brown Ware (Hays-Gilpin and van Hartesveldt 1998) was imported into the area from an unknown, presumably nearby, region. In such cases, brown ware vessels produced in various areas across the U.S. Southwest that broadly conform to the production techniques associated with Mogollon Brown Ware are typically referred to as Mogollon Brown Ware.

Ceramic analysis by the Homol'ovi Research Program (HRP) over the last 30 years has subscribed to a broader definition of Mogollon Brown Ware, considering Mogollon Brown Ware to be defined by a suite of technological attributes rather than production in a specific geographical area. Thus, the ceramic typology used by the HRP echoes other research (e.g., Goetze and Mills 1993; Peeples 2011:Table 6.1) in acknowledging that, while a strict definition of Mogollon Brown Ware would limit this category to sand or igneous tempered vessels with volcanic derived clays produced in the vicinity of the Mogollon Highlands, the name Mogollon Brown Ware may also be applied more generally to vessels made from brown-firing alluvial clays tempered with sand and rock fragments, and fired in an oxidizing atmosphere. Sherds identified as Mogollon Brown Ware by the HRP are shown in Figure 8.4, and Munsell© values for the Mogollon Brown Ware paste colors observed during this study are shown in Table 8.1.

Sampling Strategy

The quantity and context of the sherds included in this analysis are shown in Table 8.2. This analysis included 236 sherds of vessels that were imported into the HSC—68 Mogollon Brown Ware, 107 Tusayan Gray Ware, and 61 Awatovi Yellow Ware. Like the Homolovi Orange Ware and Homolovi Gray Ware (together referred to as HUW) assemblage discussed in the previous chapter, the sample for this analysis was restricted spatially and temporally.

	Structure	#MBW	#TGW	#AYW	Context	Phase
Homol'ovi I	415	2		1	Room	TP/EHP
	418	1	2		Room	TP/EHP
	210	9	6	4	Room	TP/LHP
	489	12	7	1	Room	EHP
	652	5	6	4	Room	EHP
	401	3	9	10	Room	EHP/MHP/LHP
	417		3	3	Room	LHP
	501		2	1	Room	LHP
Homol'ovi II	324	5	4	20	Kiva	LHP
	558			5	Room	LHP
	707	1	2	1	Kiva	LHP
Homol'ovi IV	2		1		Kiva	TP
	4		2		Room	TP
	5		4		Room	TP
	201	1	26		Room	TP
	301		9		Room	TP
Chevelon Pueblo	227	3	3	1	Room	TP/EHP/MHP
	222	8	6		Piiki House	EHP
	248	7	1		Kiva	EHP
	279	3	4	1	Kiva	EHP/MHP
	120	1	2	1	Room	EHP/MHP/LHP
	901	2	5	4	Kiva	MHP/LHP
	158	1	1		Room	LHP
	159	2			Room	LHP
	161			1	Room	LHP
	345		1		Room	LHP
	373	2		2	Room	LHP
	393		1	1	Room	LHP
	Total	*65*	*105*	*60*		

Table 8.2: Context and quantity of all imported utility ware sherds analyzed for this research, including Mogollon Brown Ware (MBW), Tusayan Gray Ware (TGW), and Awatovi Yellow Ware (AYW). Contexts for which multiple phases are indicated were used during all phases listed.

Spatially, this sample was drawn from the sites of Homol'ovi I (H1), Homol'ovi II (H2), H4, and Chevelon Pueblo (Chevelon). H1 was contemporary with the other sites included in this analysis; therefore, sampling at H1 was broad temporally in order to provide appropriate comparisons. Sampling at the remaining three sites focused on the earliest contexts, although contexts dating throughout the occupation of each site were included in this analysis. Sherds were selected from as many different structures as possible within each site, given the parameters defined above, in order to characterize site-wide diversity.

In order to ensure compatibility between the HUW sample and the imported utility ware sample, every effort was made to select sherds of imported corrugated pottery from the same contexts as those of the locally produced corrugated pottery; however, this was not always possible. For example, some structures contained far more locally produced utility ware than imported utility ware. In these cases, sherds from additional structures were included in order to expand the available sample of imported corrugated pottery; however, the structures included in this analysis all conformed to the sampling strategy outlined above. Whenever possible, whole, reconstructible, and partially reconstructible vessels were included in this analysis. Because visual analysis suggested that the imported wares were far more technologically uniform than the HUW assemblage, samples for this analysis were selected in order to maximize the corrugation diversity of the sample.

Characterizing Technological Clusters in Imported Utility Wares

In order to explore the stylistic groupings present within the utility wares imported to the HSC, I aggregated the data from these three wares into a single data set and performed a two-step cluster analysis based on the same variables as the prior analysis of HUW. This resulted in the identification of two clusters with good cohesion and separation, which are described in

Table 8.3 and illustrated in Figures 8.5 and 8.6. Two sherds were identified as clear outliers and are not included in either cluster: one plain corrugated and one clapboard corrugated, both Awatovi Yellow Ware. The variables which were most important in determining the distinction between these clusters were similar to those used to differentiate between the local oblique and local parallel clusters. The difference between the widest and narrowest indentation measurement was the most important variable for determining cluster membership. Other important variables were indentation direction, the widest indentation measurement (indentation width—wide) and exterior surface treatment, followed by coil width, indentation depth, and the narrowest indentation measurement (indentation width—narrow). Cluster 1, referred to as non-local oblique, is characterized by an oblique indentation shape with a relatively small difference between the widest and narrowest point of the indentation. The surface of Cluster 1 sherds tends to be obliterated. Cluster 2, called non-local parallel, is characterized by parallel indentations, which are wider at the top than at the bottom. Sherds in this cluster tend to be indented.

A chi-square test confirmed a strong association between cluster and ware (P=0.000). Mogollon Brown Ware tends to belong to the non-local oblique cluster while Tusayan Gray Ware and Awatovi Yellow Ware both tend to belong to non-local parallel cluster. While this chi-square test revealed an association between cluster and ware, it is important to note that this association is not exclusive. Because the sampling strategy for this analysis maximized technological diversity, I was able to identify a number of Mogollon Brown Ware sherds that fell into the non-local parallel cluster and a subset of the Tusayan Gray Ware and Awatovi Yellow Ware sherds that were classified as non-local oblique. Although this sampling strategy allowed greater accuracy in identifying the technological variability present within the imported utility ware assemblage, it does not provide an accurate assessment of the frequencies with which

Cluster	1	2
Name	Non-local Oblique	Non-local Parallel
Wares	Mogollon Brown Ware	Tusayan Gray Ware, Awatovi Yellow Ware
Description	Indentations tend to be oblique, the same width at the top and bottom. Surface tends to be obliterated.	Indentations tend to be parallel, wider at the top than bottom. Surface tends to be indented.
Size	37.2% (89)	62.8% (150)
Variables	Indentation Width - Difference: 0.9	Indentation Width - Difference: 4.9
	Indentation Direction: Oblique (94.4%)	Indentation Direction: Parallel (100%)
	Average Indentation Width - Wide: 4.3	Average Indentation Width - Wide: 7.5
	Exterior Surface Treatment: Obliterated (64%)	Exterior Surface Treatment: Indented (90.7%)
	Average Coil Width: 7.1	Average Coil Width: 5.4
	Average Indentation Depth: 0.5	Average Indentation Depth: 0.9
	Average Indentation Width - Narrow: 3.4	Average Indentation Width - Narrow: 2.5
	Average Vessel Wall Thickness: 5.2	Average Vessel Wall Thickness: 5.8
	Indentation Type: Finger/Fingernail (98.9%)	Indentation Type: Finger/Fingernail (100%)
	Indentation Alignment: Unaligned (97.8%)	Indentation Alignment: Unaligned (98.0%)

Table 8.3: The two stylistic clusters present within the imported utility ware assemblage from the Homol'ovi Settlement Cluster, based on two-step cluster analysis.

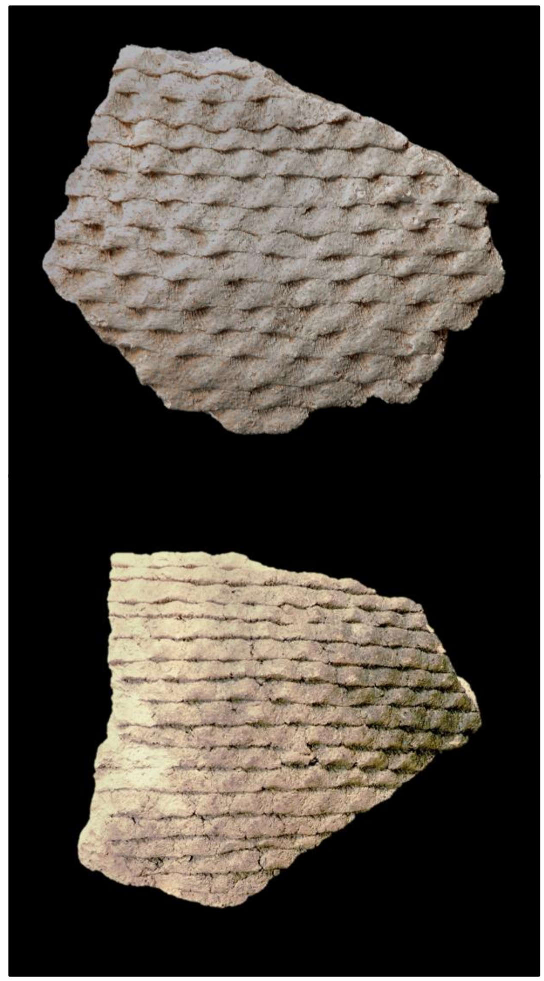

Figure 8.6: Tusayan Gray Ware (above) and Awatovi Yellow Ware (below) from Homol'ovi I, typical of the non-local parallel cluster.

different styles appeared in each ware, as sampling deliberately inflated the number of sherds that did not resemble the most common corrugation variety. Therefore, the frequencies of these styles within each ware are not discussed further here. Regardless of relative frequency, however, this analysis clearly indicates that the clusters identified in this investigation do not correlate exactly with any production location or ware.

Like the stylistic clusters observed within HUW, these stylistic traditions are better understood as constellations of practice: regional in scale and manifested on the local level by communities of practice. As families and communities migrated across the landscape, potters produced pottery based on their enculturative traditions using local raw materials. Thus, although the stylistic traditions associated with each of these two sets of manufacturing practices appears to be more prevalent in certain regions—non-local parallel in the production locus of Tusayan Gray Ware and Awatovi Yellow Ware, non-local oblique in the production area of the Mogollon Brown Ware recovered from the HSC—both stylistic traditions were present in both production locations. Further, I do not intend to suggest that these two stylistic traditions were the only traditions practiced by Puebloan potters. Undoubtedly a number of other corrugated stylistic traditions were practiced across the U.S. Southwest: several others have been identified by Matthew Peeples (Peeples 2011).

Comparison of Homolovi Utility Ware and Imported Utility Ware Stylistic Clusters

In order to explore the association between the two clusters found within the HUW assemblage and the imported utility ware clusters, I focused on the variables that were identified as important predictors of cluster membership for both data sets: indentation direction, the difference between the widest and narrowest indentation measurement (indentation width—difference), exterior surface treatment, the widest and narrowest indentation measurements (indentation width—wide, indentation width—narrow), indentation depth, coil width, and vessel wall thickness. There are immediately noticeable similarities between these clusters: local parallel and non-local parallel share a number of attributes, as do local oblique and non-local oblique. To assess the strength of these similarities, I performed a series of chi-square tests looking for statistically significant similarities and differences between these sets of clusters (Tables 8.4 and 8.5).

These chi-square tests confirmed the association between the local oblique cluster and the non-local oblique cluster. The local oblique cluster and the non-local oblique cluster are only significantly different in one variable: exterior surface treatment (P=0.030). The local oblique cluster contains more semi-obliterated and indented sherds than the non-local oblique cluster. In contrast, the local oblique cluster is almost entirely different from the non-local parallel cluster. These chi-square tests also confirm the association between the local parallel cluster and the non-local parallel cluster. As with the association between the local oblique and the non-local oblique clusters, local parallel and non-local parallel are statistically similar in all variables other than exterior surface treatment (P=0.010). The local parallel cluster contains a substantial minority of semi-obliterated sherds, while the non-local parallel cluster sherds are almost exclusively indented. The local parallel cluster is entirely different from the non-local oblique cluster: no variables overlap between these two clusters.

The significance of this discrepancy in exterior surface treatment is unclear. There does not appear to be a temporal component to the distribution of semi-obliterated pottery; semi-obliterated sherds are present in both early and late contexts. Over the course of collecting data for this research, I observed that many of the sherds identified as semi-obliterated appear to be so as the result of production error—an unintentional smearing of several coils on an indented

Variable	Local	Non-Local			
	Oblique	Parallel	*Difference?*	Oblique	*Difference?*
Indentation Direction	Oblique	Parallel	P=0.000	Oblique	P=0.412
Indentation Width - Difference	1.5	4.9	P=0.001	0.9	P=0.631
Exterior Surface Treatment	Obliterated	Indented	P=0.000	Obliterated	P=0.030
Indentation Width - Narrow	3.8	2.5	P=0.001	3.4	P=0.693
Indentation Width - Wide	5.2	7.5	P=0.030	4.3	P=0.072
Indentation Depth	0.5	0.9	P=0.000	0.5	P=0.797
Coil Width	7.1	5.4	P=0.001	7.1	P=0.286
Vessel Wall Thickness	5.5	5.8	P=0.437	5.2	P=0.107

Table 8.4: The relationship between the local oblique cluster and the non-local parallel and oblique clusters.

Variable	Local	Non-Local			
	Parallel	Parallel	*Difference?*	Oblique	*Difference?*
Indentation Direction	Parallel	Parallel	P=Constant	Oblique	P=0.000
Indentation Width - Difference	4.6	4.9	P=0.262	0.94	P=0.000
Exterior Surface Treatment	Indented	Indented	P=0.010	Obliterated	P=0.000
Indentation Width - Narrow	2.5	2.5	P=0.512	3.4	P=0.000
Indentation Width - Wide	7.1	7.5	P=0.239	4.3	P=0.000
Indentation Depth	0.8	0.9	P=0.392	0.5	P=0.000
Coil Width	5.6	5.4	P=0.642	7.1	P=0.000
Vessel Wall Thickness	5.9	5.8	P=0.926	5.2	P=0.000

Table 8.5: The relationship between the local parallel cluster and the non-local parallel and oblique clusters.

vessel—rather than an intentional production choice. However, equally, there were many examples of semi-obliterated pottery that were clearly the product of intentional production choices. Future research expanding the sample size of imported utility ware and including non-local utility ware recovered from outside the HSC may elucidate this issue.

The association between the local parallel and non-local parallel clusters and the local oblique and non-local oblique clusters supports the argument outlined in previous chapters that the association between HUW cluster membership and paste color is a stylistic choice. One of the primary characteristics of Mogollon Brown Ware is the brown paste color, the byproduct of being fired in an oxidizing environment (Colton and Hargrave 1937:44–45). It is unsurprising, therefore, that the HUW corrugated tradition associated with the Mogollon Brown Ware recovered from the HSC assemblage also tends to be fired in an oxidizing environment, producing an orange-brown paste. Tusayan Gray Ware is fired in a neutral environment, while Awatovi Yellow Ware is fired in an oxidizing environment (Colton 1955, 1956). Thus, the presence of both neutral and oxidized vessels within the corpus of HUW manufactured in the parallel style, associated with these wares, is equally unsurprising.

That each HUW cluster is associated with an imported utility ware cluster clearly indicates that these two local manufacturing traditions were part of larger, regional constellations of practice. The similarities between the HUW local parallel cluster and the non-local parallel imported utility ware cluster suggests an affiliation between the Homol'ovi potters producing local parallel cluster pottery and the Hopi Mesas, which echoes the association established by Lyons (2001, 2003) between Winslow Orange Ware (WOW) and the ceramic traditions of the Hopi Mesas. The regional affiliation of the local oblique cluster is less clear. However, the abundance of brown ware pottery, technologically similar to the Mogollon Brown Ware imported to the HSC, recovered from sites to the east of the HSC, in the Puerco area and in New Mexico, as well as to the south in the Chevelon drainage and the mountains south of the Mogollon Rim (for further discussion and examples see Dungan 2017; Hays-Gilpin and van Hartesveldt 1998; Neuzil 2008; Peeples 2011) suggest possible sources worthy of further investigation.

Regional Corrugated Ceramic Traditions

Another way I explored the regional affiliations of the stylistic traditions observed within the corrugated HUW assemblage was through an assessment of the contemporaneous utilitarian traditions of neighboring areas. To this end, this section uses extant archaeological literature to characterize the utilitarian ceramic traditions of the regions that surround the HSC[1]: the Hopi Buttes, the Puerco area, the Upper Little Colorado River region, the Silver Creek area, the Chevelon drainage, Anderson Mesa, and the Hopi Mesas (Figure 8.1). The lack of comparable datasets makes it difficult to definitively affiliate the corrugation styles identified in the HUW assemblage with the corrugated assemblages of other regions. However, although few reports and publications contain the detailed observations and measurements needed to characterize corrugation technology in the manner presented here, it is possible to glean enough data from published reports to roughly characterize the locally produced corrugated assemblages of these regions. Further, when possible, this archaeological literature is supplemented with an in-person assessment of the corrugated assemblages from each of these regions, utilizing collections held by the Arizona State Museum and the University of Arizona.

[1] One group not discussed here is the Pueblo III residents of the Homol'ovi area. This omission should not be taken to suggest that there is no possibility of social affiliation between the Pueblo III and Pueblo IV residents of Homol'ovi—such an affiliation is entirely plausible. Rather, this omission is due to a lack of data. This assessment of corrugation technology is predicated on the availability of locally produced pottery. To assess the corrugation traditions practiced in an area, analysis must consider locally produced corrugated pottery. Unfortunately, as yet no locally produced ceramic tradition has been identified within the Pueblo III communities of the Homol'ovi area (Barker and Young 2017; Young and Barker 2015); therefore, there is no basis for a comparison.

Hopi Mesas

The modern villages of the Hopi Mesas are situated on three projections of Black Mesa, on the Hopi Reservation in Northeastern Arizona (Adams et al 2004:128). Each of these mesas forms its own settlement cluster. Prior to 1700, a fourth cluster of villages was located on Antelope Mesa (Adams et al 2004:128). Settlements in the Hopi Mesas region between 1100 and 1250 tended to be relatively small and were dispersed along major drainages or located on mesa edges near springs (Adams 1996b:51; Duff 2002:140–141). After 1250, people aggregated into villages on the four mesas where the historic and modern Hopi villages are located (Duff 2002:140–141). Due to this aggregation, the Hopi Mesas region was densely settled by 1275, with several villages located on the mesas as well as surrounding the bases of the mesas (Adams 1996b; Duff 2002:140–141). Population and aggregation both increased rapidly during this time: 14 villages were established during the last few decades of the thirteenth century (Adams et al. 1993; Colton 1974; Duff 2002:140–141). This population increase was due at least in part to immigration to the Hopi Mesas from areas to the north, east, and west (Adams 1996b:51–54; Lindsay, Jr. and Dean 1983:163; Lipe 1995). Aggregation during this period was accompanied by a decrease in the number of occupied villages and an increase in the population occupying each village (Adams et al. 2004:133–134; Colton 1974). Between 1350 and 1400, a second population influx occurred as regions adjacent to the Hopi Mesas were depopulated, leading to even greater aggregation (Adams 1996b:51; Duff 2002:140–141).

During the Pueblo IV period on the Hopi Mesas, a total of 24 sites were occupied, which ranged in size from 50 to 4,200 rooms (Adams and Duff [editors] 2004:181). Unlike contemporaneous ceramic assemblages in other regions, the Pueblo IV ceramic assemblage from sites in the Hopi area is relatively homogenous, dominated by locally produced Jeddito Yellow Ware (Adams et al. 2004; Duff 2002:82). However, ceramic compositional analysis has indicated the presence of mesa-specific production groups (Bernardini 2005; Bishop et al. 1988). The exchange of ceramics between mesas appears to have been limited (Bishop et al. 1988:330) and occupants of different mesas appear to have emphasized different regional exchange networks as well (Adams et al. 2004:134–135; Bernardini 2005; Duff 2002:82), suggesting a relatively high degree of internal differentiation between the settlement clusters on the Hopi Mesas at this time.

The largest of the aggregated pueblos occupied during the Pueblo IV period was Awat'ovi (AZ J:7:1[ASM], NA 820), located on Antelope Mesa. At its maximum, this site contained several thousand rooms (Adams et al. 2004:134). Occupation of Awat'ovi began in the thirteenth century and continued until around 1700 (Brew 1949). This site was the focus of research by the Peabody Museum's Awatovi Expedition between 1935 and 1939 (Brew 1941, 1949; Smith 1952). This work resulted in, among other reports, a thorough documentation of 7,060 corrugated utilitarian sherds recovered from Awat'ovi and from sites in the surrounding area (Gifford and Smith 1978). *Gray Corrugated Pottery from Awatovi and Other Jeddito Sites in Northeastern Arizona* by James C. Gifford and Watson Smith (1978) provides details and illustrations of the various corrugated ceramic types observed at Awat'ovi as well as any spatial or chronological patterning observed in the deposition of these types.

Although this publication does not deal with the later yellow corrugated pottery produced in the Hopi area, the change from gray corrugated pottery to yellow corrugated pottery did not represent a major technological shift: the same materials and practices appear to have been used to manufacture Awatovi Yellow Ware and Tusayan Gray Ware. The shift from gray to yellow paste can be explained by a transition from a reducing to an oxidizing firing atmosphere (Colton 1956; Colton and Hargrave 1937; Hargrave 1932). Based on personal observation as well as the statistical analysis described in the previous section, corrugated Tusayan Gray Ware and Awatovi Yellow Ware did not differ substantially in style or technology during the period in which the HSC was occupied. Therefore, the information provided by Gifford and Smith (1978) may be generalized to discuss Hopi corrugated pottery traditions at Awatovi regardless of paste color. The corrugated ceramic assemblage from Awat'ovi is an appropriate comparison for the corrugated ceramic assemblage from Homol'ovi because Awat'ovi was occupied contemporaneously with the sites of the HSC. Further, compositional analysis of Jeddito Yellow Ware has demonstrated a relationship between the residents of Antelope Mesa, specifically Awat'ovi, and the occupants of the HSC (Adams et al. 2004:135; Bernardini 2005:150–158).

Gifford and Smith (1978) describe and illustrate 13 different types of corrugated pottery present within the assemblage from Antelope Mesa. Of these types, the vast majority appear to be corrugated solely in the parallel corrugation style. All but one of these parallel style types are indented rather than obliterated. Moenkopi Corrugated, while also typically produced using the parallel corrugation style, is characterized by flattened or semi-obliterated coils (Gifford and Smith 1978:110–116). All of the indented parallel style types illustrated in Gifford and Smith (1978) are consistent with the parallel cluster identified within the HSC ceramic assemblage, supporting the association between Tusayan Gray Ware, Awatovi Yellow Ware, and the local parallel cluster HSC identified through statistical analysis in the previous section.

One type of corrugated pottery, Keams Corrugated (Gifford and Smith 1978:117–131) which is illustrated in Figure 8.7, is consistent with the oblique cluster identified within the HSC ceramic assemblage. This type is characterized by fully obliterated coils and wide, oblique indentations (Gifford and Smith 1978:118). Gifford and Smith (1978:118) note further that the coils of Keams Corrugated vessels are typically quite large, another distinguishing feature of the

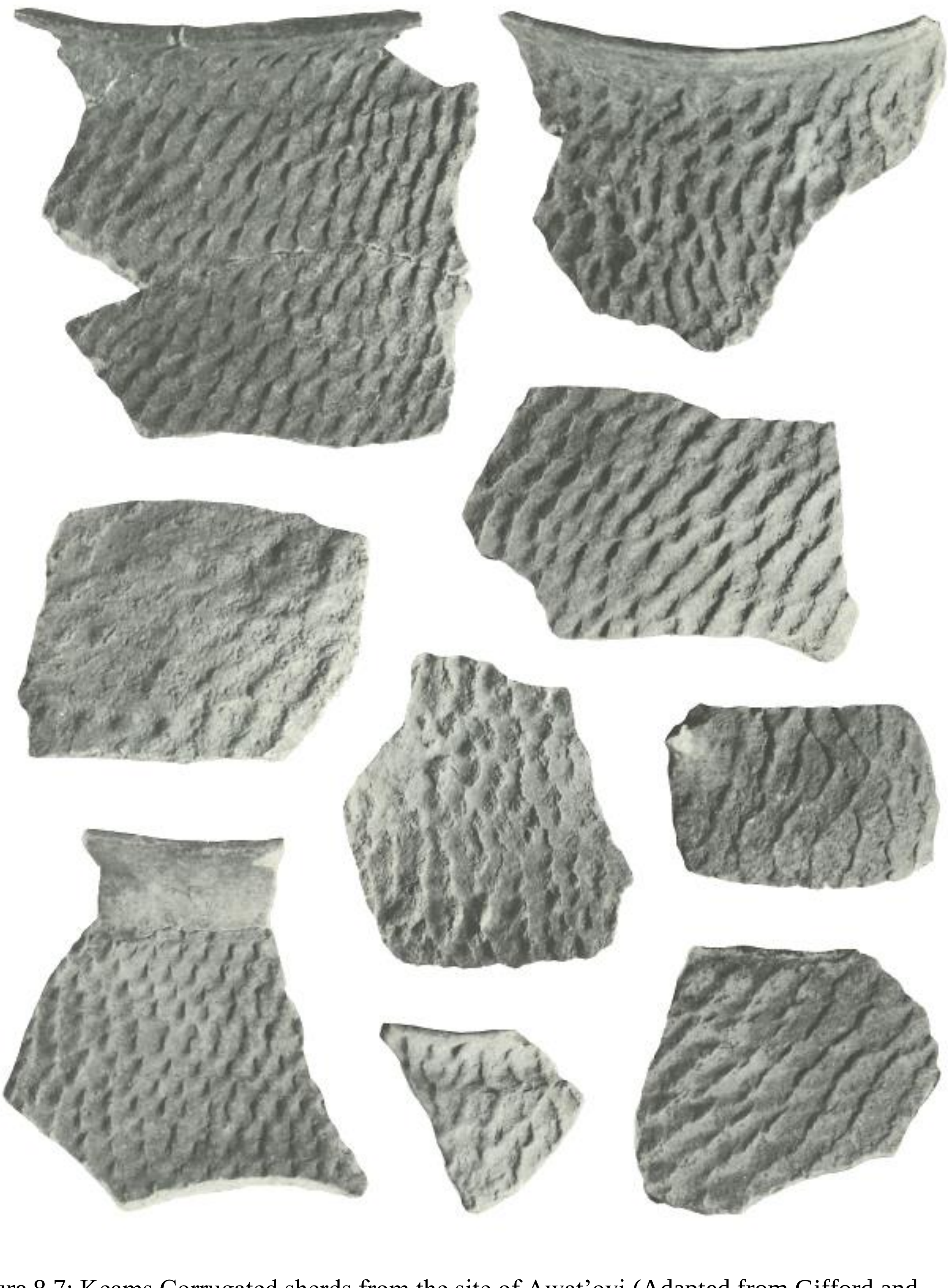

Figure 8.7: Keams Corrugated sherds from the site of Awat'ovi (Adapted from Gifford and Smith 1978:Figure 70).

oblique cluster identified in this analysis. Analysis of corrugated pottery recovered from the sites of Antelope Mesa by Gifford and Smith (1978) identified a number of interesting patterns in the distribution of Keams Corrugated within and between these sites. At the site of Awat'ovi, Keams Corrugated sherds represented seven percent of the overall corrugated assemblage (Gifford and Smith 1978:122). However, this percentage varied over time. The frequency of Keams Corrugated sherds in the corrugated assemblage from Awat'ovi ranged from around 1 percent to about 13 percent of the assemblage. Similarly, the frequency of Keams Corrugated sherds in the corrugated assemblage from other sites on Antelope Mesa varied dramatically. Keams Corrugated sherds were relatively sparse at most sites in this area. At the majority of sites analyzed by Gifford and Smith (1978:Table 2), Keams Corrugated represented less than 10 percent of the corrugated ceramic assemblage. However, at a few sites, all of which predate the HSC villages, Keams Corrugated represented between 20 and about 40 percent of the corrugated ceramic assemblage[2].

This variability demonstrates that, in certain spatial and chronological contexts, the oblique style corrugation tradition practiced on the Hopi Mesas was relatively abundant, despite the fact that this tradition was less well represented within the corrugated ceramic assemblage from this area overall. Although there are a number of possible explanations for this diversity, these concentrations of oblique style corrugated pottery may represent periodic influxes of socially distinct populations into the Hopi area. A more detailed exploration of corrugated pottery produced on the Hopi Mesas would doubtless clarify this issue. Based on the evidence of abundant production of corrugated pottery in the parallel style on the Hopi Mesas, along with

[2] Details of the corrugated ceramic assemblages from Awat'ovi and other sites on Antelope Mesa can be found in Appendix E.

copious evidence of migration from the Hopi Mesas to the HSC (e.g., Adams 2002, 2004a; Lyons 2003), it seems highly probable that this corrugation tradition was brought to the HSC by people who migrated to the Homol'ovi area from the Hopi Mesas. Given the presence of the oblique corrugation style on the Hopi Mesas in the form of Keams Corrugated, the possibility must be considered that both corrugated traditions observed in the HSC ceramic assemblage emerged on the Hopi Mesas.

There are several reasons why it seems unlikely that the oblique corrugated tradition was brought to the Homol'ovi villages solely by immigrants from Hopi. In the statistical analysis outlined in the previous section, oblique cluster sherds produced in the HSC were demonstrated to be most closely associated with Mogollon Brown Ware imported into the Homol'ovi area, not with the Hopi corrugated ceramic traditions. Also, within the HSC, the oblique ceramic tradition is most abundantly represented at Chevelon. At Chevelon, the oblique tradition represents about 60 percent of the sampled corrugated assemblage. This site also contains the most evidence of diverse social networks of all sites in the HSC, suggesting that Hopi influence is less strong at this site than at others within the HSC (Adams [editor] 2016). It is notable, therefore, that the frequency of oblique style corrugated pottery at this site is far higher than at any site at the Hopi Mesa included in this analysis.

At Awat'ovi, the site on Antelope Mesa most directly comparable to the HSC villages, Keams Corrugated never represents more than about 13 percent of the corrugated assemblage, with an average frequency of 7 percent. Across all the sites of Antelope Mesa sampled by Gifford and Smith (1978:122), Keams Corrugated represents 13 percent of the corrugated assemblage. This is less than the frequency with which oblique cluster sherds appear in the HSC ceramic assemblage (26.6%). Only the ceramic assemblages from H4 and H3 contain a comparable proportion of oblique cluster corrugated sherds (6.4% and 14.4% respectively). This suggests that, while H4 and, possibly, H3, may have been founded and occupied by a group of people who migrated from the Hopi Mesas, the residents of the other villages of the HSC were likely more diverse in their origins and cultural affiliations.

Hopi Buttes

The Hopi Buttes are located in the Little Colorado River Valley, approximately 50 kilometers north of the HSC on what is now the Navajo Reservation. Our knowledge of the prehispanic cultural context of the Hopi Buttes is largely based on a survey and excavation program undertaken by George G. Gumerman in the 1960s which recorded 210 archaeological sites (Gumerman 1969, 1988). The Hopi Buttes were also included in a survey conducted for the Transwestern Pipeline Expansion Project, which recorded 17 archaeological sites in the area (Bradley 1993:87–114; Winter 1991). In this region, the earliest definitive archaeological sequence begins in the Basketmaker II period. The earliest ceramic assemblages in this area typically contain abundant Tusayan Gray Ware and Tusayan White Ware ceramics (Gumerman 1969:173–179). The residential population of the Hopi Buttes remained low until around AD 1050, at which point population steadily increased until around 1200 (Gumerman 1969:112, 1988). The majority of sites in the Hopi Buttes date to the Pueblo III period (Mills 1993:417). The Pueblo III occupation of this area was highly dispersed, typically consisting of small pithouse and pueblo settlements (Adams 1996b:52; Eck 1994:10; Gumerman 1969:112).

The ceramics from these sites are dominated by locally produced Little Colorado White Ware and Little Colorado Gray Ware, which replaced Tusayan tradition ceramics in this area around 1050 (Gumerman 1969:328–331). Little Colorado Gray Ware and Little Colorado White Ware typically have hard, medium to dark gray paste tempered with abundant crushed white sherds. Multi-lithic sand geologically specific to the Hopi Buttes is often present as well. The surface treatments characteristic of Little Colorado Gray Ware include plain as well as clapboard, indented, and semi-obliterated styles of corrugation (Goetze and Mills 1993; Hays-Gilpin and van Hartesveldt 1998). At some sites, brown wares were reasonably abundant as well. Brown utilitarian pottery represented 4.8% of the assemblage from the Ramp Site (NA 9183) and 8% of the assemblage from the Plaza Site (NA 9400) (Barker and Young 2017:Table 7; Gumerman 1988:Tables 3-6 and 3-10). Unfortunately, Gumerman's analysis did not distinguish between Mogollon Brown Ware and Alameda Brown Ware, and predated the identification of the Puerco Valley ceramic tradition (Hays-Gilpin and van Hartesveldt 1988).

After 1250, the western area of the Hopi Buttes was depopulated as people aggregated in the large Bidahochi pueblos located in the eastern Hopi Buttes (Adams 1996b; Eck 1994:11). Unfortunately, as Gumerman's survey concentrated on the western Hopi Buttes, details of the Pueblo IV occupation of this eastern region are less well known. In 1987 the Navajo Nation conducted an archaeological survey at the site of Bidahochi (AZ J:12:1[ASM], NA 1054), which is also known as the Round Butte Spring Site (Gilpin and Stein 1987). Decorated ceramics recovered from this site indicated that it was primarily occupied during the 1300s. There were also a number of Pueblo III sites located in the vicinity of Bidahochi and evidence of seasonal use of the area during the Pueblo II period. During the Pueblo IV occupation of the site, the most abundant utility wares observed were corrugated Tusayan Gray Ware and Awatovi Yellow Ware. Brown corrugated pottery was almost entirely absent (Gilpin and Stein 1987). Pueblo IV settlements in this region were depopulated between 1350 and 1425 (Adams 1996b:54; Duff 2002:41), when people likely relocated to the Hopi Mesas (Eck 1994:11).

A very small survey collection from the site of Bidahochi was gathered by archaeologists from the Arizona State Museum. The utilitarian assemblage in this collection consisted primarily of Tusayan Gray Ware and Awatovi Yellow Ware; however, a number of sherds that did not fall comfortably into either of these ware categories were present as well. The ceramics produced locally during this period in the Hopi Buttes are less well understood than the Pueblo III Little Colorado Gray Ware and Little Colorado White Ware complex. However, given the distinctive nature of both Awatovi Yellow Ware and Tusayan Gray Ware, anomalous sherds were easy to identify. The majority of sherds that did not fall into either of these categories were a medium gray to gray-brown color with extremely abundant white sherd temper, typologically consistent with the Pueblo III Little Colorado Gray Ware ceramic tradition.

To better asses the corrugation technology of the Hopi Buttes area during the Pueblo IV period, this collection was sorted by ware and by corrugation indentation style, and the number of ceramic sherds of each corrugation indentation style that were present in the locally produced assemblage were recorded. Sherds from Bidahochi are shown in Figure 8.8. In total, 38 corrugated sherds were included in the survey collection from Bidahochi. Of these, 16 appeared to have been locally produced. For two sherds, the corrugation type was indeterminate. Ten sherds (71.4% of the sample for which corrugation style could be identified) exhibited indented parallel corrugations comparable to the Homol'ovi parallel cluster. Only one sherd (7.1% of the sample for which corrugation style could be identified) exhibited oblique corrugations. Three sherds fell into stylistic categories not represented within the Homol'ovi assemblage. Because the available assemblage from Bidahochi is very small, it is difficult to draw any strong conclusions from this assessment. However, it appears that the frequency of parallel and oblique corrugation styles manufactured in the Hopi Buttes area is more comparable to the relative

Figure 8.8: Sherds from Bidahochi Pueblo that show a range of corrugation styles visible in the Bidahochi Assemblage.

frequencies of these styles on the Hopi Mesas than in the HSC. The relative proportion of oblique style corrugated pottery present in the locally produced assemblage from this area (7.1%) is far lower than in the HSC (26.6%).

Given the proximity of the Hopi Buttes to the Homol'ovi area, the movement of people from the Hopi Buttes to the HSC seems quite plausible. Based on the ceramic technology observed in the Hopi Buttes, it is unlikely that this population would have been responsible for the relatively high proportion of oblique style corrugated pottery within the HSC ceramic assemblage. More likely, immigrants from the Hopi Buttes would have produced corrugated pottery in the parallel style. Population movement from the Hopi Buttes to the HSC is one possible explanation for the proportion of sherd temper visible in the ceramic corpus of the HSC. Sherd temper is present in just less than half of the utilitarian assemblage produced in the Homol'ovi area and is as or more abundant within the decorated assemblage. The use of sherd temper is characteristic of pottery produced in the Hopi Buttes region (Hays-Gilpin and van Hartesveldt 1998).

Although the decorated assemblage and a large proportion of the utilitarian assemblage produced in the HSC appear to be affiliated with the technological traditions of the Hopi Mesas (Lyons 2001, 2003), sherd temper is rarely present in the corresponding ceramic traditions of the Hopi Mesas (Colton 1955). The decorated and utilitarian ceramic assemblages produced in the Hopi Buttes also appear to be a part of the ceramic traditions of the Hopi Mesas: a number of Little Colorado White Ware types appear to be stylistic equivalents of contemporaneous Tusayan White Ware types (Adams 1996b:53; Colton 1955; Hays-Gilpin and van Hartesveldt 1998), and the similarities between the corrugated pottery from Bidahochi and the Hopi Mesas is discussed above. Therefore, immigrants to the HSC from the Hopi Buttes region could be responsible for the local production of pottery in the Hopi style using sherd temper—a tempering material not typical of corrugated pottery produced on the Hopi Mesas.

Little Colorado Gray Ware is present, albeit typically in extremely small quantities, in the ceramic assemblages of many HSC communities (Barker 2017; Bubemyre 2004; Cutright-Smith and Barker 2016; Lyons and Hays-Gilpin 2001). At the sites of H1, H2, and Chevelon, which were occupied after production of Little Colorado Gray Ware had largely ceased, the presence of extremely small amounts of Little Colorado Gray Ware (0.5% of the H2 assemblage, 0.19% of the assemblage from H1, 0.23% of the Chevelon assemblage) may be explained by the presence of smaller, Pueblo III communities that likely underlie the larger Pueblo IV roomblock structures

(Adams 2002). The occupation of H4 overlaps with the end of Little Colorado Gray Ware production in the Hopi Buttes (Hays-Gilpin and van Hartesveldt 1998). Little Colorado Gray Ware is more abundant at this site (6.77%), suggesting that this ware was imported to H4 during the early Pueblo IV occupation of the village.

Based on the relative frequency of Little Colorado Gray Ware within the ceramic assemblages of the HSC villages, the evidence is strongest for a social relationship between the residents of H4 and communities in the Hopi Buttes. Therefore, if population movement did occur between these two areas, it is likely associated with H4 specifically. If one accepts the premise that the exchange of utilitarian vessels over long distances, in conjunction with the local production of ceramics using the same production practices as the imported pottery, may serve as an indicator of residential relocation, it seems quite possible that people from the Hopi Buttes area relocated to H4. However, distinguishing between this group and people who migrated to the HSC directly from the Hopi Mesas is not possible in this analysis, based on the technological similarities between pottery produced in the Hopi Buttes and the Hopi Mesas.

Puerco Cluster

The Puerco River region covers a large geographic area along the course of the Rio Puerco west into New Mexico (Duff 2002:38–39). The Puerco cluster occupied during the Pueblo IV period is situated east of the Homol'ovi area between Zuni and the Hopi Mesas. The outlines of this cluster correlate roughly with the current boundaries of the Petrified Forest National Park. During the Pueblo IV period, settlements shifted from being widely dispersed to aggregated into a few large settlements, including Puerco Pueblo (AZ Q:1:22[ASM]), Dead Wash Pueblo, Wallace Tank Pueblo (AZ Q:1:199[ASM]), Black Axe Pueblo (AZ Q:1:320[ASM], NA 1021, NA 1022), Seven Springs, Spier 196, and Stone Axe Pueblo (AZ

Q:2:22[ASM]) (Schachner et al. 2016b, 2016a; Theuer 2011:127–128). Many of these villages were depopulated between 1375 and 1400 (Burton 1990, 1993; Guthrie et al. 2007; Theuer 2011:127), although Stone Axe appears to have been occupied until around 1450 (Schachner et al. 2016b). These settlements appear to represent the consolidation of local populations, likely augmented by immigrants from other areas (Duff 2002:38–39). Like the HSC, the Pueblo IV aggregated communities in the Puerco cluster participated in economic and social relationships with a number of different settlement clusters including the HSC, the Hopi Mesas, Zuni, Sinagua groups in the Flagstaff area, and Salado communities, evidenced by architectural styles, ceramic distributions, and the chemical analysis of obsidian recovered from Pueblo IV sites in the Petrified Forest (Burton 1990, 1993; Duff 2002; Schachner et al. 2016b, 2016a; Shackley 2009; Theuer 2011:127).

Of the sites occupied during the Pueblo IV period, archaeological research has been carried out at Puerco Pueblo, Wallace Tank Pueblo, Black Axe Pueblo, and Stone Axe Pueblo. Puerco Pueblo was first recorded by Jesse Walter Fewkes in 1896 (Fewkes 1898a, 1904). Most recently, archaeological excavation was carried out by the National Park Service (Burton 1990; Theuer 2011:132–133). At its largest, Puerco Pueblo contained 100 rooms that appear to have been constructed accretionally rather than as a single construction event (Burton 1990). Puerco Pueblo was occupied between 1250 and 1380 (Burton 1990; Theuer 2011:132).

Black Axe Pueblo was first recorded by Lyndon Hargrave in 1929 and later by Harry P. Mera in 1934 (Mera 1934; Theuer 2011:135). This site was redocumented in 1994 by the Western Archeological and Conservation Center (Guthrie et al. 2007) and, most recently, by Gregson Schachner and Wesley Bernardini in 2010 (Schachner and Bernardini 2014). Black Axe contains two masonry pueblos. The smaller of these two pueblos (6-8 rooms) appears to have been occupied in the Pueblo III period, around 1250-1275, while the large pueblo (50-80 rooms) was occupied later, from 1275 to 1350 (Schachner and Bernardini 2014; Theuer 2011:135–137). Ceramics recovered from the later occupation of this site include Roosevelt Red Ware, White Mountain Red Ware, Jeddito Yellow Ware, Zuni Glaze Ware, and locally produced WOW (Schachner and Bernardini 2014:15; Theuer 2011:135–137). Chemical sourcing of obsidian from this site identified four sources: Mount Taylor, Government Mountain, Valles Rhyolite, and Mule Creek (Theuer 2011:136–137). This diversity echoes the ceramic data, suggesting widespread social and economic networks.

Wallace Tank Pueblo was first recorded by Leslie Spier in 1918 (Spier 1918). Recently, this site was included in the Puerco Ridge Archaeological Survey directed by Gregson Schachner of UCLA, which focused on investigation the Pueblo IV occupation of the Petrified Forest area (Schachner et al. 2016a). Wallace Tank Pueblo was occupied from the late 1200s through the late 1300s (Schachner et al. 2016a). It is the largest community in the Petrified Forest area, containing 500-600 rooms constructed of both sandstone masonry and adobe bricks (Schachner et al. 2016a:30; Theuer 2011:137–140). Its construction differs from Stone Axe Pueblo, which is built solely of adobe brick, as well as Puerco and Black Axe Pueblos which are constructed entirely of sandstone masonry (Burton 1990; Schachner et al. 2016b; Schachner and Bernardini 2014). Other than Wallace Tank Pueblo and Stone Axe Pueblo, adobe brick construction is present at H1, Chevelon, and H3 in the HSC (Adams 2001c, 2002, 2016c) and at Fourmile Pueblo in the Silver Creek area (Johnson 1992).

Decorated pottery recovered from this site includes White Mountain Red Ware, Jeddito Yellow Ware, Roosevelt Red Ware, Cibola White Ware, Zuni Glaze Ware, and locally produced WOW (Gilpin et al. 2003; Schachner et al. 2016a:39–40; Theuer 2011:137–140). Obsidian sourcing indicates that occupants of this site participated in exchange relationships with communities in the vicinity of Government Mountain, Mule Creek, Mount Taylor, Valles Caldera, and Cerro Toledo (Shackley 2010; Theuer 2011:137–140). Thus, like other sites of the Puerco cluster, Wallace Tank Pueblo appears to have engaged in social and economic relationships with a diverse array of other regions and settlement clusters.

Stone Axe Pueblo was first identified by Walter Hough in 1901 (Theuer 2011:140). Stone Axe Pueblo was also included in the Puerco Ridge Archaeological Survey directed by Gregson Schachner of UCLA (Schachner et al. 2016b). At its largest, this site contained around 200-250 rooms constructed out of adobe bricks (Schachner et al. 2016b:25–27). Ceramics from this site include Roosevelt Red Ware, Jeddito Yellow Ware, Zuni Glaze Ware, and locally produced WOW. The presence of late types such as Sikyatki Polychrome, Kechipauan Polychrome, Ninemile Polychrome, and Los Muertos Polychrome suggest that this site was occupied from the 1300s well into the 1400s and represents the latest occupation in the Petrified Forest area (Schachner et al. 2016b:28–29). Chemical analysis of obsidian recovered from this site found it was acquired from Government Mountain, Mount Taylor, Valles Rhyolite, and Mule Creek (Shackley 2010; Theuer 2011:140–141).

Ceramics produced locally in the Petrified Forest area tend to resemble those manufactured in the Homol'ovi area. The locally produced decorated tradition is included within the WOW designation, and WOW types such as Tuwiuca Black-on-orange, Homolovi Polychrome, Chavez Pass Red, Chavez Pass Black-on-red, Chavez Pass Polychrome, Black Ax Plain, and Black Ax Polychrome were produced at sites in the Puerco cluster (Lyons 2001:305). However, the WOW produced in the Petrified Forest area also includes different combinations of slips, paints, and design styles than the WOW produced in the HSC, combining decorative traditions from Roosevelt Red Ware, Zuni Glaze Ware, White Mountain Red Ware, and the Hopi traditions associated with WOW produced in the HSC (Gilpin et al. 2003:17–18; Schachner et al. 2016a:40; Theuer 2011:143–144). The latest WOW produced in the Puerco cluster, which post-dates any WOW produced in the HSC, resembles early forms of Matsaki Polychrome, a type of pottery produced in the Zuni area (Gilpin et al. 2003:13, 17–18; Schachner et al. 2016a:40). The locally produced utilitarian pottery of this settlement cluster, Puerco Valley Brown-Gray Ware, is dominated by orange to grayish obliterated corrugated pottery which somewhat resembles the corrugated pottery produced in the HSC, but typically appears to have larger and more obliterated indentations than are characteristic of HSC utilitarian pottery (Gilpin et al. 2003:17), although indented corrugated and fully obliterated varieties are also present (Schachner et al. 2016a:40).

Ceramics imported to the area are dominated by Jeddito Yellow Ware, White Mountain Red Ware, and Roosevelt Red Ware. Notably, Jeddito Yellow Ware was not imported to the Puerco cluster in nearly the same quantities as it was to the HSC, representing 30 percent of the ceramic assemblage at Puerco Pueblo, but only 10 percent of the assemblages of Wallace Tank, Black Axe, and Stone Axe Pueblos (Theuer 2011:137). Although chronology may explain the relative lack of Jeddito Yellow Ware at Wallace Tank and Black Axe Pueblos, which were depopulated in the mid-1300s (Theuer 2011), Stone Axe Pueblo was occupied until around 1450 (Schachner et al. 2016b). Therefore, the relative dearth of Jeddito Yellow Ware at Puerco cluster sites compared to HSC sites may be the byproduct of cultural differences. Possibly the residents of the Puerco cluster were not as integrated within the Hopi cultural sphere as were the occupants of the HSC. This would also explain the presence of diverse decorative traditions within the

WOW corpus produced in the Petrified Forest area, a diversity not apparent in the HSC assemblage (Lyons 2001, 2003).

Survey collections recovered by the Puerco Ridge Archaeological Survey are currently housed in the Arizona State Museum. In order to assess the corrugation technology of the Puerco cluster, I sorted this collection by ware and by corrugation style, and recorded the number of ceramic sherds of each corrugation style that were present, along with general observations about corrugation technology in the locally produced ceramic assemblage. I recorded information on 115 sherds from Stone Axe Pueblo and 142 sherds from Wallace Tank Pueblo, for a total of 257 sherds. Sherds exhibiting surface characteristics typical of the Puerco assemblage are shown in Figure 8.9.

Based on the description of locally produced corrugated pottery as resembling corrugated pottery manufactured in the HSC, but with larger and more obliterated indentations than are characteristic of HSC utilitarian pottery (Gilpin et al. 2003:17), I expected pottery produced in this area to more closely resemble the oblique cluster identified within the HSC assemblage than the parallel cluster. Generally speaking, this expectation was correct. Within the assemblage from the Puerco cluster, 40 percent of locally produced sherds (104 sherds) conformed closely to the oblique cluster identified in the HSC assemblage. In contrast, 37 percent of the assemblage appeared to be more consistent with the parallel cluster (95 sherds). A number of corrugation traditions not well represented in the HSC assemblage were present in the Puerco cluster assemblage. Nine percent of the Puerco assemblage (25 sherds) had clapboard corrugation. Interestingly, a few sherds exhibited clapboard neck banding in conjunction with an oblique corrugated body. This stylistic combination did not occur within the HSC assemblage: typically, the neck of oblique corrugated vessels in the HSC area was either completely smoothed or

Figure 8.9: Corrugated sherds from Stone Axe Pueblo that show the range of corrugation styles present in the Puerco area.

corrugated in the same style as the body of the vessel. Eleven percent of the Puerco cluster assemblage (29 sherds) were heavily obliterated, to the point that corrugation style was indeterminate. Although heavy obliteration did occur within the HSC assemblage, these sherds represented less than one percent of the HSC assemblage.

This assessment of ceramic technology from the Puerco cluster suggests both similarities and differences between the corrugated assemblage from Puerco and the HSC. There is a clear congruence between the parallel and oblique clusters identified in the HSC assemblage and the technological traditions in the Puerco cluster. Oblique corrugation is more common within the assemblage from the Puerco cluster than the HSC assemblage, suggesting that the Petrified Forest is one possible source for the groups producing oblique style corrugated pottery in the HSC. Supporting this possibility is the evidence for the movement of utilitarian pottery from the Puerco cluster to the HSC, discussed in Chapter 6. Typically, utilitarian ceramics are only exchanged between individuals and groups with close social or kin ties (Bohannon 1955; David and Hennig 1973; Duff 2002; Graves 1991; Peeples 2011:355; cf. Abbott 2000; Abbott et al. 2007; Arazi-Coambs 2016; Stoltman 1999; Van Keuren et al. 1997). Thus, the circulation of utilitarian vessels between areas could reflect close informal relationships, such as those resulting from intermarriage or migration (Duff 2002; Zedeño 1994:17, 1998). From this perspective, the presence of utilitarian pottery produced in the Puerco cluster and imported to the HSC may reflect intermarriage or population movement between the two settlement clusters. It is also suggestive that Chevelon, which has the highest proportion of oblique style corrugated pottery of the sites sampled in the HSC, is located closer to the Puerco cluster than the other HSC sites included in this analysis.

Upper Little Colorado River

The social history of the Upper Little Colorado River (ULCR) region does not conform to traditional conceptions of a regionally coherent settlement cluster. Rather, this area was occupied by distinct populations with different historical origins (Duff 2002:61,159). For 200 years prior to the Pueblo IV period the ULCR was occupied by two distinct social groups, each with different backgrounds. During the 1100s and 1200s, residents from each of these backgrounds signaled their identities through adherence to different domestic and ritual architectural conventions as well as preferences for visibly distinct ceramics. These different expressions of identity appear to be derived from the cultural systems centered on Chaco Canyon and the Mimbres area (Duff 2002:159–160). Sites that were more oriented towards the north tended to have circular great kivas, contain gray utilitarian pottery, and occur in clusters. In contrast, sites associated with southern traditions tended to possess square great kivas, brown utilitarian pottery, and occur in isolation (Duff 2002:75–76). During this time, settlement was widely dispersed (Danson 1957:57–65; Duff 2002:66–71, 2004:75).

Beginning in the Pueblo IV period, earlier architectural differences were obscured, although differences in ceramic traditions signaled the continued maintenance of distinct social identities (Duff 2002:71, 159–160; Reed 1948, 1950). As well, occupation in the region shifted from dispersed settlements to aggregated pueblos (Duff 2002:71–72). The Pueblo IV occupation of the ULCR included nine settlements: Table Rock Pueblo (AZ Q:7:5[ASM]) occupied from 1325-1400, Spier 175 (AZ Q:7:7[ASM]) occupied from 1275-1400, Spier 176 occupied from 1325-1400, Rattlesnake Point Pueblo (AZ Q:11:118[ASM]) occupied from 1325-1400, Baca Pueblo (AZ Q:11:74[ASM]) occupied from 1275-1350, Sherwood Ranch Pueblo or Raven Pueblo (ASZQ:11:48[ASM]) occupied from 1275-1400, Danson (Spier 180/Danson 146) occupied from 1275-1400, Hooper Ranch Pueblo (AZ Q:15:6[ASM]) occupied from 1275-1350, and Casa Malpais (AZ Q:15:3[ASM]) occupied from 1275-1325 (Adams and Duff [editors] 2004:177; Duff 2002, 2004). Of these nine sites, extensive excavations have been carried out at Hooper Ranch Pueblo (Martin et al. 1961), Table Rock Pueblo (Martin and Rinaldo 1960), and Rattlesnake Point Pueblo (Duff 1999, 2002). In contrast to the earlier, more dispersed settlement pattern in this area, these Pueblo IV communities were all located immediately adjacent to the Little Colorado River, likely to utilize the floodplain areas for agriculture (Duff 2002:63, 2004:75–76).

The decorated ceramics recovered during the Pueblo IV period vary dramatically at contemporaneous sites, which Andrew Duff (2004:77) attributes to social distinctions between the sites. For example, Table Rock Pueblo, the northernmost site in the ULCR, contained a great deal of Jeddito Yellow Ware, primarily imported from Antelope Mesa and First Mesa (Duff

2002:107, 146–147), while other sites in the region contained almost no pottery imported from the Hopi Mesas. Hooper Ranch, to the south, contained large quantities of White Mountain Red Ware and Cibola White Ware. The ceramic assemblage of centrally located Rattlesnake Point Pueblo was dominated by Zuni Glaze Ware (Duff 2002:77–79). This eastern emphasis is also evident through turquoise: turquoise sourcing at Rattlesnake Point Pueblo indicates that this site had social connections primarily with groups to the east (Hedquist 2017:201–202). This suggests that the residents of Table Rock Pueblo maintained close connections to the Hopi Mesas, while Hooper Ranch residents were more strongly connected to the Silver Creek area, and residents of Rattlesnake Point were more integrated into the Zuni cultural sphere (Duff 2002:77–79).

However, these regional affiliations were not absolute: obsidian sourcing from Rattlesnake Point Pueblo suggests a procurement strategy focused southward (Hedquist 2017:201–202). Also, in contrast to the diversity evident in the imported decorated ceramic assemblage, the distribution of locally produced utilitarian and decorated ceramic vessels suggests a certain degree of integration within this settlement cluster. Plain and decorated ceramics were produced at all sites in the ULCR area. Occupants of the region manufactured local versions of Cibola White Ware, White Mountain Red Ware, and Zuni Glaze Ware. The residents of Table Rock Pueblo produced Roosevelt Red Ware (Duff 2002:159–161). These locally produced ceramics were frequently exchanged between villages, suggesting an increasingly regional group identity (Duff 2002:159–161, 2004:79–80). Of these sites, Table Rock Pueblo appears to be the most socially isolated. Ceramic compositional analysis suggests that Table Rock was established by immigrants from the Hopi Mesas (Duff 2002:107). Fewer plain wares circulated to or from Table Rock than the other sites in the ULCR (Duff 2002:135). The lack of utilitarian pottery circulation indicates a social demarcation between the residents of

Table Rock Pueblo and the rest of the settlement cluster, suggesting that Table Rock Pueblo was less integrated into the settlement cluster than other communities in the area (Duff 2002:135).

The utilitarian ceramics produced in this area during the Pueblo IV period fall into two wares: Cibola Gray Ware, associated with sites in the Zuni region, and Mogollon Brown Ware, associated with the areas in the Mogollon Rim. Cibola Gray Ware ceramics typically are either plain or feature all-over indented corrugation. The Mogollon Brown Ware pottery produced in this area is often plain, plain corrugated, or indented corrugated (Duff 2002:86–87). A number of studies have discussed the corrugation technology in this region (e.g., Duff and Nauman 2010; Nauman 2007; Peeples 2011; Wichlacz 2009). A recent analysis by Matthew Peeples (2011) identified a number of technological traditions in the corrugated assemblage of the greater Cibola region, which includes the ULCR. Peeples' (2011) analysis found that the northern and southern affiliated corrugation traditions were substantially different. Although the chronological range considered by Peeples is not entirely contemporaneous with the assemblage discussed in this research—Peeples (2011) focused on the period from 1150-1325—this work provides the most appropriate comparison in the ULCR area for the HSC ceramic assemblage.

Within the ULCR region, Peeples' (2011:Figure 6.7) analysis identified three dominant technological traditions. One of these[3] was characterized by roughly equal proportions of parallel and perpendicular indentations with relatively narrow (ca. 3-6 millimeters wide) and shallow (ca. 0.5-1 millimeters deep) indentations, small coils (ca. 4-5 millimeters wide), and a low degree of obliteration (Peeples 2011:566–571). The second technological tradition[4] typically features parallel corrugation indentations which are relatively narrow (ca. 4-7 millimeters wide), deep

[3] Technological cluster 4 in Matthew Peeples' (2011) analysis
[4] Technological cluster 2 in Matthew Peeples' (2011) analysis

(ca. 0.75-1.25 millimeters deep) and relatively small coils (4.25-5.25 millimeters wide). This tradition is typically not obliterated; when present obliteration is minimal. The third tradition[5] is comprised almost entirely of plain corrugations, with a small minority of parallel corrugations. When corrugation indentations are present, they are typically aligned either diagonally or vertically. Approximately a third of the sherds in this cluster exhibited zoned corrugations. Indentations within this cluster are wider (ca. 6-8 millimeters wide) and deeper (ca. 1.25-2 millimeters deep), with slightly smaller coils (ca. 3.5-4.5 millimeters wide). Coils in this cluster rarely exhibit any degree of obliteration (Peeples 2011:566–571). All of these clusters differ substantially both qualitatively and quantitatively from the two clusters identified within the HSC ceramic assemblage (see Table 7.3), suggesting that none of these technological traditions is present in the Pueblo IV occupation of the Homol'ovi area.

The Arizona State Museum curates a collection of artifacts removed from Casa Malpais Pueblo following an episode of pot hunting at the site in the early 1990s. Although the exact depositional contexts of these artifacts were destroyed, sherds were removed from looter's holes in Rooms 10, 12, 17, 19, 20, and a midden. I sorted sherds from this collection by ware and by corrugation indentation style, and recorded the number of ceramic sherds of each corrugation indentation style that were present in the locally produced assemblage along. In total, I inspected 150 corrugated sherds from the Casa Malpais assemblage. Sherds from this assemblage are shown in Figure 8.10. The patterning of corrugation styles that I observed in this assemblage is consistent with the patterning suggested by Peeples' (2011) analysis.

The vast majority (70.7%) of corrugated sherds in this assemblage exhibited a parallel corrugation shape. A lesser amount (22%) had plain corrugations. A number of these plain

[5] Technological cluster 5 in Matthew Peeples' (2011) analysis

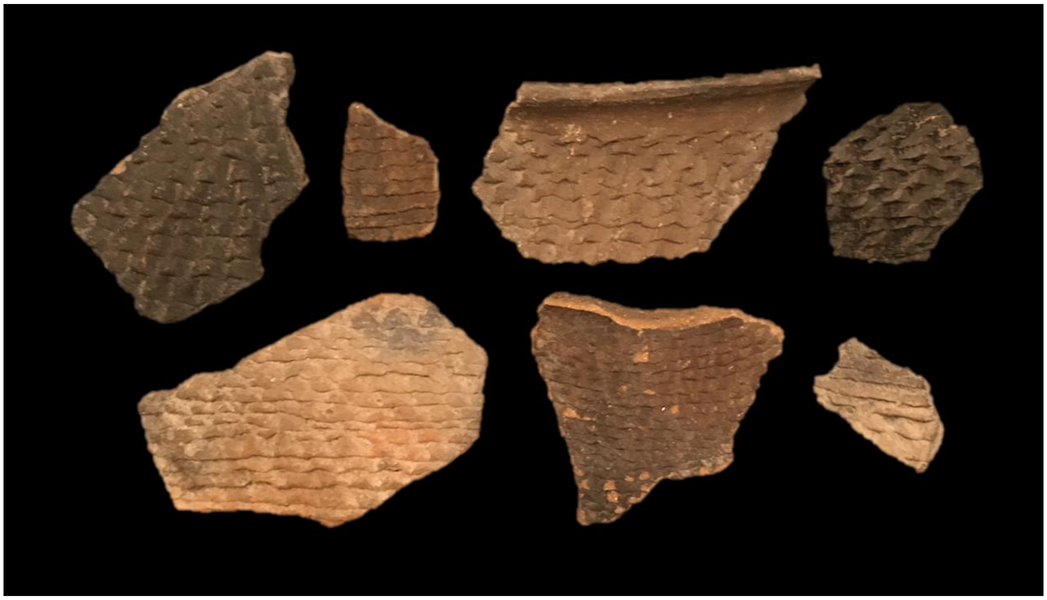

Figure 8.10: Corrugated sherds from Casa Malpais which show the range of corrugation styles present at the site.

corrugated sherds appear to have been polished over the corrugations. Very few sherds (5.3%) had oblique shaped corrugations. These corrugations were far narrower than the oblique shaped corrugations within the HSC assemblage and did not co-occur with surface obliteration. Three sherds (2%) had zoned corrugation. All of the corrugated sherds present in this assemblage differed substantially from the stylistic clusters present in the HSC assemblage. Most notable was the complete lack of obliteration—despite the contemporaneity between Casa Malpais (1275-1325) and sites such as Wallace Tank (1275-1400), H4 (1260-1280), and H3 (1280/1290-1300/1310), all of which contained obliterated corrugated sherds—as well as the relatively small corrugation indentation and coil widths compared to the corrugated assemblage of the HSC. Therefore, this assessment of corrugation technology in the ULCR suggests that neither of the corrugation stylistic traditions evident in the HSC ceramic assemblage emerged from the ULCR region.

Silver Creek

The Silver Creek area is located in east-central Arizona, north of the Mogollon Rim between the towns of Show Low and Heber. Silver Creek itself flows north from its headwaters near the Mogollon Rim, joining the Little Colorado River just south of Woodruff, Arizona. Occupation of the Silver Creek area began in the Archaic period; however, population density remained low until the late 1100s and early 1200s when population began to increase rapidly (Herr 2001; Neuzil 2005a:103; Newcomb 1999). In this region, aggregation began in the Pueblo III period. Prior to 1200, sites in this area were typically 12-20 rooms. After 1200, site size increased to around 50-100 rooms. Aggregation continued to increase during the Pueblo IV period. Beginning around 1275, smaller groups from diverse social backgrounds came together to create the largest settlements occupied in the Silver Creek area (Kaldahl et al. 2004:93).

By the late 1200s, occupation of the Silver Creek area was concentrated in six villages that range from 50 to 500 rooms: Bailey (AZ P:11:1[ASM]) occupied from 1275-1330, Fourmile (AZ P:12:4[ASM]) occupied from 1275-1390, Pinedale (AZ P:12:2[ASM]) occupied from 1250-1380, Showlow (AZ P:12:2[ASM]) occupied from 1325-1390, Shumway (AZ P:12:311[ASM]) occupied from 1275-1390, and Tundastusa (AZ P:16:3[ASM]) occupied from 1275-1390 (Adams and Duff [editors] 2004:177–178; Kaldahl et al. 2004; Van Keuren 2006b; Van Keuren and Roos 2013). Many of these pueblos have been the subject of at least limited excavation (Haury 1931; Hough 1903; Mills, Van Keuren, et al. 1999). This initial aggregation likely represents the consolidation of local populations that were later joined by immigrants to the region (Duff 2002:39; Kaldahl et al. 2004; Mills 1999b, 1999c). Some people may have migrated to this area from Chacoan influenced areas to the northeast (Herr 1999); others likely came from Kayenta and Tusayan regions (Duff 2002:39; Neuzil 2005a:104). Later, between 1325 and 1390, factions and internal disputes arose leading to greater internal differentiation within occupied villages, evidenced by diverse ritual architecture and ceramic styles. This move towards factionalism led to the dissolution of at least one large settlement, Bailey, by 1330 (Kaldahl et al. 2004:85, 93). Population increased at other large settlements, Fourmile, Showlow, and Shumway (Duff 2002:40–41; Mills 1998; Van Keuren 2006b).

Similar to the Pueblo IV ceramic assemblages in the ULCR area, ceramics from Silver Creek are internally distinct. The residents of different Silver Creek villages prioritized relationships with different external areas, suggesting that the social networks of the residents of the Silver Creek area were diverse and that the Silver Creek cluster was less internally integrated than other areas (Duff 2002:142–143; Mills 1998). The ceramic assemblage from Bailey contained more Roosevelt Red Ware and Cibola White Ware than other sites, while Fourmile has the highest percentages of White Mountain Red Ware and Jeddito Yellow Ware (Duff 2002:80). The relative absence of Jeddito Yellow Ware at sites such as Bailey may be due to chronology: the occupation at Bailey largely predates Jeddito Yellow Ware (see Adams 2014). Ceramic compositional analysis has suggested that exchange relationships among the Silver Creek villages and between villages in the Silver Creek area and other regions were diverse (Duff 2002). Similarly, evidence from turquoise compositional analysis suggest that the residents of Bailey participated in diverse exchange networks. Turquoise from sources including Canyon Creek, Cerrillos Hills, and Mineral Park in western Arizona as well as an unknown source likely located in the Rio Grande Rift Valley were found at Bailey (Hedquist 2017:199–200).

The vast majority of both decorated and utilitarian pottery found at sites in the Silver Creek area, including Bailey, were locally produced (Mills, Herr, et al. 1999:Table 9.13; Triadan 1997; Zedeño 1994:77). Corrugated brown ware was the most common utilitarian pottery at most sites in the Silver Creek area. Although this corrugated brown pottery was typically indented, obliterated surface treatments grew more common over time: obliterated corrugations are most frequent at Bailey, where they represent 11.6 percent of the brown ware assemblage (Mills 1999a:265, Table 7.13). Anna Neuzil (2005a:105) characterized the technological style of locally produced corrugated pottery in the Silver Creek area. Neuzil's (2005a) analysis included measures of coil width, indentation width, indentation depth, and degree of obliteration. Based on a comparison of the mean measurements collected by Neuzil and comparable variables collected by this research, there does not appear to be overlap between the corrugation style described by Neuzil and the corrugation stylistic clusters identified within the HSC ceramic assemblage. Although coil width appears comparable with the parallel cluster in the HSC assemblage, all other variables measured by Neuzil in the Silver Creek assemblage differ dramatically from comparable categories in the HSC assemblage.

Unfortunately for the purposes of comparison with the HSC assemblage, Neuzil's (2005a) analysis did not consider corrugation shape—the most important variable within the HSC for determining cluster membership—and did not attempt to define multiple corrugation styles within the Silver Creek assemblage. Therefore, to better compare these two collections, I sorted 247 sherds from Bailey—the latest site excavated by SCARP, although Bailey predates the main occupation of the HSC—by ware and by corrugation indentation style, and recorded the number of ceramic sherds of each corrugation indentation style that were present in the locally produced assemblage along with general notes on the assemblage. I included sherds from seven contexts: Rooms 1 through 6 and the Plaza. Representative sherds are shown in Figure 8.11. The majority of corrugated sherds in this assemblage (55%) exhibited a parallel corrugation shape. A smaller amount (23.5%) had perpendicular corrugations or oblique corrugations (17.4%). A very small number of sherds exhibited plain corrugations (1.6%), heavily obliterated corrugations

Figure 8.11: Corrugated sherds from Bailey, representing the range of variability present in the assemblage from this site.

(1.2%), zoned corrugations (0.8%), or clapboard corrugations (0.4%). As indicated by Neuzil's (2005a) analysis, all of these corrugation shapes were significantly narrower than comparable specimens in the HSC assemblage. Also consistent with Neuzil's (2005a) analysis, obliteration was far less abundant in the Silver Creek assemblage than in either the HSC assemblage or the corrugated assemblage from the Puerco area.

There were similarities between the corrugated assemblage from Silver Creek and the HSC corrugated assemblage. Both parallel and oblique corrugation shapes were present in the HSC assemblage and in the Silver Creek assemblage. However, the dimensions of the corrugation indentations differed dramatically between the HSC assemblage and the Silver Creek assemblage. As suggested initially by Neuzil's (2005a) analysis, all of the corrugation shapes represented in the Silver Creek assemblage were significantly narrower than comparable specimens in the HSC assemblage. This difference was especially striking in the oblique corrugations: within the HSC assemblage oblique corrugations are typically very wide while the oblique shaped corrugations in the Bailey assemblage are extremely thin.

Although corrugation shape was found to be the most important variable in determining cluster membership within the HSC, other variables including measurements of indentation dimensions, were also important predictors of cluster membership. Therefore, although oblique and parallel shaped corrugations were observed in both the HSC and the Silver Creek assemblages, based on the differences in indentation dimension there appear to be significant differences between the corrugation manufacturing traditions practiced by the potters of the HSC and of Silver Creek. Obliteration was also far less abundant in the Silver Creek assemblage than in either the HSC assemblage or the corrugated assemblage from the Puerco area. As suggested by Neuzil's (2005a) analysis, very few sherds from the Bailey assemblage were fully obliterated and most sherds featuring obliteration were semi-obliterated.

It is possible that these observed differences, especially the difference in obliteration, may be explained at least in part by chronology: Bailey does not contain any ceramics produced later than 1325, while the majority of the HSC villages were occupied later than this date. However, the HSC does contain assemblages that are chronologically comparable to Bailey. Both H4 and H3 were depopulated prior to 1325: H4 was depopulated by the 1280s and H3 was depopulated around 1300/1310. The differences between the corrugated ceramics at Bailey and the HSC corrugated assemblage are still significant when only corrugated ceramics from H4 and H3 are considered. Therefore, this assessment of corrugation technology in the Silver Creek area suggests that neither of the corrugation manufacturing traditions present in the HSC ceramic assemblage was practiced in the Silver Creek region.

Chevelon Drainage

The Chevelon drainage extends south of the Little Colorado River to the Mogollon Rim, encompassing Chevelon Creek's many tributaries and side-canyons. This area is less well understood than surrounding regions, as research has been somewhat piecemeal. The archaeology of this region was initially explored by John Wilson of the Peabody Museum, who surveyed from Anderson Mesa to McDonald Canyon, south of the modern town of Joseph City (Wilson 1969). Subsequently, a large survey and excavation project was conducted by the Chevelon Archaeological Research Project (CARP) in the early 1970s and again between 1997 and 2001. Parts of the Chevelon drainage were covered in the survey of the Cholla-Saguaro Transmission Line (Reid 1982). Most recently, the Chevelon drainage was included in a survey and excavation project carried out by the Rock Art Ranch Field School (RARFS) between 2011 and 2016 under the direction of E. Charles Adams through the University of Arizona. Together, these archaeological research projects have revealed a long settlement history in the Chevelon drainage including archaic camps, pithouse villages, great kivas, and masonry pueblos that were occupied during the thirteenth century (Lange et al. 2017; Plog 1978; Reid 1982; Solometo 2004; Wilson 1969). The Chevelon drainage in all periods of occupation is characterized by diverse architectural and ceramic traditions, suggesting that this area was used and occupied by several groups with different cultural affiliations, likely due to its location at the juncture of multiple archaeological culture areas (Lange et al. 2017; Solometo 2004:152).

Pre-ceramic occupation of the Chevelon drainage was concentrated around canyons, especially Chevelon Canyon (Briuer 1977; Huckell and Huckell 2004; Lange et al. 2017:9; Solometo 2004:206). The earliest ceramic residents of this region lived in pithouse villages that dated to the nineth and tenth centuries. Ceramic assemblages from these sites tend to be dominated by Tusayan White Ware and Tusayan Gray Ware (Lange et al. 2017; Solometo

2004:207). During this time, people became more dependent on agriculture, evidenced by a shift from population concentrations around canyons to sites primarily being situated on small dunes or ridges and clustered near areas that were suitable for dry farming (Lange et al. 2017; Plog 1978; Solometo 2004:206–207). From the late 1000s to the mid-1200s, the most common sites in this region were small masonry pueblos that were dispersed across the landscape, although pithouse communities are still occupied during the early Pueblo III period. These sites tend to contain high proportions of Cibola White Ware and Little Colorado White Ware (Lange et al. 2017; Solometo 2004:207–210). According to the CARP survey, the most common type of utilitarian pottery at all sites in the Chevelon drainage is Mogollon Brown Ware (Plog 1980:29). The data collected by the RARFS project is more complex, suggesting that Tusayan Gray Ware and, to a lesser extent, Alameda Brown Ware were also well-represented in the Chevelon drainage throughout its occupation (Lange et al. 2017:Table 8). Active occupation of the Chevelon drainage appears to have ceased by around 1275 (Lange et al. 2017:9–11). It has been suggested that residents may have relocated to the HSC or to sites on Anderson Mesa, the two closest Pueblo IV settlement clusters (Solometo 2004:211).

The RARFS conducted excavations at two small pueblos occupied during the Pueblo III period in the Chevelon drainage: RAR-2 also known as Brandy's Pueblo (AZ P:3:114[ASM]) and the Multi-Kiva Site (AZ P:3:112[ASM]). The site of RAR-2 is a small, four room masonry pueblo that was occupied during the early to mid-thirteenth century. The utilitarian assemblage from this site contains extremely high frequencies of brown corrugated pottery (Adams 2016e:7; Lange et al. 2017:22–23). The Multi-Kiva Site was occupied from the mid-1100s to the early 1200s. The site consists of a stone masonry pueblo with around 25-30 ground floor rooms as well as a number of pit structures (Lange 2015). Like RAR-2, the utilitarian ceramic assemblage from this site was dominated by brown corrugated pottery. Petrographic analysis of brown corrugated pottery from both the Multi-Kiva Site and RAR-2 found that the temper of the brown corrugated sherds sampled was consistent with local production (Ownby 2016). Additionally, a number of clay sources in the area were found to produce clay that fires to comparable shades of brown as the brown corrugated pottery recovered from these sites. These two lines of evidence suggest that the abundant corrugated brown pottery found at these sites was likely locally produced.

In order to assess similarities between the corrugated brown ceramic assemblage produced in the Chevelon drainage and the corrugated assemblage from the HSC, 107 sherds from the Multi-Kiva Site and RAR-2 were sorted by ware and corrugation style. Representative sherds from this assemblage are shown in Figure 8.12. The number of sherds produced in each corrugation style were recorded, along with general notes on the assemblage. These sherds were drawn from five different contexts: four structures and an exterior surface. This assessment found that the corrugation technology of these sites was dominated both by oblique corrugation indentations (46%) and parallel corrugation indentations (42%). A few sherds (12%) exhibited perpendicular indentations—a style not well represented within the HSC assemblage. Sherds with oblique corrugation indentations were almost entirely obliterated, only three sherds with oblique corrugation indentations exhibited no obliteration. Sherds with parallel corrugations were more diverse in surface treatment: nearly one third (28.8%) were indented while nearly two thirds (60%) were partially to fully obliterated. The remaining sherds were clapboard, zoned, or patterned. Based on a visual inspection, the parallel shaped indentations were narrower in this assemblage than comparable sherds in the HSC assemblage. The oblique shaped indentations were more comparable in size to the similar corrugation style in the HSC assemblage.

Figure 8.12: Corrugated sherds from the Multi-Kiva Site, representative of the assemblage from the Chevelon drainage.

This assessment of corrugation technology in the Chevelon drainage suggests that there are similarities between the oblique tradition observed within the HSC assemblage and the ceramic traditions practiced during the Pueblo III period in the Chevelon drainage. However, a number of traditions were practiced in the Chevelon drainage that were not represented within the HSC assemblage, suggesting that the residents of the Chevelon drainage may have been more diverse than the residents of the HSC. It is also suggestive that Chevelon, the site with the highest proportion of oblique style corrugated pottery in the HSC, is located on Chevelon Canyon within five kilometers of many of these smaller Pueblo III villages.

An interesting result of this assessment is the abundance of obliteration within the corrugated assemblage of the Chevelon drainage: 79 percent of the Chevelon drainage corrugated assemblage exhibited at least partial obliteration, while 57 percent was fully obliterated. This observation is consistent with other assessments of brown pottery from the Chevelon drainage, which noted that the majority of brown corrugated sherds at Pueblo III sites in this area were obliterated (Klie et al 1982a:Table 4.1; Klie et al 1982b:Table 8.1; Klie et al 1982c:Table 9.2; Klie et al 1982d:Table 11.2). The traditional narrative within the U.S. Southwest is that obliteration is largely chronological, with obliteration becoming more common in later contexts (e.g., Neuzil 2001, 2005a). However, the assemblage from the Multi-Kiva Site and RAR-2 exhibits a higher proportion of fully obliterated sherds (43%) than the assemblage from H2 (36%), the latest site occupied in the HSC. The preponderance of obliterated corrugated sherds at these Pueblo III sites suggests that there is likely also a cultural component to obliteration.

Anderson Mesa

Although Pueblo III Sinagua settlements were concentrated in the Flagstaff area, Anderson Mesa was the primary locus of population in this region by 1275. Anderson Mesa is a plateau which extends 65 kilometers southeast of Flagstaff towards Clear Creek (Bernardini 2005; Bernardini and Brown 2004:108). Between 1260 and 1325, this area was characterized by intense population aggregation. During this period, the occupation of Anderson Mesa was concentrated into several large villages, surrounded by smaller but more numerous settlements. By the late thirteenth century, the small sites in this area were depopulated as the population became more concentrated in a few large sites (Bernardini and Brown 2004:110; Duff 2002:38; Henderson 1979; Pilles 1996). Most likely, these large sites were occupied at least in part by immigrants to the area, as the population density of the Anderson Mesa area prior to this period of aggregation is not sufficient to explain the size of the aggregated pueblos (Bernardini 2005:70; Bernardini and Brown 2004:116; Duff 2002:38; Pilles 1996). Like many of the HSC villages, the pueblos on Anderson Mesa began with an initial period of accretional growth. These villages were depopulated in a similarly incremental fashion. Therefore, these communities were likely in a state of demographic flux for much of their occupation (Bernardini 2005:61–65).

During the Pueblo IV period, the occupation of Anderson Mesa was concentrated into two settlement clusters. The densest population concentration is located at Chavez Pass, also known as Nuvakwewtaqa, a natural break in Anderson Mesa that connects the Colorado Plateau to the north with the Verde Valley to the south (Bernardini 2005:52–53; Bernardini and Brown 2004). The settlement at Chavez Pass consists of three separate but intervisible pueblos: Chavez North (AZ O:4:1 [ASU]), Chavez Southeast (AZ O:4:1 [ASU]), and Chavez Southwest (AZ O:4:1 [ASU]) (Adams and Duff [editors] 2004:180; Bernardini 2005:52–53; Bernardini and Brown 2004). The Chavez Pass concentration was first recorded by Jesse Walter Fewkes (Fewkes 1904). More recently, from 1978-1982, archaeologists from Arizona State University focused on excavating the Pueblo IV occupation of Chavez Pass (Bernardini and Brown 2004:108). Chavez Pass Southwest was the largest village in the area, at 398 rooms. Chavez Pass North and Southeast were far smaller at 95 and 196 rooms respectively (Adams and Duff [editors] 2004:180; Bernardini and Brown 2004:111). Chavez North was occupied primarily between 1225 and 1320, Chavez Southwest and Southeast were occupied mainly between 1275 and 1330 (Bernardini 2005:55–57), although given the presence of Jeddito Yellow Ware the occupation of these sites likely extended to at least 1350.

The second population concentration, the Upper Grapevine cluster, is located 13 kilometers northwest of Chavez Pass at the confluence of the Kinnikinnick and Grapevine canyons, which also forms a natural break in the northeastern escarpment of Anderson Mesa (Bernardini 2005:52–53; Bernardini and Brown 2004:108). The Upper Grapevine concentration consists of three separate pueblos that are not intervisible: Grapevine Pueblo (AZ O:4:16

[ASU]), Kinnikinnick Pueblo (AZ O:3:15 [ASU]), and the Pollock Ranch Site (AZ O:4:237 [ASU]) (Adams and Duff [editors] 2004:180; Bernardini 2005:52–53; Bernardini and Brown 2004:112). The Pollock Ranch Site contained 56 rooms and was occupied from 1275/1286-1325, Kinnikinnick Pueblo was primarily occupied between 1250 and 1385 and contained 166 rooms, and Grapevine Pueblo contained 64 rooms and was occupied from around 1300 to 1400 with the maximum population between 1350 and 1375 (Adams and Duff [editors] 2004:180; Bernardini 2005:57–61).

Evidence of long distance exchange of ceramics, obsidian, and shell is abundant at the Pueblo IV communities of Anderson Mesa, especially the exchange of orange wares and yellow wares from the HSC and the Hopi Mesas in exchange for obsidian (Adams 2002:211–212; Bernardini and Brown 2004:115–116). For example, at the Chavez Pass sites, WOW and Jeddito Yellow Ware combined represent 85 percent of the Pueblo IV ceramic assemblage (Bernardini and Brown 2004:116). Although obsidian was not available locally at any of the Anderson Mesa villages, Kinnikinnick and Grapevine Pueblos contain large amounts of obsidian (Brown 1982, 1990), suggesting that occupants of these sites were directly acquiring obsidian from nearby sources and supplying obsidian to other sites in the region (Adams 2002:211–212; Bernardini and Brown 2004:116).

Ceramics were also traded to the HSC from Anderson Mesa: Alameda Brown Ware represents 14 percent of the ceramic assemblage from H4 (Adams 2002:211; Bubemyre 2004:Table 8.1). Although the frequency of Alameda Brown Ware decreases in the later phases of occupation in the HSC, Alameda Brown Ware is present in ceramic assemblages from other HSC villages (Adams 2002:Table 4.1). Recent research by Saul Hedquist (2017:190–197) suggests that turquoise from a source in the Cerrillos Hills may have been traded into the Chavez

Pass community through the HSC. Residents of the HSC apparently had greater access to turquoise from this source than other areas. Equally, however, large amounts of turquoise from a source in Canyon Creek to the south suggests social and economic relationships between the residents of the Chavez Pass area and groups in the Mogollon Rim area.

The villages on Anderson Mesa are classified as part of the Sinagua culture primarily based on the abundance of Alameda Brown Ware produced at these sites (Bernardini and Brown 2004:108). Alameda Brown Ware is characterized by a brownish to orange paste and the use of a wide variety of tempering materials, typically volcanic in origin. This temper diversity indicates a high degree of local manufacture (Goetze and Mills 1993:78–80). Alameda Brown Ware vessels are finished using paddle and anvil techniques. Decoration and surface treatments other than polishing and smudging are rare (Colton 1958; Downum 1988; Goetze and Mills 1993:78–80; Whittaker et al. 1998). There is no evidence that pottery manufactured locally within the HSC was produced using the paddle and anvil technique: vessels finished using a paddle and anvil exhibit characteristic dents or facets completely lacking within the locally produced HSC assemblage. Corrugated pottery of any kind is rare in the Alameda Brown Ware tradition. Therefore, the Pueblo IV villages of Anderson Mesa do not appear to be a likely source area for immigrants to the HSC based on the lines of evidence explored in this research, although certainly a number of lines of evidence suggest a social and economic relationship between these two areas.

Summary

Given the archaeological evidence for migration and aggregation throughout the Western Pueblo regions discussed here (e.g., Adams 1996b; Adams et al. 2004; Bernardini 2005; Bernardini and Brown 2004; Duff 2002, 2004; Kaldahl et al. 2004; Mills 1998; Theuer 2011), it is unsurprising that the corrugated ceramic manufacturing traditions from these areas contain evidence of social diversity. The archaeological record suggests that all of these areas were home to diverse settlements during the Pueblo IV period, as groups of people circulated the landscape before coalescing into the aggregated settlement clusters at Hopi, Zuni, and the other historic and modern Puebloan communities. In this social context, the technological style of corrugated pottery provides an indication of the social relationships through which these population circulations were structured. The ceramic data explored in this chapter have suggested close relationships between the residents of the HSC and communities in the Hopi Mesas, Hopi Buttes, Puerco area, and Chevelon drainage. In contrast, the corrugated ceramic assemblages described here suggest that there are significant differences between the ceramic assemblage of the HSC and those of the ULCR, Silver Creek area, and Anderson Mesa.

The movement of people and/or the existence of close social relationships between both the Hopi Mesas and the Puerco area is indicated by the transportation of locally produced utilitarian pottery. Within the Western Pueblo area, utilitarian vessels tended to circulate between proximate villages in small quantities. Exchange of utilitarian ceramics likely reflects inter-community integration, the byproduct of continuing informal interactions between former neighbors or members of the same extended family (Duff 2002; Peeples 2011:355). The circulation of utilitarian pottery across large distances, evident within the ceramic assemblage of the HSC, indicates close social relationships suggestive of intermarriage or direct population movement between regions (Duff 2002:26; Triadan 1997; Zedeño 1994:17). Utilitarian vessels exchanged over long distances were likely brought to a new location along with people relocating to that area. Such vessels are gradually replaced by locally produced vessels manufactured in the same style as imported vessels using local raw materials (Duff 2002:26;

Triadan 1997). Thus, technological similarities between utilitarian pottery produced locally in the HSC and utilitarian pottery imported into the area from the Hopi Mesas and the Puerco region likely indicates close social relationships between the residents of these production areas.

The evidence of population movement from the Hopi Buttes to the HSC is less clear cut, given the difficulty in distinguishing between the ceramic traditions of the Hopi Buttes and the Hopi Mesas when executed using materials local to the HSC, and the dearth of archaeological research on the Pueblo IV occupation of the Hopi Buttes area. Certainly the possibility exists of population movement from the Hopi Buttes to the HSC, especially given the depopulation of the western Hopi Buttes region around the time H4 was established. Similarly, the movement of groups from the Chevelon drainage to the HSC is suggested, although not proven, by this analysis. The Chevelon drainage is the most proximate area in which people produced pottery that seems comparable to the oblique corrugated style produced in the HSC. Chevelon, the site in the HSC with the most abundant proportion of oblique style corrugated pottery, is located on the edge of the Chevelon drainage region. The Chevelon drainage was largely depopulated during the transition from the Pueblo III to the Pueblo IV period. Given the proximity between the Chevelon drainage and Homol'ovi, the HSC villages would be one logical destination for groups leaving this area. However, given the diversity evident in the corrugated assemblage of the Chevelon drainage, clearly not all residents of the Chevelon drainage relocated to Homol'ovi.

Regardless of the exact migration pathways that people took, it is evident that the residents of all of these regions were diverse, drawn together from a number of different social and cultural traditions. It is also evident through this assessment of corrugation technology within the Western Pueblos, that the technological traditions identified within the HSC assemblage are only two of many corrugation traditions practiced by the ancient residents of the

Southwest (see also Peeples 2011). Some of these traditions are more abundant in certain regions, others appear more frequently in other areas. However, there is a great deal of overlap between the corrugation traditions of different regions. This suggests that analysis of corrugation technology is not a good method for studying immigrant origins. If the same corrugations style was manufactured in different regions, it is difficult to establish in which region it first emerged. However, analysis of corrugation technology is a powerful tool for studying social diversity within regions, especially regions in which other forms of material culture are more uniform, and areas without locally produced decorated pottery traditions. Corrugation technology provides an alternative perspective on the relationships that structure interactions between different social groups and the residents of different regions.

CHAPTER 9: UNDERSTANDING SOCIAL IDENTITY WITHIN THE HOMOL'OVI SETTLEMENT CLUSTER THROUGH CORRUGATED POTTERY

The stylistic analysis described in previous chapters identified two technological traditions within the corrugated ceramic assemblage produced locally within the Homol'ovi Settlement Cluster (HSC). These two traditions represent local iterations of broader constellations of practice that cross-cut the utilitarian ceramic wares of the U.S. Southwest. This chapter will discuss the chronological and spatial distribution of these technological traditions, and by extension, the people who practiced them, within the sites of the HSC. Table 9.1 and Figure 9.1 show the distribution of the two stylistic clusters identified within Homolovi Orange Ware and Homolovi Gray Ware (together referred to as Homol'ovi Utility Ware or HUW) across the five sites included in this analysis: Homol'ovi I (H1), Homol'ovi II (H2), Homol'ovi III (H3), Homol'ovi IV (H4) and Chevelon Pueblo (Chevelon). Notably, the parallel and oblique clusters are not represented equally at all sites in the HSC. HUW assemblages from H1, H2, H3, and H4 largely consist of sherds from the local parallel cluster, while the HUW assemblage from Chevelon is dominated by sherds from the local oblique cluster.

The spatial and chronological patterning evident in the distribution of these two stylistic clusters is best understood through the concentrations of these clusters within structures at each site. Therefore, this discussion of spatial and chronological clustering begins by exploring each site individually, beginning with H4, the earliest site of the HSC, and concluding with H2, the latest site occupied in the Homol'ovi area. An overview of the spatial and chronological patterning of these stylistic clusters within the HSC as a whole follows the site by site discussion. The majority of sherds included in this analysis were collected from trash deposits placed in rooms during the process of room closure (Adams 2016b). Like other social practices, trash disposal is structured by social relationships, group membership, identity, and cultural beliefs

		Cluster		*Total*
		Local Oblique	Local Parallel	
Homol'ovi IV	Count	6	88	*94*
	% within Site	6.4	93.6	*100.0*
	% Sampled HUW	1.1	16.4	*17.5*
Homol'ovi III	Count	16	95	*111*
	% within Site	14.4	85.6	*100.0*
	% Sampled HUW	3.0	17.7	*20.7*
Homol'ovi I	Count	28	110	*138*
	% within Site	20.3	79.7	*100.0*
	% Sampled HUW	5.2	20.5	*25.7*
Chevelon Pueblo	Count	57	37	*94*
	% within Site	60.6	39.4	*100.0*
	% Sampled HUW	10.6	6.9	*17.5*
Homol'ovi II	Count	36	64	*100*
	% within Site	36.0	64.0	*100.0*
	% Sampled HUW	6.7	11.9	*18.6*
Total	*Count*	*143*	*394*	*537*
	% Sampled HUW	*26.6*	*73.4*	*100.0*

Table 9.1: The distribution of the two local stylistic clusters identified in the sample considered in this analysis across the sites of the Homol'ovi Settlement Cluster. Sites are arranged in chronological order.

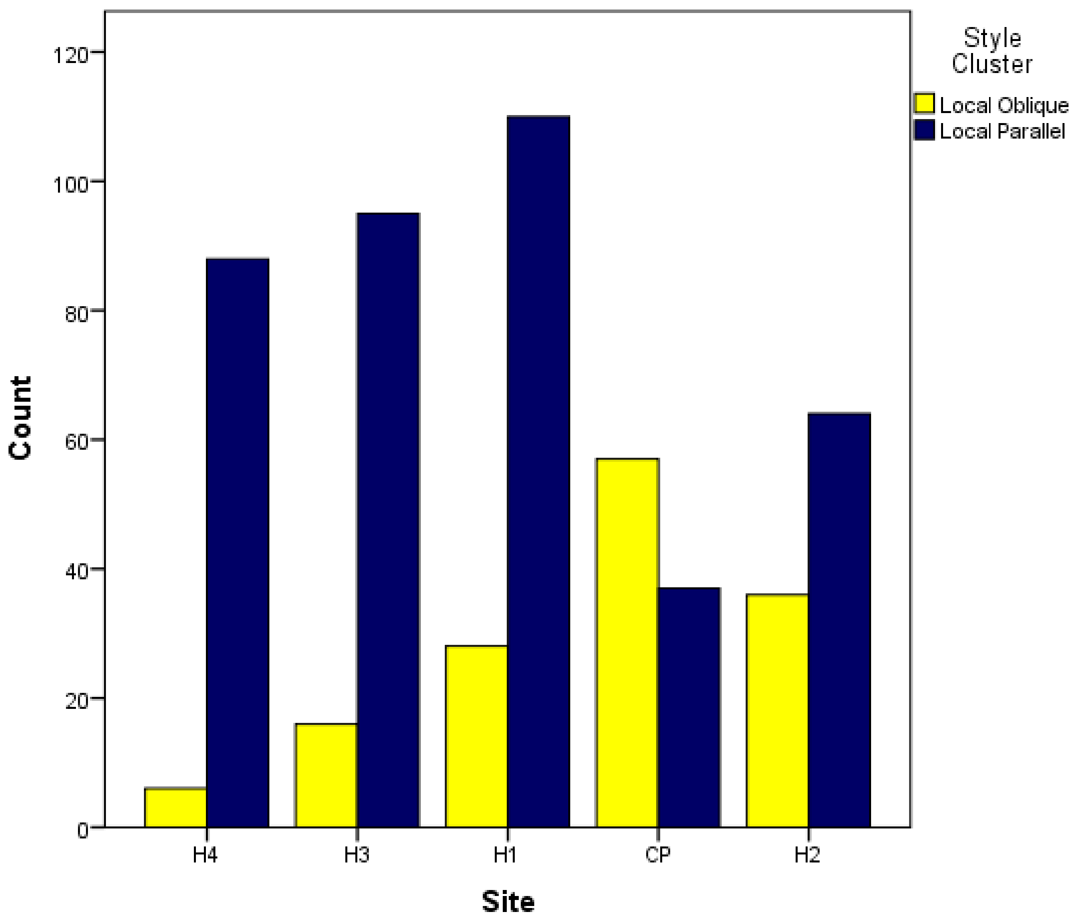

Figure 9.1: The relationship between the two local stylistic clusters and site within the Homol'ovi Settlement Cluster. Sites are arranged in chronological order. CP refers to Chevelon Pueblo.

(Hodder 1987; Joyce and Pollard 2010; Moore 1982, 1996), although the use of everyday deposition to explore and interpret social negotiations is underexplored (Garrow 2012). As such, trash deposits represent a valuable archaeological resource. Although one cannot assume that the trash deposited in a structure was placed there as a byproduct of that structure's use (see Schiffer 1987), equally it is evident that the trash deposited in any given structure was not random. Trash deposited into a room was placed by people who had the ability to do so—those who had access to certain spaces or who developed habitual practices based on regular proximity to certain spaces (Fladd et al. 2017).

Thus, the trash deposits placed in a room shed light on the group and individual identities of the people who deposited them (Beck and Hill 2004; Fladd 2012; Fladd et al. 2017; Gifford-Gonzalez 2014; Kassabaum and Nelson 2016; Martin et al. 2000; McNiven 2013; Rosenswig 2009). While the production of trash is inevitable, the location of trash disposal and what materials are placed together represent intentional decisions (Fladd et al. 2017). This research does not assume that the trash recovered from structures within the villages of the HSC was necessarily deposited by the people who used or resided in these rooms. However, this research does assume that both the trash itself and the context in which it was placed are indicative of the individual and group identities of those people who deposited the trash. In other words, the spatial distribution of trash across a site is indicative of broader relationships between individuals, groups, and constructed spaces. Exploring the distribution of local parallel and oblique corrugated sherds within the structures of a site, for example, can shed light on the ways in which the groups who produced and used these ceramic vessels interacted with each other and with the constructed space of the village, and how these relationships developed over time.

Homol'ovi IV

The assemblage of sherds from H4 sampled for this analysis is composed primarily of local parallel cluster sherds (see Table 9.1 and Figure 9.1). The distribution of these sherds across the site is shown in Figures 9.2 and 9.3. The potters who produced the local parallel cluster HUW were participants in a broader constellation of practice that also included potters living in in a number of areas. However, sherds consistent with the parallel cluster identified within the HSC assemblage are most abundant in areas to the north of the HSC, specifically on and around the Hopi Mesas and Hopi Buttes. Other lines of evidence including the decorated ceramic assemblage and architecture suggest that H4 was founded by a community that migrated from the Hopi Mesas to the HSC (Adams 2002). Given this, the relative predominance of local parallel cluster sherds at H4 is expected. Indeed, the presence of any local oblique cluster sherds at H4 is, in itself, surprising.

There are two possible explanations for this patterning. The frequency with which the oblique cluster is represented in the H4 assemblage sampled for this analysis (6.4%) is comparable to the frequency of Keams Corrugated, the oblique corrugated variety produced on the Hopi Mesas, in the assemblage from Awat'ovi (7%). Therefore, one possibility is that the entire founding population of H4 migrated from the Hopi Mesas; however, this founding population included diverse social groups that were already living in the Hopi area. Another possibility is that a more homogeneous group migrated from the Hopi Mesas to the Homol'ovi area and established H4. This group was joined by a smaller group with social ties to the south and/or east—oblique corrugated pottery occurs most abundantly in assemblages from the Chevelon drainage and the Puerco area.

Of these two possibilities, the second seems more likely. The H4 HUW assemblage sampled for this analysis contained six sherds which, according to compositional analysis

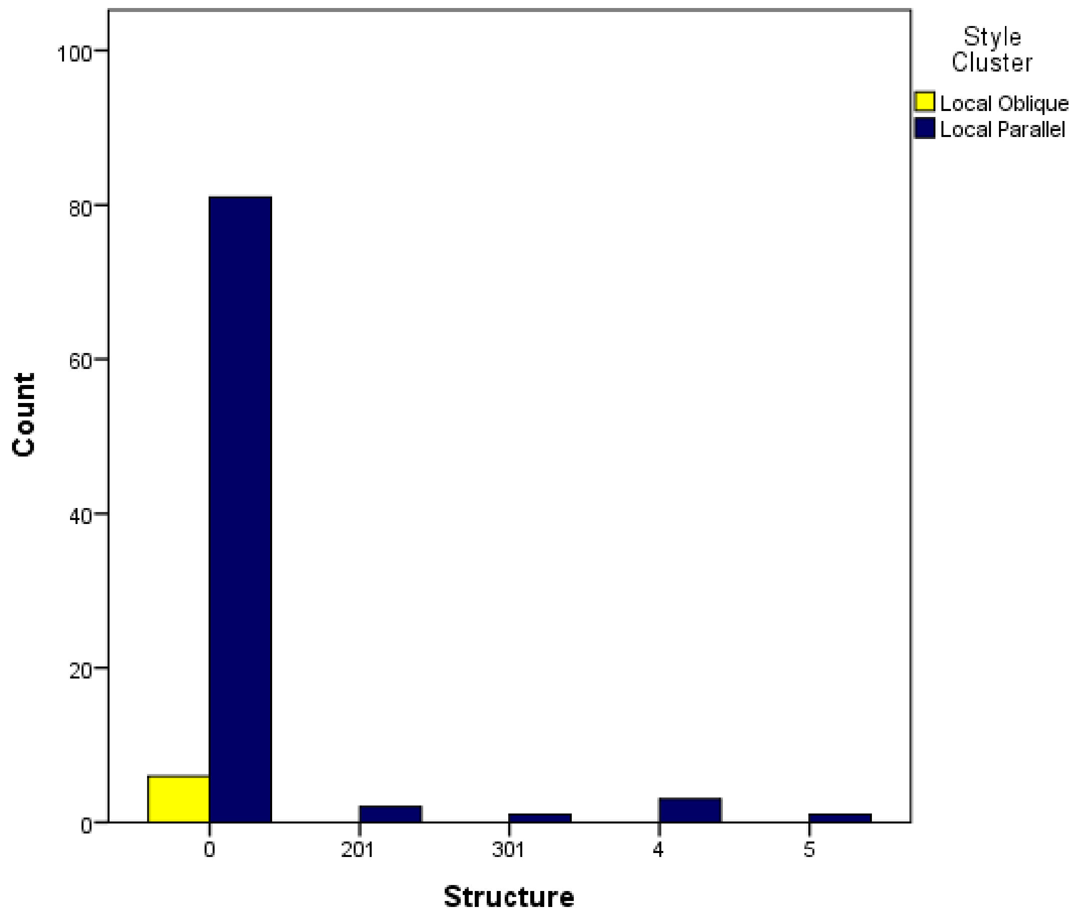

Figure 9.2: The relationship between structure and local stylistic cluster at Homol’ovi IV.

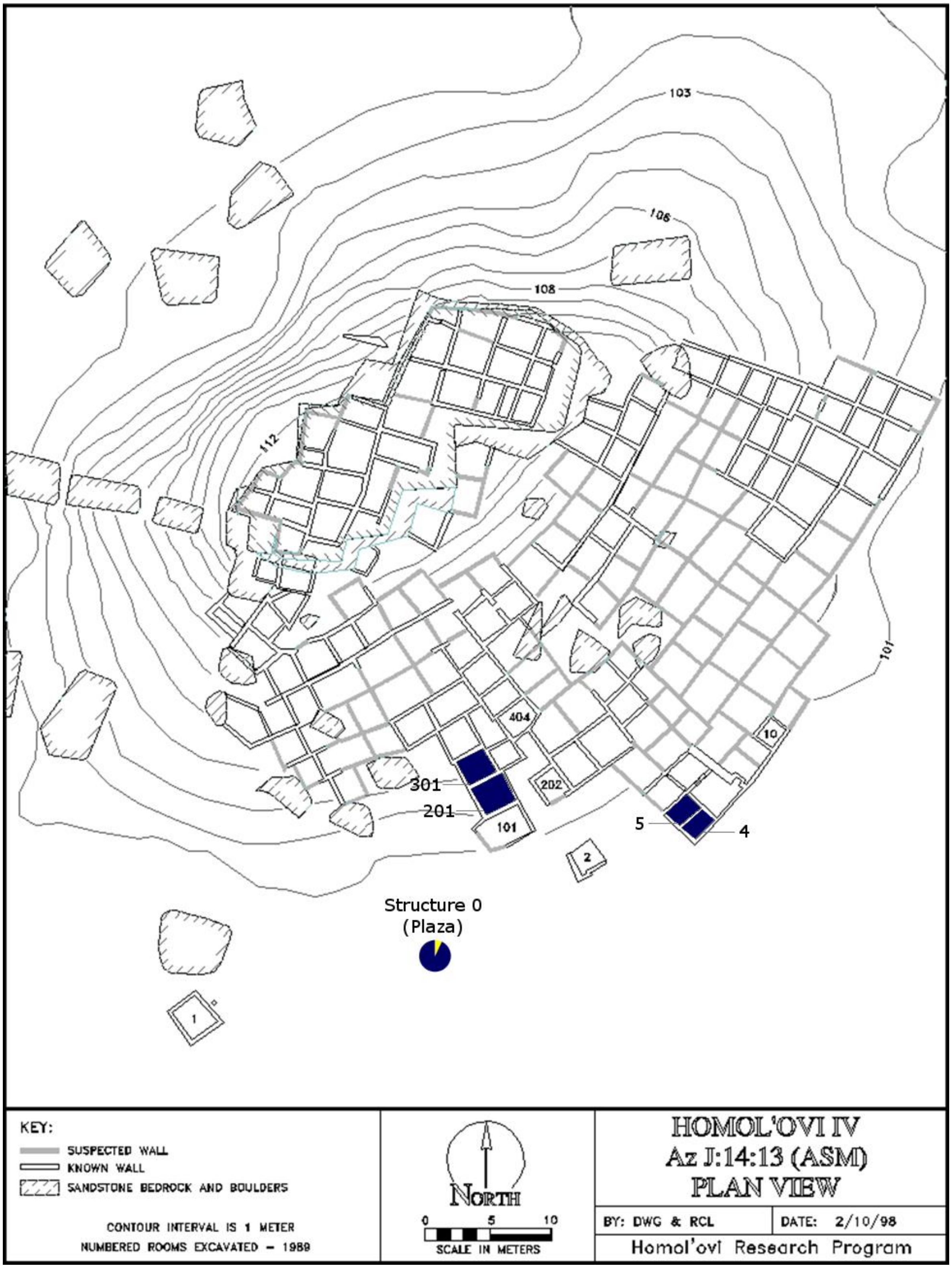

Figure 9.3: Map showing the distribution of both parallel and oblique cluster sherds at Homol'ovi IV. The presence of parallel cluster sherds is indicated by blue shading, yellow shading indicates oblique cluster sherds. The relative quantities of these two clusters within each structure is indicated by the proportion of blue and yellow shading.

provided by instrumental neutron activation analysis (INAA), were manufactured in the Puerco area. This group included sherds stylistically consistent with both the parallel and oblique corrugation styles. Long-distance exchange of utilitarian pottery likely indicates close social relationships between people in different communities (Duff 2002:26; Zedeño 1994:17). Utilitarian vessels exchanged over long distances were probably brought along with migrating groups. In such cases, these vessels are gradually replaced by locally produced vessels (Duff 2002:26; Triadan 1997), manufactured in the same style as imported vessels but using local raw materials. Based on this premise, the presence of corrugated pottery produced in the Puerco area recovered from H4 found in conjunction with locally produced pottery made in the same style suggests population movement from the Puerco area to H4.

Figures 9.2 and 9.3 show the distribution of HUW sherds from H4 sampled for this analysis organized by cluster and structure. A chi-square test of the relationship between cluster and structure revealed that there is no association between cluster and structure at H4 (P=0.972), suggesting a lack of spatial or temporal patterning in the distribution of these two clusters at H4. The lack of spatial patterning likely results from the relative lack of local oblique cluster sherds recovered from this site. Another factor is the relative homogeneity of the sample. Although great effort was made to acquire sherds from a number of different contexts, the majority of sherds selected for analysis from H4 were recovered from Structure 0—the midden underlying the Plaza area. This emphasis on Structure 0 is due to the fact that very few HUW sherds of sufficient size for this analysis were recovered from other contexts. Another likely explanation for the lack of chronological patterning is that H4 was occupied for a relatively short period of time. The site was founded around 1260 and occupied until the 1280s. With an occupation span of only 20 years, it is likely that H4 was only occupied for a single generation.

Homol'ovi III

Table 9.1 and Figure 9.1 reveal a relatively high proportion of local parallel cluster sherds within the HUW assemblage from H3 sampled for this analysis. This preponderance of local parallel cluster HUW aligns with other ceramic data from H3 that suggest a northern origin or affiliation for the residents of this site. However, INAA data from H3 indicates that both oblique and parallel cluster sherds were being produced locally within the HSC at this time. The distribution of local parallel and oblique cluster sherds across the site is shown in Figures 9.4 and 9.5. A chi-square test of the association between structure and cluster at H3 found a highly significant relationship between structure and cluster (P=0.000). While the local parallel cluster occurs in all structures sampled at this site, local oblique cluster sherds are concentrated in Structure 34: 81 percent of all local oblique cluster sherds at H3 come from Structure 34. A smaller concentration of local oblique cluster sherds was found in Structure 37.

All four H3 structures included in this analysis are pit structures that functioned primarily as kivas. Structure 34 is the earliest kiva excavated at H3, dating to the founding of the site during the Tuwiuca Phase (1260-1330) (Adams 2001a, 2001b, 2002). Structure 34 does not appear to have been used for a long period of time. After this structure ceased to function as a kiva, it was rapidly filled in and partially built over as the pueblo structure of H3 grew. Following this, a new kiva was built, likely Structure 37 (Adams 2001a). Structure 37 was also built relatively early in the occupation of H3, although later than Structure 34. When the use of this structure as a kiva ceased, it became a midden for the early occupants of the site (Adams 2001a). Thus, pottery recovered from midden deposits in Structure 34 represent the earliest assemblage recovered from H3, along with the lowest levels of Structure 37 (Adams 2001a, 2001c)—those sampled for this analysis. Structure 32 was likely built as a replacement for Structure 37. This kiva continued to be used until the site was depopulated (Adams 2001a). The

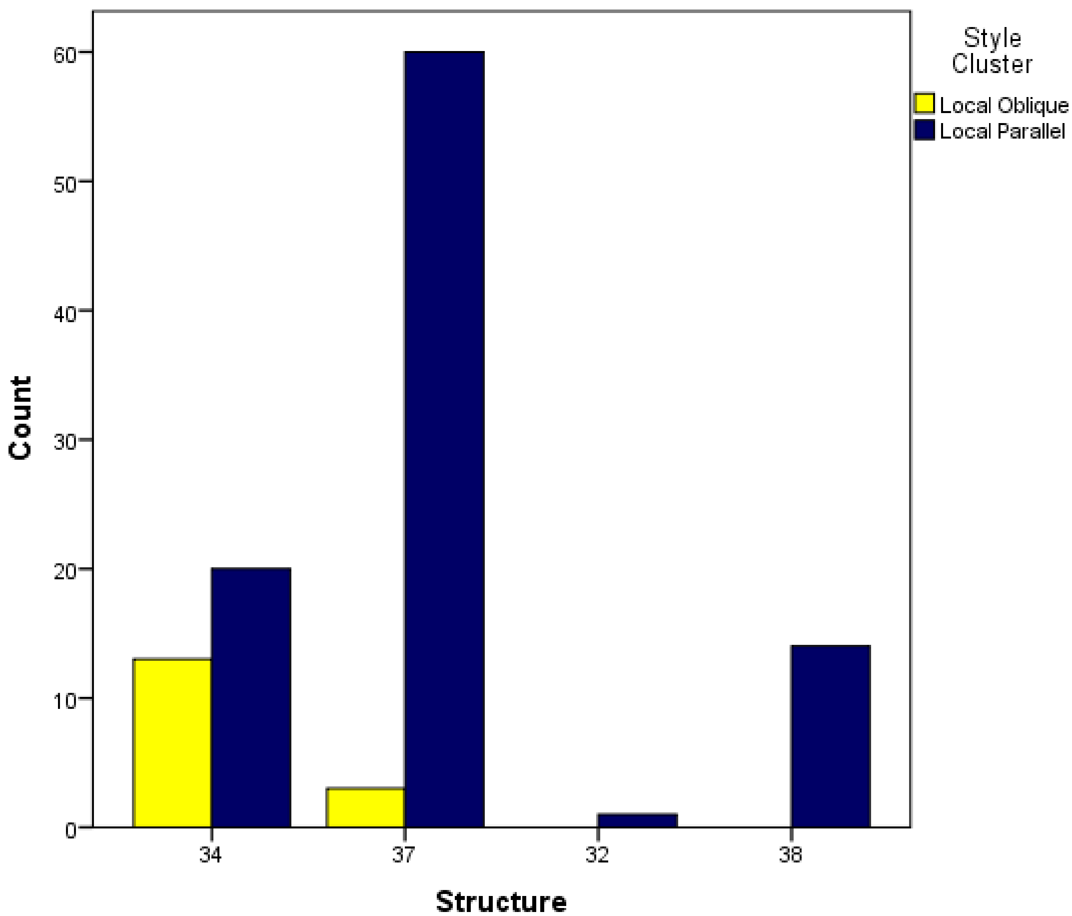

Figure 9.4: The relationship between structure and local stylistic cluster at Homol'ovi III. Structures are arranged in rough chronological order.

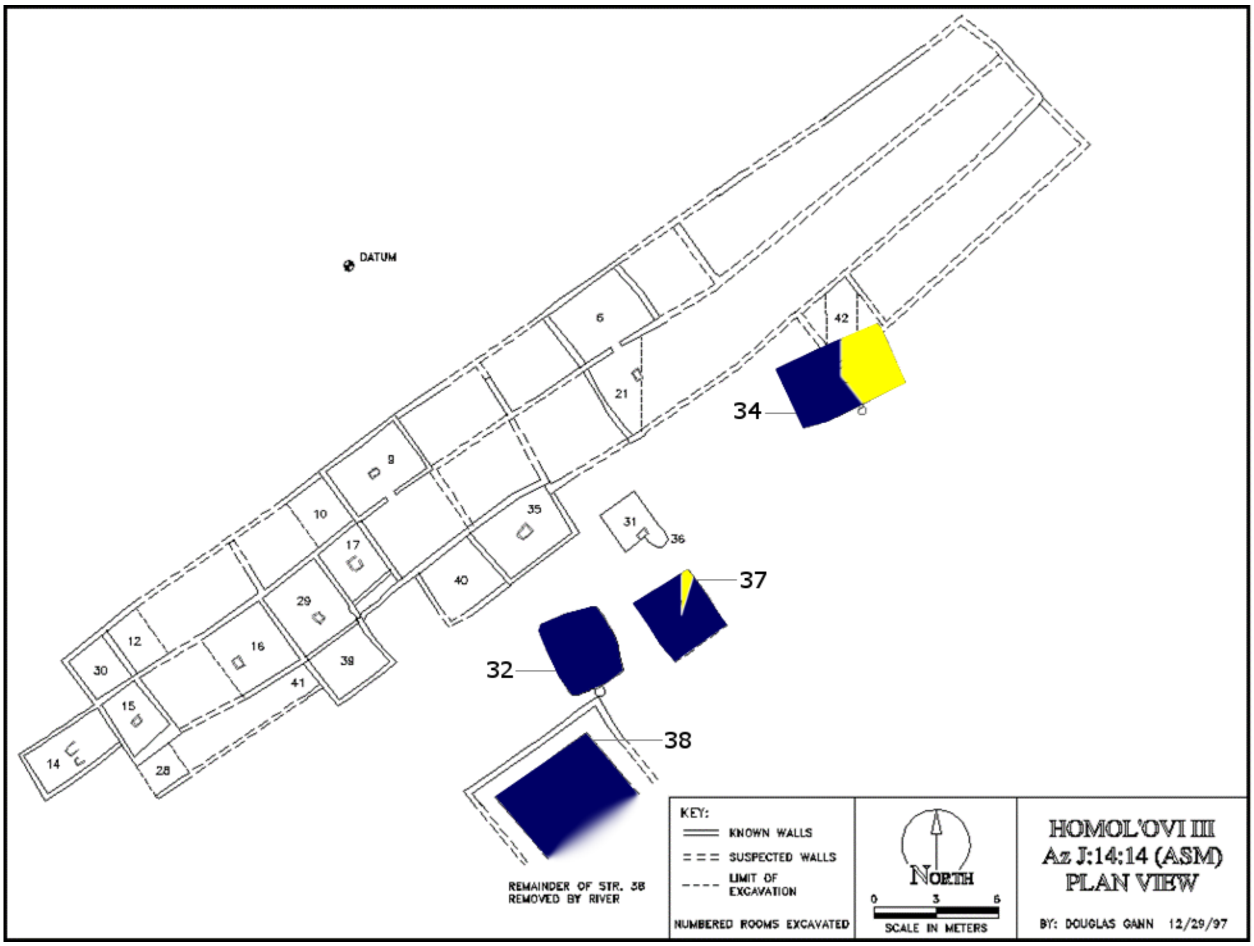

Figure 9.5: Map showing the distribution of both parallel and oblique cluster sherds at Homol’ovi III. The presence of parallel cluster sherds is indicated by blue shading, yellow shading indicates oblique cluster sherds. The relative quantities of these two clusters within each structure is indicated by the proportion of blue and yellow shading.

date of the construction and use of Structure 38 is somewhat unclear; however, it was likely constructed after the founding of the site and is comparable in date to Structure 32. Like Structure 32, Structure 38 was not used as a midden until the later, seasonal, reoccupation of H3, as use of this structure continued until the site was depopulated (Adams 2001a). Thus, midden deposits from Structures 32 and 38 date to the Early Homol'ovi Phase (1330-1365). During this period, H3 was used as a field house, likely by residents of H1 (Adams 2001a).

The distribution of local oblique and local parallel cluster sherds among these four structures reveals important details of H3's social history. Although local parallel cluster sherds were more abundant than local oblique cluster sherds throughout the initial occupation and later re-use of H3, indicating that the majority of people who lived at or used this site were affiliated with the Hopi Mesas, the ceramic assemblages from the earliest two structures at this site, Structures 34 and 37, also contain local oblique cluster HUW sherds. Structure 34 specifically contains a very high proportion of local oblique cluster sherds.

The frequency of oblique cluster sherds in these early contexts is not itself incompatible with the migration of groups from the Hopi Mesas: the assemblage from Awat'ovi contains comparable frequencies of Keams Corrugated sherds in certain chronological contexts (see Appendix E). However, INAA indicated that the H3 assemblage contained sherds that were manufactured in the Puerco region. The Puerco group defined by INAA included sherds stylistically consistent with both the parallel and oblique corrugation styles. As previously discussed, the long-distance exchange of utilitarian pottery suggests close social relationships between different communities (Duff 2002:26; Zedeño 1994:17). The presence of oblique style corrugated pottery manufactured in the Puerco region recovered from the H3 ceramic assemblage in conjunction with locally produced HUW exhibiting the same corrugation technology suggests that there was population movement from the Puerco region to H3. Therefore, the concentration of local oblique cluster sherds in Structures 34 and 37 indicates that, at the time these structures were filled with trash, H3 was occupied by a diverse group of people. The founding population of H3 appears to have included people who were culturally affiliated with the Hopi Mesas to the north as well as the Chevelon drainage to the south and/or the Puerco area to the east of the HSC.

That local oblique cluster sherds are less abundant in Structure 37 suggests that these groups represented a smaller proportion of H3's population later in the occupation of the site. Given that H3 doubled in size after its founding, this is likely due to an increase in the number of immigrants from the Hopi Mesas or the Hopi Buttes living in the village: possibly the founding population of H3 was joined by another group of people with from one of these areas. Alternately, this decrease in the amount of local oblique cluster pottery may be due to a corresponding decrease in the population affiliated with the south and/or east residing at H3. Perhaps some of the people at H3 with ties to these areas relocated to Chevelon, H1, or left the HSC altogether. Unlike these earliest contexts, the HUW assemblages from Structures 32 and 38 sampled for this analysis entirely lack local oblique cluster sherds. Although these structures were constructed during the early occupation of H3, the fill of these structures was deposited primarily during the later re-use of the site during the Early Homol'ovi Phase by the occupants of neighboring H1. This suggests that the people who used H3 as a field house beginning in the 1330s, following the depopulation of this site in the early 1300s, were far more homogenous than the original occupants of H3. As this group was likely relatively small, great diversity would be unexpected.

Homol'ovi I

The HUW assemblage from H1 sampled for this analysis is, like H3 and H4, dominated by sherds from the local parallel cluster (Table 9.1 and Figure 9.1). As at H3, the local production groups defined by INAA contained both local parallel and local oblique cluster sherds, indicating that both corrugation styles were being produced within the HSC at this time. The distribution of sherds from H1 sampled for this analysis is presented in Figures 9.6 and 9.7. Local oblique and local parallel cluster sherds are found across the site, frequently co-occurring within the same depositional context. That sherds from these two stylistic clusters were so frequently recovered from the same provenience indicates clearly that both production groups had access to all areas of the site: there is no evidence that the use of any roomblock was restricted to one or the other community. The structures from H1 sampled for this research were not all in use at the same time: structures dating to the early, middle, and late periods of occupation were included (See Table 7.2). Thus, the wide distribution of these two stylistic clusters also indicates that both stylistic clusters were produced and used at H1 throughout the occupation of the site. This in turn suggests that the two communities producing these stylistic clusters were both resident at H1 from the foundation of the site between 1280 and 1290 until it was depopulated around 1390/1400.

Similar to H3, the association between structure and cluster at H1 was statistically significant (P=0.056), albeit less strongly than it is at H3. Local parallel cluster sherds are especially abundant in Structures 558 and 651. Structure 651 was constructed during the Tuwiuca Phase and appears to have served as a storage room. Around 1330 it began to be dismantled and was filled with trash. At the end of the Early Homol'ovi Phase, around 1365, the structure was levelled to create a plaza surface (Fladd 2016). The life history of Structure 558 is somewhat similar. Structure 558 was constructed during the Tuwiuca Phase and used as a kiva

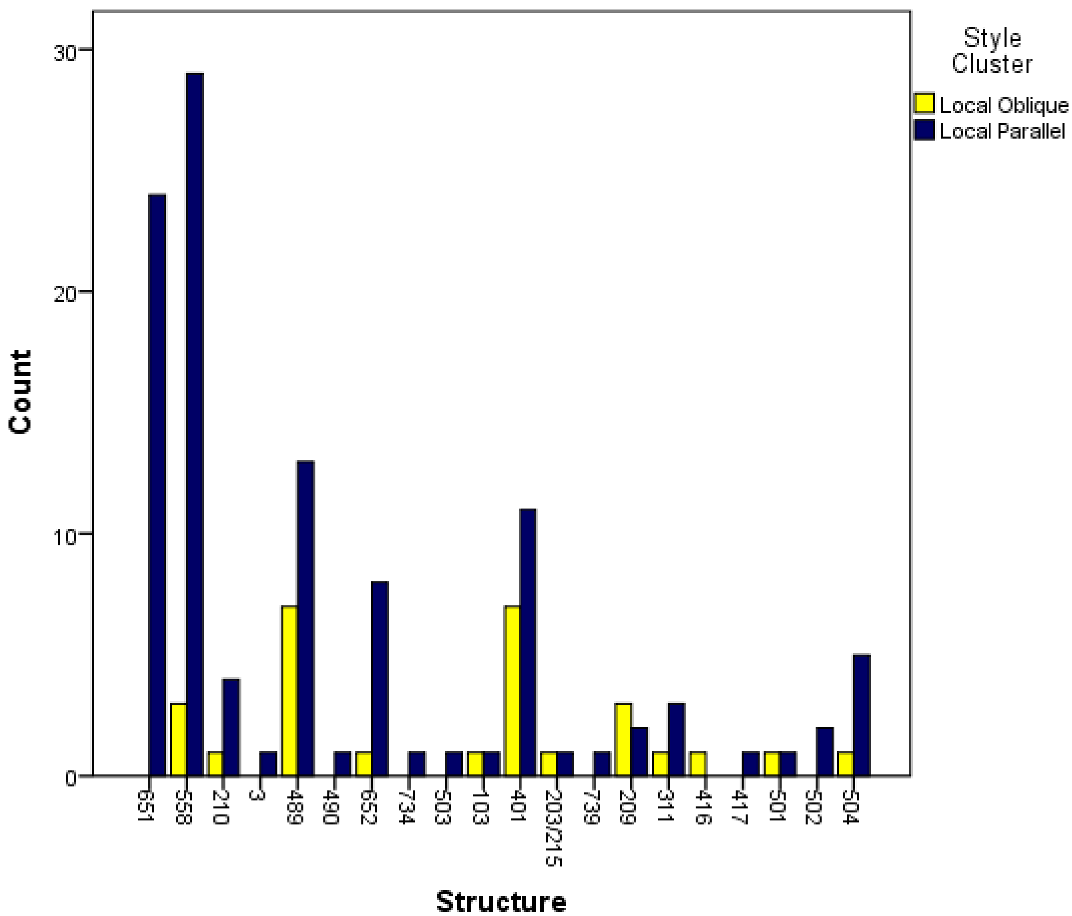

Figure 9.6: The relationship between structure and local stylistic cluster at Homol'ovi I. Structures are arranged in rough chronological order.

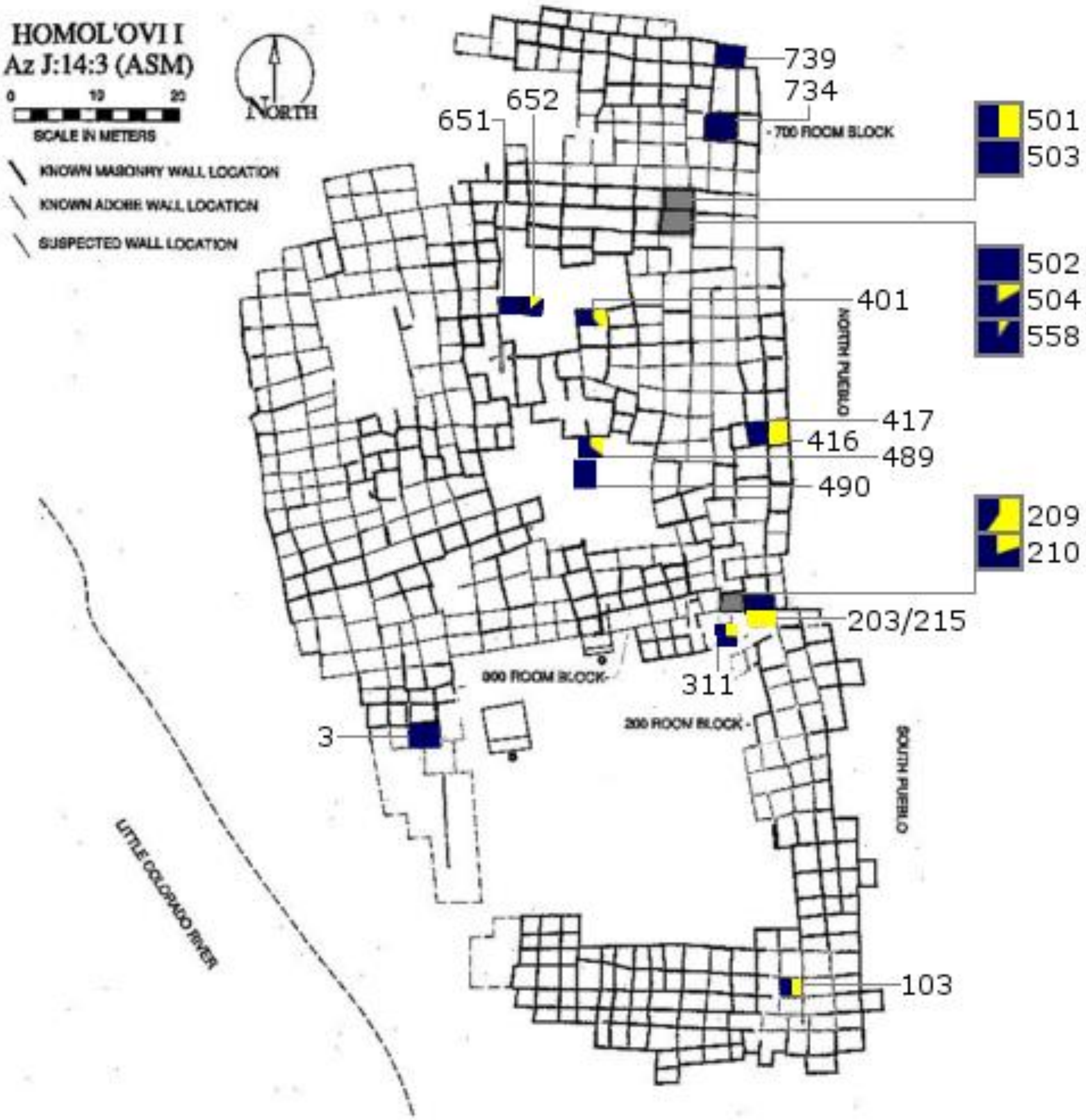

Figure 9.7: Map showing the distribution of both parallel and oblique cluster sherds at Homol'ovi I. The presence of parallel cluster sherds is indicated by blue shading, yellow shading indicates oblique cluster sherds. The relative quantities of these two clusters within each structure is indicated by the proportion of blue and yellow shading. Some areas of this site were two or three stories. The vertical relationships between sampled structures in these multi-story contexts are shown in detail on the right side of the map.

until around 1365, when it was decommissioned and filled with cultural materials. New rooms were subsequently built over this structure (Fladd 2016). In contrast, Structure 209, a piiki house, and Structure 416, a storage room, were constructed and used during the Late Homol'ovi Phase. These two rooms are notable as the only structures at H1 sampled for this analysis where local oblique cluster sherds are more abundant than local parallel cluster sherds.

The relative proportions of local oblique and local parallel cluster sherds in these structures suggest a chronological distribution of these sherds across H1. Parallel cluster sherds are most strikingly abundant in one structure built, filled with trash, then demolished during the early occupation of H1 and in a second, similar structure that was filled with trash during the middle and late phases of occupation at H1. Oblique cluster sherds only outnumber parallel cluster sherds in two contexts, dating to the latest occupation of the site. This suggests that, unlike at H3, H1 may have been founded by a relatively homogenous population comprised of many immigrants from the Hopi Mesas or Hopi Buttes and a smaller group of people migrating to H1 from the Puerco region or the Chevelon drainage. Over time, the proportion of immigrants from areas to the east or south increased, either due to a corresponding increase in population movement from eastern or southern regions to the HSC or because H1 residents affiliated with Hopi were beginning to leave the site—possibly to return to the Hopi Mesas.

However, the deposition of these two stylistic clusters in other structures complicates this straight-forward chronology. Structure 489, a possible storage room, shares the same history as Structure 651. This structure was built early in the expansion of the northern roomblock. It was demolished during the Early Homol'ovi Phase to create a plaza surface. Structure 489 contains a relatively high proportion of local oblique cluster sherds: about 35 percent of the structure assemblage sampled for this analysis consists of local oblique cluster sherds, far higher than the site average. Similarly, deposits in a large number of structures constructed, used, and filled during the Late Homol'ovi Phase, such as 311, 502, and 504, contain a higher frequency of local parallel cluster sherds than local oblique cluster sherds. Thus, while the possibility that local parallel cluster sherds may have been more abundant during the earlier occupation of H1 and the proportion of local oblique cluster sherds may have increased during the later occupation is intriguing, the evidence for this narrative remains somewhat ambiguous.

Chevelon Pueblo

The preponderance of local oblique cluster sherds in the sample from Chevelon (Table 9.1 and Figure 9.1) is unsurprising, given the other indications that this site was occupied by people with more extensive networks to the east and south than other sites in the HSC. Abundant lithic and ceramic evidence from Chevelon, including a preference for petrified wood (Medeiros 2016:192–195), relatively large amounts of Mogollon Brown Ware, as well as White Mountain Red Ware and Roosevelt Red Ware produced in the Silver Creek area[6] (Cutright-Smith and Barker 2016; Duff 2002:149–156), and corrugated pottery determined by INAA to have been produced in the Puerco area indicate that residents of Chevelon invested in ongoing relationships with groups living in the Mogollon Rim, the Silver Creek area, and the Puerco area (Adams 2016d, 2016f; Cutright-Smith and Barker 2016). Similar to H3 and H1, the locally produced pottery identified by INAA contained sherds from both the local oblique and local parallel

[6] Although Roosevelt Red Ware was produced locally within the HSC (Lyons 2001:282–284; Lyons and Hays-Gilpin 2001:156), the Chevelon ceramic assemblage (as well as other HSC ceramic assemblages) also contained Roosevelt Red Ware with light gray to white paste and tempered with crushed white sherds (Cutright-Smith and Barker 2016:134–135). These qualities are more consistent with production in the Silver Creek area than production in the Homol'ovi area. INAA data from other sites in the HSC confirmed that some Roosevelt Red Ware recovered from the HSC was produced in the Silver Creek area (Bishop and Crown 1991; Duff 2002:154–156).

clusters, indicating that this diversity is a byproduct of local production not exchange. The relationship between structure and cluster at Chevelon are shown in Figures 9.8 and 9.9. This relationship was found to be statistically significant (P=0.040). Many structures contain large concentrations of both local oblique and local parallel cluster sherds. However, certain rooms, such as Structures 248 and 264 appear to contain a disproportionately large amount of local oblique cluster sherds, while others, specifically Structures 120, 274, and 288 contain more sherds from the local parallel cluster.

Concentrations of local parallel cluster sherds were found in contexts dating throughout the occupation of Chevelon. Structures 120 and 274/279—both containing disproportionately large quantities of local parallel cluster sherds—were built in the Early Homol'ovi Phase and remained in use through the Late Homol'ovi Phase (Adams 2016a). The sherds sampled from Structure 120 were found in contexts dating to the Early Homol'ovi Phase, while sherds from Structure 274 came from contexts dating to the Middle and Late Homol'ovi Phases. Structure 288, also containing disproportionately large quantities of local parallel cluster sherds, was built around the founding of the site and remained in use until the Middle Homol'ovi Phase (Adams 2016a). The sherds sampled from this structure came from Middle Homol'ovi Phase contexts. Likewise, disproportionately large concentrations of local oblique cluster sherds were recovered from contexts dating to both the Early and Late Homol'ovi Phases. Structures 248 and 264 contain large concentrations of local oblique cluster sherds. Structure 248 was constructed during the Tuwiuca Phase and filled with trash deposits during the Early Homol'ovi Phase, while Structure 264 dates to the Late Homol'ovi Phase. Based on the broad chronological distribution of these structures, it is clear that the distribution of local parallel and oblique cluster sherds at

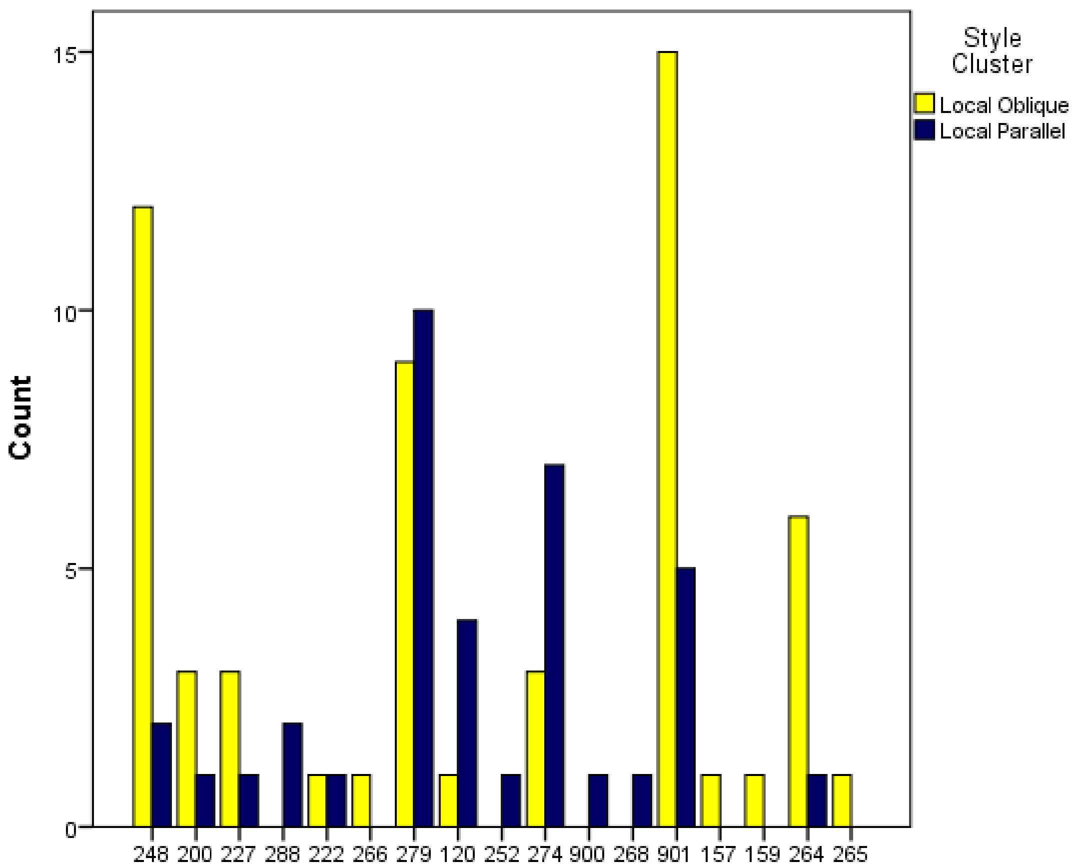

Figure 9.8: The relationship between structure and local stylistic cluster at Chevelon Pueblo. Structures are arranged in rough chronological order.

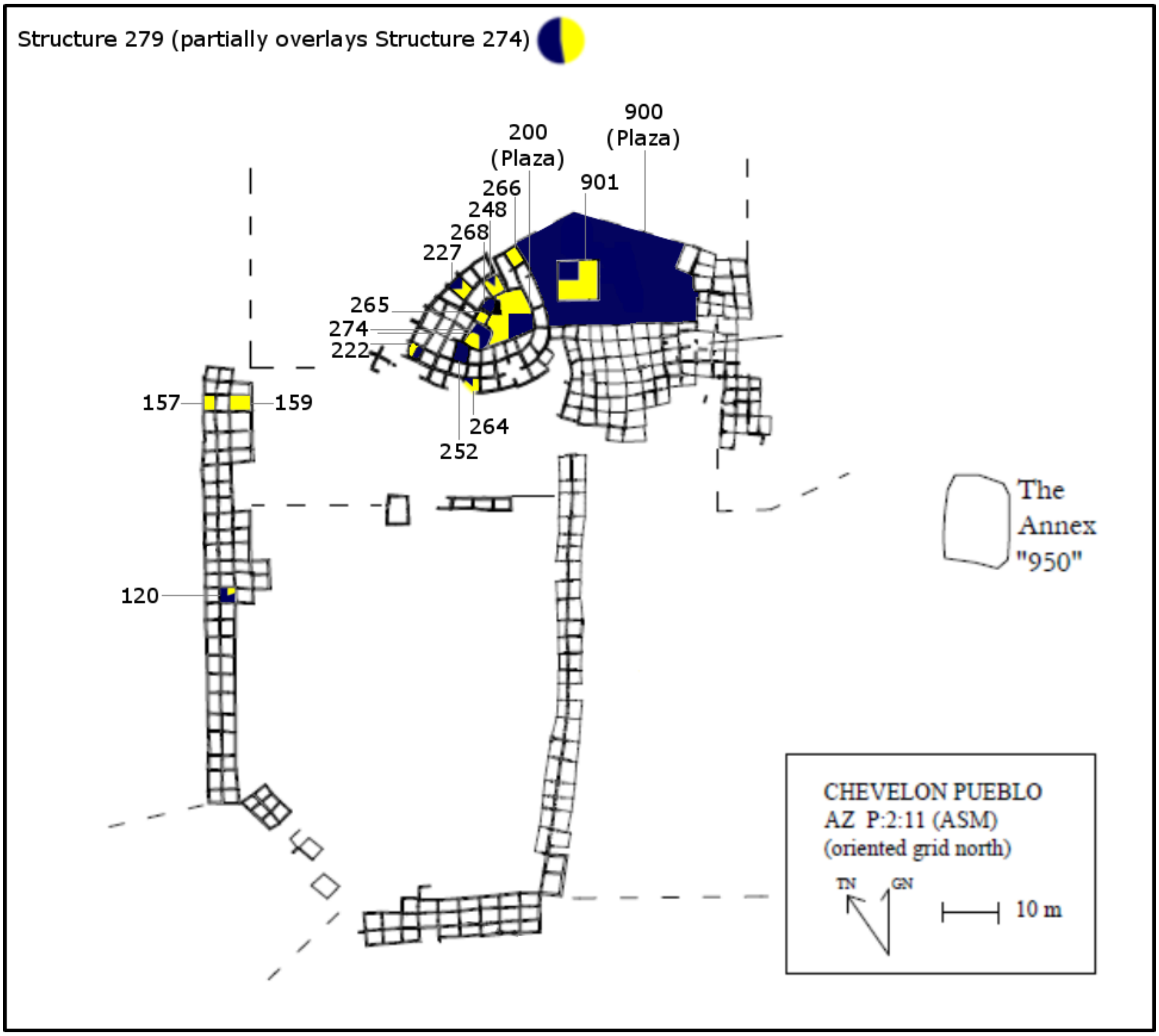

Figure 9.9: Map showing the distribution of both parallel and oblique cluster sherds at Chevelon Pueblo. The presence of parallel cluster sherds is indicated by blue shading, yellow shading indicates oblique cluster sherds. The relative quantities of these two clusters within each structure is indicated by the proportion of blue and yellow shading.

this site is not primarily determined by chronology: both local parallel and oblique cluster sherds were disproportionately abundant in deposits dating throughout the entire occupation of Chevelon. There is no evidence that one cluster was more abundant earlier or later in the occupation of this site.

Rather, the distribution of local oblique and local parallel cluster sherds appears to be spatially significant. Structures 120 and 288 are storage rooms associated with wider household groups. Structure 288 is associated with Structures 268/289, 287, and 245. Structure 120 is associated with Rooms 122-124. Both Structure 120 and 288 contained disproportionately large amounts of local parallel cluster sherds, suggesting a relationship between these rooms and people culturally affiliated with the Hopi area. The hypothesis that Structure 120 was primarily affiliated with people associated with areas to the north is further supported by whole Jeddito Yellow Ware vessels found on and under a floor in this structure (Adams 2016d).

However, the spatial division between the local parallel and local oblique clusters at Chevelon is far from absolute. Both the 100 and 200 roomblocks also contained rooms in which local oblique cluster sherds were more abundant than local parallel cluster sherds in the sample considered in this analysis. One of these rooms was Structure 264, a habitation room that was ritually closed and burned at the end of occupation at Chevelon, around 1390 (Adams 2016c). This clearly indicates that neither of these roomblocks was associated exclusively with either community: groups who produced and used both the oblique and local parallel cluster HUW resided within the same roomblocks. Given the concentrations of local parallel and local oblique HUW sherds within structures identified as parts of household groups (Structures 288, 120, and 264), these data may suggest the presence of household groups affiliated with specific regions. This conclusion is extremely tenuous, however, given that no complete household groups were sampled at Chevelon. Future research on the Chevelon assemblage including an increased sample from household groups could shed further light on this issue.

Local oblique cluster sherds occur at a relatively high frequency in several kivas, notably Structures 901 and 248. Structure 248 was constructed when Chevelon was first established, around 1290, located next to the restricted entry into what was once a small plaza in Roomblock 200. This plaza was later filled in with rooms (Adams 2016c). Use of this kiva ceased during the Early Homol'ovi Phase, likely around 1340, at which point its roof was burned and the kiva was filled with trash and layers of ash deposits—part of ritual closure practices (Adams 2016c:59–61). This kiva contains a disproportionately large quantity of local oblique cluster sherds recovered from contexts associated with its closure during the Early Homol'ovi Phase. Structure 901 is located in the small, enclosed plaza of Roomblock 300 and was constructed between 1300 and 1325/1330. This was the largest kiva excavated at Chevelon, and may have functioned at least in part as a community structure. Use of this kiva ceased between 1360 and 1370, following which it was filled with ceremonial trash and burned (Adams 2016c:66–71). Similar to Structure 248, the sample from this kiva contains a large amount of local oblique cluster sherds recovered from contexts associated with ritual closure.

The sample from Structure 274/279 contains a higher frequency of local parallel cluster sherds than local oblique cluster sherds. Structure 279 was a kiva, located in the Plaza at the center of Roomblock 200. This kiva was constructed early in the occupation of Chevelon, likely in the early 1300s. Shortly after its construction, two-story rooms were built on its north, west, and east sides, filling in the Plaza. Active use of this kiva ceased when the lower portion of the east wall collapsed. At this point, Structure 279 was ritually closed and used as a place to dispose of objects associated with ritual activity. Ceramic cross-dating of the closing deposits placed in

Structure 279 indicate that the filling of this structure began around 1340 or 1350, continuing until near the end of the Middle Homol'ovi Period, around 1385 (Adams 2016c:61–63). Following this, a wall was built over the top of what had been Structure 279, designating two different areas. The southern area, referred to as Structure 274, continued to be used as a place for disposal of objects associated with ritual activity, likely due to its location over Structure 279 (Adams 2016c:61–63). Following the closure of this kiva the social affiliation of this area likely remained the same, evidenced by the high proportion of local parallel cluster sherds found in the sample from Structure 274.

Although we cannot assume that the trash deposited in a structure was a byproduct of that structure's use (see Schiffer 1987), the trash used to create ritual deposits was not random. The materials placed together in specific contexts represent intentional decisions that shed light on the group and individual identities of the people who deposited them (Fladd et al. 2017). It is interesting, therefore, that this is the only kiva in the sample from Chevelon that contained a higher proportion of parallel cluster sherds than oblique cluster sherds in the closing ritual deposits. Structures 248 and 279 exhibited significant differences other than corrugated pottery assemblage. For example, Structure 248 was burned during closure while Structure 279 remained unburned (Adams and Fladd 2017). This suggests that these religious facilities may have served different social groups with different religious practices.

Roomblock 200 represents the initial settlement of Chevelon, around 1290. Tracing the abutment and bonding relationships in this roomblock indicated that this early construction phase was coordinated: the people who built these initial rooms likely arrived at the same time, possibly having migrated together from the same area in order to establish Chevelon. This initial construction phase included Structure 248—a kiva which contained a disproportionately high amount of local oblique cluster pottery. This suggests that the founding population of Chevelon may have included people who migrated from regions other than the Hopi Mesas, unlike the founding population of H4.

Deposits from other structures in Roomblock 200 also indicate social diversity. Roomblock 200 includes the 268/288/289, 287, and 245 habitation room complex, which were built around the inside of the Roomblock 200 plaza (Adams 2016c:88–92). The sampled assemblage from both of these structure complexes contain a disproportionate quantity of local parallel cluster sherds, suggesting that groups affiliated with the Hopi Mesas may have utilized this area of the pueblo. Roomblock 200 has been identified as the center of religious power and authority throughout the occupation of Chevelon. The continuous use of Roomblock 200 and the maintenance of religious facilities within the roomblock indicates that the power and authority of the occupants in Roomblock 200 was maintained and acknowledged throughout the occupation of Chevelon (Adams 2016c:88–92). That Roomblock 200 contains habitation and ritual contexts associated with both social groups identified by this analysis suggests that both groups had access to social and ritual power at Chevelon.

Homol'ovi II

Table 9.1 and Figure 9.1 show that, although local parallel is the most abundant stylistic cluster at H2, the local oblique cluster is better represented at H2 than at any other site in the HSC other than Chevelon. The distribution of these stylistic clusters across the site is shown in Figures 9.10 and 9.11. The relative abundance of local oblique cluster sherds in the sampled structures at H2 is surprising given the profusion of other data suggesting that H2 was founded as a planned settlement by groups from the Hopi Mesas. There are several possible explanations for this patterning. Possibly, the founding group from the Hopi Mesas was diverse, containing people who had recently migrated to Hopi from other areas. Keams Corrugated, a type of Tusayan Gray Ware, appears stylistically consistent with the locally produced oblique group identified in the HSC corrugated assemblage. However, Keams Corrugated represents a far smaller proportion of the assemblage from Awat'ovi (7% of the overall assemblage, 13.27% at its most abundant) than the local oblique group within the H2 assemblage (36%). Keams Corrugated is only comparably abundant (43.95%) at one site on Antelope Mesa (See Appendix E). Another possible explanation is that the groups from the Hopi area who established H2 were swiftly joined by people affiliated with other areas—possibly groups already residing at H1 or Chevelon relocated to H2.

Another possible explanation for the relatively high frequency of local oblique cluster HUW at H2 is that it was imported from another site in the HSC. The H2 ceramic assemblage was dominated by Jeddito Yellow Ware, imported from the Hopi Mesas, which represented 49 percent of the total ceramic assemblage (Barker 2017). In contrast, locally produced Winslow Orange Ware (WOW) represented only seven percent of the H2 ceramic assemblage. Clearly H2 relied on trade to supply their decorated ceramic needs, a similar reliance on trade to acquire utilitarian pottery would not be unexpected. INAA indicated that sherds from H2 were primarily manufactured of clay from Group 4, although clays from Groups 3 and 34 were used as well. The temper groups present in H2 sherds were also diverse: temper from Groups 1, 2, and 3 was present in sherds from this site.

One likely trading partner for H2 is H1—these two sites are located in close proximity to each other. However, there does not appear to be much overlap between the clay and temper sources used to produce the HUW recovered from H2 and the raw materials used by H1 potters. H1 potters preferred clay from INAA Group 3. Sherds made with Group 3 clay were sparse

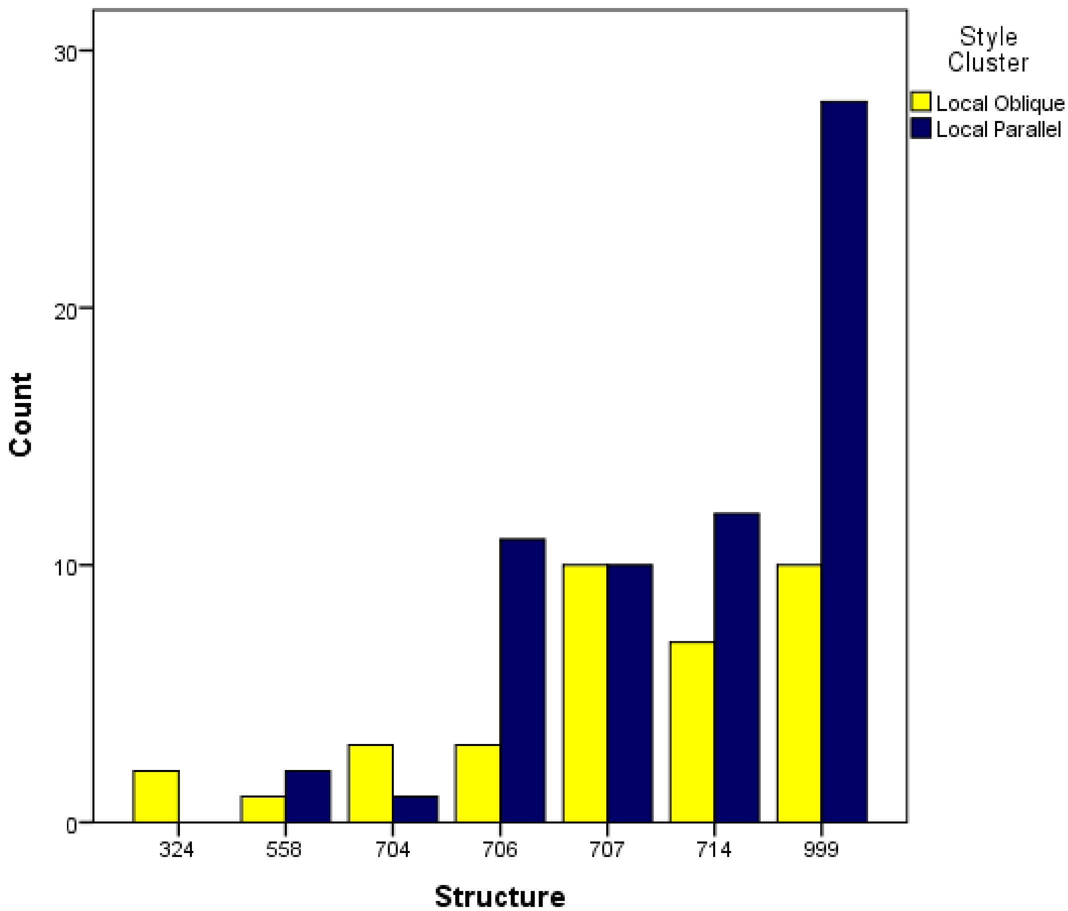

Figure 9.10: The relationship between structure and local stylistic cluster at Homol'ovi II.

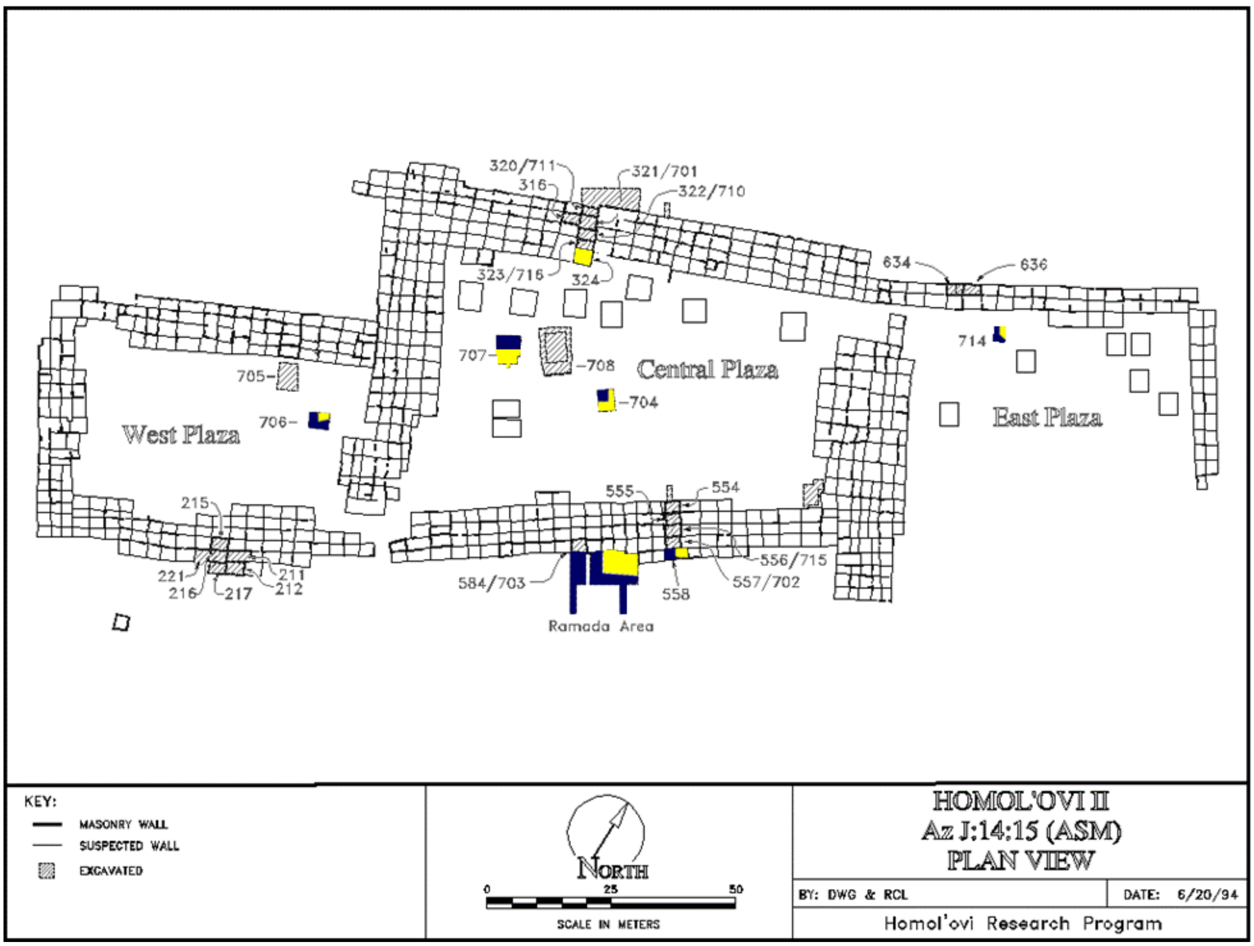

Figure 9.11: Map showing the distribution of both parallel and oblique cluster sherds at Homol'ovi II. The presence of parallel cluster sherds is indicated by blue shading, yellow shading indicates oblique cluster sherds. The relative quantities of these two clusters within each structure is indicated by the proportion of blue and yellow shading.

within the H2 assemblage. H1 potters primarily used temper from Group 4. No sherds made with Group 4 temper were recovered from H2. This compositional analysis, therefore, does not support the suggestion that pottery made in H1 was traded to H2. However, it is possible that HUW was traded from Chevelon to H2. The sherds recovered from Chevelon were made using a diversity of clay and temper sources. There is a substantial amount of overlap between the raw materials used to manufacture sherds recovered from Chevelon and H2. Thus, compositional analysis suggests Chevelon as a more likely partner in this exchange than H1.

Figures 9.10 and Figure 9.11 shows the relationship between stylistic cluster and depositional context at H2. A chi-square test revealed no statistically significant association between structure and cluster (P=0.096). This indicates a lack of patterning in the spatial and chronological distribution of parallel and local oblique cluster sherds at H2. The lack of chronological patterning at H2 is unsurprising for a number of reasons. Because this site was only occupied for approximately 40 years the deposits at this site are likely of insufficient time depth to show clear chronological patterning. Also, if the majority of local oblique cluster sherds recovered from this site were the byproduct of exchange between H2 and Chevelon, rather than local production at H2, the lack of spatial distribution is equally unsurprising.

Spatial and Chronological Patterning of Stylistic Clusters within the Homol'ovi Settlement Cluster

Although the most readily evident patterning evident in the distribution of local parallel and oblique cluster sherds across the HSC, shown in Table 9.1 and Figure 9.1, is spatial—namely, the abundance of local oblique cluster sherds at Chevelon—this distribution also indicates chronological patterning. H4 is the earliest site in the HSC, occupied from around 1260 until the 1280s. H3, although founded concurrently with Chevelon and H1, was depopulated far earlier than either of these sites, around 1300. Thus, the ceramics from these two sites are the earliest assemblages in this sample set. It is notable, therefore, that these two sites contain a dramatically lower proportion of local oblique cluster sherds than H1, H2, and Chevelon. The H4 assemblage especially contains very few local oblique cluster sherds. H2 is the latest site within the HSC, founded after Chevelon and H1 and occupied after both of these sites were depopulated.

Other than Chevelon, H2 contains the highest proportion of local oblique cluster corrugated sherds of the HSC sites. This patterning may indicate that local oblique cluster sherds became more abundant over time and, by extension, the groups producing this style of corrugated pottery represented a higher proportion of the HSC population during the later occupation of the HSC. This relative abundance may be due either to an increase in the number of groups and individuals affiliated with areas to the east and/or south occupying the HSC, or a gradual decrease in the number of people culturally affiliated with the Hopi Mesas present in the HSC. Possibly people who migrated to the HSC from Hopi or were descended from people who migrated to the HSC from Hopi returned to Hopi earlier than immigrants from other areas.

This chronological narrative is supported by data from H1. The chronological patterning suggested by the H1 ceramic assemblage is not robust: the distribution of local parallel and oblique cluster sherds at this site was not found to be strongly statistically significant ($P=0.056$). Nevertheless, the distribution of stylistic clusters between structures was suggestive. Several structures from the earliest occupation of H1 contained extremely high frequencies of local parallel cluster sherds. The only structures in which local oblique cluster sherds were more abundant than local parallel cluster sherds were constructed and used during the late occupation of the site. However, this chronological narrative is somewhat undermined by the fact that abundant local oblique cluster sherds are found in several early structures at H1, and the majority of late structures at H1 contain high frequencies of local parallel cluster sherds.

The hypothesis that local oblique cluster sherds became more abundant within the HSC over time is also challenged by chronological patterning of local parallel and oblique HUW sherds from H3 and the lack of chronological patterning within the local parallel and oblique HUW assemblage from Chevelon. The distribution of oblique and local parallel cluster sherds at Chevelon was found to be statistically significant. However, there is no evidence that this distribution was primarily determined by chronology. To the contrary, large concentrations of local oblique and local parallel cluster sherds were found throughout the occupation of this site. The H3 ceramic assemblage contains the strongest evidence of a chronological relationship between the two stylistic clusters: at H3 there is a strong correlation between the earliest, foundational contexts of the site (Structure 34) and a higher frequency of local oblique cluster sherds. Parallel cluster sherds were more abundant in Structure 37, which was constructed after Structure 34 was demolished. During the period when H3 was used as a field house by the occupants of H1, the H3 HUW assemblage consisted entirely of local parallel cluster sherds.

Summary and Conclusions

The analysis outlined in previous chapters identified two manufacturing traditions within the locally produced corrugated ceramic corpus of the HSC—each a local manifestation of a broader constellation of practice. Both of these stylistic traditions are present throughout the Pueblo IV occupation of the HSC, often co-occurring within the same contexts. As these stylistic traditions may be considered to be analogues of a broader social identity, this distribution clearly indicates the presence of potters from two different social groups living within the sites of the HSC throughout the occupation of this area. The distribution of these two stylistic clusters between the sites of the HSC further suggests an overarching chronological narrative: local oblique cluster sherds occur at a low frequency at the earliest sites of the HSC and are more abundant at the later sites. This patterning indicates that the earliest population of the HSC contained a higher proportion of immigrants affiliated with the Hopi Mesas, and also possibly the Hopi Buttes, to the north. As the HSC persisted, more groups associated with areas to the east in the Puerco area and/or south in the Chevelon drainage joined the growing community. This narrative is supported by data from H1 which indicate that local parallel cluster sherds were more abundant in earlier structures, with the relative frequency of local oblique cluster sherds increasing in later contexts.

This chronological narrative is contradicted, however, by data from Chevelon and H3. Although the relationship between context and stylistic cluster was found to be significant at Chevelon, this distribution appears to have been more spatially significant than chronologically significant. Large concentrations of local parallel and oblique cluster sherds were found in contexts dating throughout the occupation of Chevelon. There is no evidence that either stylistic cluster was more abundant earlier or later in the occupation of this site. The strongest evidence of chronological patterning within the HSC comes from H3. At H3 there is a statistically significant relationship between local oblique cluster sherds and the earliest, foundational contexts of the site. Specifically, local oblique cluster sherds are most abundant in the earliest contexts at H3. In later contexts, local parallel cluster sherds represent a higher proportion of the assemblage. It is intriguing that this relationship directly contradicts the overarching chronological narrative presented by the distribution of local parallel and oblique cluster sherds between the sites of the HSC and the chronological data from H1.

The distribution of these stylistic clusters within the HSC is also spatially significant. With the exception of Chevelon, local parallel cluster sherds are more abundant than local oblique cluster sherds throughout HSC. The people who produced local parallel cluster sherds are associated with the technological traditions of the Hopi Mesas and the Hopi Buttes and likely migrated to the HSC from the north. This is consistent with the abundant evidence for a relationship between the HSC and the Hopi Mesas, embodied by the large amounts of Jeddito Yellow Ware recovered from Homol'ovi sites and the demonstrated connection between the enculturative learning traditions associated with Jeddito Yellow Ware and WOW (Adams 2002; Bernardini 2005; Bishop et al. 1988; Fewkes 1900; Hays 1991; Lyons 2001, 2003).

Chevelon is both the southern and eastern-most HSC site included in this analysis. At Chevelon, local oblique cluster sherds were recovered far more frequently than sherds of the local parallel cluster. This suggests that residents of Chevelon may have a different social history than residents of other sites in the HSC. The abundance of oblique cluster sherds at this site supports the possibility, discussed in the previous chapter, that the potters responsible for the production of oblique cluster pottery may have migrated to the HSC from the Chevelon drainage in the south and/or the Puerco area to the east. Certainly the residents of Chevelon participated in exchange relationships more focused on the east and south than other residents of Homol'ovi (Adams 2016d; Cutright-Smith and Barker 2016; Medeiros 2016). High frequencies of local oblique cluster sherds within the foundational contexts of Chevelon, as well as high frequencies of Mogollon Brown (Cutright-Smith and Barker 2016), suggest that the site may have been established in part by immigrants from the east, possibly the Puerco area, or south. However, these immigrants were swiftly joined by people who were social affiliated with the Hopi Mesas.

Despite the lower frequency of local oblique cluster sherds within the HSC as a whole and, by extension, the smaller number of people affiliated with areas other than Hopi living in the HSC, it would be incorrect to assume that this smaller population was marginalized by the larger group associated with the Hopi Mesas. Although several sites exhibited evidence of spatial patterning, there is no evidence that either social group had exclusive access to any area or resource. As discussed in Chapter 3, social differentiation and the presence of diverse social groups may increase the stability of an aggregated community through the creation and maintenance of diverse social networks (Clark 2001; Lyons 2003; Lyons et al. 2008, 2011, Lyons and Clark 2008, 2012; Stone 2002). In this case, the people affiliated with areas to the south and/or east who lived in the HSC were a minority within the overall population of the settlement cluster. Rather than relegating the members of this social group to a marginalized state, this minority status may have increased their social capital. As participants in a social network not accessible to the majority of the residents of the HSC, members of this social group would have had access to knowledge and resources not available to the rest of the community.

CHAPTER 10: CONCLUSIONS

Through an analysis of utilitarian ceramic production technology, this study established the presence of two distinct social groups, defined through different social histories, within the population living in the Homol'ovi Settlement Cluster (HSC) during the Pueblo IV period. By placing these social groups in a regional context, this study identified possible broader affiliations for these social groups in addition to the previously well-established connections between the residents of Homol'ovi and the Hopi Mesas (Adams 2002; Lyons 2001, 2003), suggesting that the groups living within the HSC may have been associated with populations living in the Hopi Buttes to the north, the Chevelon drainage to the south, and the Puerco area to the east. By exploring the chronological and spatial distribution of these social groups among and within the different sites of the HSC, this study generated a nuanced narrative of aggregation in the HSC.

This study approached the exploration of social identity within the Pueblo IV community of the HSC from the perspective that identities are fundamentally relational and contextual. Identities, although created individually, are delineated by relationships with other entities. Thus, an identity often results in the demonstration of social group membership through shared social affiliations and practices. Recursively, these affiliations and practices reinforce, contest, or alter the identities being expressed (Fowler 2004, 2010, 2016). In this way, practices and, by extension, objects and properties of objects that embody practices, can be understood as the feedback between individuals, groups, and their social, physical, and cultural context (Casella and Fowler 2004; Díaz-Andreu and Lucy 2005; Duff 2002; Fowler 2004, 2010, 2016; Gamble 2007; Gell 1998; Hendon 2010; Knappett and Malafouris 2008; Latour 2005; Van Der Leeuw 2008; Meskell 2001, 2002, 2005; Meskell [editor] 2005; Robb 2004, 2007, 2010). By exploring the identities embodied in material culture we may explore the identities of the people who manufactured, used, and interacted with these objects.

Specifically, this research examined the social relationships embodied in the utilitarian pottery from the HSC: what identities are reflected in the utilitarian assemblage and how do these identities nest within or cross-cut other identities shared by the residents of the HSC. Identities are diverse and multi-scalar. Identities may be consciously created, subconsciously received via enculturation, intentionally communicated, suppressed, or unintentionally expressed. This study approached these questions from the perspective that identities are fundamentally relational: formed through relationships between individuals, groups, and material entities such as objects, spaces, and places. Identity is also contextual: different types and classes of material culture embody different identities. Equally, diverse facets of identity are affected by interactions with diverse material entities, and the same material entity may engage differently with identity in different contexts.

In order to explore the varied facets of identity, therefore, different types and attributes of material culture may provide the appropriate medium. This study emphasized the identities embodied in technological style and manufacturing practices, based on the understanding that such object attributes are likely to inform on subconscious, enculturative, and inconspicuous aspects of identity (Carr 1995a, 1995b; Clark 2001; Dobres 2001; Lave and Wenger 1991; Lechtman 1977; Lyons 2001, 2003; Minar and Crown 2001; Neuzil 2001; Peeples 2011). In particular, this study looked at the technological style and manufacturing practices associated with utilitarian corrugated pottery—low visibility material culture which is unlikely to be imbued with important social, ritual, or cultural meaning (Carr 1995a, 1995b; Clark 2001). Rather, such objects are more likely to embody identities derived from domestic contexts, indexing social practices at the core of everyday life (Hendon 2010:88). A number of research goals were proposed in order to explore identity within the utilitarian assemblage of the HSC. This chapter will outline these research goals and the ways they were addressed over the course of this study, concluding with a discussion of how this study contributes to our understanding of the HSC, the social history of the U.S. Southwest, and the field of archaeology as a whole.

Summary

A primary goal of this study was to identify the manufacturing techniques that were used to produce corrugated pottery within the HSC and to determine the social contexts that explain its production. I approached this issue from two different directions. Initially, I explored the ceramic recipes used to manufacture corrugated pottery within the HSC. The presence of vessels made using the same manufacturing materials according to the same ceramic recipe indicates that the potters producing these vessels participated in a community of practice in which knowledge of resources and recipes was shared (e.g., Curewitz and Goff 2012; Eckert 2012; Fenn et al. 2006; Huntley 2006; Huntley et al. 2012; Joyce 2012; Schleher et al. 2012; Thomas 2012). Instrumental neutron activation analysis (INAA) of 128 corrugated sherds identified as either Homolovi Orange Ware or Homolovi Gray Ware (together referred to as Homolovi Utility Ware or HUW) identified the majority of these sherds as having been produced in the Homol'ovi area. Nineteen sherds were found to have been manufactured in the Puerco area, while one sherd was included in the Hopi group. Thirty-seven sherds were not assigned to any chemical group, possibly indicating the existence of other important social relationships not captured in this analysis. In order to explore temper variability within HUW, 25 samples were submitted for petrographic analysis. Petrographic analysis found great uniformity across the samples: almost all of the samples contained quartz-based mono-crystalline sand, which is ubiquitous in the

Homol'ovi area. Five subgroups were identified on the basis of inclusion size, distribution of inclusions, and the presence of colored and translucent sands.

Petrographic analysis and INAA independently identified a number of raw material clusters used by the potters of the HSC. Both INAA and petrography identified a relationship between the raw materials used to produce HUW and site. Although no site within the HSC had unilateral access to any clay or temper source, some resources were preferentially used by the potters of different villages. Thus, evidence from INAA and petrography suggest that the communities of practice producing corrugated pottery within the HSC were essentially local, with the potters of each village utilizing different raw material resources. This is most clearly seen within the assemblage of Homol'ovi I (H1). INAA confirmed that, generally speaking, the potters producing painted pottery—analyzed using INAA as part of research by Patrick Lyons (2001, 2003)—and corrugated pottery used the same clay sources. One clay source identified by Lyons (2001, 2003) does not appear to have been used by potters producing corrugated pottery, suggesting that although many clay sources were shared, others may have been restricted to the production of decorated pottery.

Following the identification of these communities of practice organized around the acquisition of raw materials for the production of corrugated pottery, this study explored the social identities embodied in the technological traditions through which corrugated vessels were manufactured by potters in the HSC. This analysis identified two stylistic traditions within the HUW assemblage from the HSC: local parallel, which represented 27 percent of the sampled HUW, and local oblique, which represented 73 percent of sampled HUW. These two stylistic traditions did not correlate with any of the manufacturing communities identified through compositional analysis. Rather, these two stylistic traditions cross-cut the site-level manufacturing groups, suggesting that members of each of the communities of practice participated in both of these broader, overarching stylistic traditions. Based on this evidence, these stylistic traditions appear to be local manifestations of broader constellations of practice: learning groups similar enough to be identified as groups of practice but too diffuse to be treated as a single community, which, indeed, may cross-cut and subdivide the various communities of practice of which they are comprised (Roddick and Stahl [editors] 2016; Wenger 1998:126–127).

Thus, this analysis identified local communities of practice with membership determined primarily by site of residence, cross-cut by two constellations of practice, defined based on technological attributes of ceramic manufacture. That potters from two constellations of practice were operating within the HSC suggests the presence of at least two broad, overarching categories of identity among the potters of the HSC. However, the fact that members of both constellations participated in the same communities of practice indicates that these constellated identities were not associated with social differences of sufficient importance to justify social distinction. It is likely that the identities derived from these constellations of practice were subconscious and less important than the identities formed by co-residence.

In order to recognize possible broader affiliations of these constellations of practice, a comparable analysis of technological style was performed on corrugated sherds from the wares most abundantly imported to the HSC: Tusayan Gray Ware, Awatovi Yellow Ware, and Mogollon Brown Ware. This analysis identified two stylistic clusters, called non-local parallel and non-local oblique. Statistical tests indicated an association between the non-local parallel cluster and Tusayan Gray Ware and Awatovi Yellow Ware, while the non-local oblique cluster was comprised primarily of Mogollon Brown Ware. That non-local oblique strongly correlates with Mogollon Brown Ware and non-local parallel strongly correlates with Tusayan Gray Ware and Awatovi Yellow Ware suggests that these two technological traditions are more strongly associated with the areas in which these respective wares were manufactured. Notably, however, both clusters contained sherds of all three wares. Therefore, this analysis does not suggest that these technological traditions were exclusively practiced in the areas where these wares were manufactured. Rather, it suggests that the correlation between these clusters and wares is an over-simplification: these technological traditions cannot simply be equated with distinct areas of production.

Potters practicing different technological traditions circulated the landscape, producing pottery in a number of locations using the locally available materials. This is consistent with the known culture-history of the Pueblo IV period in the U.S. Southwest. When demographic upheaval occurred during the history of the U.S. Southwest it was typically accompanied by large migration events, especially in the late A.D. 1200's (e.g., Cameron 1995; Clark 2001; Glowacki 2010). The resulting migration and aggregation demonstrably reshaped the social milieu of the U.S. Southwest on a regional scale (e.g., Hill et al. 2004; Lyons et al. 2008; Lyons and Clark 2008, 2012; Mills et al. 2013; Neuzil 2005b, 2008; Peeples 2011). The impact of these macro-scalar processes also resonated on a smaller, more individual level. Individuals and communities experienced profound change. Migrating across long distances and settling in large, diverse settlements would have created new opportunities and tensions, resulting in increased social integration and differentiation (e.g., Neuzil 2008; Rautman 2000; Stone 2002). Thus, Ancestral Puebloan society was, in part, characterized by movement and migration, forming social patterns and relationships which continue to shape Puebloan identities to this day (Bernardini 2005; Bernardini and Fowles 2011; Dongoske et al. 1997; Ferguson and Colwell-

Chanthaphonh 2006; Ferguson and Loma'omvaya 1999; Kuwanwisiwma and Ferguson 2004, 2009; Malotki 1993).

The non-local parallel cluster, which contained primarily Awatovi Yellow Ware and Tusayan Gray Ware—both produced in the vicinity of the Hopi Mesas—was found to be statistically similar to the local parallel cluster. Abundant evidence, including an analysis of the technological style of locally produced Winslow Orange Ware (WOW), which found that WOW was manufactured by potters who followed the technological practices associated with the enculturative traditions of the Hopi Mesas (Lyons 2001, 2003), suggests that the HSC was established by immigrants from the Hopi Mesas and that the residents of the HSC maintained an important relationship with Hopi throughout its occupation (Adams 2002; Lyons 2001, 2003). That the most abundant corrugated ceramic cluster within the locally produced HUW assemblage was also produced according to the technological traditions of the Hopi Mesas is, therefore, unsurprising. The broader affiliation of the local oblique cluster is harder to identify. The local oblique cluster was found to be statistically similar to the non-local oblique cluster, which was primarily comprised of Mogollon Brown Ware. However, the area in which the Mogollon Brown Ware recovered from the HSC was produced is as yet unknown. Further compositional analysis specifically targeting the Mogollon Brown Ware imported to the HSC would doubtless clarify this issue.

The regional distribution of these stylistic clusters was further explored through a review of extant literature and an assessment of the corrugated pottery produced during the Pueblo IV period in these regions, in order to characterize the utilitarian ceramic traditions of the regions that surround the HSC: the Hopi Buttes, the Puerco area, the Upper Little Colorado River region, the Silver Creek area, the Chevelon drainage, Anderson Mesa, and the Hopi Mesas.

Unsurprisingly, given the archaeological evidence for migration and aggregation throughout the Western Pueblo area (e.g., Adams 1996b; Adams et al. 2004; Bernardini 2005; Bernardini and Brown 2004; Cameron 1995; Duff 2002, 2004; Kaldahl et al. 2004; Lyons 2003; Mills 1998; Spielmann 1998; Theuer 2011), the corrugated ceramic manufacturing traditions from all of these areas contained indicators of social diversity. The characterization of corrugated ceramic traditions discussed in this study suggest the existence of social affiliations between residents of the HSC and communities in the Hopi Mesas and the Puerco area, as well as possibly the, Hopi Buttes and the Chevelon drainage. This study did not show the same evidence of close social relationships between the residents of the HSC and villages of Anderson Mesa, the Upper Little Colorado River, and the Silver Creek area—although this analysis did not include data from the Silver Creek area post-dating 1325.

Within the Western Pueblo area, the circulation of utilitarian ceramic vessels over long distances likely indicates close social relationships, such as those resulting from intermarriage or direct population movement (Duff 2002:26; Triadan 1997; Zedeño 1994:17). In both of these circumstances, utilitarian vessels exchanged over long distances were likely brought by people who were relocating to a new area. These vessels are gradually replaced by vessels manufactured in the same style as the imported vessels using local raw materials (Duff 2002:26; Triadan 1997). Therefore, the presence of imported utilitarian pottery in conjunction with locally produced pottery manufactured in a style technologically consistent with the imported utilitarian pottery is indicative of close social relationships between the residents of the two production areas. Based on this logic, the presence of utilitarian pottery produced on the Hopi Mesas and in the Puerco area recovered from HSC ceramic assemblages, as well as the local production of corrugated ceramics that conform closely to the ceramic traditions practiced in the Hopi Mesas and in the

Puerco area, and the shared tradition of WOW suggests the movement of people and/or the existence of close social relationships between the residents of both the Hopi Mesas and the Puerco area and the occupants of the HSC.

The evidence of population movement from the Hopi Buttes to the HSC is more ambiguous, given the difficulty in distinguishing between the utilitarian ceramic traditions of the Hopi Buttes and the Hopi Mesas when executed in the HSC using local materials. However, given the proximity between the Hopi Buttes and the HSC, as well as the presence of Little Colorado Gray Ware in the ceramic assemblage from H4 (Bubemyre 2004), an affiliation between these two regions is entirely plausible. This analysis also suggests the possibility of population movement between the Chevelon drainage and the HSC. The Chevelon drainage is the area closest to Homol'ovi in which people produced pottery comparable to the oblique corrugated style identified within the ceramic assemblage of the HSC. The occupants of the Chevelon drainage appear to have relocated over the course of the transition from the Pueblo III to Pueblo IV period. Given the proximity between the Chevelon drainage and the Homol'ovi area, the HSC would have been a logical area in which to settle. Groups from the Chevelon drainage may also have moved to the Pueblo IV communities in the Puerco region.

Recent research by Andrew Duff and his colleagues identified similar patterning in the utility wares produced along the southern edge of the Colorado Plateau, west of Mariana Mesa. In these cases, although decorated ceramics and public architecture appear to be consistent with those of Chacoan settlements to the north, utilitarian pottery assemblages include both northern and southern technological traditions (Duff and Nauman 2010; Elkins 2007; Nauman 2007; Wichlacz 2009). Andrew Duff and Alissa Nauman interpret the diversity in the utilitarian ceramic assemblage at sites such as Cox Ranch Pueblo, a Pueblo II site located in the southern

Cibola region of New Mexico, as evidence of intermarriage between different social groups (Duff and Nauman 2010). At Cox Ranch Pueblo, about 80 percent of the unpainted pottery is brown ware and the remainder is mainly gray ware. Brown and gray vessels were found in assemblages throughout the site, suggesting the co-residence of both producing groups (Duff and Nauman 2010:19; Nauman 2007). Analysis of utilitarian pottery demonstrated that the brown and gray vessels were constructed differently, produced by potters who were using different learning frameworks, although both were manufactured using raw materials that are consistent with those available locally (Duff and Nauman 2010:22–28). Because utilitarian ceramics are typically circulated through close social ties, such as kin ties, Duff and Nauman (2010) suggest that the persistent presence of multiple corrugation traditions at Cox Ranch Pueblo is indicative of intermarriage between people from different social backgrounds (following Zedeño 1994). Based on the predominance of the brown ware tradition, and the association between the brown ware tradition and areas to the south, Duff and Nauman (2010:30–32) suggest that at Cox Ranch Pueblo, women culturally affiliated with northern groups were marrying into residences primarily associated with southern groups.

A similar social narrative may have shaped the corrugated assemblage from the HSC. As discussed in previous chapters, there is a great deal of evidence suggesting that the villages of the HSC were established by people who moved to the area from the Hopi Mesas (Adams 2002; Lyons 2001, 2003). If the most frequently occurring cluster, the local parallel cluster, is associated with Hopi groups to the north, the locally produced oblique cluster vessels may represent marriage into these communities by women who were culturally affiliated with areas to the south in the Chevelon drainage or to the east in the Puerco area. Speculatively, the continued production of traditional pottery may indicate a link with this matrilineal identity (e.g., Duff and

Nauman 2010:32). Alternatively, whole families from these other areas may have migrated into the Homol'ovi community. In either case, the continuing production of oblique style pottery indicates the persistence of this distinct enculturative identity.

To explore the chronological and spatial patterning of these corrugation styles within the HSC, thus elucidating the social history of the settlement cluster, I looked at the distribution of these styles across and within the sites of the HSC. The chronological patterning of these two stylistic clusters was immediately evident. Local oblique cluster sherds occur at a low frequency within the corrugated HUW assemblages of the earliest sites in the HSC and are more abundant in the assemblages of the later sites. This patterning suggests that the earliest residents of the HSC were primarily composed of immigrants affiliated with regions to the north—certainly the Hopi Mesas and possibly the Hopi Buttes as well. As the settlement cluster in the Homol'ovi area persisted and grew, more groups from other areas, most likely to the south and/or the east joined the community. This general patterning is echoed in the chronological distribution of these stylistic clusters within H1: local parallel cluster sherds were more abundant in earlier structures, local oblique cluster sherds were recovered more frequently from later contexts. Data from other sites problematizes this straightforward chronological narrative, however. Most notably, at Homol'ovi III (H3) local oblique cluster sherds were recovered most abundantly from the earliest, foundational contexts of the site. Local parallel cluster sherds represent a higher proportion of the corrugated HUW assemblage from later contexts. This suggests that the social histories of each site within the HSC may have been different: although there are cross-cutting trends, each site developed individually. In some cases, individual sites may have experienced different social trends than the HSC as a whole.

The distribution of these stylistic clusters is also spatially significant. Local parallel cluster sherds are more abundant than local oblique cluster sherds throughout the HSC, with the exception of Chevelon Pueblo (Chevelon). This omnipresence of local parallel cluster sherds, associated with the technological traditions of the Hopi Mesas, is consistent with an abundance of other evidence of the relationship between the residents of the Homol'ovi area and the Hopi Mesas (Adams 2002; Bernardini 2005; Bishop et al. 1988; Courlander 1971; Ferguson and Loma'omvaya 1999; Fewkes 1900; Hays 1991; Lomatuway'ma et al. 1993; Lyons 2001, 2003; Nequatewa 1936; Yava 1978). Alone of the Homol'ovi sites, the corrugated HUW assemblage of Chevelon contained more local oblique cluster sherds than local parallel cluster sherds. Along with evidence of exchange relationships more focused on the east and south than other HSC sites (Adams 2016d; Cutright-Smith and Barker 2016; Medeiros 2016), this suggests that the village of Chevelon may have been more diverse than the other sites of the HSC.

Exploring Social Diversity through Manufacturing Practices

An intriguing question raised by this study is how to account for the discrepancy in the identities conveyed by the technological style of the decorated and utilitarian assemblages produced locally in the Homol'ovi area. While the technological style of corrugated pottery produced in the HSC clearly indicates the presence of two social groups, a comparable analysis of WOW suggested greater uniformity, with potters participating in one ceramic manufacturing tradition (Lyons 2001, 2003). The archaeological record of the HSC lacks evidence of social marginalization which would suggest the dominance of one immigrant group by another (Adams 2002). To the contrary, the diverse social identities evident in the corrugated HUW assemblage do not appear to have been particularly important—or at least not as relevant as the identities created by site residence. The identities evident through technological style cross-cut and intersect within the ceramic manufacturing communities of practice which appear to be organized primarily upon the basis of co-residence.

One possibility is that the immigrants responsible for producing local oblique cluster corrugated sherds migrated to the HSC from an area without a strong decorated pottery tradition. Some groups below the Mogollon Rim did not produce decorated pottery. At present, there is no clear evidence of any local ceramic manufacture at Creswell Pueblo (AZ J:14:282[ASM]) or the pithouse village HP-36 (AZ J:14:36[ASM]), both of which are located within Homolovi State Park and were occupied during the Pueblo III period. Although the occupational hiatus of the Homol'ovi area between 1225 and 1260 (Adams 1996a, 2002, 2004b; Barker and Young 2017; Lange 1998; Young 1996, 1999b; Young and Barker 2015) suggests that none of the occupants of these sites was involved in the foundation of the HSC, it is possible that they returned to the Homol'ovi area following the establishment of the settlement cluster. Similarly, residents of the Chevelon drainage during the Pueblo III period do not appear to have produced decorated pottery. A locally produced utilitarian tradition has been identified at a number of Pueblo III period sites including RAR-2 (AZ P:3:114[ASM]) and the Multi-Kiva Site (AZ P:3:112[ASM]) (Lange et al. 2017; Ownby 2016); however, no corresponding decorated tradition has been found.

Another possibility is that not all potters residing within the HSC had access to the social knowledge necessary to make WOW. A recent study by Patricia Crown (2016) demonstrates how the production of two different ceramic wares—White Mountain Red Ware and Cibola White Ware—made in the same villages by the same potters (Goetze and Mills 1993; Mills, Herr, et al. 1999) were delineated by very different learning dynamics. Through a comparative analysis of White Mountain Red Ware and Cibola White Ware, Crown (2016) found that during the production of White Mountain Red Ware, which was valued within ceremonial contexts and widely exchanged, skilled potters limited the involvement of learners in aspects of pottery production that were associated with protected knowledge. In contrast, learners participate in all aspects of Cibola White Ware production.

Crown's (2016) data suggest that novice potters learned methods of forming and decorating ceramics on Cibola White Ware prior to producing White Mountain Red Ware; thus, a potter's initial attempts to produce White Mountain Red Ware were already skilled. Based on this finding, Crown argues that a learning boundary, associated with red pigment, demarcated the rights and power of the initiated and limited the legitimate peripheral participation of learning through restricted access to specialized knowledge (Crown 2016; Roddick and Stahl 2016:23). Relationships defined by power and secrecy surrounded the production of White Mountain Red Ware, which created a boundary of practice (Crown 2016:85; Dilley 2010; Gowlland 2012). These boundaries may have been enforced through the restriction of information on the material resources needed to make red slip (Crown 2016:82).

Crown's (2016) research demonstrates the ways in which ceramic production was limited by access to appropriate knowledge and practices. All societies have social mechanisms that control access to knowledge. Differential access may be determined by age, gender, sex, social group, sodality, or professional group membership (Crown 2016:67). Thus, knowledge varies according to who you are and what relationships you have developed. The ability to put secret knowledge into practice may be controlled by cultural concepts of property rights or ownership (Crown 2016:67–68). Secret societies and knowledge are particularly important in maintaining social cohesion during times of change and demographic upheaval. By controlling access to knowledge, secrecy establishes the right to control information, confers value on the information being concealed, and increases the social importance of the group members who have access to secret knowledge (e.g., Brandt 1977, 1980; Crown 2016:67; Debenport 2015; Jones 2012:78; Richland 2009:100; Simmel 1906; Whiteley 1987:703). Ethnoarchaeologists have emphasized the importance among potters of limiting knowledge through secrecy (Foster 1965:57; Nicklin 1971:33–34). Potters may derive aspects of their social identities from their access to restricted knowledge (Crown 2016:69; Dilley 1989:182; Douglass 1987). Although potters may attempt to learn the secrets of other potters, they typically respect such restricted knowledge as intellectual property and do not copy the work of other potters (Foster 1965:53; Gosselain 2016).

The practice of restricting knowledge through secrecy is common within modern Pueblos, acting as a form of social control (Brandt 1980; Suina 1992; Suina and Smolkin 1995). Some modern Puebloan potters use secrecy to maintain control over knowledge of clay resources, production techniques, and rituals associated with ceramic production (Brandt 1994:16; Crown 2014, 2016:70; Hardin 1993:268; Lanmon et al. 2007:16–17; Nahohai and Phelps 1995:27, 66; Naranjo 1992:43; Wallaert 2012:33; Wycoff 1985:81). There is also archaeological evidence for the restriction of knowledge about clay sources within Ancestral Puebloan communities (Bishop et al. 1988:332). Within Puebloan communities, secrecy is associated with ceremonial knowledge and practices, and also with the objects that are associated with such rituals (Brandt 1980:127; Lewis 2002; Plog 2003; Smith 1990:41; Spielmann 1998:156). Possibly, this tendency towards secrecy can be traced to the migrations that shaped Puebloan society. Brandt (1980:131) suggests that secrecy surrounding ritual practices allowed aggregated communities to accommodate varied ritual practices by minimizing conflict between belief systems (Crown 2016:69–72).

Although Crown's (2016) case study explores a disjuncture in practice between two decorated traditions, many of her conclusions seem relevant in the context of the relationship between HUW and WOW. Possibly some knowledge was restricted to the community of potters who produced decorated pottery, delineating a boundary of practice. This boundary of practice may also have indicated a social boundary. Crown's (2016) case study illustrates the ways in which, within the U.S. Southwest, decorated pottery served as a visual reminder of the social relationships that structured society, embodying the disparity between knowledge and ignorance while demarcating social access (Crown 2016:86). As these vessels were part of the construction of identities during the migration and subsequent aggregation of people into large pueblos during the Pueblo IV period (Spielmann 2004), control over the creation of decorated ceramic traditions and the production of these vessels was important symbolic capital: legitimizing existing social groups and validating their rights to land and ceremonies (Chamberlin 2006:42, 47; Crown 2016:88).

Within the context of the HSC[7], the WOW decorated ceramic tradition is closely tied to the ceramic traditions of the Hopi Mesas. WOW was first produced by people who migrated from Hopi to the Homol'ovi area, who produced pottery according to their ceramic traditions using local materials (Lyons 2001, 2003). Thus, WOW is a local manifestation of Hopi ceramic traditions and cultural knowledge (Adams 2002). It is possible, therefore, that knowledge of the

[7] Winslow Orange Ware was produced in the Puerco area as well as within the Homol'ovi Settlement Cluster (Adams 2002; Lyons 2001, 2003). Possibly, Winslow Orange Ware served the same social role in both communities. However, in-field analysis of Winslow Orange Ware produced in the Puerco area (Gilpin et al. 2003; Schachner et al. 2016b, 2016a) suggests that the locally produced Winslow Orange Ware assemblage from the Puerco area may be more stylistically diverse than the Winslow Orange Ware assemblage of the HSC. Further assessment of the stylistic and cultural affiliations of Winslow Orange Ware in the Puerco area would doubtless prove a fruitful avenue for future research.

skills and resources necessary to produce WOW remained restricted to this corporate group—people who migrated to Homol’ovi from Hopi and their descendants—as a form of restricted knowledge that validated their claims to the landscape as the initial founders of the HSC.

Around 1360, locally produced WOW was largely replaced by Jeddito Yellow Ware bowls, imported from the Hopi Mesas. The decrease in WOW production within the HSC has been explained as a response to the scarcity of wood in the Homol’ovi area (Adams 2002). The ability to activate social networks responsible for the importation of vast quantities of Jeddito Yellow Ware to the HSC from the Hopi Mesas would have been as effective a method of signaling access to social knowledge as the local production of pottery in the Hopi tradition. Speculatively, therefore, the replacement of Winslow Orange Ware with Jeddito Yellow Ware could have served the same social needs while preserving the increasingly scarce wood supply.

Although WOW production largely ceased, local manufacture of HUW continued throughout this period. HUW represents 20 percent of the ceramic assemblage from Homol’ovi II (H2), while Awatovi Yellow Ware and Tusayan Gray Ware represent only 6 percent and 4 percent respectively (Barker 2017). Therefore, although Jeddito Yellow Ware was by far the most abundant decorated ware at H2, representing 49 percent of the ceramic assemblage from H2 (Barker 2017), HUW was still the most abundant utility ware. In other words, this period of occupation at the HSC did not see a cessation of local ceramic production. Rather, the influx of Jeddito Yellow Ware into the HSC is associated with the termination of the local decorated tradition only. The persistence of HUW production was likely a practical consideration: it’s far easier to make cooking pots than to import all of them. The continuing presence, and increase, of local oblique cluster HUW throughout the occupation of the HSC indicates that, despite the overwhelming abundance of Jeddito Yellow Ware, the residents of the HSC during this period were as diverse as ever.

This study illustrates the importance of a multi-scalar approach to explorations of craft production and identity. Social identities are fundamentally material: identity is shaped and embodied through material culture. Recursively, the relationships developed with material entities may alter or reaffirm these identities. In this way, identities are contextually specific: different types of material culture embodies different identities, and the same material entity may invoke different aspects of identity within different social and physical contexts. Therefore, in order to explore the formation and expression of identity, multiple categories and scales of material culture should be considered. In this study, the identities reflected in domestic objects and contexts are juxtaposed with the identities embodied in objects used in a more public sphere. That this research identified a greater diversity of identities within the utilitarian objects from the HSC emphasizes the importance of considering mundane, domestic contexts as well as higher visibility contexts in explorations of social identity.

The inconsistency between the utilitarian and decorated pottery assemblage identified in this study fits within the broader context of what is known about the archaeology of the U.S. Southwest during this period. Recent research by Matthew Peeples (2011) also identified a disconnect between the social identities expressed by different technologies and categories of material culture, including utilitarian and ceramics as well as architecture, in the Cibola region. He suggests this data is consistent with a theoretical approach that views identities as multi-faceted and nested; that the development of overarching categorical identities may indicate an associated social change towards coordinated social action among larger groups of people (Peeples 2011:371–375). Peeples is not alone in identifying this pattern of dissonance between the identities embodied in high and low visibility material culture (e.g., Clark 2001; Duff 2005; Duff and Nauman 2010; Elkins 2007; Nauman 2007; Neuzil 2001, 2005a; Wichlacz 2009; Zedeño 1994). In her exploration of ceramic technology in the region of Arizona around Grasshopper Pueblo, María Nieves Zedeño (1994:103–105) found technological differences in ceramic manufacturing communities among settlements less than ten kilometers apart. These distinct technological traditions were cross-cut by a uniform decorative style. Zedeño (1994:103–105) interpreted this patterning as evidence of separate teaching frameworks and the need to maintain social distance.

This dissertation, along with studies by Jeffery Clark (2001), Patrick Lyons (2001, 2003), Andrew Duff (2005), Matthew Peeples (2011), Anna Neuzil (Neuzil 2001, 2005a), and others, is part of a growing body of literature demonstrating that low visibility attributes of material culture are a valuable tool for examining the social intricacies of ancient migrations. Similarities in technological style provide an analogy for social relationships and historical ties between groups and individuals. Previous studies pioneering this methodology have focused on the Cibola and Mogollon regions of the U.S. Southwest, exploring the social diversity and demographic changes that occurred during the Pueblo IV period in these areas. This research applied the same theoretical principals, along with an adapted methodology, to the HSC in northeastern Arizona.

Scales of Identity in the Archaeological Record

The HSC is clearly a significant place in Hopi history both as a source of and destination for immigrants. In addition to representing an important stop along the migration route to Hopi, the Homol'ovi villages included people who temporarily immigrated from the Hopi Mesas to Homol'ovi. The archaeological record of the HSC, therefore, provides unique insights on the social processes that contributed to modern Hopi society. The development, expression, and negotiation of identities on many scales at Homol'ovi (Adams 1991, 1994a, 1996a, 2002) furthered the integration of diverse social groups and simultaneously encouraged the manifestation of social distinctions, clearly presaging the diversity of Hopi identities that exist today.

Taken together, the spatial and chronological distribution of the stylistic clusters identified by this analysis within and across the sites of the HSC suggest that, although there were certain social trends that cross-cut the settlement cluster, the social history of each site within the HSC may have been highly individual. A common thread that ties together the various HSC settlements is the clear evidence of a relationship between each of these sites and the villages of the Hopi Mesas. Numerous lines of evidence suggest that immigrants from the Hopi Mesas were primarily responsible for colonizing the Homol'ovi area during the Pueblo IV period. Hopi oral tradition states that the ancestors of many modern Hopi clans passed through the Homol'ovi area, in some cases establishing villages, during their migrations to the Hopi Mesas (e.g., Courlander 1971; Ferguson and Loma'omvaya 1999; Fewkes 1900; Hantman 1982; Mindeleff 1891; Voth 1905).

This cultural tie between Hopi and Homol'ovi is also visible archaeologically. Architecture throughout the HSC is similar to that typical of the Hopi Mesas: kiva and room architecture and layout especially suggest the Hopi Mesas as the source of the HSC's initial occupation (Adams 2002). Locally produced WOW was manufactured and decorated in a style consistent with Hopi technological and decorative traditions, demonstrating a clear connection between the communities of practice responsible for the production of both Jeddito Yellow Ware and WOW (Lyons 2001, 2003). The social and economic relationships between sites in the HSC and villages on the Hopi Mesas are evidenced by the large quantities of Hopi pottery imported to the HSC, likely in exchange for cotton (Adams 2002; Adams et al. 2004; Lyons 2001, 2003). Throughout the Pueblo IV occupation of the HSC, pottery produced on the Hopi Mesas, especially Jeddito Yellow Ware, was the pottery most frequently imported to the HSC (Adams 2002). After around 1350, Jeddito Yellow Ware was more common than locally produced WOW in all occupied villages (Adams 2002; Cutright-Smith and Barker 2016; Hays 1991). Ceramic compositional analysis suggests there may be a relationship specifically between the HSC and Antelope Mesa: INAA found that 64 percent of Jeddito Yellow Ware vessels from H1 and 75 percent of Jeddito Yellow Ware vessels from H2 were produced on Antelope Mesa (Bernardini 2005:151; Bishop et al. 1988).

The data explored by this research reaffirm the existence and importance of the relationships between the residents of the HSC and the residents of the Hopi Mesas. The majority of corrugated pottery produced locally within the HSC was manufactured according to the dominant technological tradition on the Hopi Mesas at this time. Although the HSC was indisputably affiliated with the Hopi Mesas, founded in large part by immigrants from the Hopi Mesas and occupied by people who essentially followed the same social and cultural practices as the residents of the Hopi Mesas (Adams 2002; Lyons 2001, 2003), a diversity of social groups were nested within this overarching identity. Analysis of locally produced corrugated pottery indicates that some people may have migrated to the HSC from areas other than the Hopi Mesas, tying the Homol'ovi sites into a broader social network.

The social diversity indicated by the locally produced corrugated pottery assemblage pervaded the HSC from its beginning—the earliest evidence of immigrants from areas other than the Hopi Mesas residing in the HSC was found at Homol'ovi IV (H4)—persisting and increasing throughout the occupation of the settlement cluster. Each site included in this analysis exhibited different spatial and chronological patterning of corrugated stylistic clusters, suggesting that each site within the HSC was shaped by its own, unique social history. Therefore, while it is important to acknowledge the ways in which these sites formed a unitary social entity—a settlement cluster—it is equally important to emphasize the discrete identities embodied within each individual site.

This fundamental tension between a stable, uniform identity on a broad scale and social diversity and differentiation on a smaller scale is consistent with the development of Hopi identity as we understand it today. Movement and migration are fundamental components of modern Hopi identities, permeating Hopi oral histories (Bernardini 2005; Courlander 1971; Ferguson and Loma'omvaya 1999; Fewkes 1904; Malotki 1993; Nequatewa 1936). According to Hopi oral tradition, the Hopi entered this world, the Fourth World, following journeys through earlier worlds marked by disorder and corruption (Bernardini 2005:26; Malotki 1993:445). Máasaw, the guardian of the fourth world, told the Hopi to travel to the Hopi Mesas, leaving markers of their journey along the way (Bernardini 2005; Dongoske et al. 1997; Ferguson and Loma'omvaya 1999; Kuwanwisiwma and Ferguson 2004, 2009). A long period of migration followed, with different groups moving across the landscape in different directions. These groups were often quite small, containing a single household or a group of households (Bernardini 2005; Ferguson and Colwell-Chanthaphonh 2006; Harbison 1981; Neuberger 1977). Periodically, these groups came together, living in larger, aggregated settlements. The small size of these migration groups allowed the persistence of subgroup identities within the larger identities developed in each of these aggregated settlements (Bernardini and Fowles 2011).

These groups arrived at Hopi at different times from different places (Ferguson and Loma'omvaya 1999), each following a different migration trajectory. Although some clans believe that they emerged into the fourth world near the Grand Canyon (Ferguson 1998:43–47), others describe a migration to Hopi from the south, near the Valley of Mexico (Ferguson and Loma'omvaya 1999; Washburn 1995). The archaeological sites and artifacts created over the course of these migrations are markers on the landscape, testaments to these migration histories and to the fulfillment of the pact between the Hopi and Máasaw (Ferguson and Loma'omvaya 1999). Despite the separation of clans at the beginning of this migration history, the Hopi have always considered themselves to have been one people. In the ancient past, the Hopi people separated and traveled in order to explore the world, upon the completion of these travels each group arrived at the Hopi Mesas bringing with them important social knowledge and connections. Thus, modern Hopi culture is constituted of the various ceremonies, rituals, and knowledge brought to the Hopi Mesas by each of these smaller social groups (Ferguson and Loma'omvaya 1999). In this way, Hopi oral traditions acknowledge the diversity inherent in and central to the development of Hopi identity (Ferguson and Loma'omvaya 1999).

If Hopi identity is understood as accretional, accumulated over the course of movements across the landscape, it is not inconsistent for a place, broadly identifiable as affiliated with Hopi, to be comprised of small, diverse social groups. Although Homol'ovi is a distinct place on the landscape and not a part of the Hopi Mesas, it became part of the Hopi social landscape after being colonized by immigrants from the Hopi Mesas. The villages at Homol'ovi were constructed in the Hopi manner, and people residing in these communities engaged with objects and spaces associated with Hopi cultural practices. While the HSC was established by people who migrated from the Hopi Mesas, it was also occupied by people who were migrating to Hopi from other areas. The co-residence of this diverse group within the sites of the HSC would have shaped the identities of all people living in the Homol'ovi area. In this way, the HSC and other similar settlement clusters may be understood as liminal places in which Hopi identity was developed and negotiated as people continued their migrations towards the Hopi Mesas.

The residents of each site within the HSC would have experienced these social negotiations differently. As discussed above, the sites of the HSC were not uniform entities: each was formed through distinct social processes. Although each site within the HSC had extensive ties to the Hopi Mesas, each site also participated in social relationships with other areas. During certain times and at certain sites, most notably Chevelon, these other relationships may have been as important as the relationship between the HSC and the Hopi Mesas. For example, White Mountain Red Ware is more abundant at Chevelon than at the other HSC villages (Cutright-Smith and Barker 2016). This may indicate that the residents of this site may have had more extensive social contacts with groups in Silver Creek than did other HSC villages. Similarly, the lithic assemblage from Chevelon contained larger amounts of petrified wood than other HSC villages (Medeiros 2016:192–195), suggesting that the residents of Chevelon may have engaged in different lithic acquisition networks as well. At H4, Alameda Brown Ware represents a relatively large proportion of the ceramic assemblage (13.95%) (Bubemyre 2004:Table 8.1), suggesting that residents of this village had a stronger relationship with areas to the west than other, later, residents of Homol'ovi.

The founders of each HSC site may have migrated from different Hopi villages or mesas. Jeddito Yellow Ware imported from Awat'ovi on Antelope Mesa represents an overwhelming majority of the Jeddito Yellow Ware assemblage at H1 and H2 (53 and 54% respectively), while Jeddito Yellow Ware imported from Kawàyka'a and Musangnuvi are more abundant within the Jeddito Yellow Ware assemblage from H3 (21% from each site) (Bernardini 2005:151). These percentages may indicate stronger social ties between these sites. The numbers and origins of immigrants from other areas at each site also varied. These demographic factors would undoubtedly have shaped the social relationships within each site and between the different sites of the HSC. Further exploration of the ways in which this social diversity affected the development and negotiation of identity within the sites of the HSC would doubtless prove a fruitful avenue for future research.

This study of identity within the HSC clearly illustrates the value of approaching identity from multiple scales, and the inherent problems in uncritically treating any site, settlement cluster, or region as a single analytical unit. Traditionally, archaeologists have tended to understand culture as discrete and fundamental (Ferguson 2004:28; Speth 1988). Units such as Anasazi, Mogollon, and Hohokam have been employed as normative cultural categories (e.g., Haury 1936; Kidder 1936; Roberts 1935). Similarly, southwestern archaeologists have tended to study migration through site-unit intrusions: enclaves of immigrants from distant areas established within a new area, who continued to produce artifacts and material culture according to their traditional practices (e.g., Di Peso 1958; Haury 1958; Lindsay 1987; Lindsay, Jr. and Dean 1983; Wasley 1962; Woodson 1999). While this perspective has merit—certainly there are distinct differences in material culture that distinguish regional cultures, and migration of groups between these areas can be seen in the local production of technologies associated with other regions—this perspective elides the social diversity present within these cultural groups and fails to acknowledge the ways in which identities may have cross-cut these archaeological units.

If we accept the premise that identity is inherently multi-faceted and multi-scalar, both instinctively felt and constantly negotiated through social relationships and interactions, we must equally accept that even seemingly homogenous cultural units are characterized by social diversity and the tension that accompanies such diversity. While the juxtaposition of clearly identifiable culture units has analytical merit when exploring social identity on a broad scale, we must not lose sight of the negotiations of identity that played out on a smaller scale within seemingly homogeneous settlement clusters and villages. Exploring identity on a broader scale provides essential meaning and context, while studying issues of identity on a smaller scale provides greater resolution as well as the opportunity to explore how regional patterning manifests on a local level. Together these lines of evidence create a more complex and nuanced view of identity and social history than either can offer individually. The information presented in this study represents a step towards understanding the diversity of social relationships present within Pueblo IV settlement clusters, highlighting the importance of research emphasizing social interactions on both large and small scales.

Just as assemblages of material culture are accumulated at archaeological sites, individuals and groups accumulate identity through their social relationships. Hopi oral traditions describe the ways in which the migration of groups through the Homol'ovi villages shaped the identity of the resulting community, demonstrating the ways in which identity is accumulated over time, through social relationships between people, objects, and the landscape. The differentiation between social uniformity and diversity reflected in the ceramic assemblage of the HSC reveals the complexity of negotiating integration and differentiation within an aggregated community. While integrative mechanisms and the development of an overarching community identity are necessary to accommodate the needs of diverse factions within the larger community, the presence of social diversity strengthens an aggregated community through the creation and maintenance of diverse social networks, unique trade relationships, and access to specialized social knowledge. People journeyed to the HSC following different migration pathways. This diversity in social history brought varied social, economic, and ritual resources to the HSC and shaped the identities of every individual who lived in the villages of Homol'ovi.

APPENDIX A: REPORT ON HOMOLOVI ORANGE WARE AND HOMOLOVI GRAY WARE SAMPLES SUBMITTED TO MURR FOR INAA

Archaeometry Laboratory

Neutron Activation Analysis of Ceramics from Homol'ovi Pueblos, Arizona

ANIDS: HOM001-HOM128
(includes comparison to PDL001-PDL428)

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Introduction

This report describes the preparation, analysis, and interpretation of 128 pottery specimens (HOM001-HOM128) from five sites in east central Arizona. The sites include Homol'ovi I, Homol'ovi II, Homol'ovi III, Homol'ovi IV, and Chevelon Ruin. The sample focuses on Homol'ovi utility ware and in part is aimed at addressing whether the orange and gray paste versions are compositionally distinct. An initial comparison of the new data to the MURR database revealed a close match with the specimens previously analyzed for Patrick Lyons (2001) as part of his dissertation research. Lyons sampled over 380 sherds and 43 clays from the same region and many all of the same sites except Chevelon Ruin. The compositional overlap between the two projects was extensive enough to justify combining the two datasets into a single analysis. Some of the groups Lyons identified from the surrounding area (Hopi, Puerco, LCW) were chemically distinct and left largely intact except for the addition of a few new samples from this project. The "local" groups identified by Lyons (Hom1, Hom2, and Local) were combined with the remaining new data and a new group structure was identified that includes four groups and outliers instead of the previous two groups. Appendix 1 includes group assignments and some descriptive information for all of the HOM and PDL specimens included in this study.

Sample Preparation

Pottery specimens were prepared for NAA using procedures standard at MURR. Fragments of about 1cm^2 were removed from each specimen and abraded using a silicon carbide burr in order to remove slip, paint, and adhering soil, thereby reducing the risk of measuring contamination. The samples were washed in deionized water and allowed to dry in the laboratory. Once dry, the individual sherds were ground to powder in an agate mortar to homogenize the samples. Archival samples were retained from each sherd (when possible) for future research.

Two analytical samples were prepared from each source specimen. Portions of approximately 50 mg of powder were weighed into clean high-density polyethylene vials used for short irradiations at MURR. At the same time, 200 mg samples were weighed into clean high-purity quartz vials used for long irradiations. Individual sample weights were recorded to the nearest 0.01 mg using an analytical balance. Both vials were sealed prior to irradiation. Along with the unknown samples, Standards made from National Institute of Standards and Technology (NIST) certified standard reference materials of SRM-1633a (coal fly ash) and SRM-688 (basalt rock) were similarly prepared, as were quality control samples (e.g., standards treated as unknowns) of SRM-278 (obsidian rock) and Ohio Red Clay (a standard developed for in-house applications).

Irradiation and Gamma-Ray Spectroscopy

Neutron activation analysis of ceramics at MURR, which consists of two irradiations and a total of three gamma counts, constitutes a superset of the procedures used at most other NAA laboratories (Glascock 1992; Neff 1992, 2000). As discussed in detail by Glascock (1992), a short irradiation is carried out through the pneumatic tube irradiation system. Samples in the polyvials are sequentially irradiated, two at a time, for five seconds by a neutron flux of 8 x 10^{13} n cm^{-2} s^{-1} The 720-second count yields gamma spectra containing peaks for nine short-lived elements aluminum (Al), barium (Ba), calcium (Ca), dysprosium (Dy), potassium (K), manganese (Mn), sodium (Na), titanium (Ti), and vanadium (V). The samples are encapsulated in quartz vials and are subjected to a 24–hour irradiation at a neutron flux of 5 x 10^{13} n cm^{-2} s^{-1}. This long irradiation is analogous to the single irradiation utilized at most other laboratories.

After the long irradiation, samples decay for seven days, and then are counted for 1,800 seconds (the "middle count") on a high-resolution germanium detector coupled to an automatic sample changer. The middle count yields determinations of seven medium half-life elements, namely arsenic (As), lanthanum (La), lutetium (Lu), neodymium (Nd), samarium (Sm), uranium (U), and ytterbium (Yb). After an additional three- or four-week decay, a final count of 8,500 seconds is carried out on each sample. The latter measurement yields the following 17 long half-life elements: cerium (Ce), cobalt (Co), chromium (Cr), cesium (Cs), europium (Eu), iron (Fe), hafnium (Hf), nickel (Ni), rubidium (Rb), antimony (Sb), scandium (Sc), strontium (Sr), tantalum (Ta), terbium (Tb), thorium (Th), zinc (Zn), and zirconium (Zr). The element concentration data from the three measurements are tabulated in parts per million

Interpreting Chemical Data

The analyses at MURR, described above, produced elemental concentration values for 33 elements in most of the analyzed samples. Values for Ni were below detection limits for most specimens in this dataset, thus Ni was deleted. The interpretation was conducted using data for the remaining 32 elements

Use of log concentrations rather than raw data compensates for differences in magnitude between the major elements, such as calcium, and trace elements, such as the rare earth or lanthanide elements (REEs). Transformation to base-10 logarithms also yields a more normal distribution for many trace elements.

The interpretation of compositional data obtained from the analysis of archaeological materials is discussed in detail elsewhere (e.g., Baxter and Buck 2000; Bieber et al. 1976; Bishop and Neff 1989; Glascock 1992; Harbottle 1976; Neff 2000) and will only be summarized here. The main goal of data analysis is to identify distinct homogeneous groups within the analytical database. Based on the provenance postulate of Weigand *et al*. (1977), different chemical groups may be assumed to represent geographically restricted sources. For lithic materials such as obsidian, basalt, and cryptocrystalline silicates (e.g., chert, flint, or jasper), raw material samples are frequently collected from known outcrops or secondary deposits and the compositional data obtained on the samples is used to define the source localities or boundaries. The locations of sources can also be inferred by comparing unknown specimens (i.e., ceramic artifacts) to knowns (i.e., clay samples) or by indirect methods such as the “criterion of abundance” (Bishop *et al*. 1992) or by arguments based on geological and sedimentological characteristics (e.g., Steponaitis *et al*. 1996). The ubiquity of ceramic raw materials usually makes it impossible to sample all potential “sources” intensively enough to create groups of knowns to which unknowns can be compared. Lithic sources tend to be more localized and compositionally homogeneous in the case of obsidian or compositionally heterogeneous as is the case for most cherts.

Compositional groups can be viewed as “centers of mass” in the compositional hyperspace described by the measured elemental data. Groups are characterized by the locations of their centroids and the unique relationships (i.e., correlations) between the elements. Decisions about whether to assign a specimen to a particular compositional group are based on the overall probability that the measured concentrations for the specimen could have been obtained from that group.

Initial hypotheses about source-related subgroups in the compositional data can be derived from non-compositional information (e.g., archaeological context, decorative attributes, etc.) or from application of various pattern-recognition techniques to the multivariate chemical data. Some of the pattern recognition techniques that have been used to investigate archaeological data sets are cluster analysis (CA), principal components analysis (PCA), and discriminant analysis (DA). Each of the techniques has its own advantages and disadvantages which may depend upon the types and quantity of data available for interpretation.

The variables (measured elements) in archaeological and geological data sets are often correlated and frequently large in number. This makes handling and interpreting patterns within the data difficult. Therefore, it is often useful to transform the original variables into a smaller set of uncorrelated variables in order to make data interpretation easier. Of the above-mentioned pattern recognition techniques, PCA is a technique that transforms from the data from the original correlated variables into uncorrelated variables most easily.

PCA creates a new set of reference axes arranged in decreasing order of variance subsumed. The individual PCs are linear combinations of the original variables. The data can be displayed on combinations of the new axes, just as they can be displayed on the original elemental concentration axes. PCA can be used in a pure pattern-recognition mode, i.e., to search for subgroups in an undifferentiated data set, or in a more evaluative mode, i.e., to assess the coherence of hypothetical groups suggested by other criteria. Generally, compositional differences between specimens can be expected to be larger for specimens in different groups than for specimens in the same group, and this implies that groups should be detectable as distinct areas of high point density on plots of the first few components. It is well known that PCA of chemical data is scale dependent (Mardia *et al*. 1979), and analyses tend to be dominated by those elements or isotopes for which the concentrations are relatively large. This is yet another reason for the log transformation of the data.

One frequently exploited strength of PCA, discussed by Baxter (1992), Baxter and Buck (2000), and Neff (1994, 2002), is that it can be applied as a simultaneous R- and Q-mode technique, with both variables (elements) and objects (individual analyzed samples) displayed on the same set of principal component reference axes. A plot using the first two principal components as axes is usually the best possible two-dimensional representation of the correlation or variance-covariance structure within the data set. Small angles between the vectors from the origin to variable coordinates indicate strong positive correlation; angles at 90 degrees indicate no correlation; and angles close to 180 degrees indicate strong negative correlation. Likewise, a plot of sample coordinates on these same axes will be the best two-dimensional representation of Euclidean relations among the samples in log-concentration space (if the PCA was based on the variance-covariance matrix) or standardized log-concentration space (if the PCA was based on the correlation matrix). Displaying both objects and variables on the same plot makes it possible to observe the contributions of specific elements to group separation and to the distinctive shapes of the various groups. Such a plot is commonly referred to as a “biplot” in reference to the simultaneous plotting of objects and variables. The variable inter-relationships inferred from a biplot can be verified directly by inspecting bivariate elemental concentration plots. [Note that a bivariate plot of elemental concentrations is not a biplot.]

Whether a group can be discriminated easily from other groups can be evaluated visually in two dimensions or statistically in multiple dimensions. A metric known as the Mahalanobis distance (or generalized distance) makes it possible to describe the separation between groups or between individual samples and groups on multiple dimensions. The Mahalanobis distance of a specimen from a group centroid (Bieber *et al*. 1976, Bishop and Neff 1989) is defined by:

$$D^2_{y,X} = [y - \overline{X}]^t I_x [y - \overline{X}]$$

where y is the 1 x m array of logged elemental concentrations for the specimen of interest, X is the n x m data matrix of logged concentrations for the group to which the point is being compared with $\overline{X}$ being it 1 x m centroid, and I_x is the inverse of the m x m variance-covariance matrix of group X. Because Mahalanobis distance takes into account variances and covariances in the multivariate group it is analogous to expressing distance from a univariate mean in standard deviation units. Like standard deviation units, Mahalanobis distances can be converted into probabilities of group membership for individual specimens. For relatively small sample sizes, it is appropriate to base probabilities on Hotelling's T^2, which is the multivariate extension of the univariate Student's t.

When group sizes are small, Mahalanobis distance-based probabilities can fluctuate dramatically depending upon whether or not each specimen is assumed to be a member of the group to which it is being compared. Harbottle (1976) calls this phenomenon "stretchability" in reference to the tendency of an included specimen to stretch the group in the direction of its own location in elemental concentration space. This problem can be circumvented by cross-validation, that is, by removing each specimen from its presumed group before calculating its own probability of membership (Baxter 1994; Leese and Main 1994). This is a conservative approach to group evaluation that may sometimes exclude true group members.

Small sample and group sizes place further constraints on the use of Mahalanobis distance: with more elements than samples, the group variance-covariance matrix is singular thus rendering calculation of I_x (and D^2 itself) impossible. Therefore, the dimensionality of the groups must somehow be reduced. One approach would be to eliminate elements considered irrelevant or redundant. The problem with this approach is that the investigator's preconceptions about which elements should be discriminate may not be valid. It also squanders the main advantage of multielement analysis, namely the capability to measure a large number of elements. An alternative approach is to calculate Mahalanobis distances with the scores on principal components extracted from the variance-covariance or correlation matrix for the complete data set. This approach entails only the assumption, entirely reasonable in light of the above discussion of PCA, that most group-separating differences should be visible on the first several PCs. Unless a data set is extremely complex, containing numerous distinct groups, using enough components to subsume at least 90% of the total variance in the data can be generally assumed to yield Mahalanobis distances that approximate Mahalanobis distances in full elemental concentration space.

Lastly, Mahalanobis distance calculations are also quite useful for handling missing data (Sayre 1975). When many specimens are analyzed for a large number of elements, it is almost certain that a few element concentrations will be missed for some of the specimens. This occurs most frequently when the concentration for an element is near the detection limit. Rather than eliminate the specimen or the element from consideration, it is possible to substitute a missing value by replacing it with a value that minimizes the Mahalanobis distance for the specimen from the group centroid. Thus, those few specimens which are missing a single concentration value can still be used in group calculations.

Results

The results include a detailed description of the comparison to the MURR database, a justification for combining the new data with the previous data from Lyons, assignment of your samples to the outlier PDL groups, a justification for the merge of the "local" Homol'ovi ceramics, and a new group structure for the Homol'ovi data. We present additional sections that specifically address some of the stated research objectives including a comparison of the orange and gray paste colors, the compositional support (or lack thereof) for the provided temper groups, compositional group patterns by site, and a discussion for evidence of production locations for the compositional groups.

Comparison with Previous Regional Data

The initial data analysis involved a Euclidian distance search of the entire MURR ceramic database. Rather than treat a Euclidian distance search as a clear quantitative measure of related data, it is safer (due to lots of false positive and false negative matches) to look for previous projects that regularly show similarity to the new data. In this case, the previous study for Patrick Lyons (2001) included almost all the closest matches for every specimen in the new dataset. No other single project had more than a few scattered close matches. Other projects with close matches include projects like the Cañada Alamosa dataset (submitted by Karl Laumbach) that include obvious imported ceramics. Because this project is focused on local production of the Homol'ovi utility ware it was beyond the scope of this research to track down every scattered export.

Comparison to Lyons Data

The project conducted by Lyons is clearly directly relevant to the current dataset and includes ceramic samples from many of the same sites. Upon initial inspection, the compositional group structure presented by Lyons (2001) was well justified, both statistically and archaeologically. The new study is only about a fourth the size of Lyons' dataset, so it is reasonable to project the new samples against the previously established groups and then make adjustments as necessary. The groups include a large "local" cluster that is subdivided into two groups: Hom1 and Hom2. The majority of the new HOM specimens plot well with this local cluster and a more detailed description of this group is provided later in this report. Thirteen of the new samples were clear outliers from the previous data and are classified as unassigned.

The LCW group identified by Lyons includes primarily Little Colorado Whitewares and there are no specimens in the current study matching this group. One sample (HOM080) shows some similarity to the Hopi Group, although that match should be considered marginal. It generally plots between the Hopi and Local clusters. 18 specimens plot well with the Puerco Group, but there are some slight shifts in Ba and Zr that make clear assignment by Mahalanobis distance probabilities difficult. Figure 1 shows a plot of the Hopi and Puerco groups along with all of the new samples (except for the 13 outliers).

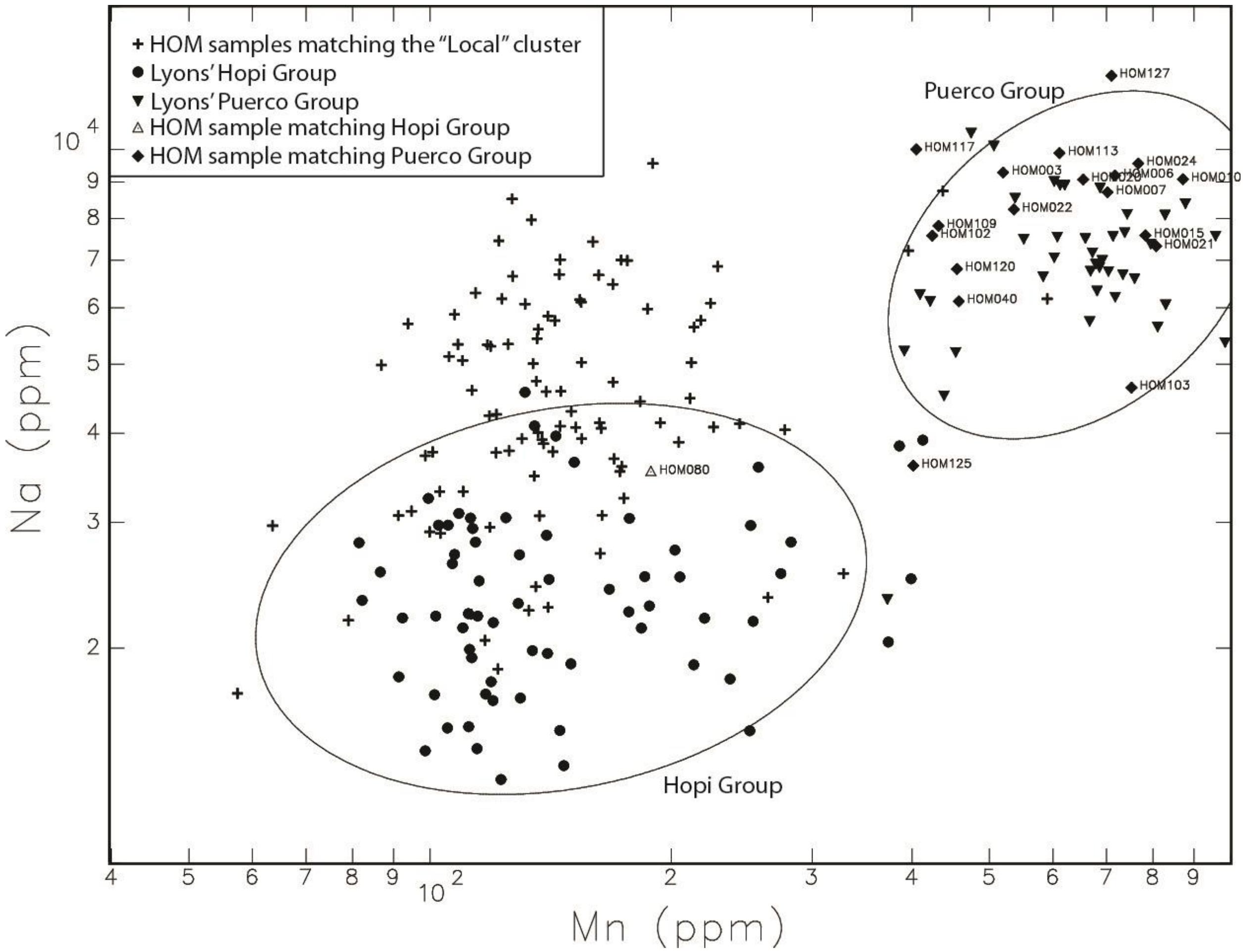

Figure 1: Bivariate plot of manganese and sodium showing the relationship between the new samples and the Hopi and Puerco groups. The HOM samples assigned to Hopi and Puerco are individually labeled while the remaining samples matching the local cluster are only plotted. The ellipses represent 90% confidence intervals for membership in the groups.

Lyons split the Local cluster into two large groups Hom1 and Hom2, with a small portion of samples remaining in the broader Local group. Most of the samples in the current dataset fit well into this cluster, but the additional of the new samples blurred the distinction between Hom1 and Hom2 and also hinted at some additional clustering. Rather than attempt to work with the existing structure, all of the previous members of Hom1, Homs, and local were combined with the new samples (n=96) not already assigned or removes as outliers. Two initial groups were identified within this large cluster based on increased concentrations of rubidium (Group 1, n=30) and cobalt (Group 2, n=25) (Figure 2). These groups were further refined using Mahalanobis distance probabilities. Most of the new Group 1 was part of Lyons' Group Hom1.

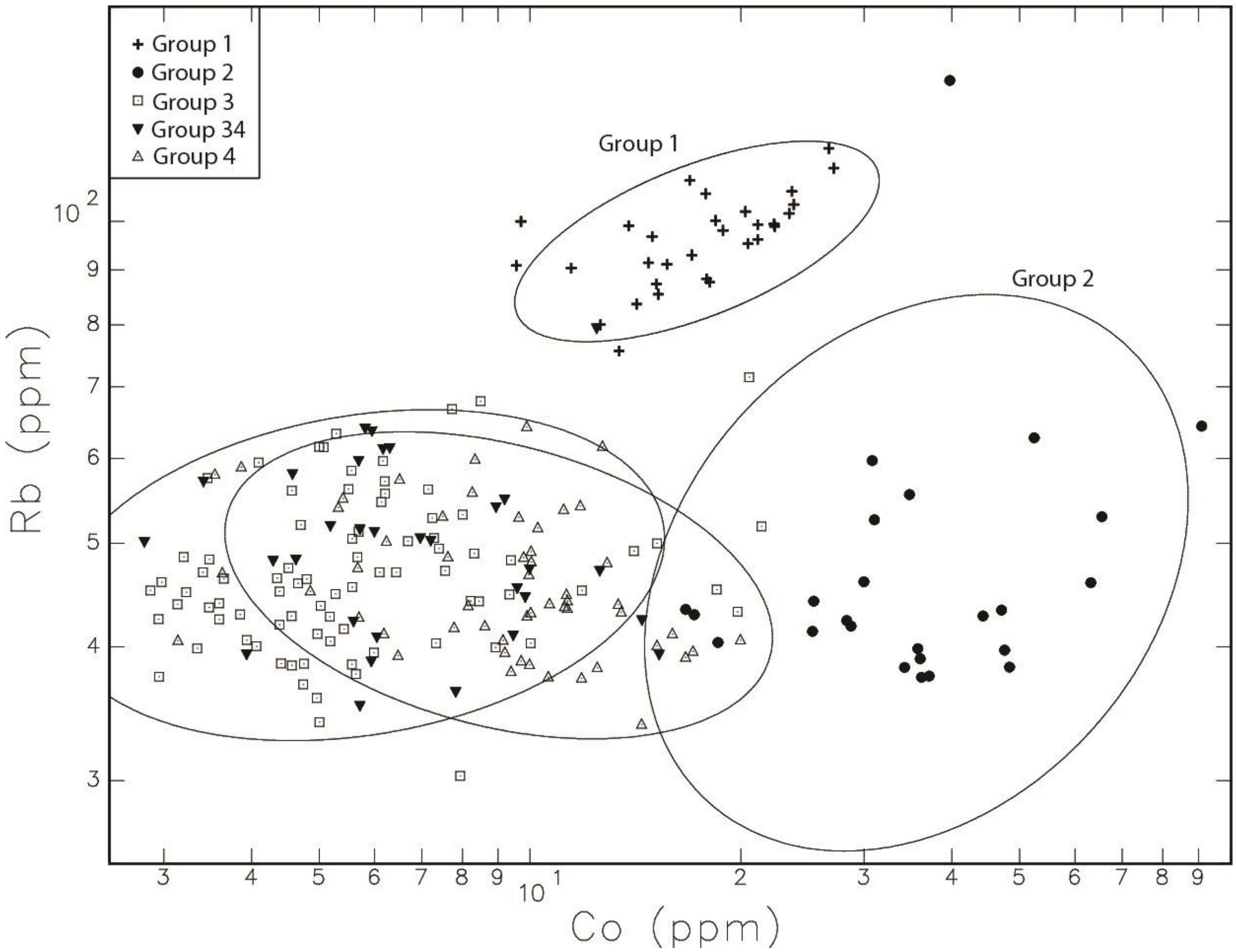

Figure 2: Bivariate plot of cobalt and rubidium showing the separation of new Groups 1 and 2. The ellipses represent 90% confidence intervals for membership in the groups.

The remaining large cluster was initially split using a cluster analysis and then refined with Mahalanobis distance probabilities and bivariate plots. The new groups include Group 3 (n=83) and Group 4 (n=54) roughly correlate with Lyons' groups Hom1 and Hom2 respectively. A large number of specimens (n=31) remain similar to Groups 3 and 4, but show significant statistical deviations or create too much overlap between the groups. These are assigned to a compositionally diverse Group 34 that is similar to Lyons' Local Group. Groups 3 and 4 might be more accurately considered ends of a continuum of variability, with much of Group 34 in the middle. Figure 3 is a plot of Groups 3, 4, and 34, and Appendix 2 lists group membership probabilities in Groups 3 and 4 for all samples in this study separated by compositional group.

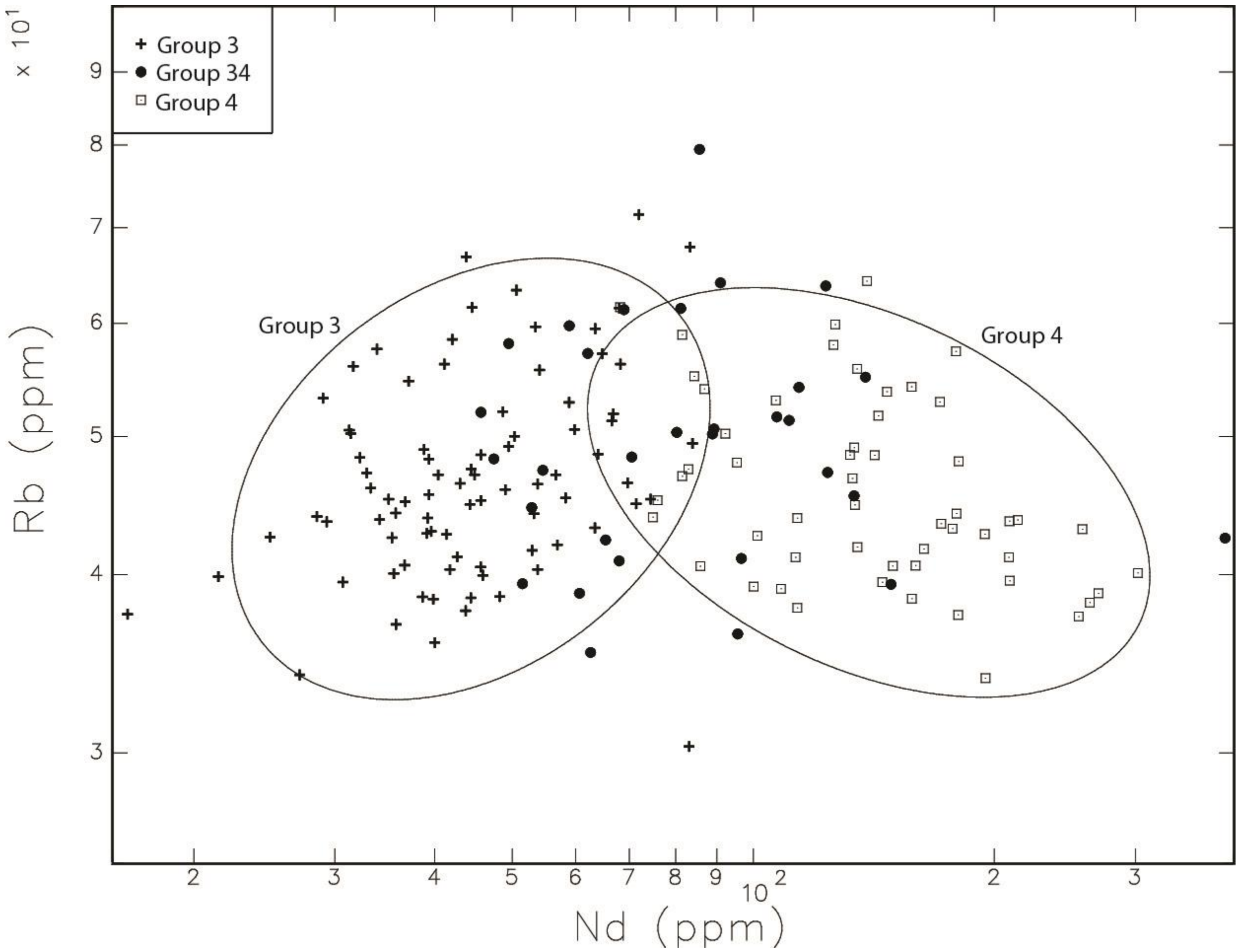

Figure 3: Bivariate plot of neodymium and rubidium showing the separation of new Groups 3 and 4. The ellipses represent 90% confidence intervals for membership in the groups.

<u>Compositional Assessment of Paste Color (Orange versus Gray)</u>

One of the research questions stated in the proposal was to assess compositional variability between Homol'ovi Orange and Gray ware. The color is likely a result of different firing conditions (oxidation versus reduction) and this is supported by the presence of both colors on the same vessel. If the color difference is due only to the oxidation states of the iron then bulk compositional analysis such as NAA will not differentiate these. It is clear from the compositional data that there are no patterned differences in the bulk chemistry between the orange and gray wares (Table 1 and Figure 4). Table 1 shows slightly higher gray ware in Group 4 and slightly more orange ware in the Puerco Group. This might indicate a slight patterning in firing techniques. Figure 4 shows the lack of chemical separation between the two wares.

Table 1: Breakdown of ware by compositional group assignment for the HOM samples.

	Compositional Group							
Ware	**2**	**3**	**34**	**4**	**Hopi**	**Puerco**	**Unas**	**Total**
Homolovi Gray Ware	1	17	9	15	1	5	14	62
Homolovi Orange Ware	3	17	5	5		13	23	66
Total	4	34	14	20	1	18	37	128

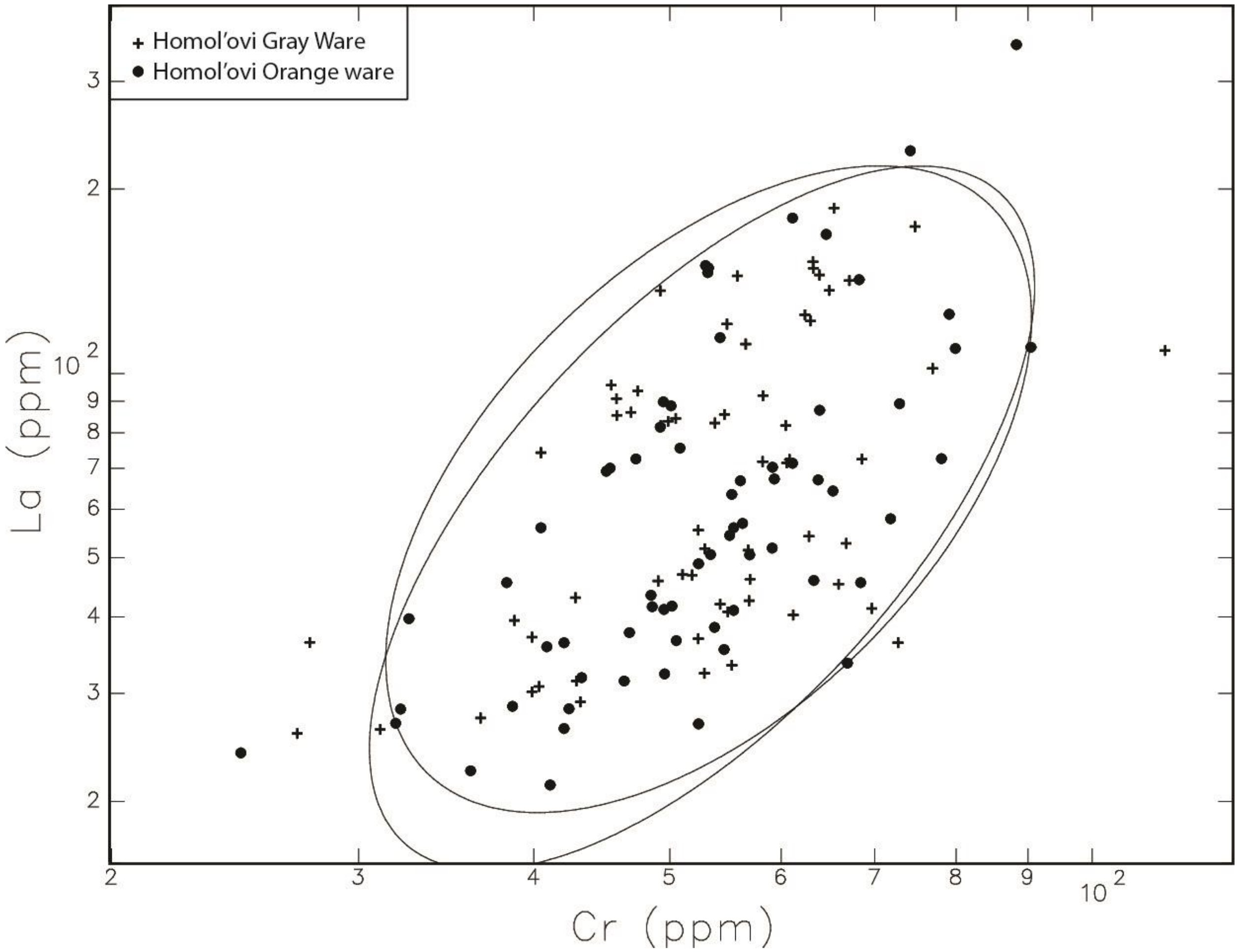

Figure 4: Bivariate plot of chromium and lanthanum showing the lack of separation between the orange and gray wares. The ellipses represent 90% confidence intervals for membership in the groups.

<u>Compositional Assessment of Temper Groups</u>

Temper group assignments were provided for each sample that are based on macroscopic visual inspection of the paste. The primary differences in the temper groups involved the amount of colored or non-colored sand and the presence or absence of sherd temper. Sand tempers in general tend to have minimal impact on the bulk chemistry of ceramic pastes because they consist of primarily silica and this is not measured by NAA. They can have a diluting effect in an assemblage that includes highly variable amounts of sand temper. Likewise, sherd temper (containing primarily sherds with sand temper) will likely not have a significant compositional impact. Tempers can drive compositional group separation, but this typically occurs with highly variable sources of temper including volcanics such as the case in the Mimbres Valley. The sherds are divided into four basic temper groups (A, B, C, and D) and then subdivided based on the presence of sherd temper. Table 1 includes a breakdown of temper groups by compositional group assignment and shown no distinct patterns. Figure 5 is a plot of the eight temper groups showing the nearly complete overlap of all of them. It is fairly safe to conclude that the sand color and sherd temper are not the driving force in compositional variability within this assemblage.

Table 2: Breakdown of temper groups by compositional group assignment for the HOM samples.

Temper Group	Compositional Group 2	3	34	4	Hopi	Puerco	Unas	Total
A		7	4	3		2	12	28
AS	2	9	4	3			10	28
B				1		2	3	6
BS	1	5		1		3	3	13
C		2	1	7		4	5	19
CS	1	10	2	5	1	3	3	25
D							1	1
DS		1	3			4		8
Total	4	34	14	20	1	18	37	128

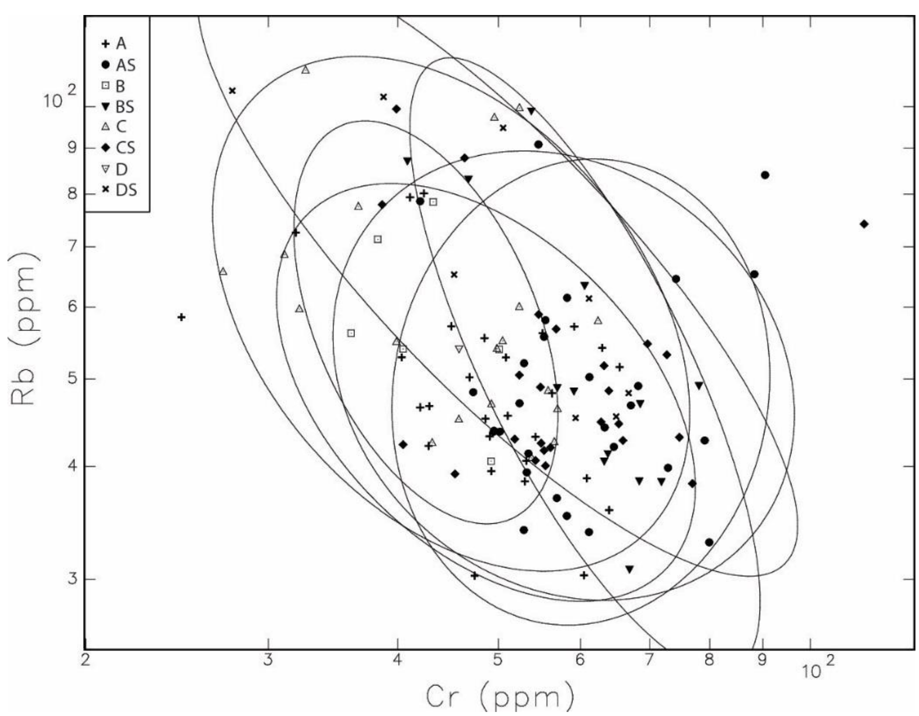

Figure 5: Bivariate plot of chromium and lanthanum showing the lack of separation between the orange and gray wares. The ellipses represent 90% confidence intervals for group membership.

Compositional Group Distribution by Site

A detailed assessment of compositional group distribution by site requires a thorough understanding of the local archaeology as well as the types and other evidence of production that is beyond the scope of this report. We present site-based distributions for the new samples alone (Table 3) and for the broader assemblage that include the samples submitted by Lyons (Table 4). Some interesting differences within the HOM dataset include the similar patterns between Chevelon Pueblo and Homol'ovi 1, and the shift from Group 3 to Group 4 between Homol'ovi II and III.

Table 3: Breakdown of compositional group assignment by site for the HOM samples.

	Compositional Group							
Site	**2**	**3**	**34**	**4**	**Hopi**	**Puerco**	**Unas**	**Total**
Chevelon Pueblo	2	7		1		8	10	28
Homol'ovi I		6	2	3		9	5	25
Homol'ovi II	2	13	3	1		1	5	25
Homol'ovi III		2	5	12			6	25
Homol'ovi IV		6	4	3	1		11	25
Total	4	34	14	20	1	18	37	128

Similar patterns hold when examining the entire assemblage included in the analysis (Table 4). The table includes a number of sites with very small sample sizes that are difficult to interpret. An additional 10 sites include only sherds assigned to the LCW group that has little relevance to this project. Puerco Ruin and/or Wallace Tank present a strong case for local production of the sherds assigned to the Puerco Group; however, there is some slight concern over the assignment of the new samples to this group since there is a slight shift in a couple elements. The vast majority of the new samples assigned to the Puerco Group are from Homol'ovi 1 and Chevelon Pueblo. Is there any other archaeological/temporal evidence for a connection between these two sites and Puerco Pueblo? If so, it appears to involve a one-way movement of ceramics.

Another interesting pattern involves Group 1. Group 1 is only found at two sites (Homol'ovi I and III) and only in the samples submitted by Lyons. Is there some difference in the sampling strategies between the two sites that might create the difference?

The presence of the Hopi Group members at Homol'ovi IV is remarkable and makes the single new sherd assigned to this group (from Homol'ovi IV) seem less problematic. A more detailed examination of the difference in sampling strategies between the two studies is needed as well as a better understanding of the temporal/cultural relationship between Homol'ovi IV and Hopi.

Table 3: Breakdown of compositional group assignment by site for the HOM and PDL samples. The PLD clays are not included.

	Compositional Group									
Site Name	**1**	**2**	**3**	**34**	**4**	**Hopi**	**LCW**	**Puerco**	**Unas**	**Total**
Adobe Pueblo									1	1
Az O:15:54						1				1
Bailey Ruin						2			2	4
Chavez Pass	1	2	4						3	10
Chevelon Pueblo		2	7		1			8	10	28
Holiday Inn									1	1
Homol'ovi I	19	8	20	8	16	5		9	45	130
Homol'ovi II		6	18	3	1			1	7	36
Homol'ovi III	10	5	21	15	32	5		1	23	112
Homol'ovi IV			9	5	4	55			35	108
Hp 36							1			1
Hp 36B							3			3
Hp 36C							2			2
Hp 51B							2			2
PEFO 1998B1							3			3
PEFO 1998B13							2			2
PEFO 1998B19							1			1
PEFO 1998B39							2			2
PEFO 1998B7							2			2
PEFO Wacc 6229							1			1
Puerco Ruin								23	2	25
Rye Creek Ruin									2	2
Verde:3:3		1	3						3	7
Verde:5:11									1	1
Verde:5:17									1	1
Verde:5:21			1							1
Verde:5:3		1								1
Verde:5:31									1	1
Verde:6:9									3	3
Wallace Tank								15		15
Total	30	25	83	31	54	68	19	57	140	507

Evidence of Production Location

Linking ceramic compositional to potential production locations through the analysis of archaeological clays is rarely successful. Of the more than 40 clay samples analyzed by Lyons, none showed any significant similarity to the compositional groups. There are many possible reasons, but the most likely is that significant alterations of the clays took place. Although the sand temper is not driving the compositional variability between the groups, it may be enough to shift the clays away from the sherds. Other possibilities include simply not sampling the right clays, or significant mixing or levigation of the clays.

Clearer links to production locations can be made by examining archaeologically recovered prepared clays, unfired sherds, or wasters (Glowacki et al. 2015). If possible this is an avenue for future research, but few areas in the Southwest present such opportunities. At this point the best assessment of production location involves the criterion of abundance. The Puerco, and LCW groups seem to have dense distributions that likely correlate with production location. Group 1, 2, 3, 4, and 34 present a more complicated case. Most likely these group differences represent subtle raw material difference within a larger pattern of production common to the Homol'ovi area.

Conclusions

The analysis of 128 new samples from the Homol'ovi region has added to the regional database started by Patrick Lyons (2001). The new samples have been merged into the previous compositional group structure, and the presumably "local" Homol'ovi cluster has been reassessed and a new 4-group structure replaces the previous 2-group structure. There is little direct evidence for the specific production location of most of the sherds and there is no clear match with any of the raw clay samples analyzed by Lyons.

It is clear from the compositional data that there is no bulk chemical basis for the distinction between Homol'ovi Orange and Gray Wares. The slightly different spatial patterning might indicate some patterned firing regime differences within the study area, but this is very speculative. The provided temper groups show a similar lack of justification based on the bulk chemistry.

Acknowledgments

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Appendix 1: Descriptive information along with compositional group assignment for the specimens in this study.[8]

ANID	Comp grp	alt ID	Site Name	Material	Ware
HOM001	g4	H1-81-CS	Homol'ovi I	Pottery	Homolovi Gray Ware
HOM002	g4	H1-45-CS	Homol'ovi I	Pottery	Homolovi Gray Ware
HOM003	Puerco	H1-65-C	Homol'ovi I	Pottery	Homolovi Gray Ware
HOM004	unas	H1-91-CS	Homol'ovi I	Pottery	Homolovi Gray Ware
HOM005	g4	H1-74-CS	Homol'ovi I	Pottery	Homolovi Gray Ware
HOM006	Puerco	H1-48-C	Homol'ovi I	Pottery	Homolovi Gray Ware
HOM007	Puerco	H1-58-A	Homol'ovi I	Pottery	Homolovi Orange Ware
HOM008	g34	H1-1-AS	Homol'ovi I	Pottery	Homolovi Orange Ware
HOM009	g34	H1-33-A	Homol'ovi I	Pottery	Homolovi Orange Ware
HOM010	Puerco	H1-30-B	Homol'ovi I	Pottery	Homolovi Orange Ware
HOM011	g3	H1-31-CS	Homol'ovi I	Pottery	Homolovi Orange Ware
HOM012	unas	H1-59-AS	Homol'ovi I	Pottery	Homolovi Orange Ware
HOM013	unas	H1-32-A	Homol'ovi I	Pottery	Homolovi Orange Ware
HOM014	g3	H1-89-A	Homol'ovi I	Pottery	Homolovi Orange Ware
HOM015	Puerco	H1-43-DS	Homol'ovi I	Pottery	Homolovi Orange Ware
HOM016	unas	H1-96-B	Homol'ovi I	Pottery	Homolovi Orange Ware
HOM017	g3	H1-67-BS	Homol'ovi I	Pottery	Homolovi Gray Ware
HOM018	g3	H1-66-AS	Homol'ovi I	Pottery	Homolovi Gray Ware
HOM019	g3	H1-70-AS	Homol'ovi I	Pottery	Homolovi Orange Ware
HOM020	Puerco	H1-64-BS	Homol'ovi I	Pottery	Homolovi Orange Ware
HOM021	Puerco	H1-78-B	Homol'ovi I	Pottery	Homolovi Orange Ware
HOM022	Puerco	H1-20-C	Homol'ovi I	Pottery	Homolovi Orange Ware
HOM023	g3	H1-52-A	Homol'ovi I	Pottery	Homolovi Orange Ware
HOM024	Puerco	H1-92-DS	Homol'ovi I	Pottery	Homolovi Gray Ware
HOM025	unas	H1-68-CS	Homol'ovi I	Pottery	Homolovi Gray Ware
HOM026	g3	H2-92-AS	Homol'ovi II	Pottery	Homolovi Gray Ware
HOM027	g34	H2-60-AS	Homol'ovi II	Pottery	Homolovi Orange Ware
HOM028	unas	H2-7-AS	Homol'ovi II	Pottery	Homolovi Orange Ware
HOM029	unas	H2-97-AS	Homol'ovi II	Pottery	Homolovi Orange Ware
HOM030	g3	H2-28-AS	Homol'ovi II	Pottery	Homolovi Orange Ware
HOM031	g3	H2-73-AS	Homol'ovi II	Pottery	Homolovi Orange Ware
HOM032	unas	H2-43-A	Homol'ovi II	Pottery	Homolovi Orange Ware

[8] Following the completion of his dissertation research in 2001, Patrick Lyons revised the ware and type assignments for a number of the samples he submitted for INAA. For PDL specimens with a revised typological assignment, the correct ware is shown in the ware column while the original typological assignment, which is recorded in the MURR database, is shown in parentheses.

HOM033	g3	H2-35-A	Homol'ovi II	Pottery	Homolovi Gray Ware
HOM034	g34	H2-63-A	Homol'ovi II	Pottery	Homolovi Gray Ware
HOM035	g3	H2-49-A	Homol'ovi II	Pottery	Homolovi Orange Ware
HOM036	unas	H2-96-A	Homol'ovi II	Pottery	Homolovi Orange Ware
HOM037	g3	H2-52-A	Homol'ovi II	Pottery	Homolovi Orange Ware
HOM038	g3	H2-61-CS	Homol'ovi II	Pottery	Homolovi Gray Ware
HOM039	g34	H2-45-CS	Homol'ovi II	Pottery	Homolovi Orange Ware
HOM040	Puerco	H2-71-DS	Homol'ovi II	Pottery	Homolovi Gray Ware
HOM041	g3	H2-65-CS	Homol'ovi II	Pottery	Homolovi Gray Ware
HOM042	g2	H2-98-CS	Homol'ovi II	Pottery	Homolovi Gray Ware
HOM043	g3	H2-16-C	Homol'ovi II	Pottery	Homolovi Gray Ware
HOM044	g4	H2-50-C	Homol'ovi II	Pottery	Homolovi Gray Ware
HOM045	g3	H2-94-BS	Homol'ovi II	Pottery	Homolovi Orange Ware
HOM046	g2	H2-3-BS	Homol'ovi II	Pottery	Homolovi Orange Ware
HOM047	g3	H2-81-BS	Homol'ovi II	Pottery	Homolovi Orange Ware
HOM048	g3	H2-9-BS	Homol'ovi II	Pottery	Homolovi Orange Ware
HOM049	g3	H2-31-BS	Homol'ovi II	Pottery	Homolovi Orange Ware
HOM050	unas	H2-75-BS	Homol'ovi II	Pottery	Homolovi Orange Ware
HOM051	g34	H3-84-C	Homol'ovi III	Pottery	Homolovi Gray Ware
HOM052	g4	H3-15-C	Homol'ovi III	Pottery	Homolovi Gray Ware
HOM053	g4	H3-25-C	Homol'ovi III	Pottery	Homolovi Gray Ware
HOM054	g4	H3-55-AS	Homol'ovi III	Pottery	Homolovi Orange Ware
HOM055	g4	H3-12-AS	Homol'ovi III	Pottery	Homolovi Gray Ware
HOM056	g4	H3-33-CS	Homol'ovi III	Pottery	Homolovi Gray Ware
HOM057	unas	H3-36-CS	Homol'ovi III	Pottery	Homolovi Gray Ware
HOM058	g34	H3-31-DS	Homol'ovi III	Pottery	Homolovi Gray Ware
HOM059	g4	H3-9-BS	Homol'ovi III	Pottery	Homolovi Gray Ware
HOM060	g4	H3-66-CS	Homol'ovi III	Pottery	Homolovi Gray Ware
HOM061	g34	H3-74-A	Homol'ovi III	Pottery	Homolovi Gray Ware
HOM062	g4	H3-30-AS	Homol'ovi III	Pottery	Homolovi Orange Ware
HOM063	g34	H3-38-AS	Homol'ovi III	Pottery	Homolovi Gray Ware
HOM064	g34	H3-5-A	Homol'ovi III	Pottery	Homolovi Gray Ware
HOM065	g3	H3-18-A	Homol'ovi III	Pottery	Homolovi Orange Ware
HOM066	g3	H3-17-A	Homol'ovi III	Pottery	Homolovi Gray Ware
HOM067	g4	H3-83-A	Homol'ovi III	Pottery	Homolovi Gray Ware
HOM068	g4	H3-73-A	Homol'ovi III	Pottery	Homolovi Orange Ware
HOM069	g4	H3-68-A	Homol'ovi III	Pottery	Homolovi Orange Ware
HOM070	g4	H3-86-C	Homol'ovi III	Pottery	Homolovi Gray Ware
HOM071	unas	H3-70-AS	Homol'ovi III	Pottery	Homolovi Orange Ware
HOM072	unas	H3-7-AS	Homol'ovi III	Pottery	Homolovi Orange Ware
HOM073	unas	H3-92-AS	Homol'ovi III	Pottery	Homolovi Orange Ware

HOM074	unas	H3-50-AS	Homol'ovi III	Pottery	Homolovi Orange Ware
HOM075	unas	H3-58-AS	Homol'ovi III	Pottery	Homolovi Orange Ware
HOM076	g34	H4-34-DS	Homol'ovi IV	Pottery	Homolovi Orange Ware
HOM077	g4	H4-76-B	Homol'ovi IV	Pottery	Homolovi Orange Ware
HOM078	unas	H4-75-B	Homol'ovi IV	Pottery	Homolovi Orange Ware
HOM079	g34	H4-70-DS	Homol'ovi IV	Pottery	Homolovi Gray Ware
HOM080	Hopi	H4-90-CS	Homol'ovi IV	Pottery	Homolovi Gray Ware
HOM081	unas	H4-14-A	Homol'ovi IV	Pottery	Homolovi Gray Ware
HOM082	unas	H4-19-BS	Homol'ovi IV	Pottery	Homolovi Gray Ware
HOM083	g34	H4-30-AS	Homol'ovi IV	Pottery	Homolovi Gray Ware
HOM084	unas	H4-12-D	Homol'ovi IV	Pottery	Homolovi Gray Ware
HOM085	g3	H4-81-AS	Homol'ovi IV	Pottery	Homolovi Gray Ware
HOM086	g4	H4-55-C	Homol'ovi IV	Pottery	Homolovi Gray Ware
HOM087	g4	H4-51-C	Homol'ovi IV	Pottery	Homolovi Gray Ware
HOM088	g3	H4-46-CS	Homol'ovi IV	Pottery	Homolovi Gray Ware
HOM089	unas	H4-57-C	Homol'ovi IV	Pottery	Homolovi Gray Ware
HOM090	unas	H4-3-A	Homol'ovi IV	Pottery	Homolovi Gray Ware
HOM091	unas	H4-6-A	Homol'ovi IV	Pottery	Homolovi Orange Ware
HOM092	unas	H4-53-A	Homol'ovi IV	Pottery	Homolovi Gray Ware
HOM093	unas	H4-39-A	Homol'ovi IV	Pottery	Homolovi Gray Ware
HOM094	g3	H4-66-AS	Homol'ovi IV	Pottery	Homolovi Orange Ware
HOM095	unas	H4-11-A	Homol'ovi IV	Pottery	Homolovi Gray Ware
HOM096	unas	H4-38-C	Homol'ovi IV	Pottery	Homolovi Gray Ware
HOM097	g3	H4-80-CS	Homol'ovi IV	Pottery	Homolovi Gray Ware
HOM098	g3	H4-31-CS	Homol'ovi IV	Pottery	Homolovi Gray Ware
HOM099	g3	H4-9-C	Homol'ovi IV	Pottery	Homolovi Gray Ware
HOM100	g34	H4-7-CS	Homol'ovi IV	Pottery	Homolovi Gray Ware
HOM101	g3	CHV-63-DS	Chevelon Pueblo	Pottery	Homolovi Orange Ware
HOM102	Puerco	CHV-56-DS	Chevelon Pueblo	Pottery	Homolovi Orange Ware
HOM103	Puerco	CHV-99-BS	Chevelon Pueblo	Pottery	Homolovi Orange Ware
HOM104	unas	CHV-38-BS	Chevelon Pueblo	Pottery	Homolovi Orange Ware
HOM105	g3	CHV-49-AS	Chevelon Pueblo	Pottery	Homolovi Gray Ware
HOM106	unas	CHV-79-B	Chevelon Pueblo	Pottery	Homolovi Orange Ware
HOM107	unas	CHV-94-AS	Chevelon Pueblo	Pottery	Homolovi Orange Ware
HOM108	g2	CHV-11-AS	Chevelon Pueblo	Pottery	Homolovi Orange Ware
HOM109	Puerco	CHV-4-BS	Chevelon Pueblo	Pottery	Homolovi Orange Ware
HOM110	g3	CHV-46-AS	Chevelon Pueblo	Pottery	Homolovi Orange Ware
HOM111	g2	CHV-88-AS	Chevelon Pueblo	Pottery	Homolovi Orange Ware
HOM112	unas	CHV-2-AS	Chevelon Pueblo	Pottery	Homolovi Orange Ware
HOM113	Puerco	CHV-23-A	Chevelon Pueblo	Pottery	Homolovi Orange Ware
HOM114	unas	CHV-62-A	Chevelon Pueblo	Pottery	Homolovi Orange Ware

HOM115	unas	CHV-65-A	Chevelon Pueblo	Pottery	Homolovi Gray Ware
HOM116	unas	CHV-87-C	Chevelon Pueblo	Pottery	Homolovi Orange Ware
HOM117	Puerco	CHV-74-C	Chevelon Pueblo	Pottery	Homolovi Orange Ware
HOM118	g4	CHV-75-C	Chevelon Pueblo	Pottery	Homolovi Gray Ware
HOM119	unas	CHV-85-C	Chevelon Pueblo	Pottery	Homolovi Orange Ware
HOM120	Puerco	CHV-68-CS	Chevelon Pueblo	Pottery	Homolovi Orange Ware
HOM121	unas	CHV-13-A	Chevelon Pueblo	Pottery	Homolovi Orange Ware
HOM122	g3	CHV-91-CS	Chevelon Pueblo	Pottery	Homolovi Orange Ware
HOM123	g3	CHV-67-CS	Chevelon Pueblo	Pottery	Homolovi Gray Ware
HOM124	g3	CHV-32-CS	Chevelon Pueblo	Pottery	Homolovi Gray Ware
HOM125	Puerco	CHV-66-CS	Chevelon Pueblo	Pottery	Homolovi Orange Ware
HOM126	g3	CHV-27-CS	Chevelon Pueblo	Pottery	Homolovi Gray Ware
HOM127	Puerco	CHV-20-CS	Chevelon Pueblo	Pottery	Homolovi Gray Ware
HOM128	unas	CHV-47-C	Chevelon Pueblo	Pottery	Homolovi Gray Ware
PDL001	clay		Adobe Pueblo	clay	clay
PDL002	clay		Homol’ovi I	clay	clay
PDL003	clay		Adobe Pueblo	clay	clay
PDL004	clay		Adobe Pueblo	clay	clay
PDL005	lyunas		Homol’ovi I	pottery	wow
PDL006	clay		Swarm Hill	clay	clay
PDL007	g3		Homol’ovi I	pottery	wow
PDL008	g1		Homol’ovi I	pottery	wow
PDL009	lyunas		Homol’ovi I	pottery	wow
PDL010	clay		Ogre Butte	clay	clay
PDL011	clay		Ogre Butte	clay	clay
PDL012	clay		Shrine Boulder	clay	clay
PDL013	g1		Homol’ovi I	pottery	wow
PDL014	clay		Homol’ovi I	clay	clay
PDL015	clay		Homol’ovi I	clay	clay
PDL016	clay		Homol’ovi I	clay	clay
PDL017	clay		Homol’ovi I	clay	clay
PDL018	clay		Ogre Butte	clay	clay
PDL019	clay		Ogre Butte	clay	clay
PDL020	clay		Homol’ovi II	clay	clay
PDL021	clay		Homol’ovi II	clay	clay
PDL022	clay		Homol’ovi II	clay	clay
PDL023	clay		Ogre/Swarm	clay	clay
PDL024	lyunas		Homol’ovi I	pottery	wow
PDL025	clay		Homol’ovi III	clay	clay
PDL026	clay		Homol’ovi III	clay	clay
PDL027	clay		Homol’ovi III	clay	clay

PDL028	clay		Homol'ovi III	clay	clay
PDL029	clay		Homol'ovi IV	clay	clay
PDL030	clay		Homol'ovi IV	clay	clay
PDL031	g3		Homol'ovi I	pottery	wow
PDL032	clay		Homol'ovi IV	clay	clay
PDL033	g4		Homol'ovi I	pottery	wow
PDL034	clay		Homol'ovi I	clay	clay
PDL035	clay		Homol'ovi I	clay	clay
PDL036	clay		Homol'ovi I	clay	clay
PDL037	clay		E Butte S H IV	clay	clay
PDL038	clay		Homol'ovi I	clay	clay
PDL039	clay		E Butte Horsesh	clay	clay
PDL040	clay		E Butte Horsesh	clay	clay
PDL041	clay		E Butte Horsesh	clay	clay
PDL042	clay		W Butte S H IV	clay	clay
PDL043	clay		Homol'ovi I	clay	clay
PDL044	clay		Homol'ovi II	clay	clay
PDL045	clay		Homol'ovi II	clay	clay
PDL046	g3		Chavez Pass	pottery	wow
PDL047	lyunas		Chavez Pass	pottery	wow
PDL048	g2		Chavez Pass	pottery	wow
PDL049	g2		Chavez Pass	pottery	wow
PDL050	lyunas		Chavez Pass	pottery	wow
PDL051	g3		Chavez Pass	pottery	wow
PDL052	g3		Chavez Pass	pottery	wow
PDL053	lyunas		Chavez Pass	pottery	wow
PDL054	g1		Chavez Pass	pottery	wow
PDL055	g3		Chavez Pass	pottery	wow
PDL056	unas		Verde:3:3	pottery	wow
PDL057	g3		Verde:3:3	pottery	wow
PDL058	g2		Verde:3:3	pottery	wow
PDL059	lyunas		Verde:3:3	pottery	wow
PDL060	lyunas		Verde:3:3	pottery	wow
PDL061	g3		Verde:3:3	pottery	wow
PDL062	g3		Verde:3:3	pottery	wow
PDL063	unas		Verde:5:11	pottery	wow
PDL064	g2		Verde:5:3	pottery	wow
PDL065	lyunas		Verde:6:9	pottery	wow
PDL066	lyunas		Verde:6:9	pottery	wow
PDL067	lyunas		Verde:6:9	pottery	wow
PDL068	lyunas		Verde:5:17	pottery	wow

PDL069	g3		Verde:5:21	pottery	wow
PDL070	unas		Verde:5:31	pottery	wow
PDL071	lyunas		Rye Creek Ruin	pottery	wow
PDL072	Hopi		Az O:15:54	pottery	wow
PDL073	unas		Rye Creek Ruin	pottery	jow (wow)
PDL074	Puerco		Wallace Tank	pottery	wow
PDL075	Puerco		Puerco Ruin	pottery	wow
PDL076	Puerco		Puerco Ruin	pottery	wow
PDL077	Puerco		Wallace Tank	pottery	wow
PDL078	Puerco		Puerco Ruin	pottery	wow
PDL079	Puerco		Puerco Ruin	pottery	wow
PDL080	Puerco		Puerco Ruin	pottery	wow
PDL081	Puerco		Wallace Tank	pottery	wow
PDL082	Puerco		Puerco Ruin	pottery	wow
PDL083	Puerco		Puerco Ruin	pottery	wow
PDL084	Puerco		Wallace Tank	pottery	wow
PDL085	Puerco		Wallace Tank	pottery	wow
PDL086	Puerco		Wallace Tank	pottery	rrw
PDL087	Puerco		Puerco Ruin	pottery	wow
PDL088	Puerco		Puerco Ruin	pottery	rrw
PDL089	Puerco		Puerco Ruin	pottery	wow
PDL090	Puerco		Puerco Ruin	pottery	wow
PDL091	Puerco		Puerco Ruin	pottery	wow
PDL092	Puerco		Puerco Ruin	pottery	wow
PDL093	lyunas		Puerco Ruin	pottery	wow
PDL094	Puerco		Puerco Ruin	pottery	wow
PDL095	Puerco		Puerco Ruin	pottery	wow
PDL096	Puerco		Puerco Ruin	pottery	wow
PDL097	Puerco		Puerco Ruin	pottery	wow
PDL098	lyunas		Puerco Ruin	pottery	wow
PDL099	Puerco		Wallace Tank	pottery	wow
PDL100	Puerco		Wallace Tank	pottery	wow
PDL101	Puerco		Wallace Tank	pottery	wow
PDL102	Puerco		Wallace Tank	pottery	wow
PDL103	Puerco		Wallace Tank	pottery	wow
PDL104	Puerco		Puerco Ruin	pottery	wow
PDL105	Puerco		Puerco Ruin	pottery	wow
PDL106	Puerco		Puerco Ruin	pottery	wow
PDL107	Puerco		Puerco Ruin	pottery	wow
PDL108	Puerco		Puerco Ruin	pottery	wow
PDL109	Puerco		Puerco Ruin	pottery	wow

PDL110	Puerco		Wallace Tank	pottery	wow
PDL111	Puerco		Wallace Tank	pottery	wow
PDL112	Puerco		Wallace Tank	pottery	rrw
PDL113	Puerco		Wallace Tank	pottery	rrw
PDL114	g4		Homol'ovi I	pottery	rrw
PDL115	g4		Homol'ovi I	pottery	rrw
PDL116	lyunas		Homol'ovi I	pottery	wow
PDL117	lyunas		Homol'ovi I	pottery	wow
PDL118	unas		Homol'ovi I	pottery	wow
PDL119	lyunas		Homol'ovi I	pottery	wow
PDL120	lyunas		Homol'ovi I	pottery	wow
PDL121	g1		Homol'ovi I	pottery	wow
PDL122	g1		Homol'ovi I	pottery	wow
PDL123	g1		Homol'ovi I	pottery	wow
PDL124	lyunas		Homol'ovi I	pottery	wow
PDL125	lyunas		Homol'ovi I	pottery	wow
PDL126	g4		Homol'ovi I	pottery	wow
PDL127	unas		Homol'ovi I	pottery	wow
PDL128	g4		Homol'ovi I	pottery	wow
PDL129	g4		Homol'ovi I	pottery	wow
PDL130	g4		Homol'ovi I	pottery	wow
PDL131	g34		Homol'ovi I	pottery	wow
PDL132	g1		Homol'ovi I	pottery	wow
PDL133	g4		Homol'ovi I	pottery	wow
PDL134	g34		Homol'ovi I	pottery	wow
PDL135	g1		Homol'ovi I	pottery	wow
PDL136	g3		Homol'ovi I	pottery	wow
PDL137	g4		Homol'ovi I	pottery	wow
PDL138	lyunas		Homol'ovi I	pottery	wow
PDL139	lyunas		Homol'ovi I	pottery	wow
PDL140	g1		Homol'ovi I	pottery	wow
PDL141	lyunas		Homol'ovi I	pottery	wow
PDL142	unas		Homol'ovi I	pottery	wow
PDL143	g4		Homol'ovi I	pottery	wow
PDL144	g1		Homol'ovi I	pottery	wow
PDL145	g1		Homol'ovi I	pottery	wow
PDL146	g1		Homol'ovi I	pottery	wow
PDL147	lyunas		Homol'ovi I	pottery	wow
PDL148	g34		Homol'ovi I	pottery	wow
PDL149	unas		Homol'ovi I	pottery	wow
PDL150	g3		Homol'ovi I	pottery	wow

PDL151	g4		Homol'ovi I	pottery	wow
PDL152	g2		Homol'ovi I	pottery	wow
PDL153	lyunas		Homol'ovi I	pottery	wow
PDL154	g2		Homol'ovi I	pottery	wow
PDL155	g1		Homol'ovi I	pottery	wow
PDL156	g2		Homol'ovi I	pottery	wow
PDL157	g2		Homol'ovi I	pottery	wow
PDL158	lyunas		Homol'ovi I	pottery	wow
PDL159	lyunas		Homol'ovi I	pottery	wow
PDL160	g3		Homol'ovi I	pottery	wow
PDL161	lyunas		Homol'ovi I	pottery	wow
PDL162	lyunas		Homol'ovi I	pottery	wow
PDL163	lyunas		Homol'ovi I	pottery	rrw
PDL164	lyunas		Homol'ovi I	pottery	wow
PDL165	g3		Homol'ovi I	pottery	wow
PDL166	g3		Homol'ovi I	pottery	wow
PDL167	Hopi		Homol'ovi I	pottery	jow (wow)
PDL168	g2		Homol'ovi I	pottery	wow
PDL169	g1		Homol'ovi I	pottery	wow
PDL170	lyunas		Homol'ovi I	pottery	wow
PDL171	lyunas		Homol'ovi I	pottery	wow
PDL172	g1		Homol'ovi I	pottery	wow
PDL173	lyunas		Homol'ovi I	pottery	wow
PDL174	lyunas		Homol'ovi I	pottery	wow
PDL175	g34		Homol'ovi I	pottery	wow
PDL176	g3		Homol'ovi I	pottery	wow
PDL177	g2		Homol'ovi I	pottery	wow
PDL178	lyunas		Homol'ovi I	pottery	wow
PDL179	lyunas		Homol'ovi I	pottery	wow
PDL180	g3		Homol'ovi I	pottery	wow
PDL181	g3		Homol'ovi I	pottery	wow
PDL182	g3		Homol'ovi I	pottery	wow
PDL183	lyunas		Homol'ovi I	pottery	wow
PDL184	g3		Homol'ovi I	pottery	rrw
PDL185	g34		Homol'ovi I	pottery	wow
PDL186	lyunas		Homol'ovi I	pottery	tow
PDL187	lyunas		Homol'ovi I	pottery	tww
PDL188	lyunas		Homol'ovi I	pottery	tow
PDL189	lyunas		Homol'ovi IV	pottery	tow
PDL190	lyunas		Homol'ovi IV	pottery	tww
PDL191	g4		Homol'ovi I	pottery	wow

PDL192	g1		Homol'ovi I	pottery	jow (tow)
PDL193	lyunas		Homol'ovi III	pottery	tww
PDL194	g3		Homol'ovi I	pottery	wow
PDL195	g34		Homol'ovi I	pottery	wow
PDL196	g2		Homol'ovi I	pottery	wow
PDL197	lyunas		Homol'ovi I	pottery	wow
PDL198	g1		Homol'ovi I	pottery	wow
PDL199	g3		Homol'ovi I	pottery	wow
PDL200	lyunas		Homol'ovi I	pottery	wow
PDL201	lyunas		Homol'ovi III	pottery	wow
PDL202	lyunas		Homol'ovi III	pottery	wow
PDL203	Hopi		Homol'ovi III	pottery	jow (wow)
PDL204	g4		Homol'ovi III	pottery	wow
PDL205	lyunas		Homol'ovi III	pottery	wow
PDL206	lyunas		Homol'ovi III	pottery	wow
PDL207	g1		Homol'ovi III	pottery	wow
PDL208	g1		Homol'ovi III	pottery	wow
PDL209	g4		Homol'ovi III	pottery	wow
PDL210	g4		Homol'ovi III	pottery	wow
PDL211	Puerco		Homol'ovi III	pottery	wow
PDL212	unas		Homol'ovi III	pottery	wow
PDL213	g3		Homol'ovi III	pottery	wow
PDL214	g1		Homol'ovi III	pottery	wow
PDL215	g1		Homol'ovi III	pottery	wow
PDL216	g4		Homol'ovi III	pottery	wow
PDL217	g1		Homol'ovi III	pottery	wow
PDL218	g34		Homol'ovi III	pottery	wow
PDL219	g4		Homol'ovi III	pottery	wow
PDL220	g34		Homol'ovi III	pottery	wow
PDL221	g3		Homol'ovi III	pottery	wow
PDL222	g34		Homol'ovi III	pottery	wow
PDL223	g4		Homol'ovi III	pottery	wow
PDL224	lyunas		Homol'ovi III	pottery	wow
PDL225	g1		Homol'ovi III	pottery	wow
PDL226	unas		Homol'ovi III	pottery	wow
PDL227	g4		Homol'ovi III	pottery	wow
PDL228	unas		Homol'ovi III	pottery	wow
PDL229	g4		Homol'ovi III	pottery	wow
PDL230	g4		Homol'ovi III	pottery	wow
PDL231	g34		Homol'ovi III	pottery	wow
PDL232	g34		Homol'ovi III	pottery	wow

PDL233	g3		Homol'ovi III	pottery	wow
PDL234	g4		Homol'ovi III	pottery	wow
PDL235	g4		Homol'ovi III	pottery	wow
PDL236	g4		Homol'ovi III	pottery	rrw
PDL237	g3		Homol'ovi III	pottery	wow
PDL238	g2		Homol'ovi III	pottery	wow
PDL239	g4		Homol'ovi III	pottery	wow
PDL240	g4		Homol'ovi III	pottery	wow
PDL241	g4		Homol'ovi III	pottery	wow
PDL242	g4		Homol'ovi III	pottery	wow
PDL243	g3		Homol'ovi III	pottery	wow
PDL244	g34		Homol'ovi III	pottery	wow
PDL245	g4		Homol'ovi III	pottery	wow
PDL246	g34		Homol'ovi III	pottery	wow
PDL247	lyunas		Homol'ovi III	pottery	wow
PDL248	g1		Homol'ovi III	pottery	wow
PDL249	g4		Homol'ovi III	pottery	wow
PDL250	g1		Homol'ovi III	pottery	wow
PDL251	g3		Homol'ovi III	pottery	wow
PDL252	g3		Homol'ovi III	pottery	wow
PDL253	g3		Homol'ovi III	pottery	wow
PDL254	lyunas		Homol'ovi III	pottery	wow
PDL255	lyunas		Homol'ovi III	pottery	wow
PDL256	g3		Homol'ovi III	pottery	wow
PDL257	g3		Homol'ovi III	pottery	wow
PDL258	g34		Homol'ovi III	pottery	wow
PDL259	g2		Homol'ovi III	pottery	wow
PDL260	g3		Homol'ovi III	pottery	wow
PDL261	unas		Homol'ovi III	pottery	wow
PDL262	g3		Homol'ovi III	pottery	wow
PDL263	g2		Homol'ovi III	pottery	wow
PDL264	g3		Homol'ovi III	pottery	wow
PDL265	g34		Homol'ovi III	pottery	wow
PDL266	g1		Homol'ovi III	pottery	wow
PDL267	g1		Homol'ovi III	pottery	wow
PDL268	g2		Homol'ovi III	pottery	wow
PDL269	unas		Homol'ovi III	pottery	wow
PDL270	g4		Homol'ovi III	pottery	wow
PDL271	g3		Homol'ovi III	pottery	wow
PDL272	g4		Homol'ovi III	pottery	wow
PDL273	g3		Homol'ovi III	pottery	wow

PDL274	g2		Homol’ovi III	pottery	wow
PDL275	lyunas		Homol’ovi III	pottery	wow
PDL276	unas		Homol’ovi III	pottery	wow
PDL277	g3		Homol’ovi III	pottery	wow
PDL278	g3		Homol’ovi III	pottery	wow
PDL279	g3		Homol’ovi III	pottery	wow
PDL280	g34		Homol’ovi III	pottery	wow
PDL281	g4		Homol’ovi IV	pottery	hgw/how
PDL282	g3		Homol’ovi IV	pottery	wow
PDL283	lyunas		Homol’ovi IV	pottery	tow
PDL284	g3		Homol’ovi IV	pottery	wow
PDL285	Hopi		Homol’ovi IV	pottery	jow
PDL286	lyunas		Homol’ovi IV	pottery	jow (jyw)
PDL287	Hopi		Homol’ovi IV	pottery	jow
PDL288	Hopi		Homol’ovi IV	pottery	jow
PDL289	Hopi		Homol’ovi IV	pottery	jow (jyw)
PDL290	lyunas		Homol’ovi IV	pottery	jow (jyw)
PDL291	Hopi		Homol’ovi IV	pottery	jow
PDL292	Hopi		Homol’ovi IV	pottery	jow (wow)
PDL293	Hopi		Homol’ovi IV	pottery	jow (wow
PDL294	lyunas		Homol’ovi IV	pottery	jow (jyw)
PDL295	Hopi		Homol’ovi IV	pottery	jow
PDL296	Hopi		Homol’ovi IV	pottery	jow (wow)
PDL297	lyunas		Homol’ovi IV	pottery	rrw
PDL298	lyunas		Homol’ovi IV	pottery	jow (jyw)
PDL299	Hopi		Homol’ovi IV	pottery	jow
PDL300	lyunas		Homol’ovi IV	pottery	jow
PDL301	Hopi		Homol’ovi IV	pottery	jow (jyw)
PDL302	Hopi		Homol’ovi IV	pottery	jow (jyw)
PDL303	lyunas		Homol’ovi IV	pottery	tww
PDL304	lyunas		Homol’ovi IV	pottery	jow (jyw)
PDL305	Hopi		Homol’ovi IV	pottery	jow (jyw)
PDL306	Hopi		Homol’ovi IV	pottery	jow
PDL307	lyunas		Homol’ovi IV	pottery	jow (jyw)
PDL308	lyunas		Homol’ovi IV	pottery	jow (jyw)
PDL309	Hopi		Homol’ovi IV	pottery	jow (jyw)
PDL310	lyunas		Holiday Inn	pottery	tow
PDL311	Hopi		Homol’ovi IV	pottery	jow (jyw)
PDL312	lyunas		Homol’ovi IV	pottery	jow (jyw)
PDL313	lyunas		Homol’ovi IV	pottery	hww
PDL314	lyunas		Homol’ovi IV	pottery	hww

PDL315	Hopi	Homol'ovi IV	pottery	jow
PDL316	Hopi	Homol'ovi IV	pottery	jow
PDL317	Hopi	Homol'ovi IV	pottery	jow (jyw)
PDL318	lyunas	Homol'ovi IV	pottery	wow
PDL319	Hopi	Homol'ovi IV	pottery	jow (jyw)
PDL320	Hopi	Homol'ovi IV	pottery	jow (jyw)
PDL321	Hopi	Homol'ovi IV	pottery	jow (jyw)
PDL322	lyunas	Homol'ovi IV	pottery	jow (jyw)
PDL323	Hopi	Homol'ovi IV	pottery	jow
PDL324	Hopi	Homol'ovi IV	pottery	jow
PDL325	Hopi	Homol'ovi IV	pottery	jow
PDL326	Hopi	Homol'ovi IV	pottery	jow
PDL327	Hopi	Homol'ovi IV	pottery	jow
PDL328	Hopi	Homol'ovi IV	pottery	jow
PDL329	Hopi	Homol'ovi IV	pottery	jow
PDL330	lyunas	Homol'ovi IV	pottery	jow (jyw)
PDL331	g1	Homol'ovi I	pottery	hgw (tgw)
PDL332	g4	Homol'ovi I	pottery	hgw (tgw)
PDL333	lyunas	Homol'ovi I	pottery	how
PDL334	lyunas	Adobe Pueblo	pottery	how
PDL335	unas	Homol'ovi I	pottery	hgw
PDL336	g1	Homol'ovi I	pottery	how
PDL337	lyunas	Homol'ovi I	pottery	tgw
PDL338	g3	Homol'ovi III	pottery	hgw
PDL339	unas	Homol'ovi II	pottery	hgw
PDL340	g3	Homol'ovi IV	pottery	hgw (tgw)
PDL341	unas	Homol'ovi II	pottery	wow
PDL342	g3	Homol'ovi II	pottery	wow
PDL343	g2	Homol'ovi II	pottery	wow
PDL344	g2	Homol'ovi II	pottery	wow
PDL345	g3	Homol'ovi II	pottery	wow
PDL346	g3	Homol'ovi II	pottery	wow
PDL347	g3	Homol'ovi II	pottery	wow
PDL348	g2	Homol'ovi II	pottery	wow
PDL349	g2	Homol'ovi II	pottery	wow
PDL350	Hopi	Homol'ovi IV	pottery	jow (wow)
PDL351	Hopi	Homol'ovi IV	pottery	jow (wow)
PDL352	Hopi	Homol'ovi IV	pottery	jow (wow)
PDL353	Hopi	Homol'ovi IV	pottery	jow (wow)
PDL354	Hopi	Homol'ovi IV	pottery	jow (wow)
PDL355	Hopi	Homol'ovi IV	pottery	jow (wow)

PDL356	Hopi	Homol'ovi IV	pottery	jow (wow)
PDL357	Hopi	Homol'ovi IV	pottery	jow
PDL358	Hopi	Homol'ovi IV	pottery	jow (jyw)
PDL359	Hopi	Homol'ovi IV	pottery	jow (jyw)
PDL360	Hopi	Homol'ovi IV	pottery	jow
PDL361	Hopi	Homol'ovi IV	pottery	jow
PDL362	Hopi	Homol'ovi IV	pottery	jow
PDL363	lyunas	Homol'ovi IV	pottery	jow (jyw)
PDL364	Hopi	Homol'ovi IV	pottery	jow (jyw)
PDL365	Hopi	Homol'ovi IV	pottery	jow
PDL366	lyunas	Homol'ovi IV	pottery	tow
PDL367	Hopi	Homol'ovi IV	pottery	jow (wow)
PDL368	Hopi	Homol'ovi IV	pottery	jow (jyw)
PDL369	g3	Homol'ovi II	pottery	wow
PDL370	Hopi	Homol'ovi IV	pottery	jow
PDL371	Hopi	Homol'ovi IV	pottery	jow (wow)
PDL372	Hopi	Homol'ovi IV	pottery	jow
PDL373	Hopi	Homol'ovi IV	pottery	jow
PDL374	lyunas	Homol'ovi IV	pottery	jow
PDL375	Hopi	Homol'ovi IV	pottery	jow
PDL376	Hopi	Homol'ovi IV	pottery	jow
PDL377	lyunas	Homol'ovi IV	pottery	jow
PDL378	lyunas	Homol'ovi IV	pottery	jow
PDL379	Hopi	Homol'ovi IV	pottery	jow
PDL380	Hopi	Homol'ovi IV	pottery	jow
PDL381	Hopi	Homol'ovi I	pottery	jow
PDL382	Hopi	Homol'ovi I	pottery	jow
PDL383	Hopi	Homol'ovi I	pottery	jow
PDL384	g2	Homol'ovi I	pottery	jow (jow)
PDL385	g1	Homol'ovi I	pottery	jow (jow)
PDL386	lyunas	Homol'ovi I	pottery	jow
PDL387	Hopi	Homol'ovi I	pottery	jow
PDL388	Hopi	Homol'ovi III	pottery	jow
PDL389	lyunas	Homol'ovi III	pottery	jow (jyw)
PDL390	Hopi	Homol'ovi III	pottery	jow
PDL391	Hopi	Homol'ovi III	pottery	jow (jyw)
PDL392	Hopi	Homol'ovi III	pottery	jow
PDL393	g34	Homol'ovi IV	pottery	how
PDL394	lyunas	Bailey Ruin	pottery	jyw
PDL395	Hopi	Bailey Ruin	pottery	jow
PDL396	lyunas	Bailey Ruin	pottery	jow (jyw)

PDL397	Hopi	Bailey Ruin	pottery	jow (jyw)
PDL398	clay	Puerco Ruin	clay	clay
PDL399	clay	Puerco Ruin	clay	clay
PDL400	clay	Puerco Ruin	clay	clay
PDL401	clay	Puerco Ruin	clay	clay
PDL402	clay	Puerco Ruin	clay	clay
PDL403	clay	Brigham City	clay	clay
PDL404	LCW	Pefo 1998B1	pottery	lcww
PDL405	LCW	Pefo 1998B1	pottery	lcww
PDL406	LCW	Pefo 1998B1	pottery	lcww
PDL407	LCW	Pefo 1998B7	pottery	lcww
PDL408	LCW	Pefo 1998B7	pottery	lcww
PDL409	LCW	Pefo 1998B13	pottery	lcww
PDL410	LCW	Pefo 1998B13	pottery	lcww
PDL411	LCW	Pefo 1998B19	pottery	lcww
PDL412	LCW	Pefo 1998B39	pottery	lcww
PDL413	LCW	Pefo 1998B39	pottery	lcww
PDL414	LCW	Pefo Wacc 6229	pottery	lcww
PDL415	LCW	Hp 36B	pottery	lcww
PDL416	LCW	Hp 36B	pottery	lcww
PDL417	LCW	Hp 36C	pottery	lcww
PDL418	LCW	Hp 36B	pottery	lcgw
PDL419	LCW	Hp 36C	pottery	lcgw
PDL420	LCW	Hp 36	pottery	lcgw
PDL421	LCW	Hp 51B	pottery	lcww
PDL422	LCW	Hp 51B	pottery	lcww

Appendix 2: Group membership probabilities for Groups 3 and 4 based on a Mahalanobis distance projection using all elements except Ni, K, and Ti.

GROUP CLASSIFICATION USING MAHALANOBIS DISTANCE

Results are based on the following variables:
Na K Ca Sc V Cr Mn Fe Co Zn As Rb Sr Zr Sb Cs Ba La
Ce Nd Sm Eu Tb Dy Yb Lu Hf Ta Th U
Best Group is based on highest membership probability > 0.001%

Membership probabilities(%) for samples in group: g3
Probabilities calculated after removing each sample from group.

ANID	g3	g4	Best Group
HOM011	78.157	0.228	g3
HOM014	87.237	0.457	g3
HOM017	75.135	0.057	g3
HOM018	76.904	0.000	g3
HOM019	36.497	10.733	g3
HOM023	77.815	2.249	g3
HOM026	27.435	0.002	g3
HOM030	99.104	0.253	g3
HOM031	9.674	1.240	g3
HOM033	99.612	0.114	g3
HOM035	96.325	0.018	g3
HOM037	85.754	0.023	g3
HOM038	42.749	0.000	g3
HOM041	96.945	0.031	g3
HOM043	17.398	0.001	g3
HOM045	24.917	0.006	g3
HOM047	96.147	0.080	g3
HOM048	87.911	1.471	g3
HOM049	82.692	0.000	g3
HOM065	51.501	0.000	g3
HOM066	21.631	0.678	g3
HOM085	92.532	0.121	g3
HOM088	36.923	0.792	g3
HOM094	18.750	0.388	g3
HOM097	34.688	0.000	g3
HOM098	1.283	0.000	g3
HOM099	91.041	2.141	g3
HOM101	12.112	0.000	g3
HOM105	88.286	0.001	g3
HOM110	31.659	0.000	g3
HOM122	79.453	0.075	g3
HOM123	30.371	0.001	g3
HOM124	91.596	0.141	g3
HOM126	61.683	0.183	g3
PDL007	42.432	0.184	g3
PDL031	86.888	0.000	g3
PDL046	15.500	0.000	g3
PDL051	38.193	0.032	g3
PDL052	2.213	0.001	g3
PDL055	42.058	0.000	g3
PDL057	0.845	0.003	g3
PDL061	13.356	0.000	g3
PDL062	4.101	0.002	g3
PDL069	1.007	0.043	g3
PDL136	66.852	0.009	g3
PDL150	62.212	0.000	g3
PDL160	26.661	0.000	g3
PDL165	62.849	0.000	g3
PDL166	45.630	0.000	g3
PDL176	43.379	0.000	g3
PDL180	6.342	0.022	g3
PDL181	49.352	0.001	g3
PDL182	65.514	0.006	g3
PDL184	65.053	8.326	g3
PDL194	13.318	0.087	g3
PDL199	93.760	0.000	g3
PDL213	35.994	0.004	g3
PDL221	15.882	1.934	g3
PDL233	99.661	0.062	g3
PDL237	10.100	0.241	g3
PDL243	0.979	0.000	g3
PDL251	35.318	0.617	g3
PDL252	45.175	0.205	g3
PDL253	52.659	0.000	g3

PDL256	51.082	0.349	g3
PDL257	43.358	0.000	g3
PDL260	8.811	0.000	g3
PDL262	84.621	0.086	g3
PDL264	98.108	0.000	g3
PDL271	96.171	0.193	g3
PDL273	40.371	0.111	g3
PDL277	77.397	0.000	g3
PDL278	94.139	1.918	g3
PDL279	27.612	0.872	g3
PDL282	14.173	0.086	g3
PDL284	19.215	0.026	g3
PDL338	32.781	0.001	g3
PDL340	27.403	0.000	g3
PDL342	64.769	0.000	g3
PDL345	8.421	0.000	g3
PDL346	42.540	0.012	g3
PDL347	62.722	0.008	g3
PDL369	33.629	0.000	g3

Membership probabilities(%) for samples in group: g4
Probabilities calculated after removing each sample from group.

ANID	g3	g4	Best Group
HOM001	3.983	38.083	g4
HOM002	8.890	32.639	g4
HOM005	2.895	49.682	g4
HOM044	0.304	20.620	g4
HOM052	0.007	1.991	g4
HOM053	3.671	87.144	g4
HOM054	5.059	95.950	g4
HOM055	9.594	94.005	g4
HOM056	0.480	7.502	g4
HOM059	3.348	74.066	g4
HOM060	4.187	91.641	g4
HOM062	0.007	89.743	g4
HOM067	0.135	33.050	g4
HOM068	2.468	61.816	g4
HOM069	3.201	17.641	g4
HOM070	7.131	35.401	g4
HOM077	1.100	8.595	g4
HOM086	15.353	54.724	g4
HOM087	6.497	65.568	g4
HOM118	0.120	90.468	g4
PDL033	0.000	31.887	g4
PDL114	0.000	90.715	g4
PDL115	0.000	50.029	g4
PDL126	2.212	66.817	g4
PDL128	5.087	69.728	g4
PDL129	0.227	21.687	g4
PDL130	1.321	61.979	g4
PDL133	0.572	81.008	g4
PDL137	0.001	42.162	g4
PDL143	7.292	48.447	g4
PDL151	0.262	25.650	g4
PDL191	0.065	0.145	g4
PDL204	0.046	14.646	g4
PDL209	0.003	22.376	g4
PDL210	0.156	86.273	g4
PDL216	2.744	63.618	g4
PDL219	1.617	74.631	g4
PDL223	0.923	67.588	g4
PDL227	5.224	98.279	g4
PDL229	5.856	71.876	g4
PDL230	0.011	94.496	g4
PDL234	0.054	73.459	g4
PDL235	1.543	43.521	g4
PDL236	0.075	29.490	g4
PDL239	0.932	32.749	g4
PDL240	0.138	42.219	g4
PDL241	11.823	34.008	g4
PDL242	0.525	58.709	g4
PDL245	0.149	13.832	g4
PDL249	0.902	9.662	g4
PDL270	4.181	70.164	g4
PDL272	0.183	0.822	g4
PDL281	0.001	11.724	g4
PDL332	0.519	83.810	g4

Membership probabilities(%) for samples in group: clay
Probabilities calculated by projecting unknowns against reference groups.

ANID	g3	g4	Best Group
PDL001	0.000	0.000	
PDL002	0.000	0.000	
PDL003	0.000	0.000	
PDL004	0.000	0.000	
PDL006	0.000	0.000	
PDL010	0.000	0.000	
PDL011	0.000	0.000	
PDL012	0.000	0.000	
PDL014	0.000	0.000	
PDL015	0.000	0.000	
PDL016	0.000	0.000	
PDL017	0.000	0.000	
PDL018	0.000	0.000	
PDL019	0.000	0.000	
PDL020	0.000	0.000	
PDL021	0.000	0.000	
PDL022	0.000	0.000	
PDL023	0.000	0.000	
PDL025	0.000	0.000	
PDL026	0.000	0.000	
PDL027	0.000	0.000	
PDL028	0.000	0.000	
PDL029	0.000	0.000	
PDL030	0.000	0.000	
PDL032	0.000	0.000	
PDL034	0.000	0.000	
PDL035	0.000	0.000	
PDL036	0.000	0.000	
PDL037	0.000	0.000	
PDL038	0.000	0.000	
PDL039	0.000	0.000	
PDL040	0.000	0.000	
PDL041	0.000	0.000	
PDL042	0.000	0.000	
PDL043	0.000	0.000	
PDL044	0.000	0.000	
PDL045	0.000	0.000	
PDL398	0.000	0.000	
PDL399	0.000	0.000	
PDL400	0.000	0.000	
PDL401	0.000	0.000	
PDL402	0.000	0.000	
PDL403	0.000	0.000	

Membership probabilities(%) for samples in group: g1
Probabilities calculated by projecting unknowns against reference groups.

ANID	g3	g4	Best Group
PDL008	0.006	0.000	g3
PDL013	0.081	0.000	g3
PDL054	0.016	0.000	g3
PDL121	0.000	0.000	
PDL122	0.342	0.000	g3
PDL123	0.008	0.000	g3
PDL132	0.007	0.000	g3
PDL135	0.000	0.000	
PDL140	0.759	0.000	g3
PDL144	0.000	0.000	
PDL145	0.000	0.000	
PDL146	0.000	0.000	
PDL155	0.002	0.000	g3
PDL169	0.000	0.000	
PDL172	0.000	0.000	
PDL192	0.021	0.000	g3
PDL198	0.000	0.000	
PDL207	0.859	0.000	g3
PDL208	0.034	0.001	g3
PDL214	0.022	0.002	g3
PDL215	0.008	0.000	g3
PDL217	0.006	0.000	g3
PDL225	0.034	0.000	g3
PDL248	0.000	0.000	
PDL250	7.653	0.000	g3
PDL266	1.387	0.000	g3
PDL267	0.000	0.000	
PDL331	0.074	0.000	g3

PDL336	0.004	0.000	g3
PDL385	0.088	0.000	g3

Membership probabilities(%) for samples in group: g2
Probabilities calculated by projecting unknowns against reference groups.

ANID	g3	g4	Best Group
HOM042	0.035	0.000	g3
HOM046	0.007	0.000	g3
HOM108	0.004	0.000	g3
HOM111	0.005	0.000	g3
PDL048	0.048	0.000	g3
PDL049	0.113	0.000	g3
PDL058	0.154	0.000	g3
PDL064	8.359	0.000	g3
PDL152	0.002	0.061	g4
PDL154	0.560	0.000	g3
PDL156	0.141	0.000	g3
PDL157	3.529	0.000	g3
PDL168	0.019	0.000	g3
PDL177	0.039	0.000	g3
PDL196	0.000	0.000	
PDL238	0.250	0.000	g3
PDL259	0.020	0.000	g3
PDL263	0.122	0.000	g3
PDL268	0.012	0.000	g3
PDL274	0.614	0.190	g3
PDL343	0.000	0.000	
PDL344	0.000	0.000	
PDL348	0.124	0.000	g3
PDL349	18.969	0.000	g3
PDL384	0.000	0.000	

Membership probabilities(%) for samples in group: g34
Probabilities calculated by projecting unknowns against reference groups.

ANID	g3	g4	Best Group
HOM008	73.028	13.244	g3
HOM009	3.452	8.641	g4
HOM027	14.264	12.466	g3
HOM034	0.005	1.609	g4
HOM039	88.045	5.864	g3
HOM051	34.007	24.029	g3
HOM058	13.416	37.827	g4
HOM061	21.130	1.102	g3
HOM063	25.376	0.189	g3
HOM064	51.536	88.276	g4
HOM076	22.037	1.303	g3
HOM079	69.891	7.641	g3
HOM083	37.583	11.634	g3
HOM100	53.765	67.384	g4
PDL131	27.846	8.851	g3
PDL134	13.311	8.911	g3
PDL148	87.916	47.899	g3
PDL175	99.491	5.516	g3
PDL185	14.889	21.205	g4
PDL195	0.114	3.035	g4
PDL218	14.655	0.194	g3
PDL220	0.000	0.000	
PDL222	9.320	51.997	g4
PDL231	4.251	46.494	g4
PDL232	7.426	56.653	g4
PDL244	1.917	3.200	g4
PDL246	3.892	31.739	g4
PDL258	20.457	2.146	g3
PDL265	68.449	88.665	g4
PDL280	83.060	1.956	g3
PDL393	1.964	0.043	g3

Membership probabilities(%) for samples in group: hopi
Probabilities calculated by projecting unknowns against reference groups.

ANID	g3	g4	Best Group
HOM080	0.000	0.000	
PDL072	0.000	0.000	
PDL167	0.000	0.000	
PDL203	0.000	0.000	
PDL285	0.000	0.000	

PDL287	0.000	0.000
PDL288	0.000	0.000
PDL289	0.000	0.000
PDL291	0.000	0.000
PDL292	0.000	0.000
PDL293	0.000	0.000
PDL295	0.000	0.000
PDL296	0.000	0.000
PDL299	0.000	0.000
PDL301	0.000	0.000
PDL302	0.000	0.000
PDL305	0.000	0.000
PDL306	0.000	0.000
PDL309	0.000	0.000
PDL311	0.000	0.000
PDL315	0.000	0.000
PDL316	0.000	0.000
PDL317	0.000	0.000
PDL319	0.000	0.000
PDL320	0.000	0.000
PDL321	0.000	0.000
PDL323	0.000	0.000
PDL324	0.000	0.000
PDL325	0.000	0.000
PDL326	0.000	0.000
PDL327	0.000	0.000
PDL328	0.000	0.000
PDL329	0.000	0.000
PDL350	0.000	0.000
PDL351	0.000	0.000
PDL352	0.000	0.000
PDL353	0.000	0.000
PDL354	0.001	0.000
PDL355	0.000	0.000
PDL356	0.000	0.000
PDL357	0.000	0.000
PDL358	0.000	0.000
PDL359	0.000	0.000
PDL360	0.000	0.000
PDL361	0.000	0.000
PDL362	0.000	0.000
PDL364	0.000	0.000
PDL365	0.000	0.000
PDL367	0.000	0.000
PDL368	0.000	0.000
PDL370	0.000	0.000
PDL371	0.000	0.000
PDL372	0.000	0.000
PDL373	0.000	0.000
PDL375	0.000	0.000
PDL376	0.000	0.000
PDL379	0.000	0.000
PDL380	0.000	0.000
PDL381	0.000	0.000
PDL382	0.000	0.000
PDL383	0.000	0.000
PDL387	0.000	0.000
PDL388	0.000	0.000
PDL390	0.000	0.000
PDL391	0.000	0.000
PDL392	0.000	0.000
PDL395	0.000	0.000
PDL397	0.000	0.000

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Membership probabilities(%) for samples in group: lcw
Probabilities calculated by projecting unknowns against reference groups.

ANID	g3	g4	Best Group
PDL404	0.000	0.000	
PDL405	0.000	0.000	
PDL406	0.000	0.000	
PDL407	0.000	0.000	
PDL408	0.000	0.000	
PDL409	0.000	0.000	
PDL410	0.000	0.000	
PDL411	0.000	0.000	
PDL412	0.000	0.000	
PDL413	0.000	0.000	
PDL414	0.000	0.000	
PDL415	0.000	0.000	

PDL416	0.000	0.000
PDL417	0.000	0.000
PDL418	0.000	0.000
PDL419	0.000	0.000
PDL420	0.000	0.000
PDL421	0.000	0.000
PDL422	0.000	0.000

Membership probabilities(%) for samples in group: unassigned1
Probabilities calculated by projecting unknowns against reference groups.

ANID	g3	g4	Best Group
PDL005	0.000	0.000	
PDL009	0.001	0.000	g3
PDL024	0.000	0.000	
PDL047	0.000	0.000	
PDL050	0.000	0.000	
PDL053	0.001	0.000	
PDL059	0.000	0.000	
PDL060	0.018	0.000	g3
PDL065	0.000	0.000	
PDL066	0.000	0.000	
PDL067	0.000	0.000	
PDL068	0.000	0.019	g4
PDL071	0.000	0.000	
PDL093	0.000	0.000	
PDL098	0.000	0.000	
PDL116	0.065	0.003	g3
PDL117	0.004	0.002	g3
PDL119	0.000	0.000	
PDL120	0.003	0.000	g3
PDL124	0.018	0.269	g4
PDL125	0.000	0.000	
PDL138	0.000	0.000	
PDL139	0.000	0.002	g4
PDL141	0.000	0.000	
PDL147	0.007	0.000	g3
PDL153	6.457	0.033	g3
PDL158	0.000	0.000	
PDL159	0.000	0.000	
PDL161	0.000	0.000	
PDL162	0.000	0.000	
PDL163	0.000	0.000	
PDL164	0.000	0.000	
PDL170	0.001	0.000	g3
PDL171	0.193	1.702	g4
PDL173	0.004	0.000	g3
PDL174	0.047	0.000	g3
PDL178	0.000	0.000	
PDL179	4.615	0.000	g3
PDL183	0.000	0.000	
PDL186	0.000	0.000	
PDL187	0.000	0.000	
PDL188	0.000	0.000	
PDL189	0.000	0.000	
PDL190	0.000	0.000	
PDL193	0.000	0.000	
PDL197	0.201	0.000	g3
PDL200	0.000	0.000	
PDL201	0.000	0.000	
PDL202	0.000	0.000	
PDL205	0.000	0.000	
PDL206	0.002	0.000	g3
PDL224	0.000	0.000	
PDL247	0.021	0.391	g4
PDL254	0.368	0.000	g3
PDL255	0.001	0.000	
PDL275	0.000	0.000	
PDL283	0.000	0.000	
PDL286	0.000	0.000	
PDL290	0.000	0.000	
PDL294	0.000	0.000	
PDL297	0.000	0.000	
PDL298	0.000	0.000	
PDL300	0.000	0.000	
PDL303	0.000	0.000	
PDL304	0.000	0.000	
PDL307	0.000	0.000	
PDL308	0.000	0.000	
PDL310	0.000	0.000	

PDL312	0.000	0.000	
PDL313	0.000	0.000	
PDL314	0.000	0.000	
PDL318	0.000	0.000	
PDL322	0.000	0.000	
PDL330	0.000	0.000	
PDL333	0.000	0.000	
PDL334	0.000	0.000	
PDL337	0.000	0.000	
PDL363	0.000	0.000	
PDL366	0.000	0.000	
PDL374	0.000	0.000	
PDL377	0.000	0.000	
PDL378	0.000	0.000	
PDL386	0.002	0.000	g3
PDL389	0.000	0.000	
PDL394	0.000	0.000	
PDL396	0.000	0.000	

Membership probabilities(%) for samples in group: unassigned2
Probabilities calculated by projecting unknowns against reference groups.

ANID	g3	g4	Best Group
HOM012	0.001	0.004	g4
HOM013	0.049	0.023	g3
HOM016	0.000	0.008	g4
HOM025	0.177	0.000	g3
HOM029	0.027	0.025	g3
HOM032	0.340	0.000	g3
HOM050	8.192	0.000	g3
HOM071	0.000	0.000	
HOM072	0.000	0.000	
HOM084	0.602	0.450	g3
HOM089	0.000	0.000	
HOM090	0.000	0.004	g4
HOM092	0.000	0.000	
HOM093	0.000	0.000	
HOM095	0.000	0.000	
HOM096	0.001	0.000	
HOM112	0.000	0.000	
HOM115	0.109	0.002	g3
HOM119	0.000	0.000	
PDL056	0.021	0.028	g4
PDL063	0.703	0.000	g3
PDL073	0.001	0.008	g4
PDL118	1.324	0.000	g3
PDL142	3.462	0.791	g3
PDL149	0.012	0.117	g4
PDL212	0.150	0.006	g3
PDL226	2.510	1.346	g3
PDL228	0.000	0.054	g4
PDL261	0.247	0.425	g4
PDL269	4.044	0.000	g3
PDL276	0.002	0.000	g3
PDL335	0.014	0.164	g4
PDL339	0.002	0.003	g4
PDL341	0.011	0.094	g4

Membership probabilities(%) for samples in group: puerco
Probabilities calculated by projecting unknowns against reference groups.

ANID	g3	g4	Best Group
HOM003	0.002	0.000	g3
HOM006	0.004	0.000	g3
HOM007	0.006	0.000	g3
HOM010	0.026	0.000	g3
HOM015	0.030	0.000	g3
HOM020	0.000	0.000	
HOM021	0.055	0.001	g3
HOM022	0.005	0.000	g3
HOM024	0.000	0.000	
HOM040	0.000	0.000	
HOM102	0.011	0.000	g3
HOM103	0.010	0.000	g3
HOM109	0.029	0.000	g3
HOM113	0.006	0.000	g3
HOM117	0.000	0.000	
HOM120	0.003	0.000	g3
HOM125	0.000	0.000	

HOM127	0.000	0.000	
PDL074	0.000	0.000	
PDL075	0.000	0.000	
PDL076	0.000	0.000	
PDL077	0.000	0.000	
PDL078	0.000	0.000	
PDL079	0.000	0.000	
PDL080	0.000	0.000	
PDL081	0.000	0.000	
PDL082	0.000	0.000	
PDL083	0.001	0.000	g3
PDL084	0.000	0.000	
PDL085	0.000	0.000	
PDL086	0.000	0.000	
PDL087	0.000	0.000	
PDL088	0.000	0.000	
PDL089	0.000	0.000	
PDL090	0.000	0.000	
PDL091	0.002	0.000	g3
PDL092	0.000	0.000	
PDL094	0.000	0.000	
PDL095	0.000	0.000	
PDL096	0.000	0.000	
PDL097	0.056	0.000	g3
PDL099	0.000	0.000	
PDL100	0.001	0.000	
PDL101	0.242	0.000	g3
PDL102	0.002	0.000	g3
PDL103	0.000	0.000	
PDL104	0.000	0.000	
PDL105	0.000	0.000	
PDL106	0.000	0.000	
PDL107	0.000	0.000	
PDL108	0.000	0.000	
PDL109	0.000	0.000	
PDL110	0.000	0.000	
PDL111	0.002	0.000	g3
PDL112	0.000	0.000	
PDL113	0.012	0.000	g3
PDL211	0.000	0.000	

Membership probabilities(%) for samples in group: unassigned3
Probabilities calculated by projecting unknowns against reference groups.

ANID	g3	g4	Best Group
HOM004	0.000	0.000	
HOM028	0.000	0.000	
HOM036	0.000	0.000	
HOM074	0.000	0.000	
HOM078	0.000	0.000	
HOM082	0.000	0.000	
HOM104	0.000	0.000	
HOM106	0.000	0.000	
HOM107	0.003	0.000	g3
HOM114	0.000	0.000	
PDL070	0.712	0.001	g3
PDL127	0.800	0.000	g3

Membership probabilities(%) for samples in group: new outliers
Probabilities calculated by projecting unknowns against reference groups.

ANID	g3	g4	Best Group
HOM057	0.000	0.000	
HOM073	0.000	0.000	
HOM075	0.000	0.047	g4
HOM081	0.000	0.000	
HOM091	0.000	0.000	
HOM104	0.000	0.000	
HOM106	0.000	0.000	
HOM114	0.000	0.000	
HOM116	0.000	0.000	
HOM121	0.000	0.000	
HOM128	0.000	0.000	

APPENDIX B: REPORT ON HOMOLOVI ORANGE WARE AND HOMOLOVI GRAY WARE SAMPLES SUBMITTED FOR PETROGRAPHIC ANALYSIS

Petrographic Analysis Report: Sites Homol’ovi I, Homol’ovi II, Homol’ovi III, Homol’ovi IV, and Chevelon Pueblo

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Introduction:

This report presents the results of a general petrographic analysis of 25 petrographic thin sections of Homolovi Utility Ware sherds from four sites: Homol’ovi I, Homol’ovi II, Homol’ovi III, Homol’ovi IV, and Chevelon Pueblo. The slides were manufactured by Quality Thin Section.

I use a Nikon Labophot T2-Pol optical mineralogy microscope to complete my analyses. I initially work with the samples, blind, not referring to any of the information related to me by the client or the academic, or gray, literature that currently exists. As part of my analysis, I complete a 100-click point count, using an arbitrary, absolute scale, identifying the mineralogical components that occur, under the cross-hairs, at every point along this scale. I execute the majority of my analysis at 40x magnification, the lowest magnification available to me. As part of my mineral identification process, I sometimes shift to 100x magnification, or higher, though this is rarely necessary. Point counts for each sample are attached to the end of this report. There are usually two major categories of inclusions within archaeological ceramics: mono-crystals and lithic fragments. In this report, there is a third, major type of inclusion: sherd (grog) temper.

By far and away, the most common inclusions are monocrystals, as most all of the thin sections are composed of quartz-based sand. However, for the sake of the introductory statements for this report, I will state that lithic fragments may pose a dilemma for ceramic petrographers in that we rarely have fragments large enough to make what many geologists would consider to be a clear or certain identification. However, with enough fragments in a single sherd, the ability to situate a site and collection of artifacts within the geologic context, and an understanding erosional processes and their effects on specific types of geologic units, identification of these fragments can be made with a fair degree of certainty.

I use standard optical mineralogical methods in identifying each non-plastic inclusion, including, but limited to, properties such as color, birefringence, fracture, cleavage, crystal habit, pleochroism, twinning, extinction, and relief in thin section. If appropriate, or necessary, I sometimes look at the interference figure of an individual crystal, but this is rarely necessary. For rock fragments, I use collections of mineral identities and individual crystals' relationships to one another, to assign a lithic description. I frequently note the angularity and roundedness of these inclusions in my more qualitative, written descriptions in addition to the size distribution of these inclusions within the sherds themselves (ie. well-sorted, poorly-sorted, bimodal distribution).

Angularity and roundedness is frequently a product of natural processes, both chemical and mechanical. However, these qualities may also be a result of human-action. “Crushed rock,” for example, is a phrase often used in the American Southwest to describe the mechanical reduction of rocks, by humans, to intentionally produce temper for pottery (see Shepard 1939). A marked difference in the roundedness of some inclusions in comparison to the angularity of others, may indicate the addition of non-plastic materials by potters. Alternatively, this could be a result of the natural introduction of relatively new sediments into a depositional system.

Similarly, size distributions of inclusions may be a result of either natural or cultural processes. Aeolian and alluvial processes may selectively winnow the smaller size fractions of a collection of sediments, producing a well-sorted collection of eroded material. Poorly sorted material may be indicative of an episodic, high-energy event, such as a flash flood through an arroyo. Alternatively, humans can achieve similar results, creating well-sorted sediments, through sieving or levigation, among other methods. Or, people may add non-plastic materials, with different angularity or roundedness, to ameliorate perceived flaws within raw clays.

The focus of most petrographic analysis of sherds inevitably dwells on mineralogical inclusions rather than the clay itself, as most all clay minerals are not visible using optical mineralogy. However, frequently, there are spaces during point counts where a single mineral inclusion does not fall under the cross-hairs of the field of view. During these instances, I will describe the clay matrix itself. If there are no, small inclusions, I note these spaces as, simply, “clay matrix.” If there are small, angular or rounded, crystals in this clay matrix, I describe these spaces as “silty clay matrix.” The silt component of the clay matrix is often too small for significant mineralogical analysis.

After completing point-counts, I usually organize samples into broader mineralogical-based categories further differentiating sub-groups based on texture and inclusion size-distributions. This report deviates from my standard practice in that inclusion sizes and the relative ratio of those sizes are the principal characteristic in distinguishing potential groupings of sherds. This is due to the fact that most all of the sherds are dominated by quartz-based sands, as previously stated. The addition of sherd temper (grog) does not appear to be entirely helpful in distinguishing groups within the sample set. Ultimately, I decided to create over-arching groups similar to those used by Claire Barker in her visual analysis of temper groups, which organized sherds by inclusion size, distribution of sizes, and the presence of colored and translucent sands.

Few ceramics are virtually identical. However, if ceramics share enough textural similarities, I group these individual sherds together. I generally identify sub-groups based on major textural differences between sherds within a larger group.

Group #1: N=5

Group #1 is dominated by coarse quartz-dominated sands. Most inclusions are sub-angular to sub-rounded. Fine sands are largely absent, but the minor presence of finer-grained sands is not enough to exclude sherds from Group #1. However, fine-grained sands must be an extremely minor component in the overall slide, or else it is better categorized as being part of Group #2. An argument can be made that differences between Groups #1 and #2 are largely arbitrary and that these two grade into one another rather than there being a sharp line differentiating the two.

Group #1a:
This description applies to the following slides:
CHV-13
H1-127
H4-57
H2-61

This sub-group is dominated by sub-rounded to rounded quartz mono-crystals. Minor fine particles are present in Slides H2-61 and H1-127. A large sub-angular augite crystal is present in Slide H1-127 differentiating it, mineralogically, from others in this sub-group. Slide H2-61, too, exhibits grog temper, which is absent in the other slides in this sub-group.

Group #1b:
This description applies to the following slides:
H3-12

Slide H3-12 is difficult to place in that inclusions are much sparser than in other slides in this sample. Coarse sand grains are most noticeable, but fine-grained sand is also present, though it does not dominate the slide. Grog is present.

Group #2: N=9
Group #2 is differentiated from Group #1 in that fine-grained sands are a much more significant component of the slides in Group #2. Coarser inclusions are still prevalent in these slides, but fine sands make up a larger percentage of each of these slides. Coarse inclusions can be sub-angular to sub-rounded whereas most of the finer-grained sand particles are sub-angular to angular.

Group #2a
This description applies to the following slides:
H2-97
H4-30
CHV-27
CHV-38

Sub-group #2a is characterized by very large, sub-angular to sub-rounded quartz mono-crystals, accompanied by a much finer, sub-angular mono-crystals. All slides in this sub-group exhibit grog temper. Significantly Slide CHV-27 may contain a couple pieces of fine-grained igneous rock, though these possible lithic fragments are not common.

Group #2b
This description applies to the following slides:
H3-36
H3-31

Sub-group #2b is similar to Sub-group #2a, except that the size difference between the coarse and fine inclusions are markedly less than those in Sub-group #2a. Grog temper is present in both slides.

Group #2c:
This description applies to the following slides:
H3-15

Slide H3-15 is characterized by a sub-angular, silty matrix and large, sub-rounded inclusions. A few of these coarse, sub-rounded inclusions may be lithic in nature, but they are heavily altered.

Group #2d:
This description applies to the following slides:
H4-75

Slide H4-75 is composed of a silty, sub-angular clay matrix with coarse inclusions that are much more likely to be poly-crystalline than those in Groups #1 or #2. Microcline is also much more common in this slide than in Groups #1 and #2. This is heavily suggestive that this slide is derived from a distinct parent material.

Group #2e:
This description applies to the following slides:
H4-31

I originally placed Slide H4-31 within Sub-group #2a. However, Slide H4-31 is unique in this sample in that there are several lithic fragments. I tentatively identify these inclusions as being an intrusive, intermediate igneous rock, such as diorite. Sherd-temper is also present.

Group #3: N=5

Group #3 contains finer inclusions, in comparison with Groups #1 and #2. Coarse inclusions are present, but are fewer in number than those in Groups #1 and #2. Coarse inclusions tend to be subangular to sub-rounded. Finer inclusions tend to be sub-angular to rounded.

Group #3a:
This description applies to the following slides:
H2-3

Slide H2-3 is dominated by a sub-rounded silty paste and occasional, large sub-rounded inclusions, usually quartz. Grog is present.

Group #3b:
This description applies to the following slides:
H2-71

Slide H2-71 is characterized by a much more angular, silty paste, in comparison to Sub-group #3a. Larger inclusions are tend to be angular fragments of sherd-temper, rather than mineralogical inclusions. Mineralogical inclusions, mostly quartz, are present and tend to be sub-rounded to sub-angular.

Group #3c:
This description applies to the following slides:
CHV-63

Slide CHV-63 is characterized by a rounded, silty paste and large sub-rounded mineralogical inclusions, primarily quartz. There are a few inclusions, however, that may be lithic in nature. These inclusions are few and heavily altered. They may be of intermediate, igneous origin. Grog is present.

Group #3d:
This description applies to the following slides:
H2-75

Slide H2-75 is characterized by a rounded, silty paste and sub-rounded, large inclusions, primarily quartz. Whereas most of the mineralogical inclusions are quartz, several are also plagioclase, suggesting a less-mature parent material.

Group #3e:
This description applies to the following slides:
H4-34

Slide H4-34 is much more angular than other slides in Group #3. Both large- and small-sized mineralogical inclusions are sub-angular. Microcline is present. Grog is also present in this slide.

Group #4: N=5
This description applies to the following slides:
H1-96
H1-65
H1-43
H1-58
H3-83

Group #4 is comprised of slides that I had originally split between Groups #1 and #2, based on the relative presence and absence of fine inclusions. However, as I began to type of the descriptions, I decided that these sherds had more in common with one another than either of the other two groups. Specifically, inclusions appear to be of very similar sizes and the number of feldspar inclusions suggests that the raw source may be slightly less mature than those utilized by either Group #1, #2, or #3. Specifically, Slide H1-96 contains a few crystals of what is likely microcline. Slides H1-65, H3-83, and H1-58 contain plagioclase, though the mineral is much more prevalent in H1-65 than H3-83 or H1-58. Grog is not present in any of these slides.

Group #5: N=1

This description applies to the following slides:
CHV-49

Slide CHV-49 is dominated by angular grog fragments, rather than mineralogical inclusions. For this reason, I have placed this slide in its own group. Sub-angular mono-crystalline inclusion make up a minority of all the inclusions in this slide.

Works Cited:

Shepard, Anna O.
1939 Technology of La Plata Pottery. In *Archaeological Studies in La Plata District-Southwestern Colorado and Northwestern New Mexico,* by Earl H. Morris, pp. 249-287. Carnegie Institute of Washington Publication No. 519. Washington, D.C.

Sample: Slide CHV-13

1. Quartz
2. Quartz
3. Quartz
4. Quartz
5. Quartz
6. Quartz
7. Clay Matrix
8. Quartz
9. Quartz
10. Quartz
11. Quartz-rich Groundmass
12. Quartz
13. Quartz-rich Groundmass
14. Quartz
15. Clay Matrix
16. Quartz-rich Groundmass
17. Quart-rich Groundmass
18. Quartz
19. Opaque
20. Quartz
21. Polycrystalline Quartz
22. Quartz
23. Quartz
24. Quartz
25. Plagioclase
26. Quartz
27. Quartz
28. Opaque
29. Quartz
30. Quartz
31. Opaque
32. Chemically-weathered rock
33. Quartz
34. Quartz
35. Possible Microcline
36. Sanidine
37. Quartz
38. Quartz
39. Plagioclase
40. Plagioclase
41. Quartz
42. Chemically-weathered rock
43. Opaque
44. Quartz
45. Quartz
46. Sanidine
47. Quartz
48. Quartz
49. Quartz
50. Microcline
51. Quartz
52. Quartz
53. Quartz
54. Opaque
55. Quartz
56. Quartz
57. Opaque
58. Quartz
59. Quartz-rich Groundmass
60. Quartz
61. Quartz
62. Chemically-weathered rock
63. Quartz
64. Quartz
65. Opaque
66. Quartz
67. Quartz
68. Quartz
69. Polycrystalline Quartz
70. Quartz
71. Quartz
72. Quartz-rich groundmass
73. Quartz
74. Quartz
75. Quartz
76. Quartz
77. Quartz
78. Quartz
79. Quartz
80. Clay Matrix
81. Chemically-weathered rock
82. Quartz
83. Quartz
84. Quartz
85. Quartz
86. Opaque
87. Quartz
88. Quartz
89. Polycrystalline Quartz
90. Quartz
91. Quartz
92. Opaque
93. Quartz
94. Quartz
95. Quartz
96. Polycrystalline Quartz
97. Quartz-rich groundmass
98. Quartz
99. Opaque
100. Quartz

Sample: Slide CHV-49

1. Sherd
2. Silt
3. Sherd
4. Silt
5. Sherd
6. Sherd
7. Sherd
8. Silt
9. Quartz
10. Opaque
11. Sherd
12. Quartz
13. Quartz
14. Silt
15. Clay Matrix
16. Quartz
17. Quartz
18. Sherd
19. Quartz
20. Quartz
21. Quartz
22. Clay Matrix
23. Clay Matrix
24. Silt
25. Silt
26. Quartz
27. Void
28. Clay Matrix
29. Clay Matrix
30. Quartz
31. Quartz
32. Quartz
33. Silt
34. Quartz
35. Clay Matrix
36. Silt
37. Quartz
38. Sherd
39. Clay Matrix
40. Clay Matrix
41. Clay Matrix
42. Sherd
43. Silt
44. Silt
45. Quartz
46. Quartz
47. Clay Matrix
48. Clay Matrix
49. Clay Matrix
50. Clay Matrix
51. Silt
52. Void
53. Clay Matrix
54. Void
55. Clay Matrix
56. Clay Matrix
57. Quartz
58. Sherd
59. Quartz
60. Clay Matrix
61. Sherd
62. Clay Matrix
63. Void
64. Quartz
65. Quartz
66. Clay Matrix
67. Clay Matrix
68. Quartz
69. Quartz
70. Clay Matrix
71. Clay Matrix
72. Quartz
73. Sherd
74. Quartz
75. Quartz
76. Sherd
77. Sherd
78. Sherd
79. Sherd
80. Quartz
81. Quartz
82. Clay Matrix
83. Sherd
84. Clay Matrix
85. Sherd
86. Quartz
87. Quartz
88. Clay Matrix
89. Sherd
90. Opaque
91. Sherd
92. Clay Matrix
93. Quartz
94. Sherd
95. Sherd
96. Clay Matrix
97. Sherd
98. Clay Matrix
99. Quartz
100. Quartz

Sample: Slide CHV-63

1. Quartz
2. Quartz
3. Quartz
4. Sherd
5. Quartz
6. Sherd
7. Sherd
8. Quartz
9. Quartz
10. Quartz
11. Sherd
12. Sherd
13. Quartz
14. Quartz
15. Silt
16. Quartz
17. Altering Mineral
18. Quartz
19. Quartz
20. Sherd
21. Sherd
22. Sherd
23. Quartz
24. Quartz
25. Quartz
26. Silt
27. Silt
28. Opaque
29. Sherd
30. Sherd
31. Quartz
32. Quartz
33. Quartz
34. Quartz
35. Silt
36. Quartz
37. Quartz
38. Silt
39. Quartz
40. Sherd
41. Altering Mineral
42. Sherd
43. Sherd
44. Silt
45. Silt
46. Quartz
47. Quartz
48. Quartz
49. Silt
50. Silt
51. Quartz
52. Quartz
53. Sherd
54. Sherd
55. Silt
56. Silt
57. Quartz
58. Altering Mineral
59. Quartz
60. Silt
61. Silt
62. Sherd
63. Sherd
64. Quartz
65. Quartz
66. Quartz
67. Silt
68. Silt
69. Sherd
70. Sherd
71. Silt
72. Sherd
73. Quartz
74. Quartz
75. Quartz
76. Silt
77. Silt
78. Quartz
79. Sherd
80. Sherd
81. Silt
82. Quartz
83. Quartz
84. Silt
85. Quartz
86. Silt
87. Sherd
88. Sherd
89. Sherd
90. Silt
91. Quartz
92. Quartz
93. Silt
94. Quartz
95. Quartz
96. Silt
97. Sherd
98. Sherd
99. Quartz
100. Silt

Sample: Slide CHV-27

1. Quartz
2. Quartz
3. Quartz
4. Quartz
5. Possible Sherd
6. Quartz
7. Quartz
8. Quartz
9. Sherd
10. Quartz
11. Quartz
12. Quartz
13. Quartz
14. Sherd
15. Polycrystalline Quartz
16. Quartz
17. Quartz
18. Polycrystalline Quartz
19. Quartz
20. Sherd
21. Quartz
22. Altering Rock Fragment
23. Quartz
24. Quartz
25. Quartz
26. Quartz
27. Sherd
28. Quartz
29. Quartz
30. Quartz
31. Silt
32. Clay Matrix
33. Quartz
34. Quartz
35. Quartz
36. Quartz
37. Opaque
38. Quartz
39. Sherd
40. Quartz
41. Quartz
42. Quartz
43. Quartz
44. Quartz
45. Quartz
46. Polycrystalline Quartz
47. Quartz
48. Quartz
49. Silt
50. Quartz
51. Quartz
52. Quartz
53. Quartz
54. Quartz
55. Quartz
56. Possible Igneous Rock Fragment?
57. Quartz
58. Quartz
59. Polycrystalline Quartz
60. Quartz
61. Quartz
62. Quartz
63. Quartz
64. Silt
65. Silt
66. Quartz
67. Silt
68. Quartz
69. Polycrystalline Quartz
70. Quartz
71. Sherd
72. Quartz
73. Sherd
74. Quartz
75. Silt
76. Quartz
77. Quartz
78. Silt
79. Polycrystalline Quartz
80. Sherd
81. Quartz
82. Opaque
83. Silt
84. Opaque
85. Quartz
86. Quartz
87. Polycrystalline Quartz
88. Sherd
89. Quartz
90. Quartz
91. Opaque
92. Quartz
93. Quartz
94. Opaque
95. Silt
96. Sherd
97. Opaque
98. Sherd
99. Quartz
100. Quartz

Sample: Slide H1-43

1. Void
2. Silt
3. Silt
4. Silt
5. Quartz
6. Quartz
7. Silt
8. Silt
9. Quartz
10. Quartz
11. Plagioclase
12. Quartz
13. Quartz
14. Silt
15. Silt
16. Silt
17. Opaque
18. Silt
19. Silt
20. Silt
21. Opaque
22. Quartz
23. Silt
24. Silt
25. Silt
26. Quartz
27. Silt
28. Silt
29. Silt
30. Quartz
31. Quartz
32. Silt
33. Silt
34. Opaque
35. Altering Mineral
36. Silt
37. Quartz
38. Quartz
39. Silt
40. Silt
41. Quartz
42. Quartz
43. Quartz
44. Silt
45. Silt
46. Silt
47. Quartz
48. Silt
49. Quartz
50. Opaque
51. Silt
52. Silt
53. Quartz
54. Quartz
55. Silt
56. Silt
57. Silt
58. Quartz
59. Silt
60. Silt
61. Quartz
62. Quartz
63. Quartz
64. Silt
65. Silt
66. Quartz
67. Silt
68. Silt
69. Quartz
70. Possible Feldspar
71. Silt
72. Silt
73. Quartz
74. Quartz
75. Quartz
76. Silt
77. Silt
78. Quartz
79. Silt
80. Silt
81. Quartz
82. Quartz
83. Opaque
84. Silt
85. Opaque
86. Silt
87. Silt
88. Void
89. Altering Mineral
90. Silt
91. Silt
92. Quartz
93. Opaque
94. Opaque
95. Silt
96. Silt
97. Quartz
98. Quartz
99. Silt
100. Silt

Sample: Slide H1-58

1. Quartz
2. Quartz
3. Quartz
4. Quartz
5. Quartz
6. Plagioclase
7. Quartz
8. Quartz
9. Quartz
10. Quartz
11. Quartz
12. Quartz
13. Quartz
14. Quartz
15. Quartz
16. Quartz
17. Quartz
18. Quartz
19. Quartz
20. Quartz
21. Quartz
22. Quartz
23. Plagioclase
24. Quartz
25. Quartz
26. Plagioclase
27. Quartz
28. Quartz
29. Quartz
30. Quartz
31. Quartz
32. Quartz
33. Void
34. Quartz
35. Quartz
36. Quartz
37. Quartz
38. Quartz
39. Quartz
40. Quartz
41. Quartz
42. Quartz
43. Quartz
44. Quartz
45. Quartz
46. Quartz
47. Quartz
48. Plagioclase
49. Quartz
50. Quartz
51. Quartz
52. Quartz
53. Void
54. Quartz
55. Quartz
56. Quartz
57. Quartz
58. Quartz
59. Quartz
60. Quartz
61. Plagioclase
62. Quartz
63. Quartz
64. Quartz
65. Quartz
66. Quartz
67. Quartz
68. Quartz
69. Quartz
70. Quartz
71. Quartz
72. Quartz
73. Void
74. Quartz
75. Quartz
76. Quartz
77. Quartz
78. Quartz
79. Quartz
80. Quartz
81. Quartz
82. Quartz
83. Quartz
84. Quartz
85. Quartz
86. Quartz
87. Quartz
88. Quartz
89. Quartz
90. Plagioclase
91. Quartz
92. Quartz
93. Quartz
94. Quartz
95. Quartz
96. Plagioclase
97. Quartz
98. Quartz
99. Quartz
100. Quartz

Sample: Slide H1-65

1. Quartz
2. Quartz
3. Quartz
4. Quartz
5. Quartz
6. Quartz
7. Quartz
8. Plagioclase
9. Quartz
10. Quartz
11. Quartz
12. Quartz
13. Quartz
14. Quartz
15. Quartz
16. Quartz
17. Quartz
18. Quartz
19. Quartz
20. Quartz
21. Quartz
22. Quartz
23. Quartz
24. Quartz
25. Quartz
26. Quartz
27. Augite
28. Quartz
29. Quartz
30. Quartz
31. Quartz
32. Quartz
33. Quartz
34. Quartz
35. Plagioclase
36. Quartz
37. Quartz
38. Quartz
39. Quartz
40. Quartz
41. Quartz
42. Quartz
43. Quartz
44. Quartz
45. Quartz
46. Quartz
47. Quartz
48. Quartz
49. Quartz
50. Quartz
51. Plagioclase
52. Quartz
53. Quartz
54. Possible Rock Fragment
55. Quartz
56. Quartz
57. Quartz
58. Quartz
59. Quartz
60. Quartz
61. Quartz
62. Quartz
63. Quartz
64. Quartz
65. Quartz
66. Plagioclase
67. Quartz
68. Quartz
69. Quartz
70. Quartz
71. Quartz
72. Quartz
73. Quartz
74. Opaque
75. Plagioclase
76. Quartz
77. Quartz
78. Quartz
79. Quartz
80. Quartz
81. Quartz
82. Plagioclase
83. Quartz
84. Quartz
85. Quartz
86. Quartz
87. Quartz
88. Quartz
89. Quartz
90. Quartz
91. Quartz
92. Quartz
93. Quartz
94. Quartz
95. Quartz
96. Quartz
97. Plagioclase
98. Quartz
99. Quartz
100. Quartz

Sample: Slide H1-96

1. Quartz
2. Quartz
3. Quartz
4. Quartz
5. Quartz
6. Quartz
7. Quartz
8. Quartz
9. Quartz
10. Void
11. Quartz
12. Void
13. Quartz
14. Quartz
15. Quartz
16. Void
17. Quartz
18. Quartz
19. Quartz
20. Quartz
21. Quartz
22. Plagioclase
23. Quartz
24. Quartz
25. Quartz
26. Quartz
27. Quartz
28. Quartz
29. Possible Igneous Fragment
30. Quartz
31. Quartz
32. Quartz
33. Quartz
34. Void
35. Quartz
36. Quartz
37. Void
38. Quartz
39. Quartz
40. Void
41. Opaque
42. Quartz
43. Quartz
44. Quartz
45. Quartz
46. Quartz
47. Quartz
48. Void
49. Quartz
50. Quartz
51. Quartz
52. Quartz
53. Quartz
54. Quartz
55. Quartz
56. Opaque
57. Void
58. Quartz
59. Quartz
60. Quartz
61. Quartz
62. Quartz
63. Plagioclase
64. Quartz
65. Quartz
66. Quartz
67. Quartz
68. Quartz
69. Quartz
70. Quartz
71. Void
72. Quartz
73. Quartz
74. Quartz
75. Quartz
76. Quartz
77. Opaque
78. Opaque
79. Quartz
80. Quartz
81. Quartz
82. Quartz
83. Quartz
84. Quartz
85. Void
86. Quartz
87. Quartz
88. Quartz
89. Quartz
90. Void
91. Quartz
92. Quartz
93. Quartz
94. Opaque
95. Possible Feldspar
96. Quartz
97. Quartz
98. Quartz
99. Quartz
100. Quartz

Sample: Slide H1-127

1. Quartz
2. Polycrystalline Quartz
3. Polycrystalline Quartz
4. Quartz
5. Quartz
6. Quartz
7. Quartz
8. Void
9. Altering Mineral
10. Quartz
11. Polycrystalline Quartz
12. Quartz
13. Polycrystalline Quartz
14. Quartz
15. Altering Mineral
16. Altering Mineral
17. Quartz
18. Quartz
19. Void
20. Opaque
21. Quartz
22. Possible Feldspar
23. Altering Mineral
24. Quartz
25. Void
26. Altering Mineral
27. Altering Mineral
28. Augite
29. Quartz
30. Quartz
31. Polycrystalline Quartz
32. Quartz
33. Void
34. Quartz
35. Quartz
36. Altering Mineral
37. Quartz
38. Quartz
39. Quartz
40. Void
41. Quartz
42. Quartz
43. Silt
44. Silt
45. Quartz
46. Void
47. Altering Mineral
48. Altering Mineral
49. Quartz
50. Quartz
51. Quartz
52. Void
53. Quartz
54. Quartz
55. Quartz
56. Quartz
57. Void
58. Altering Mineral
59. Quartz
60. Quartz
61. Quartz
62. Altering Mineral
63. Quartz
64. Quartz
65. Quartz
66. Quartz
67. Altering Mineral
68. Void
69. Quartz
70. Quartz
71. Altering Mineral
72. Void
73. Quartz
74. Quartz
75. Quartz
76. Quartz
77. Opaque
78. Quartz
79. Quartz
80. Altering Mineral
81. Polycrystalline Quartz
82. Quartz
83. Likely Feldspar
84. Quartz
85. Quartz
86. Quartz
87. Silt
88. Quartz
89. Quartz
90. Quartz
91. Silt
92. Void
93. Quartz
94. Altering Mineral
95. Quartz
96. Quartz
97. Possible Feldspar
98. Quartz
99. Quartz
100. Silt

Sample: Slide H2-3

1. Silt
2. Silt
3. Sherd
4. Sherd
5. Silt
6. Silt
7. Quartz
8. Silt
9. Opaque
10. Altering Mineral
11. Silt
12. Quartz
13. Sherd
14. Quartz
15. Silt
16. Silt
17. Silt
18. Silt
19. Quartz
20. Opaque
21. Silt
22. Silt
23. Opaque
24. Silt
25. Quartz
26. Silt
27. Sherd
28. Sherd
29. Silt
30. Silt
31. Silt
32. Sherd
33. Sherd
34. Silt
35. Quartz
36. Quartz
37. Sherd
38. Sherd
39. Silt
40. Silt
41. Silt
42. Sherd
43. Altering Mineral
44. Sherd
45. Silt
46. Silt
47. Silt
48. Quartz
49. Quartz
50. Silt
51. Sherd
52. Silt
53. Sherd
54. Sherd
55. Possible Sandstone?
56. Silt
57. Silt
58. Quartz
59. Opaque
60. Silt
61. Silt
62. Silt
63. Quartz
64. Sherd
65. Sherd
66. Silt
67. Quartz
68. Silt
69. Silt
70. Silt
71. Quartz
72. Quartz
73. Quartz
74. Silt
75. Silt
76. Silt
77. Silt
78. Quartz
79. Quartz
80. Sherd
81. Sherd
82. Quartz
83. Sherd
84. Silt
85. Silt
86. Silt
87. Quartz
88. Opaque
89. Silt
90. Silt
91. Silt
92. Silt
93. Quartz
94. Silt
95. Silt
96. Sherd
97. Silt
98. Silt
99. Sherd
100. Silt

Sample: Slide H2-61

1. Sherd
2. Quartz
3. Sherd
4. Quartz
5. Quartz
6. Quartz
7. Quartz
8. Sherd
9. Quartz
10. Quartz
11. Quartz
12. Sherd
13. Sherd
14. Quartz
15. Sherd
16. Quartz
17. Sherd
18. Polycrystalline Quartz
19. Sherd
20. Quartz
21. Quartz
22. Quartz
23. Sherd
24. Quartz
25. Quartz
26. Quartz
27. Sherd
28. Quartz
29. Quartz
30. Quartz
31. Sherd
32. Sherd
33. Quartz
34. Quartz
35. Quartz
36. Opaque
37. Sherd
38. Quartz
39. Sherd
40. Quartz
41. Sherd
42. Quartz
43. Quartz
44. Quartz
45. Polycrystalline Quartz
46. Quartz
47. Quartz
48. Quartz
49. Quartz
50. Quartz
51. Sherd
52. Opaque
53. Quartz
54. Quartz
55. Sherd
56. Sherd
57. Quartz
58. Quartz
59. Quartz
60. Sherd
61. Quartz
62. Void
63. Quartz
64. Quartz
65. Sherd
66. Quartz
67. Quartz
68. Quartz
69. Quartz
70. Quartz
71. Sherd
72. Quartz
73. Quartz
74. Sherd
75. Quartz
76. Quartz
77. Sherd
78. Silt
79. Quartz
80. Sherd
81. Sherd
82. Sherd
83. Quartz
84. Quartz
85. Sherd
86. Quartz
87. Opaque
88. Sherd
89. Sherd
90. Quartz
91. Sherd
92. Quartz
93. Quartz
94. Quartz
95. Sherd
96. Sherd
97. Quartz
98. Quartz
99. Quartz
100. Altering Mineral

Sample: Slide H2-71

1. Sherd
2. Sherd
3. Quartz
4. Quartz
5. Quartz
6. Silt
7. Opaque
8. Quartz
9. Quartz
10. Quartz
11. Quartz
12. Quartz
13. Quartz
14. Sherd
15. Sherd
16. Quartz
17. Sherd
18. Quartz
19. Sherd
20. Quartz
21. Opaque
22. Sherd
23. Sherd
24. Quartz
25. Quartz
26. Sherd
27. Sherd
28. Sherd
29. Sherd
30. Quartz
31. Sherd
32. Quartz
33. Quartz
34. Quartz
35. Sherd
36. Sherd
37. Sherd
38. Quartz
39. Quartz
40. Quartz
41. Plagioclase
42. Quartz
43. Quartz
44. Quartz
45. Sherd
46. Sherd
47. Sherd
48. Opaque
49. Quartz
50. Quartz
51. Quartz
52. Quartz
53. Opaque
54. Opaque
55. Sherd
56. Sherd
57. Quartz
58. Quartz
59. Quartz
60. Sherd
61. Sherd
62. Altering Mineral
63. Quartz
64. Quartz
65. Quartz
66. Quartz
67. Sherd
68. Clay Matrix
69. Sherd
70. Sherd
71. Quartz
72. Quartz
73. Quartz
74. Quartz
75. Quartz
76. Quartz
77. Sherd
78. Sherd
79. Quartz
80. Quartz
81. Quartz
82. Quartz
83. Sherd
84. Sherd
85. Sherd
86. Quartz
87. Quartz
88. Quartz
89. Quartz
90. Sherd
91. Sherd
92. Plagioclase
93. Quartz
94. Quartz
95. Quartz
96. Sherd
97. Quartz
98. Sherd
99. Quartz
100. Quartz

Sample: Slide H2-75

1. Sherd
2. Sherd
3. Quartz
4. Quartz
5. Quartz
6. Clay Matrix
7. Clay Matrix
8. Clay Matrix
9. Quartz
10. Opaque
11. Clay Matrix
12. Clay Matrix
13. Opaque
14. Clay Matrix
15. Clay Matrix
16. Quartz
17. Clay Matrix
18. Clay Matrix
19. Quartz
20. Quartz
21. Quartz
22. Clay Matrix
23. Clay Matrix
24. Quartz
25. Clay Matrix
26. Clay Matrix
27. Quartz
28. Sherd
29. Quartz
30. Quartz
31. Sherd
32. Clay Matrix
33. Clay Matrix
34. Clay Matrix
35. Opaque
36. Opaque
37. Clay Matrix
38. Clay Matrix
39. Quartz
40. Sherd
41. Clay Matrix
42. Clay Matrix
43. Clay Matrix
44. Opaque
45. Clay Matrix
46. Opaque
47. Clay Matrix
48. Quartz
49. Quartz
50. Quartz
51. Opaque
52. Clay Matrix
53. Clay Matrix
54. Clay Matrix
55. Opaque
56. Clay Matrix
57. Clay Matrix
58. Quartz
59. Clay Matrix
60. Clay Matrix
61. Opaque
62. Clay Matrix
63. Clay Matrix
64. Opaque
65. Quartz
66. Quartz
67. Opaque
68. Clay Matrix
69. Clay Matrix
70. Clay Matrix
71. Opaque
72. Clay Matrix
73. Clay Matrix
74. Opaque
75. Quartz
76. Clay Matrix
77. Clay Matrix
78. Quartz
79. Clay Matrix
80. Quartz
81. Opaque
82. Opaque
83. Sherd
84. Clay Matrix
85. Clay Matrix
86. Quartz
87. Quartz
88. Clay Matrix
89. Clay Matrix
90. Clay Matrix
91. Quartz
92. Quartz
93. Sherd
94. Clay Matrix
95. Clay Matrix
96. Quartz
97. Quartz
98. Clay Matrix
99. Clay Matrix
100. Clay Matrix

Sample: Slide H2-97

1. Sherd
2. Opaque
3. Quartz
4. Quartz
5. Quartz
6. Possible Igneous Fragment
7. Quartz
8. Quartz
9. Quartz
10. Silt
11. Silt
12. Opaque
13. Silt
14. Quartz
15. Quartz
16. Silt
17. Opaque
18. Silt
19. Quartz
20. Quartz
21. Quartz
22. Quartz
23. Quartz
24. Quartz
25. Quartz
26. Quartz
27. Quartz
28. Quartz
29. Silt
30. Quartz
31. Quartz
32. Opaque
33. Quartz
34. Quartz
35. Opaque
36. Silt
37. Quartz
38. Quartz
39. Quartz
40. Quartz
41. Quartz
42. Quartz
43. Opaque
44. Quartz
45. Quartz
46. Quartz
47. Quartz
48. Silt
49. Opaque
50. Quartz
51. Quartz
52. Quartz
53. Silt
54. Quartz
55. Quartz
56. Quartz
57. Quartz
58. Possible Igneous Fragment
59. Quartz
60. Quartz
61. Opaque
62. Quartz
63. Quartz
64. Silt
65. Quartz
66. Quartz
67. Quartz
68. Quartz
69. Silt
70. Opaque
71. Opaque
72. Quartz
73. Quartz
74. Quartz
75. Quartz
76. Quartz
77. Quartz
78. Quartz
79. Quartz
80. Quartz
81. Quartz
82. Opaque
83. Quartz
84. Quartz
85. Quartz
86. Quartz
87. Opaque
88. Quartz
89. Quartz
90. Quartz
91. Quartz
92. Silt
93. Opaque
94. Quartz
95. Quartz
96. Quartz
97. Silt
98. Quartz
99. Quartz
100. Opaque

Sample: Slide H3-12

1. Silt
2. Silt
3. Quartz
4. Silt
5. Sherd
6. Silt
7. Clay Matrix
8. Silt
9. Quartz
10. Silt
11. Silt
12. Quartz
13. Quartz
14. Silt
15. Clay Matrix
16. Clay Matrix
17. Clay Matrix
18. Quartz
19. Quartz
20. Quartz
21. Clay Matrix
22. Silt
23. Quartz
24. Sherd
25. Clay Matrix
26. Clay Matrix
27. Clay Matrix
28. Quartz
29. Silt
30. Clay Matrix
31. Clay Matrix
32. Opaque
33. Clay Matrix
34. Clay Matrix
35. Opaque
36. Clay Matrix
37. Clay Matrix
38. Sherd
39. Quartz
40. Quartz
41. Clay Matrix
42. Clay Matrix
43. Clay Matrix
44. Silt
45. Clay Matrix
46. Clay Matrix
47. Clay Matrix
48. Quartz
49. Opaque
50. Sherd
51. Clay Matrix
52. Clay Matrix
53. Silt
54. Silt
55. Clay Matrix
56. Clay Matrix
57. Clay Matrix
58. Quartz
59. Quartz
60. Clay Matrix
61. Clay Matrix
62. Clay Matrix
63. Quartz
64. Silt
65. Clay Matrix
66. Clay Matrix
67. Silt
68. Clay Matrix
69. Clay Matrix
70. Clay Matrix
71. Silt
72. Quartz
73. Quartz
74. Clay Matrix
75. Clay Matrix
76. Sherd
77. Quartz
78. Quartz
79. Clay Matrix
80. Clay Matrix
81. Silt
82. Clay Matrix
83. Clay Matrix
84. Quartz
85. Quartz
86. Sherd
87. Clay Matrix
88. Clay Matrix
89. Clay Matrix
90. Silt
91. Clay Matrix
92. Clay Matrix
93. Silt
94. Quartz
95. Clay Matrix
96. Quartz
97. Quartz
98. Sherd
99. Clay Matrix
100. Clay Matrix

Sample: Slide H3-15

1. Void
2. Possible Igneous Fragment
3. Quartz
4. Quartz
5. Quartz
6. Quartz
7. Silt
8. Quartz
9. Quartz
10. Quartz
11. Quartz
12. Silt
13. Plagioclase
14. Quartz
15. Quartz
16. Quartz
17. Quartz
18. Possible Igneous Fragment
19. Quartz
20. Quartz
21. Opaque
22. Quartz
23. Quartz
24. Possible Igneous Fragment
25. Quartz
26. Quartz
27. Opaque
28. Quartz
29. Silt
30. Quartz
31. Void
32. Quartz
33. Void
34. Quartz
35. Opaque
36. Quartz
37. Opaque
38. Quartz
39. Quartz
40. Quartz
41. Quartz
42. Altered Mineral
43. Quartz
44. Quartz
45. Opaque
46. Quartz
47. Quartz
48. Quartz
49. Quartz
50. Silt
51. Quartz
52. Opaque
53. Quartz
54. Quartz
55. Quartz
56. Opaque
57. Altered Mineral
58. Quartz
59. Quartz
60. Quartz
61. Opaque
62. Opaque
63. Quartz
64. Quartz
65. Altered Mineral
66. Altered Mineral
67. Altered Mineral
68. Quartz
69. Quartz
70. Quartz
71. Quartz
72. Quartz
73. Silt
74. Silt
75. Quartz
76. Quartz
77. Opaque
78. Void
79. Opaque
80. Quartz
81. Quartz
82. Void
83. Opaque
84. Altered Mineral
85. Quartz
86. Quartz
87. Quartz
88. Quartz
89. Silt
90. Opaque
91. Quartz
92. Quartz
93. Quartz
94. Altered Mineral
95. Quartz
96. Quartz
97. Quartz
98. Quartz
99. Opaque
100. Quartz

Sample: Slide H3-31

1. Sherd
2. Sherd
3. Quartz
4. Quartz
5. Opaque
6. Silt
7. Silt
8. Sherd
9. Silt
10. Silt
11. Quartz
12. Quartz
13. Opaque
14. Opaque
15. Silt
16. Sherd
17. Quartz
18. Quartz
19. Silt
20. Silt
21. Possible Rock Fragment
22. Silt
23. Quartz
24. Quartz
25. Quartz
26. Sherd
27. Silt
28. Silt
29. Opaque
30. Silt
31. Silt
32. Silt
33. Altering Mineral
34. Silt
35. Quartz
36. Silt
37. Quartz
38. Quartz
39. Silt
40. Quartz
41. Silt
42. Quartz
43. Silt
44. Quartz
45. Silt
46. Silt
47. Silt
48. Altering Mineral
49. Silt
50. Silt
51. Quartz
52. Silt
53. Silt
54. Quartz
55. Quartz
56. Silt
57. Silt
58. Quartz
59. Quartz
60. Silt
61. Silt
62. Quartz
63. Quartz
64. Silt
65. Silt
66. Silt
67. Sherd
68. Silt
69. Silt
70. Quartz
71. Quartz
72. Quartz
73. Silt
74. Silt
75. Silt
76. Silt
77. Silt
78. Quartz
79. Sherd
80. Silt
81. Silt
82. Opaque
83. Silt
84. Opaque
85. Silt
86. Opaque
87. Silt
88. Quartz
89. Quartz
90. Quartz
91. Silt
92. Silt
93. Quartz
94. Silt
95. Quartz
96. Opaque
97. Silt
98. Sherd
99. Silt
100. Opaque

Sample: Slide H3-36

1. Silt

2. Quartz

3. Silt

4. Quartz

5. Silt

6. Sherd

7. Quartz

8. Silt

9. Silt

10. Silt

11. Sherd

12. Quartz

13. Silt

14. Silt

15. Silt

16. Silt

17. Silt

18. Quartz

19. Silt

20. Quartz

21. Silt

22. Silt

23. Silt

24. Silt

25. Silt

26. Quartz

27. Quartz

28. Silt

29. Silt

30. Silt

31. Silt

32. Silt

33. Silt

34. Sherd

35. Silt

36. Silt

37. Quartz

38. Silt

39. Sherd

40. Silt

41. Quartz

42. Silt

43. Silt

44. Silt

45. Quartz

46. Silt

47. Silt

48. Quartz

49. Silt

50. Silt

51. Quartz

52. Quartz

53. Silt

54. Silt

55. Silt

56. Sherd

57. Silt

58. Silt

59. Quartz

60. Silt

61. Silt

62. Sherd

63. Silt

64. Silt

65. Quartz

66. Sherd

67. Sherd

68. Silt

69. Silt

70. Silt

71. Sherd

72. Silt

73. Silt

74. Silt

75. Sherd

76. Silt

77. Silt

78. Silt

79. Silt

80. Clay Matrix

81. Silt

82. Silt

83. Silt

84. Quartz

85. Quartz

86. Silt

87. Sherd

88. Silt

89. Silt

90. Quartz

91. Silt

92. Quartz

93. Quartz

94. Silt

95. Silt

96. Sherd

97. Quartz

98. Sherd

99. Silt

100. Silt

Sample: Slide H3-83

1. Quartz
2. Quartz
3. Quartz
4. Quartz
5. Quartz
6. Quartz
7. Quartz
8. Quartz
9. Quartz
10. Quartz
11. Plagioclase
12. Quartz
13. Quartz
14. Quartz
15. Quartz
16. Quartz
17. Quartz
18. Quartz
19. Quartz
20. Quartz
21. Quartz
22. Quartz
23. Quartz
24. Quartz
25. Quartz
26. Quartz
27. Quartz
28. Quartz
29. Quartz
30. Quartz
31. Quartz
32. Quartz
33. Quartz
34. Quartz
35. Plagioclase
36. Quartz
37. Quartz
38. Quartz
39. Quartz
40. Opaque
41. Quartz
42. Quartz
43. Quartz
44. Opaque
45. Quartz
46. Quartz
47. Quartz
48. Quartz
49. Quartz
50. Quartz
51. Opaque
52. Quartz
53. Quartz
54. Quartz
55. Quartz
56. Plagioclase
57. Quartz
58. Quartz
59. Quartz
60. Quartz
61. Quartz
62. Quartz
63. Quartz
64. Opaque
65. Quartz
66. Quartz
67. Quartz
68. Quartz
69. Opaque
70. Quartz
71. Quartz
72. Quartz
73. Quartz
74. Quartz
75. Quartz
76. Augite?
77. Quartz
78. Quartz
79. Quartz
80. Quartz
81. Quartz
82. Quartz
83. Quartz
84. Quartz
85. Quartz
86. Quartz
87. Quartz
88. Plagioclase
89. Quartz
90. Quartz
91. Quartz
92. Quartz
93. Quartz
94. Quartz
95. Quartz
96. Quartz
97. Quartz
98. Quartz
99. Quartz
100. Opaque

Sample: Slide H4-30

1. Quartz
2. Quartz
3. Quartz
4. Sherd
5. Quartz
6. Quartz
7. Opaque
8. Quartz
9. Quartz
10. Quartz
11. Opaque
12. Quartz
13. Quartz
14. Silt
15. Quartz
16. Quartz
17. Silt
18. Quartz
19. Quartz
20. Quartz
21. Clay Matrix
22. Quartz
23. Quartz
24. Quartz
25. Quartz
26. Quartz
27. Clay Matrix
28. Quartz
29. Quartz
30. Opaque
31. Quartz
32. Quartz
33. Quartz
34. Opaque
35. Clay Matrix
36. Quartz
37. Quartz
38. Quartz
39. Quartz
40. Quartz
41. Opaque
42. Clay Matrix
43. Clay Matrix
44. Quartz
45. Quartz
46. Quartz
47. Quartz
48. Quartz
49. Quartz
50. Quartz
51. Quartz
52. Clay Matrix
53. Clay Matrix
54. Quartz
55. Quartz
56. Quartz
57. Quartz
58. Quartz
59. Clay Matrix
60. Quartz
61. Quartz
62. Quartz
63. Opaque
64. Opaque
65. Clay Matrix
66. Quartz
67. Quartz
68. Quartz
69. Clay Matrix
70. Quartz
71. Quartz
72. Quartz
73. Clay Matrix
74. Quartz
75. Quartz
76. Quartz
77. Quartz
78. Silt
79. Quartz
80. Quartz
81. Quartz
82. Clay Matrix
83. Quartz
84. Quartz
85. Quartz
86. Clay Matrix
87. Quartz
88. Quartz
89. Opaque
90. Polycrystalline Quartz
91. Opaque
92. Quartz
93. Quartz
94. Quartz
95. Clay Matrix
96. Quartz
97. Quartz
98. Quartz
99. Quartz
100. Quartz

Sample: Slide H4-31

1. Small Igneous Rock Fragment
2. Silt
3. Silt
4. Sherd
5. Sherd
6. Sherd
7. Sherd
8. Sherd
9. Clay Matrix
10. Sherd
11. Clay Matrix
12. Quartz
13. Quartz
14. Sherd
15. Clay Matrix
16. Sherd
17. Sherd
18. Sherd
19. Sherd
20. Clay Matrix
21. Sherd
22. Clay Matrix
23. Silt
24. Silt
25. Silt
26. Opaque
27. Silt
28. Sherd
29. Sherd
30. Quartz
31. Quartz
32. Quartz
33. Sherd
34. Sherd
35. Sherd
36. Silt
37. Opaque
38. Silt
39. Opaque
40. Sherd
41. Sherd
42. Altering Mineral
43. Sherd
44. Silt
45. Silt
46. Silt
47. Diorite?
48. Sherd
49. Sherd
50. Sherd
51. Silt
52. Silt
53. Silt
54. Opaque
55. Sherd
56. Sherd
57. Sherd
58. Sherd
59. Silt
60. Silt
61. Sherd
62. Sherd
63. Opaque
64. Sherd
65. Silt
66. Sherd
67. Sherd
68. Quartz
69. Quartz
70. Sherd
71. Sherd
72. Sherd
73. Sherd
74. Quartz
75. Quartz
76. Quartz
77. Silt
78. Silt
79. Silt
80. Quartz
81. Quartz
82. Sherd
83. Sherd
84. Sherd
85. Silt
86. Opaque
87. Silt
88. Sherd
89. Sherd
90. Quartz
91. Quartz
92. Quartz
93. Quartz
94. Sherd
95. Sherd
96. Altering Mineral
97. Quartz
98. Quartz
99. Sherd
100. Sherd

Sample: Slide H4-34

1. Altered Igneous Rock?
2. Silt
3. Sherd
4. Silt
5. Quartz
6. Quartz
7. Silt
8. Quartz
9. Silt
10. Opaque
11. Silt
12. Quartz
13. Silt
14. Quartz
15. Opaque
16. Silt
17. Silt
18. Silt
19. Quartz
20. Quartz
21. Silt
22. Quartz
23. Silt
24. Opaque
25. Silt
26. Silt
27. Quartz
28. Quartz
29. Opaque
30. Quartz
31. Quartz
32. Opaque
33. Silt
34. Opaque
35. Silt
36. Opaque
37. Altered Igneous Rock?
38. Clay Matrix
39. Silt
40. Clay Matrix
41. Opaque
42. Quartz
43. Quartz
44. Opaque
45. Clay Matrix
46. Silt
47. Silt
48. Microcline
49. Silt
50. Quartz
51. Quartz
52. Silt
53. Silt
54. Silt
55. Quartz
56. Quartz
57. Silt
58. Silt
59. Silt
60. Opaque
61. Sherd
62. Silt
63. Silt
64. Sherd
65. Opaque
66. Silt
67. Clay Matrix
68. Opaque
69. Silt
70. Silt
71. Silt
72. Opaque
73. Silt
74. Quartz
75. Quartz
76. Silt
77. Silt
78. Microcline
79. Silt
80. Silt
81. Quartz
82. Quartz
83. Quartz
84. Silt
85. Silt
86. Quartz
87. Opaque
88. Silt
89. Opaque
90. Silt
91. Silt
92. Quartz
93. Opaque
94. Sherd
95. Silt
96. Silt
97. Silt
98. Quartz
99. Silt
100. Quartz

Sample: Slide H4-57

1. Plagioclase
2. Quartz
3. Quartz
4. Quartz
5. Clay Matrix
6. Quartz
7. Quartz
8. Quartz
9. Clay Matrix
10. Quartz
11. Quartz
12. Quartz
13. Quartz
14. Clay Matrix
15. Quartz
16. Quartz
17. Quartz
18. Quartz
19. Microcline
20. Quartz
21. Quartz
22. Quartz
23. Quartz
24. Clay Matrix
25. Quartz
26. Quartz
27. Clay Matrix
28. Quartz
29. Quartz
30. Opaque
31. Quartz
32. Quartz
33. Quartz
34. Quartz
35. Clay Matrix
36. Quartz
37. Quartz
38. Quartz
39. Quartz
40. Clay Matrix
41. Opaque
42. Clay Matrix
43. Quartz
44. Quartz
45. Quartz
46. Quartz
47. Quartz
48. Clay Matrix
49. Quartz
50. Quartz
51. Quartz
52. Clay Matrix
53. Quartz
54. Quartz
55. Quartz
56. Quartz
57. Clay Matrix
58. Clay Matrix
59. Quartz
60. Quartz
61. Clay Matrix
62. Quartz
63. Quartz
64. Quartz
65. Quartz
66. Quartz
67. Opaque
68. Clay Matrix
69. Clay Matrix
70. Quartz
71. Quartz
72. Quartz
73. Quartz
74. Quartz
75. Quartz
76. Quartz
77. Clay Matrix
78. Opaque
79. Quartz
80. Quartz
81. Quartz
82. Quartz
83. Clay Matrix
84. Possible Augite
85. Quartz
86. Quartz
87. Quartz
88. Quartz
89. Clay Matrix
90. Quartz
91. Quartz
92. Quartz
93. Quartz
94. Quartz
95. Quartz
96. Clay Matrix
97. Quartz
98. Opaque
99. Clay Matrix
100. Quartz

Sample: Slide H4-75

1. Quartz
2. Quartz
3. Polycrystalline Quartz
4. Polycrystalline Quartz
5. Quartz
6. Microcline
7. Quartz
8. Quartz
9. Polycrystalline Quartz
10. Microcline
11. Silt
12. Opaque
13. Quartz
14. Quartz
15. Quartz
16. Silt
17. Quartz
18. Silt
19. Quartz
20. Quartz
21. Opaque
22. Quartz
23. Quartz
24. Quartz
25. Polycrystalline Quartz
26. Quartz
27. Polycrystalline Quartz
28. Quartz
29. Silt
30. Quartz
31. Quartz
32. Quartz
33. Silt
34. Quartz
35. Quartz
36. Polycrystalline Quartz
37. Quartz
38. Void
39. Quartz
40. Quartz
41. Quartz
42. Void
43. Quartz
44. Quartz
45. Silt
46. Quartz
47. Quartz
48. Polycrystalline Quartz
49. Quartz
50. Silt
51. Quartz
52. Quartz
53. Quartz
54. Quartz
55. Silt
56. Quartz
57. Quartz
58. Quartz
59. Polycrystalline Quartz
60. Quartz
61. Opaque
62. Quartz
63. Polycrystalline Quartz
64. Quartz
65. Quartz
66. Quartz
67. Quartz
68. Quartz
69. Polycrystalline Quartz
70. Quartz
71. Quartz
72. Quartz
73. Void
74. Opaque
75. Quartz
76. Quartz
77. Quartz
78. Polycrystalline Quartz
79. Quartz
80. Quartz
81. Silt
82. Quartz
83. Quartz
84. Silt
85. Quartz
86. Quartz
87. Quartz
88. Silt
89. Quartz
90. Quartz
91. Silt
92. Quartz
93. Polycrystalline Quartz
94. Quartz
95. Quartz
96. Quartz
97. Quartz
98. Quartz
99. Quartz
100. Silt

APPENDIX C: CORRUGATED POTTERY TECHNOLOGICAL STYLE ANALYSIS KEY AND CODING SHEET

CORRUGATED CERAMIC TECHNOLOGICAL ANALYSIS KEY

PROVENIENCE

ID—Individual ID number assigned to all sherds analyzed

STR—Structure

PD—Provenience Designation

FS—Field Specimen

VARIABLES MEASURED ON ALL BODY SHERDS

Temper Type 1:

- 0—Unapplicable
- 1—Fine Paste (temperless)
- 2—Fine Colored Fragments
- 9—Burned (indeterminate)
- 13—Yellow Sherd
- 14—Gray Sherd
- 15—Orange Sherd
- 16—White Sherd
- 17—Fine Colorless Sand
- 18—Coarse Colorless Sand
- 19—Colored Sand
- 20—Limestone
- 21—Cinder
- 22—Tuff
- 23—Crushed Rock
- 24—Mica
- 25—WAF
- 26—Augite
- 27—Clear and Colored Sand (local)
- 28—Red Fragments
- 29—Mixed Colorless sand—coarse and fine, clear and opaque
- 30—Black fragments—not burnt or volcanic
- 99—Other

Temper Type 2: see options above

Temper Type 3: see options above

Color: Refers to the dominant color of the sherd paste

- 0—Indeterminate
- 1—White
- 2—Light Gray
- 3—Medium Gray
- 4—Steel Gray
- 5—Dark Gray
- 6—Brownish-gray
- 7—Brown
- 8—Rust (Orange-brown)
- 9—Orange
- 10—Yellow
- 11—Buff
- 99—Other (specify in comments)

Ware:

- 0—indeterminate
- 102—Awatovi Yellow Ware
- 104—Homolovi Orange Ware
- 108—Tusayan Gray Ware
- 110—Little Colorado Gray Ware
- 114—Mogollon Brown Ware
- 116—Homolovi Gray Ware
- 203—Puerco Valley Utility Ware
- 99—other—specify in notes

Vessel Portion:

- 0—indeterminate
- 1—body sherd
- 2—rim sherd
- 3—basal sherd
- 4—rim and body sherd
- 5—base and body sherd
- 6—complete/nearly complete vessel
- 99—other—specify in notes

Type (primary treatment): A majority of sherds will fit into one of the categories below. If a sherd does not fit into any of these categories, code it as "other" and write a description in the notes field. These variables are not included in the quantitative analyses.

- 0—indeterminate
- 1—indented corrugated—indented corrugated sherd
- 2—zoned corrugated—both plain and indented coils are visible (transition at coils)
- 3—patterned corrugated—both plain and indented coils (transition across coils)
- 4—plain corrugated—coils without any kind of indentations

5—clapboard corrugated—wide or narrow clapboard corrugations
6—plainware—smoothed surface
7—obliterated corrugated—corrugated surface with uniformly, fully obliterated coils
8—wiped obliterated—coils are partially obliterated, maintain vertical integrity
9—semi-obliterated—coils are uniformly but partially obliterated, coil junctions will still be partially visible
10—Heavily obliterated—indents and corrugations are barely visible, largely erased
11—flattened—like clapboard but indented
99—other—specify in notes

Type of indentations: This category applies to indented, zoned, and patterned corrugated sherds.
0—indeterminate –indentations clearly visible but type cannot be determined
1—finger/finger nail– finger prints/pads/nail marks clearly visible between/across coils
2—tool—tooled indentations
99—other/multiple—specify in notes

Direction of indentation: This variable relates to the direction of the indentations in relation to the coils used to form the vessel. As with the variable above, this is only measured on indented, zoned, and patterned corrugated sherds. See example sherds.
0—indeterminate
1—parallel—the indentation is parallel with the coils (i.e., the finger was held parallel to the direction of the coils), forms a U-shaped depression
2—perpendicular—the indentation is perpendicular to the coils, cuts through both sides of coil
3—oblique—the indentation is between parallel/perpendicular

Indentation Alignment: This variable relates to whether or not indentations are aligned between coils. Consider 5–6 coils for this variable. This variable is only measured on indented, zoned, and patterned corrugated sherds.
0—indeterminate
1—aligned—indentations are vertically aligned between coils
2—unaligned—indentations are not vertically aligned between coils
3—diagonally aligned—indentation clearly diagonally aligned

Type of surface elaborations: This variable refers secondary surface elaborations that are applied after the vessel is formed. The list below includes most of the secondary surface treatments that you are likely to encounter. If you encounter a surface treatment not included here, code this sherd as “other” and write a description in the notes field.
0—none/indeterminate—no secondary surface elaboration visible
1—incised—surface is incised
2—punctate—the surface of the sherd has be punched with a sharp tool
3—appliqué—A secondary form has been applied to the surface of the sherd
99—other/multiple—specify in the notes

Vessel form: The type of vessel. Use one of the following categories. If a sherd does not fit any of these categories, code it as “other” and describe it in the notes field.

0—indeterminate
1—jar
2—bowl
3—ladle/scoop
4—seed jar
5—effigy
6—pitcher
7—miniature vessel
99—other—specify in notes

Presence/Absence of smudging: This variable refers to the presence or absence of smudging. Smudging is most common on the interior surface of bowls. It characterized as a black, waxy feeling, and reflective surface that is usually highly polished.

0—indeterminate
1—smudging absent
2—smudging present

Interior surface treatment:

0—indeterminate
1—rough—temper protrudes from unsmoothed surface
2—scraped—scrape/drag marks where temper protrudes
3—smoothed—Smooth but not shiny, a few streaks/marks may be visible
4—polished—surface is clearly polished with little to no temper protruding
99—other—specify in notes

Sooting: This variable refers to the presence or absence of sooting, a dark carbon residue.

0—indeterminate
1—present on exterior only
2—present on interior only
3—present on both surfaces
4—present on broken edges of sherd
5—no sooting present

Vessel wall thickness (cm): This variable refers to the thickness of the thickest portion of the sherd. This is measured using the digital calipers. Do not measure this variable on rim or base sherds. Average of 3 measurements.

Width of indentations at widest point (cm): This variable refers to the width of indentations at the widest point. This is measured using the digital calipers. Three indentations are measured for each sherd which will later be averaged.

Width of indentations at narrowest point (cm): This variable refers to the width of indentations at the narrowest point. This is measured using the digital calipers. Three indentations are measured for each sherd which will later be averaged.

Depth of indentations (cm): This variable refers to the difference between the deepest portion of an indentation and the top of the adjacent coil. Three indentations are measured which will later be averaged. This is measured using the digital depth gauge.

Coil width (cm): This variable provides an estimate of the average size of coils for each sherd. This is the average of three measures from coil juncture to coil juncture.

Number of indentations per sq cm: This variable refers to the number of indentations per square cm of vessel surface. This is measured by placing the 3x3 cm cardboard cutout over a sherd and recording the number of indentations that are fully visible. If measuring a zoned or patterned corrugated sherd, make sure that unindented portions of the vessel are not visible through the cardboard cutout.

Number of coils per sq cm: This variable refers to the number of coils per square cm of vessel surface. This is measured by placing the 3x3 cm cardboard cutout over a sherd and recording the number of coils that are fully visible. If measuring a zoned or patterned corrugated sherd, make sure that unindented portions of the vessel are not visible through the cardboard cutout.

Number of obliterated coils per sq cm: This variable refers to the number of coils that are obliterated. Obliteration refers to the smoothing of coil junctures so that they are only visible through the indentations. This variable is measured by counting the total number of coils and obliterated coils visible. This is measured by placing the 3x3 cm cardboard cutout over a sherd and recording the number of obliterated coils that are fully visible.

VARIABLES ONLY MEASURED ON RIM SHERDS

The following variables are measured only for rim sherds. Write these variables on the back of the form along with the ID letter.

Rim radius (cm): This variable refers to the radius of the vessel opening. This is measured using the rim radius template chart.

Distance to coils (cm): This variable refers to the distance from the top of the rim to the first exposed coil. This is measured using a flexible rule.

Rim form: This variable refers to the general form of the rim in cross-section. Refer to the vessel profile sheet.

0—indeterminate
1—short flare-rim jar
2—tall flare-rim jar
3—short, straight-collared jar
4—tall, straight-collared jar
5—incurving, short, straight-collared jar
6—semi-flaring, short, straight-collared jar
7—semi-flaring, tall, straight-collared jar

8—semi-flaring, angled, long-collared jar
9—straight sided bowl
11—slightly incurved bowl
12—incurved bowl
13—recurved bowl
99—other—specify in notes and draw on back of coding sheet

VARIABLES ONLY MEASURED ON BASAL SHERDS
The following variables are measured only for base sherds. Write these variables on the back of the form along with the ID letter.

Direction of coils: This variable refers to the direction that coils when looking at the bottom of the vessel from the exterior.
0—indeterminate
1—clockwise
2—counter-clockwise

VARIABLES ONLY MEASURED ON WHOLE VESSELS
The following variables are measured only for whole vessels. For the purpose of this study, whole vessels are defined as those possessing a full vessel profile—rim, body, and base. Write these variables on the back of the form along with the ID letter.

Vessel profile: This variable describes the profile of the vessel. Refer to the vessel profile sheet
0—indeterminate
1—narrow middle shoulder jar
2—wide middle shoulder jar
3—seed jar
4—neckless jar
5—plate
6—hemispherical bowl
7—slightly incurved bowl
8—incurved bowl
9—recurved bowl
99—other—please specify in notes and draw on back of coding sheet

Vessel aperture: This variable refers to the width of a jar aperture.
0—indeterminate
1—restricted
2—medium
3—wide
99—other—specify in comments

Vessel size: Estimate the overall size of the vessel.
0—indeterminate

1—small
2—medium
3—large
4—extremely large
99—other—please specify in comments

Corrugated Ceramic Technological Analysis Coding Sheet

Site ______________ Date ______________ Analyst ______________ Page ______

ID	STR	PD	FS	TTYP1	TTYP2	TTYP3	COLOR	WARE	PART	TYPE	I.TYPE	I.DIREC	I.ALIGN	ELAB	FORM	SMG	SURF	SOOT	Vessel Wall Thickness			Indent Width - Wide			Indent Width - Narrow			Depth of Indent			Coil Width			#INDT	#COIL	#OBLIT

Write any additional notes on the back of this form along with the ID. Rim, base, and whole vessel variables are recorded on the back of this form.

APPENDIX D: CHI-SQUARE TESTS SHOWING THE RELATIONSHIP BETWEEN LOCAL STYLISTIC CLUSTERS AND COMPOSITIONAL ANALYSIS GROUPS

Instrumental Neutron Activation Analysis

Style Cluster/INAA Cluster Crosstabulation

		INAA Cluster					Total
		g2	g3	g34	g4	Unassigned	
Style Cluster	Oblique	0	8	6	7	11	32
	Parallel	4	25	8	13	26	76
Total		4	33	14	20	37	108

Chi-Square Test

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	3.601[a]	5	.608
Likelihood Ratio	4.660	5	.459
N of Valid Cases	108		

a. 5 cells (41.7%) have expected count less than 5. The minimum expected count is 1.19.

Petrographic Analysis

Style Cluster/Petrography Cluster Crosstabulation

		Petrography Cluster					Total
		1	2	3	4	5	
Style Cluster	Oblique	1	1	2	2	1	7
	Parallel	3	6	2	3	0	14
Total		4	7	4	5	1	21

Chi-Square Test

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	3.868[a]	4	.424
Likelihood Ratio	4.218	4	.377
N of Valid Cases	21		

a. 10 cells (100.0%) have expected count less than 5. The minimum expected count is .33.

APPENDIX E: DISTRIBUTION OF KEAMS CORRUGATED AT SITES ON ANTELOPE MESA

Corrugation Types at Sites on Antelope Mesa

Table showing percentages of different corrugation types at other sites on Antelope Mesa, based on data presented in Gifford and Smith (1978:Table 2). The chronological associations of these sites are based on the painted pottery recovered in their ceramic assemblages.

Site	**Period of Occupation**	**Tusayan Corrugated**		**Bluebird Corrugated**		**Moenkopi Corrugated**		**Keams Corrugated**		**Deadmans Corrugated**		**Other Corrugated Types**		*Site Sample Size*
		#	**%**	**#**	**%**	**#**	**%**	**#**	**%**	**#**	**%**	**#**	**%**	*#*
4	BM3-P3	134	13.73	247	25.31	132	13.52	429	43.95	1	0.10	33	3.38	*976*
4A	BM3-P3	375	38.11	216	21.95	162	16.46	220	22.36	8	0.81	3	0.3	*984*
101	BM3-P2/P3	5	31.25	5	31.25	4	25	2	12.50	0	0.00	0	0	*16*
102	P2	23	18.7	64	52.03	15	12.2	5	4.07	0	0.00	16	13.01	*123*
103	P2	27	55.1	12	24.49	8	16.33	1	2.04	0	0.00	1	2.04	*49*
104	P2-P3	394	55.18	49	6.86	94	13.17	173	24.23	2	0.28	2	0.28	*714*
105	P2-P3	159	54.45	37	12.67	65	22.26	23	7.88	4	1.37	4	1.37	*292*
106	P3	70	10.92	226	35.26	329	51.33	15	2.34	0	0.00	1	0.16	*641*
107	P1-P3	831	32.37	682	26.57	858	33.42	167	6.51	18	0.70	11	0.43	*2567*
108	P2-P3	284	28.69	135	13.64	246	24.85	205	20.71	25	2.53	95	9.6	*990*
109	P2	3	9.09	9	27.27	14	42.42	0	0.00	0	0.00	7	21.21	*33*
111	P2	1056	67.82	105	6.74	82	5.27	3	0.19	197	12.65	114	7.32	*1557*
112	P2	31	58.49	15	28.3	3	5.66	0	0.00	4	7.55	0	0	*53*
169	P2	19	41.3	6	13.04	13	28.26	0	0.00	3	6.52	5	10.87	*46*
231	P3	403	53.03	225	29.61	67	8.82	39	5.13	14	1.84	12	1.58	*760*
236	P1-P3	9	8.65	19	18.27	71	68.27	3	2.88	0	0.00	2	1.92	*104*

Table showing percentages of different corrugation types at the site of Awat'ovi, based on data presented in Gifford and Smith (1978:Table 1). Period refers to time-spans defined on the basis of relative quantities of painted sherds. BW refers to contexts in which Black-on-white pottery is most abundant, corresponding to the early to middle Pueblo III period. WO describes contexts where the decorated ceramics are in transition between Black-on-white and Black-on-orange, corresponding to the middle to late Pueblo III period. BO refers to contexts where decorated ceramics are dominated by Black-on-orange pottery, during the late Pueblo III period. OY describes contexts where the decorated ceramic assemblage is in transition between Black-on-orange and Black-on-yellow, dating to the late Pueblo III and early Pueblo IV periods. BY refers to contexts in which Black-on-yellow pottery is most abundant, encompassing the early Pueblo IV period. Y17 contexts date from the Pueblo IV period until the beginning of the fourteenth century. Unsd refers to temporally unassigned contexts.

Period	**Tusayan Corrugated**		**Bluebird Corrugated**		**Moenkopi Corrugated**		**Keams Corrugated**		**Deadmans Corrugated**		*Total*
	#	%	#	%	#	%	#	%	#	%	#
BW	1899	63.62	488	16.35	273	9.15	318	10.65	7	0.23	*2985*
WO	1278	75.71	166	9.83	68	4.03	155	9.18	21	1.24	*1688*
BO	1286	78.85	227	13.92	63	3.86	41	2.51	14	0.86	*1631*
OY	716	81.74	131	14.95	15	1.71	10	1.14	4	0.46	*876*
BY	334	76.43	22	5.03	20	4.58	58	13.27	3	0.69	*437*
Y17	3	60.00	0	0.00	0	0.00	2	40.00	0	0.00	*5*
Unsd	119	77.78	5	3.27	19	12.42	9	5.88	1	0.65	*153*
Total	*5635*		*1039*		*458*		*593*		*50*		*7775*

APPENDIX F: STRUCTURE/CLUSTER CROSSTABULATIONS TABLES FOR HOMOL'OVI I, HOMOL'OVI II, HOMOL'OVI III, HOMOL'OVI IV, AND CHEVELON PUEBLO

Homol'ovi I Structure/Cluster Crosstabulation

			Cluster		Total
			Oblique	Parallel	
Structure	103	Count	1	1	2
		% within Structure	50.0	50.0	100.0
		% within Style Cluster	3.4	0.9	1.4
		% of Total	0.7	0.7	1.4
	203/215	Count	1	1	2
		% within Structure	50.0	50.0	100.0
		% within Style Cluster	3.4	0.9	1.4
		% of Total	0.7	0.7	1.4
	209	Count	3	2	5
		% within Structure	60.0	40.0	100.0
		% within Style Cluster	10.3	1.8	3.5
		% of Total	2.1	1.4	3.5
	210	Count	1	4	5
		% within Structure	20.0	80.0	100.0
		% within Style Cluster	3.4	3.6	3.5
		% of Total	0.7	2.8	3.5
	3	Count	0	1	1
		% within Structure	0.0	100.0	100.0
		% within Style Cluster	0.0	0.9	0.7
		% of Total	0.0	0.7	0.7
	311	Count	1	3	4
		% within Structure	25.0	75.0	100.0
		% within Style Cluster	3.4	2.7	2.8
		% of Total	0.7	2.1	2.8
	401	Count	7	11	18
		% within Structure	38.9	61.1	100.0
		% within Style Cluster	24.1	9.8	12.8
		% of Total	5.0	7.8	12.8
	416	Count	1	0	1
		% within Structure	100.0	0.0	100.0
		% within Style Cluster	3.4	0.0	0.7

		% of Total	0.7	0.0	0.7
	417	Count	0	1	1
		% within Structure	0.0	100.0	100.0
		% within Style Cluster	0.0	0.9	0.7
		% of Total	0.0	0.7	0.7
	489	Count	7	14	21
		% within Structure	33.3	66.7	100.0
		% within Style Cluster	24.1	12.5	14.9
		% of Total	5.0	9.9	14.9
	490	Count	0	1	1
		% within Structure	0.0	100.0	100.0
		% within Style Cluster	0.0	0.9	0.7
		% of Total	0.0	0.7	0.7
	501	Count	1	2	3
		% within Structure	33.3	66.7	100.0
		% within Style Cluster	3.4	1.8	2.1
		% of Total	0.7	1.4	2.1
	502	Count	0	3	3
		% within Structure	0.0	100.0	100.0
		% within Style Cluster	0.0	2.7	2.1
		% of Total	0.0	2.1	2.1
	503	Count	0	1	1
		% within Structure	0.0	100.0	100.0
		% within Style Cluster	0.0	0.9	0.7
		% of Total	0.0	0.7	0.7
	504	Count	1	5	6
		% within Structure	16.7	83.3	100.0
		% within Style Cluster	3.4	4.5	4.3
		% of Total	0.7	3.5	4.3
	558	Count	3	29	32
		% within Structure	9.4	90.6	100.0
		% within Style Cluster	10.3	25.9	22.7
		% of Total	2.1	20.6	22.7
	651	Count	1	23	24
		% within Structure	4.2	95.8	100.0
		% within Style Cluster	3.4	20.5	17.0
		% of Total	0.7	16.3	17.0
	652	Count	1	8	9

		% within Structure	11.1	88.9	100.0
		% within Style Cluster	3.4	7.1	6.4
		% of Total	0.7	5.7	6.4
	734	Count	0	1	1
		% within Structure	0.0	100.0	100.0
		% within Style Cluster	0.0	0.9	0.7
		% of Total	0.0	0.7	0.7
	739	Count	0	1	1
		% within Structure	0.0	100.0	100.0
		% within Style Cluster	0.0	0.9	0.7
		% of Total	0.0	0.7	0.7
Total		Count	29	112	141
		% within Structure	20.6	79.4	100.0
		% within Style Cluster	100.0	100.0	100.0
		% of Total	20.6	79.4	100.0

Homol'ovi II Structure/Cluster Crosstabulation

			Cluster		Total
			Oblique	Parallel	
Structure	324	Count	2	0	2
		% within Structure	100.0	0.0	100.0
		% within Style Cluster	5.6	0.0	2.0
		% of Total	2.0	0.0	2.0
	558	Count	1	2	3
		% within Structure	33.3	66.7	100.0
		% within Style Cluster	2.8	3.1	3.0
		% of Total	1.0	2.0	3.0
	704	Count	3	1	4
		% within Structure	75.0	25.0	100.0
		% within Style Cluster	8.3	1.6	4.0
		% of Total	3.0	1.0	4.0
	706	Count	3	11	14
		% within Structure	21.4	78.6	100.0
		% within Style Cluster	8.3	17.2	14.0
		% of Total	3.0	11.0	14.0
	707	Count	10	10	20
		% within Structure	50.0	50.0	100.0
		% within Style Cluster	27.8	15.6	20.0
		% of Total	10.0	10.0	20.0
	714	Count	7	12	19
		% within Structure	36.8	63.2	100.0
		% within Style Cluster	19.4	18.8	19.0
		% of Total	7.0	12.0	19.0
	999	Count	10	28	38
		% within Structure	26.3	73.7	100.0
		% within Style Cluster	27.8	43.8	38.0
		% of Total	10.0	28.0	38.0
Total		Count	36	64	100
		% within Structure	36.0	64.0	100.0
		% within Style Cluster	100.0	100.0	100.0
		% of Total	36.0	64.0	100.0

Homol'ovi III Structure/Cluster Crosstabulation

			Cluster		Total
			Oblique	Parallel	
Structure	32	Count	0	1	1
		% within Structure	0.0	100.0	100.0
		% within Style Cluster	0.0	1.1	0.9
		% of Total	0.0	0.9	0.9
	34	Count	14	20	34
		% within Structure	41.2	58.8	100.0
		% within Style Cluster	73.7	21.1	29.8
		% of Total	12.3	17.5	29.8
	37	Count	5	60	65
		% within Structure	7.7	92.3	100.0
		% within Style Cluster	26.3	63.2	57.0
		% of Total	4.4	52.6	57.0
	38	Count	0	14	14
		% within Structure	0.0	100.0	100.0
		% within Style Cluster	0.0	14.7	12.3
		% of Total	0.0	12.3	12.3
Total		Count	19	95	114
		% within Structure	16.7	83.3	100.0
		% within Style Cluster	100.0	100.0	100.0
		% of Total	16.7	83.3	100.0

Homol'ovi IV Structure/Cluster Crosstabulation

			Cluster		Total
			Oblique	Parallel	
Structure	0	Count	9	84	93
		% within Structure	9.7	90.3	100.0
		% within Style Cluster	100.0	92.3	93.0
		% of Total	9.0	84.0	93.0
	201	Count	0	2	2
		% within Structure	0.0	100.0	100.0
		% within Style Cluster	0.0	2.2	2.0
		% of Total	0.0	2.0	2.0
	301	Count	0	1	1
		% within Structure	0.0	100.0	100.0
		% within Style Cluster	0.0	1.1	1.0
		% of Total	0.0	1.0	1.0
	4	Count	0	3	3
		% within Structure	0.0	100.0	100.0
		% within Style Cluster	0.0	3.3	3.0
		% of Total	0.0	3.0	3.0
	5	Count	0	1	1
		% within Structure	0.0	100.0	100.0
		% within Style Cluster	0.0	1.1	1.0
		% of Total	0.0	1.0	1.0
Total		Count	9	91	100
		% within Structure	9.0	91.0	100.0
		% within Style Cluster	100.0	100.0	100.0
		% of Total	9.0	91.0	100.0

Chevelon Pueblo Structure/Cluster Crosstabulation

			Cluster		Total
			Oblique	Parallel	
Structure	120	Count	1	4	5
		% within Structure	20.0	80.0	100.0
		% within Style Cluster	1.5	11.1	4.9
		% of Total	1.0	3.9	4.9
	157	Count	1	0	1
		% within Structure	100.0	0.0	100.0
		% within Style Cluster	1.5	0.0	1.0
		% of Total	1.0	0.0	1.0
	159	Count	1	0	1
		% within Structure	100.0	0.0	100.0
		% within Style Cluster	1.5	0.0	1.0
		% of Total	1.0	0.0	1.0
	200	Count	3	1	4
		% within Structure	75.0	25.0	100.0
		% within Style Cluster	4.5	2.8	3.9
		% of Total	2.9	1.0	3.9
	222	Count	1	1	2
		% within Structure	50.0	50.0	100.0
		% within Style Cluster	1.5	2.8	2.0
		% of Total	1.0	1.0	2.0
	227	Count	3	1	4
		% within Structure	75.0	25.0	100.0
		% within Style Cluster	4.5	2.8	3.9
		% of Total	2.9	1.0	3.9
	248	Count	12	2	14
		% within Structure	85.7	14.3	100.0
		% within Style Cluster	18.2	5.6	13.7
		% of Total	11.8	2.0	13.7
	252	Count	0	1	1
		% within Structure	0.0	100.0	100.0
		% within Style Cluster	0.0	2.8	1.0
		% of Total	0.0	1.0	1.0
	264	Count	7	0	7
		% within Structure	100.0	0.0	100.0

		% within Style Cluster	10.6	0.0	6.9
		% of Total	6.9	0.0	6.9
	265	Count	1	0	1
		% within Structure	100.0	0.0	100.0
		% within Style Cluster	1.5	0.0	1.0
		% of Total	1.0	0.0	1.0
	266	Count	1	0	1
		% within Structure	100.0	0.0	100.0
		% within Style Cluster	1.5	0.0	1.0
		% of Total	1.0	0.0	1.0
	268	Count	1	1	2
		% within Structure	50.0	50.0	100.0
		% within Style Cluster	1.5	2.8	2.0
		% of Total	1.0	1.0	2.0
	274	Count	3	7	10
		% within Structure	30.0	70.0	100.0
		% within Style Cluster	4.5	19.4	9.8
		% of Total	2.9	6.9	9.8
	279	Count	15	10	25
		% within Structure	60.0	40.0	100.0
		% within Style Cluster	22.7	27.8	24.5
		% of Total	14.7	9.8	24.5
	288	Count	0	2	2
		% within Structure	0.0	100.0	100.0
		% within Style Cluster	0.0	5.6	2.0
		% of Total	0.0	2.0	2.0
	900	Count	0	1	1
		% within Structure	0.0	100.0	100.0
		% within Style Cluster	0.0	2.8	1.0
		% of Total	0.0	1.0	1.0
	901	Count	16	5	21
		% within Structure	76.2	23.8	100.0
		% within Style Cluster	24.2	13.9	20.6
		% of Total	15.7	4.9	20.6
Total		Count	66	36	102
		% within Structure	64.7	35.3	100.0
		% within Style Cluster	100.0	100.0	100.0
		% of Total	64.7	35.3	100.0

APPENDIX G: PD/CLUSTER CROSSTABULATION TABLES FOR HOMOL'OVI I, HOMOL'OVI II, HOMOL'OVI III, HOMOL'OVI IV, AND CHEVELON PUEBLO

Homol'ovi I PD/Cluster Crosstabulation

			Cluster		Total
			Oblique	Parallel	
PD	39	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	0.9	0.7
		% of Total	0.0	0.7	0.7
	146	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	0.9	0.7
		% of Total	0.0	0.7	0.7
	215	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	0.9	0.7
		% of Total	0.0	0.7	0.7
	222	Count	3	0	3
		% within PD	100.0	0.0	100.0
		% within Style Cluster	10.3	0.0	2.1
		% of Total	2.1	0.0	2.1
	230	Count	1	0	1
		% within PD	100.0	0.0	100.0
		% within Style Cluster	3.4	0.0	0.7
		% of Total	0.7	0.0	0.7
	248	Count	2	0	2
		% within PD	100.0	0.0	100.0
		% within Style Cluster	6.9	0.0	1.4
		% of Total	1.4	0.0	1.4
	281	Count	1	0	1
		% within PD	100.0	0.0	100.0
		% within Style Cluster	3.4	0.0	0.7
		% of Total	0.7	0.0	0.7
	297	Count	1	5	6
		% within PD	16.7	83.3	100.0
		% within Style Cluster	3.4	4.5	4.3
		% of Total	0.7	3.5	4.3

	303	Count	1	1	2
		% within PD	50.0	50.0	100.0
		% within Style Cluster	3.4	0.9	1.4
		% of Total	0.7	0.7	1.4
	363	Count	1	0	1
		% within PD	100.0	0.0	100.0
		% within Style Cluster	3.4	0.0	0.7
		% of Total	0.7	0.0	0.7
	410	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	0.9	0.7
		% of Total	0.0	0.7	0.7
	479	Count	0	2	2
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	1.8	1.4
		% of Total	0.0	1.4	1.4
	483	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	0.9	0.7
		% of Total	0.0	0.7	0.7
	485	Count	0	3	3
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	2.7	2.1
		% of Total	0.0	2.1	2.1
	511	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	0.9	0.7
		% of Total	0.0	0.7	0.7
	512	Count	0	2	2
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	1.8	1.4
		% of Total	0.0	1.4	1.4
	682	Count	1	0	1
		% within PD	100.0	0.0	100.0
		% within Style Cluster	3.4	0.0	0.7
		% of Total	0.7	0.0	0.7
	732	Count	1	1	2
		% within PD	50.0	50.0	100.0

		% within Style Cluster	3.4	0.9	1.4
		% of Total	0.7	0.7	1.4
	767	Count	1	0	1
		% within PD	100.0	0.0	100.0
		% within Style Cluster	3.4	0.0	0.7
		% of Total	0.7	0.0	0.7
	1042	Count	0	13	13
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	11.6	9.2
		% of Total	0.0	9.2	9.2
	1045	Count	0	7	7
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	6.2	5.0
		% of Total	0.0	5.0	5.0
	1109	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	0.9	0.7
		% of Total	0.0	0.7	0.7
	1159	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	0.9	0.7
		% of Total	0.0	0.7	0.7
	1166	Count	1	1	2
		% within PD	50.0	50.0	100.0
		% within Style Cluster	3.4	0.9	1.4
		% of Total	0.7	0.7	1.4
	1219	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	0.9	0.7
		% of Total	0.0	0.7	0.7
	1223	Count	1	0	1
		% within PD	100.0	0.0	100.0
		% within Style Cluster	3.4	0.0	0.7
		% of Total	0.7	0.0	0.7
	1225	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	0.9	0.7
		% of Total	0.0	0.7	0.7

	1325	Count	0	3	3
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	2.7	2.1
		% of Total	0.0	2.1	2.1
	1331	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	0.9	0.7
		% of Total	0.0	0.7	0.7
	1396	Count	1	0	1
		% within PD	100.0	0.0	100.0
		% within Style Cluster	3.4	0.0	0.7
		% of Total	0.7	0.0	0.7
	1493	Count	1	0	1
		% within PD	100.0	0.0	100.0
		% within Style Cluster	3.4	0.0	0.7
		% of Total	0.7	0.0	0.7
	1500	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	0.9	0.7
		% of Total	0.0	0.7	0.7
	1501	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	0.9	0.7
		% of Total	0.0	0.7	0.7
	1506	Count	1	0	1
		% within PD	100.0	0.0	100.0
		% within Style Cluster	3.4	0.0	0.7
		% of Total	0.7	0.0	0.7
	1597	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	0.9	0.7
		% of Total	0.0	0.7	0.7
	1779	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	0.9	0.7
		% of Total	0.0	0.7	0.7
	2105	Count	0	1	1
		% within PD	0.0	100.0	100.0

		% within Style Cluster	0.0	0.9	0.7
		% of Total	0.0	0.7	0.7
	2114	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	0.9	0.7
		% of Total	0.0	0.7	0.7
	2116	Count	0	2	2
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	1.8	1.4
		% of Total	0.0	1.4	1.4
	2121	Count	0	3	3
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	2.7	2.1
		% of Total	0.0	2.1	2.1
	2126	Count	1	0	1
		% within PD	100.0	0.0	100.0
		% within Style Cluster	3.4	0.0	0.7
		% of Total	0.7	0.0	0.7
	2128	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	0.9	0.7
		% of Total	0.0	0.7	0.7
	2134	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	0.9	0.7
		% of Total	0.0	0.7	0.7
	2398	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	0.9	0.7
		% of Total	0.0	0.7	0.7
	2494	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	0.9	0.7
		% of Total	0.0	0.7	0.7
	2505	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	0.9	0.7
		% of Total	0.0	0.7	0.7

	2602	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	0.9	0.7
		% of Total	0.0	0.7	0.7
	2707	Count	2	0	2
		% within PD	100.0	0.0	100.0
		% within Style Cluster	6.9	0.0	1.4
		% of Total	1.4	0.0	1.4
	2711	Count	3	4	7
		% within PD	42.9	57.1	100.0
		% within Style Cluster	10.3	3.6	5.0
		% of Total	2.1	2.8	5.0
	2717	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	0.9	0.7
		% of Total	0.0	0.7	0.7
	2736	Count	0	2	2
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	1.8	1.4
		% of Total	0.0	1.4	1.4
	2768	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	0.9	0.7
		% of Total	0.0	0.7	0.7
	2769	Count	3	16	19
		% within PD	15.8	84.2	100.0
		% within Style Cluster	10.3	14.3	13.5
		% of Total	2.1	11.3	13.5
	2773	Count	0	10	10
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	8.9	7.1
		% of Total	0.0	7.1	7.1
	2860	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	0.9	0.7
		% of Total	0.0	0.7	0.7
	2960	Count	0	1	1
		% within PD	0.0	100.0	100.0

		% within Style Cluster	0.0	0.9	0.7
		% of Total	0.0	0.7	0.7
	2971	Count	1	6	7
		% within PD	14.3	85.7	100.0
		% within Style Cluster	3.4	5.4	5.0
		% of Total	0.7	4.3	5.0
	2977	Count	1	0	1
		% within PD	100.0	0.0	100.0
		% within Style Cluster	3.4	0.0	0.7
		% of Total	0.7	0.0	0.7
	2988	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	0.9	0.7
		% of Total	0.0	0.7	0.7
	2990	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	0.9	0.7
		% of Total	0.0	0.7	0.7
	3203	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	0.9	0.7
		% of Total	0.0	0.7	0.7
	3221	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	0.9	0.7
		% of Total	0.0	0.7	0.7
Total		Count	29	112	141
		% within PD	20.6	79.4	100.0
		% within Style Cluster	100.0	100.0	100.0
		% of Total	20.6	79.4	100.0

Homol'ovi II PD/Cluster Crosstabulation

			Cluster		Total
			Oblique	Parallel	
PD	609	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	1.6	1.0
		% of Total	0.0	1.0	1.0
	615	Count	0	4	4
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	6.2	4.0
		% of Total	0.0	4.0	4.0
	629	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	1.6	1.0
		% of Total	0.0	1.0	1.0
	637	Count	1	1	2
		% within PD	50.0	50.0	100.0
		% within Style Cluster	2.8	1.6	2.0
		% of Total	1.0	1.0	2.0
	641	Count	2	0	2
		% within PD	100.0	0.0	100.0
		% within Style Cluster	5.6	0.0	2.0
		% of Total	2.0	0.0	2.0
	654	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	1.6	1.0
		% of Total	0.0	1.0	1.0
	667	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	1.6	1.0
		% of Total	0.0	1.0	1.0
	687	Count	0	2	2
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	3.1	2.0
		% of Total	0.0	2.0	2.0
	690	Count	2	0	2
		% within PD	100.0	0.0	100.0

		% within Style Cluster	5.6	0.0	2.0
		% of Total	2.0	0.0	2.0
	696	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	1.6	1.0
		% of Total	0.0	1.0	1.0
	699	Count	1	2	3
		% within PD	33.3	66.7	100.0
		% within Style Cluster	2.8	3.1	3.0
		% of Total	1.0	2.0	3.0
	718	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	1.6	1.0
		% of Total	0.0	1.0	1.0
	765	Count	1	0	1
		% within PD	100.0	0.0	100.0
		% within Style Cluster	2.8	0.0	1.0
		% of Total	1.0	0.0	1.0
	776	Count	2	1	3
		% within PD	66.7	33.3	100.0
		% within Style Cluster	5.6	1.6	3.0
		% of Total	2.0	1.0	3.0
	794	Count	0	3	3
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	4.7	3.0
		% of Total	0.0	3.0	3.0
	798	Count	0	4	4
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	6.2	4.0
		% of Total	0.0	4.0	4.0
	812	Count	3	1	4
		% within PD	75.0	25.0	100.0
		% within Style Cluster	8.3	1.6	4.0
		% of Total	3.0	1.0	4.0
	823	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	1.6	1.0
		% of Total	0.0	1.0	1.0

	843	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	1.6	1.0
		% of Total	0.0	1.0	1.0
	894	Count	1	0	1
		% within PD	100.0	0.0	100.0
		% within Style Cluster	2.8	0.0	1.0
		% of Total	1.0	0.0	1.0
	922	Count	0	2	2
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	3.1	2.0
		% of Total	0.0	2.0	2.0%
	1063	Count	6	9	15
		% within PD	40.0	60.0	100.0
		% within Style Cluster	16.7	14.1	15.0
		% of Total	6.0	9.0	15.0
	1068	Count	3	1	4
		% within PD	75.0	25.0	100.0
		% within Style Cluster	8.3	1.6	4.0
		% of Total	3.0	1.0	4.0
	1121	Count	1	2	3
		% within PD	33.3	66.7	100.0
		% within Style Cluster	2.8	3.1	3.0
		% of Total	1.0	2.0	3.0
	1170	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	1.6	1.0
		% of Total	0.0	1.0	1.0
	1235	Count	1	0	1
		% within PD	100.0	0.0	100.0
		% within Style Cluster	2.8	0.0	1.0
		% of Total	1.0	0.0	1.0
	1286	Count	3	10	13
		% within PD	23.1	76.9	100.0
		% within Style Cluster	8.3	15.6	13.0
		% of Total	3.0	10.0	13.0
	1327	Count	0	1	1
		% within PD	0.0	100.0	100.0

		% within Style Cluster	0.0	1.6	1.0
		% of Total	0.0	1.0	1.0
	1462	Count	1	0	1
		% within PD	100.0	0.0	100.0
		% within Style Cluster	2.8	0.0	1.0
		% of Total	1.0	0.0	1.0
	1472	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	1.6	1.0
		% of Total	0.0	1.0	1.0
	1548	Count	1	3	4
		% within PD	25.0	75.0	100.0
		% within Style Cluster	2.8	4.7	4.0
		% of Total	1.0	3.0	4.0
	1568	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	1.6	1.0
		% of Total	0.0	1.0	1.0
	1582	Count	1	1	2
		% within PD	50.0	50.0	100.0
		% within Style Cluster	2.8	1.6	2.0
		% of Total	1.0	1.0	2.0
	1595	Count	1	4	5
		% within PD	20.0	80.0	100.0
		% within Style Cluster	2.8	6.2	5.0
		% of Total	1.0	4.0	5.0
	1631	Count	2	1	3
		% within PD	66.7	33.3	100.0
		% within Style Cluster	5.6	1.6	3.0
		% of Total	2.0	1.0	3.0
	1693	Count	1	1	2
		% within PD	50.0	50.0	100.0
		% within Style Cluster	2.8	1.6	2.0
		% of Total	1.0	1.0	2.0
	1728	Count	2	0	2
		% within PD	100.0	0.0	100.0
		% within Style Cluster	5.6	0.0	2.0
		% of Total	2.0	0.0	2.0

Total	Count	36	64	100
	% within PD	36.0	64.0	100.0
	% within Style Cluster	100.0	100.0	100.0
	% of Total	36.0	64.0	100.0

Homol'ovi III PD/Cluster Crosstabulation

			Cluster		Total
			Oblique	Parallel	
PD	528	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	1.1	0.9
		% of Total	0.0	0.9	0.9
	666	Count	9	13	22
		% within PD	40.9	59.1	100.0
		% within Style Cluster	47.4	13.7	19.3
		% of Total	7.9	11.4	19.3
	694	Count	3	44	47
		% within PD	6.4	93.6	100.0
		% within Style Cluster	15.8	46.3	41.2
		% of Total	2.6	38.6	41.2
	702	Count	5	7	12
		% within PD	41.7	58.3	100.0
		% within Style Cluster	26.3	7.4	10.5
		% of Total	4.4	6.1	10.5
	717	Count	0	9	9
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	9.5	7.9
		% of Total	0.0	7.9	7.9
	799	Count	0	3	3
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	3.2	2.6
		% of Total	0.0	2.6	2.6
	808	Count	1	3	4
		% within PD	25.0	75.0	100.0
		% within Style Cluster	5.3	3.2	3.5
		% of Total	0.9	2.6	3.5
	1037	Count	1	0	1
		% within PD	100.0	0.0	100.0
		% within Style Cluster	5.3	0.0	0.9
		% of Total	0.9	0.0	0.9
	1046	Count	0	1	1
		% within PD	0.0	100.0	100.0

		% within Style Cluster	0.0	1.1	0.9
		% of Total	0.0	0.9	0.9
	1111	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	1.1	0.9
		% of Total	0.0	0.9	0.9
	1113	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	1.1	0.9
		% of Total	0.0	0.9	0.9
	1114	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	1.1	0.9
		% of Total	0.0	0.9	0.9
	1118	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	1.1	0.9
		% of Total	0.0	0.9	0.9
	1119	Count	0	2	2
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	2.1	1.8
		% of Total	0.0	1.8	1.8
	1122	Count	0	8	8
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	8.4	7.0
		% of Total	0.0	7.0	7.0
Total		Count	19	95	114
		% within PD	16.7	83.3	100.0
		% within Style Cluster	100.0	100.0	100.0
		% of Total	16.7	83.3	100.0

Homol'ovi IV PD/Cluster Crosstabulation

			Cluster		Total
			Oblique	Parallel	
PD	90	Count	1	0	1
		% within PD	100.0	0.0	100.0
		% within Style Cluster	11.1	0.0	1.0
		% of Total	1.0	0.0	1.0
	123	Count	2	47	49
		% within PD	4.1	95.9	100.0
		% within Style Cluster	22.2	51.6	49.0
		% of Total	2.0	47.0	49.0
	127	Count	0	8	8
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	8.8	8.0
		% of Total	0.0	8.0	8.0
	129	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	1.1	1.0
		% of Total	0.0	1.0	1.0
	155	Count	2	1	3
		% within PD	66.7	33.3	100.0
		% within Style Cluster	22.2	1.1	3.0
		% of Total	2.0	1.0	3.0
	161	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	1.1	1.0
		% of Total	0.0	1.0	1.0
	170	Count	1	5	6
		% within PD	16.7	83.3	100.0
		% within Style Cluster	11.1	5.5	6.0
		% of Total	1.0	5.0	6.0
	190	Count	1	2	3
		% within PD	33.3	66.7	100.0
		% within Style Cluster	11.1	2.2	3.0
		% of Total	1.0	2.0	3.0
	191	Count	0	3	3
		% within PD	0.0	100.0	100.0

		% within Style Cluster	0.0	3.3	3.0
		% of Total	0.0	3.0	3.0
	199	Count	0	3	3
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	3.3	3.0
		% of Total	0.0	3.0	3.0
	200	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	1.1	1.0
		% of Total	0.0	1.0	1.0
	205	Count	0	3	3
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	3.3	3.0
		% of Total	0.0	3.0	3.0
	206	Count	0	3	3
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	3.3	3.0
		% of Total	0.0	3.0	3.0
	208	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	1.1	1.0
		% of Total	0.0	1.0	1.0
	210	Count	0	2	2
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	2.2	2.0
		% of Total	0.0	2.0	2.0
	213	Count	0	2	2
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	2.2	2.0
		% of Total	0.0	2.0	2.0
	214	Count	1	1	2
		% within PD	50.0	50.0	100.0
		% within Style Cluster	11.1	1.1	2.0
		% of Total	1.0	1.0	2.0
	215	Count	0	2	2
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	2.2	2.0
		% of Total	0.0	2.0	2.0

	218	Count	1	1	2
		% within PD	50.0	50.0	100.0
		% within Style Cluster	11.1	1.1	2.0
		% of Total	1.0	1.0	2.0
	225	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	1.1	1.0
		% of Total	0.0	1.0	1.0
	226	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	1.1	1.0
		% of Total	0.0	1.0	1.0
	231	Count	0	2	2
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	2.2	2.0
		% of Total	0.0	2.0	2.0
Total		Count	9	91	100
		% within PD	9.0	91.0	100.0
		% within Style Cluster	100.0	100.0	100.0
		% of Total	9.0	91.0	100.0

Chevelon Pueblo PD/Cluster Crosstabulation

			Cluster		Total
			Oblique	Parallel	
PD	7	Count	2	0	2
		% within PD	100.0	0.0	100.0
		% within Style Cluster	3.0	0.0	2.0
		% of Total	2.0	0.0	2.0
	8	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	2.8	1.0
		% of Total	0.0	1.0	1.0
	11	Count	1	0	1
		% within PD	100.0	0.0	100.0
		% within Style Cluster	1.5	0.0	1.0
		% of Total	1.0	0.0	1.0
	26	Count	1	0	1
		% within PD	100.0	0.0	100.0
		% within Style Cluster	1.5	0.0	1.0
		% of Total	1.0	0.0	1.0
	27	Count	1	0	1
		% within PD	100.0	0.0	100.0
		% within Style Cluster	1.5	0.0	1.0
		% of Total	1.0	0.0	1.0
	30	Count	1	0	1
		% within PD	100.0	0.0	100.0
		% within Style Cluster	1.5	0.0	1.0
		% of Total	1.0	0.0	1.0
	34	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	2.8	1.0
		% of Total	0.0	1.0	1.0
	49	Count	1	1	2
		% within PD	50.0	50.0	100.0
		% within Style Cluster	1.5	2.8	2.0
		% of Total	1.0	1.0	2.0
	80	Count	1	0	1
		% within PD	100.0	0.0	100.0

		% within Style Cluster	1.5	0.0	1.0
		% of Total	1.0	0.0	1.0
	87	Count	1	0	1
		% within PD	100.0	0.0	100.0
		% within Style Cluster	1.5	0.0	1.0
		% of Total	1.0	0.0	1.0
	92	Count	1	0	1
		% within PD	100.0	0.0	100.0
		% within Style Cluster	1.5	0.0	1.0
		% of Total	1.0	0.0	1.0
	101	Count	2	0	2
		% within PD	100.0	0.0	100.0
		% within Style Cluster	3.0	0.0	2.0
		% of Total	2.0	0.0	2.0
	104	Count	1	0	1
		% within PD	100.0	0.0	100.0
		% within Style Cluster	1.5	0.0	1.0
		% of Total	1.0	0.0	1.0
	122	Count	3	0	3
		% within PD	100.0	0.0	100.0
		% within Style Cluster	4.5	0.0	2.9
		% of Total	2.9	0.0	2.9
	125	Count	1	0	1
		% within PD	100.0	0.0	100.0
		% within Style Cluster	1.5	0.0	1.0
		% of Total	1.0	0.0	1.0
	168	Count	3	0	3
		% within PD	100.0	0.0	100.0
		% within Style Cluster	4.5	0.0	2.9
		% of Total	2.9	0.0	2.9
	170	Count	1	0	1
		% within PD	100.0	0.0	100.0
		% within Style Cluster	1.5	0.0	1.0
		% of Total	1.0	0.0	1.0
	172	Count	1	1	2
		% within PD	50.0	50.0	100.0
		% within Style Cluster	1.5	2.8	2.0
		% of Total	1.0	1.0	2.0

	174	Count	1	1	2
		% within PD	50.0	50.0	100.0
		% within Style Cluster	1.5	2.8	2.0
		% of Total	1.0	1.0	2.0
	175	Count	4	0	4
		% within PD	100.0	0.0	100.0
		% within Style Cluster	6.1	0.0	3.9
		% of Total	3.9	0.0	3.9
	176	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	2.8	1.0
		% of Total	0.0	1.0	1.0
	177	Count	1	0	1
		% within PD	100.0	0.0	100.0
		% within Style Cluster	1.5	0.0	1.0
		% of Total	1.0	0.0	1.0
	212	Count	2	0	2
		% within PD	100.0	0.0	100.0
		% within Style Cluster	3.0	0.0	2.0
		% of Total	2.0	0.0	2.0
	260	Count	0	2	2
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	5.6	2.0
		% of Total	0.0	2.0	2.0
	265	Count	1	1	2
		% within PD	50.0	50.0	100.0
		% within Style Cluster	1.5	2.8	2.0
		% of Total	1.0	1.0	2.0
	453	Count	1	0	1
		% within PD	100.0	0.0	100.0
		% within Style Cluster	1.5	0.0	1.0
		% of Total	1.0	0.0	1.0
	491	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	2.8	1.0
		% of Total	0.0	1.0	1.0
	500	Count	1	0	1
		% within PD	100.0	0.0	100.0

		% within Style Cluster	1.5	0.0	1.0
		% of Total	1.0	0.0	1.0
	507	Count	1	0	1
		% within PD	100.0	0.0	100.0
		% within Style Cluster	1.5	0.0	1.0
		% of Total	1.0	0.0	1.0
	511	Count	1	0	1
		% within PD	100.0	0.0	100.0
		% within Style Cluster	1.5	0.0	1.0
		% of Total	1.0	0.0	1.0
	514	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	2.8	1.0
		% of Total	0.0	1.0	1.0
	517	Count	0	2	2
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	5.6	2.0
		% of Total	0.0	2.0	2.0
	518	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	2.8	1.0
		% of Total	0.0	1.0	1.0
	520	Count	1	0	1
		% within PD	100.0	0.0	100.0
		% within Style Cluster	1.5	0.0	1.0
		% of Total	1.0	0.0	1.0
	591	Count	1	0	1
		% within PD	100.0	0.0	100.0
		% within Style Cluster	1.5	0.0	1.0
		% of Total	1.0	0.0	1.0
	592	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	2.8	1.0
		% of Total	0.0	1.0	1.0
	594	Count	2	4	6
		% within PD	33.3	66.7	100.0
		% within Style Cluster	3.0	11.1	5.9
		% of Total	2.0	3.9	5.9

	596	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	2.8	1.0
		% of Total	0.0	1.0	1.0
	760	Count	1	0	1
		% within PD	100.0	0.0	100.0
		% within Style Cluster	1.5	0.0	1.0
		% of Total	1.0	0.0	1.0
	778	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	2.8	1.0
		% of Total	0.0	1.0	1.0
	786	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	2.8	1.0
		% of Total	0.0	1.0	1.0
	791	Count	1	0	1
		% within PD	100.0	0.0	100.0
		% within Style Cluster	1.5	0.0	1.0
		% of Total	1.0	0.0	1.0
	794	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	2.8	1.0
		% of Total	0.0	1.0	1.0
	832	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	2.8	1.0
		% of Total	0.0	1.0	1.0
	835	Count	1	0	1
		% within PD	100.0	0.0	100.0
		% within Style Cluster	1.5	0.0	1.0
		% of Total	1.0	0.0	1.0
	862	Count	1	0	1
		% within PD	100.0	0.0	100.0
		% within Style Cluster	1.5	0.0	1.0
		% of Total	1.0	0.0	1.0
	871	Count	1	0	1
		% within PD	100.0	0.0	100.0

		% within Style Cluster	1.5	0.0	1.0
		% of Total	1.0	0.0	1.0
	880	Count	1	0	1
		% within PD	100.0	0.0	100.0
		% within Style Cluster	1.5	0.0	1.0
		% of Total	1.0	0.0	1.0
	938	Count	1	0	1
		% within PD	100.0	0.0	100.0
		% within Style Cluster	1.5	0.0	1.0
		% of Total	1.0	0.0	1.0
	969	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	2.8	1.0
		% of Total	0.0	1.0	1.0
	977	Count	1	0	1
		% within PD	100.0	0.0	100.0
		% within Style Cluster	1.5	0.0	1.0
		% of Total	1.0	0.0	1.0
	978	Count	1	0	1
		% within PD	100.0	0.0	100.0
		% within Style Cluster	1.5	0.0	1.0
		% of Total	1.0	0.0	1.0
	983	Count	1	1	2
		% within PD	50.0	50.0	100.0
		% within Style Cluster	1.5	2.8	2.0
		% of Total	1.0	1.0	2.0
	984	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	2.8	1.0
		% of Total	0.0	1.0	1.0
	987	Count	2	1	3
		% within PD	66.7	33.3	100.0
		% within Style Cluster	3.0	2.8	2.9
		% of Total	2.0	1.0	2.9
	991	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	2.8	1.0
		% of Total	0.0	1.0	1.0

	1035	Count	1	0	1
		% within PD	100.0	0.0	100.0
		% within Style Cluster	1.5	0.0	1.0
		% of Total	1.0	0.0	1.0
	1036	Count	1	0	1
		% within PD	100.0	0.0	100.0
		% within Style Cluster	1.5	0.0	1.0
		% of Total	1.0	0.0	1.0
	1042	Count	6	4	10
		% within PD	60.0	40.0	100.0
		% within Style Cluster	9.1	11.1	9.8
		% of Total	5.9	3.9	9.8
	1044	Count	3	0	3
		% within PD	100.0	0.0	100.0
		% within Style Cluster	4.5	0.0	2.9
		% of Total	2.9	0.0	2.9
	1056	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	2.8	1.0
		% of Total	0.0	1.0	1.0
	1058	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	2.8	1.0
		% of Total	0.0	1.0	1.0
	1119	Count	1	0	1
		% within PD	100.0	0.0	100.0
		% within Style Cluster	1.5	0.0	1.0
		% of Total	1.0	0.0	1.0
	1125	Count	1	0	1
		% within PD	100.0	0.0	100.0
		% within Style Cluster	1.5	0.0	1.0
		% of Total	1.0	0.0	1.0
	1199	Count	0	1	1
		% within PD	0.0	100.0	100.0
		% within Style Cluster	0.0	2.8	1.0
		% of Total	0.0	1.0	1.0
	1336	Count	1	0	1
		% within PD	100.0	0.0	100.0

		% within Style Cluster	1.5	0.0	1.0
		% of Total	1.0	0.0	1.0
	1355	Count	1	0	1
		% within PD	100.0	0.0	100.0
		% within Style Cluster	1.5	0.0	1.0
		% of Total	1.0	0.0	1.0
Total		Count	66	36	102
		% within PD	64.7	35.3	100.0
		% within Style Cluster	100.0	100.0	100.0
		% of Total	64.7	35.3	100.0

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