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The Role of Style in Community Identity and Group Affiliation: An Archaeological Study of Virgin and Kayenta Branch Ceramics

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THE ROLE OF STYLE IN COMMUNITY IDENTITY AND GROUP AFFILIATION: AN ARCHAEOLOGICAL STUDY OF VIRGIN AND KAYENTA BRANCH CERAMICS

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ABSTRACT

This research focuses on the Virgin Branch heartland of the North American Southwest, an archaeological area spanning southern Nevada, southwestern Utah, and northwestern Arizona. The interplay of Virgin Branch community identity, group affiliation, and social interaction over time, between ca. 300 B.C. and A.D. 1225, is considered intra-regionally and in the context of interactions with neighboring Kayenta Branch populations of northeastern Arizona. The principal question for this research is: *How is Virgin Branch group identity communicated and reflected through expressions of technological and painted designs styles on pottery amidst intra- and inter-regional events and interactions over time?* Support for this principal research question is provided through: (1) chronometric reconstruction of the Virgin Branch heartland and an understanding of how this correlates with the well-established chronometry of the Kayenta Branch heartland; and (2) clarifying the technological styles and rules of design (i.e., design layout, design symmetry, and design elements) associated with painted pottery from both heartlands. The theoretical framework for this study is informed through consideration of how the behavioral categories of exchange, enculturation, and migration, as dependent variables, can be used and expressed through painted design, technological, and functional aspects of painted pottery to investigate the independent variable of identity—namely, Virgin Branch group identity. Methodologically, this research uses a hierarchical system of ceramic analysis through which technological and painted design styles are investigated within a statistical framework of diversity and similarity indices, across temporal and spatial contexts. Using archaeological approaches to painted and technological ceramic design styles as proxies for expressions of Virgin Branch group identity, this study investigates the degree to which pottery style can reflect

Virgin Branch group identity, in the context of social interactions both inter-regionally and among Kayenta Branch populations, over time.

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The journey in completing this dissertation includes a long list of individuals, who I would like to formally recognize here. While the space utilized within the scope of this section hardly serves as a sufficient expression of my gratitude, the following is brief list of individuals who provided support of this research from the planning, data collection, and writing stages of this dissertation.

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DEDICATION

For Margaretha.

Eternally grateful for your limitless love and support.

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CHAPTER 1. INTRODUCTION

This dissertation represents a regional archaeological study focusing on painted pottery. More specifically, I investigate Virgin Branch social dynamics with particular considerations given to archaeological theories of style and identity, using painted pottery styles as a proxy for group identity. Through this study, I aim to provide greater clarity on Virgin Branch heartland chronometry, inter- and intra-regional social dynamics, and painted pottery styles while simultaneously challenging previously-advanced models pertaining to Virgin Branch identity and group affiliation in the archaeological record. This chapter introduces my research within the following structure: (1) background information to this study; (2) statement of the research problem and associated justification; (3) my rationale and objectives for pursuing this problem and my guiding research questions; (4) the scope of my study; (5) the significance of this research; and (6) the structure/organization of this dissertation.

Background

Ceramic design studies have provided a substantive foundation for archaeological research since the early 20th century. Representative of these is Harold Sellers Colton and Lyndon Lane Hargrave's (1937) formative work, *Handbook of Northern Arizona Pottery Wares,* which presented a classification system for northern Arizona ceramics and influenced the development of the similar, though distinct, type-variety systems in the Maya lowlands and the U.S. Southeast (Sinopoli 1991:52-53). These early approaches contributed to our collective knowledge of the spatial and temporal distribution of pottery in the New World but lacked a theoretical framework for understanding the relationship between ceramic design variability and the maintenance or manipulation of prehistoric group identities. Since the late 20th century and early 21st century, however, ceramic studies in the North American Southwest have increasingly focused on the relationship between design style and group affiliation/identity (e.g., Hays 1992; Hegmon 1995; Mills 2007; Peeples 2018; Washburn 2011). Building from this long tradition of archaeological stylistic design studies, this research focuses on a cultural region of the North American Southwest within which considerations of style and identity have not yet been considered—the Virgin Branch region, a peripheral zone spanning portions of southern Nevada, southern Utah, and northwestern Arizona (See Figure 1.1; Lyneis 1995, 1996, 2000).

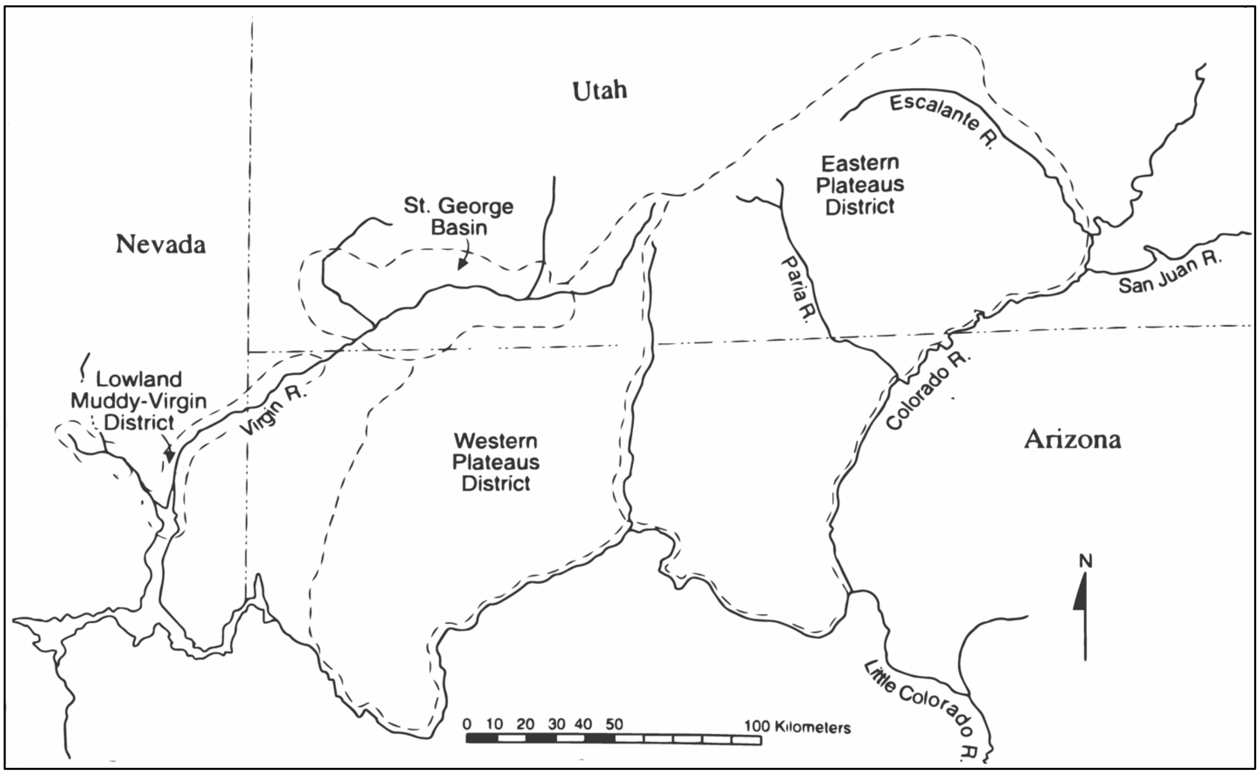


Figure 1.1. Map of Virgin Branch region, after Lyneis (1996:12, Figure 2.1).

Rooted in both archaeological approaches to style and socio-cultural literature on identity, this research applies a multi-faceted, stylistic analytical framework on pottery sherds and whole ceramic vessels from the Virgin Branch region. Virgin Branch community identity and group affiliation are considered against the backdrop of social relations with, and movements of, the neighboring Kayenta Branch populations in northeastern Arizona. Archaeological understandings of interaction and influence between these two areas have been limited by a paucity of research (e.g., Aikens 1966, McFadden 2012). Although Aikens (1966) proposed that the Escalante River formed the boundary between the Kayenta and Virgin Branch regions (see Figure 1.2), subsequent research has shown that the boundary between these cultures is not clearly demarcated but likely fluctuated as the territories occupied by these respective populations expanded and contracted over time (e.g., Effland et al. 1981; Geib et al. 2001; Schwartz et al. 1981). These population movements would have impacted interaction between the two regions and influenced how the Virgin Branch people elected to advertise or express their group identities. The expression of group identities within the Virgin Branch region likely varied as well in response to intra-regional variations in population densities and settlement strategies. Using technological and painted design styles as a proxy for expressions of Virgin Branch group identity, this study investigates the dynamic, volatile, and nuanced nature of Virgin Branch communities and group affiliations (Isbell 2000).

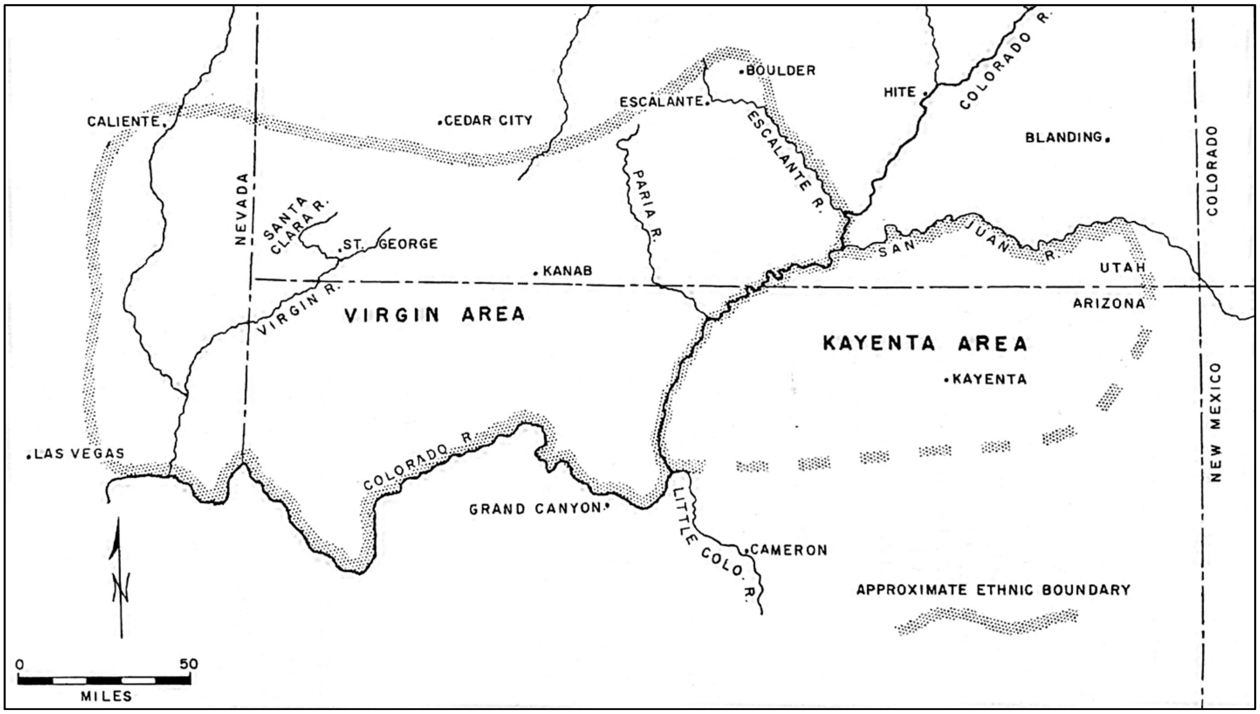


Figure 1.2. Map of Virgin and Kayenta Branch regions, after Aikens (1966:2, Figure 1).

Statement of the Problem

The trajectory of archaeological research in the North American Southwest since the late 19th century has largely focused on select so-called cultural regions or areas (e.g., Chaco Canyon, Mesa Verde) at the expense of less focus given to other areas such as the Virgin Branch region. Over the course of the past century, however, significant advances in our understanding of the archaeological record within the Virgin Branch. Research conducted in the Moapa Valley (e.g., Harrington 1925; Lyneis 1992), the St. George Basin (e.g., Aikens 1965, 1966; Walling et al. 1986), and on the Colorado Plateau (e.g., Harry and Willis 2019; McFadden 2012, 2016) have provided insights into Virgin Branch material culture, subsistence practices, settlement and regional patterns, and other themes. While these advances have no doubt furthered our understanding of the Virgin Branch region and people, untested assumptions and models have inhibited greater clarity on questions pertaining to social dynamics in the archaeological record.

Inter- and intra-regional trade and associated social dynamics have been a major focus in previous studies conducted by archaeologists working in the Virgin Branch region (e.g., Aikens 1966; Harry et al. 2013; Hull et al. 2014; Rafferty 1990). All of these studies provide inspiration for my dissertation research. In surveying these past investigations, a research gap persists in understanding how a ubiquitous artifact class (namely, pottery) can be used to gain insights into Virgin Branch social dynamics. This topic in particular was pursued by Aikens (1966), however, his study on Virgin-Kayenta Branch relations was conducted on basis of deliberately excluding ceramics from his study and conclusions. In order to address this gap, the present dissertation serves to investigate Virgin Branch group identity and social dynamics through the lens of pottery style over time.

Rationale

The foundation of this dissertation serves to challenge prevailing assumptions and untested models of Virgin Branch social dynamics. In particular, this research aims to investigate Virgin Branch social dynamics, intra-regionally (between communities) and inter-regionally (in the context of contemporaneous neighboring Kayenta Branch populations), through a study of technological and painted pottery style. I use two themes—chronometric reconstruction and pottery style—as the scaffolding to investigate the following research questions.

1) How does a refined Virgin Branch heartland chronometry clarify current understandings of Virgin Branch chronology and correlate with the established chronometry of the Kayenta Branch heartland?

2) What are the technological styles and rules of design (i.e., design layout, design symmetry, and design elements) associated with painted pottery from the Virgin and Kayenta Branch heartlands over time?

3) How is Virgin Branch group identity communicated and reflected through expressions of technological and painted design styles on pottery amidst intra- and inter-regional events and interactions over time; and what implications do these findings carry with respect to Virgin Branch agency?

Scope

My investigation into Virgin Branch pottery style, group identity, and social dynamics focuses on painted Virgin and Kayenta Branch pottery, specifically: Tusayan White Ware, Virgin Series (inclusive of corrugated varieties); Moapa Gray Ware (inclusive of corrugated varieties); and Tusayan White Ware, Kayenta Series (inclusive of corrugated "Shato" varieties). In addition to these pottery wares, for my investigation into Virgin Branch chronometry, I also use the Tsegi Orange Ware and San Francisco Mountain Gray Ware pottery in my figuring of mean ceramic dates and ceramic cross-dating efforts. Geographically, this research focuses on the Virgin Branch heartland (i.e., the portion of the Virgin Branch region west of Kanab Creek) and the Kayenta Branch heartland (i.e., the greater Black Mesa area). Temporally, I broadly focus on the Basketmaker III through early Pueblo III periods (ca. 300 B.C. – A.D. 1225) using the following brackets as the analytical frame through which I present and discuss my findings: (1) Basketmaker III – Pueblo I periods; (2) early – middle Pueblo II periods; and (3) late Pueblo II – early Pueblo III periods. Demographically, I consider Virgin Branch group identity and group affiliation on two scales: (1) collectively as a Virgin Branch heartland group (inclusive of districts) juxtaposed with the Kayenta Branch heartland; and (2) as separate "communities" within the Virgin Branch heartland, defined geographically (i.e., Moapa Valley, St. George Basin, and western Colorado Plateau). Thematically, this study focuses on the following research themes: (1) archaeological identity; (2) technological and painted Virgin and Kayenta Branch pottery styles; and (3) Virgin Branch heartland chronometry, with a particular focus on ceramic dating methods.

Significance

The significance of this research broadly relates to considerations of style and ceramic analysis within archaeology as a whole. The approaches used in this study are applicable towards anthropological questions of identity and style through the study of material culture. Within the North American Southwest, in particular, this research challenges long-held normative assumptions that the Virgin Branch people were simply the passive recipients of cultural patterns diffused from the Kayenta Branch region. This will be accomplished by examining *why* Virgin Branch potters selected certain technological and painted design styles in the production of pottery. Moreover, the reconstructed chronometry for the Virgin Branch heartland, and resulting suggested refinements to the regional chronometry, serve as an invaluable resource for future researchers within the North American Southwest and will enable more fine-grained questions to be addressed within the region. Finally, this research serves as an original and substantive contribution towards the topics of identity and archaeological style as applied within a disproportionately under-researched cultural region of the North American Southwest. Broader contributions of this research include the application of hierarchically-structured stylistic ceramic analyses outside of the more intensively-studied regions of the Southwest, while also advancing a more unified and dynamic approach pertaining to style and regional interaction in archaeological research.

Structure of this Dissertation

This dissertation is organized into eight chapters. The present chapter introduces overarching scope and significance of the research conducted within this study. Chapter 2 provides the research context for this study through the lens of the geographic and cultural foci of this dissertation, respectively. In addition, I present the archaeological context and related scholarly debates associated with this study. Chapter 3 presents the research orientation of this study. That chapter is broken up into sections covering my theoretical framework, data collection strategy, analytical methods, research questions, and associated hypotheses and expectations. Chapter 4 presents all of the tabular data for my chronometric reconstruction, and associated refinement, of the Virgin Branch heartland using mean ceramic dating and ceramic cross-dating. Chapter 5 serves as my response to my first research question. In that chapter, I discuss the results presented in Chapter 4 and make connections between mean ceramic dating (using tree-ring dated non-local ceramic types) and Virgin Branch pottery types found in association with these non-local ceramics, provenienced to archaeological contexts. Chapter 6 presents the results and associated discussion for my examination of the structure of style with multiple iterations of a Chi-square Test of Independence run as the primary means in establishing rules of design for Tusayan White Ware, Virgin and Kayenta series pottery, in response to my second research question. Chapter 7 uses findings from Chapters 5 and 6 as a foundation to complement the associated presentation of technological and design style data, Shannon Diversity indices, and Brainerd-Robinson Similarity coefficients to examine my research hypotheses associated with my third research question. Chapter 8 serves as the conclusion in which I present a summary of my findings, the limitations of this study, recommendations for future research, and the contribution of this research to Southwestern archaeology in general and Virgin Branch archaeology in particular.

CHAPTER 2. RESEARCH CONTEXT

The geographic and cultural framework for this research embraces a synthesis of spatial boundaries reported by archaeologists working in the Virgin and Kayenta Branch regions. The greater Virgin Branch region encompasses an area that spans from approximately Las Vegas, Nevada to the San Juan River on the eastern Colorado Plateau (west-east) and from approximately Cedar City, Utah to the southern end of the Shivwits Plateau in northwestern Arizona (north-south) (see Figure 1.2). The greater Kayenta Branch region spans an area from approximately the San Juan River to the Arizona-New Mexico border (west-east) and from the eastern Colorado Plateau of the Utah-Arizona border to the Little Colorado River (north-south) (Figure 1.2). This chapter provides the archaeological context for this dissertation and establishes the geographic and cultural components of the research setting through which this project is operationalized.

An Overview of Archaeological Research in the Virgin Branch Region

The first archaeological expeditions in the Virgin Branch region were undertaken in the 1920s by Mark Raymond Harrington, under the auspices of the Heye Foundation and the Museum of the American Indian in New York. Harrington's work in the Virgin Branch region was focused within the Moapa Valley of southern Nevada (approximately 70 miles northeast of Las Vegas) through which he worked on excavating and documenting the so-called Pueblo Grande de Nevada (also known as "Lost City") (cf. Harrington 1925, 1927). Harrington's work at "Lost City" comprised excavating habitation and storage Pueblo room structures he termed "houses" (cf. Shutler 1961). The excavation-based research Harrington conducted at "Lost City," though brief, helped establish the "far western" (Lyneis 1995) extent of Puebloan occupation in the North American Southwest. This pioneering research by Harrington expanded our understanding of Puebloan culture extending into southern Nevada, evidenced through the presence of key markers of Puebloan groups—namely, Pueblo architecture, cultivation of The Three Sisters crops (corn, beans, and squash), and production and use of black-on-white painted pottery.

Following the initial work conducted by Harrington, archaeological research in the Virgin Branch region has been conducted both within and beyond the Moapa Valley of southern Nevada. Within southern Nevada, other survey- and excavation-based research endeavors were conducted by, but not limited to: Irwin Hayden's work at Mesa House (Hayden 1930); Richard Shulter's synthesis of Harrington's excavation of "Lost City" (Shutler 1961); Margaret Lyneis' (University of Nevada, Las Vegas) survey and documentation of the extent and scope of the Main Ridge community, including "Lost City" (Lyneis 1992); and Karen Harry's (University of Nevada, Las Vegas) excavation of select "house" sites in the Moapa Valley in the early 21st century.

Within the higher reaches of the Virgin Branch region (i.e., the St. George Basin and the Colorado Plateau), archaeological research projects have been conducted largely during the second half of the 20th century and have continued into the 21st century. Some of the earliest excavation and survey work in the St. George Basin of southern Utah were conducted through archaeologists associated with research projects led by teams from the University of Utah (e.g., Aikens 1965). Archaeological surveys and excavations between the 1970s and 1990s, however, resulted in some of the greatest insights into Virgin Branch archaeology within the St. George Basin. Landmark projects conducted through the Utah Bureau of Land Management at the Little Man sites (Dalley and McFadden 1988), the Red Cliffs Site (Dalley and McFadden 1985), and Quail Creek (Walling et al. 1986) represent some of the most extensive survey- and excavation-based research which has informed our understanding of Virgin Branch lifeways, subsistence, and technology. In addition, synthesis studies pertaining to archaeological sites within the St. George Basin have shed significant light on Virgin Branch diet and subsistence practices (cf. Martin 1999; Watson 2008).

When compared with the extensive record of investigations conducted within the Moapa Valley and St. George Basin, the greatest paucity of archaeological research in the Virgin Branch region is found on the Colorado Plateau portion of the Virgin Branch region. Extensive surveys and archaeological assessments have been conducted pertaining to the Arizona Strip (Altschul and Fairley 1989), the Shivwits Plateau (Allison and Forest forthcoming; Harry and Willis 2019, forthcoming; MacWilliams et al. 2006; Wells 1991), the Uinkaret Plateau (Thibodeaux et al. forthcoming), Powell Plateau (Effland et al. 1981), the Walhalla Plateau (Schwartz et al. 1981), and the Grand Staircase Escalante National Monument (Geib et al. 2001; McFadden 2012). All of these studies notwithstanding, the Colorado Plateau represents the most under-researched portion of the Virgin Branch region. In addition to these surveys, respective excavation projects have been conducted on the Shivwits Plateau in the early 21st century by Brigham Young University and the University of Nevada, Las Vegas. In addition, recent (and as of this writing, on-going) excavations of multiple sites on the Uinkaret Plateau, conducted by California State University, Long Beach (e.g., Sakai forthcoming), have provided significant insights into the Virgin Branch archaeological record on the western portion of the Colorado Plateau.

A Note on Richard A. Thompson's Impact on the Study of Virgin Branch Pottery

One particularly notable contribution from the archaeological research conducted in the St. George Basin and on the Colorado Plateau, with direct ramifications on scope and framing of this dissertation, stemmed from the work of Richard A. Thompson. A historian by training, Thompson taught himself the ceramics of the Virgin Branch region through studying Harold Colton's ceramic typologies of the northern American Southwest—including Colton's (1952) typological assessment of Virgin Branch ceramics—in conjunction with other literature pertaining to pottery typologies of the area (Barbara Frank 2021, personal communication). Coupled with studying the archaeological literature, and unconvinced of Colton's inconsistent and seemingly cursory approach to constructing a Virgin Branch ceramics typology (Walling et al. 1986:351-365), Thompson applied his own research of pottery typologies to a variety of archaeological projects that influenced Virgin Branch typological schema and naming conventions throughout the St. George Basin and Colorado Plateau (e.g., Walling et al. 1986). Although these naming conventions were essentially single-handedly devised by Thompson, leading to potential internally conflicting/contradictory painted style identifications (James Allison 2021, personal communication), Thompson's naming conventions have largely held and remain in use to the present among archaeologists working in the Virgin Branch region. For this reason, and as a means of standardizing painted pottery styles for this dissertation research, Thompson's naming conventions for Virgin Branch pottery (cf. Seymour and Perry 1998; Walling et al. 1986) will be used throughout this dissertation. A complete list of the Virgin Branch pottery wares and types, as devised by Thompson, can be found in Appendix A of this dissertation.

Previous Archaeological Research in the Kayenta Branch Region

Archaeological research in the Kayenta Branch region has a long, rich history that began in the late 19th century. While a variety of syntheses of the archaeological record within the Kayenta Branch region have been written (e.g., Dean 1996; Gumerman 1984, 1988; Haas and Creamer 1993), Andrew Christenson (2013) provides a concise account of the various archaeological expeditions in the Kayenta Branch region, spanning over a century, within a broader synopsis of Kayenta Branch archaeology (Dean and Clark 2013). Since the Virgin Branch heartland is the focus of this dissertation, the arc of archaeological research in the Kayenta Branch region will not be visited here. Research focusing on the convergence between respective Virgin and Kayenta Branch culture, though limited, has been pursued in the past (e.g., Aikens 1966). This social and cultural overlap between both regions serves as the point of contact through which Kayenta Branch populations are considered in this dissertation. Using previous studies relating to Virgin-Kayenta Branch relations to guide the overall lens of this study, the following sections discuss those synthesis studies and how they inform the broader research context of this dissertation.

Geographic and Cultural Framework

Geographic Framework

The aim of this dissertation is not to consider the full geographic extent of both the Virgin and Kayenta Branch regions. Nor are both regions equally considered. Rather, the scope of this research is limited to the geographic “heartland” of each region (see Figure 1.1). These respective “heartlands,” within the Virgin and Kayenta Branch regions, are geographically-bounded areas within a central portion of each region. The decision to focus only on the heartland portion of each region was informed through known limited intrusion from outside populations. In the case of Virgin Branch sites, particularly on the eastern Colorado Plateau, east of Kanab Creek, many archaeological investigations on that portion of the Colorado Plateau have reported substantially-mixed cultural influences, primarily documented in the form of, but not limited to, architectural features, site layout, and (most notably, in the case of this dissertation) ceramic assemblages (cf. Aikens 1966; Altschul and Fairley 1989; Effland et al. 1981; Geib

1996, 2011; Geib et al. 2001; McFadden 1996, 2012; Schwartz et al. 1981). The discussion in the following section elucidates the Virgin Branch archaeological record in the context of Kayenta Branch culture in isolation as well as interactions with Kayenta Branch populations from the Basketmaker III period through the early Pueblo III period, the temporal arc of known production and distribution of painted Virgin Branch pottery.

Cultural Framework

While this project considers both Virgin and Kayenta Branch populations through the enculturative markers of painted pottery, the primary cultural focus of this dissertation is upon Virgin Branch communities and populations. Broad, comparative, all-encompassing studies that consider vast portions of the Virgin and Kayenta Branch regions have previously been undertaken (cf. Aikens 1966; Hall 1942; Lister 1964; Rudy and Stirland 1950). Among these previously studies, the comparative study by C. Melvin Aikens (1966), *Virgin-Kayenta Cultural Relationships*, has persisted as perhaps the best representative comparative work conducted on the connection(s) between Virgin and Kayenta Branch populations. Particularly notable from Aiken's (1966) study, in the context of this dissertation, is the explicit exclusion of ceramics data from his assessment of the two regions. Unconvinced by the then-prevalent ceramics-based studies conducted by his contemporaries Harold Sellers Colton, Lyndon Lane Hargrave, and Harold Sterling and Winifred Gladwin, Aikens did not find archaeological ceramics to be a useful medium through which to investigate cultural connections (Aikens 1966:5-6). Not seeking to conduct a similarly expansive comparative study, as previously done by Aikens, this dissertation focuses on Virgin Branch populations both intra-regionally (between communities in the Virgin Branch heartland) and inter-regionally (against Kayenta heartland populations). In consideration of Aikens' (1966) study, this dissertation, in part, serves to build upon Aikens' research concerning Virgin-Kayenta Branch relations while simultaneously challenging some of his published conclusions through a ceramics-based study as a means of better understanding the Virgin Branch group and community expression. Within the scope of this research, my use of the term "community" is defined by shared practices (e.g., painted design styles, pottery production techniques) within a limited geographic area (i.e., a given archaeological site, close-knit grouping of archaeological sites). In short, this dissertation focuses on inter- and intra-regional dynamics of Virgin Branch heartland populations and communities, through the analytical lens of painted design style and design, over time.

The Virgin Branch Archaeological Record in the Context of Painted Ceramics and Kayenta Branch Culture: Basketmaker III – Early Pueblo III Periods

The Virgin Branch region is made up of distinct environmental zones spanning portions of southern Nevada, southern Utah, and northwestern Arizona. Archaeologically, the Virgin Branch region can be understood in the context of four sub-regions, or "districts," as advanced by Lyneis (1996): (1) the Lowland Muddy-Virgin Valley District, in southern Nevada and comprising the Moapa Valley and the lower Virgin River valley; (2) the St. George Basin District of southwestern Utah; and (3) the Western and (4) Eastern Colorado Plateaus districts (see Figure 1.1).

Within these four districts, past studies have disproportionately focused on the Lowland Muddy-Virgin Valley and St. George Basin districts (Aikens 1965, 1966; Dalley and McFadden 1985, 1988; Harrington 1925, 1927; Harry 2019; Harry and Watson 2010; Hayden 1930; Jenkins 1981; Lyneis 1992, 2000, 2008; Myhrer and Lyneis 1985; Shutler 1961; Walling et al. 1986), though notable contributions have also been made within the Western and Eastern Colorado Plateaus districts (cf. Allison 1988; Altschul and Fairley 1989; Geib et al. 2001; Harry et al.

2013; Harry and Willis 2019; Janetski et al. 2013; McFadden 2012, 2016; Westfall 1987). The Lowland Muddy-Virgin Valley, St. George Basin, and Western Colorado Plateaus districts compose what is referred to here as the Virgin Branch heartland. The Eastern Colorado Plateaus District, in contrast, is sometimes placed within the Virgin Branch region (Aikens 1966) and sometimes not (Lyneis 1995). As well, during certain portions of the archaeological occupation of the Colorado Plateau, the Eastern Colorado Plateaus District supported sizeable Kayenta Branch populations. For this reason, the present study focuses on the Virgin Branch heartland, which is contextualized using findings from the Kayenta Branch heartland of northeastern Arizona (see Figure 2.1). The Kayenta Branch heartland is defined as the area "bounded by the San Juan and Colorado Rivers on the north and west and the extremities of Black Mesa on the south and east," areas which have "exhibited strong Kayenta affiliations at all times" (Dean 1996:29-30). This study examines three temporal intervals: Basketmaker III – Pueblo I, early – middle Pueblo II, and late Pueblo II – early Pueblo III. This organization was selected because of the relative coherence of material culture within each of these intervals compared with the more marked differences found between them.

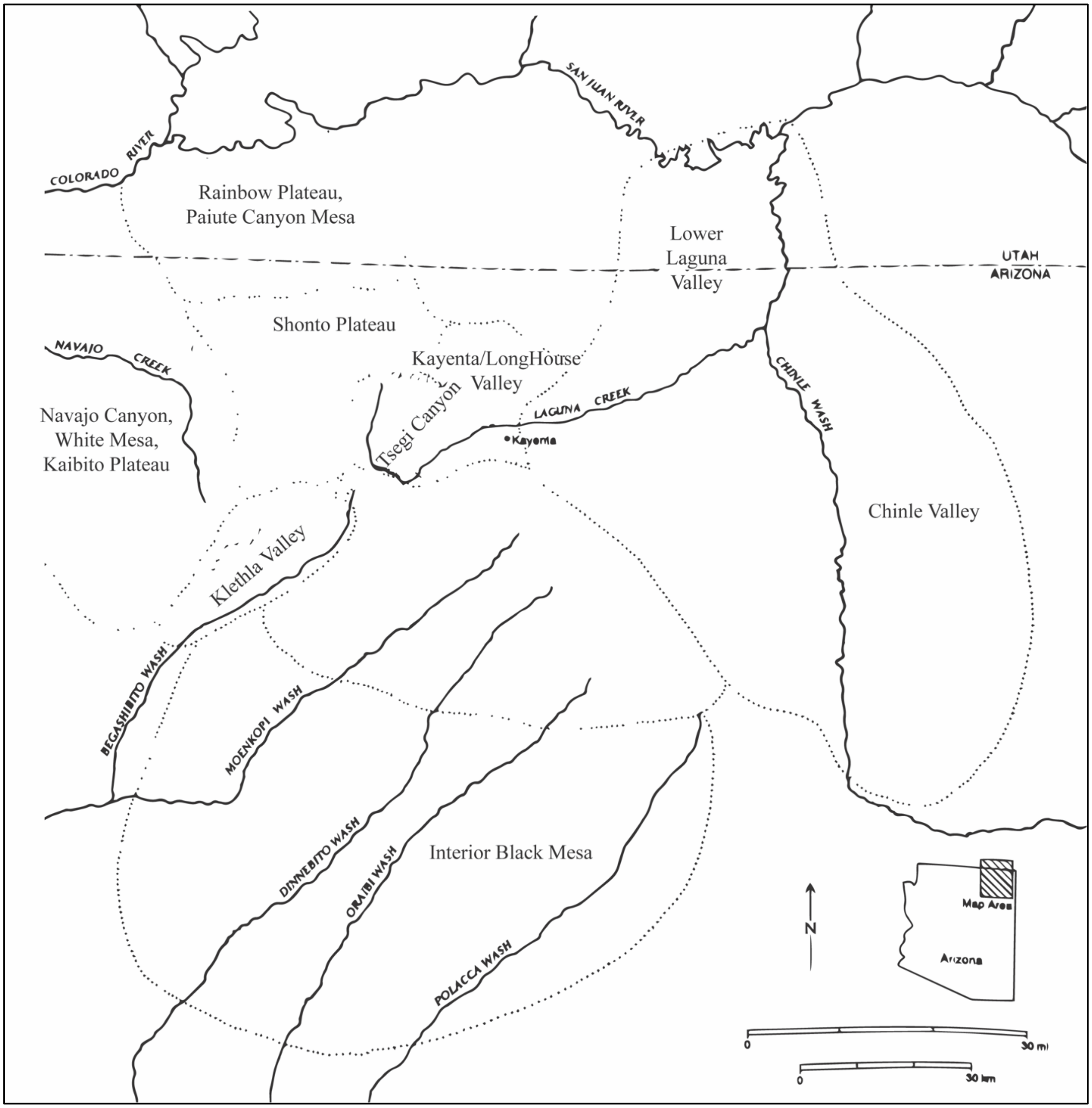


Figure 2.1. Overview map of Kayenta Branch region, inclusive of heartland, after Dean (1996:30, Figure 3.1).

Basketmaker III – Pueblo I

The Basketmaker III period in the Virgin Branch heartland was marked by the establishment of small, autonomous communities in which pit structures, typifying the household, were accompanied by storage cists (Altschul and Fairley 1989; Dalley and McFadden

1985; Lyneis 1995). The appearance of Basketmaker sites in the Virgin Branch heartland has traditionally been interpreted as resulting from immigration of Kayenta Branch populations into the area; however, recent research suggests that the emergence of this culture was more likely an indigenous development that resulted when descendants of local Archaic-period populations, who were culturally and genetically related to Great Basin hunter-gatherer groups, adopted agriculture and new forms of material culture (Harry 2019; Harry and Watson 2018). Site structure during the Basketmaker III period does not seem to have been pre-planned (Dalley and McFadden 1985). The overall Virgin Branch lifeway was primarily oriented towards a horticultural subsistence base, against the backdrop of steady population growth and settlement expansion. Farming practices, however, varied between the Virgin Branch districts. In the Moapa Valley, farming was irrigation based; while in the St. George Basin floodwater farming was practiced, and on the Colorado Plateau cultivation relied on dry farming. During this time, a ceramic distribution network emerged connecting the Moapa Valley lowlands with the western Colorado Plateau (Lyneis 1995). Basketmaker III painted pottery types consisted of Mesquite Black-on-gray (Tusayan White Ware, Virgin Series) Boulder Black-on-gray (Moapa Gray Ware), both roughly analogous to the Lino Black-on-gray pottery designs found in the Kayenta Branch heartland (see Figure 2.2).

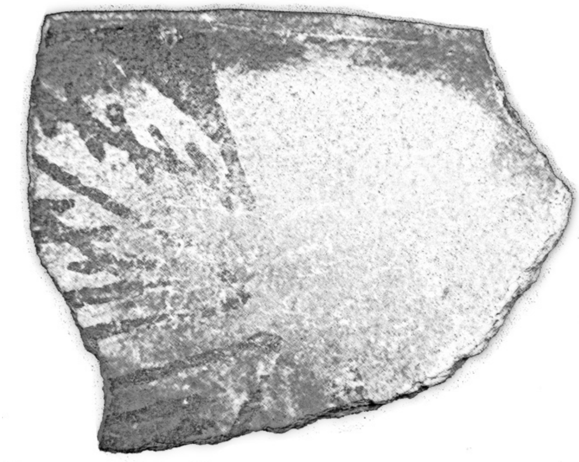
(a)

(b)

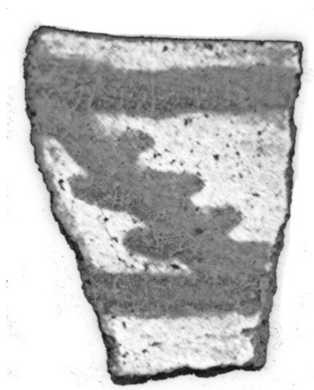
(c)

Figure 2.2. Example of Mesquite Black-on-gray (a) (Case 386), Boulder Black-on-gray (middle) (Case 36), and Lino Black-on-gray (bottom) (Case 453) designs.

The transition to the Pueblo I period is characterized by more formalized pit structures and habitation rooms, along with notable population increases (Altschul and Fairley 1989; Lyneis 1995). Agricultural lifeways continued, presumably supplemented by hunting and gathering, though researchers debate the relative contributions of wild resources to the diet (Altschul and Fairley 1989; Dalley and McFadden 1985, 1988; Watson 2008). Although populations remained relatively low, they began to consolidate into larger pithouse villages (Altschul and Fairley 1989; Lyneis 1995). The predominant painted pottery types found in the Virgin Branch heartland during this time were Washington Black-on-gray (Tusayan White Ware, Virgin Series) and Boysag Black-on-gray (Moapa Gray Ware), both similar to the Kana-a Black-on-white design style from the Kayenta Branch region (Altschul and Fairley 1989) (see Figure 2.3).



(a)



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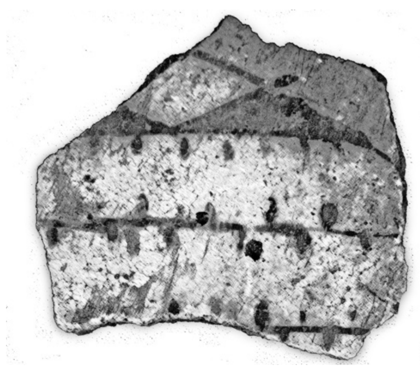
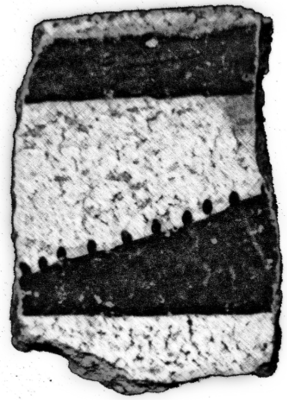


(c)

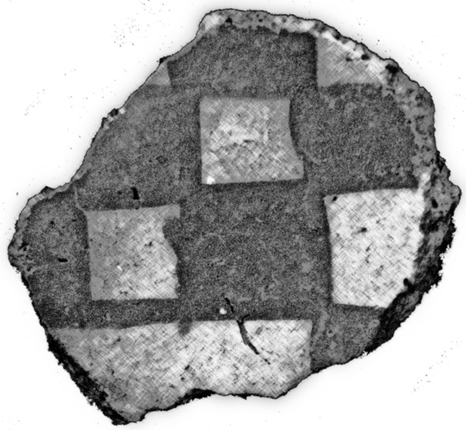
Figure 2.3. Example of Washington Black-on-gray (a) (Case 22), Boysag Black-on-gray (b) (Case 55), and Kana-a Black-on-white (c) (Case 510) designs.

Early – Middle Pueblo II

The early Pueblo II period in the Virgin Branch heartland showed a continued use of pit structures, but also adopted were semi-subterranean and above-ground structures, which were increasingly organized into C-shaped layouts of contiguous habitation and storage rooms (Aikens 1966; Dalley and McFadden 1985; Lyneis 1995; McFadden 2016). Subsistence practices in the Western Colorado Plateaus District relied on seasonal mobility and horticulture (Altschul and Fairley 1989), while in the St. George Basin and Moapa Valley occupations were year-round and subsistence continued to rely on floodwater and irrigation agriculture, respectively (Dalley and McFadden 1988; Lyneis 1992). Populations continued to consolidate towards the end of the Pueblo I period, and new painted pottery types, St. George Black-on-gray (Tusayan White Ware, Virgin Series) and Trumbull Black-on-gray (Moapa Gray Ware)—roughly analogous to the Kayenta Black Mesa Black-on-white design styles—were widely adopted (see Figure 2.4).



(a)



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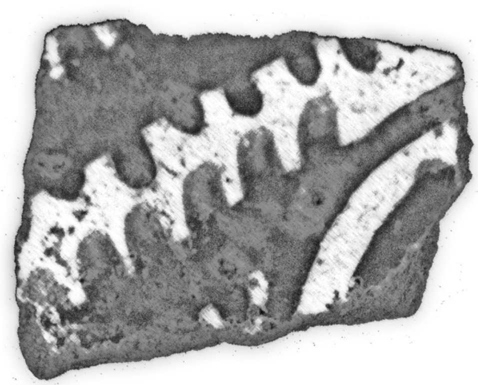
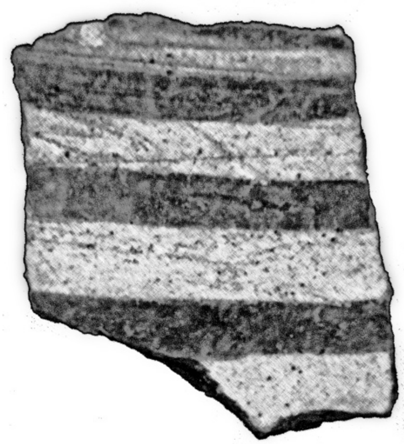


(c)

Figure 2.4. Example of St. George Black-on-gray (a) (Case 1093), Trumbull Black-on-gray (b) (Case 198), and Black Mesa Black-on-white (c) (Case 494) designs.

During the middle Pueblo II period, site layouts continued largely as before, though above-ground structures were increasingly used. In the Moapa Valley, the Virgin Branch community of Main Ridge (Lyneis 1992) represented the largest known settlement within the Virgin and Kayenta Branch regions at the time (Harry 2019:317). Although Virgin Branch populations in the Moapa Valley eventually transitioned from subterranean to above-ground structures, as found in the Kayenta region, no definitive mealing rooms or kivas have been found (Lyneis 1995). Moreover, there were no substantial changes in subsistence practices, though some intensification may have occurred in the Western Colorado Plateaus District, as suggested by the appearance of check dams and terraces (Lyneis 1995). This period is marked by substantial population increase and expansion, as immigrants from both the Virgin and Kayenta Branch regions expanded outward from their respective heartlands into previously unoccupied areas of the Eastern Colorado Plateaus District, bringing members of these two regions into more regular contact with one another. Intra-regional interaction within the Virgin Branch heartland also increased at this time, with pottery exchange between the Moapa Valley and the Western Colorado Plateaus District reaching its height (Allison 2000; Harry et al. 2013). The painted pottery types during the middle Pueblo II period included North Creek Black-on-gray (Tusayan White Ware, Virgin Series) and Moapa Black-on-gray (Moapa Gray Ware), both approximate analogs of the Kayenta Branch Sosi Black-on-white design style (see Figure 2.8).

(a)



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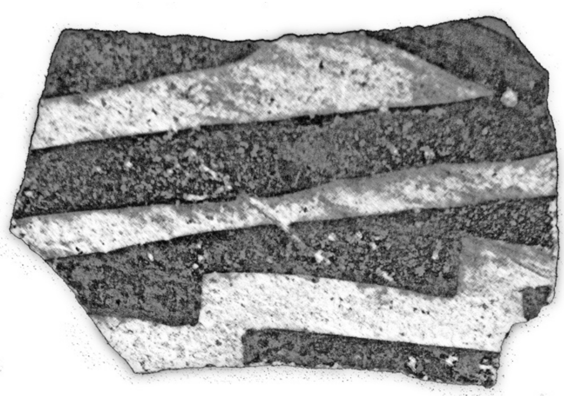


(c)

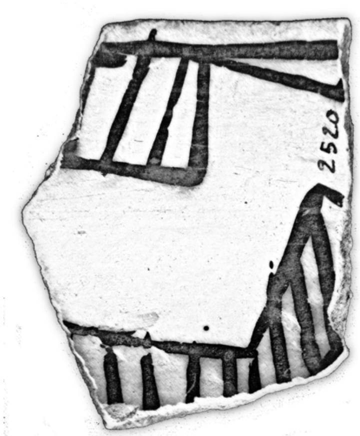
Figure 2.5. Example of North Creek Black-on-gray (a) (Case 924), Moapa Black-on-gray (b) (Case 337), and Sosi Black-on-white (c) (Case 500) designs.

Late Pueblo II – Early Pueblo III

During the late Pueblo II period, regional reorganization occurred in the Virgin Branch heartland—as evidenced by a few notably larger sites in the Moapa Valley, St. George Basin, and Western Colorado Plateaus District (Lyneis 1996). Mesa House, one of the largest sites in the Virgin Branch heartland at this time, has been proposed to reflect a pooling of resources by lineage family groups (Hayden 1930; Lyneis 1986). Trade between Virgin Branch populations in the Moapa Valley and on the Shivwits Plateau terminated sometime during the late Pueblo II period (Allison 2000; Harry et al. 2013; Lyneis 1995). The occupational terminus in the Virgin Branch heartland culminated in abrupt depopulation episodes following the peak populations exhibited during the middle Pueblo II period. Based on ceramic seriation, depopulation of the Virgin Branch heartland is thought to have occurred in episodic succession west to east—first in the Moapa Valley, followed by the St. George Basin, and culminating in the Western Colorado Plateaus District during the early Pueblo III period (Lyneis 1996). New painted pottery types were adopted in the Virgin Branch heartland, Hildale Black-on-gray (Tusayan White Ware, Virgin Series) and Slide Mountain Black-on-gray (Moapa Gray Ware) which integrated hachured design motifs similar to the Dogoszhi Black-on-white design style from the Kayenta Branch region (see Figure 2.6). In addition, contemporaneous with the cross-hachured Dogoszhi-style pottery is the Kayenta Flagstaff Black-on-white pottery design, which has been identified by archaeologists working in the Virgin Branch region through the Glendale Black-on-gray (Tusayan White Ware, Virgin Series) and Poverty Mountain Black-on-gray (Moapa Gray Ware) pottery designs (see Figure 2.7). Nonetheless, Virgin and Kayenta Branch populations appear to have remained distinct, partly indicated by the lack of Kayenta Branch enculturative markers (e.g., entryboxes and perforated plates) within the Virgin Branch region.

(a)

(b)



(c)

Figure 2.6. Example of Hildale Black-on-gray (a) (Case 42), Slide Mountain Black-on-gray (b) (Case 1530), and Dogoszhi Black-on-white (c) (Case 488) designs.

Figure 2.7. Example of Glendale Black-on-gray (a) (Case 798), Poverty Mountain Black-on-gray (b) (Case 1661), and Flagstaff Black-on-white (c) (Case 872) designs.

Discussion

In consideration of the preceding section on Virgin Branch painted ceramics and the associated archaeological record—in the context of Kayenta Branch culture—the reader must understand that this dissertation does not focus on these two areas in equal proportions. Rather, the scope of this research primarily investigates the Virgin and Kayenta Branch heartlands through two scales of focus: (1) an intra-heartland of the Virgin Branch region among the Lowland Muddy-Virgin Valley, the St. George Basin, and the western Colorado Plateau districts; and (2) an inter-regional perspective of the Virgin Branch population as a whole (inclusive of all districts) in the context of interactions (e.g., trade, exchange, migration) with Kayenta Branch populations, as inferred through painted ceramics recovered from archaeological sites and associated site/feature context (where available). Although specific sites from within the Kayenta Branch heartland are considered in the scope of this study, the focus is not on these Kayenta Branch sites in isolation. An understanding of Kayenta Branch social dynamics is pursued through painted ceramic designs and styles recovered from these sites, which are studied and understood in relation to Virgin Branch painted ceramics—with the primary goal of understanding how painted designs and styles articulate (where discernable) Virgin Branch social dynamics on intra-regional and inter-regional levels among Virgin Branch communities and between Kayenta Branch populations, respectively.

Regarding the notion of distinct regional "identities" in the North American Southwest (see Figure 2.8), archaeologists have conventionally inferred identities in the archaeological record on the basis of concentrations (or the lack of) particular types of material culture. One of the most commonly used arguments associated with this inferential model is the conventionally reductive adage of "pots equal people." While I will not revisit and respond to the "pots equal people" with my own critique of this long-criticized cultural historical framework here, suffice it to state that I do not subscribe to or utilize this interpretive model in this dissertation research. I will expand on how the analytical framework used in this dissertation, particularly in how I approach the association of painted pottery designs and styles with Virgin and Kayenta Branch populations in the next chapter.

Research pertaining to material cultural seemingly restricted to the Virgin and Kayenta Branch regions, respectively, have primarily informed the differentiation of these two regions as representing two distinct cultural areas. For example, Harry (2019) noted differences in painted design layouts on ceramic bowls and jars between the two regions; and Aikens (1966:44) noted the presence of mealing bins within the Kayenta region and the relative absence of this material culture type within the Virgin Branch region. Another observation resides in the seeming absence of kivas in the Virgin Branch region, whereas kivas are found as key architectural features among many sites in the Kayenta Branch region. (As a note, not all archaeologists working in the Virgin Branch region are in complete agreement with the previous point regarding the absence of kivas in the Virgin Branch region. One or two architectural features, interpreted as kivas, have been tentatively reported in the St. George Basin; however, confirmation of these structure(s) as in fact being kivas has not been comprehensively published or ascertained by the archaeologists associated with those preliminary findings. To date, I am not convinced any kivas have been positively identified in the Virgin Branch region; however, I remain open to any new data and evidence as more research is published by archaeologists working in the region).

As observations of differentiation between these two regions have prompted further investigation in recent years, older assumptions prevail in the archaeological literature—making the topic of differentiation of these two regions an unsettled matter, often predicated on untested presuppositions by archaeologists. For instance, Aikens (1966:5) specified such untested models as involving: (1) a Kayenta Branch Puebloan migration to the Virgin Branch region (Rudy and Stirland 1950); (2) conversely, a Virgin Branch Puebloan migration to the Kayenta Branch region (Hall 1942); and (3) "a lowering of esthetic standards [regarding painted designs on pottery vessels] on the part of the Virgin people as a result of their separation from the Kayenta cultural hearth" (Lister 1964). In addition, Altschul and Fairley (1989:77) have broadly framed these varying models by noting that, "following the work of Aikens (1965, 1966), archaeologists debated the validity of the Virgin Branch as a regional variant separate and distinct from the neighboring Kayenta branch. This issue continues to be a subject of controversy."

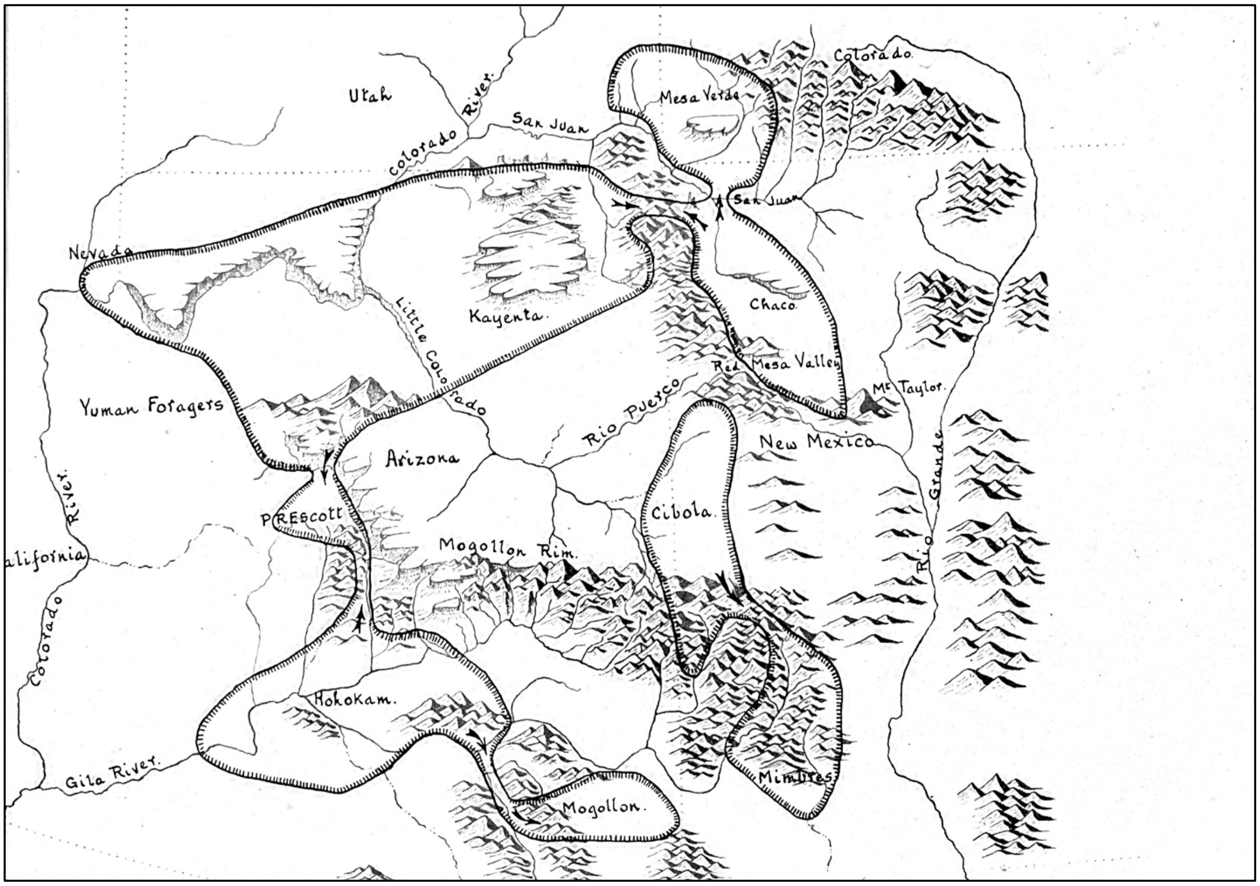


Figure 2.8. Map of the North American Southwest at A.D. 900 according to Harold Sterling Gladwin's book, A History of the Ancient Southwest (Gladwin 1957:190).

Following from this supposed "subject of controversy" among archaeologists working in the area, as noted by Altschul and Fairley (1989:77), this dissertation operates within the assumption that the Virgin and Kayenta Branch painted ceramic regional variants can be generally signified as being separate and distinct traditions. (The precise degree of separateness and distinction, however, is admittedly not well understood by archaeologists and remains as one of many unresolved research topics concerning Virgin-Kayenta relations—including within the scope of one of the guiding research questions). This assumption within my overall research orientation is based on: (1) archaeological material culture distinctions and observations presented by archaeologists working within the Virgin Branch region (as discussed above); (2) research establishing the Virgin Branch people as being genetic descendants of Great Basin populations, and not of Ancestral Puebloan descent (Harry and Watson [2018:122]); and (3) the widespread understanding of the Kayenta Branch people being associated with the greater Ancestral Puebloan populations of the northern American Southwest.

In summary, the above studies regarding Virgin-Kayenta Branch relations provide the scholarly, geographic, and cultural scaffolding for this dissertation research. While I do not presume to exhaustively address all idiosyncrasies associated with the inferential models used by these archaeologists working within the Virgin Branch region, the following chapters will be discussed in the context of the broader themes advanced through these pioneering studies while simultaneously proposing advancements in our collective understanding of Virgin Branch community and group identity.

CHAPTER 3. RESEARCH ORIENTATION

The analytical and methodological structure of this dissertation is organized around the two driving research components of this undertaking—(1) a working chronometry of the Virgin Branch heartland and associated painted pottery styles; and (2) the role of painted design style in the expression of Virgin Branch group identity. With these two research components in mind, this chapter provides a discussion of the theoretical framework, research design, and analytical methods used in this research. The theoretical framework is presented as a historical discussion in relation to the guiding research questions, along the two themes—past and current approaches to archaeological style and questions of identity; and ceramic design method and theory. The research design section of this chapter details the following three guiding research questions of this dissertation.

1) How does a refined Virgin Branch heartland chronometry clarify current understandings of Virgin Branch chronology and correlate with the established chronometry of the Kayenta Branch heartland?
2) What are the technological styles and rules of design (i.e., design layout, design symmetry, and design elements) associated with painted pottery from the Virgin and Kayenta Branch heartlands over time?
3) How is Virgin Branch group identity communicated and reflected through expressions of technological and painted design styles on pottery amidst intra- and inter-regional events and interactions over time; and what implications do these findings carry with respect to Virgin Branch agency?

In addition, the research design section of this chapter includes a discussion on the data expectations that were used to frame the analysis and discussion regarding my findings on the role of painted design style in community identity and group affiliation among Virgin Branch people (see Chapter 7). The last section of this chapter communicates the analytical methods used for the chronometric and archaeological style components of the research design. This final section includes complete tables of the Virgin and Kayenta Branch archaeological sites used in the sampling strategy of this dissertation.

Theoretical Framework

Approaches to Archaeological Style and Identity

Considerations of identity in archaeological studies have been demonstrated through a circuitous path involving a variety of approaches and have ultimately been rooted in the defining and consideration of the term *style*. Historically, archaeological approaches to identity have largely persisted within broader theoretical schools of thought—namely, Processual and Post-processual archaeologies (Hegmon 1992). This section provides an overview of the varied ways in which archaeologists have attempted to examine different types of identity, the associated implications of these approaches, and a broader multi-level evaluation of archaeological-based considerations of identity.

Style, the term which has largely served as the framework and broader concept for archaeological considerations of identity, has been approached in a variety of ways since the advent of the so-called "New" or Processual archaeology. Initial archaeological pursuits regarding the study of identity—particularly, during the heyday of the so-called "New" or Processual archaeology (i.e., late 1950s – 1970s)—were framed by a broader assumption of style being a passive expression of identity (cf. Hegmon 1992). Arguably, the most notable initial forays into considerations of style among Processual archaeologists were by a group called “ceramic sociologists.” These so-called “ceramic sociologists” (i.e., Deetz 1968; Hill 1970; Longacre 1970) approached the notion of style (and by association, identity) through the idea of identity being something not demonstrated through a deep sense of agency, or intentionality, in the past (as seen through the archaeological record). “Ceramic sociologists” made inferences from design elements on painted ceramic vessels and associated distribution as a means of making connections with patrilineal and matrilineal social and familial connections in the archaeological record. Moreover, in line with the Processual school of thought, the “ceramic sociologists” sought to assert these types of inferences pertaining to style and identity as parts of a universal law of human behavior, applicable in all social contexts. After the studies advanced by the “ceramic sociologists” and the overall Processual school of thought, archaeological approaches to style and identity largely shifted to considerations of style and identity being actively expressed in the archaeological record (cf. Hegmon 1992).

Wobst (1977) used ethnographic observations to propose a theoretical framework in which style could be viewed as a type of information exchange. According to his study of contemporary European nations, Wobst (1977) suggested that various symbols, signs, and even paraphernalia communicate different things and carry varying understandings depending upon the individual(s) seeing a given item. Wobst (1977) argued that symbols used within a given society or community carry greater meaning to individuals who are associated within the network in which a given symbol is used. In essence, Wobst (1977) contended that symbols and signs carry greater communicative power the more visible they are—and are also informational expressions of identity—as opposed to items and symbols not presented in a visible manner (e.g., items found within a domestic, private setting). Contemporaneous to Wobst, Heather Lechtman

(1977), in her study of Andean metallurgy, contended that style is communicated through technological processes. Through ethnographic and historical considerations of metallurgical processes in the Andes, Lechtman (1977) argued that identity can be found expressed through an implied "essence" of meaning (Lechtman 1977) found in the manufacturing processes pertaining to technological items in the archaeological record.

James Sackett (1982, 1986, 1990), using archaeological stone tools (i.e., lithics), contended that style is an *isochrestic* expression of identity. In other words, Sackett (1982, 1986, 1990) contended that artifactual changes seen in the archaeological record (in this case, lithic technology) represent expressions of functionally equivalent choices made by individuals. In contrast, and serving as challenge to Sackett, Polly Wiessner (1983, 1984, 1989) argued that style (and by association, identity) can be seen through two concepts in the archaeological record: *emblemic* means (relating to group expressions of identity) and *assertive* means (relating to individual choices and decisions). Using Kalahari Sans projectile point technology as her case study, Wiessner (1983, 1984, 1986) argued that broad consistent expressions of lithic technology can be associated as indicative of emblemic, or group identity, expressions of identity. Moreover, Wiessner (1983, 1984, 1986) contended that small, discernable changes in lithic technology within a given cultural tradition represented assertive—i.e., individual choices and decisions—expressions of identity.

With the studies by the Deetz (1965), Longacre (1970), Hill (1970), Lechtman (1977), Wobst (1977), Sackett (1982, 1986, 1990), and Wiessner (1983, 1984, 1989) providing the overarching backdrop for archaeological studies pertaining to identity, recent archaeological studies regarding the nature of identity and style have built upon the ideas and concepts proposed by these scholars. One such study which exemplifies a continuation of Wiessner's notions of emblemic and assertive style is Hegmon and Kulow's (2005) examination of painted pottery designs from the Mimbres region through developmental stages during prehistory. Ultimately, Hegmon and Kulow (2005) attributed standardized decorative styles to be expressions of a type of group identity, and anomalous decorative styles (i.e., painted designs that are found on some vessels but are not standardized or universally applied throughout a period or region) to be expressions of individual identity.

Brenda Bowser (2000), in her ethnoarchaeological study of pottery manufacture in Peru, observed expressions of identity between two opposing political groups. Through participant observation and consideration of painted designs on ceramic vessels manufactured between two different communities, Bowser (2000) found that individuals from one political group subversively expressed sympathies and ties to the opposing political group through painted symbols expressed on ceramic vessels. Bowser's (2000) study represents one ethnoarchaeological example in which identity can be seen as multifaceted and fluid within the archaeological record.

In yet another study on archaeological style, Michelle Hegmon (1995) conducted a comparative analysis on two cultural regions using prehistoric ceramics from Black Mesa area of northeastern Arizona and the Mesa Verde area of southwestern Colorado. Through implementation of a multi-leveled approach to ceramic design analysis and statistical testing, Hegmon (1995) interpreted statistical testing of stylistic homogeneous expressions among Mesa Verde and Black Mesa ceramic assemblages as correlating with social upheaval known to have taken place in the San Juan Basin during that time. In essence, Hegmon (1995) argued that design styles in the Mesa Verde pottery assemblage showing homogeneity were expressions of a broader desire to conform to prevailing social customs and expressions (as a means of reducing individual and group social tension during that period of social upheaval and change). As a final, and more recent, example, Sarah Peelo (2011) demonstrated a similar fluidity in the expression of identity in her study on Spanish contact period ceramic vessel production among indigenous groups in California.

These varying pursuits by archaeologists to study and discern identity (through style) in the archaeological record, as presented in the examples described above, have yielded mixed results. The concept of identity as being fluid, multifaceted, and even obscured has been extensively documented among cultural and social anthropologists (e.g., Cohen 1994; Hall 1990, 1995, 1996), with many archaeological applications having included some of these non-archaeological approaches (e.g., Bowser 2000). In terms of archaeological pursuits to identity, overt expressions of identity in which historic accounts and ethnographic information are available have generally yielded easier access to understanding the concept of identity among archaeologists. Aspects of identity in archaeological settings have generally led to a more tenuous and difficult realm of study in which identity has been understood by archaeologists. To better understand identity in the archaeological record, archaeologists should employ a greater understanding (i.e., holistic approach) of broader contexts toward available/applicable material culture. As one case in point, archaeologists should be aware of hidden or downplayed expressions of identity during times of known environmental tumult/change within a given region and among a given culture group. With this understanding in mind, archaeologists should expect identities to be fluid when considering concepts such as ethnicity and social stability in the context of enculturation within a region (cf. Preucel 2000, study on the expression of identity at Kotyiti, New Mexico). Finally, archaeologists need to be aware of the effects of categories or classifications in studying identity because idealized (and in many instances, incorrect) conceptions of expressions of identity in the archaeological record can become fictive reconstructions of the past (cf. Cohen 1994), and not actually rooted in reality. This warning regarding the effects of categories/classifications in the study of identity can arguably be best seen in William Isbell's (2000) use of the terms "imagined" and "natural" communities—where "imagined" communities are dynamic, fluid, and volatile by definition (i.e., rooted in reality); and "natural" communities are static and stable, exhibiting very little change (i.e., what Isbell contends being fictitious and an artificial construct, not reflective of reality, and should be disabused of by archaeologists).

Discussion: Archaeological Style and Identity in the Context of this Dissertation

The historical trajectory and study of style in archaeological research have yielded a multitude of approaches and considerations. In general, approaches to style have historically been couched within one of two competing schools of thought (Hegmon 1992)—namely, a passive approach utilized by processual archaeologists in which broad, universal cultural laws are applied; and an active approach in which style is confined to a particular historical context. More specifically, a variety of approaches to style have been utilized and developed over the last 50 years, with the notion of style in many cases remaining ill-defined. These include style as a form of communication or "information exchange" (Friedrich 1970; Wobst 1977); technological style as a means of symbolic communication (Lechtman 1977; Lemonnier 1986); style residing as a choice resulting in the same function (i.e., isochrestism) (Sackett 1982, 1985, 1986, 1990); and style representing a form of non-verbal communication (i.e., emblemic vs. assertive) (Wiessner 1983, 1984, 1989). Although these approaches to style have been debated to varying degrees, and are usually framed as competing claims, these conceptions of style are in fact not mutually exclusive, as articulated by different scholars over the past few decades (e.g., Carr

1995; Carr and Neitzel 1995; Lyons 2003; Sackett 1990; Tostevin 2012). Carr (1995), in particular, proposed a synthesis of these previously advanced definitions in which style is considered through a middle-range theory model made up of three distinct hierarchies: the decision sequence hierarchy, the production sequence hierarchy, and the visibility hierarchy (Tostevin 2012:40). Carr's (1995) unified theory of artifact design has been successfully implemented by a number of scholars (e.g., Clark 2001, 2007; Lyons 2003; Lyons and Clark 2012; Tostevin 2012).

In consideration of complementary and synthetic approaches to both active and passive dimensions of style (Carr 1995; Clark 2001, 2007; Hegmon 1995, 1998; Lyons 2003; Lyons and Clark 2012; Mills 2007; Peeples 2018; Tostevin 2012), this dissertation research approaches Virgin Branch identity, in the context of Kayenta Branch culture, using a hierarchical framework in which style on painted ceramic wares—as expressed through both technological style (e.g., paste, temper, slip, and non-functional aspects of vessel form) and painted decorations—are considered as a proxy for identity. Specifically, modelling my approach after Barbara Mills (2007), the behavioral categories of exchange, emulation, enculturation, and migration are used as dependent variables to investigate the independent variable of identity (Mills 2007:211; cf. Clark 2001). For the purpose of this research, "identity" and not "ethnicity" serves as the focal point and independent variable. This particular research nuance and focus stems from the problematic nature of investigating ethnicity in non-state societies, as articulated by a number of scholars (Goodby 1998:162; MacEachern 1998:112; Mills 2007:211-214).

To investigate identity through painted pottery assemblages, this research uses the following lines of evidence: (1) pottery wares and types; (2) technological styles; (3) painted design styles; and (4) vessel function. Identification of pottery wares and types will help distinguish between local and non-local pottery production (i.e., emulation and exchange). Technological styles (e.g., attributes of low visibility) are assessed in consideration of passive expressions of identity (i.e., the concept of habitus; enculturative background), as a means of helping distinguish between migration and emulation. Painted design styles (e.g., attributes of high visibility) are used in consideration of active expressions of identity (i.e., messaging). Finally, consideration of vessel function contributes to further understanding messaging (e.g., interior/exterior placement of painted decorations on bowls and placement of painted decorations on jar exteriors) while also assisting in the reconstruction of social context scales (e.g., vessel size, rim diameter, rim arc). Using this framework, this research assesses Virgin Branch identity in the analytical context of similarity and difference (Hegmon 1995, Mills 2007, Peeples 2018) through an agency-based approach (Bourdieu 1977) in which social boundaries are understood to be mutable, and discernable, at multiple scales (Mills 2007; Stark 1998; Wenger 1998).

Ceramic Design Analysis Method and Theory

Approaches to ceramic design analysis, to many archaeologists, appear to have evolved along a linear and progressive trajectory over time. To the contrary—and in agreement with Prudence Rice's (1996) grievance regarding the history of ceramic design analysis—I contend that archaeological approaches to ceramic design have changed and evolved along a cyclical trajectory in which various approaches to ceramic design analysis have been introduced (cf. Rice 1996). Despite this cyclical trajectory—of which I will expound upon throughout the remainder of this section—the various approaches to ceramic design proposed and advanced over the last century have been classified according to various schools of thought within the broader realm of archaeological method and theory.

Formative Americanist Approach (1890s – 1920s)

Beginning in the 1890s, archaeologists working in the North American Southwest—notably Jesse Walter Fewkes and Frank Hamilton Cushing—introduced the first approaches to ceramic design analysis. Framed in what Michael Graves (1998) termed the "Formative Americanist" approach to ceramic design, Fewkes and Cushing utilized a design element and motif emphasis to ceramic design analysis in which design styles were largely classified according to specific design elements identified on ceramic vessels throughout the North American Southwest. Although some assumptions regarding prehistoric behavior in the North American Southwest, were ubiquitous at this time—such as the idea of pottery not being exchanged/traded—significant breakthroughs were realized. For instance, Fewkes' (1919) integration of Zuni oral history and ethnological applications to the study of ceramic designs represents an approach—namely, insistence on the utility and significance of indigenous perspectives and oral histories—that would not fully take root within the archaeological discourse regarding ceramic design analysis until the late twentieth/early twenty-first century (e.g., Dongoske et al. 1997; Clark 2001; Bernardini 2005a, 2005b).

Culture History Approach (1920s – 1940s)

Working from the framework established by Formative Americanist archaeologists, new regional approaches to ceramic design analysis began to form. Seminal works by Charles Amsden (1936) on Hohokam ceramics, Harold and Winifred Gladwin (1934) and Harold Colton and Lynwood Hargrave (1937) on the northern portion of the North American Southwest informed the cultural historical approaches to ceramic design analysis spread throughout the North American Southwest. Among the most impactful works from this period was Colton and Hargrave's (1937) seminal volume, *Handbook of Northern Arizona Pottery Wares*. This handbook outlines the general approach (and frankly, baseline) to the study of archaeological pottery informing many facets of ceramic design analysis through to the present day. As seen in the pottery handbook by Colton and Hargrave (1937), approaches to ceramic design analysis were based on a system in which pottery vessels (both painted and unpainted) were classified according to an evolutionary taxonomic structure in which all pottery types are grouped within a supposed "genus" and "species" framework. Colton (a biologist) and Hargrave (an ornithologist)—neither being a trained archaeologist—structured ceramic design within a standardized evolutionary taxonomic structure (a system familiar to their formal education and training). As a scaffolding for this evolutionary taxonomic structure, Colton and Hargrave utilized three concepts which encapsulated this organizational framework for ceramics in the North American Southwest (specifically applied to northern Arizona)—*ware*, *type*, and *series*.

A *Ware*, signifying the broadest category of ceramic classification, refers to a grouping of ceramic vessels (inclusive of painted and unpainted ceramics as well as all vessel forms) which are similar in most characteristics (e.g., paste color, firing atmosphere). A *type* refers to a grouping of ceramic vessels (inclusive of all vessel forms) similar in nearly every regard (e.g., temper, painted design type). A *series* refers to a grouping of temporally contemporaneous ceramic vessels similar to those classed under a type but manufactured/produced in a different geographic region (e.g., Tusayan White Ware, Kayenta Series; Tusayan White Ware, Virgin Series). In addition to the regional design element and motif classificatory approaches to design analysis, as found in the works of Colton and Hargrave (1937) and other archaeologists during this time, alternative approaches to ceramic design were being pioneered.

Towards the end of what is considered to be the terminus of the Cultural Historical approach/school of thought, the first-known forays into a previously unknown type of ceramic design analysis, called symmetry analysis, were published in the 1940s. Symmetry analysis, a method of design analysis in which painted design motifs are studied according to symmetrical motion classes, is based on principles adapted from crystallography. The first-known published symmetry analysis study of archaeological ceramic designs was conducted by archaeologist George Brainerd (1942). Brainerd's (1942) study—in what is possibly the shortest article ever published in the journal *American Antiquity*—comprised the comparative study of a collection of whole vessels from two regions, the Kayenta Branch region of northeastern Arizona and Chichen Itza, Yucatan (in the Maya uplands). Brainerd's (1942) study, comparative and pioneering in nature, provided fundamental insights into the utility of symmetry analysis in archaeological ceramic design studies—namely, the visible expression of cultural exchange and the transmission of ideas (i.e., copied painted symmetry designs) across regions. This approach Brainerd represented, at the time, a phenomenon not previously observed though design element studies among ceramic assemblages. In addition to Brainerd's (1942) abbreviated study, the most comprehensive consideration and codification of symmetry analysis can be found in Anna Shepard's (1948) Carnegie Institution publication on the nature, classes, and significance of symmetry analysis in archaeological undertakings pertaining to ceramic design analysis.

New Archaeology Approaches (1950s – 1960s)

Although the terminus of the Culture History approach spread into the 1950s (e.g., Colton 1950, 1952), new approaches to ceramic design analysis emerged from the then-burgeoning "New Archaeology," zealously advocated by Lewis R. Binford (e.g., 1962) and David L. Clarke. The so-called "New Archaeology" was informed and driven by quantification (e.g., statistics) and by a firm belief in the universal applicability of general laws relating to human/cultural behavior (i.e., akin to laws found in the natural sciences). Approaches to ceramic design analysis by New Archaeologists comprised studies in which groupings of similar design characteristics (i.e., design elements and motifs) were considered expressions of a particular culture group. Colton's (1939, 1952, 1953) publications regarding pre-Hispanic ceramics from the northern portion of the North American Southwest led to the identification of so-called "branches" of larger cultural groups (e.g., Anasazi). In addition to the sweeping effects of the New Archaeology during the 1950s and 1960s, Anna Shepard (1956) published one of the most frequently referenced handbooks on pottery analysis (including ceramic design analysis, among many other considerations) in her seminal volume, *Ceramics for the Archaeologist*.

New Processual Archaeology Approaches (1960s – 1980s)

Modifying and even advancing beyond the strict universal approach to ceramic design analysis, as advocated by Binford and others, archaeologists in the New Processual Archaeology school of thought (as termed by Graves [1998]) introduced elements of behavioral archaeology and strong consideration/emphasis upon archaeological formation processes (e.g., Schiffer 1987). One representative study from this school of thought can be seen in the re-analysis of ceramics from Broken K pueblo by Skibo et al. (1989). In their re-assessment of James Hill's excavation and ceramic data from Broken K pueblo, Skibo et al.'s (1989) study emphasized the need for archaeologists to consider the formation processes (e.g., systemic and archaeological contexts) from which ceramic assemblages and sherds provenience. Moreover, Skibo et al. (1989) urge the need of conducting ethnoarchaeological, experimental studies, and ceramic re-fitting analyses in order to understand the nature of ceramic function and systemic behavior in the archaeological record. In addition, hierarchical approaches to ceramic analysis—modeled after the foundation set forth by Colton and Hargrave (1937)—can be found in regional design element analyses as conducted by Stephen Plog (1980).

Post-Processual Archaeology and Holistic Approaches (1980s – Present)

Over the course of the upturning of Processual conventions, Post-Processual archaeological approaches to ceramic design analysis (e.g., Hodder 1982) were advanced. Although Post-Processual thought was widespread among archaeologists, ethnoarchaeological approaches—as well as some contrarian studies—to ceramic design analysis persisted. Michael Graves's (1983, 1985) study on Kalinga pottery represents one of many ethnoarchaeological studies from this time. In terms of "contrarian" studies to ceramic design analysis, E. W. Jernigan's (1986) repudiation of hierarchical ceramic design analyses—and proposal of his *schemata* approach (and subsequent rejection [cf. Douglas and Lindauer 1988])—represents an anomalous proposal to the study of ceramic design. Moreover, amidst the prevailing Post-Processual school of thought in the United States and Europe, holistic and synthetic approaches to ceramic design analysis were advanced. Prudence Rice's (1987) *Pottery Analysis* handbook as well as Dorothy Washburn and Donald Crowe's (1988, 2004) volumes on symmetry analysis both strongly pointed back to the legacy of Anna Shepard and her publications from the 1940s and 1950s.

Discussion: Strengths and Limitations of Ceramic Design Analysis

The study of ceramic design stems from the cyclical nature (and associated history) of approaches to ceramic design analysis. As indicated by Rice (1996), advancement in the field of pottery analysis (in general) and ceramic design analysis (in particular) requires the review of past works so new insights and advancements can be made. Another key lesson from the above review of approaches to ceramic design analysis, from which archaeologists today can learn, is the appreciation and applicability of holistic approaches to ceramic design studies. Consideration of design from all possible angles (e.g., indigenous perspectives, oral history, ethnoarchaeology, formation processes, and symmetry structures) would only help to enrich and further buttress archaeological inferences and interpretations.

Reliance upon ceramic design as the sole variable of consideration, however, can ultimately leave an archaeologist's inference and interpretation myopic in his or her understanding of the archaeological record. While studies in symmetry for instance (e.g., Washburn 2011; Washburn et al. 2010) can be extremely insightful into cultural processes such as exchange, deeper understandings of other variables from systemic behavior within the archaeological record will remain unknown without broader and more encompassing investigations by archaeologists moving forward.

Research Design

The interplay of community identity, group affiliation, and social interaction over time, spanning from the Basketmaker III through the early Pueblo III periods, is addressed through two inter-dependent research domains: (1) the temporal and structural framework of painted Virgin Branch pottery; and (2) the role of style in community identity and group affiliation. The first domain provides the foundation for the principal question of this research: *How is Virgin Branch Puebloan group identity communicated and reflected through expressions of technological and painted design styles on pottery amidst intra- and inter-regional events and interactions over time?* This section outlines the goals, aims, and data expectations for this research.

The Temporal and Structural Framework of Painted Virgin Branch Pottery

As stated in the introduction of this chapter, this dissertation is organized around the themes of chronometric refinement of the Virgin Branch heartland and the role of painted design style in Virgin Branch community identity and group affiliation. This sub-section lays out the three research questions guiding this dissertation along with the associated hypotheses and expectations regarding the third question on style and Virgin Branch identity.

Chronometric Refinement of the Virgin Branch Heartland

1) *How does a refined Virgin Branch heartland chronometry clarify current understandings of Virgin Branch chronology and correlate with the established chronometry of the Kayenta Branch heartland?*

Archaeological expeditions within the Virgin Branch region have spanned nearly a century (e.g., Harrington 1925; Lyneis 1992; McFadden 2012; Shutler 1961); however, the establishment of a coherent chronometry applicable throughout the Virgin Branch heartland has remained elusive. Extensive tree-ring research in the Black Mesa portion of the Kayenta Branch heartland (e.g., Dean 1969), in contrast, has resulted in a fine-tuned chronometric record that includes the best dated prehistoric sites in the world (e.g., Betatakin, Kiet Siel). Given the paucity of datable tree timbers from cultural contexts in the Virgin Branch region, the following methodological approaches have been used to reconstruct the prehistoric chronology for this area: (a) cross-seriation of the chronometric dates associated with "analogous" painted design styles on pottery produced in the Kayenta Branch region (e.g., Lyneis 1992, 2008; McFadden 2012; Walling et al. 1986); (b) chronologically-based assignment of archaeological time periods (e.g., Pueblo I, Pueblo II) on the basis of corrugated ceramic sherd proportions found within site assemblages (e.g., Allison 2000; Harry and Willis 2019; Lyneis 1992); (c) radiocarbon dating (e.g., McFadden 2016); and (d) Optically-Stimulated Luminescence (OSL) dating (e.g., Sakai 2008, 2014).

The above methods have provided general date ranges, but these have not been adequately evaluated. Although Virgin Branch painted pottery designs are presumed to be approximately contemporaneous with their Kayenta Branch analogs, the lifespans of the painted design styles may have differed between the two regions. Similarly, while the proportion of corrugated ceramics is known to have increased over time, the specific dates associated with different proportions are not well established, nor do we know the degree to which they are consistent throughout the Virgin Branch region. Finally, though radiocarbon and OSL dating have proved useful, these data classes have not been adequately synthesized throughout the region. Therefore, to achieve the level of chronometric precision required for this study, multiple, interconnected methodological approaches are used. Ultimately, the overarching goal of this research domain is the refinement of the chronometric record within the Virgin Branch heartland, in relation to the Kayenta Branch heartland chronology, for the purpose of: (1) establishing a transferrable temporal foundation suitable for asking higher-level research questions; and (2) providing an applicable chronometric framework for addressing the focus of this research—i.e., the role of style in community identity and group affiliation over time.

Technological Style and Rules of Design for Painted Virgin and Kayenta Branch Pottery

2) *What are the technological styles and rules of design (i.e., design layout, design symmetry, and design elements) associated with painted pottery from the Virgin and Kayenta Branch heartlands over time?*

Past studies have yielded significant insights into both painted and non-painted design styles produced within the Virgin Branch region, with some consideration of technological style (Allison and Coleman 1998; Colton 1952; Horton and Harry 2017; Lyneis 2008; Perry and Van Alfen 2012; Thompson 1986). Many of these previous studies have linked Virgin and Kayenta Branch pottery types on the basis of similar technological and painted design characteristics. However, a systematic nomenclature has not been consistently applied for the analogous design styles found in both regions (Perry and Van Alfen 2012:82). Although previously established typological naming conventions for painted Virgin Branch pottery (e.g., North Creek Black-on-gray) are used in this research, Hegmon's (1995) means of establishing rules of design (i.e., design layout, design symmetry, and design elements) between Kayenta Branch and Mesa Verde painted pottery styles are adapted in this dissertation as a means of both objectively identifying and classifying painted decorations produced within both Virgin and Kayenta Branch heartlands as well as detecting active expressions of style. In addition, Mills' (2007) considerations of technological style in ceramic analyses pertaining to studying identity in the archaeological record are adapted in this research as a means of detecting passive expressions of style and associated inferences relating to Virgin Branch identity. The data required to address this question are to be found through systematic considerations of hierarchically organized aspects of painted pottery. Although stylistic commonalities are expected to be found between the Virgin and Kayenta Branch heartlands, as noted through past studies, I expect to also find distinguishing painted decorative and technological characteristics associated with each heartland. For example, it has been previously observed that application of an across-the-bowl design layout was implemented by Virgin Branch potters but not by those in the Kayenta Branch region (Allison 2019:293; Harry 2019:319). In addition, differences in paste characteristics (e.g., presence/absence of carbon cores) suggest differences in technological style between the two regions.

The Role of Style in Community Identity and Group Affiliation: Research Hypotheses and Expectations

3) *How is Virgin Branch group identity communicated and reflected through expressions of technological and painted design styles on pottery amidst intra- and inter-regional events*

and interactions over time; and what implications do these findings carry with respect to Virgin Branch agency?

This third research question represents the primary thrust of this undertaking. Using the chronometric parameters established by the first two questions—regarding the Virgin Branch heartland and Virgin Branch painted design styles—the final question addresses the Virgin Branch identity through the analytical lens of painted design style. Moreover, as detailed below and in Table 3.1, my approach to understanding Virgin Branch identity is framed in terms of intra-regional relations (i.e., between communities in the Virgin Branch heartland) and inter-regional relations (i.e., between Virgin and Kayenta Branch populations) as seen through similarities and differences of painted design style on pottery sherds and whole vessels. Finally, these two regional scales of interaction are organized along three archaeological period groupings: Basketmaker III – Pueblo I periods; early Pueblo II – middle Pueblo II periods; and late Pueblo II – early Pueblo III periods.

Intra-Virgin Branch Relations: Basketmaker III – Pueblo I

During this period, when pottery production first emerges and population densities are low, I would expect the scale of learning communities to be correspondingly low. Accordingly, I anticipate technological styles (relative to later time periods) to vary across the Virgin Branch heartland. In contrast, I would expect less variation to occur in painted design styles (i.e., Lino and Kana-a style analogs). Specifically, the combination of relatively low population densities, small site sizes, and abundant land are all expected to correlate with a lack of intra-regional variation along with a lack of strong localized social networks of identity. Moreover, as Braun and Plog (1982) contend in regard to the development of social groups in the North American Southwest, stylistic homogeneity (i.e., lack of signaling strong boundaries of difference or localized identities) is expected as a reflection of a desire to maintain social alliances across a broad, loosely connected landscape. During the Pueblo I period, I expect a similar trend of stylistic homogeneity, though perhaps with minor increases in the expression of intra-regional identities triggered by increasing populations and growing localized social interconnectivity.

Intra-Virgin Branch Relations: Early – Middle Pueblo II

Following from marked increases in population and aggregation (i.e., the Main Ridge community), and reliance on irrigation agriculture within the Moapa Valley, I expect painted ceramic assemblages within the Lowland Muddy-Virgin Valley District to demonstrate an increasing consolidation of painted design and technological styles with an increase in vessel size, along with potential changes in vessel forms. In addition, an increase in active expressions of style is expected via painted decorations on the exterior of jars and bowls and on the interior of bowls, and through sudden stylistic changes (technological and/or painted decorations). These dynamics would suggest a unified group identity among lowland populations, which in turn would facilitate the cooperation needed to maintain and use the irrigation canals constructed in this district. In addition, a shared cohesive identity marker would help establish land tenure claims. In contrast, in the Western Colorado Plateaus District frontier zone, where populations remained low in proportion to available land and where agriculture was based on dry farming (Harry and Willis 2019), exclusionary practices are not expected. After Herr (1999), I expect *relative* greater variability in painted design styles within the Western Colorado Plateaus District compared to other Virgin Branch heartland districts, as a means of signaling inclusivity to populations and preserving social ties among comparatively low population densities on the Colorado Plateau during this time. However, technological styles should exhibit relatively greater variability, reflecting the presumed population influxes during this time onto the

Colorado Plateau. Finally, I expect populations in the St. George Basin to demonstrate moderate stylistic diversity, reflecting the moderate population densities and flexible subsistence practices (i.e., floodwater farming) in that district. Against these general patterns, I expect the intensive trade networks linking the Lowland Muddy-Virgin Valley and Western Colorado Plateaus districts at this time (Allison 2000; Harry et al. 2013; Sakai 2008, 2014) to result in an overall shared similarity in design symmetry and layout—indicative of increasing social relations and inter-dependence within the Virgin Branch heartland and perhaps also suggesting exchange between communities.

Intra-Virgin Branch Relations: Late Pueblo II – Early Pueblo III

As sites grew in size and populations further aggregated within the Virgin Branch heartland, I expect to find an increase in vessel size, intra-regional differentiation through marked diversity indices, and overall distinctions in design layout and symmetry—indicative of increasingly isolated local identities manifested throughout the Virgin Branch heartland. The discontinuity of trade wares from the Western Colorado Plateaus District into the Moapa Valley during the late Pueblo II period has been interpreted as a significant decline of intra-regional trade between the upland and lowland zones of the Virgin Branch heartland (Allison 2000; Harry et al. 2013). Using technological and painted decorated styles as a proxy to reflect exchange between the Western Colorado Plateaus District and the Moapa Valley, I expect to find a discontinuation of any previously-shared rules of design and overall homogeneous technological styles within each district, suggesting regional reorganization and diminished intra-regional relations between populations.

Virgin and Kayenta Branch Relations: Basketmaker III – Pueblo I

During the Basketmaker III period, although some distinctions can be made regarding early communities between the two cultural regions, settlements and lifeways between the Virgin and Kayenta Branch heartlands at this time are largely similar in nature (Altschul and Fairley 1989; Gumerman 1984). Additionally, both areas are characterized by low population densities and exhibit autonomous, loosely-knit communities that span across and between the two heartlands (Fairley 1989). Stemming from these observations, per Braun and Plog (1982), I expect painted design styles to exhibit little variation, with only technological styles (e.g., temper, paste) differing, between both heartlands. Although populations remained relatively low, during the Pueblo I period the Eastern Colorado Plateaus District was depopulated, creating a spatial separation between the two cultures (Allison 2019). As a result of this separation, I expect to find increasing technological and painted design style differentiation between the two heartlands, indicative of growing regional insularity and a lack of exchange or emulation.

Virgin and Kayenta Branch Relations: Early – Middle Pueblo II

During the early Pueblo II period, social roles in the Kayenta Branch region grew increasingly formalized, as evidenced by the appearance and growing frequency of kivas and mealing rooms. Harry and Watson (2018:144-145) propose that the absence of these structures in the Virgin Branch region suggest that, compared to the Kayenta Branch region, less emphasis was placed on communal rituals and social conformity, and individualist behaviors were more tolerated. Following from these two social structures, I expect painted design styles in both heartlands to parallel accordingly. In the Virgin Branch heartland, I expect painted design styles to demonstrate relatively low to moderate similarity indices—suggesting flexible social roles. In the Kayenta Branch heartland, in contrast, I expect technological and painted design styles to yield relatively high similarity indices—consistent with the relatively more rigid social structures found among Kayenta Branch populations.

During the middle Pueblo II period, Kayenta Branch populations intruded into the Eastern Colorado Plateaus District (cf. Lyneis 1995), bringing the two cultures into closer contact (Fairley 1989). This movement would have likely triggered changes in Virgin Branch social identity which could have resulted in one of two options: relative acceptance or rejection of Kayenta Branch values. If social integration with Kayenta Branch populations was desired by the Virgin Branch people, I expect to find greater similarities in painted design styles during this period, suggesting social interaction being facilitated (i.e., enculturation). On the other hand, if Virgin Branch populations felt threatened—i.e., if they wanted to mark their territory and exclude newcomers—I would expect a greater distinction through active signaling of painted decorations. In either case, since co-residence is not apparent from the scholarly literature, I would expect technological styles to remain distinct between the two heartlands.

Virgin and Kayenta Branch Relations: Late Pueblo II – Early Pueblo III

During the late Pueblo II period, trade relations between Virgin and Kayenta Branch populations are generally presumed to have remained relatively unchanged. Accordingly, I expect to find no significant diminishment in either rules of design or similarity indices between these two cultures. However, sometime during the early Pueblo III period, the Virgin Branch region was depopulated and Kayenta Branch populations retracted to the east and reorganized south of the Colorado River. An analysis of technological and painted design styles can provide clarification on the nature of the depopulation processes. If painted design styles maintain relatively high similarity indices between Virgin and Kayenta Branch pottery assemblages, then this would suggest social ties (i.e., enculturation and/or migration) between the two populations remained strong throughout the sequence. This would lend plausibility to the commonly-held idea that Virgin Branch populations ultimately migrated east and assimilated with Kayenta Branch populations (Aikens 1966; Hall 1942). Elsewhere, such assimilation was preceded by intermarriage and co-residence between the assimilating groups (Clark et al. 2019). If that were the case here, I would expect to see decreasing variability in the technological styles between the two heartlands, as potters moved into new settings and brought learned technologies with them. In contrast, if the technological and painted design styles between Virgin and Kayenta Branch pottery assemblages diverged from the relatively high similarity indices characteristic of the late Pueblo II period, then this would suggest that a weakening of social ties—potentially evidenced through highly visible, active signaling on the exterior of pots—preceded depopulation of the Virgin Branch region. This conclusion would in turn lend support to the interpretation that Virgin Branch populations did not migrate eastward (Roberts and Ahlstrom 2012).

Table 3.1. Summary of Intra- and Inter-Heartland Relations Research Hypotheses and Expectations.

Research Hypotheses and Expectations: Intra-Virgin Branch Relations	
Basketmaker III – Pueblo I	• The scale of learning communities should be correspondingly low. • Technological styles should vary across the Virgin Branch heartland, with less variation in painted design styles. • Low population densities, small site sizes, and abundant land should correlate with a lack of intra-regional variation and a lack of strong localized social networks of identity. • Stylistic homogeneity is expected as a reflection of a desire to maintain social alliances across a broad, loosely connected landscape. • A similar trend of stylistic homogeneity is expected during the Pueblo I period, with minor increases in the expression of intra-regional identities triggered by increasing populations and growing localized social interconnectivity.
Early Pueblo II – Late Pueblo II	• Painted ceramic assemblages within the Lowland Muddy-Virgin Valley District are expected to demonstrate an increasing consolidation of painted design and technological styles with an increase in vessel size, along with potential changes in vessel forms. • An increase in active expressions of style is expected via painted decorations on the exterior of jars and bowls and on the interior of bowls, and through sudden stylistic changes (technological and/or painted decorations). • On the Western Colorado Plateau frontier zone, where populations remained low in proportion to available land and where agriculture was based on dry farming, exclusionary practices are not expected. • I expect *relative* greater variability in painted design styles within the Western Colorado Plateaus District compared to other Virgin Branch heartland districts, as a means of signaling inclusivity to populations and preserving social ties among comparatively low population densities on the Colorado Plateau during this time. • Technological styles should exhibit relatively greater variability, reflecting the presumed population influxes during this time onto the Colorado Plateau.

	• Populations in the St. George Basin to demonstrate moderate stylistic diversity, reflecting the moderate population densities and flexible subsistence practices (i.e., floodwater farming) in that district. • Overall, I expect the intensive trade networks linking the Lowland Muddy-Virgin Valley and Western Colorado Plateaus districts at this time to result in an overall shared similarity in design symmetry and layout—indicative of increasing social relations and inter-dependence within the Virgin Branch heartland and perhaps also suggesting exchange between communities.
Late Pueblo II - Early Pueblo III	• I expect to find an increase in vessel size, intra-regional differentiation through marked diversity indices, and overall distinctions in design layout and symmetry. • Using technological and painted decorated styles as a proxy to reflect exchange between populations on the Western Colorado Plateau and in the Moapa Valley, I expect to find a discontinuation of any previously-shared rules of design and overall homogeneous technological styles within each district, suggesting regional reorganization and diminished intra-regional relations between populations.
Research Hypotheses and Expectations: Virgin and Kayenta Branch Relations	
Basketmaker III – Pueblo I	• During the Basketmaker III period, settlements and lifeways between the Virgin and Kayenta Branch heartlands are expected to be largely similar in nature. • With the Virgin and Kayenta Branch heartlands characterized by low population densities and autonomous, loosely-knit communities that span across and between the two heartlands, I expect painted design styles to exhibit little variation, with only technological styles (e.g., temper, paste) differing, between both heartlands. • During the Pueblo I period, I expect to find increasing technological and painted design style differentiation between the two heartlands, indicative of growing regional insularity and a lack of exchange or emulation.
Early Pueblo II – Late Pueblo II	• During the early Pueblo II period, I expect painted design styles in both heartlands to parallel accordingly. • In the Virgin Branch heartland, I expect painted design styles to demonstrate relatively low to moderate similarity indices—suggesting flexible social roles. • In the Kayenta Branch heartland, I expect technological and painted design styles to yield relatively high similarity indices—consistent with the relatively more rigid social structures found among Kayenta Branch populations.

	• During the middle Pueblo II period, I expect to find greater similarities in painted design styles between Virgin and Kayenta Branch heartland populations—suggesting social interaction being facilitated (i.e., enculturation). • On the other hand, if Virgin Branch populations felt threatened—i.e., if they wanted to mark their territory and exclude newcomers—I expect to see a greater distinction through active signaling of painted decorations.
Late Pueblo II - Early Pueblo III	• During the late Pueblo II period, I expect to find no significant diminishment in either rules of design or similarity indices between Virgin and Kayenta Branch populations. • If painted design styles maintain relatively high similarity indices between Virgin and Kayenta Branch pottery assemblages, then this would suggest social ties (i.e., enculturation and/or migration) between the two populations remained strong throughout the latter end of the occupation sequence. • If assimilation was preceded by intermarriage and co-residence between the assimilating groups, I would expect to see decreasing variability in the technological styles between the Virgin and Kayenta Branch heartlands, as potters moved into new settings and brought learned technologies with them. • If the technological and painted design styles between Virgin and Kayenta Branch pottery assemblages diverged from the relatively high similarity indices characteristic of the late Pueblo II period, then this would suggest that a weakening of social ties—potentially evidenced through highly visible, active signaling on the exterior of pots—preceded depopulation of the Virgin Branch region.

Analytical Methods

The analytical methods used to address this research are divided along two themes: (1) chronometric reconstruction methods; and (2) the analysis of painted decorations and technological styles on painted pottery. Although chronological frameworks exist for both the Virgin and Kayenta Branch heartlands (see Tables 3.2 and 3.3), greater resolution of the Virgin Branch heartland chronometry comprises the overarching backdrop for this research. Under the umbrella of these two themes, a sampling strategy was implemented across an array of sites from the Virgin and Kayenta Branch heartlands. The sampling strategy for each of these two research themes is detailed in the following two sub-sections.

Table 3.2. Current Virgin Branch Chronology.

Period	Phase[1]	Dates[2]
Basketmaker II	-	300 B.C. - A.D. 400
Basketmaker III	Moapa Phase/Muddy River Phase	A.D. 400 - 800
Pueblo I	Lost City Phase	A.D. 800 - 1000
Early Pueblo II	Lost City Phase	A.D. 1000 - 1050
Late Pueblo II	Lost City Phase/Mesa House Phase	A.D. 1050 - 1150
Early Pueblo III	-	A.D. 1150 - 1225

[1]After Shutler (1961).
[2] After Lyneis (1995).

Table 3.3. Current Kayenta Branch Chronology.

Period(s)	**Phase[3]**	**Dates[3]**
Basketmaker II	Lolomai Phase	600 B.C. - A.D. 400
Basketmaker III	Dot Klish Phase	A.D. 600 - 750
Basketmaker III - Pueblo I	Tallahogan Phase	A.D. 750 - 850
Pueblo I	Dinnebito Phase	A.D. 850 - 975
Pueblo I - Pueblo II	Wepo Phase	A.D. 975 - 1050
Early Pueblo II	Lamoki Phase	A.D. 1050 - 1100
Late Pueblo II	Toreva Phase	A.D. 1100 - 1150
Early Pueblo III	Klethla Phase	A.D. 1150 - 1250
Late Pueblo III	Tsegi Phase	A.D. 1250 - 1300

[3] After Gumerman (1984).

Chronometric Reconstruction of the Virgin Branch Puebloan Heartland

The framework for chronometric reconstruction of the Virgin Branch heartland stems from behavioral archaeology models for understanding and interpreting the archaeological record (Dean 1978; Dean et al. 1985; Schiffer 1987; Smiley 1985). More specifically, the workflow for this chronometric reconstruction involves two methodological phases. First, the available chronometric data—largely radiocarbon assays, along with all available tree-ring data—were synthesized from the Virgin Branch heartland. The chronometric data used in this first methodological phase stem from processed radiocarbon samples and reported tree-ring dates from sites throughout the Virgin Branch heartland, primarily found in academic, governmental, and cultural resource management data reports (e.g., McFadden 2016).

The second methodological phase, and serving as the most informative pillar for chronometric reconstruction in the Virgin Branch heartland, comes from Mean Ceramic Dating. A method developed by Stanley South (1977) for studying historical archaeological ceramic assemblages, Mean Ceramic Dating has been successfully implemented in the Kayenta Branch region where the results of the method have been verified by comparing them against available tree-ring data (Christenson 1994). In the context of this dissertation, Mean Ceramic Dating was used to date all imported painted Kayenta Branch ceramics (namely, Tsegi Orange Ware and Tusayan White Ware, Kayenta Series) from within Virgin Branch site pottery assemblages.

In addition to dating Virgin Branch sites through Mean Ceramic Dating methods using imported painted Kayenta Branch ceramics, this approach was also used to indirectly date local variations of painted Virgin Branch ceramic styles long considered to generally represent "analogues" to ceramic painted Kayenta Branch ceramic styles (e.g., North Creek Black-on-gray in the Virgin Branch region in comparison to Sosi Black-on-white in the Kayenta Branch region). Since date ranges for diagnostic painted Virgin Branch pottery styles are required to be as accurate as possible for within my overall research design, use of Mean Ceramic Dating to both date imported painted Kayenta Branch ceramic styles as well as indirectly date local painted Virgin Branch ceramic styles was conducted to ascertain chronometric controls with regard to the above guiding research questions of this study.

In light of what are considered by many archaeologists to be seemingly loose representations (or "analogues") to painted Kayenta Branch pottery styles, painted Virgin Branch pottery styles were used to reconstruct a chronometric framework to assess stylistic changes *over time* (see Figures 2.5 through 2.10 for examples) through implementation of indirect dating methods using (see Chapters 4 and 5 of this dissertation). With these "analogues" in mind, I utilized an array of pottery assemblages the Kayenta Branch heartland (see Table 3.5) to help date sites, using Mean Ceramic Dating, according to frequencies of typologically diagnostic painted Kayenta Branch pottery sherds and vessels recovered at Virgin Branch sites (see Table 3.4).

Technological Style and Painted Design Analysis

Application of the theoretical framework for this research, particularly Mills' (2007) considerations toward technological styles and painted decorations on pottery and the analytical approach to style used by Michelle Hegmon (1995), were conducted through a multi-scalar lens (i.e., site, community, and region). This research was guided along three overarching phases of analysis. First, recording of technological styles, painted attributes on pottery sherds and whole vessels (design layout, symmetry, and elements), and location/placement of painted decorations (e.g., interior/exterior, neck, rim) identified on Virgin and Kayenta Branch ceramic sherds and whole vessels. This first phase involved a loose adaptation of Hegmon's (1995:203-208) attribute coding system; however, the system used in this research was customized to include key hierarchical design attributes noted in studies involving painted Tusayan White Ware, Virgin and Kayenta Series, and Moapa Ware ceramics (Allison and Coleman 1998; Beals et al. 1945; Colton 1952; Colton and Hargrave 1937; Hays-Gilpin and van Hartesveldt 1998; Lyneis and Hays-Gilpin 2008; Perry and Van Alfen 2012; Thompson 1986) (see Appendix A of this dissertation). Key variables that were recorded on ceramic sherds and whole vessels included: (a) ceramic ware and type (which will inform on the general area where pottery was produced; i.e., in the Kayenta Branch region [for Kayenta Wares], the Western Colorado Plateau region [for Moapa Wares], or the lowland or St. George region [for the Virgin Series ceramics]); (b) technological style (polish, paint type, temper, and specific vessel form [i.e., bowl or jar forms that do not reflect functional needs]); (c) vessel function (general vessel form [bowl or jar], vessel size [height and diameter], rim diameter, and rim arc; to help inform on the social context where the vessel was used, and thus on the intended audience for any messaging); (d) design elements, organized into attribute sets (e.g., primary forms, secondary forms, line width); and (e) design layout and symmetry on whole and near-complete vessels only (which, when compared with design elements, can help inform on the nature and degree of contact, since these attributes are much harder to copy than design elements; see Washburn and Crowe 1988, 2004).

Second, statistical tests measuring indices of diversity and similarity were conducted, inclusive of established time periods and multiple spatial scales. Specifically, Claude Shannon's information theory statistic (H-statistic) served as the primary method used to assess the richness and evenness (i.e., diversity) of the technological and painted design style attributes, within set temporal and spatial contexts. In addition, the Brainerd-Robinson similarity coefficient was used to measure stylistic similarities across set temporal contexts.

Finally, after identifying technological and painted design styles, contextual (i.e., visual and locational components) and spatial relations (i.e., site, community, and region) were investigated. In this final phase, the dependent variables of exchange, emulation, enculturation, and migration were used to investigate the independent variable of this study—Virgin Branch identity.

Previous studies involving Virgin-Kayenta Branch relations and interaction (e.g., Aikens 1965, 1966; Altschul and Fairley 1989; Geib et al. 2001; MacWilliams et al. 2006; McFadden 1996, 2012; Mink II 2015) have yielded many significant insights, though without incorporation of ceramic sourcing. Virgin Branch ceramic sourcing studies to date, though having not focused on Virgin-Kayenta Branch interaction, have yielded significant insights on intra-regional trade between the St. George Basin and the Lowland Muddy-Virgin Valley districts (Ferguson 2016), production of Shivwits Ware pottery on the Shivwits Plateau and distribution to the Moapa Valley (Harry et al. 2013), and production of Moapa White Ware pottery on the Uinkaret Plateau and distribution to the Moapa Valley (Lyneis 1996:23). Other ceramic sourcing studies (Larson et al. 2005; Sakai 2014), though insightful, have also attested to recurring difficulties in sourcing Virgin Branch ceramics. Although ceramic sourcing is not within the scope of this project, and in light of the relatively few sourcing studies conducted on Virgin Branch ceramics to date, positive identification of Tusayan White Ware, Virgin and Kayenta Series, and Moapa Ware sherds, will be conducted in reference to Lyneis' (2008:174-176) criteria for distinguishing Virgin and Kayenta Branch ceramics, inclusive of Tusayan White Ware and Moapa Ware.

The ceramic sherds and whole vessels for use within this methodological approach were selected from assemblages provenienced to archaeological sites associated with the Virgin and Kayenta Branch cultures (see Tables 3.4 and 3.5, respectively). The Kayenta Branch ceramics considered for this study are provenienced to well-dated sites, as established through tree-ring dating (Ambler 1985; Bannister et al. 1968; Christenson 1994; Dean 1969). The overall sampling universe pertaining to these sherds and whole vessels spans a collection of nine repositories, mostly located within the southwestern United States, at which sizeable collections of Virgin and Kayenta Branch sherds and whole vessels resided at the time of the data phase of this research (Tables 3.4 and 3.5). For all repositories included within my research design, I analyzed all painted whole vessels and at least 100 sherds (where available) from each of the archaeological sites listed in Tables 3.4 and 3.5. When any of the site(s) used in during the data collection phase of this project yielded sherds that far exceeded 100 in number, a sample of 100 sherds was selected from an array of proveniences at the site in question, as a means of both avoiding sampling bias and ensuring a representative sample (insofar as possible) from each site.

Discussion

The data collection phase for this dissertation research took place during the heart of the Covid-19 pandemic. As with the research pursuits of countless other graduate students during that period of time, the success of my efforts in coordinating and initiating visits to all identified museums and repositories within the original scope of the research design were uneven—comprising a mix of a lack of responsiveness from museum staff and/or an on-going lack of research access due to regional and local Covid-19 pandemic restrictions. I made good faith efforts to contact all associated museum and tribal representatives over the course of the data collection phase of this dissertation research project. The results of these efforts are found through the nine repositories listed in Tables 3.4 and 3.5. As a note, repeated communication efforts were made by phone and email to the Hopi Cultural Preservation Office, over the span of approximately one year (December 2020 through November 2021) for research permission to access Virgin Branch ceramics housed at the National Museum of the American Indian in Washington, D.C. All phone calls, voice messages, and emails were unreturned. Given this lack of responsiveness, and in lieu of analyzing these ceramic specimens in person, all data from these sherds and whole vessels, housed at the National Museum of the American Indian, were recorded through the use of published resources in which these specific items are listed (along with scaled photographs and attribute information).

Table 3.4. Virgin Branch Puebloan Pottery Sampling Strategy Showing Chronological Periods Attributed by Investigating Archaeologist(s).

Site	**Basketmaker III**	**Pueblo I**	**Early Pueblo II**	**Middle Pueblo II**	**Late Pueblo II**	**Early Pueblo III**	**Geographic Location**	**Repository**
26Ck00							Moapa Valley	Lost City Museum
26Ck7 (Lost City)			●	●	●		Moapa Valley	Lost City Museum
26Ck1721 (Pottery Store House of Allen Ranch)			●	●	●		Moapa Valley	Lost City Museum
26Ck1799							Moapa Valley	Lost City Museum
26Ck1800 (Glass Sands)							Moapa Valley	Lost City Museum
26Ck2001 (Poverty Point)	●						Moapa Valley	Lost City Museum
26Ck2002 (C. Stewart Site)							Moapa Valley	Lost City Museum
26Ck2004 (Mill Point #2)							Moapa Valley	Lost City Museum
26Ck2008 (Mill Point #6)			●	●	●		Moapa Valley	Lost City Museum
26Ck2011 (Mill Point #9)							Moapa Valley	Lost City Museum
26Ck2014 (Cooper Hill #1)			●	●	●		Moapa Valley	Lost City Museum
26Ck2015 (Cooper Hill #2)							Moapa Valley	Lost City Museum
26Ck2016 (Cooper Hill #3)			●	●	●		Moapa Valley	Lost City Museum

26Ck2017 (Cooper Hill #4)			●	●	●		Moapa Valley	Lost City Museum
26Ck2018 (Cooper Hill #5)			●	●	●		Moapa Valley	Lost City Museum
26Ck2020 (Burial Hill #1)	●	●					Moapa Valley	Lost City Museum
26Ck2021 (Park Perkins #1)			●				Moapa Valley	Lost City Museum
26Ck2022 (Park Perkins #2)			●	●	●		Moapa Valley	Lost City Museum
26Ck2024 (Park Perkins #4)			●	●	●		Moapa Valley	Lost City Museum
26Ck2026 (Park Perkins #6)			●	●	●		Moapa Valley	Lost City Museum
26Ck2027 (Park Perkins #7)			●	●	●		Moapa Valley	Lost City Museum
26Ck2028 (Park Perkins #8)			●	●	●		Moapa Valley	Lost City Museum
26Ck2029 (Park Perkins #9)					●		Moapa Valley	Lost City Museum
26Ck2030 (Park Perkins #10)			●	●	●		Moapa Valley	Lost City Museum
26Ck2031 (Park Perkins #11)							Moapa Valley	Lost City Museum
26Ck2032 (Park Perkins #12)							Moapa Valley	Lost City Museum
26Ck2054 (Capalapa #7)			●	●	●		Moapa Valley	Lost City Museum
26Ck2056 (Capalapa #9)			●	●	●		Moapa Valley	Lost City Museum
26Ck2059 (Adam 2)			●	●	●	●	Moapa Valley	Lost City Museum

26Ck2060 (Adam 2)			●	●	●	●	Moapa Valley	Lost City Museum
26Ck2061 (Adam 3)			●	●	●	●	Moapa Valley	Lost City Museum
26Ck2063 (Adam 5)					●	●	Moapa Valley	Lost City Museum
26Ck2068 (Gubler Ranch Ruin)			●	●	●		Moapa Valley	Lost City Museum
26Ck2071 (Elwood #3)			●	●	●		Moapa Valley	Lost City Museum
26Ck2078 (Stewart Lewis)			●	●	●		Moapa Valley	Lost City Museum
26Ck2079 (Weber #1)	●						Moapa Valley	Lost City Museum
26Ck2087 (Airport Ruin)			●	●	●		Moapa Valley	Lost City Museum
26Ck2092			●	●	●		Moapa Valley	Lost City Museum
26Ck2148 (House 50?)			●	●	●		Moapa Valley	Lost City Museum
26Ck2148 (Main Ridge: Pueblo Grande de Nevada)			●	●	●		Moapa Valley	Archaeological Repository, Lake Mead National Recreation Area
26Ck3130 (Bovine Bluff)			●				Moapa Valley	Las Vegas Natural History Museum
26Ck4891 (Gold Butte)	●	●	●	●	●		Moapa Valley	Las Vegas Natural History Museum
26Ck5686 (Black Dog Cave)	●	●					Moapa Valley	Las Vegas Natural History Museum
26Ck6078/6095 (Gold Butte)	●	●	●	●	●		Moapa Valley	Las Vegas Natural History Museum
26Ck6080/6081 (Gold Butte)	●	●	●	●	●		Moapa Valley	Las Vegas Natural History Museum

42Ka1060 (Sand Hill Site)		●	●	●	●	●	St. George Basin	Natural History Museum of Utah
42Ka1076 (Bonanza Dune)		●	●	●	●	●	St. George Basin	Natural History Museum of Utah
2Mo869, AZ B:1:102 (Colorado City)						●	St. George Basin	Archaeological Repository, Southern Utah University
42Ws30							St. George Basin	Natural History Museum of Utah
42Ws36							St. George Basin	Natural History Museum of Utah
42Ws46							St. George Basin	Natural History Museum of Utah
42Ws50 (Three Mile Ruin)		●	●	●	●	●	St. George Basin	Natural History Museum of Utah
42Ws164 (Frei Site)							St. George Basin	Natural History Museum of Utah
42Ws172 (Goosenecks Overlook)	●	●	●				St. George Basin	Natural History Museum of Utah
42Ws173 (The Reusch Site)		●	●	●	●	●	St. George Basin	Natural History Museum of Utah
42Ws195							St. George Basin	Museum of Peoples and Cultures, Brigham Young University
42Ws199							St. George Basin	Natural History Museum of Utah
42Ws200 (Parunuweap Knoll)	●	●					St. George Basin	Natural History Museum of Utah
42Ws202 (Lamb’s Knoll Cave 1)		●	●	●	●	●	St. George Basin	Natural History Museum of Utah

42Ws203 (Lamb's Knoll Cave 2)		●	●	●	●	●	St. George Basin	Natural History Museum of Utah
42Ws219							St. George Basin	Natural History Museum of Utah
42Ws245 (Quail Creek)		●					St. George Basin	Archaeological Repository, Southern Utah University
42Ws268 (Quail Creek)		●					St. George Basin	Archaeological Repository, Southern Utah University
42Ws288 (Quail Creek)		●	●				St. George Basin	Archaeological Repository, Southern Utah University
42Ws388 (Quail Creek)		●					St. George Basin	Archaeological Repository, Southern Utah University
42Ws390 (Quail Creek)				●	●		St. George Basin	Archaeological Repository, Southern Utah University
42Ws392 (Quail Creek)				●	●		St. George Basin	Archaeological Repository, Southern Utah University
42Ws395 (Quail Creek)					●		St. George Basin	Archaeological Repository, Southern Utah University
42Ws397 (Quail Creek)		●					St. George Basin	Archaeological Repository, Southern Utah University
42Ws404 (Little Man Site 1)			●				St. George Basin	Archaeological Repository, Southern Utah University

42Ws503 (Red Cliffs Site)	●	●	●				St. George Basin	Archaeological Repository, Southern Utah University
42Ws881 (Little Creek)				●	●	●	St. George Basin	Archaeological Repository, Southern Utah University
42Ws920 (Little Creek)				●	●	●	St. George Basin	Archaeological Repository, Southern Utah University
42Ws1342 (Anasazi Valley Project)							St. George Basin	Museum of Peoples and Cultures, Brigham Young University
42Ws1345							St. George Basin	Museum of Peoples and Cultures, Brigham Young University
42Ws1346 (Little Man Site 2)			●	●	●		St. George Basin	Archaeological Repository, Southern Utah University
42Ws1349 (Little Man Site 3)		●					St. George Basin	Archaeological Repository, Southern Utah University
42Ws1931							St. George Basin	Museum of Peoples and Cultures, Brigham Young University
42Ws2188 (Anasazi Valley Project)							St. George Basin	Museum of Peoples and Cultures, Brigham Young University
42Ws2250							St. George Basin	Museum of Peoples and Cultures, Brigham Young University
42Ws2501							St. George Basin	Museum of Peoples and Cultures, Brigham Young University

42Ws2722							St. George Basin	Museum of Peoples and Cultures, Brigham Young University
42Ws3119 (Between Hurricane and Colorado)							St. George Basin	Archaeological Repository, Southern Utah University
42Ws4458 (Grapevine Gap Pueblo)	●	●					St. George Basin	Archaeological Repository, Southern Utah University
AZ A:10:20 (BLM) (Hidden Hills)						●	Western Colorado Plateau	Museum of Peoples and Cultures, Brigham Young University
AZ A:10:24 (BLM) (Hidden Hills)		●	●	●			Western Colorado Plateau	Museum of Peoples and Cultures, Brigham Young University
AZ A:10:25 (BLM) (Hidden Hills)		●	●	●			Western Colorado Plateau	Museum of Peoples and Cultures, Brigham Young University
AZ B:1:35							Western Colorado Plateau	Museum of Peoples and Cultures, Brigham Young University
AZ B:1:63 (BLM) (Yellowstone Mesa)					●		Western Colorado Plateau	Museum of Peoples and Cultures, Brigham Young University
AZ B:1:64 (BLM) (Yellowstone Mesa)					●		Western Colorado Plateau	Museum of Peoples and Cultures, Brigham Young University
AZ B:1:68 (BLM) (Yellowstone Mesa)			●				Western Colorado Plateau	Museum of Peoples and Cultures, Brigham Young University
AZ B:1:69 (BLM) (Yellowstone Mesa)			●				Western Colorado Plateau	Museum of Peoples and Cultures, Brigham Young University

AZ B:1:73 (BLM) (Yellowstone Mesa)					●		Western Colorado Plateau	Museum of Peoples and Cultures, Brigham Young University
AZ B:1:84 (BLM) (Yellowstone Mesa)			●				Western Colorado Plateau	Museum of Peoples and Cultures, Brigham Young University
AZ B:1:85 (BLM) (Yellowstone Mesa)							Western Colorado Plateau	Museum of Peoples and Cultures, Brigham Young University
AZ B:1:89 (Yellowstone Mesa)			●				Western Colorado Plateau	Museum of Peoples and Cultures, Brigham Young University
AZ B:1:91							Western Colorado Plateau	Museum of Peoples and Cultures, Brigham Young University
AZ B:1:115 (BLM) (Yellowstone Mesa)					●		Western Colorado Plateau	Museum of Peoples and Cultures, Brigham Young University
AZ B:5:79							Western Colorado Plateau	Museum of Peoples and Cultures, Brigham Young University
NA5507, AZ A:3:1 (MNA) (Antelope Cave)			●	●	●		Western Colorado Plateau	Arizona State Museum; Museum of Northern Arizona; Museum of Peoples and Cultures, Brigham Young University
NA8960, AZ B:2:12 (MNA) (Fredonia I)		●	●	●	●		Western Colorado Plateau	Museum of Northern Arizona

NA8960C, AZ B:2:12 (MNA) (Fredonia I)			●	●	●		Western Colorado Plateau	Museum of Northern Arizona
NA8960F, AZ B:2:12 (MNA) (Fredonia I)			●	●	●		Western Colorado Plateau	Museum of Northern Arizona
NA8964, AZ B:2:14 (MNA) (Fredonia I)		●	●	●	●		Western Colorado Plateau	Museum of Northern Arizona
NA9058, AZ A:1:11 (MNA) (Littlefield)		●	●	●	●		Western Colorado Plateau	Museum of Northern Arizona
NA9066, AZ B:2:13 (MNA) (Fredonia II)							Western Colorado Plateau	Museum of Northern Arizona
NA9072, AZ B:2:6 (MNA) (Fredonia II)			●	●	●	●	Western Colorado Plateau	Museum of Northern Arizona
NA9073 (Fredonia II)							Western Colorado Plateau	Museum of Northern Arizona
NA9074, AZ B:1:23 (MNA) (Fredonia II)							Western Colorado Plateau	Museum of Northern Arizona
NA9078, AZ B:1:10 (MNA)							Western Colorado Plateau	Museum of Northern Arizona
NA9079, AZ B:1:13 (MNA) (Fredonia II)							Western Colorado Plateau	Museum of Northern Arizona
NA9080, AZ B:1:14 (MNA) (Fredonia II)							Western Colorado Plateau	Museum of Northern Arizona

NA9083, AZ B:1:21 (MNA) (Fredonia II)							Western Colorado Plateau	Museum of Northern Arizona
NV DD:7:5							Moapa Valley	Archaeological Repository, Lake Mead National Recreation Area
NV DD:16:5							Moapa Valley	Archaeological Repository, Lake Mead National Recreation Area
Pueblo Grande de Nevada (Lost City) (Various "Houses")				●	●		Moapa Valley	National Museum of the American Indian, Smithsonian Institution

Table 3.5. Kayenta Branch Puebloan Pottery Sampling Strategy Showing Chronological Periods Attributed by Investigating Archaeologist(s).

Site	**Basketmaker III**	**Pueblo I**	**Early Pueblo II**	**Middle Pueblo II**	**Late Pueblo II**	**Early Pueblo III**	**Geographic Location**	**Repository**
AZ C:8		●	●				Chilchinbeto, Nitsir Canyon	Arizona State Museum
AZ D:1						●	Chilchinbeto, Nitsir Canyon	Arizona State Museum
AZ D:1, AZ D:5						●	Chilchinbeto, Nitsir Canyon	Arizona State Museum
AZ D:2, AZ D:3, AZ D:6, AZ D:7		●	●	●	●	●	Tsegi Canyon	Arizona State Museum
AZ D:2, AZ D:3, AZ D:6, AZ D:7 (Round Rock Ruin)		●	●	●	●	●	Tsegi Canyon	Arizona State Museum
AZ D:3					●	●	Kiet Siel Canyon	Arizona State Museum
AZ D:3 (Sheep Corral Cave)					●	●	Kiet Siel Canyon	Arizona State Museum
AZ D:3, AZ D:4		●	●	●	●	●	Kiet Siel Canyon	Arizona State Museum
AZ D:3, AZ D:6		●	●	●	●	●	Kiet Siel Canyon; Tsegi Canyon	Arizona State Museum
AZ D:3:1 (ASM)					●	●	Kiet Siel Canyon	Arizona State Museum
AZ D:5:11 (ASM) (Gourd Cave)	●	●	●	●	●	●	Nitsir Canyon	Arizona State Museum
AZ D:6					●	●	Tsegi Canyon	Arizona State Museum

AZ D:6 (Needacloy Ruin)					●	●	Tsegi Canyon	Arizona State Museum
AZ D:7					●	●	Northern Black Mesa	Arizona State Museum
AZ D:11:510 (Black Mesa)				●	●		Dinnebito Wash	Museum of Northern Arizona
MARSH PASS:7:4 (GP)							Kiet Siel Canyon; Tsegi Canyon	Arizona State Museum
MARSH PASS:7:4 (GP) (Tachini Point)							Kiet Siel Canyon; Tsegi Canyon	Arizona State Museum
MARSH PASS:7:9 (GP) (Juniper Cove)	●						Kiet Siel Canyon; Tsegi Canyon	Arizona State Museum
MARSH PASS:7:9 (GP) (Tachini Point)							Kiet Siel Canyon; Tsegi Canyon	Arizona State Museum
NA2515, AZ D:6:7 (MNA) (Betatakin)						●	Tsegi Canyon	Museum of Northern Arizona
NA2519, AZ D:3:1 (MNA) (Kiel Siel)						●	Kiet Siel Canyon	Museum of Northern Arizona
NA2520, MARSH PASS:2:2 (GP) (Turkey Cave)	●	●	●	●	●	●	Kiet Siel Canyon; Tsegi Canyon	Arizona State Museum
NA2521 (Turkey House)					●	●	Kiet Siel Canyon	Museum of Northern Arizona

NA2537		●	●				Dogoszhi Biko	Museum of Northern Arizona
NA2543 (Ladder House Pueblo)			●	●	●		Tsegi Canyon	Museum of Northern Arizona
NA2544			●	●	●		Tsegi Canyon, Long Canyon	Museum of Northern Arizona
NA2630 (Lenaki)					●	●	Tsegi Canyon	Museum of Northern Arizona
NA3570, NA7623 AZ D:7:4 (MNA) (Juniper Cove Village)	●						San Juan Drainage (Chinle Wash)	Museum of Northern Arizona
NA5507, AZ A:3:1 (MNA) (Antelope Cave)			●	●	●		Western Colorado Plateau	Arizona State Museum; Museum of Northern Arizona
NA23369, AZ D:11:690 (MNA) (Black Mesa)				●	●		Dinnebito Wash	Museum of Northern Arizona
Sand Dune Canyon, Kiet Siel Canyon, Tsegi Canyon							Sand Dune Canyon, Kiet Siel Canyon, Tsegi Canyon	Arizona State Museum
NA8607, AZ D:6:71 (MNA)			●	●	●		Little Colorado River, Moenkopi Wash	Museum of Northern Arizona

NA8612, AZ D:6:76 (MNA)		●	●				Little Colorado River, Moenkopi Wash	Museum of Northern Arizona
NA8613, AZ D:6:77 (MNA)			●	●	●		Little Colorado River, Moenkopi Wash	Museum of Northern Arizona
NA8800, AZ D:8:25 (MNA)		●	●	●	●	●	San Juan Drainage, Chinle Wash	Museum of Northern Arizona

CHAPTER 4. CHRONOMETRIC RECONSTRUCTION OF THE VIRGIN BRANCH HEARTLAND: PRESENTATION OF DATA AND RESULTS

As laid out in Chapter 3, the starting point of this ceramics-based investigation focuses on the role in which painted design style plays in communicating Virgin Branch community identity and group affiliation. To investigate this, by way of revisitation, the research aims of this dissertation are organized around three questions:

1) How does a refined Virgin Branch heartland chronometry clarify current understandings of Virgin Branch chronology and correlate with the established chronometry of the Kayenta Branch heartland?
2) What are the technological styles and rules of design (i.e., design layout, design symmetry, and design elements) associated with painted pottery from the Virgin and Kayenta Branch heartlands over time?
3) How is Virgin Branch group identity communicated and reflected through expressions of technological and painted design styles on pottery amidst intra- and inter-regional events and interactions over time; and what implications do these findings carry with respect to Virgin Branch agency?

The first of these research questions is the focus of the present chapter and Chapter 5 in which I present the chronometric data/results and associated interpretation/discussion, respectively. The second and third research questions, pertaining to the ceramic style analysis results and discussion of this dissertation, are addressed in Chapters 6 and 7, respectively. In my presentation of the data within this chapter, I provide a descriptive commentary conducted on a basis of site-specific chronological and chronometric data through mean ceramic dating results of select Virgin Branch sites (see Table 4.1). The primary aim of this chapter is to serve as a repository of the mean ceramic dates I calculated as well as a synthesis of available radiocarbon assays and the sole available tree-ring date from associated site reports. Pulling from this information, in Chapter 5, I: (a) discuss and interpret these data in light of the first guiding research question, (b) propose a refined chronology for painted Virgin Branch ceramic styles (inclusive of cognate styles within the Virgin Branch region), and (c) discuss a refined Virgin Branch heartland chronometry in the context of painted Virgin Branch pottery styles and widely-used dating methods by archaeologists working in the Virgin Branch region—including use of the percentage of corrugated ceramics within a given site pottery assemblage to help date Virgin Branch sites. With this overview and trajectory in mind, this chapter presents the chronological and chronometric data I gathered, synthesized, and applied towards a proposed chronometric refinement of the Virgin Branch heartland and associated painted Virgin Branch pottery styles.

Virgin Branch Heartland Chronometric Refinement: Site Sampling Strategy

The previous chapter, as laid out in Table 3.4, presented all Virgin Branch sites sampled within the research parameters of this dissertation—totaling over 120 sites. Although all sites listed in Table 3.4 yielded pottery sherds and/or whole vessels used in the stylistic analysis component of this research, not all of these previously listed sites were found helpful towards the chronometric refinement portion of my research aims. Limited by availability of and/or access to ceramic assemblages, less than half of the total sites listed in Table 3.4 were selected for mean ceramic dating (see Table 4.1), and even fewer sites were useful for the ceramic cross-dating of painted Virgin Branch pottery styles (see Tables 4.44 -Tables 4.78). Even though I encountered sampling limitations, this chapter presents the data I collected, and subsequently analyzed and synthesized, in my attempt to refine the chronometry of the Virgin Branch heartland and associated painted pottery styles. In Chapter 5, I analyze and discuss the data presented in this chapter, to (provisionally) provide a refined chronometric framework for Virgin Branch pottery.

My investigation into the chronometry of the Virgin Branch heartland and associated painted pottery styles began with an assessment of the mechanisms by which the sites I sampled were dated by investigating archaeologists. Table 4.1 shows nearly three dozen sites I selected in my refinement of an overall Virgin Branch chronometry. These sites were chosen due to the promise each site demonstrated in potentially yielding mean ceramic dates that could then be applied to greater efforts in refining painted Virgin Branch pottery styles. (Sites for which no archaeological periods have been attributed are the result of the published reports/notes and site card not attributing any chronological periods or perceived chronometric dates. As seen in later in this chapter and in the discussion throughout Chapter 5, though most of the selected sites yielded mean ceramic dates, some sites were found to be unhelpful towards refining the time spans for painted Virgin Branch pottery styles. As a result of not being able to formulate a coherent chronometry on the basis of mean ceramic dating alone, I applied a mix method approach in my attempt to refine the chronometry of the Virgin Branch heartland and associated painted pottery styles. This mixed approach involved synthesizing available radiocarbon assays (recovered from unmixed, systemic contexts) with calculated mean ceramic dates. More will be stated regarding my approach and application of mean ceramic dating in this chapter as well as in Chapter 5.

Table 4.1. Virgin Branch Puebloan Site Sample Selected for Chronometric Refinement, Showing Dating Methods Used at Each Site by Investigating Archaeologist(s) to Establish a Given Archaeological Period.

Site	Basketmaker III[1]	Pueblo I[1]	Early Pueblo II[1]	Middle Pueblo II[1]	Late Pueblo II[1]	Early Pueblo III[1]	Geographic Location[2]
26Ck2059 (Adam 2)			P	P	P	P	MV
26Ck2148 ("Lost City")			P	P	P		MV
26Ck3130 (Bovine Bluff)			P, R				MV
26Ck4891 (Riverside Pithouse Village, Gold Butte)	P, R	P, R					MV
26Ck6078/6095 (Cedar Basin Midden, Gold Butte)	P	P	P	P	P	P	MV
26Ck6080/6081 (Ian's Rock Shelter, Gold Butte)	P	P	P	P	P	P	MV
42Ka1076 (Bonanza Dune)		P	P	P	P	P	SGB
2Mo869, AZ B:1:102 (BLM) (Corngrower Site)					T, P	T, P	SGB
42Ws288 (Quail Creek)		(R)	P, (R)	P, (R)	P, (R)		SGB
42Ws388 (Quail Creek)		R, P					SGB
42Ws392 (Quail Creek)			R	R	R	R	SGB
42Ws503 (Red Cliffs Site)		(R)	P, (R)	(R)	(R)	(R)	SGB
42Ws920 (Little Creek)	P, (R)	P, (R)	P, (R)	P, (R)	P	P	SGB
42Ws1349 (Little Man Site 3)		P, R					SGB
42Ws2188 (Anasazi Valley Project)					P		SGB
AZ A:10:20 (BLM) (Hidden Hills)							
AZ A:10:24 (BLM) (Hidden Hills)							
AZ A:10:25 (BLM) (Hidden Hills)							
AZ B:1:35 (BLM) (Reservoir Site)		(R)	(R)	(R)	(R)	R	WCP
AZ B:1:63 (BLM) (Yellowstone Mesa)					P		WCP
AZ B:1:64 (BLM) (Yellowstone Mesa)					P		WCP
NA5507, AZ A:3:1 (MNA) (Antelope Cave)	(R)	(R)	(R)				WCP
NA8960, AZ B:2:12 (MNA) (Fredonia I)		P	P	P	P		WCP

NA8960C, AZ B:2:12 (MNA) (Fredonia I)		P	P	P		WCP
NA8960F, AZ B:2:12 (MNA) (Fredonia I)		P	P	P		WCP
NA8961 (Fredonia I)						WCP
NA8962 (Fredonia I)						WCP
NA8964, AZ B:2:14 (MNA) (Fredonia I)	P	P	P	P		WCP
NA9058, AZ A:1:11 (MNA) (Littlefield)	P	P	P	P		WCP
NA9066B, AZ B:2:13 (MNA)						WCP
NA9072, AZ B:2:6 (MNA) (Fredonia II)		P	P	P	P	WCP
NA9073 (Fredonia II)						WCP
NA9074, AZ B:1:23 (MNA) (Fredonia II)						WCP
NA9077 (Fredonia II)						WCP
NA9079, AZ B:1:13 (MNA) (Fredonia II)						WCP
NA9083, AZ B:1:21 (MNA) (Fredonia II)						WCP

[1] P = Chronological period established through analysis of Virgin Branch pottery types, rim jar eversion, and/or percentage of corrugated sherds from the pottery assemblage for a given site.
(R) = Chronometric date established through radiocarbon sample recovered from a non-systemic context (e.g., fill).
R = Chronometric date established through radiocarbon sample recovered from a systemic context (e.g., floor).
T = Tree-ring date.

[2] MV = Moapa Valley.
SGB = St. George Basin.
WCP = Western Colorado Plateau.

Mean Ceramic Dating: Logic, Application, and Relevance to the Virgin Branch Region

As is well known to archaeologists working in the Virgin Branch region, and within the North American Southwest generally, tree-ring dates have been a persistently pursued and seemingly equally elusive dating approach at nearly every investigated site in the region. While not blessed with an abundance of tree-ring dates, as compared to many sites in the Kayenta Branch region, archaeologists working in the Virgin Branch region have implemented various approaches (e.g., OSL dating, radiocarbon dating) as workarounds to the paucity of datable tree beams. Although these alternative approaches to dating sites have yielded general success in helping establish a framework for a Virgin Branch chronology, the dating of Virgin Branch ceramics in particular are widely known to be not well established. In fact, from my perspective, the practice of generally dating painted Virgin Branch ceramics according to the seeming Kayenta Branch analogues (Allison 1988:57) is too imprecise to expect any discernably nuanced chronometry that would fit within the archaeological record of the Virgin Branch region. With this disparity in view, I implemented mean ceramic dating across sites in the Virgin Branch heartland in an attempt to provide greater clarity on the chronometry of a number of sites and painted pottery styles of the region.

With a near complete lack datable tree-ring specimens recovered from within the Virgin Branch region, an alternative approach is in order. As datable tree-ring specimens would provide key target dates, pertaining to construction events in the establishment of a given site—and of great interest to archaeologists (Dean 1978:228)—the unavailability of such data from Virgin Branch sites requires the pursuit of alternative events in the archaeological record. The use of mean ceramic dating, as pointed out by Christenson (1994:310), does not serve as alternative way in which to obtain a target date from a given site. Rather, a mean ceramic date provides insights not into a primary context (such as a construction date obtained from a tree-ring dated roof beam) but into a secondary context (Dean 1978:226). In other words, a mean ceramic date provides insight into the disposal of the ceramics being investigated. While obtaining a date relating to the disposition of a ceramic assemblage would require investigation of the formation processes spanning between disposition of the ceramics and the depopulation of a given site (cf. Schiffer 1976:142-143), this time horizon is likely negligible in most cases (Wallace 1992:35-36). In consideration of these factors, the practical meaning of a mean ceramic date can be viewed not as a singular date (such as a tree-ring date). Instead, a mean ceramic date should be viewed as a date within a greater probability distribution for a site (Christenson 1994:310-311).

In my investigation of using mean ceramic dating to date Virgin Branch sites directly, and painted pottery styles indirectly, I followed the general method set forth by Christenson (1994:304-309) and selected imported ceramic types which have been correlated with tree-ring dates (cf. Downum 1988 and Christenson 1994). Using the date ranges for over a dozen decorated and undecorated traded ceramic types, recovered from Virgin Branch sites, I weighted each pottery type in consideration of the respective date range (see Table 4.2). Although I followed the methods laid out by Christenson (1994:304), the ceramic date (CED) weights I assigned to imported pottery types (Table 4.2) followed those proposed by Christian Downum (2010, personal communication). Following the methods laid out by Christenson (1994:304), I calculated CED weights for each ceramic type. Issuing of weights to each type helps in reducing the overrepresentation of any ceramic type with a long date range. In applying mean ceramic dating to Virgin Branch sites, I argue that this methodological approach can serve as meaningful chronometric anchor from which a clearer chronometry for Virgin Branch sites directly, and painted pottery styles indirectly, can emerge in the absence of usable tree-ring dates.

Table 4.2. Mean Ceramic Date (CED) Weights Used In This Study For Tree-Ring Dated Kayenta Branch Pottery Styles.

Pottery Ware and Type	CED Weight
Tusayan Gray Ware	
Lino Black-on-gray	1
Tusayan Corrugated	2.25
Tusayan White Ware	
Kana-a Black-on-white	1.25
Black Mesa Black-on-white	2.25
Dogoszhi Black-on-white	2
Sosi Black-on-white	2
Flagstaff Black-on-white	2.75
San Juan Red Ware	
Deadmans Black-on-red	1.1
Tsegi Orange Ware	
Medicine Black-on-red	2.75
Cameron Polychrome	3.25
Citadel - Tusayan Polychrome	2.5
San Francisco Mountain Gray Ware	
Deadmans Gray - Fugitive Red	0.5

Virgin Branch Heartland Chronology and Chronometry:

Site Dating and Mean Ceramic Dating Results

Using the above parameters in my approach to general mean ceramic dates for selected Virgin Branch sites, the following tables (Tables 4.3 - 4.43) show the mean ceramic dates for nearly all of the sites listed in Table 4.1. In my investigation of these sites, on more granular level, Tables 4.4 though 4.25 show calculated mean ceramic dates for specific "Houses" associated 26Ck2148 (Main Ridge: Pueblo Grande de Nevada/"Lost City"). The overarching aim of Tables 4.3 through 4.43 is to present the imported ceramic types associated with each site along with the varied dates generated from the distribution of the these imported pottery wares and types. Regarding the mean ceramic date presented in each of the following tables, at least one of three categorizations can be found in each table. For sites from which only painted imported pottery types were recovered, the mean ceramic date for such a site will be entirely based on a "MCD (Decorated only)" (i.e., a mean ceramic date calculated on the basis of imported painted pottery types only). Similarly, in the case of sites from which only non-decorated (i.e., non-painted) pottery types were recovered, the calculated mean date will be shown as a "MCD (Non-decorated only)." In the case of several sites, a standalone mean ceramic date (MCD) was calculated, which lies between a "MCD (Decorated only)" and "MCD (Non-decorated only)"calculated dates. As implied in a standalone mean ceramic date, such a case requires the presence of both decorated and non-decorated imported pottery types at a site.

Table 4.3. Mean Ceramic Date Calculation for 26Ck2148 (Main Ridge: Pueblo Grande de Nevada/"Lost City"), All Houses.

Pottery Type	No. Sherds	CED Weight	Percentage	CED Median	Weighted Sherds	Sum Weight Date
Lino Black-on-gray	3	1	0.710900474	675	0.710900474	479.8578199
Deadmans Black-on-red	1	1.1	0.236966825	945	0.260663507	246.3270142
Medicine Black-on-red	255	2.75	60.42654028	1087.5	166.1729858	180713.122
Tusayan Black-on-red	138	2.15	32.7014218	1132.5	70.30805687	79623.87441
Citadel - Tusayan Polychrome	25	2.5	5.924170616	1200	14.81042654	17772.51185
TOTALS (Decorated)	422				252.2738095	278734.9107
Deadmans Gray - Fugitive Red	18	0.5	100	975	50	48750
TOTALS (Non-Decorated)	18				50	48750
TOTALS (Decorated and Non-Decorated)					302.2630332	327585.6931
Mean Ceramic Date (MCD) 1083.7769						
MCD (Non-Decorated only) 975						
MCD (Decorated only) 1105.337114						

Table 4.4. Mean Ceramic Date Calculation for 26Ck2148 (Main Ridge: Pueblo Grande de Nevada/"Lost City"), House 47.

Pottery Type	No. Sherds	CED Weight	Percentage	CED Median	Weighted Sherds	Sum Weight Date
Lino Black-on-gray	1	1	1.219512195	675	1.219512195	823.1707317
Medicine Black-on-red	31	2.75	37.80487805	1087.5	103.9634146	113060.2134
Tusayan Black-on-red	48	2.15	58.53658537	1132.5	125.8536585	142529.2683
Citadel - Tusayan Polychrome	2	2.5	2.43902439	1200	6.097560976	7317.073171
TOTALS (Decorated)	82				237.1341463	263729.7256
MCD (Decorated only)						
1112.154153						

Table 4.5. Mean Ceramic Date Calculation for 26Ck2148 (Main Ridge: Pueblo Grande de Nevada/"Lost City"), House 50.

Pottery Type	No. Sherds	CED Weight	Percentage	CED Median	Weighted Sherds	Sum Weight Date
Medicine Black-on-red	73	2.75	78.49462366	1087.5	215.8602151	234747.9839
Tusayan Black-on-red	2	2.15	2.150537634	1132.5	4.623655914	5236.290323
Citadel - Tusayan Polychrome	18	2.5	19.35483871	1200	48.38709677	58064.51613
TOTALS (Decorated)	93				268.8709677	298048.7903
MCD (Decorated only)						
1108.519796						

Table 4.6. Mean Ceramic Date Calculation for 26Ck2148 (Main Ridge: Pueblo Grande de Nevada/"Lost City"), House 68.

Pottery Type	No. Sherds	CED Weight	Percentage	CED Median	Weighted Sherds	Sum Weight Date
Medicine Black-on-red	7	2.75	87.5	1087.5	240.625	261679.6875
Tusayan Black-on-red	1	2.15	12.5	1132.5	26.875	30435.9375
TOTALS (Decorated)	8				267.5	292115.625
MCD (Decorated only)						
1092.021028						

Table 4.7. Mean Ceramic Date Calculation for 26Ck2148 (Main Ridge: Pueblo Grande de Nevada/"Lost City"), House 69.

Pottery Type	No. Sherds	CED Weight	Percentage	CED Median	Weighted Sherds	Sum Weight Date
Medicine Black-on-red	1	2.75	50	1087.5	137.5	149531.25
Tusayan Black-on-red	1	2.15	50	1132.5	107.5	121743.75
TOTALS (Decorated)	2				245	271275
MCD (Decorated only)						
1104.439453						

Table 4.8. Mean Ceramic Date Calculation for 26Ck2148 (Main Ridge: Pueblo Grande de Nevada/"Lost City"), House 71.

Pottery Type	No. Sherds	CED Weight	Percentage	CED Median	Weighted Sherds	Sum Weight Date
Medicine Black-on-red	9	2.75	100	1087.5	275	299062.5
TOTALS (Decorated)	9				275	299062.5
MCD (Decorated only)						
1087.5						

Table 4.9. Mean Ceramic Date Calculation for 26Ck2148 (Main Ridge: Pueblo Grande de Nevada/"Lost City"), House 73.

Pottery Type	No. Sherds	CED Weight	Percentage	CED Median	Weighted Sherds	Sum Weight Date
Medicine Black-on-red	4	2.75	100	1087.5	275	299062.5
TOTALS (Decorated)	4				275	299062.5
MCD (Decorated only)						
1087.5						

Table 4.10. Mean Ceramic Date Calculation for 26Ck2148 (Main Ridge: Pueblo Grande de Nevada/“Lost City”), House 72.

Pottery Type	No. Sherds	CED Weight	Percentage	CED Median	Weighted Sherds	Sum Weight Date
Medicine Black-on-red	39	2.75	88.63636364	1087.5	243.75	265078.125
Tusayan Black-on-red	5	2.15	11.36363636	1132.5	24.43181818	27669.03409
TOTALS (Decorated)	44				268.1818182	292747.1591
Deadmans Gray - Fugitive Red	16	0.5	100	975	50	48750
TOTALS (Non-Decorated)	16				50	48750
TOTALS (Decorated and Non-Decorated)					318.1818182	341497.1591
Mean Ceramic Date (MCD) 1073.276786						
MCD (Non-Decorated only) 975						
MCD (Decorated only) 1091.599576						

Table 4.11. Mean Ceramic Date Calculation for 26Ck2148 (Main Ridge: Pueblo Grande de Nevada/"Lost City"), House 74.

Pottery Type	No. Sherds	CED Weight	Percentage	CED Median	Weighted Sherds	Sum Weight Date
Medicine Black-on-red	3	2.75	60	1087.5	165	179437.5
Tusayan Black-on-red	2	2.15	40	1132.5	86	97395
TOTALS (Decorated)	5				251	276832.5
MCD (Decorated only)						
1102.918327						

Table 4.12. Mean Ceramic Date Calculation for 26Ck2148 (Main Ridge: Pueblo Grande de Nevada/"Lost City"), House 75.

Pottery Type	No. Sherds	CED Weight	Percentage	CED Median	Weighted Sherds	Sum Weight Date
Medicine Black-on-red	10	2.75	66.66666667	1087.5	187.3333333	199375
Tusayan Black-on-red	5	2.15	33.33333333	1132.5	71.66666667	81162.5
TOTALS (Decorated)	15				255	280537.5
MCD (Decorated only)						
1100.147059						

Table 4.13. Mean Ceramic Date Calculation for 26Ck2148 (Main Ridge: Pueblo Grande de Nevada/"Lost City"), House 77.

Pottery Type	No. Sherds	CED Weight	Percentage	CED Median	Weighted Sherds	Sum Weight Date
Medicine Black-on-red	11	2.75	91.66666667	1087.5	252.0833333	274140.625
Tusayan Black-on-red	1	2.15	8.33333333	1132.5	17.91666667	20290.625
TOTALS (Decorated)	12				270	294431.25
MCD (Decorated only)						
1090.486111						

Table 4.14. Mean Ceramic Date Calculation for 26Ck2148 (Main Ridge: Pueblo Grande de Nevada/"Lost City"), House 78.

Pottery Type	No. Sherds	CED Weight	Percentage	CED Median	Weighted Sherds	Sum Weight Date
Tusayan Black-on-red	6	2.15	100	1132.5	215	243487.5
TOTALS (Decorated)	6				215	243487.5
MCD (Decorated only)						
1132.5						

Table 4.15. Mean Ceramic Date Calculation for 26Ck2148 (Main Ridge: Pueblo Grande de Nevada/"Lost City"), House 79.

Pottery Type	No. Sherds	CED Weight	Percentage	CED Median	Weighted Sherds	Sum Weight Date
Medicine Black-on-red	2	2.75	100	1087.5	275	299062.5
TOTALS (Decorated)	2				245	299062.5
MCD (Decorated only)						
1087.5						

Table 4.16. Mean Ceramic Date Calculation for 26Ck2148 (Main Ridge: Pueblo Grande de Nevada/"Lost City"), House 80.

Pottery Type	No. Sherds	CED Weight	Percentage	CED Median	Weighted Sherds	Sum Weight Date
Medicine Black-on-red	11	2.75	19.29824561	1087.5	53.07017544	57713.81579
Tusayan Black-on-red	46	2.15	80.70175439	1132.5	173.5087719	196498.6842
TOTALS (Decorated)	57				226.5789474	254212.5
MCD (Decorated only)						
1121.95993						

Table 4.17. Mean Ceramic Date Calculation for 26Ck2148 (Main Ridge: Pueblo Grande de Nevada/“Lost City”), House 81.

Pottery Type	No. Sherds	CED Weight	Percentage	CED Median	Weighted Sherds	Sum Weight Date
Medicine Black-on-red	1	2.75	50	1087.5	137.5	149531.25
Tusayan Black-on-red	1	2.15	50	1132.5	107.5	121743.75
TOTALS (Decorated)	2				245	271275
MCD (Decorated only)						
1107.244898						

Table 4.18. Mean Ceramic Date Calculation for 26Ck2148 (Main Ridge: Pueblo Grande de Nevada/“Lost City”), House 88.

Pottery Type	No. Sherds	CED Weight	Percentage	CED Median	Weighted Sherds	Sum Weight Date
Tusayan Black-on-red	1	2.15	100	1132.5	215	243487.5
TOTALS (Decorated)	1				215	243487.5
MCD (Decorated only)						
1132.5						

Table 4.19. Mean Ceramic Date Calculation for 26Ck2148 (Main Ridge: Pueblo Grande de Nevada/"Lost City"), House 87.

Pottery Type	No. Sherds	CED Weight	Percentage	CED Median	Weighted Sherds	Sum Weight Date
Tusayan Black-on-red	6	2.15	100	1132.5	215	243487.5
TOTALS (Decorated)	6				215	243487.5
Deadmans Gray - Fugitive Red	1	0.5	100	975	50	48750
TOTALS (Non-Decorated)	1				50	48750
TOTALS (Decorated and Non-Decorated)					265	292237.5
Mean Ceramic Date (MCD) 1102.783019						
MCD (Non-Decorated only) 975						
MCD (Decorated only) 1132.5						

Table 4.20. Mean Ceramic Date Calculation for 26Ck2148 (Main Ridge: Pueblo Grande de Nevada/"Lost City"), House 90.

Pottery Type	No. Sherds	CED Weight	Percentage	CED Median	Weighted Sherds	Sum Weight Date
Medicine Black-on-red	2	2.75	50	1087.5	137.5	149531.25
Citadel – Tusayan Polychrome	2	2.5	50	1200	125	150000
TOTALS (Decorated)	2				262.5	299531.25
MCD (Decorated only)						
1141.071429						

Table 4.21. Mean Ceramic Date Calculation for 26Ck2148 (Main Ridge: Pueblo Grande de Nevada/"Lost City"), House 91.

Pottery Type	No. Sherds	CED Weight	Percentage	CED Median	Weighted Sherds	Sum Weight Date
Citadel – Tusayan Polychrome	2	2.5	100	1200	250	300000
TOTALS (Decorated)	2				250	300000
MCD (Decorated only)						
1200						

Table 4.22. Mean Ceramic Date Calculation for 26Ck2148 (Main Ridge: Pueblo Grande de Nevada/"Lost City"), House 89.

Pottery Type	No. Sherds	CED Weight	Percentage	CED Median	Weighted Sherds	Sum Weight Date
Medicine Black-on-red	55	2.75	84.615385	1087.5	232.6923077	253052.8846
Tusayan Black-on-red	9	2.15	13.846154	1132.5	29.76923077	33713.65385
Citadel - Tusayan Polychrome	1	2.5	1.5384615	1200	3.846153846	4615.384615
TOTALS (Decorated)	65				266.3076923	291381.9231
Deadmans Gray - Fugitive Red	1	0.5	100	975	50	48750
TOTALS (Non-Decorated)	1				50	48750
TOTALS (Decorated and Non-Decorated)					316.3076923	340131.9231
Mean Ceramic Date (MCD) 1075.319796						
MCD (Non-Decorated only) 975						
MCD (Decorated only) 1094.155113						

Table 4.23. Mean Ceramic Date Calculation for 26Ck2148 (Main Ridge: Pueblo Grande de Nevada/"Lost City"), House 94.

Pottery Type	No. Sherds	CED Weight	Percentage	CED Median	Weighted Sherds	Sum Weight Date
Lino Black-on-gray	1	1	20	675	20	13500
Medicine Black-on-red	3	2.75	60	1087.5	165	179437.5
Tusayan Black-on-red	1	2.15	20	1132.5	43	48697.5
TOTALS (Decorated)	5				245	241635
MCD (Decorated only)						
1059.802632						

Table 4.24. Mean Ceramic Date Calculation for 26Ck2148 (Main Ridge: Pueblo Grande de Nevada/"Lost City"), House 120.

Pottery Type	No. Sherds	CED Weight	Percentage	CED Median	Weighted Sherds	Sum Weight Date
Medicine Black-on-red	2	2.75	40	1087.5	110	119625
Tusayan Black-on-red	3	2.15	60	1132.5	129	146092.5
TOTALS (Decorated)	5				239	265717.5
MCD (Decorated only)						
1111.788703						

Table 4.25. Mean Ceramic Date Calculation for 26Ck2148 (Main Ridge: Pueblo Grande de Nevada/"Lost City"), Museum Site.

Pottery Type	No. Sherds	CED Weight	Percentage	CED Median	Weighted Sherds	Sum Weight Date
Tusayan Black-on-red	1	2.15	100	1132.5	215	243487.5
TOTALS (Decorated)	1				215	243487.5
MCD (Decorated only)						
1132.5						

Table 4.26. Mean Ceramic Date Calculation for 42Ka1076 (Bonanza Dune).

Pottery Type	No. Sherds	CED Weight	Percentage	CED Median	Weighted Sherds	Sum Weight Date
Black Mesa Black-on-white	3	2.25	37.5	1087.5	84.375	91757.8125
Sosi Black-on-white	1	2	12.5	1125	25	28125
Flagstaff Black-on-white	2	2.75	25	1187.5	68.75	81640.625
Tusayan Black-on-red	1	2.15	12.5	1132.5	26.875	30435.9375
Citadel – Tusayan Polychrome	1	2.5	12.5	1200	31.25	37500
TOTALS (Decorated)	8				236.25	269459.375
MCD (Decorated only)						
1140.568783						

Table 4.27. Mean Ceramic Date Calculation for 42Ws392 (Quail Creek).

Pottery Type	No. Sherds	CED Weight	Percentage	CED Median	Weighted Sherds	Sum Weight Date
Kana-a Black-on-white	1	1.25	6.666666667	912.5	8.333333333	7604.166667
Dogoszhi Black-on-white	3	2	20	1125	40	45000
Sosi Black-on-white	8	2	53.33333333	1125	106.6666667	120000
Flagstaff Black-on-white	1	2.75	6.666666667	1187.5	18.33333333	21770.83333
Tusayan Black-on-red	2	2.15	13.33333333	1132.5	28.66666667	32465
TOTALS (Decorated)	15				202	226840
MCD (Decorated only)						
1122.970297						

Table 4.28. Mean Ceramic Date Calculation for 42Ws503 (Red Cliffs Site).

Pottery Type	No. Sherds	CED Weight	Percentage	CED Median	Weighted Sherds	Sum Weight Date
Kana-a Black-on-white	3	1.25	100	912.5	125	114062.5
TOTALS (Decorated)	3				125	114062.5
MCD (Decorated only)						
912.5						

Table 4.29. Mean Ceramic Date Calculation for 42Ws920 (Little Creek).

Pottery Type	No. Sherds	CED Weight	Percentage	CED Median	Weighted Sherds	Sum Weight Date
Tusayan Black-on-red	1	2.15	50	1132.5	107.5	121743.75
Citadel - Tusayan Polychrome	1	2.5	50	1200	125	150000
TOTALS (Decorated)	2				232.5	271743.75
MCD (Decorated only)						
1168.790323						

Table 4.30. Mean Ceramic Date Calculation for AZ B:1:63 (BLM) (Yellowstone Mesa).

Pottery Type	No. Sherds	CED Weight	Percentage	CED Median	Weighted Sherds	Sum Weight Date
Medicine Black-on-red	2	2.75	66.66666667	1087.5	183.3333333	199375
Tusayan Black-on-red	1	2.15	33.33333333	1132.5	74.66666667	81162.5
TOTALS (Decorated)	3				255	280537.5
MCD (Decorated only)						
1100.147059						

Table 4.31. Mean Ceramic Date Calculation for AZ B:1:64 (BLM) (Yellowstone Mesa).

Pottery Type	No. Sherds	CED Weight	Percentage	CED Median	Weighted Sherds	Sum Weight Date
Tusayan Black-on-red	1	2.15	100	1132.5	215	243487.5
TOTALS (Decorated)	1				215	243487.5
MCD (Decorated only)						
1132.5						

Table 4.32. Mean Ceramic Date Calculation for Gold Butte, Inclusive of All Sites.

Pottery Type	No. Sherds	CED Weight	Percentage	CED Median	Weighted Sherds	Sum Weight Date
Black Mesa Black-on-white	1	2.25	50	1087.5	112.5	122343.75
Sosi Black-on-white	1	2	50	1125	100	112500
TOTALS (Decorated)	2				212.5	234843.75
MCD (Decorated only)						
1105.147059						

Table 4.33. Mean Ceramic Date Calculation for NA8961 (Fredonia I).

Pottery Type	No. Sherds	CED Weight	Percentage	CED Median	Weighted Sherds	Sum Weight Date
Black Mesa Black-on-white	1	2.25	100	1087.5	225	244687.5
TOTALS (Decorated)	1				225	244687.5
MCD (Decorated only)						
1087.5						

Table 4.34. Mean Ceramic Date Calculation for NA8962 (Fredonia I).

Pottery Type	No. Sherds	CED Weight	Percentage	CED Median	Weighted Sherds	Sum Weight Date
Black Mesa Black-on-white	3	2.25	100	1087.5	225	244687.5
TOTALS (Decorated)	3				225	244687.5
MCD (Decorated only)						
1087.5						

Table 4.35. Mean Ceramic Date Calculation for 2Mo869, AZ B:1:102 (Corngrower Site).

Pottery Type	No. Sherds	CED Weight	Percentage	CED Median	Weighted Sherds	Sum Weight Date
Lino Black-on-gray	1	1	0.156494523	675	0.156494523	105.6338028
Black Mesa Black-on-white	86	2.25	13.45852895	1087.5	30.28169014	32931.33803
Dogoszhi Black-on-white	405	2	63.38028169	1125	126.7605634	142605.6338
Sosi Black-on-white	94	2	14.71048513	1125	29.42097027	33098.59155
Flagstaff Black-on-white	17	2.75	2.660406886	1187.5	7.316118936	8687.891236
Deadmans Black-on-red	1	1.1	0.156494523	945	0.172143975	162.6760563
Medicine Black-on-red	28	2.75	4.381846635	1087.5	12.05007825	13104.46009
Tusayan Black-on-red	7	2.15	1.095461659	1132.5	2.355242567	2667.312207
TOTALS (Decorated)	639				208.513302	233363.5368
Tusayan Corrugated	3762	2.25	100	1112.5	225	250312.5
TOTALS (Non-Decorated)	3762				225	250312.5
TOTALS (Decorated and Non-Decorated)					433.513302	483676.0368
Mean Ceramic Date (MCD) 1115.7121						
MCD (Non-Decorated only) 1112.5						
MCD (Decorated only) 1119.178175						

Table 4.36. Mean Ceramic Date Calculation for NA9058, AZ A:1:11 (MNA) (Littlefield).

Pottery Type	No. Sherds	CED Weight	Percentage	CED Median	Weighted Sherds	Sum Weight Date
Black Mesa Black-on-white	18	2.25	20.93023256	1087.5	47.09302326	21213.66279
Dogoszhi Black-on-white	3	2	3.488372093	1125	6.976744186	7848.837209
Flagstaff Black-on-white	7	2.75	8.139534884	1187.5	22.38372093	26580.6686
Deadmans Black-on-red	20	1.1	23.25581395	945	25.58139535	24174.4186
Medicine Black-on-red	12	2.75	13.95348837	1087.5	38.37209302	41729.65116
Tusayan Black-on-red	22	2.15	25.58139535	1132.5	55	62287.5
Citadel – Tusayan Polychrome	4	2.5	4.651162791	1200	11.62790698	13953.48837
TOTALS (Decorated)	86				207.0348837	227788.2267
MCD (Decorated only)						
1100.240803						

Table 4.37. Mean Ceramic Date Calculation for NA9066B (Fredonia II).

Pottery Type	No. Sherds	CED Weight	Percentage	CED Median	Weighted Sherds	Sum Weight Date
Medicine Black-on-red	1	2.75	100	1087.5	275	299062.5
TOTALS (Decorated)	1				275	299062.5
MCD (Decorated only)						
1087.5						

Table 4.38. Mean Ceramic Date Calculation for NA9072 (Fredonia II).

Pottery Type	No. Sherds	CED Weight	Percentage	CED Median	Weighted Sherds	Sum Weight Date
Dogoszhi Black-on-white	1	2	7.142857143	1125	14.28571429	16071.42857
Deadmans Black-on-red	1	1.1	7.142857143	945	7.857142857	7425
Tusayan Black-on-red	6	2.15	42.85714286	1132.5	92.14285714	104351.7857
Cameron Polychrome	3	3.25	21.42857143	1112.5	69.64285714	77477.67857
Citadel – Tusayan Polychrome	3	2.5	21.42857143	1200	53.57142857	64285.71429
TOTALS (Decorated)	14				237.5	269611.6071
MCD (Decorated only)						
1135.206767						

Table 4.39. Mean Ceramic Date Calculation for NA9073 (Fredonia II).

Pottery Type	No. Sherds	CED Weight	Percentage	CED Median	Weighted Sherds	Sum Weight Date
Kana-a Black-on-white	2	1.25	25	912.5	31.25	28515.625
Black Mesa Black-on-white	1	2.25	12.5	1087.5	28.125	30585.9375
Tusayan Black-on-red	4	2.15	50	1132.5	107.5	121743.75
Citadel – Tusayan Polychrome	1	2.5	12.5	1200	31.25	37500
TOTALS (Decorated)	8				198.125	218345.3125
MCD (Decorated only)						
1102.05836						

Table 4.40. Mean Ceramic Date Calculation for NA9074 (Fredonia II).

Pottery Type	No. Sherds	CED Weight	Percentage	CED Median	Weighted Sherds	Sum Weight Date
Black Mesa Black-on-white	3	2.25	60	1087.5	135	146812.5
Medicine Black-on-red	1	2.75	20	1087.5	55	59812.5
Tusayan Black-on-red	1	2.15	20	1132.5	43	48697.5
TOTALS (Decorated)	5				233	255322.5
MCD (Decorated only)						
1095.804721						

Table 4.41. Mean Ceramic Date Calculation for NA9077 (Fredonia II).

Pottery Type	No. Sherds	CED Weight	Percentage	CED Median	Weighted Sherds	Sum Weight Date
Black Mesa Black-on-white	4	2.25	100	1087.5	225	244687.5
TOTALS (Decorated)	4				225	244687.5
MCD (Decorated only)						
1087.5						

Table 4.42. Mean Ceramic Date Calculation for NA9079, AZ B:1:13 (MNA) (Fredonia II).

Pottery Type	No. Sherds	CED Weight	Percentage	CED Median	Weighted Sherds	Sum Weight Date
Black Mesa Black-on-white	1	2.25	10	1087.5	22.5	24468.75
Deadmans Black-on-red	3	1.1	30	945	33	31185
Medicine Black-on-red	2	2.75	20	1087.5	55	59812.5
Tusayan Black-on-red	4	2.15	40	1132.5	86	97395
TOTALS (Decorated)	10				196.5	212861.25
MCD (Decorated only)						
1083.263359						

Table 4.43. Mean Ceramic Date Calculation for NA9083 (Fredonia II).

Pottery Type	No. Sherds	CED Weight	Percentage	CED Median	Weighted Sherds	Sum Weight Date
Black Mesa Black-on-white	5	2.25	71.42857143	1087.5	160.7142857	174776.7857
Citadel – Tusayan Polychrome	2	2.5	28.57142857	1200	71.42857143	85714.28571
TOTALS (Decorated)	7				232.1428571	260491.0714
MCD (Decorated only)						
1122.115385						

Indirect Dating of Painted Virgin Branch Pottery Styles in the Context of Kayenta Branch Chronometry: Mean Ceramic Dating and Ceramic Cross-Dating

Following from the mean ceramic dates calculated from select Virgin Branch sites, I correlated these mean ceramic dates with known date ranges for Tusayan Gray Ware, Tusayan White Ware (Kayenta Series), Tsegi Orange Ware, and San Juan Red Ware pottery types recovered from Virgin Branch sites (see Figure 4.1). These date ranges were synthesized from Christenson (1994:305) and represented graphically in Figure 4.1 to serve as a baseline temporal illustration upon which I overlaid deduced date ranges for painted Virgin Branch pottery styles (discussed in Chapter 5). This section presents my synthesis of mean ceramic dates, based on well-dated non-local pottery types. The resulting dates, in turn, help organize my research into painted Virgin Branch pottery types within a coherent chronometric framework.

Mean Ceramic Dating: Imported Pottery Types in the Context of Virgin Branch Sites

Using the date ranges from Christenson (1994:305), in conjunction with the mean ceramic dates in Table 4.3 through 4.43, I graphically transposed these mean ceramic dates over the imported pottery types found at each Virgin Branch site as a way of visualizing the general temporal relationship between the known manufacture and distribution dates for these imported ceramics and the mean ceramic date for a given site (see Figures 4.2 through 4.20). Although a temporal relationship between the reported mean ceramic date (indicated by a red line) and the recovered imported pottery type(s) for each site represented in Figures 4.2 through 4.20 may appear to some as meaningful, this perceived relationship is superficial and only meaningful with additional temporal and contextual anchor points—namely, radiocarbon dates and imported pottery associated with painted Virgin Branch pottery styles from systemic contexts.

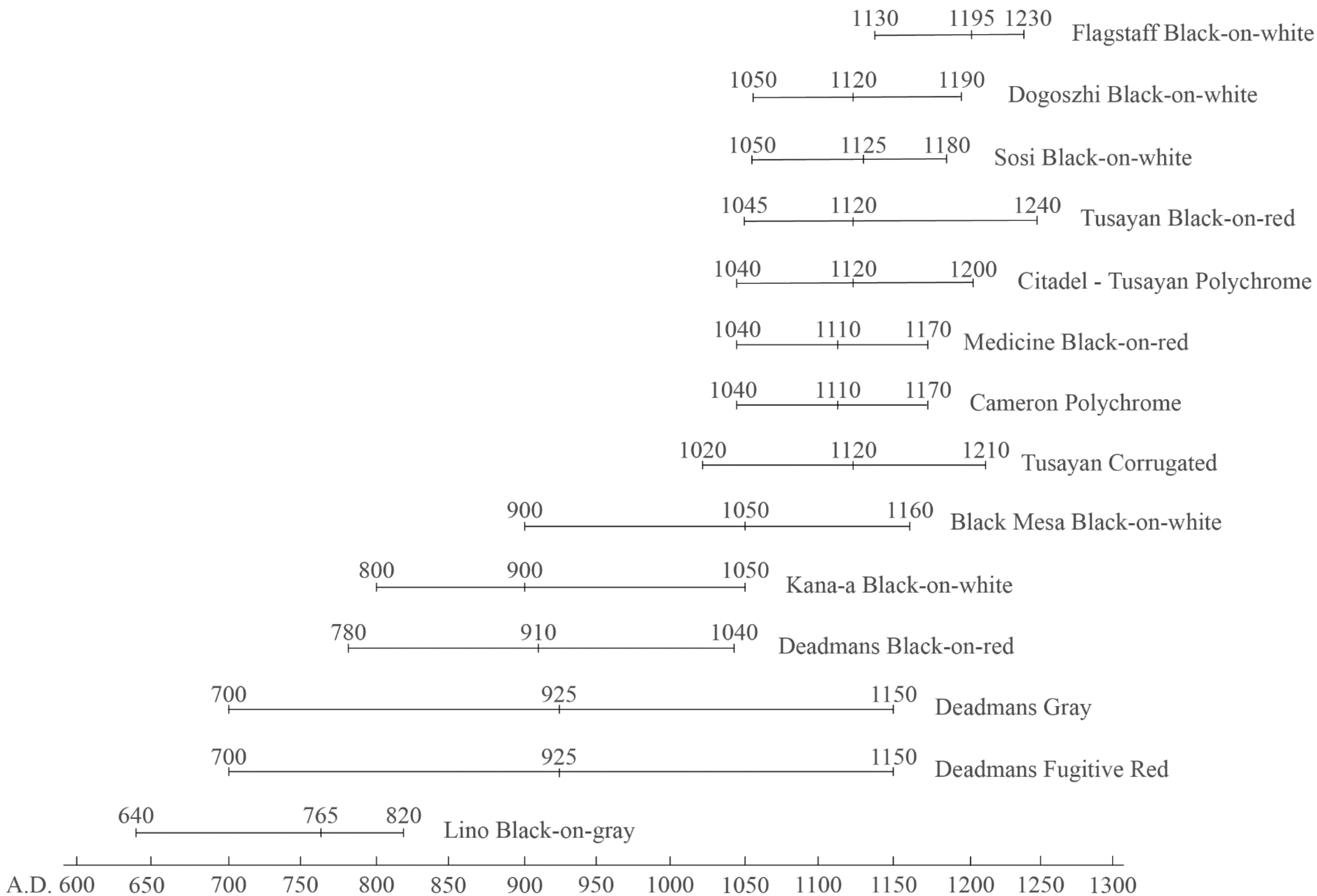


Figure 4.1. Ceramic type date ranges, including median dates, for imported pottery types recovered from Virgin Branch sites.

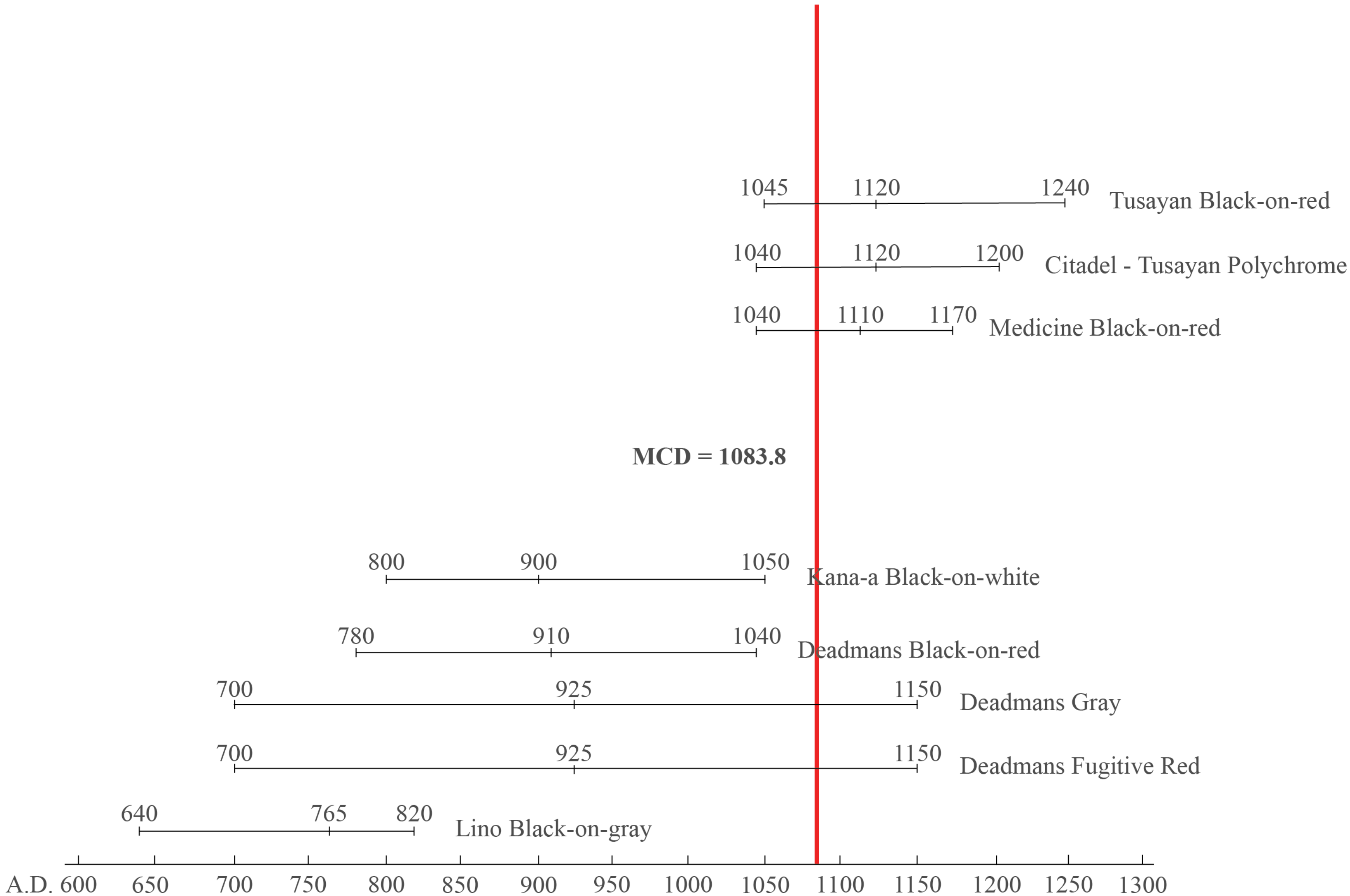


Figure 4.2. Mean ceramic date (MCD) for 26Ck2148 (Lost City), inclusive of all Houses, based on recovered imported pottery types.

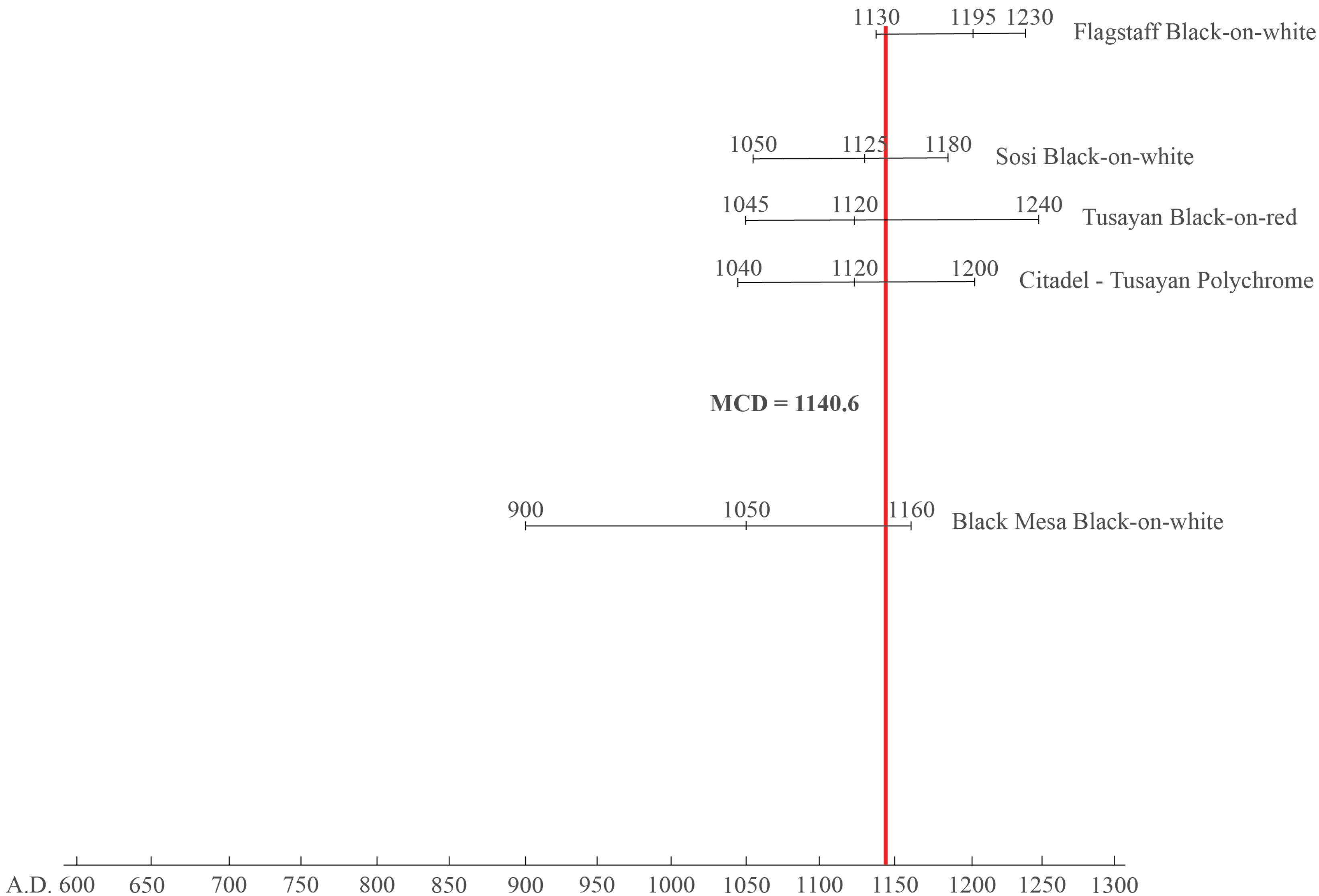


Figure 4.3. Mean ceramic date (MCD) for 42Ka1076 (Bonanza Dune), based on recovered imported pottery types.

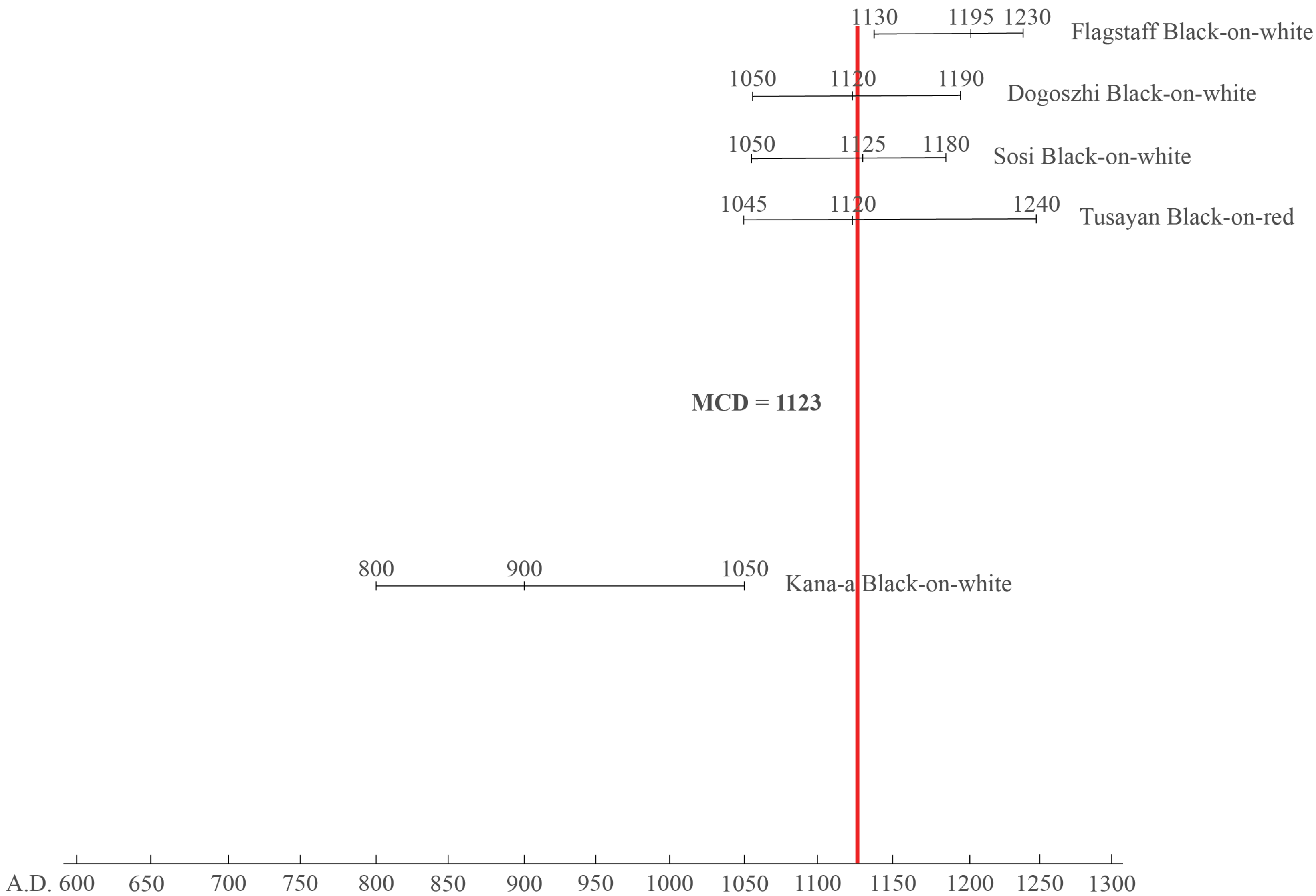


Figure 4.4. Mean ceramic date (MCD) for 42Ws392 (Quail Creek), based on recovered imported pottery types.

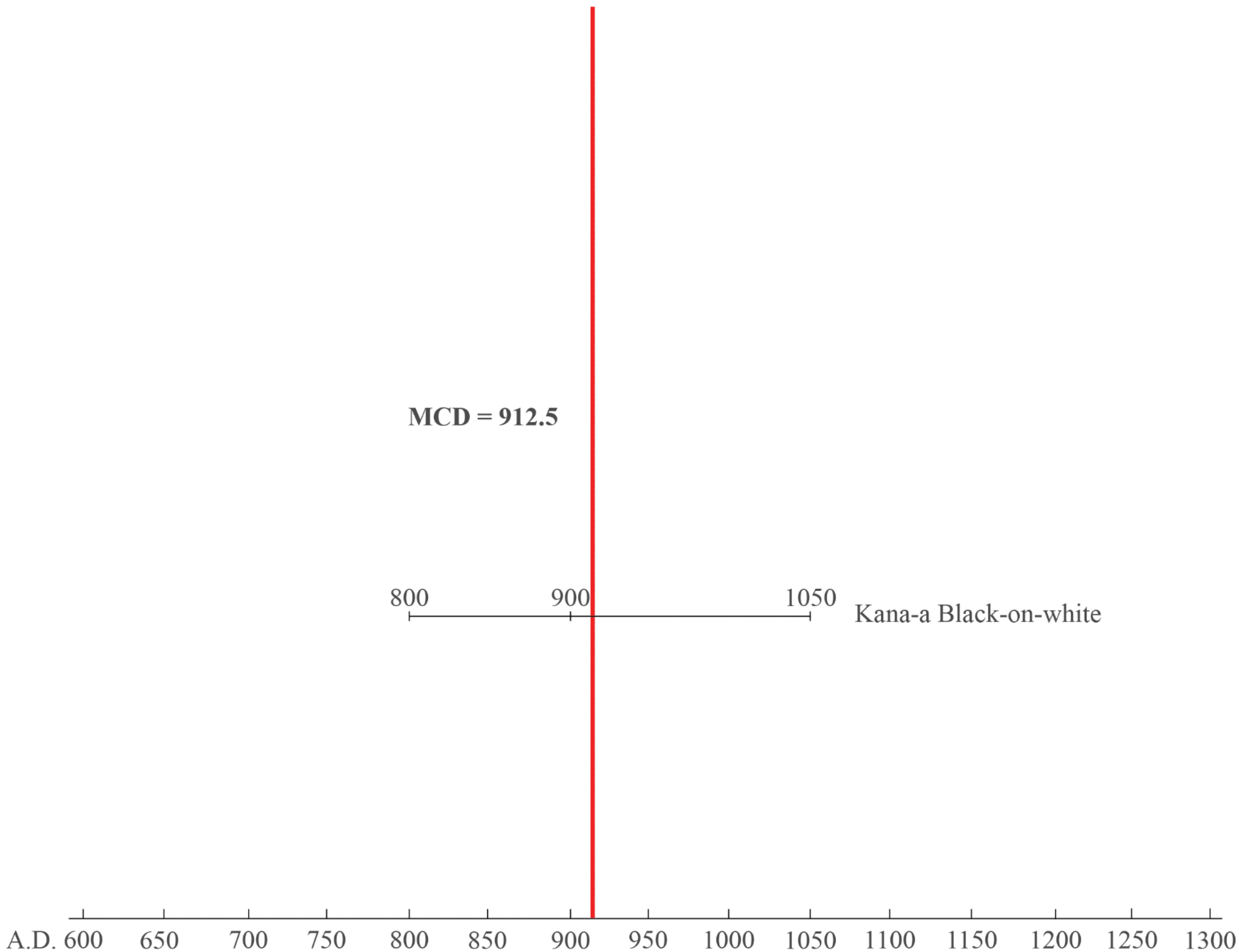


Figure 4.5. Mean ceramic date (MCD) for 42Ws503 (Red Cliffs Site), based on recovered imported pottery types.

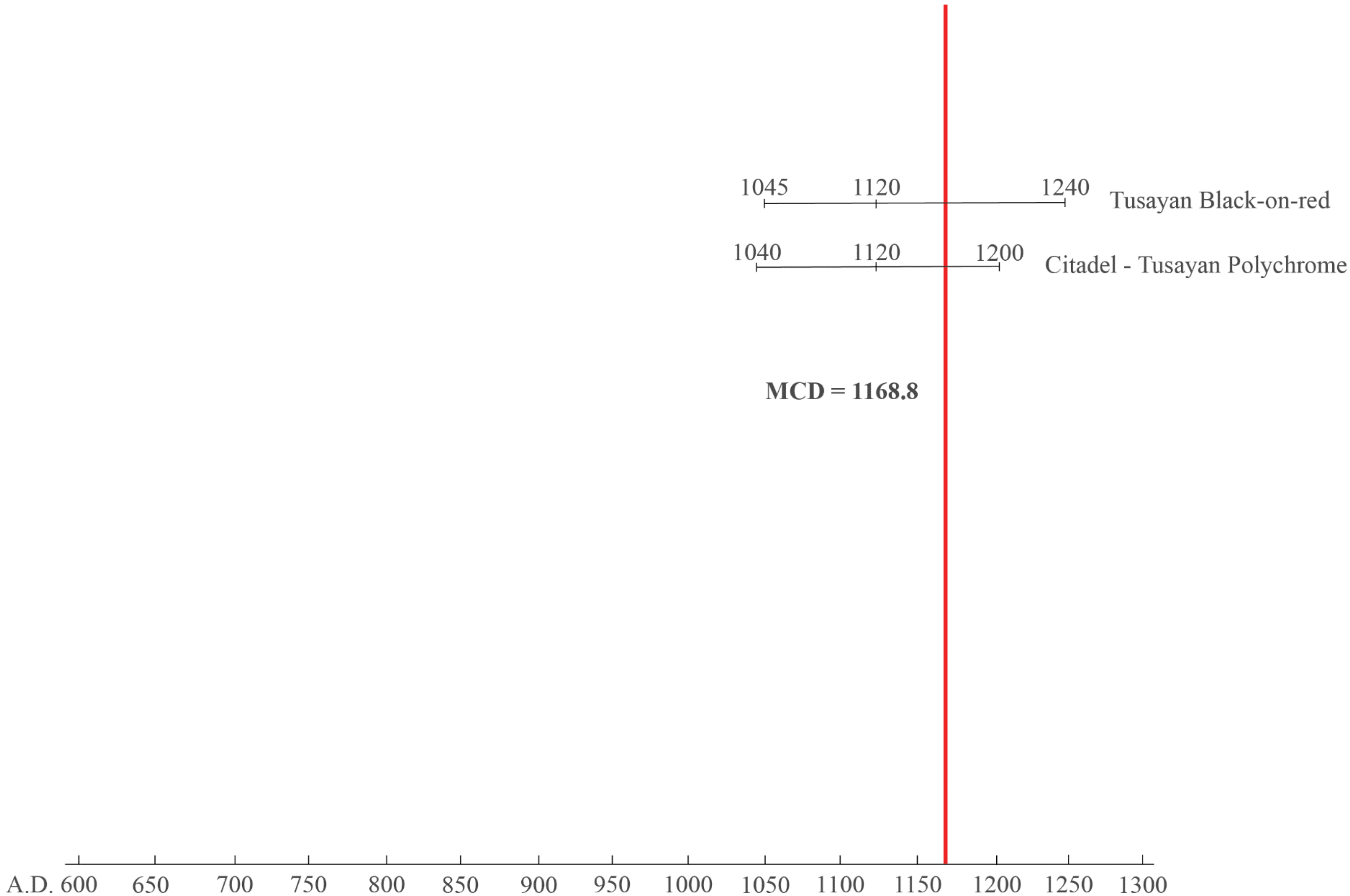


Figure 4.6. Mean ceramic date (MCD) for 42Ws920 (Little Creek), based on recovered imported pottery types.

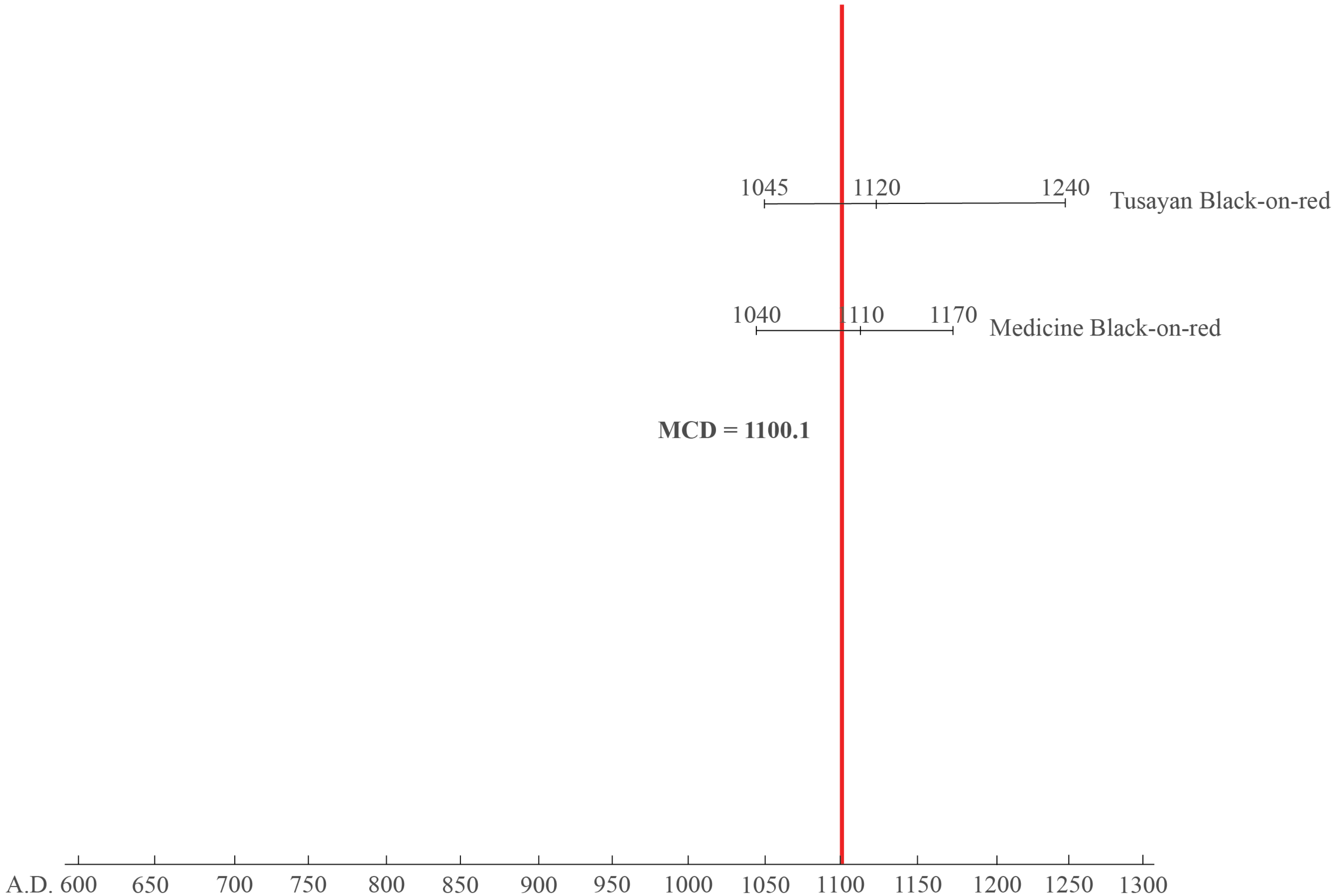


Figure 4.7. Mean ceramic date (MCD) for AZ B:1:63 (BLM) (Yellowstone Mesa), based on recovered imported pottery types.

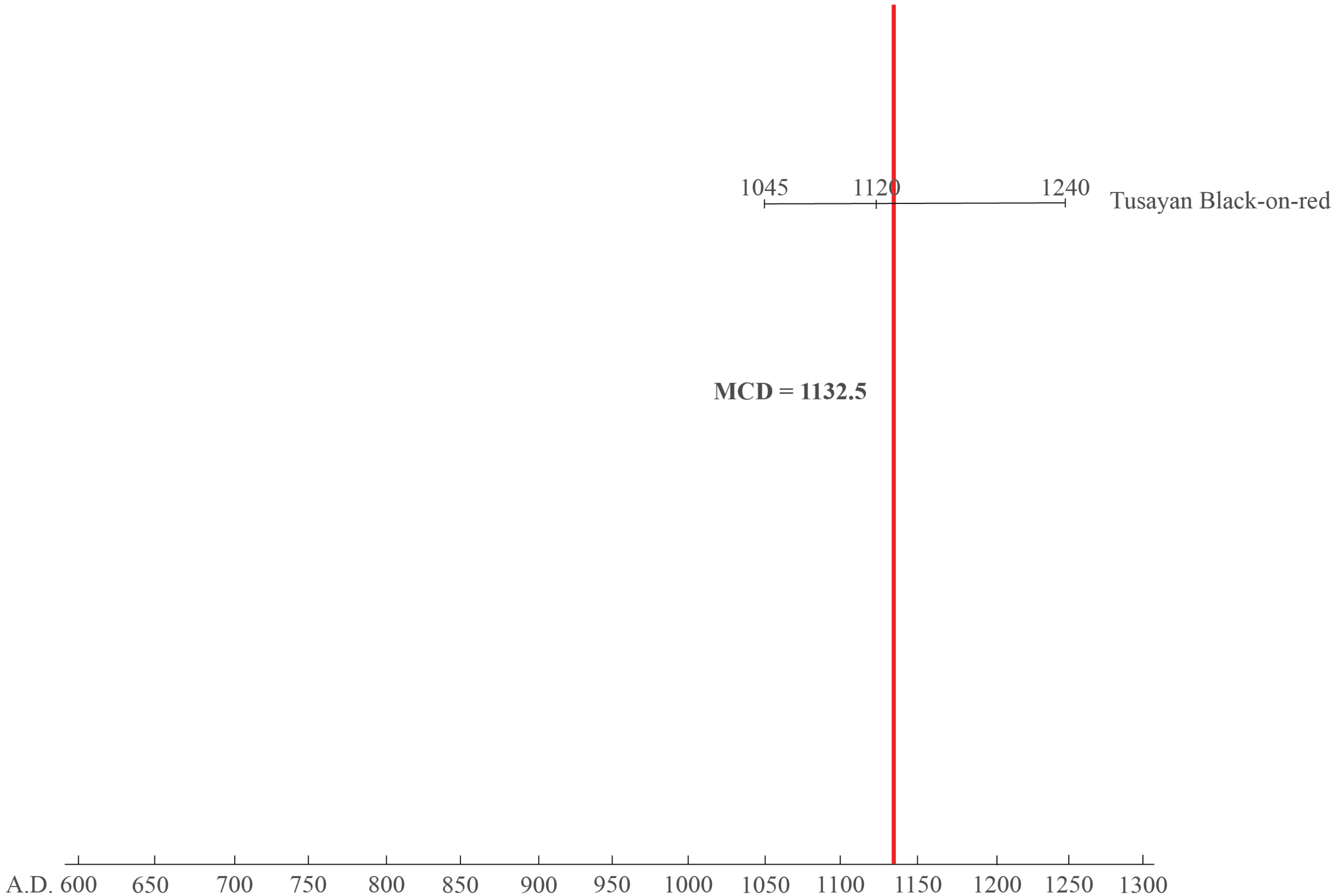


Figure 4.8. Mean ceramic date (MCD) for AZ B:1:64 (BLM) (Yellowstone Mesa), based on recovered imported pottery types.

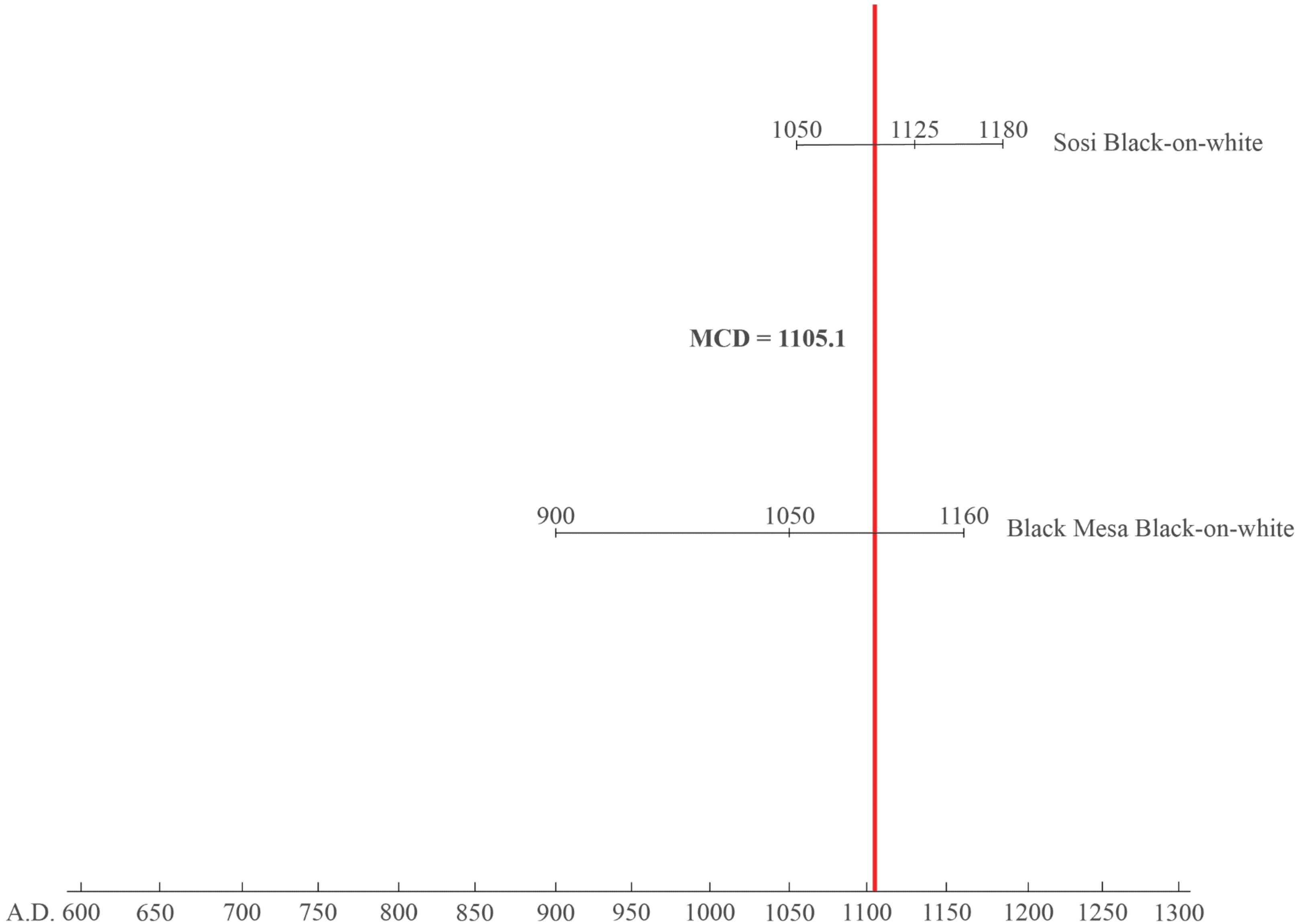


Figure 4.9. Mean ceramic date (MCD) for Gold Butte (inclusive of all sites), based on recovered imported pottery types.

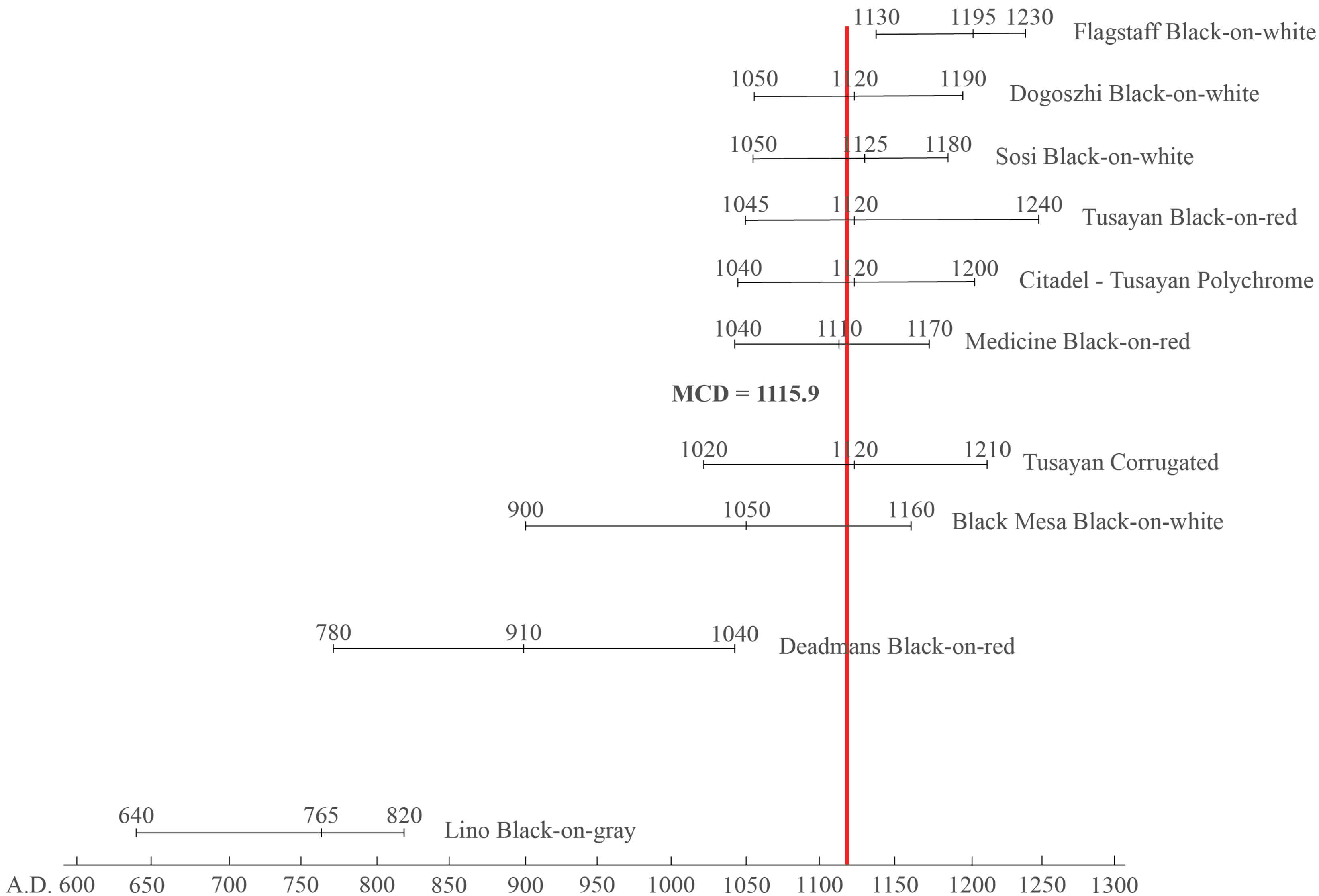


Figure 4.10. Mean ceramic date (MCD) for 2Mo869, AZ B:1:102 (Corngrower Site), based on recovered imported pottery types.

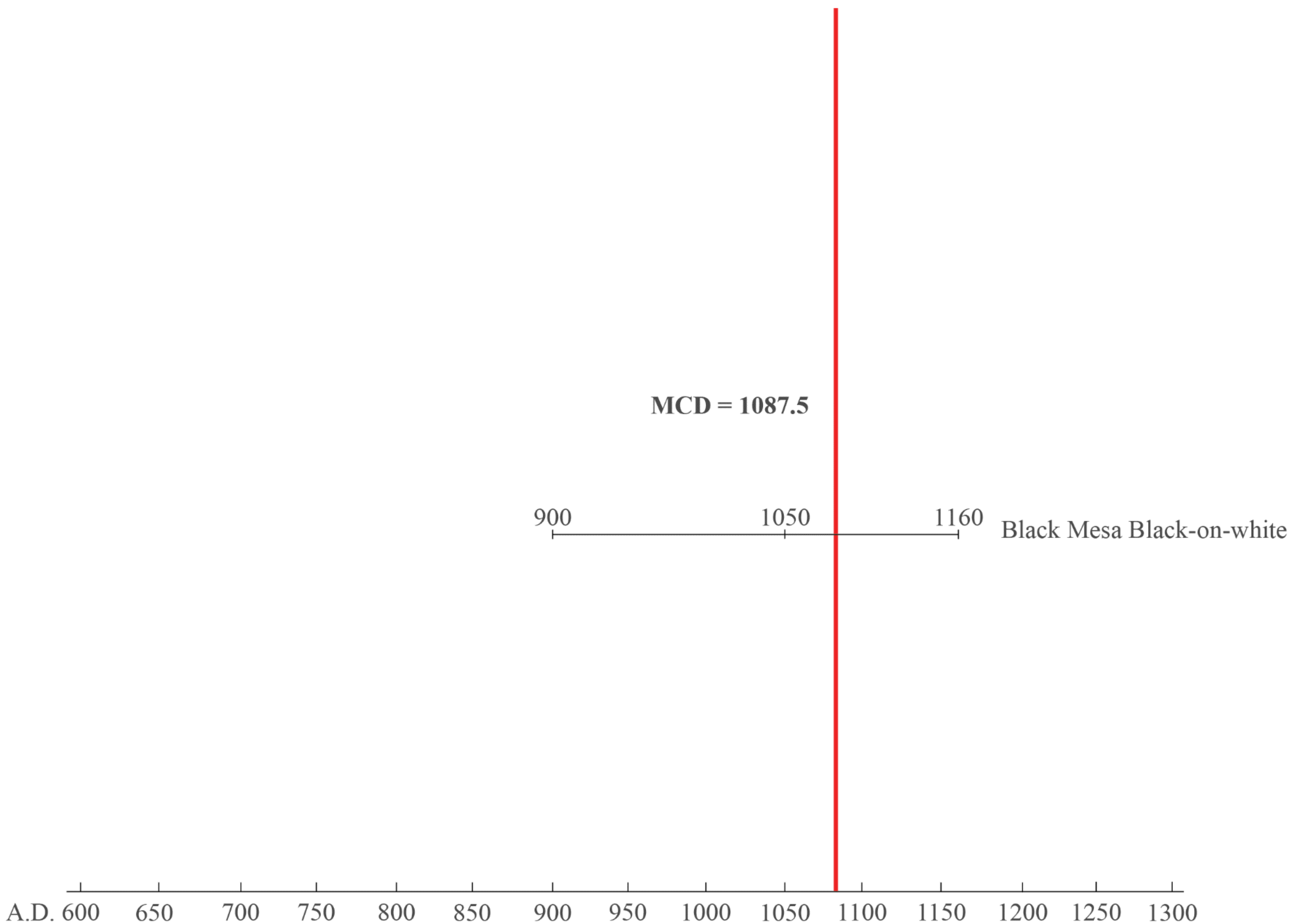


Figure 4.11. Mean ceramic date (MCD) for NA8961 (Fredonia I), based on recovered imported pottery types.

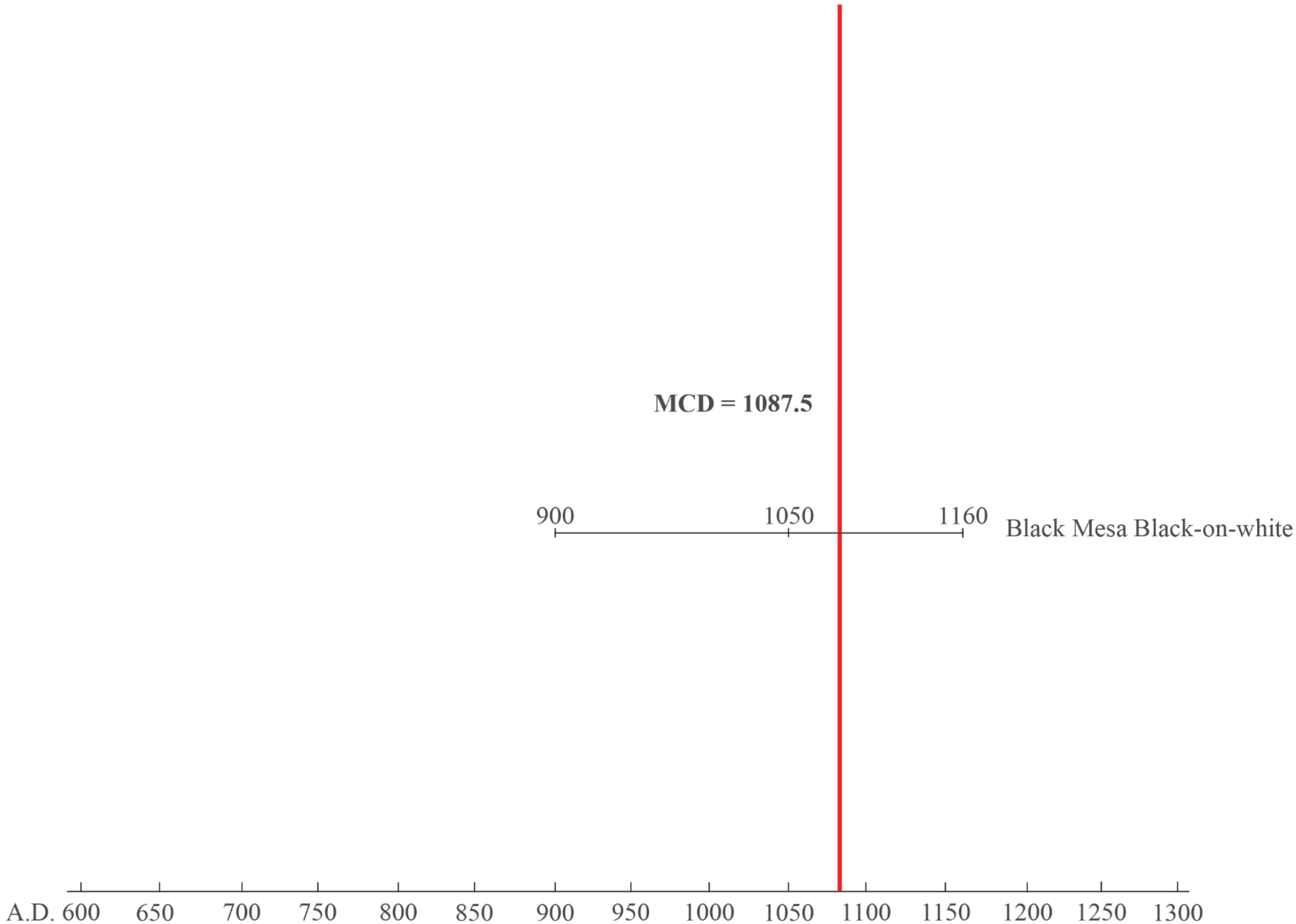


Figure 4.12. Mean ceramic date (MCD) for NA8962 (Fredonia I), based on recovered imported pottery types.

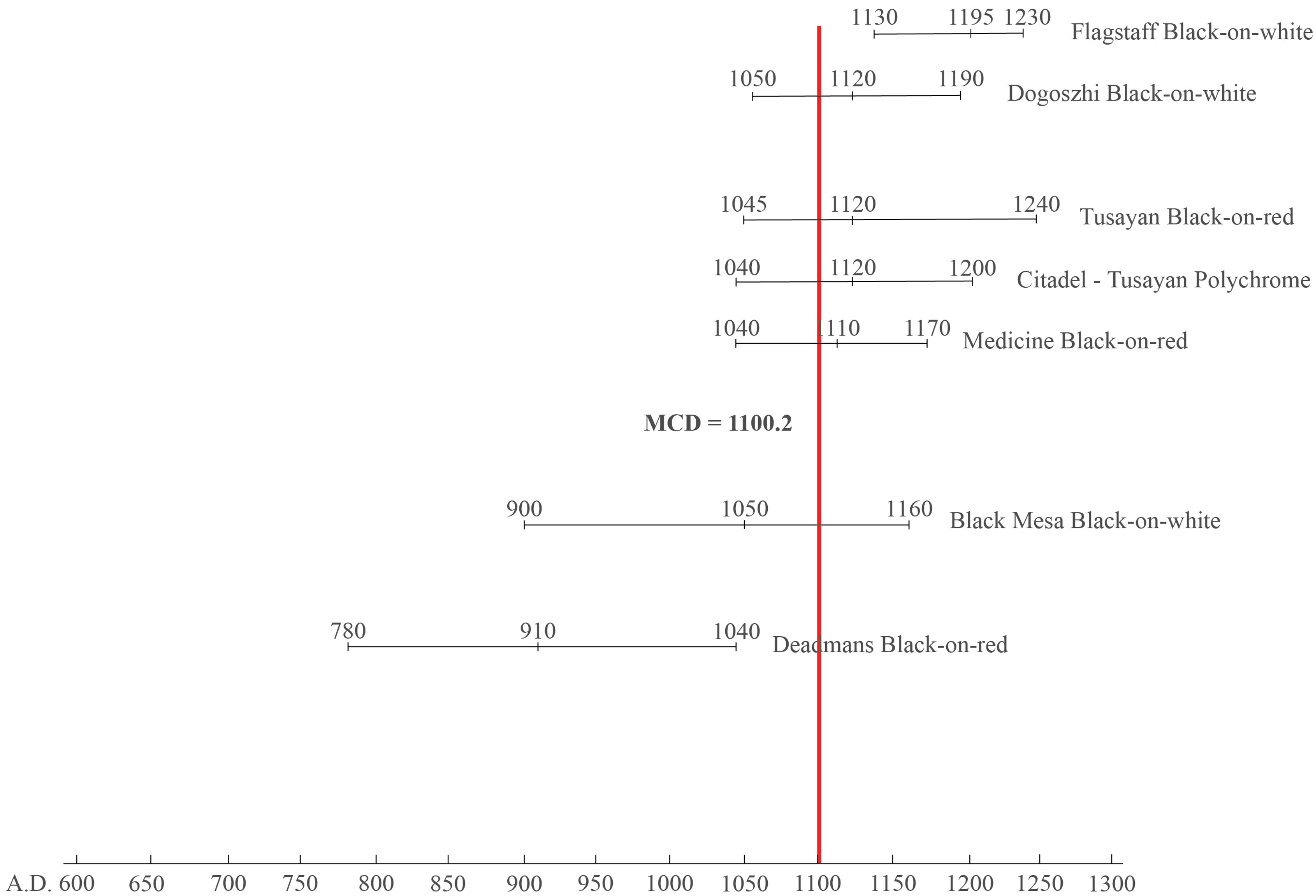


Figure 4.13. Mean ceramic date (MCD) for NA9058, AZ A:1:11 (Littlefield), based on recovered imported pottery types.

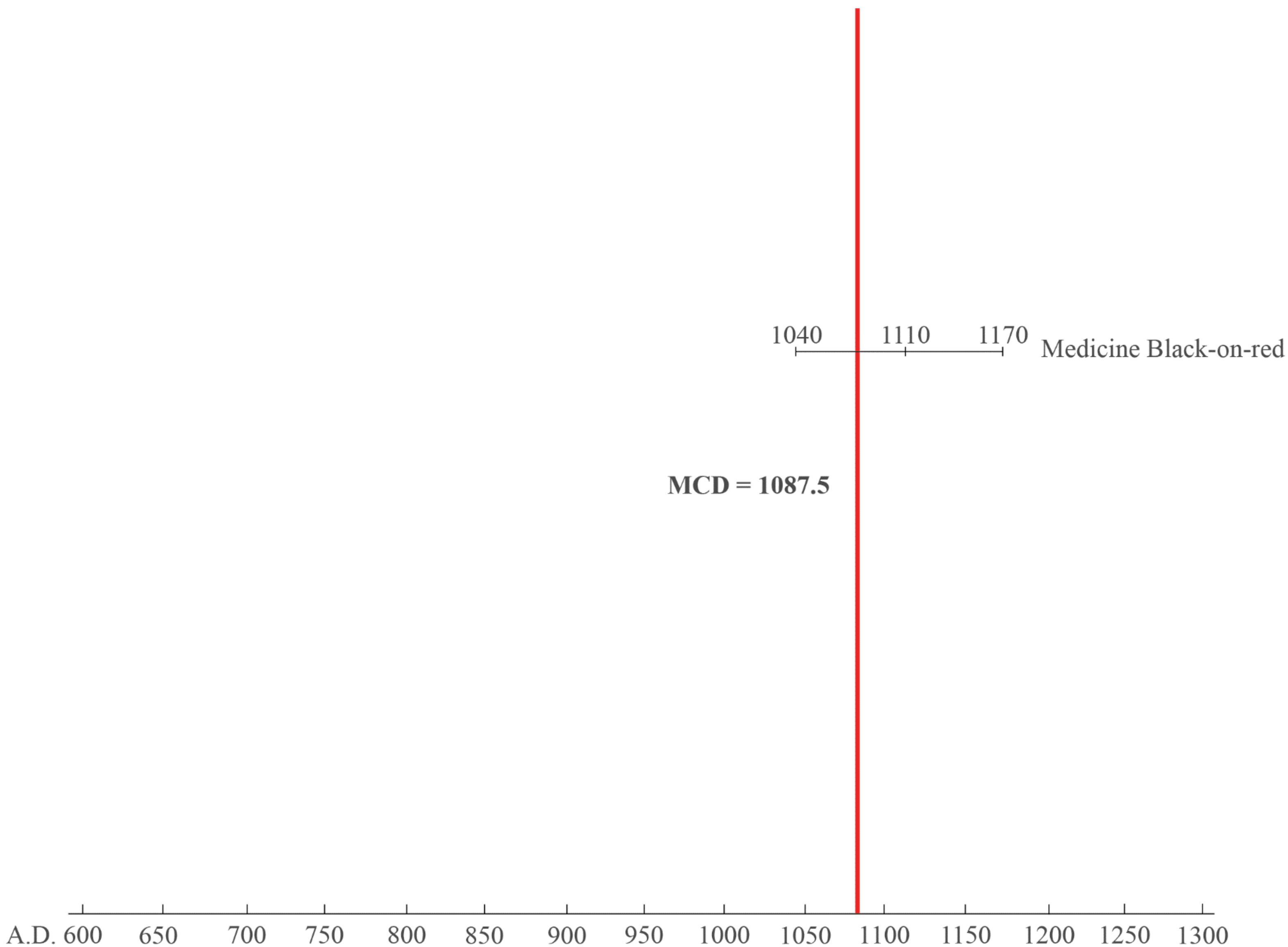


Figure 4.14. Mean ceramic date (MCD) for NA9066B (Fredonia II), based on recovered imported pottery types.

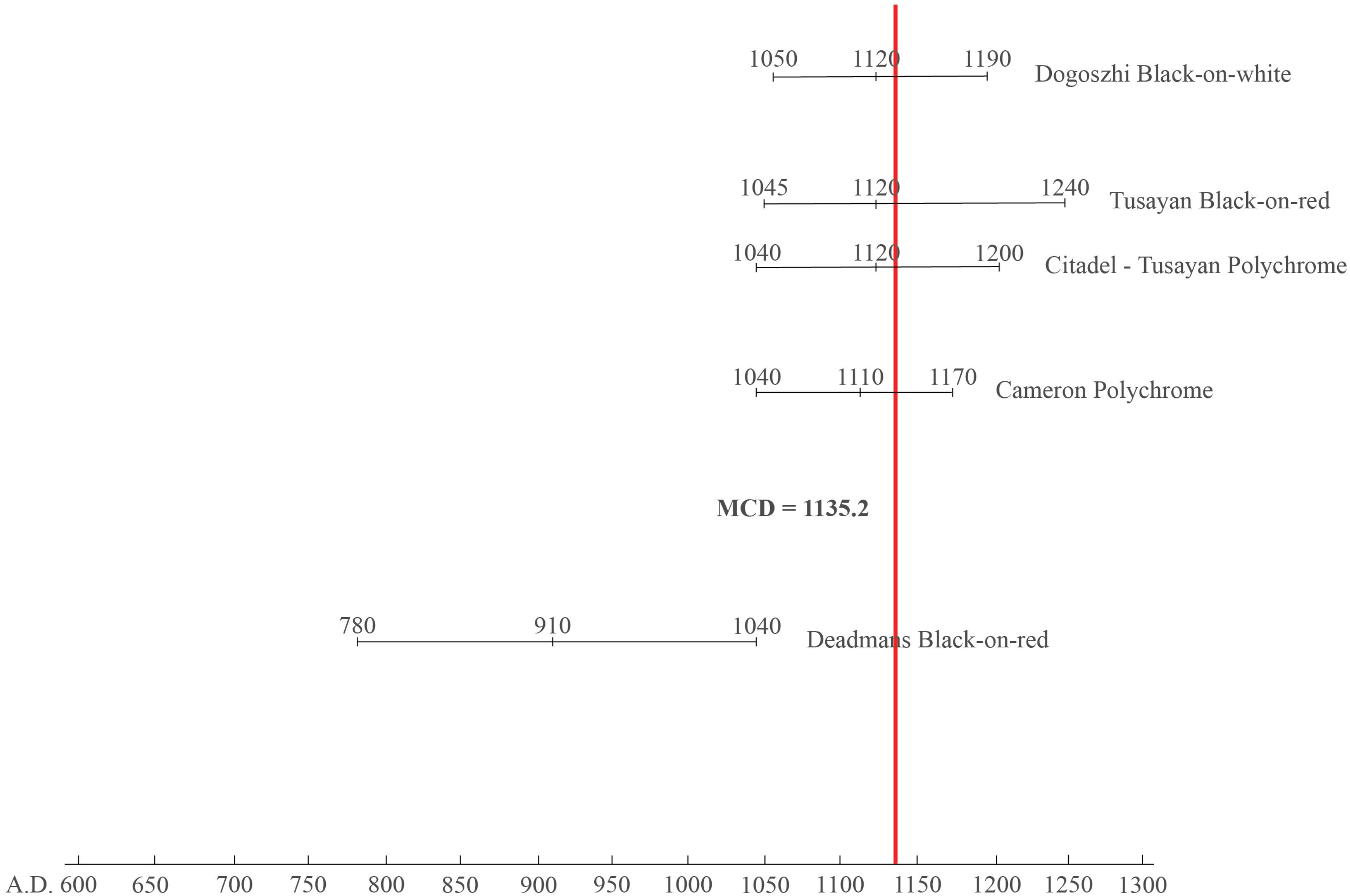


Figure 4.15. Mean ceramic date (MCD) for NA9072 (Fredonia II), based on recovered imported pottery types.

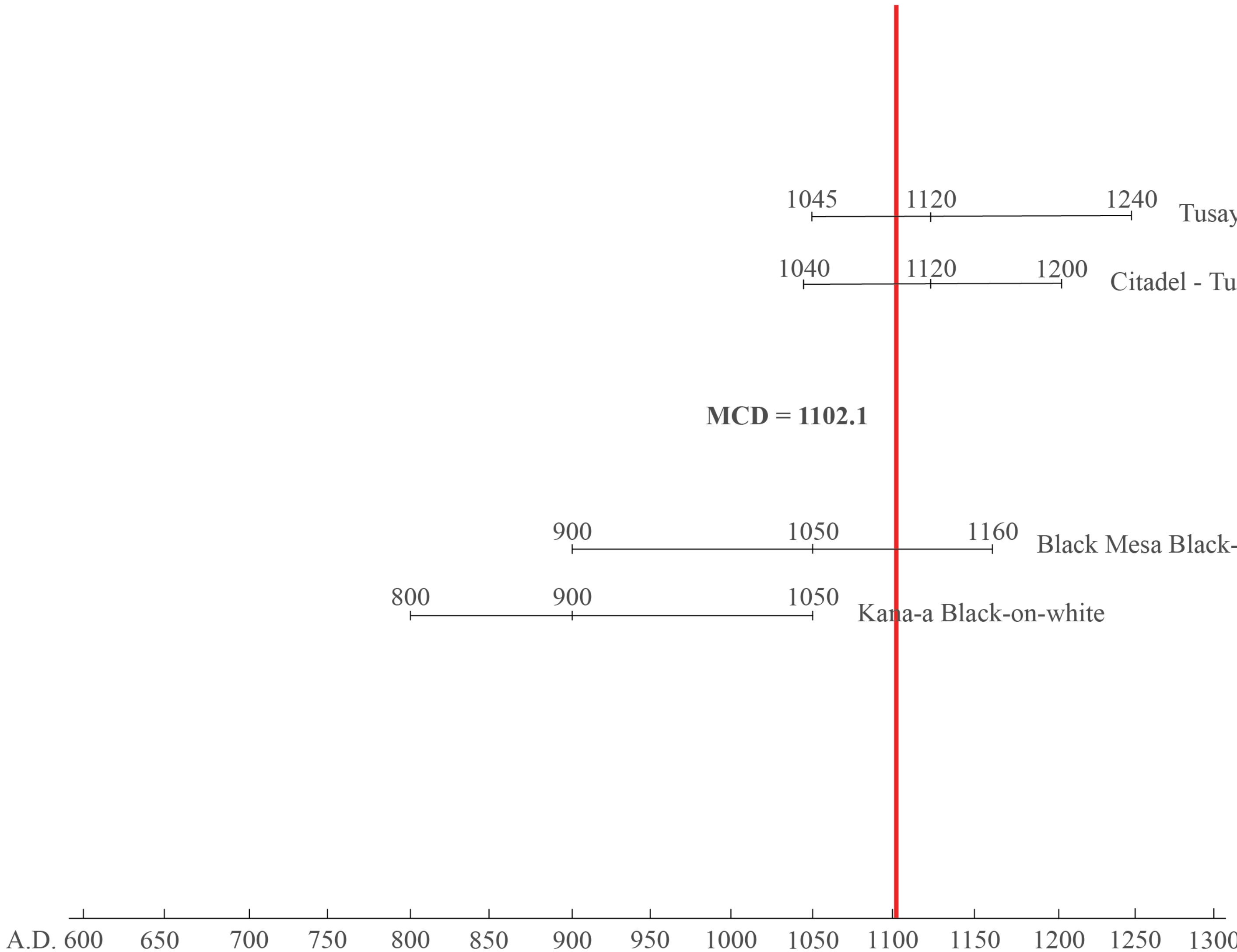


Figure 4.16. Mean ceramic date (MCD) for NA9073 (Fredonia II), based on recovered imported pottery types.

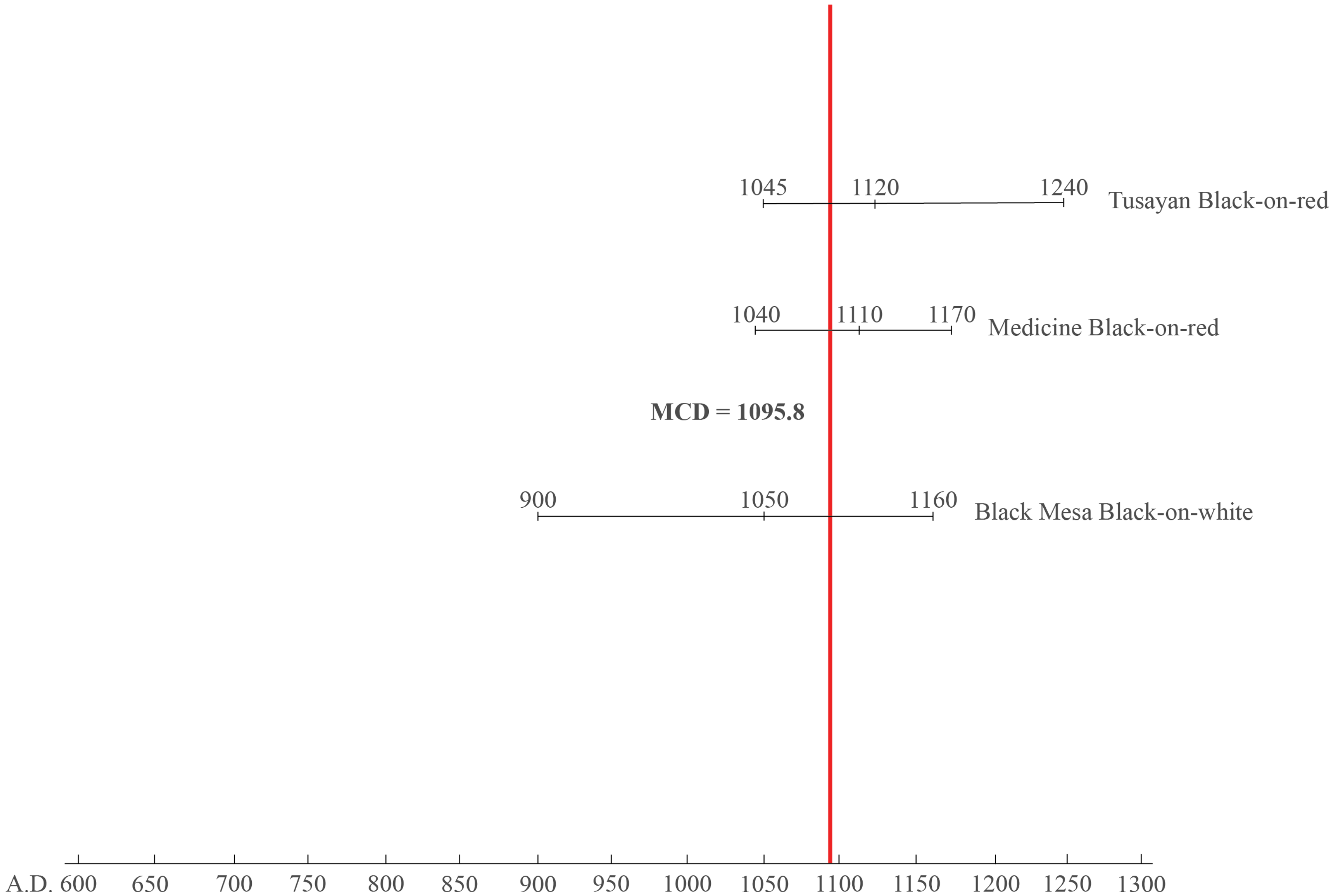


Figure 4.17. Mean ceramic date (MCD) for NA9074 (Fredonia II), based on recovered imported pottery types.

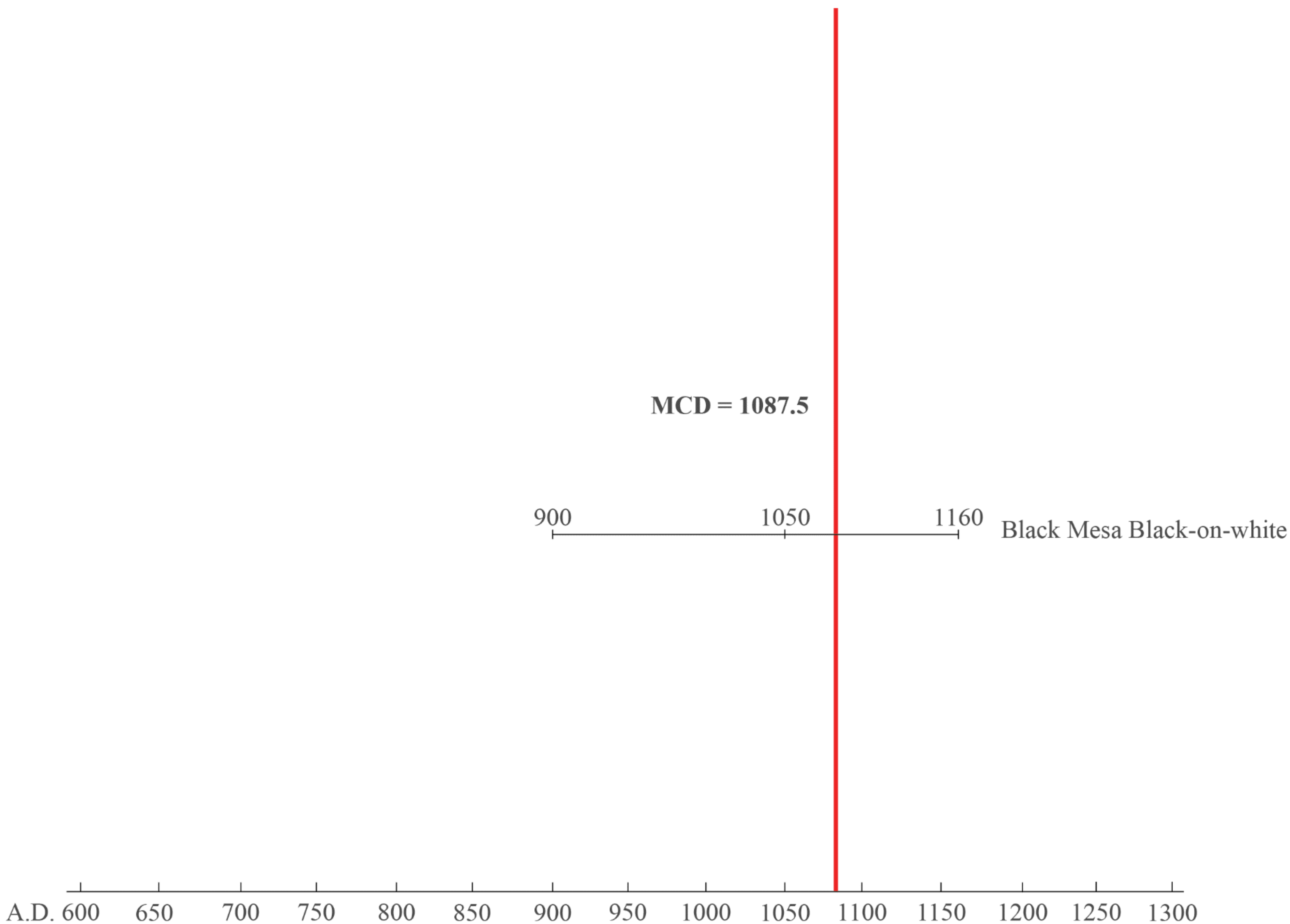


Figure 4.18. Mean ceramic date (MCD) for NA9077 (Fredonia II), based on recovered imported pottery types.

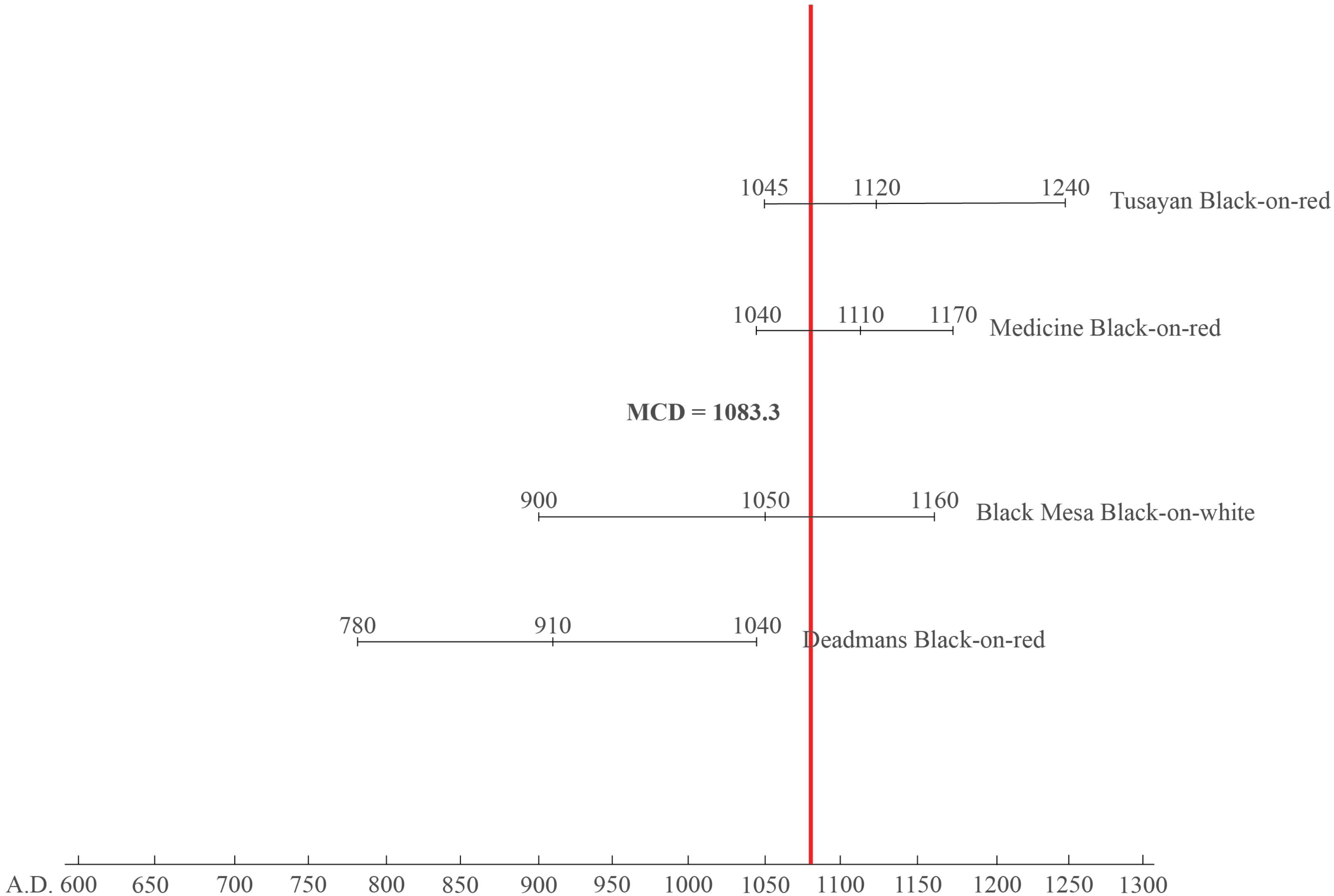


Figure 4.19. Mean ceramic date (MCD) for NA9079 (Fredonia II), based on recovered imported pottery types.

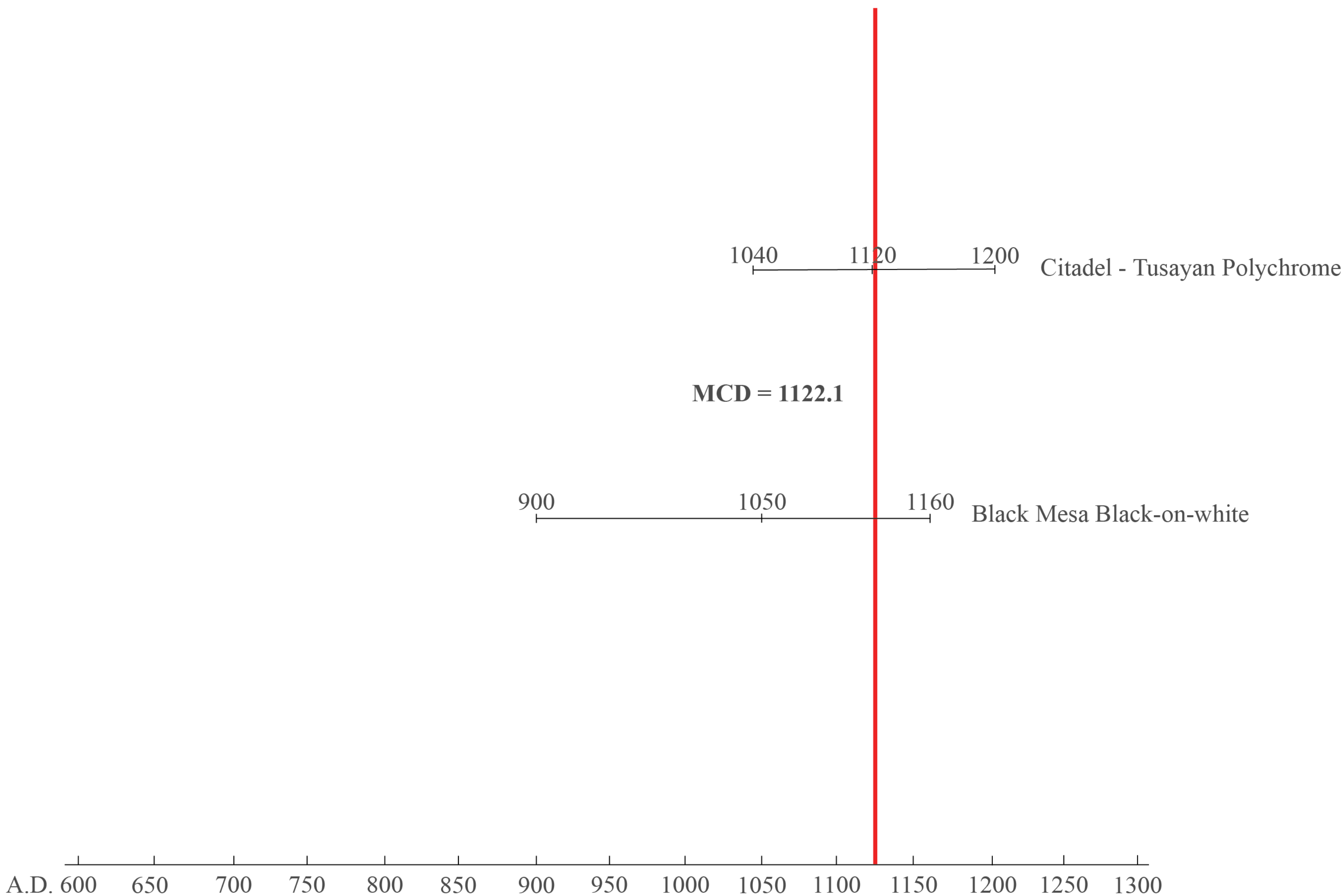


Figure 4.20. Mean ceramic date (MCD) for NA9083 (Fredonia II), based on recovered imported pottery types.

Organization and Use of Painted Virgin Branch Pottery Style Names

As found in Table 4.44 below, the information gathered from Richard Thompson's pottery classification system presented in Walling et al. (1986:352), painted Virgin Branch pottery styles are generally organized within four distinct ware categories—Tusayan White Ware, Virgin Series; Moapa Gray Ware; Tusayan White Ware, Virgin Series (Corrugated); and Tusayan White Ware, Moapa Series (Corrugated). While technological and stylistic differences may in fact legitimately justify treating each of these ware categories as distinct bins, investigation of such nuances among subcategories of Virgin Branch pottery wares is outside of the scope of this dissertation. As such, for the purposes of the chronometric and stylistic analysis components of this research, these four ware categories are treated as interchangeable with regard to overarching painted stylistic designs. The reason for this reduction is three-fold.

First, investigation of minute (and presumably discernable) distinctions between these four categories is outside the scope of my established research design. Second, the overwhelming majority of the painted Virgin Branch pottery styles recovered from archaeological sites are Tusayan White Ware, Virgin Series sherds and vessels, with the other three groupings scantly represented in site pottery assemblages—if at all (see Tables 4.45 - 4.78 below for examples of these representational disparities). Finally, the primary aim of the chronometric refinement of this dissertation concerns painted Virgin Branch pottery styles (collectively) in juxtaposition with painted Kayenta Branch pottery styles. My treatment of both Tusayan White Ware, Kayenta Series painted styles and the associated Shato (corrugated) varieties associated with the complementary non-corrugated design styles is similar to my approach to painted Virgin Branch pottery styles.

Table 4.44. Ware and Type Classification for Painted Kayenta and Virgin Branch Pottery Styles.

Tusayan Gray and White Wares, Kayenta Series	*Tusayan White Ware, Virgin Series*	Moapa Gray Ware	*Tusayan White Ware, Virgin Series (Corrugated)*	*Tusayan White Ware, Moapa Series (Corrugated)*
Lino Black-on-gray	Mesquite Black-on-gray	Boulder Black-on-gray	-	-
Kana-a Black-on-white	Washington Black-on-gray	Boysag Black-on-gray	-	-
Black Mesa Black-on-white	St. George Black-on-gray	Trumbull Black-on-gray	Orderville Black-on-gray	Toroweap Black-on-gray
Sosi Black-on-white	North Creek Black-on-gray	Moapa Black-on-gray	Hurricane Black-on-gray	Whitmore Black-on-gray
Dogoszhi Black-on-white	Hildale Black-on-gray	Slide Mountain Black-on-gray	Pipe Spring Black-on-gray	Fern Glen Black-on-gray
Flagstaff Black-on-white	Glendale Black-on-gray	Poverty Mountain Black-on-gray	Parashant Black-on-gray	Tuckup Black-on-gray

Ceramic Cross-Dating Painted Virgin Branch Pottery Styles: Methods and Implementation

The above site-specific mean ceramic dates, along with painted Virgin Branch pottery styles recovered from each site (Tables 4.3 - 4.43, Figures 4.1 - 4.20) and the available radiocarbon assays from Virgin Branch sites (see Table 4.79), serve as the baseline in helping me indirectly date these pottery styles in the context of the established chronometric record for Kayenta Branch pottery. In this section, I discuss my use, and associated reasoning, of painted Virgin Branch pottery styles in the context of my research question. In the latter portion of this section, I present the distribution of both painted Virgin and Kayenta Branch pottery sherds recovered from the same depositional context, as observed among the sites selected for chronometric refinement of the Virgin Branch heartland and painted pottery styles (see Tables 4.45 - 4.78). Although overall, indiscriminate counts of imported pottery sherds were utilized to calculate mean ceramic dates for selected sites, I implemented a more nuanced approach to ascertain mean ceramic dates that could be used to indirectly date painted Virgin Branch pottery styles.

Following the ceramic cross-dating method successfully implemented by Wallace (1992), on ceramic styles in the Tonto Basin of central Arizona, I adapted Wallace's approach to indirectly date painted Virgin Branch pottery styles by cross-dating with tree-ring dated imported pottery types found to occur in the same depositional context (Tables 4.45 - 4.78). In my adaptation of Wallace's approach to ceramic cross-dating painted Virgin Branch pottery styles with depositionally-associated imported sherds, I implemented the following four specific guidelines set forth by Wallace (1992:37) as a means of helping establish meaningful associations between Virgin Branch and imported pottery sherds found in the same depositional context(s):

1. Contexts must be unmixed; i.e., sequential or discontinuous noncontemporaneous well-dated ceramic types cannot co-occur in the given context. An exception in this regard would be cases where multiple occupations are evident that are markedly distinct in time such as a pithouse occupation in the A.D. 800s overlain by a Pueblo III occupation in the 1200s. The types are easily separated and associations tend to be unambiguous in these cases. Another exception might be cases in the [Virgin Branch] area where some mixing is evident with later ceramic types, but the intrusive ceramic is indisputably related to the earliest [Virgin Branch] ceramics in the deposit.

2. Single sherd associations are considered weaker than multiple sherds, though they are not necessarily rejected out of hand.

3. There must be diagnostic ceramics in direct association. Phase assignments based on related features on a site or on stratigraphic information alone are not accepted.

4. Contexts considered suitable for consideration can include structure floors, floor pits, structure fill, and burials (although isolated sherds are not considered suitable in burial fill). Contexts such as extramural pits and trash middens are considered inadequate due to the very common problems of contextual interpretation and mixing that occur within them. This is not to say that these problems do not occur in houses; only that on a probabilistic basis the likelihood of there being poor associations is much greater in extramural pits and midden deposits. Needless to say, nonfeature and extramural surface contexts also are considered inadequate for the purposes of this study.

Following from these guidelines, counts of these contextually associated painted Virgin Branch and imported pottery types were then correlated with calculated mean ceramic dates (Tables 4.45 - 4.78). My assessment of all these contextually associated pottery sherds informed my inferred painted Virgin Branch pottery style chronometry, presented in Chapter 5.

Painted Virgin and Kayenta Branch Pottery Styles: Sherds Counts from Associated Proveniences

The following data, Tables 4.45 - 4.78, present the aggregated painted Virgin and Kayenta Branch pottery counts, along with the data source from which the information was collected. For all pottery types with zero counts, this information was either present as such in a given archaeological report or was simply excluded all together (implying the absence of a given type).

Table 4.45. Painted Virgin and Kayenta Branch Pottery Sherd Counts Recovered from 26Ck2148, House 47.

Pottery Ware and Type	Room 26	Room 30	Room 33	Room 39	Room 45	Room 64	Room 66	Data Source
Tusayan White Ware, Virgin Series								
Washington Black-on-gray	-	-	-	-	-	1	-	Shutler (1961:23)
St. George Black-on-gray	2	6	-	10	4	1	4	Shutler (1961:23)
North Creek Black-on-gray	4	17	7	37	2	6	33	Shutler (1961:23)
Moapa Gray Ware								
Boulder Black-on-gray	-	-	-	-	-	-	1	Shutler (1961:23)
Trumbull Black-on-gray	-	-	-	-	2	-	-	Shutler (1961:23)
Moapa Black-on-gray	-	1	-	1	-	1	4	Shutler (1961:23)
Tusayan White Ware, Virgin Series (Corrugated)								
Hurricane Black-on-gray	-	1	1	1	2	5	3	Shutler (1961:23)
Tsegi Orange Ware								
Medicine Black-on-red	-	-	-	-	1	1	-	Shutler (1961:23)
Tusayan Black-on-red	1	1	1	4	-	2	4	Shutler (1961:23)

Table 4.46. Painted Virgin and Kayenta Branch Pottery Sherd Counts Recovered from 26Ck2148, House 50.

Pottery Ware and Type	Room 4	Room 13	Room 14	Room 20	Room 24	Room 25	Data Source
Tusayan White Ware, Virgin Series							
Washington Black-on-gray	-	-	-	-	1	1	Shutler (1961:24)
St. George Black-on-gray	2	-	24	1	2	1	Shutler (1961:24)
North Creek Black-on-gray	-	3	7	-	7	3	Shutler (1961:24)
Moapa Gray Ware							
Boulder Black-on-gray	-	-	-	-	2	-	Shutler (1961:24)
Moapa Black-on-gray	-	-	4	-	1	1	Shutler (1961:24)
Tusayan White Ware, Virgin Series (Corrugated)							
Hurricane Black-on-gray	1	-	-	-	-	-	Shutler (1961:24)
Tsegi Orange Ware							
Medicine Black-on-red	-	1	8	1	2	2	Shutler (1961:24)
Tusayan Black-on-red	1	-	-	-	-	-	Shutler (1961:24)

Table 4.47. Painted Virgin and Kayenta Branch Pottery Sherd Counts Recovered from 26Ck2148, House 68.

Pottery Ware and Type	Room 3	Data Source
Tusayan White Ware, Virgin Series		
St. George Black-on-gray	3	Shutler (1961:24)
North Creek Black-on-gray	6	Shutler (1961:24)
Moapa Gray Ware		
Moapa Black-on-gray	1	Shutler (1961:24)
Tsegi Orange Ware		
Medicine Black-on-red	2	Shutler (1961:24)
Tusayan Black-on-red	1	Shutler (1961:24)

Table 4.48. Painted Virgin and Kayenta Branch Pottery Sherd Counts Recovered from 26Ck2148, House 71.

Pottery Ware and Type	Room 3	Room 4	Room 5	Data Source
Tusayan White Ware, Virgin Series				
Washington Black-on-gray	-	-	1	Shutler (1961:24)
St. George Black-on-gray	6	-	-	Shutler (1961:24)
North Creek Black-on-gray	5	1	1	Shutler (1961:24)
Moapa Gray Ware				
Moapa Black-on-gray	5	-	-	Shutler (1961:24)
Tusayan White Ware, Virgin Series (Corrugated)				
Hurricane Black-on-gray	-	-	1	Shutler (1961:24)
Tsegi Orange Ware				
Medicine Black-on-red	4	1	9	Shutler (1961:24)

Table 4.49. Painted Virgin and Kayenta Branch Pottery Sherd Counts Recovered from 26Ck2148, House 72.

Pottery Ware and Type	Room 2	Room 4	Rooms 5 - 10	Room 7	Room 9	Room 15	Data Source
Tusayan White Ware, Virgin Series							
Washington Black-on-gray	-	-	-	1	-	-	Shutler (1961:25)
St. George Black-on-gray	6	-	2	1	-	1	Shutler (1961:25)
North Creek Black-on-gray	2	2	4	2	-	2	Shutler (1961:25)
Moapa Gray Ware							
Boulder Black-on-gray	-	-	-	1	1	-	Shutler (1961:25)
Moapa Black-on-gray	11	1	10	-	-	1	Shutler (1961:25)
San Francisco Mountain Gray Ware							
Deadmans Fugitive Red	-	5	-	3	-	5	Shutler (1961:25)
Tsegi Orange Ware							
Medicine Black-on-red	5	-	2	3	1	1	Shutler (1961:25)

Table 4.50. Painted Virgin and Kayenta Branch Pottery Sherd Counts Recovered from 26Ck2148, House 74.

Pottery Ware and Type	Room 4	Room 64	Data Source
Tusayan White Ware, Virgin Series			
St. George Black-on-gray	2	1	Shutler (1961:25)
North Creek Black-on-gray	-	3	Shutler (1961:25)
Moapa Gray Ware			
Boulder Black-on-gray	8	1	Shutler (1961:25)
Moapa Black-on-gray	-	1	Shutler (1961:25)
Tusayan White Ware, Virgin Series (Corrugated)			
Hurricane Black-on-gray	-	1	Shutler (1961:25)
Tsegi Orange Ware			
Medicine Black-on-red	1	1	Shutler (1961:25)
Tusayan Black-on-red	1	-	Shutler (1961:25)

Table 4.51. Painted Virgin and Kayenta Branch Pottery Sherd Counts Recovered from 26Ck2148, House 75.

Pottery Ware and Type	Room 1	Room 2	Rooms 7	Room 8	Room 10	Data Source
Tusayan White Ware, Virgin Series						
Washington Black-on-gray	-	2	1	-	-	Shutler (1961:26)
St. George Black-on-gray	3	-	1	1	1	Shutler (1961:26)
North Creek Black-on-gray	3	-	3	-	-	Shutler (1961:26)
Moapa Gray Ware						
Moapa Black-on-gray	3	-	-	3	-	Shutler (1961:26)
Tsegi Orange Ware						
Medicine Black-on-red	1	1	1	-	3	Shutler (1961:26)
Tusayan Black-on-red	-	-	-	2	-	Shutler (1961:26)

Table 4.52. Painted Virgin and Kayenta Branch Pottery Sherd Counts Recovered from 26Ck2148, House 77.

Pottery Ware and Type	Room 9	Data Source
Tusayan White Ware, Virgin Series		
St. George Black-on-gray	1	Shutler (1961:26)
Moapa Gray Ware		
Moapa Black-on-gray	1	Shutler (1961:26)
Tsegi Orange Ware		
Medicine Black-on-red	5	Shutler (1961:26)

Table 4.53. Painted Virgin and Kayenta Branch Pottery Sherd Counts Recovered from 26Ck2148, House 78.

Pottery Ware and Type	Room on hilltop	Data Source
Tusayan White Ware, Virgin Series		
St. George Black-on-gray	3	Shutler (1961:22)
North Creek Black-on-gray	6	Shutler (1961:22)
Moapa Gray Ware		
Moapa Black-on-gray	7	Shutler (1961:22)
Tsegi Orange Ware		
Tusayan Black-on-red	29	Shutler (1961:22)

Table 4.54. Painted Virgin and Kayenta Branch Pottery Sherd Counts Recovered from 26Ck2148, House 80.

Pottery Ware and Type	Room 2	Room 3	Room 8	Data Source
Tusayan White Ware, Virgin Series				
St. George Black-on-gray	1	-	7	Shutler (1961:26)
North Creek Black-on-gray	4	1	6	Shutler (1961:26)
Moapa Gray Ware				
Moapa Black-on-gray	-	-	1	Shutler (1961:26)
Tusayan White Ware, Virgin Series (Corrugated)				
Hurricane Black-on-gray	-	-	3	Shutler (1961:26)
Tsegi Orange Ware				
Medicine Black-on-red	-	2	2	Shutler (1961:26)
Tusayan Black-on-red	1	-	1	Shutler (1961:26)

Table 4.55. Painted Virgin and Kayenta Branch Pottery Sherd Counts Recovered from 26Ck2148, House 81.

Pottery Ware and Type	Room 2	Data Source
Moapa Gray Ware		
Moapa Black-on-gray	1	Shutler (1961:26)
Tsegi Orange Ware		
Tusayan Black-on-red	1	Shutler (1961:26)

Table 4.56. Painted Virgin and Kayenta Branch Pottery Sherd Counts Recovered from 26Ck2148, House 89.

Pottery Ware and Type	Room 3	Room 4	Room 6	Room 12	Room 15	Room 18	Room 19	Room 20	Room 22	Data Source
Tusayan White Ware, Virgin Series										
Washington Black-on-gray	-	1	-	-	1	-	-	1	2	Shutler (1961:27)
St. George Black-on-gray	1	-	2	1	-	3	1	7	3	Shutler (1961:27)
North Creek Black-on-gray	4	-	1	4	-	7	5	10	13	Shutler (1961:27)
Moapa Gray Ware										
Boulder Black-on-gray	-	-	-	-	-	1	-	-	-	Shutler (1961:27)
Moapa Black-on-gray	1	-	1	3	-	-	-	1	1	Shutler (1961:27)
Tsegi Orange Ware										
Medicine Black-on-red	1	1	1	4	-	2	1	-	3	Shutler (1961:27)
Tusayan Black-on-red	-	-	-	-	1	-	3	-	-	Shutler (1961:27)
Citadel Polychrome	-	-	-	-	-	-	-	1	-	Shutler (1961:27)

Table 4.57. Painted Virgin and Kayenta Branch Pottery Sherd Counts Recovered from 26Ck2148, House 94.

Pottery Ware and Type	Room 2	Data Source
Tusayan White Ware, Virgin Series		
St. George Black-on-gray	3	Shutler (1961:27)
North Creek Black-on-gray	2	Shutler (1961:27)
Moapa Gray Ware		
Moapa Black-on-gray	3	Shutler (1961:27)
Tsegi Orange Ware		
Tusayan Black-on-red	1	Shutler (1961:27)

Table 4.58. Painted Virgin and Kayenta Branch Pottery Sherd Counts Recovered from 26Ck2148, House 94.

Pottery Ware and Type	Room 2	Data Source
Tusayan White Ware, Virgin Series		
St. George Black-on-gray	8	Shutler (1961:23)
Tsegi Orange Ware		
Tusayan Black-on-red	1	Shutler (1961:23)

Table 4.59. Painted Virgin and Kayenta Branch Pottery Sherd Counts Recovered from 42Ws920, Room Fill.

Pottery Ware and Type	Room Fill F-69, 0-80 cm	Data Source
Tusayan White Ware, Virgin Series		
Washington Black-on-gray	4	Thompson (1984:18)
St. George Black-on-gray	2	Thompson (1984:18)
North Creek Black-on-gray	4	Thompson (1984:18)
Hildale Black-on-gray	7	Thompson (1984:18)
Tusayan White Ware, Virgin Series (Corrugated)		
Orderville Black-on-gray	1	Thompson (1984:18)
Tsegi Orange Ware		
Tusayan Black-on-red	1	Thompson (1984:18)

Table 4.60. Painted Virgin and Kayenta Branch Pottery Sherd Counts Recovered from AZ B:1:102 (BLM), Room 3 Fill.

Pottery Ware and Type	Room 3 Fill F-4, 0-26 cm	Data Source
Tusayan White Ware, Virgin Series		
Hildale Black-on-gray	2	Thompson (1995:1)
Tusayan Gray Ware		
Tusayan Corrugated	4	Thompson (1995:1)
Tusayan White Ware, Kayenta Series		
Black Mesa Black-on-white	1	Thompson (1995:1)

Table 4.61. Painted Virgin and Kayenta Branch Pottery Sherd Counts Recovered from AZ B:1:102 (BLM), Kiva Fill.

Pottery Ware and Type	Kiva Fill F-13, 0-30 cm	Kiva Fill F-13, 70-180 cm	Data Source
Tusayan White Ware, Virgin Series			
St. George Black-on-gray	1	-	Thompson (1995:2)
Hildale Black-on-gray	1	4	Thompson (1995:2)
Tusayan White Ware, Virgin Series (Corrugated)			
Pipe Spring Black-on-gray	1	-	
Tusayan Gray Ware			
Tusayan Corrugated	20	38	Thompson (1995:2)
Tusayan White Ware, Kayenta Series			
Sosi Black-on-white	-	1	Thompson (1995:2)
Dogoszhi Black-on-white	-	3	Thompson (1995:2)

Table 4.62. Painted Virgin and Kayenta Branch Pottery Sherd Counts Recovered from AZ B:1:102 (BLM), Kiva Fill.

Pottery Ware and Type	Kiva Fill F-20, 0-210 cm	Kiva Fill F-20 above F-48, 45-215 cm	Kiva Fill F-20 (F-42, F-48) 145-230 cm	Data Source
Tusayan White Ware, Virgin Series				
St. George Black-on-gray	1	2	-	Thompson (1995:3)
North Creek Black-on-gray	-	4	1	Thompson (1995:3)
Hildale Black-on-gray	-	2	-	Thompson (1995:3)
Tusayan Gray Ware				
Tusayan Corrugated	7	97	11	Thompson (1995:3)
Tusayan White Ware, Kayenta Series				
Black Mesa Black-on-white	-	3	-	Thompson (1995:3)
Sosi Black-on-white	1	1	-	Thompson (1995:3)
Dogoszhi Black-on-white	-	3	1	Thompson (1995:3)
Flagstaff Black-on-white	-	1	-	Thompson (1995:3)
Flagstaff Black-on-white (Shato)	-	1	-	Thompson (1995:3)

Table 4.63. Painted Virgin and Kayenta Branch Pottery Sherd Counts Recovered from AZ B:1:102 (BLM), Room 10 Fill.

Pottery Ware and Type	Room 10 Fill F-33, 0-50 cm	Data Source
Tusayan White Ware, Virgin Series		
North Creek Black-on-gray	1	Thompson (1995:4)
Hildale Black-on-gray	1	Thompson (1995:4)
Tusayan Gray Ware		
Tusayan Corrugated	66	Thompson (1995:4)
Tusayan White Ware, Kayenta Series		
Black Mesa Black-on-white	1	Thompson (1995:4)

Table 4.64. Painted Virgin and Kayenta Branch Pottery Sherd Counts Recovered from AZ B:1:102 (BLM), Room 7 Fill.

Pottery Ware and Type	Kiva Fill F-4, 0-50 cm	Kiva Fill F-54, 55-59 cm	Data Source
Tusayan White Ware, Virgin Series			
St. George Black-on-gray	-	2	Thompson (1995:6)
North Creek Black-on-gray	-	2	Thompson (1995:6)
Moapa Gray Ware			
Moapa Black-on-gray	1	1	Thompson (1995:6)
Tusayan White Ware, Virgin Series (Corrugated)			
Pipe Spring Black-on-gray	-	2	Thompson (1995:6)
Tusayan Gray Ware			
Tusayan Corrugated	24	4	Thompson (1995:6)
Tusayan White Ware, Kayenta Series			
Dogoszhi Black-on-white	1	15	Thompson (1995:6)
Dogoszhi Black-on-white (Shato)	1	-	Thompson (1995:6)

Table 4.65. Painted Virgin and Kayenta Branch Pottery Sherd Counts Recovered from AZ B:1:102 (BLM), Room 11 Floor.

Pottery Ware and Type	Room 11 Floor F-55 floor, 13-17 cm	Data Source
Tusayan White Ware, Virgin Series		
North Creek Black-on-gray	1	Thompson (1995:6)
Tusayan Gray Ware		
Tusayan Corrugated	7	Thompson (1995:6)

Table 4.66. Painted Virgin and Kayenta Branch Pottery Sherd Counts Recovered from AZ B:1:102 (BLM), Room 4 Fill.

Pottery Ware and Type	Room 4 Fill F-60, 28-74 cm	Data Source
Tusayan White Ware, Virgin Series		
North Creek Black-on-gray	1	Thompson (1995:7)
Tusayan White Ware, Kayenta Series		
Sosi Black-on-white	1	Thompson (1995:7)

Table 4.67. Painted Virgin and Kayenta Branch Pottery Sherd Counts Recovered from AZ B:1:102 (BLM), Room 8 Fill.

Pottery Ware and Type	Room 8 Fill F-87, 45-65 cm	Room 8 Fill F-87, 65-85 cm	Room 8 Fill F-87, 80-85 cm	Data Source
Tusayan White Ware, Virgin Series				
St. George Black-on-gray	-	3	-	Thompson (1995:8)
North Creek Black-on-gray	1	2	-	Thompson (1995:8)
Hildale Black-on-gray	-	-	2	Thompson (1995:8)
Glendale Black-on-gray	-	1	-	
Tusayan Gray Ware				
Tusayan Corrugated	24	20	7	Thompson (1995:8)
Tusayan White Ware, Kayenta Series				
Black Mesa Black-on-white	-	-	13	Thompson (1995:8)
Sosi Black-on-white	-	-	2	Thompson (1995:8)
Sosi Black-on-white (Shato)	1	-	-	Thompson (1995:8)
Dogoszhi Black-on-white	1	-	-	Thompson (1995:8)

Table 4.68. Painted Virgin and Kayenta Branch Pottery Sherd Counts Recovered from AZ B:1:102 (BLM), Room 12 Fill.

Pottery Ware and Type	Room 12 Fill F-92, 45-75 cm	Data Source
Tusayan White Ware, Virgin Series		
St. George Black-on-gray	3	Thompson (1995:10)
Tusayan Gray Ware		
Tusayan Corrugated	5	Thompson (1995:10)

Table 4.69. Painted Virgin and Kayenta Branch Pottery Sherd Counts Recovered from AZ B:1:102 (BLM), Room 6 Fill.

Pottery Ware and Type	Room 6 Fill F-93, 0-45 cm	Data Source
Tusayan White Ware, Virgin Series		
St. George Black-on-gray	5	Thompson (1995:10)
North Creek Black-on-gray	2	Thompson (1995:10)
Hildale Black-on-gray	4	Thompson (1995:10)
Tusayan White Ware, Kayenta Series		
Dogoszhi Black-on-white (Shato)	1	Thompson (1995:10)

Table 4.70. Painted Virgin and Kayenta Branch Pottery Sherd Counts Recovered from AZ B:1:102 (BLM), Room 1 Fill.

Pottery Ware and Type	Room 1 Fill F-102, 0-50 cm	Data Source
Tusayan White Ware, Virgin Series		
St. George Black-on-gray	1	Thompson (1995:11)
Tusayan Gray Ware		
Tusayan Corrugated	12	Thompson (1995:11)
Tusayan White Ware, Kayenta Series		
Black Mesa Black-on-white	1	Thompson (1995:11)
Sosi Black-on-white (Shato)	4	Thompson (1995:11)

Table 4.71. Painted Virgin and Kayenta Branch Pottery Sherd Counts Recovered from AZ B:1:102 (BLM), Room 7 Fill.

Pottery Ware and Type	Room 7 Fill F-103, 15-23 cm	Room 7 Fill F-103, 35-45 cm	Room 7 Fill F-103/F-61, 50 cm	Data Source
Tusayan White Ware, Virgin Series				
St. George Black-on-gray	-	1	-	Thompson (1995:11)
North Creek Black-on-gray	-	-	2	Thompson (1995:11)
Hildale Black-on-gray	1	4	-	Thompson (1995:11)
Tusayan White Ware, Virgin Series (Corrugated)				
Pipe Spring Black-on-gray	1	1	-	Thompson (1995:11)
Tusayan Gray Ware				
Tusayan Corrugated	-	2	1	Thompson (1995:11)
Tusayan White Ware, Kayenta Series				
Dogoszhi Black-on-white	2	4	4	Thompson (1995:11)

Table 4.72. Painted Virgin and Kayenta Branch Pottery Sherd Counts Recovered from AZ B:1:102 (BLM), Room 13 Fill.

Pottery Ware and Type	Room 13 Fill F-128, 20-40 cm	Room 13 Fill F-128, 70-80 cm	Data Source
Tusayan White Ware, Virgin Series			
St. George Black-on-gray	5	1	Thompson (1995:13-14)
North Creek Black-on-gray	2	1	Thompson (1995:13-14)
Hildale Black-on-gray	2	3	Thompson (1995:13-14)
Tusayan White Ware, Virgin Series (Corrugated)			
Pipe Spring Black-on-gray	-	1	Thompson (1995:13-14)
Tusayan Gray Ware			
Tusayan Corrugated	29	10	Thompson (1995:13-14)
Tusayan White Ware, Kayenta Series			
Black Mesa Black-on-white	1	-	
Dogoszhi Black-on-white	1	3	Thompson (1995:13-14)

Table 4.73. Painted Virgin and Kayenta Branch Pottery Sherd Counts Recovered from AZ B:1:102 (BLM), Room 7 Fill.

Pottery Ware and Type	Room 7 Fill F-169, 45-55 cm	Data Source
Tusayan White Ware, Virgin Series		
North Creek Black-on-gray	14	Thompson (1995:17)
Tsegi Orange Ware		
Medicine Black-on-red	28	Thompson (1995:17)

Table 4.74. Painted Virgin and Kayenta Branch Pottery Sherd Counts Recovered from AZ B:1:102 (BLM), Room 19 Fill.

Pottery Ware and Type	Room 19 Fill F-177, 0-25 cm	Room 19 Fill F-177, 25-35 cm	Room 19 Fill F-177, 27-32 cm	Data Source
Tusayan White Ware, Virgin Series				
Washington Black-on-gray	1	-	-	Thompson (1995:19)
St. George Black-on-gray	-	1	-	Thompson (1995:19)
North Creek Black-on-gray	1	1	1	Thompson (1995:19)
Hildale Black-on-gray	3	2	-	Thompson (1995:19)
Tusayan Gray Ware				
Tusayan Corrugated	5	14	45	Thompson (1995:19)
Tusayan White Ware, Kayenta Series				
Dogoszhi Black-on-white	-	1	-	Thompson (1995:19)

Table 4.75. Painted Virgin and Kayenta Branch Pottery Sherd Counts Recovered from AZ B:1:102 (BLM), Room 10 Fill.

Pottery Ware and Type	Room 10 Fill F-188, 5-25 cm	Room 10 Fill F-188, 25-30 cm	Data Source
Tusayan White Ware, Virgin Series			
St. George Black-on-gray	1	-	Thompson (1995:21)
North Creek Black-on-gray	-	2	Thompson (1995:21)
Hildale Black-on-gray	-	1	Thompson (1995:21)
Tusayan Gray Ware			
Tusayan Corrugated	6	4	Thompson (1995:21)
Tusayan White Ware, Kayenta Series			
Dogoszhi Black-on-white	-	1	Thompson (1995:21)

Table 4.76. Painted Virgin and Kayenta Branch Pottery Sherd Counts Recovered from NA9058.

Pottery Ware and Type	Pithouse 4 Fill	Pithouse 5 Fill	Data Source
Tusayan White Ware, Virgin Series			
North Creek Black-on-gray	7	9	Wade (2009:Table 69a-c)
North Creek Black-on-gray (Fugitive Red)	2	1	Wade (2009:Table 69a-c)
Hildale Black-on-gray	1	5	Wade (2009:Table 69a-c)
Moapa Gray Ware			
Moapa Black-on-gray	1	-	Wade (2009:Table 69a-c)
Tusayan White Ware, Kayenta Series			
Flagstaff Black-on-white (Shato)	2	-	Wade (2009:Table 69a-c)
San Juan Red Ware			
Deadmans Black-on-red	-	1	Wade (2009:Table 69a-c)

Table 4.77. Painted Virgin and Kayenta Branch Pottery Sherd Counts Recovered from NA9072.

Pottery Ware and Type	Room 2 Fill	Data Source
Tusayan White Ware, Virgin Series		
North Creek Black-on-gray	5	Wade (2009:Table 47a)
Hildale Black-on-gray	6	Wade (2009:Table 47a)
Tsegi Orange Ware		
Cameron Polychrome	1	Wade (2009:Table 47b)
Citadel Polychrome	1	Wade (2009:Table 47b)

Table 4.78. Painted Virgin and Kayenta Branch Pottery Sherd Counts Recovered from NA9077.

Pottery Ware and Type	Room 4 Floor	Data Source
Moapa Gray Ware		
Moapa Black-on-gray	4	Wade (2009:Table 56)
Tusayan White Ware, Kayenta Series		
Black Mesa Black-on-white	1	Wade (2009:Table 56)

Virgin Branch Heartland Chronology and Chronometry: Site Dating and Radiocarbon Data

As the third method in my multi-faceted approach to refine the chronometry of the Virgin Branch heartland and associated painted pottery styles—with mean ceramic dating and ceramic cross-dating functioning as the other two methods—I synthesized all available, and known (to me), radiocarbon assays from Virgin Branch sites found within my site sample (Table 4.1). As Table 4.79 shows, although many of the sites laid out in my chronometric refinement site sample yielded useful radiocarbon dates, others were found to have either produced no such dates or only unreliable dates (i.e., dates that were likely affected by old wood problems).

As one can see in Table 4.79, I found approximately half of the reported radiocarbon dates to be associated with painted Virgin Branch pottery sherds. From those radiocarbon dates, only six dates were found to be associated with a single painted pottery style and not among a mix ceramic assemblage. These radiocarbon dates that were depositionally-related to a single pottery style were then selected for consideration in my refinement of painted Virgin Branch pottery styles.

When one overlays the sites from Table 4.1 and Table 4.78, a good amount of convergence can be found. However, when the sites listed in these two tables are juxtaposed with the sites represented in Tables 4.3 - 4.43 (Virgin Branch sites that yielded mean ceramic dates) and Tables 4.45 - 4.78 (contextually associated Virgin Branch and imported pottery types), the resulting convergence reduces to a total of six sites. This result, along with the several radiocarbon dates found to be depositionally-associated with a single pottery style from additional sites, are discussed in the following chapter and represent the cornerstone of my inference regarding a proposed revised chronometry for painted Virgin Branch pottery styles.

Table 4.79. Radiocarbon Dates from Sampled Virgin Branch Sites.

Site	Sample Material	Date (95% Probability)	Median Probability	Provenience	Associated Painted Pottery
26Ck3130[1]	Charcoal	A.D. 900 - 1000	A.D. 950	Pit 4	-
26Ck3130[1]	Charcoal	A.D. 840 - 1000	A.D. 920	Pit 5	-
26Ck4891[2]	Charcoal	A.D. 650 - 890	A.D. 690	Unit 5, Post Hole 1	-
26Ck6078/6095[2]	Charcoal	A.D. 650 - 1950	A.D. 1800	S5/E1	-
26Ck6078/6095[2]	Charcoal	950 - 810 B.C.	870 B.C.	S5/E1	-
26Ck6080/6081[2]	Charcoal	A.D. 230 - 430	A.D. 340	S3/W3	-
26Ck6080/6081[2]	Charcoal	A.D. 1480 - 1950	A.D. 1650	S2/W4	-
26Ck6080/6081[2]	Charcoal	160 B.C. - A.D. 60	40 B.C.	S3/W5	-
42Ws288[3]	Charcoal	A.D. 793 - 1019	A.D. 947	Pithouse 1 Fill 1	St. George Black-on-gray
42Ws288[4]	Charcoal	A.D. 904 - 1147	A.D. 1014	Room 1, Fill 1	-
42Ws288[5]	Charcoal	AD 1036-1242	A.D. 1135	Roasting Pit Fill	-
42Ws288[6]	Charcoal	A.D. 1156 - 1379	A.D. 1258	Room 6, Fill 1	-
42Ws388[7]	Carbon	A.D. 703 - 983	A.D. 854	Cist 4 Beam	-
42Ws388[8]	Burned Beam	AD 771-995	A.D. 896	Pithouse 2 Burned Beam, Fill 2	Washington Black-on-gray
42Ws392[9]	Charcoal	A.D. 601 - 842	A.D. 686	Pithouse, Floor 2, Fill 1	-
42Ws392[10]	Charcoal	A.D. 795 - 1116	A.D. 962	Pithouse, Floor 1 Vault	-
42Ws392[11]	Charcoal	AD 1053-1264	A.D. 1195	Structure 2 Burned Beam	Hildale Black-on-gray
42Ws392[12]	Charcoal	A.D. 1175 - 1384	A.D. 1272	Hearth 2	-
42Ws503[13]	Charcoal	A.D. 433 - 651	A.D. 574	F98 Fill Structure A-1	St. George Black-on-gray
42Ws503[14]	Charcoal	A.D. 521 - 804	A.D. 652	Cist B4 Floor FS-261	-

42Ws503[15]	Carbonized Log	A.D. 779 - 1007	A.D. 918	Room BI-1 FS-384	St. George Black-on-gray
42Ws503[16]	Charcoal	A.D. 1036 - 1368	A.D. 1201	Area A, A2 West Midden	-
42Ws920[17]	Charcoal	A.D. 729 - 1005	A.D. 890	F-148 Pithouse	-
42Ws920[17]	Charcoal	A.D. 719 - 1015	A.D. 899	F-71 Kiva or Pithouse	Mesquite Black-on-gray Washington Black-on-gray St. George Black-on-gray North Creek Black-on-gray Hildale Black-on-gray Pipe Spring Black-on-gray Parashant Black-on-gray
42Ws920[17]	Charcoal	A.D. 876 - 1212	A.D. 1058	F-50 pithouse	Washington Black-on-gray St. George Black-on-gray
42Ws920[17]	Charcoal	A.D. 990 - 1208	A.D. 1096	F-59 Structure Timber	Washington Black-on-gray North Creek Black-on-gray Hildale Black-on-gray
42Ws920[17]	Charcoal	A.D. 838 - 1259	A.D. 1090	Structure Timber	-
42Ws1349[18]	Charcoal	A.D. 699 - 964	A.D. 832	Pithouse	Washington Black-on-gray
AZ B:1:35 (BLM) [19]	Charcoal	A.D. 27 - 248	A.D. 129	Pit Structure 8, Hearth Fill	-
AZ B:1:35 (BLM) [19]	Wood	A.D. 72 - 350	A.D. 196	Pit Structure 5 Above Floor	-
AZ B:1:35 (BLM) [19]	Wood	A.D. 146 - 423	A.D. 305	Pit Structure 11, above floor	-
AZ B:1:35 (BLM) [19]	Wood	A.D. 657 - 960	A.D. 775	Pit Structure 12 Fill	-

AZ B:1:35 (BLM) [19]	Wood	A.D. 1178 - 1420	A.D. 1319	Pit Structure 13, Level 1 Fill-Floor	North Creek Black-on-gray Hildale Black-on-gray Slide Mountain Black-on-gray
NA5507, AZ A:3:1 (MNA) [20]	Wood Charcoal	2110 - 1786 B.C.	1947 B.C.	Stratum 2a	-
NA5507, AZ A:3:1 (MNA) [20]	Wood Charcoal	1966 - 1665 B.C.	1813 B.C.	Stratum 2c	-
NA5507, AZ A:3:1 (MNA) [20]	Wood Charcoal	1715 - 1449 B.C.	1569 B.C.	Stratum 2a	-
NA5507, AZ A:3:1 (MNA) [20]	Wood	A.D. 39 - 324	A.D. 170	Rear Midden	-
NA5507, AZ A:3:1 (MNA) [21]	Yucca Sandal	A.D. 684 - 876	A.D. 762	MNA Collection	-
NA5507, AZ A:3:1 (MNA) [21]	Yucca Sandal	A.D. 683 - 882	A.D. 772	MNA Collection	-
NA5507, AZ A:3:1 (MNA) [21]	Yucca Sandal	A.D. 690 - 882	A.D. 792	MNA Collection	-
NA5507, AZ A:3:1 (MNA) [20]	*Zea mays*	A.D. 659 - 1046	A.D. 837	Stratum, 3 Test 5	Washington Black-on-gray St. George Black-on-gray
NA5507, AZ A:3:1 (MNA) [21]	Cob/Sandal Fragment	A.D. 678 - 1086	A.D. 862	Stratum 2, Test 5	-
NA5507, AZ A:3:1 (MNA) [21]	Yucca Sandal	A.D. 782 - 1012	A.D. 929	MNA Collection	-

[1] Myhrer and Lyneis (1985:57).
[2] McGuire et al. (2014:48).
[3] Walling et al. (1986:149, 158).
[4] Walling et al. (1986:139).

[5] Walling et al. (1986:151).
[6] Walling et al. (1986:146).
[7] Walling et al. (1986:199, 220).
[8] Walling et al. (1986:214, 221).
[9] Walling et al. (1986:261).
[10] Walling et al. (1986:260).
[11] Walling et al. (1986:257).
[12] Walling et al. (1986:270).
[13] Dalley and McFadden (1985:44, 148).
[14] Dalley and McFadden (1985:44).
[15] Dalley and McFadden (1985:44, 150).
[16] Dalley and McFadden (1985:45).
[17] Barbara Frank, personal communication with Jerry Spangler (2018).
[18] Dalley and McFadden (1988:149).
[19] Nielson (1998:7.1).
[20] Janetski et al. (2013:24).
[21] Janetski et al. (2013:120).

Statement Regarding Identification of Painted Virgin Branch Pottery Types

As noted throughout this chapter, the ceramic analyses from the different recovered site artifact assemblages were conducted by different individuals. With this point in mind, as virtually every ceramic analyst can attest, archaeologists are almost never in complete agreement with the typological identifications in pottery analyses—though significant convergence in agreement can exist. Since I personally have only seen part, all, or none of some of the site-specific pottery assemblages presented in this chapter, I cannot positively affirm that all, or even a general majority, of the pottery identifications are even in agreement with my own typological assignment—given the opportunity to analyze such sherds. Even so, such an expectation upon any investigating archaeologist is both unreasonable and unnecessary. While I have not necessarily seen all of the ceramic assemblages reported in this chapter, I can affirm to have seen a majority. In the instance of two site assemblages—42Ws200 (Parunuweap Knoll) and 42Ws920 (Little Creek)—I encountered a misidentification of select Mesquite Black-on-gray sherds from 42Ws200 (typed in Aikens [1965] as St. George Black-on-gray) and select Glendale Black-on-gray sherds (typed by Richard Thompson as North Creek Black-on-gray). Even with these two cases, comprising an approximately two dozen combined misidentified sherds, I remain sufficiently confident in my use of reported ceramic analyses in this dissertation for two principal reasons. First, my personal assessment of a majority of these site artifact assemblages is in significant agreement with reported pottery types and also demonstrates significant inter-analyst agreement in identifications. Second, neither of the two discrepant cases of misidentification from 42Ws200 and 42Ws920 have any adverse bearing upon the chronometric refinement or stylistic components of my research design.

CHAPTER 5. CHRONOMETRIC RECONSTRUCTION OF THE VIRGIN BRANCH HEARTLAND: DATING VIRGIN BRANCH SITES AND PAINTED POTTERY STYLES

In this chapter, I discuss the data and results presented in Chapter 4 within the following structure: (1) a discussion of indirect dating of select Virgin Branch sites and painted pottery styles (through mean ceramic dating, radiocarbon assays, and ceramic cross-dating of known tree-ring dated non-local ceramics); (2) a discussion of the use of percentage of corrugated pottery to date Virgin Branch sites (considered in light of the site-specific mean ceramic dating results); and (3) a proposed chronometric revision for painted Virgin Branch pottery styles (based on the presented ceramic cross-dating, radiocarbon assays, and mean ceramic dating results). At the end of this chapter, I conclude by answering the following research: How does a refined Virgin Branch heartland chronometry clarify current understandings of Virgin Branch chronology and correlate with the established chronometry of the Kayenta Branch heartland?

Mean Ceramic Dating, Ceramic Cross-Dating, and Radiocarbon Assays: An Indirect Approach to Dating Painted Virgin Branch Sites and Painted Pottery Styles

The vast majority of the Virgin Branch heartland chronology and chronometry over the last century has been constructed on the basis of seriating painted pottery styles by reference to stylistic analogues from the Kayenta Branch region. Although archaeologists working in the greater Virgin Branch region (including northern Arizona in general) have noted stylistic similarities between painted Virgin and Kayenta Branch pottery, I contend that the risk of tautological reasoning looms large when one directly applies date ranges to painted Virgin Branch pottery styles from tree-ring dated Kayenta Branch pottery “analogues.”

The history and application of dating painted Virgin Branch pottery styles by reference to Kayenta Branch pottery "analogues" opens the way to potential circular reasoning in the assigning of date ranges to both Virgin Branch pottery styles and sites. In fact, the entire foundation upon which the commonly used Virgin Branch pottery chronology and chronometry is almost singularly based upon Colton's (1952) assessment of Virgin Branch pottery. Although Colton, at the time of publishing *Pottery Types of the Arizona Strip and Adjacent Areas in Utah and Nevada*, had demonstrated his keen attention to detail in previous works in developing an interconnected ceramic typology for much of northern Arizona (Colton and Hargrave 1937) that remains a pillar of ceramic analysis for Southwestern archaeologists to the present day, Richard Thompson (Walling et al. 1986:351-354) noted that Colton's specific lack of knowledge of the areas from where the Virgin Branch pottery were collected, having never visited these locations himself, ultimately resulted in a series of inconsistencies and missed pattern recognition of design styles on various specimens that he assessed. Notwithstanding these shortcomings, the ceramic chronology and chronometry Colton (1952) proposed for Virgin Branch pottery has been widely propagated by archaeologists working in the Virgin Branch region with little revision.

Although Thompson published his observations of Colton's (1952) inaccuracies and mistakes regarding Virgin Branch ceramics, Thompson's own methodology in constructing a chronometry for selected Virgin Branch ceramic types was partly flawed for other reasons. While filling in Colton's (1952) missed observations regarding details in Virgin Branch ceramic types, Thompson's proposed chronometry for Tusayan White Ware, Virgin Series and Moapa Gray Ware pottery types was formulated on the basis Breternitz's (1966) correlation of tree-ring dates with various Southwestern pottery types (Walling et al. 1986:355-356). Moreover, where a given Virgin Branch pottery type was not well-dated, Thompson used the Kayenta Branch "analogue" date range for the Virgin Branch ceramic type in question (Walling et al. 1986:356). This approach and related reasoning employed by Thompson in dating Virgin Branch pottery types seems, at least superficially, circular in nature. Moreover, Thompson's formulation of a Virgin Branch pottery chronometry largely through the lens of Breternitz's (1966) work is also problematic. While many researchers in the North American Southwest have leaned heavily upon Breternitz's (1966) study—many times without question—there has been comparatively little progress in succeeding archaeologists' efforts in using Breternitz's work while also controlling for contexts and postdepositional formation processes (Wallace 1992:35).

In providing the above brief review of the problematic history in the development of the prevailing Virgin Branch pottery chronometry, originating from the work of Colton (1952) and Breternitz (1966), it is not my intention to simply cast stones at my predecessors. In fact, I fully recognize that this entire dissertation rests upon the work all those who preceded me and to whom I am indebted for their contributions to the study of Southwestern archaeology—particularly Thompson's significant pioneering work in Virgin Branch pottery analysis. Instead, my intention in reviewing these problems arises from wanting to bring awareness to current and future archaeologists of the scholarly blind spots that have seemingly hindered the development of a Virgin Branch ceramic.

In this section, I discuss the chronometric dating results from the six sites referenced at the end of Chapter 4. From these sites, I used calculated mean ceramics dates and ceramic cross-dating to indirectly date painted Virgin Branch pottery types, in conjunction with several radiocarbon dates from other sites. By association, the process of indirectly dating Virgin Branch pottery types also helped provided occupational date ranges for each of the six sites. In the follow sub-sections, I discuss each site in the context of mean ceramic dates and ceramic cross-dating Virgin Branch pottery styles with non-local pottery types. Towards the end of this chapter, I synthesize my use of mean ceramic dating, ceramic cross-dating, and radiocarbon assays as a multi-pronged approach in establishing greater resolution to the chronometry of painted Virgin Branch pottery types.

Moapa Valley

26Ck2148 (Main Ridge: Pueblo Grande de Nevada/"Lost City")

Efforts in the chronometric refinement of painted Virgin Branch pottery styles recovered from 26Ck2148 (Main Ridge: Pueblo Grande de Nevada/"Lost City") involved calculating mean ceramic dates for 13 "houses" (Tables 4.4 – 4.6, 4.8, 4.10 – 4.14, 4.16, 4.17, 4.22, and 4.23). The mean ceramic dates for each of these 13 "houses" yielded a date range spanning from A.D. 1060 to 1175. However, when I accounted for all non-local, well-dated pottery sherds from all applicable "houses" to calculate a mean ceramic date—regardless of contextual control—the resulting mean ceramic date for Main Ridge was A.D. 975 – 1105 (Table 4.3, Figure 4.2).

The former date range appears to better converge with the common designation of Main Ridge as a middle Pueblo II site (A.D. 1050) and be in accordance with previously chronological assignments issued by Lyneis (1992), Shutler (1961), and others. Similarly, while the latter mean ceramic date range (A.D. 975 to 1105) also overlaps with the conventional middle Pueblo II period designation for this site, this date range attributes an early Pueblo II occupation of the site prior to the middle Pueblo II—out of sync with previous chronological designations attributed to this site. When ceramic cross-dating of non-local pottery types is conducted for painted Virgin Branch ceramics found in the same depositional contexts, and mean ceramic dates are calculated with these same respective pottery groupings, I argue that a more meaningful date range emerges that is more reflective of the systemic occupation of Main Ridge and use period of the represented Virgin Branch pottery types alike, while minimizing any distributional skewing by the presence of a small minority of early painted styles that may be contributing to an unfounded earlier occupation date when depositional context is not considered.

St. George Basin

2Mo869, AZ B:1:102 (BLM) (Corngrower Site)

AZ B:1:102 (Corngrower Site) represents the site with the largest pottery assemblage of all sites considered in this dissertation. From the nearly 46,000 pottery sherds Richard Thompson analyzed over the course of that excavation project—with a high proportion being non-local pottery types (mostly comprising Tusayan Gray Ware, Tusayan White Ware [Kayenta Series], and Tsegi Orange Ware ceramic types)—approximately 4,400 sherds were used in my calculation of a mean ceramic date for this site (Table 4.35, Figure 4.10). In addition to yielding the largest number of pottery sherds, the Corngrower Site also represents the only Virgin Branch site from all sampled sites in this research to have yielded a tree-ring date. The Corngrower Site tree-ring specimen, taken from a post provenienced to what the principal investigators interpreted as a kiva, produced a date of A.D. 1150 (Barbara Frank, personal communication 2021). For multiple reasons, the Corngrower Site appears to be a completely anomalous Virgin Branch site. With exception of a kiva reported by Aikens (1965:8) at Bonanza Dune in southwestern Utah, and now apparently also at the Corngrower Site, kivas do not seem to be a cultural phenomenon to occur in the Virgin Branch region. In addition to the large number of recovered pottery sherds, including a particularly high proportion of non-local Tusayan Corrugated sherds, excavations at the Corngrower Site produced one of very few usable tree-ring dates from within the Virgin Branch region.

Since this site yielded the only tree-ring date from my sample of Virgin Branch sites, I tested my calculated mean ceramic date, using the procedure advanced by Christenson (1994:304-308), to assess how far my calculated mean ceramic date deviated from the sole tree-ring date of A.D. 1150—calculated by simply subtracting the mean tree-ring date (T) from the mean ceramic date (C) (see Table 5.1). On the surface of this calculation, it is evident that the deviation between the mean ceramic date and the tree-ring date are not far apart in time (Table 5.1). However, while calculating the deviation between the mean tree-ring date (or sole tree-ring date, in this case) and the mean ceramic date at the Corngrower Site was easy to obtain and intuitively understand, this resulting value does not convey a confidence interval for the mean ceramic date. According to Christenson (1994:306), obtaining a confidence interval for the mean ceramic date requires conducting a chi-square test of variance,

$$\sigma^2 = \frac{(n-1)s^2}{X^2}$$

"where s is the sample standard deviation, σ is the population standard deviation, and X^2 is the critical value of the chi-square at n-1 degrees of freedom (South 1972:171; Mendenhall 1983:371-372)". Following Christenson's instructions, I obtained the sample standard deviation through the following calculations, where x_i is the mean ceramic date, $\bar{x}$ is the mean tree-ring date, and N is number of pottery types.

$$s = \sqrt{\frac{\Sigma_{i=1}^{N} (x_i - \bar{x})^2}{N-1}}$$

$$s = \sqrt{\frac{(1116 - 1150)^2}{10 - 1}}$$

$$s = 11.333$$

After having solved for the sample standard deviation, I then returned to the chi-square test of variance formula and plugged in the sample standard deviation (11.333), the number of ceramic pottery types (10), and the chi-square critical value at nine (n - 1) degrees of freedom (16.919). The resulting variance was calculated to be 68.327, or approximately 68 years.

$$\sigma^2 = \frac{(n - 1)s^2}{X^2}$$

$$\sigma^2 = \frac{(10 - 1)(11.333)^2}{16.919}$$

$$\sigma^2 = 68.322 \approx 68 \text{ years}$$

The final chi-square test of variance calculation revealed a 95 percent confidence interval of ±68 years for the Corngrower Site mean ceramic date (Table 5.1). This resulting value demonstrates a notable benefit over widely used target date methodologies, such as archaeomagnetic dating and radiocarbon dating—namely, that this dating method is established through the dating a ceramic assemblage calibrated by tree-ring dates (Christenson 1994:312). However, as stated earlier in the chapter, mean ceramic dating does not convey a target event.

Instead, mean ceramic dates correspond to secondary depositional events (cf. Dean 1978) from which archaeologists are required to then work to understand how these dates correspond to a given site or ceramic assemblage in question. In the case of the Corngrower Site, and the five other sites discussed in this section, my confidence in the relevance of these calculated mean ceramic dates to both the occupation of each site and real temporal connection to the use life of the painted Virgin Branch pottery styles persists in large measure because of the fact that I know both Virgin Branch and non-local pottery types assessed in the calculation of each mean ceramic date are provenienced to relevant, unmixed systemic depositional contexts.

Table 5.1. Ceramic Dating Results for AZ B:1:102 (BLM) (Corngrower Site).

Site	No. Sherds	No. Types	(T) Mean Tree-Ring Date	(C) Mean Ceramic Date	(C - T) Deviation
AZ B:1:102 (BLM)	4403	10	A.D. 1150	A.D. 1116 ± 8	-34

42Ws920 (Little Creek)

After sorting through the ceramic analysis Richard Thompson conducted for 42Ws920 (Little Creek), I calculated a mean ceramic date of A.D. 1169 (Table 4.29, Figure 4.6). Within the Pecos Classification, conventionally applied to the Virgin Branch region, this mean ceramic date thus classifies 42Ws920 as an early Pueblo III site. However, as previously stated on the basis of Christenson's (1994) work, mean ceramic date does not signify an absolute target date. Rather, this date should be viewed within a greater distribution of dates (Christenson 1994:310). On the basis of excavated Virgin Branch pottery types and radiocarbon assays, the investigators of 42Ws920 attribute an occupation of the site spanning from the Basketmaker III through the late Pueblo II periods (Barbara Frank, personal communication 2021). This dating scheme, inferred on the basis of pottery types recovered through excavation as well as radiocarbon dating, though expansive, does not convey the nuances of the dating revealed through the mean ceramic date and radiocarbon assays (Table 4.78).

While all painted Virgin Branch pottery stylistic variations were found contextually in same depositional fill of a pithouse, the median radiocarbon assay obtained from that pithouse yielded a median probability of A.D. 899 and a 95 percent confidence date range of A.D. 719 – 1015 (Table 4.78). This radiocarbon date, the other four radiocarbon assays from this site, and the mean ceramic date, when considered together, seem to indicate multicomponent site with occupations during the Basketmaker III/Pueblo I and late Pueblo II/early Pueblo III periods. In addition, the presence of a Tusayan Black-on-red sherd (Table 4.58)—recovered in the same room fill deposit as various painted Virgin Branch pottery sherds—offers some additional (even if relatively miniscule) support to notion of a late occupation of this site during the late Pueblo II/early Pueblo III periods. On the basis of these observations, I contend that the mere presence of certain ceramic types should not be used to unilaterally dictate the process of dating a site or even a feature. Moreover, the absence of particular pottery types can potentially help an investigating archaeologist's inferential reasoning when seeking to establish a site chronology. Though absence of evidence is not necessarily evidence of absence, ceramic types found missing from a given site assemblage should give one pause and help even preliminarily inform the date(s) attributed to a site in question.

Western Colorado Plateau

NA9058, AZ A:1:11 (MNA) (Littlefield)

The systemic occupation of NA9058 was determined to span from the Pueblo I period through the late Pueblo II period by investigating archaeologists (Table 4.1), according to the site card on file at the Museum of Northern Arizona. This chronological assignment was presumably conducted on the basis of Virgin Branch ceramic types recovered over the course of the project. After sifting through the published report for this site (Wade 2009), calculating a mean ceramic date on the basis of well-dated non-local ceramic types, and focusing on the contextual systemic associations of particular well-dated, non-local and painted Virgin Branch ceramic types, I arrived at a different conclusion. The mean ceramic date I calculated, on the basis of 86 sherds comprising seven painted non-local ceramic types, was A.D. 1100 (Table 4.36, Figure 4.13). One should remember, however, that a mean ceramic date is associated with a secondary context in the archaeological record and is not a direct indication of a target event. Moreover, although one needs to link mean ceramic dates with associated bridging event(s) (such as the use or discard of pottery vessels) in order to resolve the temporal gap between the secondary context associated with a mean ceramic date and a given target event (e.g., depopulation of a site), this time span may in fact be negligible in duration (Wallace 1992:35-36). In consideration of the above and of the presence of Flagstaff Black-on-white sherds and a Deadmans Black-on-red sherd recovered from two pithouse fill deposits (Table 4.75), I submit that the principal occupation of NA9058 was confined to the late Pueblo II/early Pueblo III periods.

NA9072, AZ B:2:6 (MNA) (Fredonia II)

According to the associated site card on file at the Museum of Northern Arizona, investigators at NA9072 ascribed a sequential occupation of this site beginning in the early

Pueblo II period and ending in the Pueblo III period—presumably on the basis of seriation of documented ceramic types (Table 4.1). However, in consideration of the calculated mean ceramic date of A.D. 1135 (Table 4.38, Figure 4.15) and the recovery of Cameron Polychrome and Citadel Polychrome sherds recovered from a room fill (Table 4.76), the occupation of NA9072 seems to be more in line with the late Pueblo II.

NA9077 (Fredonia II)

No chronological assignments were found for this site in its associated publication (Wade 2009), nor did my own research into the site's associated records at the Museum of Northern Arizona yield any such assignments. After looking into the pottery sherd tables for this site, I calculated a mean ceramic date of A.D. 1088, based on four Black Mesa Black-on-white sherds (Table 4.41, Figure 4.18). Black Mesa Black-on-white sherds were the only non-local pottery type recovered from NA9077, including one such sherd found in association with several Moapa Black-on-gray sherds on a room floor (Table 4.77).

Discussion

In consideration of the multiple approaches presented within this section, in my attempt to refine the dating of these six sites, I submit that chronometric assignments to site occupations should be conducted through multiple avenues of investigation. Such an approach, one would likely retort in protest, is already implemented by archaeologists. However, such a statement in response to my suggestion assumes that a firm chronometric understanding of key temporal anchors—in this case, ceramic types—is already well established. To the contrary, I argue that the temporal framework of Virgin Branch ceramic types has been poorly understood (e.g., Allison 1988:57). In order to be able to fully implement such a multi-pronged approach to dating Virgin Branch sites, as I suggest, greater resolution of the dating of each Virgin Branch pottery type is required. While every Virgin Branch ceramic type is beyond the scope of this dissertation, towards the end of this chapter, I propose a refined chronometry for all painted Tusayan White Ware, Virgin Series ceramic types along with three Moapa Gray Ware ceramic types, and two Tusayan White Ware, Virgin Series (corrugated) pottery types.

Dating Virgin Branch Sites According to Percentage of Corrugated Ceramics: A Comparative Discussion in Light of Mean Ceramic Dating Results

In Chapter 3, I referenced multiple ways through which archaeologists working in the Virgin Branch region have pursued chronological and chronometric dating of sites. Among the most commonly used approaches today includes tabulating the total number of corrugated sherds from an overall site pottery assemblage as a means of approximating the archaeological period in which a given site was occupied. Table 5.2 lists one of the more recent applications of this relative dating method. In this section, as illustrated in Table 5.4, I provide a brief evaluation, on a site-by-site basis, of how the dating a site according to proportion of corrugated ceramics in a site assemblage compares to the mean ceramic dating results I calculated (see Chapter 4). Informing this brief comparison of these two dating methods are the respective proportion of corrugated pottery sherds I calculated from site reports (see Table 5.3). Determination of chronological periods for each mean ceramic date were assigned according to the conventional and long-used archaeological period/date reckoned by Lyneis (1995) (see Table 3.2 of this dissertation). Period assignments, on the basis of corrugated proportions were issued using the breakdown listed by Harry and Willis (2019) in Table 5.3.

Table 5.2. Temporal Classification of Puebloan Sites. After Harry and Willis (2019:Table 5.9).

Approximate Correlation to Puebloan Periods	Corrugated Ceramics in a Site Assemblage
Basketmaker III to Early Pueblo II	0%
Middle Pueblo II	1 – 19%
Late Pueblo II	20 – 39%
Early Pueblo III	40 – 59%
Middle Pueblo III	>60%

Table 5.3. Pottery Sherds Counts with Percentage of Corrugated Sherds from Site Assemblage.

Site	Total Sherd Count	Corrugated Count	Proportion Corrugated
26Ck2148, House 47[1]	1,825	554	30%
26Ck2148, House 50[1]	1,410	258	18%
2Ck2148, House 68[1]	406	47	12%
26Ck2148, House 71[1]	46	0	0%
26Ck2148, House 69[1]	24	0	0%
26Ck2148, House 72[1]	1,116	98	9%
26Ck2148, House 73[1]	414	0	0%
26Ck2148, House 74[1]	161	0	0%
26Ck2148, House 75[1]	508	14	3%
26Ck2148, House 77[1]	260	5	2%
26Ck2148, House 78[1]	183	14	8%
26Ck2148, House 79[1]	114	22	19%
26Ck2148, House 80[1]	859	265	31%
26Ck2148, House 81[1]	70	26	37%
26Ck2148, House 87[1]	133	18	14%
26Ck2148, House 88[1]	164	138	84%
26Ck2148, House 89[1]	1,405	455	32%
26Ck2148, House 90[1]	43	2	5%
26Ck2148, House 91[1]	86	22	26%
26Ck2148, House 94[1]	650	7	1%
26Ck2148, House 120[1]	95	0	0%
26Ck2148, Museum Site[1]	169	77	46%
26Ck2148, Inclusive of All Houses[1]	11,272	2,097	19%

26Ck4891 (Riverside Pithouse Village)[2]	299	0	0%
26Ck6078/6095 (Cedar Basin Midden)[2]	217	0	0%
26Ck6080/6081 (Ian's Rock Shelter)[2]	773	0	0%
42Ka1076 (Bonanza Dune)[3]	11,386	1,819	16%
42Ws392 (Quail Creek)[4]	4,465	2,542	57%
42Ws503 (Red Cliffs Site)[5]	5,521	0	0%
42Ws920 (Little Creek)[6]	23,639	8,111	34%
AZ B:1:63 (Yellowstone Mesa)[7]	212	45	21%
AZ B:1:64 (Yellowstone Mesa)[7]	31	1	3%
AZ B:1:102 (Corngrower Site)[8]	45,417	28,883	64%
NA8961 (Fredonia I)[9]	87	1	1%
NA8962 (Fredonia I)[9]	1,134	7	1%
NA9058 (Littlefield)[9]	26,203	5,672	22%
NA9066B (Fredonia II)[9]	453	12	3%
NA9072 (Fredonia II)[9]	4,004	2,210	55%
NA9073 (Fredonia II)[9]	4,070	1,382	34%
NA9074 (Fredonia II)[9]	1,134	138	12%
NA9077 (Fredonia II)[9]	596	38	6%
NA9079 (Fredonia II)[9]	1,437	19	1%
NA9083 (Fredonia II)[9]	858	75	9%

[1] Shutler (1961).
[2] McGuire et al. (2014).
[3] Aikens (1965).
[4] Walling et al. (1986).
[5] Dalley and McFadden (1985).
[6] Thompson (1984).
[7] Allison (1988).
[8] Thompson (1995).
[9] Wade (2009).

Table 5.4. A Comparison of Chronological Period Assignments Between Mean Ceramic Dating (MCD) Results and Proportions of Corrugated Pottery Sherds.

Site	Chronological Period (Mean Ceramic Date)	Chronological Period (Proportion Corrugated)
26Ck2148, House 47	Late Pueblo II	Late Pueblo II
26Ck2148, House 50	Late Pueblo II	Middle Pueblo II
2Ck2148, House 68	Late Pueblo II	Middle Pueblo II
26Ck2148, House 71	Late Pueblo II	Basketmaker III to Early Pueblo I
26Ck2148, House 69	Late Pueblo II	Basketmaker III to Early Pueblo I
26Ck2148, House 72	Late Pueblo II	Middle Pueblo II
26Ck2148, House 73	Late Pueblo II	Basketmaker III to Early Pueblo I
26Ck2148, House 74	Late Pueblo II	Basketmaker III to Early Pueblo I
26Ck2148, House 75	Late Pueblo II	Middle Pueblo II
26Ck2148, House 77	Late Pueblo II	Middle Pueblo II
26Ck2148, House 78	Late Pueblo II	Middle Pueblo II
26Ck2148, House 79	Late Pueblo II	Middle Pueblo II
26Ck2148, House 80	Late Pueblo II	Late Pueblo II
26Ck2148, House 81	Late Pueblo II	Late Pueblo II
26Ck2148, House 87	Late Pueblo II	Middle Pueblo II
26Ck2148, House 88	Late Pueblo II	Middle Pueblo III
26Ck2148, House 89	Late Pueblo II	Late Pueblo II
26Ck2148, House 90	Late Pueblo II	Middle Pueblo II
26Ck2148, House 91	Early Pueblo III	Late Pueblo II
26Ck2148, House 94	Late Pueblo II	Middle Pueblo II
26Ck2148, House 120	Late Pueblo II	Basketmaker III to Early Pueblo I
26Ck2148, Museum Site	Late Pueblo II	Early Pueblo III
26Ck2148, Inclusive of All Houses	Late Pueblo II	Middle Pueblo II
26Ck4891 (Riverside Pithouse Village)	-	Basketmaker III to Early Pueblo I
26Ck6078/6095 (Cedar Basin Midden)	-	Basketmaker III to Early Pueblo I

26Ck6080/6081 (Ian's Rock Shelter)	-	Basketmaker III to Early Pueblo I
42Ka1076 (Bonanza Dune)	Late Pueblo II	Middle Pueblo II
42Ws392 (Quail Creek)	Late Pueblo II	Early Pueblo III
42Ws503 (Red Cliffs Site)	Pueblo I	Basketmaker III to Early Pueblo I
42Ws920 (Little Creek)	Early Pueblo III	Late Pueblo II
AZ B:1:63 (Yellowstone Mesa)	Late Pueblo II	Late Pueblo II
AZ B:1:64 (Yellowstone Mesa)	Late Pueblo II	Middle Pueblo II
AZ B:1:102 (Corngrower Site)	Late Pueblo II	Middle Pueblo III
NA8961 (Fredonia I)	Late Pueblo II	Middle Pueblo II
NA8962 (Fredonia I)	Late Pueblo II	Middle Pueblo II
NA9058 (Littlefield)	Late Pueblo II	Late Pueblo II
NA9066B (Fredonia II)	Late Pueblo II	Middle Pueblo II
NA9072 (Fredonia II)	Late Pueblo II	Early Pueblo III
NA9073 (Fredonia II)	Late Pueblo II	Late Pueblo II
NA9074 (Fredonia II)	Late Pueblo II	Middle Pueblo II
NA9077 (Fredonia II)	Late Pueblo II	Middle Pueblo II
NA9079 (Fredonia II)	Late Pueblo II	Middle Pueblo II
NA9083 (Fredonia II)	Late Pueblo II	Middle Pueblo II

Discussion

While I am not certain of the origins of this dating method, use of the proportion of corrugated pottery sherd to help date a Virgin Branch site been implemented at least over the past 25 years or so (e.g., Allison 2000, Harry and Willis 2019). As an interesting aside, based on my investigation of site records, reports, and personal communication with archaeologists working the in region, I have only been able to establish use of relative dating method for Virgin Branch sites in the Moapa Valley and on the Colorado Plateau. To date, I have not been able to find a Virgin Branch site located in the St. George Basin for which a relative date was established by calculated and applying the proportion of corrugated pottery sherds from a site assemblage. As can be seen in my cursory assessment of this method, in light of the mean ceramic dates I calculated for each of the above sites, inconsistencies can be found between these two means of ascertaining the occupation of a site. (The discrepancies between sites determined to be late Pueblo II versus middle Pueblo II seem to be more of a distinction without a difference. This seeming conflict can be resolved by defining the middle Pueblo II period—something missing from Lyneis' [1995] synthesis of Virgin Branch chronological periods). My principal criticism in using the proportion of corrugated sherds within a pottery assemblage to date a site is two-fold.

First, it seems that an underlying assumption of this dating method almost certainly operates with the understanding that a given pottery assemblage is associated with a single-component site. Implementation of this approach to chronologically dating a site does not seem to offer room for considering multicomponent sites since all corrugated sherds are pulled from the entire pottery assemblage recovered from a site. On the basis of an entire pottery assemblage, this chronological dating method does not appear to lend to the possibility of the systemic occupation of a site extending beyond a particular period since this approach bins each archaeological period as mutually exclusive, by design, on the basis of meeting a certain threshold.

Second, using the proportion of corrugated pottery sherds within an assemblage does not seem consider the context with which the sherds are associated nor does are restorable vessels/pottery re-fits seemingly factored into the assignment of chronological period. Without contextual control, application of this chronological dating approach seems susceptible to the same criticisms raised by Schiffer (1982:309-312) regarding his issues regarding the utility and application of ceramic cross-dating. In the case Schiffer's three-point criticism of ceramic cross-dating, Wallace (1992:35-37) offers convincing and actionable ways to address Schiffer's criticism and meaningfully use ceramic cross-dating.

From my perspective, in order for the use of the proportion of corrugated pottery sherds to be considered a reliably transferrable and consistent method of chronologically dating sites throughout the Virgin Branch region, efforts need to be made in addressing the two criticisms raised above. If properly addressed, I have no reason to think that using the proportion of corrugated pottery sherds as a means of offering insight into the occupation of a given Virgin Branch site could not help effectively advance our understanding of the Virgin Branch region as a whole.

Towards a Refined Chronometry for Painted Virgin Branch Pottery Styles: A Proposed Contextual Revision Based on Ceramic Cross-Dating, Mean Ceramic Dating, and Radiocarbon Assays

The data presented in Chapter 4, and associated discussion above in this chapter, serve as the foundation upon which I base my proposed revised chronometry for select painted Virgin

Branch ceramic types (Table 5.4, Figures 5.1 and 5.2). In this section, I provide commentary and associated reasoning (where applicable) in my figuring of the dates laid out in my proposed revised chronometry for specific painted Virgin Branch ceramic types. In addition, I use the information presented in Figures 5.1 and 5.2 to help contextualize the proposed revised chronometry for each painted Virgin Branch ceramic type with corresponding and/or overlapping painted Kayenta Branch ceramic types and the Pecos Classification applied by Lyneis (1995) to the Virgin Branch region.

Tusayan White Ware, Virgin Series

The ceramic types classed under Tusayan White Ware, Virgin Series are tempered with quartz sand and feldspar. Although all of the Virgin Series ceramic types of this ware are in fact gray and not white, I classify these under Tusayan White Ware in accordance with the previous precedent set by past researchers working in the Virgin Branch region.

Mesquite Black-on-gray

My mean ceramics dating and ceramic cross-dating research did not reveal any Mesquite Black-on-gray sherds recovered from any systemic contexts in association with well-dated non-local ceramics. On the basis of a radiocarbon assay produced from a charcoal sample collected from a pithouse at 42Ws920 (Little Creek), with a 95 percent probability interval of A.D. 719 – 1015, I surmised that Mesquite Black-on-gray can perhaps be dated at early as A.D. 719 (Table 4.78). With this pottery style contextually associated with the collected radiocarbon sample, as well as other (later) painted Virgin Branch pottery styles, I inferred that A.D. 719 could reasonably serve as a start date for this ceramic type. I propose a loose end date of A.D. 900, however, that particular is conjectured and a conservative estimate on my part. Based on the painted stylistic association of Mesquite Black-on-gray with that of Boulder Black-on-gray (discussed below), coupled with the fact that the latter ceramic type was recovered from room fill deposits at Main Ridge (26Ck2148), another potential end date estimate for Mesquite Black-on-gray could be A.D. 975—on the basis of this date serve as the earliest mean ceramic date calculated for Main Ridge.

Washington Black-on-gray

The start date I propose for Washington Black-on-gray of A.D. 896 represents the median date obtained from a radiocarbon sample taken from a burned beam recovered from a pithouse fill at 42Ws388. Washington Black-on-gray represents the only ceramic type found in association with that radiocarbon assay (Table 4.78). A.D. 896 represents a conservative start date. A median radiocarbon date of A.D. 832, from a charcoal sample collected from a pithouse at 42Ws1349 (Table 4.78), represents a potential alternative start date for Washington Black-on-gray. The latest date cross-dated with Washington Black-on-gray, a mean ceramic date from Main Ridge, was A.D. 1075—which I propose as a revised end date for this ceramic type.

St. George Black-on-gray

Mean ceramic dates and ceramic cross-dating conducted for St. George Black-on-gray produced a date range of A.D. 975 to 1175 (Figure 5.2). However, a median radiocarbon date of A.D. 918, taken from a carbonized log found in a room at the Red Cliffs Site (42Ws503) and found in associated with St. George Black-on-gray sherds, serves an earlier start date that I propose for the ceramic type. Although the persistence of St. George Black-on-gray pottery into the early Pueblo III period may raise some eyebrows among archaeologists working in the Virgin Branch region, the ubiquity of this ceramic type in systemic contexts among well-dated non-local pottery types is incontrovertible. Moreover, when one assesses the site reports and associated artifact assemblages, as I did, while meticulously controlling for the contexts used in my ceramic cross-dating efforts (cf. Tables 4.45 – 4.78), one can have reasonable confidence in resulting mean ceramic dates.

North Creek Black-on-gray

My research into the ceramic assemblages recovered from the six sites I used in my ceramic cross-dating analysis led me to settle upon a date range of A.D. 1060 to 1169 for the production and use of North Creek Black-on-gray. I found this ceramic type contextually associated with all other non-local ceramic types used in my cross-dating efforts (cf. Tables 4.45 – 4.78).

Hildale Black-on-gray

Like St. George and North Creek Black-on-gray sherds, I found Hildale Black-on-gray sherds to be found with notable frequency among an array of non-local ceramic types, all in systemic depositional contexts (cf. Tables 4.45 – 4.78). Based on mean ceramic dates used as anchor points, in conjunction with ceramic cross-dating this type with non-local ceramics, I propose a date range of A.D. 1100 to 1169 for Hildale Black-on-gray.

Glendale Black-on-gray

No Glendale Black-on-gray sherds were found suitable in my investigation for use in ceramic cross-dating. However, on the basis of my proposed start date of A.D. 1100 for Hildale Black-on-gray and A.D. 1116 for Pipe Spring Black-on-gray, I speculate a likely post-A.D. 1100 start date for Glendale Black-on-gray. Based on likelihood depopulation by Virgin Branch people occurred as late as A.D. 1200, or even A.D. 1225 on the South Rim of the Grand Canyon (Lyneis 1996:26), and since it is conceivable that such a date would likely coincide with the end of Tusayan White Ware, Virgin Series pottery being produced, I propose A.D. 1200/1225 as a potential end date for Glendale Black-on-gray.

Moapa Gray Ware

The six ceramic types classified under Moapa Gray Ware, mirroring each of the Tusayan White Ware, Virgin Series ceramic types, respectively, are tempered with crushed xenoliths (primarily olivine) and are known to have been produced in the vicinity of Trumbull on the Uinkaret Plateau.

Boulder Black-on-gray

As with Mesquite Black-on-gray, my association of A.D. 900 with Boulder Black-on-gray is admittedly conjectured. This start date was estimated on the basis of it coinciding just a few years after my early date estimate for Washington Black-on-gray (a Tusayan White Ware, Virgin Series ceramic type). In addition, from my research, Moapa Gray Ware pottery seems to start or temporally lag behind their painted stylistic counterparts found among Tusayan White Ware, Virgin Series types. With Boulder Black-on-gray sherds recovered from several rooms at Main Ridge, I attribute a conservative end date of A.D. 975 for this ceramic type—the earliest mean ceramic date calculated from the Main Ridge pottery assemblage.

Boysag Black-on-gray

No Boysag Black-on-gray sherds were found suitable in my investigation for use in ceramic cross-dating.

Trumbull Black-on-gray

When attempting to cross-date Trumbull Black-on-gray with well-dated non-local ceramic types associated in the same systemic context, I only found one instance of overlap—inside House 47, in association with Medicine Black-on-red sherds. While I cannot confidently establish a start or end date for this ceramic type, I was able to infer A.D. 1112 as being a date related to the overall use life of Trumbull Black-on-gray.

Moapa Black-on-gray

Mean ceramic dates associated with cross-dated non-local ceramic types found in association with Moapa Black-on-gray yielded a date range of A.D. 1060 to 1173. Although the start date for this ceramic type coincides with the same date I proposed for North Creek Black-on-gray, by my reckoning through ceramic cross-dating, Moapa Black-on-gray seems to terminate a few years after North Creek Black-on-gray.

Slide Mountain Black-on-gray

No Slide Mountain Black-on-gray sherds were found suitable in my investigation for use in ceramic cross-dating.

Poverty Mountain Black-on-gray

No Poverty Mountain Black-on-gray sherds were found suitable in my investigation for use in ceramic cross-dating.

Tusayan White Ware, Virgin Series (Corrugated)

Tusayan White Ware, Virgin Series (Corrugated) comprises the same temper characteristics as the non-corrugated ware. Aside from the ceramic types organized under this ware being corrugated, by definition exclusively manufactured as bowls, only four types have been identified that correspond with the non-corrugated Tusayan White Ware, Virgin Series ceramic types.

Orderville Black-on-gray

No Orderville Black-on-gray sherds were found suitable in my investigation for use in ceramic cross-dating.

Hurricane Black-on-gray

Mean ceramic dates associated with my efforts in cross-dating Hurricane Black-on-gray with non-local ceramic types produced a date range of A.D. 1088 to 1122. This ceramic type contextually associated with Tusayan Black-on-red and Medicine Black-on-red sherds within several "houses" at Main Ridge.

Pipe Spring Black-on-gray

Pipe Spring Black-on-gray, the corrugated variant of Hildale Black-on-gray, was found in several systemic contexts, including a kiva depositional fill at the Corngrower Site, in high association with Tusayan Corrugated sherds. The mean ceramic dates, when correlated with ceramic cross-dating, resulted in a date range of A.D. 1116 to 1150 for Pipe Spring Black-on-gray.

Parashant Black-on-gray

No Parashant Black-on-gray sherds were found suitable in my investigation for use in ceramic cross-dating.

Tusayan White Ware, Moapa Series

Tusayan White Ware, Moapa Series is a corrugated version of Moapa Gray Ware. Made up of the same temper characteristics as Moapa Gray Ware pottery types, similar to Tusayan White Ware, Virgin Series (Corrugated) ceramic types, only four types have been identified that correspond with the non-corrugated Tusayan White Ware, Virgin Series ceramic types. Aside from the ceramic types organized under this ware being corrugated, by definition exclusively manufactured as bowls, only four types have been identified that corresponds with the latter four Tusayan White Ware, Virgin Series ceramic types.

Toroweap Black-on-gray

No Toroweap Black-on-gray sherds were found suitable in my investigation for use in ceramic cross-dating.

Whitmore Black-on-gray

No Whitmore Black-on-gray sherds were found suitable in my investigation for use in ceramic cross-dating.

Fern Glen Black-on-gray

No Fern Glen Black-on-gray sherds were found suitable in my investigation for use in ceramic cross-dating.

Tuckup Black-on-gray

No Tuckup Black-on-gray sherds were found suitable in my investigation for use in ceramic cross-dating.

Discussion

After cross-dating the above painted Virgin Branch pottery styles with well-dated non-local ceramic types, both of which associated in the same systemic depositional contexts, I arrive at a different conclusion that advanced by Thompson (1986:355-356). In his comparative assessment of Virgin Branch ceramic types, in relation to Breternitz's (1966) work and dates associated with Kayenta Branch painted "analogues," Thompson asserted—albeit, non-dogmatically—that certain painted Virgin Branch ceramic types predated corresponding Kayenta Branch painted "analogues." In his assessment of painted pottery styles, Thompson (1986:356) states: "In the Virgin and Moapa series, St. George Black-on-gray and Trumbull Black-on-gray are shown as earlier than Black Mesa Black-on-white." Immediately following this statement, however, Thompson amended this observation with: "This is not meant to argue that the arrows of culture flow should be reversed. The discrepancies exist in this instance only in terms of the period of greatest abundance." Although Thompson's evaluation of painted Virgin Branch pottery styles appeared to indicate that Virgin Branch painted pottery styles preceded the manufacture and use of Kayenta Branch painted "analogues," his follow-up statement seems to hedge that observation and attribute his conclusion to dealing with an unrepresentative sample. Though his conclusions may have been affected by a sampling error, I think it is equally reasonable to attribute his conclusion (at least, in part) to his reliance on Breternitz's (1966) dates for Tusayan White Ware pottery types.

Stemming from my efforts in cross-dating contextually-provenienced painted Virgin Branch with well-dated non-local ceramic types, within the framework of mean ceramic dates and radiocarbon assays associated with painted Virgin Branch pottery types, I contend that the weight of evidence my assessment seems to indicate the manufacture and use of painted Kayenta Branch ceramic types having preceded the emergence of painted Virgin Branch pottery styles. The topic of painted "analogues" between Virgin and Kayenta Branch ceramic types, and any associated significance in this observation, remains outside the scope of the research question investigated in this chapter. The nuances pertaining to this follow-up issue—namely, the expression of painted stylistic design over time and any potential substance to these seeming "arrows of culture flow"—are the subject of following two chapter, Chapters 6 and 7.

Table 5.5. Identified Minimized Date Ranges for Select Painted Virgin Branch Pottery Styles.

Pottery Ware and Type	Dates (A.D.)	Pecos Classification
Tusayan White Ware, Virgin Series		
Mesquite Black-on-gray	719 – 900?	Basketmaker III – Pueblo I
Washington Black-on-gray	896 – 1075	Pueblo I – Late Pueblo II
St. George Black-on-gray	918 – 1175	Pueblo I – Early Pueblo III
North Creek Black-on-gray	1060 – 1169	Late Pueblo II – Early Pueblo III
Hildale Black-on-gray	1100 – 1169	Late Pueblo II – Early Pueblo III
Glendale Black-on-gray	Post-1100 – 1200/1225?	Late Pueblo II – Early Pueblo III
Moapa Gray Ware		
Boulder Black-on-gray	900? – 975	Pueblo I
Trumbull Black-on-gray	1112	Late Pueblo II
Moapa Black-on-gray	1060 – 1173	Late Pueblo II – Early Pueblo III
Tusayan White Ware, Virgin Series (Corrugated)		
Hurricane Black-on-gray	1088 – 1122	Late Pueblo II
Pipe Spring Black-on-gray	1116 – 1150	Late Pueblo II

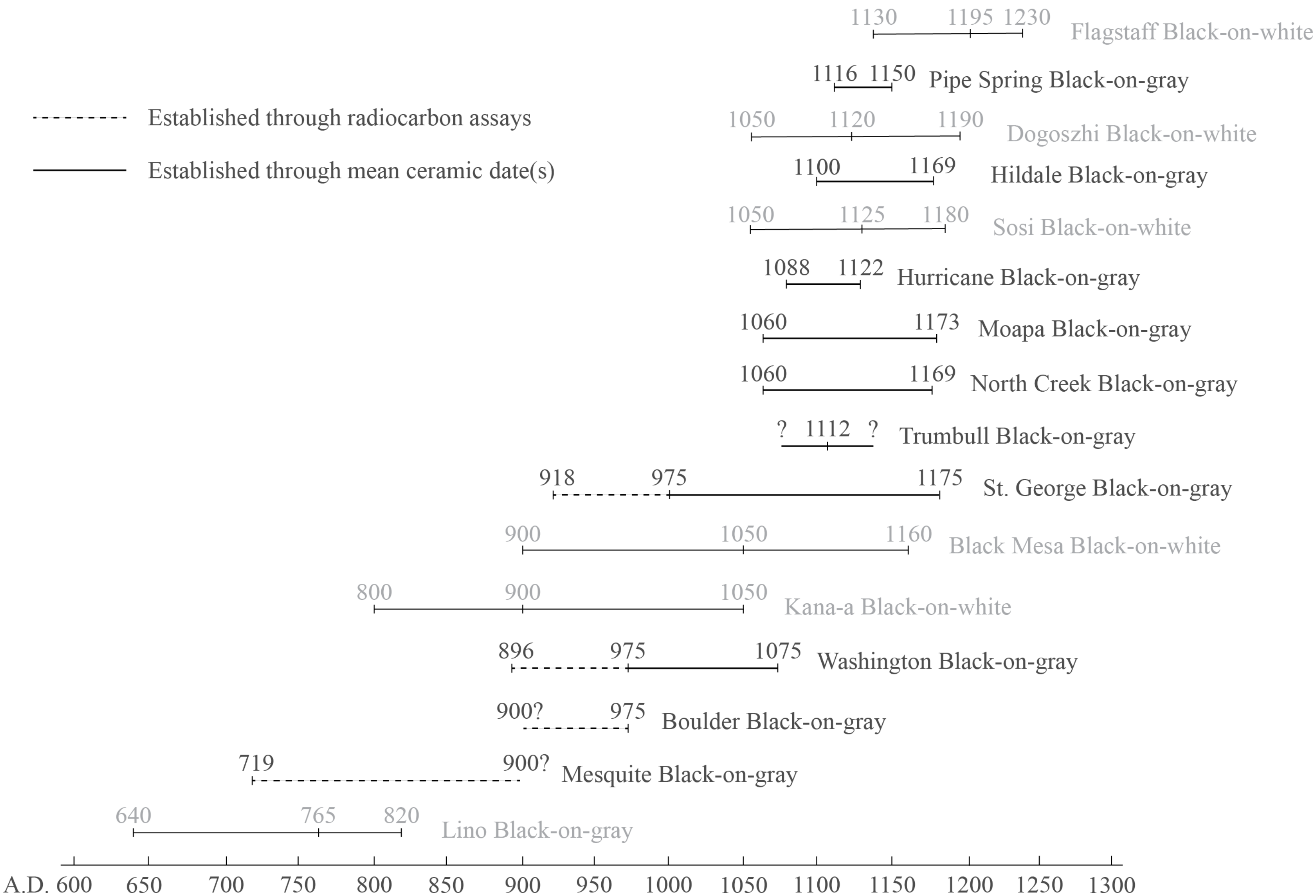


Figure 5.1. Reconstructed chronometry for painted Virgin Branch pottery styles, juxtaposed with the chronometry for the painted styles associated with Tusayan White Ware, Kayenta Series ceramics.

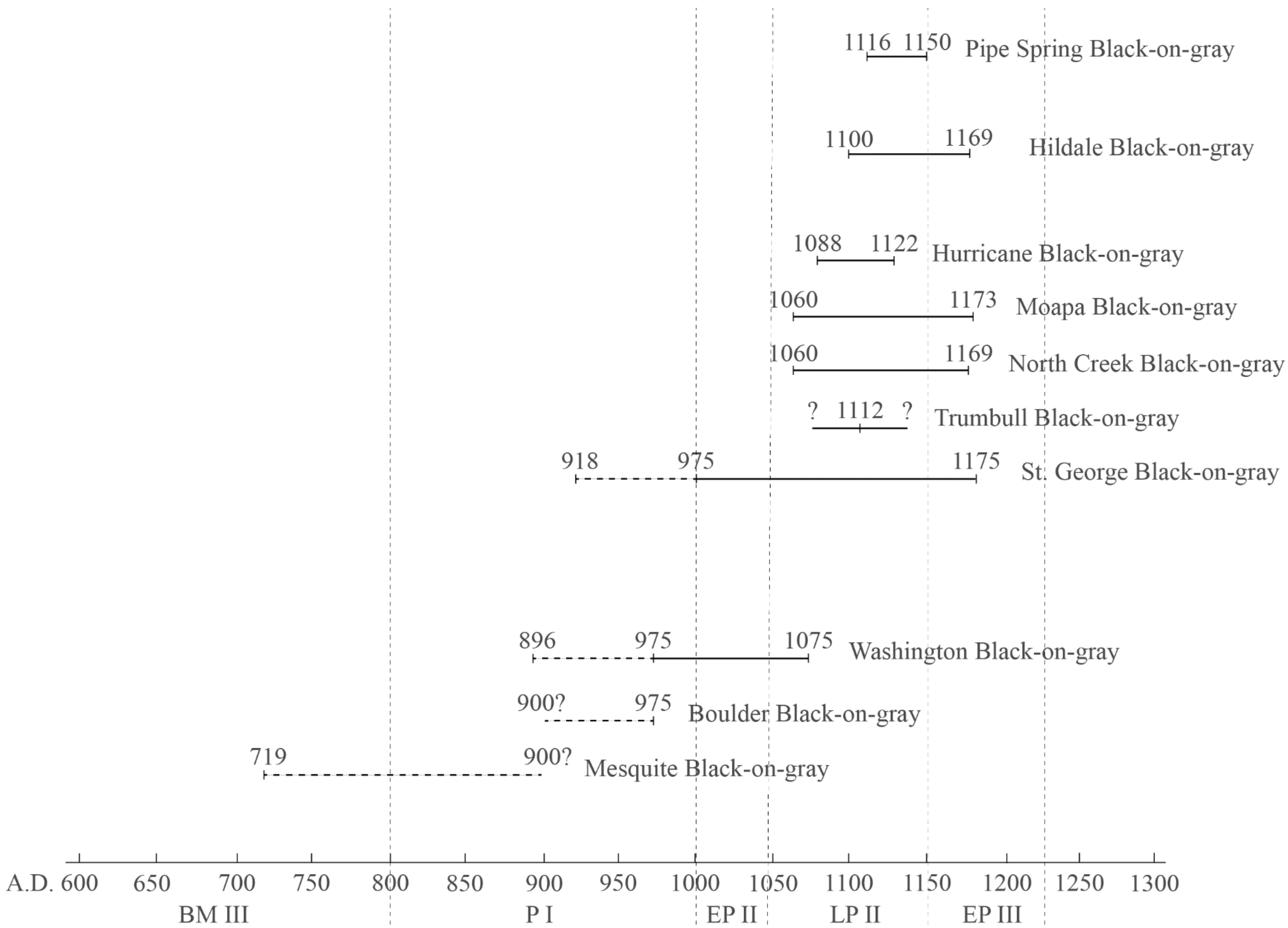


Figure 5.2. Revised chronometry for painted Virgin Branch pottery styles in the context of the Pecos Classification (Lyneis 1995).

Concluding Thoughts on a Virgin Branch Heartland Chronometry Moving Forward

My original research question set out to a refine the Virgin Branch heartland chronology and chronometry through the framing of an investigation intent on clarifying our current understanding of the dates affiliated with painted Virgin Branch pottery styles. Using tree-ring dated non-local ceramic types associated with the Kayenta Branch heartland, I used these well-dated pottery types as a proxy for the Kayenta Branch chronometry as the baseline with which I cross-dated painted Virgin Branch ceramic types. By selecting painted Virgin Branch pottery sherds found within the same systemic depositional context (e.g., structure fill, floor) as these well-dated non-local pottery types, I used mean ceramic dating to determine occupation dates for each Virgin Branch site in my sample. I then used these calculated mean ceramic dates to serve as temporal anchor points from which I then reconstructed a chronometric framework for the Virgin Branch heart through the lens of associated local painted ceramic types.

My attempt to refine and propose a revised chronometry for the Virgin Branch heartland was largely inspired by Downum's (1988) dissertation in which he proposed a revised chronometry for the Flagstaff area through cross-dating various pottery types with tree-ring dates. Downum's meticulous revision of chronometric dates for sites in the Flagstaff area has led to greater efforts by other archaeologists to pursue greater resolution of dates within other portions of the North American Southwest. Through my own efforts, in Chapter 4 and this chapter, my intention in conducting this study has been to help advance our collective understanding of the Virgin Branch archaeological record. Implementation of ceramic cross-dating painted Virgin Branch pottery styles with well-dated imported ceramic types, as a result of my efforts, has certainly shown promise in future studies pertaining to a broader consideration of more Virgin Branch ceramic types. Similarly, mean ceramic dating of Virgin Branch sites proved to be a highly valuable and practical means through which chronometric anchor points can be established. Even so, more needs to be done moving forward in order to provide greater clarification of the Virgin Branch chronometric record.

Building upon the work presented in this chapter, as well as from other researchers, broader efforts are needed into to develop an extensive regional chronometry based on well-dated ceramics. Mean ceramics dating is certainly a useful tool in this endeavor, however, additional dating methods should be pursued. Target dating efforts focused upon Virgin Branch pottery, such as thermoluminescence and optically-stimulated luminescence dating, are two particular avenues of research that show great potential in clarifying our understanding of this extensive, yet relatively under-researched portion of the North American Southwest. Although such dating procedures are not inexpensive, future researchers should consider pursuing these avenues of investigation in conjunction with more cost-effective methods (e.g., mean ceramic dating) in order to better understand the temporal sequences within the Virgin Branch occupation of southern Nevada, southern Utah, and northwestern Arizona.

CHAPTER 6. THE STRUCTURE OF STYLE FOR SELECT PAINTED VIRGIN AND KAYENTA BRANCH CERAMIC TYPES

The focus of this dissertation is on the role of style on Virgin and Kayenta Branch pottery over time. While this research aim is addressed along both themes of chronometry (Chapters 4 and 5) and the role of style (Chapter 7), an intermediate phase of investigation between the framing of time and the role of style persists. Archaeologists working within the greater Virgin Branch region have long spoken of painted Virgin Branch pottery styles as being incredibly similar to "analogous" painted Kayenta Branch styles. For example, the overarching structure of painted design styles of North Creek Black-on-gray has been widely referred to as "Sosi style" pottery (in reference to Sosi Black-on-gray). The utility in using "-style" as a modifier to describe painted Virgin Branch pottery types in reference to well-known painted Kayenta Branch pottery types should be apparent to nearly anyone. Such language provides an easily-accessible communication regarding the style depicted on a painted Virgin Branch pottery vessel or sherd. However, I contend that use of these sort of modifiers does not help clarify what one means in attributing North Creek Black-on-gray as simultaneously being a distinct pottery type (produced within the Virgin Branch region) and "Sosi-style"—in reference to Sosi Black-on-white, a pottery type produced within the Kayenta Branch region. In order for a distinction between North Creek Black-on-gray and Sosi Black-on-white to be made, a respective and comparative investigation into the structure of style is required.

In this chapter, I present the results and conclusions of an exploratory assessment of the technological (e.g., temper, slip) and painted styles exhibited by painted Tusayan White Ware, Virgin and Kayenta series pottery sherds and whole vessels as a means of assessing the following research question: What are the technological styles and rules of design (i.e., design layout, design symmetry, and design elements) associated with painted pottery from the Virgin and Kayenta Branch heartlands over time?

Analytical Approach to Establishing Rules of Design

In addressing this guiding research question, this chapter presents the tabular results for selected Tusayan White Ware, Virgin and Kayenta series painted pottery styles. Accompanying each table, where applicable, is a note stating how the table should be read as well as any associated statistics (including a finding statistical significance). My investigation of the structure of style for select painted Virgin and Kayenta Branch pottery styles is heavily influenced by the methodological approach employed by Hegmon (1995). As in Hegmon's assessment of Kayenta and Mesa Verde Pueblo I painted pottery styles, my evaluation of the pottery types below employs a statistically comparative approach (where possible) among three categories of painted style: design layout, design symmetry, and use of design elements (see Table B.1 in Appendix B for examples of the attributes recorded within each of these categories).

The three categories were not equally evaluated across each of the 12 ceramic types presented below. Rather, my exploratory assessment of select painted Virgin and Kayenta pottery styles was informed by available data recorded on over 3,000 cases comprising a mix of Virgin and Kayenta Branch pottery sherds and whole vessels. In sorting through these recorded cases, I evaluated each of the six respective painted Virgin and Kayenta Branch pottery styles on the basis of comparative convergences among the categories of design layout, design symmetry, and use of design elements. Using attributes among these three categories, comparative assessments were made using a Chi-square Test of Independence. For all cases in which a Chi-square Test of Independence could not be used (i.e., in instances when the assumptions associated with that test were not met), I used Fisher's exact test to evaluate whether or not the association between two groupings of design is statistically significant.

As can be seen in many of the notes associated with the tables listed below, statistical significance was rarely established in my evaluation of these three design categories among the selected painted Virgin and Kayenta ceramic types. This rarity of established statistical significance should not lead one to discard the results contained within the associated table. Statistical findings, as incorporated into the note associated with a given table, is provided as a reference marker to the reader. While a lack of statistical significance may appear to (or, in reality) statistically weaken the communication within a given table, the primary aim of the investigation within this chapter is to pursue potential anthropological significance on a comparative basis between two design groupings. Similar to Hegmon's (1995) study, I use the preponderance of observations over associated expected values for a given occurrence to guide my formulation of rules of design for select painted Virgin and Kayenta Branch ceramic types. On this basis, I consider variables in which observations for a particular table cell that demonstrate a clear majority over the rest of the corresponding row/column—as well as having observed frequencies meeting, or exceeding, expected frequencies for the cell in question—sufficient for establishing a rule of design for a particular ceramic type. As a complement, where applicable, frequency counts for a variable also used towards informing the structure of style for a ceramic type. Given the constraints, and limitations, of sampling throughout the data collection process for this research, the rules of design presented in this chapter should not be seen immutable and/or exhaustive. The results presented below are representative of accessible site pottery assemblages. Further research into the structure of style is needed. The following results are a contribution to that on-going process.

Assessment of the Structure of Painted Style

The following pages comprise the exploratory assessment of various combinations within the categories of design layout, design symmetry, and use of design elements. The organization of my evaluation of painted Virgin and Kayenta Branch pottery types was conducted in consideration of common design characteristics associated with selected painted Kayenta Branch pottery styles and so-called "analogues" among painted Virgin Branch ceramic types. Pairings of select Kayenta Branch ceramic types with associated Virgin Branch "analogues" (see Table 4.45) were selected from Tusayan White Ware, Virgin and Kayenta series ceramic types as a means of framing my investigation into the structure of style. This section is organized in approximate chronological order, with Virgin and Kayenta Branch pottery "analogues" grouped sequentially to help myself and the reader more efficiently compare design layout, design symmetry, and the use of design elements—as applicable—between two "analogous" pottery types and as a whole grouping of pottery styles. In addition, the following sub-sections are further limited to bowl and jar vessels. Additional vessels were found in this study (see Appendix A for vessel types), however, these other vessel types were few in number and were not found represented across all ceramic types considered in this chapter.

Mesquite Black-on-gray

Jars

Table 6.1. Design Field, Dots, and Triangle Use on Mesquite Black-on-gray Jars.

Design Field (V80)	Dots (V52)		Triangle Use		Total
			Single Series (V92)	Type (V95)	
	4	7	1	I	
Neck	0(0)	0(0)	1(1)	1(1)	2
Body	1(1)	1(1)	1(1)	1(1)	4
Total	1	1	2	2	6

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. See Appendix A for explanation of codes used in this table.

Table 6.2. Combined Categories of Design Field, Dots, and Triangle Use on Mesquite Black-on-gray Jars.

Design Field	Dots	Triangle Use		Total
		Single Series	Type	
	4 and 7	1	I	
Neck	0(1)	2(1)		2
Body	2(1)	2(1)		4
Total	2	4		6

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. Fisher exact test statistic value = 0.4667. See Appendix A for explanation of codes used in this table.

Bowls

Table 6.3. Finite Symmetry and Design Layout on Mesquite Black-on-gray Bowls.

Finite symmetry (V84)	Design Layout (V80)				Total
	B-1	B-5	P-f	P-n	
c1	0(1)	0(1)	1(0)	1(1)	2
c2	2(1)	0(1)	0(0)	0(1)	2
c5	0(1)	1(1)	0(0)	1(1)	2
c7	0(0)	1(0)	0(0)	0(0)	1
Total	2	2	1	2	7

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. See Appendix A for explanation of codes used in this table.

Table 6.4. Combined Categories for Finite Symmetry and Design Layout on Mesquite Black-on-gray Bowls.

Finite symmetry	Design Layout		Total
	B-1 and B-5	P-f and P-n	
c1 and c2	2(2)	2(2)	4
c5 and c7	2(2)	1(1)	3
Total	4	3	7

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. Fisher exact test statistic value = 1. Result is not statistically significant at $p<0.05$ level. See Appendix A for explanation of codes used in this table.

Table 6.5. Dots and Triangle Use on Mesquite Black-on-gray Bowls.

Dots	Triangle Use					Total
	Single Series		Type			
	1	3	E	I	R	
3	1(1)	12(7)	0(2)	0(2)	1(4)	14
4	0(0)	1(6)	3(1)	3(1)	6(3)	13
Total	1	13	3	3	7	27

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. See Appendix A for explanation of codes used in this table.

Table 6.6. Combined Categories for Dots and Triangle Use on Mesquite Black-on-gray Bowls.

Dots	Triangle Use		Total
	Single Series (1, 3)	Type (E, I, R)	
3	13(7)	1(7)	14
4	1(7)	12(6)	13
Total	14	13	27

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. Fisher exact test statistic value < 0.00001. This result is statistically significant at p<0.01 level. See Appendix A for explanation of codes used in this table.

Lino Black-on-gray

Jars

Table 6.7. Multiple Parallel Lines, Triangle Use, and Design Field on Lino Black-on-gray Jars.

Design Field (V80)	Triangle Use		Total
	Single Series (V92)	Type (V95)	
	3	I	
Neck	0(0)	0(0)	0
Body	2(2)	2(2)	4
Total	2	2	4

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. Fisher exact test statistic value = 1. Result is not statistically significant at p<0.05 level. See Appendix A for explanation of codes used in this table.

Bowls

Table 6.8. Finite Symmetry and Design Layout on a Lino Black-on-gray Bowl.

Finite Symmetry	Design Layout
	B-1
c2	1

Note: Frequency count only. See Appendix A for explanation of codes used in this table.

Table 6.9. Dots and Triangle Use on Lino Black-on-gray Bowls.

Dots	Triangle Use			Total
	Single Series	Type		
	1	E	I	
3	1(1)	1(1)	0(1)	2
4	0(1)	1(1)	1(1)	2
Total	1	2	1	4

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. See Appendix A for explanation of codes used in this table.

Table 6.10. Combined Categories for Dots and Triangle Use on Lino Black-on-gray Bowls.

Dots	Triangle Use		Total
	Single Series (1)	Type (E, I)	
3	1(1)	1(2)	2
4	0(1)	2(2)	2
Total	1	3	4

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. Fisher exact test statistic value = 1. Result is not statistically significant at $p<0.05$ level. See Appendix A for explanation of codes used in this table.

Washington Black-on-gray

Jars

Table 6.11. Design Layout and Design Field on Washington Black-on-gray Jars.

Design Field (V80)	Design Layout	Total
	D-s	
Neck	0	0
Shoulder	0	0
Body	1	1
Total	1	1

Note: Frequency count only. See Appendix A for explanation of codes used in this table.

Table 6.12. One-Dimensional Symmetry and Design Field on Washington Black-on-gray Jars.

Design Field (V80)	One-dimensional symmetry (V85)	Total
	11	
Neck	1	1
Shoulder	1	1
Body	1	1
Total	3	3

Note: Frequency count only. See Appendix A for explanation of codes used in this table.

Table 6.13. Design Field, Dots, and Triangle Use on Washington Black-on-gray Jars.

Design Field (V80)	Dots (V52)	Triangle Use				Total
		Single Series (V92)	Double Series (V93)	Type (V95)		
	3	1	5	E	I	
Neck	0(0)	0(0)	0(0)	1(1)	0(0)	1
Shoulder	0(0)	0(0)	0(0)	1(1)	0(0)	1
Body	1(1)	1(1)	1(1)	2(3)	1(1)	6
Total	1	1	1	4	1	8

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. See Appendix A for explanation of codes used in this table.

Table 6.14. Combined Categories for Triangle Use and Design Field on Washington Black-on-gray Jars.

Design Field	Dots	Triangle Use	Total
	3	Single Series (1), Double Series (5), and Type	
Neck	0(0)	2(2)	2
Body	1(1)	5(5)	6
Total	1	7	8

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. Fisher exact test statistic value = 1. Result is not statistically significant at $p<0.05$ level. See Appendix A for explanation of codes used in this table.

Bowls

Table 6.15. Finite Symmetry and Design Layout on Washington Black-on-gray Bowls.

Finite Symmetry (V84)	Design Layout (V81)					Total
	B-1	B-3	B-4	D-o	P-a	
c1	2(2)	1(1)	0(1)	1(1)	1(1)	5
c2	1(1)	0(0)	1(0)	0(0)	1(1)	3
Total	3	1	1	1	2	8

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. See Appendix A for explanation of codes used in this table.

Table 6.16. Combined Categories for Finite Symmetry and Design Layout on Washington Black-on-gray Bowls.

Finite Symmetry	Design Layout (V81)		Total
	B-1, B-3, and B-4	D-o and P-a	
c1	3(3)	2(2)	5
c2	2(2)	1(1)	3
Total	5	3	8

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. Fisher exact test statistic value = 1. Result is not statistically significant at $p<0.05$ level. See Appendix A for explanation of codes used in this table.

Table 6.17. Fringe on Line and Triangle Use on Washington Black-on-gray Bowls.

Fringe on Line (V69)	Triangle Use Type (V95)			Total
	E	I	R	
1	3(3)	1(1)	5(5)	9
2	2(2)	1(1)	3(3)	6
4	0(0)	0(0)	1(1)	1
Total	5	2	9	16

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. See Appendix A for explanation of codes used in this table.

Table 6.18. Combined Categories for Fringe on Line and Triangle Use on Washington Black-on-gray Bowls.

Fringe on Line	Triangle Use Type		Total
	E and I	R	
1	4(4)	5(5)	9
2 and 4	3(3)	4(4)	7
Total	7	9	16

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. Fisher exact test statistic value = 1. Result is not statistically significant at $p<0.05$ level. See Appendix A for explanation of codes used in this table.

Table 6.19. Design Layout and Triangle Use on Washington Black-on-gray Bowls.

Design Layout (V81)	Triangle Use					Total
	Single Series (V92)			Type (V95)		
	1	2	3	E	I	
B-1	1(1)	0(1)	1(0)	3(3)	1(1)	6
B-3	0(0)	1(0)	0(0)	1(1)	0(0)	2
B-4	1(0)	0(0)	0(0)	1(1)	0(0)	2
D-o	0(1)	1(0)	0(0)	1(1)	1(1)	3
P-a	1(1)	0(0)	0(0)	2(2)	1(1)	4
Total	3	2	1	8	3	17

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. See Appendix A for explanation of codes used in this table.

Table 6.20. Combined Categories for Design Layout and Triangle Use on Washington Black-on-gray Bowls.

Design Layout	Triangle Use		Total
	Single Series (1, 2, 3)	Type (E, I)	
B-1, B-3, and B-4	4(4)	6(6)	10
D-o and P-a	2(2)	5(5)	7
Total	6	11	17

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. Fisher exact test statistic value = 1. Result is not statistically significant at $p<0.05$ level. See Appendix A for explanation of codes used in this table.

Table 6.21. Fringe on Solid and Triangle Use on Washington Black-on-gray Bowls.

Fringe on Solid	Triangle Use							Total
	Single Series (V92)		Double Series (V93)		Type (V95)			
	1	2	1l	1r	E	I	R	
1	2(2)	0(1)	1(1)	0(1)	21(16)	1(1)	25(26)	50
2	2(1)	2(1)	3(1)	1(0)	3(8)	1(1)	14(14)	26
3	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0
4	0(0)	0(0)	0(0)	0(0)	1(1)	0(0)	3(2)	4
Total	4	2	4	1	25	2	42	80

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. See Appendix A for explanation of codes used in this table.

Table 6.22. Combined Categories for Fringe on Solid and Triangle Use on Washington Black-on-gray Bowls.

Fringe on Solid	Triangle Use		Total
	Single Series (1, 2) and Double Series (1l, 1r)	Type (E, I, R)	
1 and 2	11(10)	65(66)	76
3 and 4	0(1)	4(3)	4
Total	11	69	80

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. Fisher exact test statistic value = 1. Result is not statistically significant at $p<0.05$ level. See Appendix A for explanation of codes used in this table.

Kana-a Black-on-white

Jars

Table 6.23. Design Field, Multiple Parallel Lines, and Triangle Use on Kana-a Black-on-white Jars.

Design Field (V80)	Multiple Parallel Lines		Triangle Use								Total
	Bend (V90)		Rectangular Spaces (V91)	Single Series (V92)	Double Series (V93)			Type (V95)			
	D	R	1	1	11	2	3	E	I	R	
Collar	0(0)	1(1)	0(0)	0(0)	1(0)	0(0)	0(0)	0(0)	0(0)	0(0)	2
Shoulder	0(0)	2(1)	0(0)	1(1)	1(0)	0(0)	0(0)	0(1)	0(0)	0(0)	4
Neck	0(0)	5(3)	0(0)	4(3)	0(1)	1(0)	0(0)	0(3)	0(0)	1(1)	11
Body	2(1)	10(13)	1(1)	9(10)	2(3)	1(1)	1(1)	15(11)	1(1)	2(2)	44
Total	2	18	1	14	4	2	1	15	1	3	61

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. See Appendix A for explanation of codes used in this table.

Table 6.24. Combined Categories for Multiple Parallel Lines and Triangle Use on Design Fields on Kana-a Black-on-white Jars.

Design Field	Multiple Parallel Lines	Triangle Use	Total
	Bend (D and R)	Rectangular Spaces (1), Single Series (1), Double Series (1l, 2, 3), and Type (E, I, R)	
Collar and Shoulder	3(2)	3(4)	6
Neck and Body	17(18)	38(37)	55
Total	20	41	61

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. Fisher exact test statistic value = 0.3835. Result is not statistically significant at $p<0.05$ level. See Appendix A for explanation of codes used in this table.

Bowls

Table 6.25. Finite Symmetry and Design Layout on Kana-a Black-on-white Bowls.

Finite Symmetry (V84)	Design Layout (V81)					Total
	B-1	B-3	B-5	D-s	P-n	
No associated symmetry	1(1)	1(1)	1(1)	1(1)	1(1)	5
c1	0(0)	0(0)	0(0)	0(0)	0(0)	0
c5	0(0)	0(0)	1(0)	0(0)	0(0)	1
Total	1	1	2	1	1	6

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. See Appendix A for explanation of codes used in this table.

Table 6.26. Combined Categories for Finite Symmetry and Design Layout on Kana-a Black-on-white Bowls.

Finite Symmetry (V84)	Design Layout (V81)		Total
	B-1, B-3, and B-5	D-s and P-n	
No associated symmetry	3(3)	2(2)	5
c1 and c5	1(1)	0(0)	1
Total	4	2	6

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. Fisher exact test statistic value = 1. Result is not statistically significant at $p<0.05$ level. See Appendix A for explanation of codes used in this table.

Table 6.27. Fringe on Line and Triangle Use on Kana-a Black-on-white Bowls.

Fringe on Line (V69)	Triangle Use Type (V95)		Total
	E	I	
1	0(0)	2(2)	2
3	0(0)	0(0)	0
Total	0	2	2

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. Fisher exact test statistic value = 1. Result is not statistically significant at $p<0.05$ level. See Appendix A for explanation of codes used in this table.

Table 6.28. Fringe on Solid and Triangle Use on Kana-a Black-on-white Bowls.

Fringe on Solid	Triangle Use Type			Total
	E	I	R	
2	1(1)	0(0)	1(1)	2
3	1(0)	0(0)	0(0)	1
4	0(1)	1(0)	1(1)	2
Total	2	1	2	5

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. See Appendix A for explanation of codes used in this table.

St. George Black-on-gray

Jars

Table 6.29. Design Field, Dots, and Triangle Use on St. George Black-on-gray Jars.

Design Field (V80)	Dots (V52)	Triangle Use				Total
		Rectangular spaces (V91)	Single Series (V92)	Type (V95)		
	3	1	1	I	R	
Neck	0(1)	0(0)	3(2)	3(2)	0(0)	6
Body	1(1)	1(1)	2(3)	2(3)	1(1)	7
Total	1	1	5	5	1	13

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. See Appendix A for explanation of codes used in this table.

Table 6.30. Combined Categories for Triangle Use and Design Field on St. George Black-on-gray Jars.

Design Field	Dots	Triangle Use	Total
	3	Rectangular spaces (1), Single Series (1), and Type (I and R)	
Neck	0(0)	6(6)	6
Body	1(1)	6(6)	7
Total	1	12	13

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. Fisher exact test statistic value = 1. Result is not statistically significant at $p<0.05$ level. See Appendix A for explanation of codes used in this table.

Bowls

Table 6.31. Finite Symmetry Layout and Design Layout on St. George Black-on-gray Bowls.

Finite Symmetry (V84)	Design Layout (V81)					Total
	B-1	B-3	D-b	D-q	P-n	
c1	3(3)	5(2)	0(1)	0(0)	0(1)	8
c2	3(3)	0(1)	3(1)	0(0)	1(1)	7
c3	1(1)	0(1)	1(1)	0(0)	2(1)	4
c4	1(1)	0(1)	0(1)	1(0)	1(1)	3
Total	8	5	4	1	4	22

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. See Appendix A for explanation of codes used in this table.

Table 6.32. Combined Categories for Finite Symmetry Layout and Design Layout on St. George Black-on-gray Bowls.

Finite Symmetry (V84)	Design Layout (V81)		Total
	B-1 and B-3	D-b, D-q, and P-n	
c1 and c2	11(9)	4(6)	15
c3 and c4	2(4)	5(3)	7
Total	13	9	22

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. Fisher exact test statistic value = 0.0743. Result is not statistically significant at $p<0.05$ level. See Appendix A for explanation of codes used in this table.

Table 6.33. Multiple Parallel Lines, Scrolls, Spirals, and Checks on St. George Black-on-gray Bowls.

Multiple Parallel Lines	Primary Forms				Total
	Scrolls (V36)	Spirals (V38)	Checks		
Complex (V89)			1	2	
CCd	0(0)	0(0)	0(0)	1(0)	1
CCr	0(0)	0(0)	1(0)	0(0)	1
Sc	1(1)	3(2)	0(1)	0(1)	4
Sr	1(0)	0(0)	0(0)	0(0)	1
Total	2	3	1	1	7

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. See Appendix A for explanation of codes used in this table.

Table 6.34. Combined Categories for Multiple Parallel Lines, Scrolls, Spirals, and Checks on St. George Black-on-gray Bowls.

Multiple Parallel Lines	Primary Forms		Total
Complex	Scrolls and Spirals	Checks (1, 2)	
CCd and CCr	0(1)	2(1)	2
Sc and Sr	5(4)	0(1)	5
Total	5	2	7

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. Fisher exact test statistic value = 0.0476. This result is statistically significant at $p<0.05$ level. See Appendix A for explanation of codes used in this table.

Black Mesa Black-on-white

Jars

Table 6.35. Design Field and Design Layout on Black Mesa Black-on-white Jars.

Design Field	Design Layout				Total
	B-1	B-3	B-4	D-s	
Neck	1(1)	1(1)	1(1)	5(5)	8
Body	1(1)	1(1)	0(1)	5(4)	7
Shoulder	0(0)	0(0)	1(0)	0(1)	1
Total	2	2	2	10	16

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. See Appendix A for explanation of codes used in this table.

Table 6.36. Combined Categories for Design Field and Design Layout on Black Mesa Black-on-white Jars.

Design Field	Design Layout		Total
	B-1, B-3, and B-4	D-s	
Neck	3(3)	5(5)	8
Body and Shoulder	3(3)	5(5)	8
Total	6	10	16

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. Fisher exact test statistic value = 1. Result is not statistically significant at $p<0.05$ level. See Appendix A for explanation of codes used in this table.

Table 6.37. Design Field, Dots, and Triangle Use on Black Mesa Black-on-white Jars.

Design Field	Dots	Triangle Use							Total
		Rectangular spaces	Single Series	Double Series			Type		
	7	2	1	11	3	6	E	R	
Neck	1(0)	2(3)	5(6)	3(3)	7(7)	1(1)	8(8)	12(12)	39
Shoulder	0(0)	1(1)	1(1)	0(0)	0(1)	1(0)	1(1)	2(2)	6
Body	0(0)	1(1)	3(2)	1(1)	4(3)	0(1)	3(3)	5(5)	17
Total	1	4	9	4	11	2	12	19	62

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. See Appendix A for explanation of codes used in this table.

Table 6.38. Combined Categories for Design Field, Dots, and Triangle Use on Black Mesa Black-on-white Jars.

Design Field	Dots	Triangle Use	Total
		Rectangular spaces (2), Single Series (1), Double Series (11, 3, 6), and Type (E, R)	
Neck	1(1)	38(38)	39
Shoulder and Body	0(0)	23(23)	23
Total	1	61	62

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. Fisher exact test statistic value = 1. Result is not statistically significant at $p<0.05$ level. See Appendix A for explanation of codes used in this table.

Bowls

Table 6.39. Finite Symmetry and Design Layout on Black Mesa Black-on-white Bowls.

Finite symmetry	Design Layout			Total
	B-1	B-5	P-n	
c1	1(1)	1(1)	1(1)	3
c3	0(0)	0(0)	0(0)	0
Total	1	1	1	3

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. See Appendix A for explanation of codes used in this table.

Table 6.40. Combined Categories for Finite Symmetry and Design Layout on Black Mesa Black-on-white Bowls.

Finite symmetry	Design Layout		Total
	B-1 and B-5	P-n	
c1	2(2)	1(1)	3
c3	0(0)	0(0)	0
Total	2	1	3

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. Fisher exact test statistic value = 1. Result is not statistically significant at $p<0.05$ level. See Appendix A for explanation of codes used in this table.

Table 6.41. Multiple Parallel Lines, Spirals, and Fringe on Solid on Black Mesa Black-on-white Bowls.

Multiple Parallel Lines		Spirals	Secondary Forms	Total
			Fringe on solid	
			3	
Complex	Sc	4(3)	1(1)	5
Bend	R	0(1)	1(0)	1
Total		4	2	6

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. Fisher exact test statistic value = 0.333. Result is not statistically significant at $p<0.05$ level. See Appendix A for explanation of codes used in this table.

North Creek Black-on-gray

Jars

Table 6.42. Combined Categories for Design Layout and Design Field on North Creek Black-on-gray Jars.

Design Field	Design Layout		Total
	B-4, P-n	D-v	
Neck	2(2)	1(1)	3
Body	2(2)	1(1)	3
Total	4	2	6

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. Fisher exact test statistic value = 1. Result is not statistically significant at $p<0.05$ level. See Appendix A for explanation of codes used in this table.

Table 6.43. One-Dimensional Symmetry and Design Field on North Creek Black-on-gray Jars.

Design Field (V80)	One-dimensional Symmetry (V85)	Total
	11	
Neck	1	1
Body	1	1
Total	2	2

Note: Frequency count only. See Appendix A for explanation of codes used in this table.

Table 6.44. Triangle Use and Design Field on North Creek Black-on-gray Jars.

Design Field (V80)	Triangle Use					Total
	Single Series (V92)	Double Series (V93)		Type (V95)		
	1	11	2	E	I	
Neck	0(0)	0(0)	1(1)	0(0)	1(1)	2
Body	1(1)	1(1)	2(3)	1(1)	5(5)	10
Total	1	1	3	1	6	12

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. See Appendix A for explanation of codes used in this table.

Table 6.45. Combined Categories for Triangle Use and Design Field on North Creek Black-on-gray Jars.

Design Field	Triangle Use		Total
	Single (1) and Double (1l, 2) Series	Type E and I	
Neck	1(1)	1(1)	2
Body	4(4)	6(5)	10
Total	5	7	12

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. Fisher exact test statistic value = 1. Result is not statistically significant at $p<0.05$ level. See Appendix A for explanation of codes used in this table.

Bowls

Table 6.46. Finite Symmetry Layout and Design Layout on North Creek Black-on-gray Bowls.

Finite symmetry	Design Layout								Total
	B-1	B-3	B-4	B-5	D-b	D-o	D-q	P-n	
c1	2(5)	4(1)	8(3)	0(0)	0(1)	0(1)	0(1)	2(3)	16
c2	16(13)	0(2)	1(7)	0(1)	6(3)	5(3)	0(3)	10(7)	38
c3	3(2)	0(0)	2(1)	0(0)	0(1)	0(0)	0(0)	2(1)	7
c4	3(3)	0(1)	0(2)	1(0)	0(1)	0(1)	5(1)	0(2)	9
c6	0(0)	0(0)	1(0)	0(0)	0(0)	0(0)	0(0)	0(0)	1
c7	0(0)	0(0)	1(0)	0(0)	0(0)	0(0)	0(0)	0(0)	1
Total	24	4	13	1	6	5	5	14	72

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table See Appendix A for explanation of codes used in this table.

Table 6.47. Combined Categories for Finite Symmetry Layout and Design Layout on North Creek Black-on-gray Bowls.

Finite symmetry	Design Layout		Total
	B-1, B-3, B-4, and B-5	D-b, D-o, D-q, and P-n	
c1, c2, and c3	36(36)	25(25)	61
c4, c6, and c7	6(6)	5(5)	11
Total	42	30	72

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. Fisher exact test statistic value = 1. Result is not statistically significant at p<0.05 level. See Appendix A for explanation of codes used in this table.

Table 6.48. Design Layout and Triangle Use on North Creek Black-on-gray Bowls.

Design Layout	Triangle Use										Total
	Single Series		Double Series					Type			
	1	3	1	2	3	11	3e	E	I	R	
B-1	4(4)	0(0)	0(1)	1(1)	0(0)	10(9)	0(1)	2(6)	6(3)	13(12)	36
B-3	2(2)	1(0)	0(0)	1(1)	1(0)	6(5)	1(0)	8(4)	0(2)	3(7)	23
B-4	4(3)	0(0)	1(0)	0(1)	0(0)	5(7)	1(0)	7(5)	2(2)	8(9)	28
B-5	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	1(0)	1
D-b	1(1)	0(0)	0(0)	0(0)	0(0)	2(2)	0(0)	3(2)	0(1)	3(3)	9
D-o	2(1)	0(0)	0(0)	1(0)	0(0)	3(3)	0(0)	0(2)	1(1)	4(4)	11
D-q	0(1)	0(0)	0(0)	0(0)	0(0)	3(1)	0(0)	0(1)	1(0)	2(2)	6
P-n	2(3)	0(0)	1(0)	1(0)	0(0)	4(6)	0(0)	5(4)	1(2)	11(8)	25
Total	15	1	2	4	1	33	2	25	11	45	139

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. See Appendix A for explanation of codes used in this table.

Table 6.49. Combined Categories for Design Layout and Triangle Use on North Creek Black-on-gray Bowls.

Design Layout	Triangle Use		Total
	Single Series (1, 3) and Double Series (1, 2, 3, 1l, 3e)	Type (E, I, R)	
B-1, B-3, B-4, and B-5	38(37)	50(51)	88
D-b, D-o, D-q, and P-n	20(21)	31(30)	51
Total	58	81	139

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. Fisher exact test statistic value = 0.7224. Result is not statistically significant at $p<0.05$ level. See Appendix A for explanation of codes used in this table.

Sosi Black-on-white

Jars

Table 6.50. Design Layout and Design Field on Sosi Black-on-white Jars.

Design Field (V80)	Design Layout (V81)				Total
	B-4	B-5	D-s	D-v	
Neck	2(2)	2(2)	2(2)	1(1)	7
Shoulder	2(2)	2(2)	2(2)	1(1)	7
Body	1(1)	1(1)	2(2)	1(1)	5
Total	5	5	6	3	19

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. See Appendix A for explanation of codes used in this table.

Table 6.51. Combined Categories for Design Layout and Design Field on Sosi Black-on-white Jars.

Design Field	Design Layout		Total
	B-4 and B-5	D-s and D-v	
Neck	4(4)	3(3)	7
Shoulder and Body	6(6)	6(6)	12
Total	10	9	19

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. Fisher exact test statistic value = 1. Result is not statistically significant at $p<0.05$ level. See Appendix A for explanation of codes used in this table.

Table 6.52. One-Dimensional Symmetry and Design Field on Sosi Black-on-white Jars.

Design Field (V80)	One-dimensional Symmetry (V85)	Total
	11	
Collar	1	1
Neck	8	8
Shoulder	6	6
Body	8	8
Total	22	22

Note: Frequency count only. See Appendix A for explanation of codes used in this table.

Table 6.53. Multiple Parallel Lines and Triangle Use on Design Fields on Sosi Black-on-white Jars.

Design Field	Multiple Parallel Lines				Triangle Use								Total
	Complex		Bend		Single Series		Double Series			Type			
	Sd	Sr	D	R	1	3	1l	1r	3	E	I	R	
Collar	0(0)	0(0)	0(0)	0(1)	0(0)	0(0)	1(0)	0(0)	0(0)	1(0)	0(0)	1(1)	3
Neck	2(2)	0(0)	1(1)	6(4)	2(2)	1(0)	3(3)	0(0)	0(0)	1(2)	1(1)	4(5)	21
Shoulder	0(1)	0(0)	1(1)	4(3)	2(1)	0(0)	3(2)	0(0)	0(0)	1(1)	1(1)	3(4)	15
Body	4(3)	1(1)	1(2)	7(9)	4(4)	0(1)	4(6)	1(1)	1(1)	4(4)	2(2)	13(11)	42
Total	6	1	3	17	8	1	11	1	1	7	4	21	81

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. See Appendix A for explanation of codes used in this table.

Table 6.54. Combined Categories Multiple Parallel Lines and Triangle Use on Design Fields on Sosi Black-on-white Jars.

Design Field	Multiple Parallel Lines	Triangle Use	Total
	Complex (Sd, Sr) and Bend (D, R)	Single Series (1, 3), Double Series (1l, 1r, 3), and Type (E, I, R)	
Collar and Neck	9(8)	15(16)	24
Shoulder and Body	18(19)	39(38)	57
Total	27	54	81

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. $X^2 = 5.692$, df =1, $p > 0.05$. Result is not statistically significant at $p<0.05$ level. See Appendix A for explanation of codes used in this table.

Bowls

Table 6.55. Finite Symmetry Layout and Design Layout on Sosi Black-on-white Bowls.

Finite Symmetry	Design Layout				Total
	B-1	D-o	D-q	P-n	
c2	1(1)	1(0)	0(0)	0(0)	2
c4	1(1)	0(1)	1(1)	1(1)	3
Total	2	1	1	1	5

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. See Appendix A for explanation of codes used in this table.

Table 6.56. Combined Categories for Finite Symmetry Layout and Design Layout on Sosi Black-on-white Bowls.

Finite Symmetry	Design Layout		Total
	B-1	D-o, D-q, and P-n	
c2	1(1)	1(1)	2
c4	1(1)	2(2)	3
Total	2	3	5

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. Fisher exact test statistic value = 1. Result is not statistically significant at $p<0.05$ level. See Appendix A for explanation of codes used in this table.

Table 6.57. Design Layout and Triangle Use on Sosi Black-on-white Bowls.

Design Layout	Triangle Use					Total
	Single Series	Double Series	Type			
	1	11	E	I	R	
B-1	1(0)	1(2)	1(2)	1(1)	2(2)	6
B-3	0(0)	1(1)	1(1)	0(0)	0(1)	2
D-o	0(0)	0(0)	0(0)	0(0)	0(0)	0
D-q	0(0)	1(1)	1(1)	1(1)	1(1)	4
P-n	0(0)	1(1)	1(1)	1(1)	1(1)	4
Total	1	4	4	3	4	16

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. See Appendix A for explanation of codes used in this table.

Table 6.58. Combined Categories for Design Layout and Triangle Use on Sosi Black-on-white Bowls.

Design Layout	Triangle Use		Total
	Single Series (1) and Double Series (11)	Type (E, I, R)	
B-1 and B-3	3(3)	5(6)	8
D-o, D-q, and P-n	2(3)	6(6)	8
Total	5	11	16

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. Fisher exact test statistic value = 1. Result is not statistically significant at $p<0.05$ level. See Appendix A for explanation of codes used in this table.

Hildale Black-on-gray

Jars

Table 6.59. Triangle Use and Design Field on Hildale Black-on-gray Jars.

Design Field	Triangle Use	Total
	Single Series	
	1	
Neck	1	1
Shoulder	0	0
Body	1	1
Total	2	2

Note: Frequency count only. See Appendix A for explanation of codes used in this table.

Bowls

Table 6.60. Finite Symmetry and Design Layout on Hildale Black-on-gray Bowls.

Finite Symmetry (V83)	Design Layout (V81)				Total
	B-1	B-3	D-q	P-n	
c1	0(0)	1(0)	0(0)	0(0)	1
c2	1(0)	0(0)	0(0)	0(0)	1
c4	1(1)	0(1)	1(1)	1(1)	3
Total	2	1	1	1	5

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. See Appendix A for explanation of codes used in this table.

Table 6.61. Combined Categories for Finite Symmetry and Design Layout on Hildale Black-on-gray Bowls.

Finite Symmetry (V83)	Design Layout (V81)		Total
	B-1 and B-3	D-q and P-n	
c1 and c2	2(1)	0(1)	2
c4	1(2)	2(1)	3
Total	3	2	5

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. Fisher exact test statistic value = 0.4. Result is not statistically significant at p<0.05 level. See Appendix A for explanation of codes used in this table.

Dogoszhi Black-on-white

Jars

Table 6.62. Design Layout and Design Field on Dogoszhi Black-on-white Jars.

Design Field (V80)	Design Layout (V81)			Total
	B-2	B-3	D-s	
Neck	1(1)	1(1)	3(3)	5
Shoulder	1(1)	1(1)	3(3)	5
Body	1(1)	1(1)	3(3)	5
Total	3	3	9	15

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. See Appendix A for explanation of codes used in this table.

Table 6.63. Combined Categories for Design Layout and Design Field on Dogoszhi Black-on-white Jars.

Design Field (V80)	Design Layout (V81)		Total
	B-2 and B-3	D-s	
Neck	2	3	5
Shoulder and Body	4	6	10
Total	6	9	15

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. Fisher exact test statistic value = 1. Result is not statistically significant at $p<0.05$ level. See Appendix A for explanation of codes used in this table.

Table 6.64. One-Dimensional Symmetry and Design Field on Dogoszhi Black-on-white Jars.

Design Field (V80)	One-dimensional Symmetry (V85)	Total
	11	
Neck	3	3
Shoulder	3	3
Body	3	3
Total	9	9

Note: Frequency count only. See Appendix A for explanation of codes used in this table.

Table 6.65. Dots, Multiple Parallel Lines, and Triangle Use on Design Fields on Dogoszhi Black-on-white Jars.

Design Field (V80)	Dots (V52)	Multiple Parallel Lines	Triangle Use				Total
			Single Series (V92)	Double Series (V93)		Type (V95)	
	1	Bend (V90)	1	1l	2	E	
Neck	0(0)	1(1)	1(1)	0(0)	1(1)	2(2)	5
Shoulder	0(0)	1(1)	1(1)	0(0)	0(1)	2(2)	4
Body	1(0)	1(1)	1(1)	1(0)	2(1)	2(2)	6
Total	1	3	3	1	3	6	15

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. See Appendix A for explanation of codes used in this table.

Table 6.66. Combined Categories for Dots, Multiple Parallel Lines, and Triangle Use on Design Fields on Dogoszhi Black-on-white Jars.

Design Field	Dots (1) and Multiple Parallel Lines (Bend)	Triangle Use	Total
		Single Series (1), Double Series (1l, 2), and Type (E)	
Neck	1(1)	4(4)	5
Shoulder and Body	3(3)	9(9)	10
Total	4	13	15

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. Fisher exact test statistic value = 1. Result is not statistically significant at $p<0.05$ level. See Appendix A for explanation of codes used in this table.

Bowls

Table 6.67. Finite Symmetry and Design Layout on a Dogoszhi Black-on-white Bowl.

Finite Symmetry (V84)	Design Layout (V81)
	B-1
c3	1

Note: Frequency count only. See Appendix A for explanation of codes used in this table.

Glendale Black-on-gray

Jars

Table 6.68. Multiple Parallel Lines, Triangle Use, and Design Field on Glendale Black-on-gray Jars.

Design Field (V80)	Dots (V52)	Multiple Parallel Lines Complex (V89)	Triangle Use Type (V95)	Total
	3	CCd	R	
Body	1	1	1	3
Total	1	1	1	3

Note: Frequency count only. See Appendix A for explanation of codes used in this table.

Bowls

Table 6.69. Design Layout and Triangle Use on Glendale Black-on-gray Bowls.

Design Layout (V81)	Triangle Use			Total
	Double Series (V93)	Type (V95)		
	1l	I	R	
B-1	1	1	1	3

Note: Frequency count only. See Appendix A for explanation of codes used in this table.

Table 6.70. Multiple Parallel Lines and Triangle Use on Glendale Black-on-gray Bowls.

Multiple Parallel Lines	Triangle Use			Total
	Double Series (V93)	Type (V95)		
Bend	11	I	R	
D	1	1	1	3

Note: Frequency count only. See Appendix A for explanation of codes used in this table.

Table 6.71. Dots and Multiple Parallel Lines on Glendale Black-on-gray Bowls.

Dots	Multiple Parallel Lines		Total
	Complex		
	CCd	CCr	
3	1	2	3
Total	1	2	3

Note: Frequency count only. See Appendix A for explanation of codes used in this table.

Flagstaff Black-on-white

Jars

Table 6.72. Dots, Multiple Parallel Lines, and Triangle Use on Design Fields on Flagstaff Black-on-white Jars.

Design Field	Dots			Multiple Parallel Lines					Triangle Use							Total
				Dead-end	Complex			Bend	Single Series	Double Series			Type			
	3	4	7	R	CCd	CCr	Sd	R	3	1l	1r	2	E	I	R	
Collar	0(1)	1(0)	0(0)	0(0)	0(0)	0(0)	0(0)	1(1)	0(0)	2(2)	0(1)	1(1)	2(1)	1(1)	2(2)	10
Neck	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	1(0)	1(0)	0(0)	1(1)	0(0)	1(1)	0(0)	1(1)	2(2)	7
Shoulder	0(1)	1(1)	0(0)	0(1)	0(1)	0(0)	1(1)	2(1)	0(0)	3(3)	0(1)	2(1)	2(1)	2(2)	4(4)	17
Body	6(4)	1(2)	1(1)	4(3)	3(2)	1(1)	1(2)	2(4)	2(1)	8(9)	5(3)	4(5)	2(4)	5(6)	14(14)	59
Total	6	3	1	4	3	1	3	6	2	14	5	8	6	9	22	93

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. See Appendix A for explanation of codes used in this table.

Table 6.73. Combined Categories for Dots, Multiple Parallel Lines, and Triangle Use on Design Fields on Flagstaff Black-on-white Jars.

Design Field	Dots (3, 4, 7); Multiple Parallel Lines: Dead-end (R), Complex (CCd, CCr, Sd), and Bend (R)	Triangle Use	Total
		Single Series (3); Double Series (1l, 1r, 2); Type (E, I, R)	
Collar and Neck	4(5)	13(12)	17
Shoulder and Body	23(22)	53(54)	76
Total	27	66	93

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. $X^2 = 0.283$, df =1, $p > 0.05$. Result is not statistically significant at $p<0.05$ level. See Appendix A for explanation of codes used in this table.

Table 6.74. Finite Symmetry and Design Layout on Flagstaff Black-on-white Bowls.

Finite Symmetry	Design Layout			Total
	B-3	D-o	P-n	
c2	0(1)	2(1)	1(1)	3
c4	1(0)	1(1)	0(0)	2
Total	1	3	1	5

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. See Appendix A for explanation of codes used in this table.

Table 6.75. Combined Categories for Finite Symmetry and Design Layout on Flagstaff Black-on-white Bowls.

Finite Symmetry	Design Layout		Total
	B-3	D-o and P-n	
c2	0(1)	3(2)	3
c4	1(0)	1(1)	2
Total	1	4	5

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. Fisher exact test statistic value = 0.4. Result is not statistically significant at $p<0.05$ level. See Appendix A for explanation of codes used in this table.

Table 6.76. Design Layout and Triangle Use on Flagstaff Black-on-white Bowls.

Design Layout	Triangle Use				Total
	Double Series	Type			
	1l	E	I	R	
B-3	0(0)	0(0)	1(0)	0(0)	1
D-o	1(1)	1(1)	1(1)	1(1)	4
P-n	1(1)	1(1)	0(1)	1(1)	3
Total	2	2	2	2	8

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. See Appendix A for explanation of codes used in this table.

Table 6.77. Combined Categories for Design Layout and Triangle Use on Flagstaff Black-on-white Bowls.

Design Layout	Triangle Use		Total
	Double Series (1l)	Type (E, I, R)	
B-3	0(0)	1(1)	1
D-o and P-n	2(2)	5(5)	7
Total	2	6	8

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. Fisher exact test statistic value = 1. Result is not statistically significant at $p<0.05$ level. See Appendix A for explanation of codes used in this table.

Table 6.78. Multiple Parallel Lines and Triangle Use on Flagstaff Black-on-white Bowls.

Multiple Parallel Lines	Triangle Use				Total
	Double Series		Type		
Complex	1l	2	I	R	
CCd	0(0)	0(0)	0(0)	1(0)	1
CCr	0(0)	0(0)	0(0)	0(0)	0
Sd	1(2)	1(1)	2(1)	1(2)	5
Sr	2(1)	0(0)	0(1)	2(2)	4
Total	3	1	2	4	10

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. See Appendix A for explanation of codes used in this table.

Table 6.79. Combined Categories for Multiple Parallel Lines and Triangle Use on Flagstaff Black-on-white Bowls.

Multiple Parallel Lines	Triangle Use		Total
Complex	Double Series (1l, 2)	Type (I, R)	
CCd and CCr	0(0)	1(1)	1
Sd and Sr	4(4)	5(5)	9
Total	4	6	10

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. Fisher exact test statistic value = 1. Result is not statistically significant at $p<0.05$ level. See Appendix A for explanation of codes used in this table.

Table 6.80. Dots and Multiple Parallel Lines on a Flagstaff Black-on-white Bowl.

Dots	Multiple Parallel Lines
	Complex
	Sd
3	1

Note: Frequency count only. See Appendix A for explanation of codes used in this table.

Assessment of the Structure of Technological Style

Technological similarities and distinctions between Tusayan White Ware, Virgin and Kayenta series, pottery vessels have been well-established since the earliest ceramic studies in the early 20th century. Two common technological similarities between Tusayan White Ware, Virgin and Kayenta series include the use of organic paint, and the incorporation of quartz sand as a primary temper (though size and roundedness of grains do vary). My intention in revisiting technological style between Tusayan White Ware, Virgin and Kayenta series is not to merely relitigate what has already been established. Instead, my aim is to respectively evaluate Tusayan White Ware, Virgin and Kayenta series jars and bowls against variable forms of technological style—namely, the categories of polish, slip, carbon streak (see Appendix A for the meaning of codes used for these attributes). Similar to my evaluation above for painted style, the following assessment of attributes pertaining to technological style conducting using a Chi-square Test of Independence between categories of technological style (polish, slip, and carbon streak) against Tusayan White Ware, Virgin and Kayenta series jars and bowls, respectively.

Jars

Table 6.81. Polish, Slip, and Carbon Streak Associated with Tusayan White Ware (TWW), Virgin and Kayenta Series Jars.

Ware and Series	Polish			Slip			Carbon Streak		Total
	1	2	3	1	2	3	1	99	
TWW, Virgin Series	25(5)	12(4)	17(48)	36(5)	1(0)	17(47)	8(24)	46(29)	162
TWW, Kayenta Series	9(29)	14(22)	311(280)	0(31)	1(2)	310(280)	156(133)	155(172)	956
Total	34	26	328	36	2	327	164	201	1118

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. $X^2 = 409$, df =7, $p < 0.01$. This result is statistically significant at $p<0.01$ level. See Appendix A for explanation of codes used in this table.

Bowls

Table 6.82. Polish, Slip, and Carbon Streak Associated with Tusayan White Ware (TWW), Virgin and Kayenta Series Bowls.

Ware and Series	Polish			Slip			Carbon Streak		Total
	1	2	3	1	2	3	1	99	
TWW, Virgin Series	197(184)	1093(972)	324(457)	931(816)	43(43)	640(755)	179(267)	1435(1347)	4842
TWW, Kayenta Series	18(31)	42(163)	210(77)	22(137)	7(7)	241(126)	133(45)	137(225)	810
Total	215	1135	534	953	50	881	312	1572	5652

Note: Observed (expected) counts. Expected counts were rounded to nearest whole number. Expected frequencies for each cell were calculated by multiplying the column total by the row total and then multiplying the product by the grand total of the table. $X^2 = 857$, df =7, $p < 0.01$. This result is statistically significant at $p<0.01$ level. See Appendix A for explanation of codes used in this table.

Rules of Design Summary

The above exploratory assessment of the structure of style for all painted Tusayan White Ware, Virgin and Kayenta series ceramic types resulted in a limited number of rules of design. The following list of rules were primarily established using the comparative preponderance of observed frequencies within a given table. This criterion, along with an obedience rate above 70 percent (selected out of convention), were used to evaluate and preliminarily establish rules of design for select ceramic types within the overarching sampled pottery assemblage. Due to sampling limitations, as can be seen in the rules listed below, only a select few ceramic types yielded demonstrable rules of design. Tables 6.84 – 6.87 list the degree to which each of the following rules were upheld for all considered ceramic types.

Rule 1: Bands and Finite Symmetry

Mesquite Black-on-gray uses simple bands with rotational symmetry. Lino Black-on-gray uses simple bands with rotational symmetry. Washington Black-on-gray uses simple bands with asymmetrical designs. (Exceptions include complex bands with rotational symmetry). Kana-a Black-on-white uses complex bands with rotational symmetry. North Creek Black-on-gray use simple bands nested panel layouts on divided bowls with c2 rotational symmetry and complex bands with asymmetrical designs. Sosi Black-on-white uses complex bands with one-dimensional symmetry and simple bands with rotational symmetry. Dogoszhi Black-on-white uses simple bands with one-dimensional symmetry or rotational symmetry. Glendale Black-on-gray uses simple bands. Flagstaff Black-on-white uses simple bands with rotational symmetry.

Rule 2: Divided Layouts

St. George Black-on-gray use bisected divided layouts. (Exceptions include use of quartered divided layouts). Black Mesa Black-on-white uses slant/spiral divided layouts. North

Creek Black-on-gray use divided layouts in association with rotational symmetry. Hildale Black-on-gray uses quartered divided layouts. Dogoszhi Black-on-white uses slant/spiral divided layouts. Flagstaff Black-on-white uses offset divided layouts.

Rule 3: Panel Layouts

Mesquite Black-on-gray use free panel layouts with asymmetrical designs. Washington Black-on-gray use attached panel layouts. St. George Black-on-gray uses nested panels with rotational symmetry. Black Mesa Black-on-white uses slant/spiral divided layouts. North Creek Black-on-gray bowls use nested panel layouts c2 symmetry. (Exceptions include asymmetrical and other forms of rotational symmetry). Sosi Black-on-white uses nested panel layouts with rotational symmetry. Hildale Black-on-gray use nested panel layouts with rotational symmetry. Flagstaff Black-on-white uses nested panel layouts with rotational symmetry.

Rule 4: Finite Symmetry

Lino Black-on-gray uses c2 symmetry. Black Mesa Black-on-white uses asymmetrical designs. Sosi Black-on-white uses c2 and c4 symmetry. Dogoszhi Black-on-white uses c3 symmetry.

Rule 5: One-dimensional Symmetry

All applicable Tusayan White Ware, Virgin and Kayenta series, jars demonstrated 11 (translation only) symmetry. (Exceptions include use of p1 [vertical and horizontal translation] two-dimensional symmetry on a Sosi Black-on-white jar.

Rule 6: Dots and Triangle Use

Mesquite Black-on-gray uses free dots as filler in association with a single series of non-touching triangles. (Exceptions include using free dots in a line). Lino Black-on-gray uses free dots as filler in association with a single series of triangles. Washington Black-on-gray uses free dots as filler in association with single and double series of triangles.

Rule 7: Fringe on Solid and Triangle Use

Washington Black-on-gray uses serrated solids in associations with equilateral triangles.

Rule 8: Multiple Parallel Lines and Triangle Use

Kana-a Black-on-white uses equilateral triangles on jar bodies. Sosi Black-on-white uses right triangles in association with diagonal spiral multiple parallel lines on jar bodies.

Rule 9: Technological Style of Tusayan White Ware, Virgin Series

Painted Tusayan White Ware, Virgin Series pottery is not polished or slipped, and does not have a carbon core (see Table 6.87).

Rule 10: Technological Style of Tusayan White Ware, Kayenta Series

Painted Tusayan White Ware, Kayenta Series pottery is polished, slipped, and has a carbon core (see Table 6.88).

Table 6.83. Application of the Rules of Design to Tusayan White Ware, Virgin Series Pottery.

Rule	Mesquite Black-on-gray			Washington Black-on-gray			St. George Black-on-gray		
	Number Obey	Number Violate	Percent Obey	Number Obey	Number Violate	Percent Obey	Number Obey	Number Violate	Percent Obey
1	2	0	100.00	4	1	80.00	-	-	-
2	-	-	-	2	0	100.00	4	1	80.00
3	1	0	100.00	2	0	100.00	5	0	100.00
4	-	-	-	-	-	-	-	-	-
5	-	-	-	2	0	100.00	1	0	100.00
6	13	1	92.86	2	0	100.00	-	-	-
7	-	-	-	21	4	84.00	-	-	-
8	-	-	-	-	-	-	-	-	-

Table 6.84. Application of the Rules of Design to Tusayan White Ware (TWW), Virgin Series Pottery.

Rule	North Creek Black-on-gray			Hildale Black-on-gray			Glendale Black-on-gray		
	Number Obey	Number Violate	Percent Obey	Number Obey	Number Violate	Percent Obey	Number Obey	Number Violate	Percent Obey
1	49	5	90.74	-	-	-	3	0	100.00
2	16	0	100.00	1	0	100.00	-	-	-
3	10	4	71.43	1	0	100.00	-	-	-
4	-	-	-	-	-	-	-	-	-
5	1	0	100.00	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-
7	-	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-

Table 6.85. Application of the Rules of Design to Tusayan White Ware, Kayenta Series Pottery.

Rule	Lino Black-on-gray			Kana-a Black-on-white			Black Mesa Black-on-white		
	Number Obey	Number Violate	Percent Obey	Number Obey	Number Violate	Percent Obey	Number Obey	Number Violate	Percent Obey
1	1	0	100.00	1	0	100	-	-	-
2	-	-	-	-	-	-	10	0	100.00
3	-	-	-	-	-	-	1	0	100.00
4	1	0	100.00	-	-	-	3	0	100
5	-	-	-	5	0	100.00	22	0	100.00
6	1	0	100.00	-	-	-	-	-	-
7	-	-	-	-	-	-	-	-	-
8	-	-	-	15	3	83.33	-	-	-

Table 6.86. Application of the Rules of Design to Tusayan White Ware (TWW), Kayenta Series Pottery.

Rule	Sosi Black-on-white			Dogoszhi Black-on-white			Flagstaff Black-on-white		
	Number Obey	Number Violate	Percent Obey	Number Obey	Number Violate	Percent Obey	Number Obey	Number Violate	Percent Obey
1	12	0	100.00	7	0	100	1	0	100.00
2	8	3	72.73	9	0	100	3	0	100.00
3	1	0	100.00	-	-	-	1	0	100.00
4	5	0	100.00	1	0	100	-	-	-
5	10	1	90.91	7	0	100.00	9	0	100
6	-	-	-	-	-	-	-	-	-
7	-	-	-	-	-	-	-	-	-
8	17	3	85.00	-	-	-	-	-	-

Table 6.87. Application of the Rules of Design to Tusayan White Ware, Virgin Series Pottery.

Rule	Tusayan White Ware, Virgin Series		
	Number Obey	Number Violate	Percent Obey
9	3566	1438	71.26

Table 6.88. Application of the Rules of Design to Tusayan White Ware, Kayenta Series Pottery.

Rule	Tusayan White Ware, Kayenta Series		
	Number Obey	Number Violate	Percent Obey
10	1361	405	77.07

Discussion

The structure of style and associated rules of design for the above Tusayan White Ware, Virgin and Kayenta series ceramic types are presented in this chapter on the basis of the collections visited over the course of this research. The rules of design are based on correlations between various design layouts, design symmetries, and design element combinations; but these should not be seen as exhaustive of all possible considerations. The conclusions I have reached pertaining to the structure of style for painted Virgin and Kayenta Branch pottery are limited in nature and by no means preclude additional variables from future consideration by other researchers.

Accessibility to partial and/or whole vessels, no doubt, inhibited sample sizes considered as well as further investigation into the design categories laid out above and the structure of style among the selected Tusayan White Ware, Virgin and Kayenta series ceramic types. The purpose of the efforts presented in this chapter are to propose an exploratory understanding of the structure of style for select painted Virgin and Kayenta Branch pottery types. In my assertion of rules of design for the above ceramic types, as similarly stated by Hegmon (1995), I am not attributing these rules as being reflective of Virgin or Kayenta Branch cognition. Rather, I present the above assessment and resulting rules of design—albeit, limited in nature—as an etic analytical framework through which one can consider Virgin and Kayenta Branch pottery style. As an etic framework, I contend that the results from this chapter provide a starting point upon which Virgin and Kayenta Branch pottery styles can be further explored. In the following chapter, I build upon these rules of design and more broadly consider stylistic variation over time among Virgin and Kayenta Branch populations.

CHAPTER 7. THE ROLE OF STYLE IN VIRGIN BRANCH COMMUNITY IDENTITY AND GROUP AFFILIATION: AN INTRA- AND INTER-REGIONAL PERSPECTIVE

In the preceding chapters, I presented the results and associated discussions pertaining to the first two research questions of this study. The first question centered on reconstructing a chronometry for the Virgin Branch heartland, which was accomplished by examining the calculated mean ceramic dates for Virgin Branch sites and the ceramic cross-dating of painted Virgin Branch ceramic types with well-dated non-local pottery types from the Kayenta Branch region. The second question focused on exploring the structure of style and establishing rules of design for painted Virgin and Kayenta Branch ceramic types. After conducting statistical correlation tests on design layout, design symmetry, and design element attributes, the second research question was addressed through the establishment of rules of design for selected painted Virgin and Kayenta Branch ceramic types. This chapter, using the temporal and structural framework for Virgin Branch painted pottery styles laid out in Chapters 4, 5, and 6 as a foundation, addresses the third and final research question of this study: *How is Virgin Branch group identity communicated and reflected through expressions of technological and painted design styles on pottery amidst intra- and inter-regional events and interactions over time; and what implications do these findings carry with respect to Virgin Branch agency?*

Analytical Methods Used to Address the Role of Style in Virgin Branch Group Identity

At the heart of this third research question is the assumption that pottery style does in fact play a role in communicating and reflecting social dynamics, observable in the archaeological record. Working within this assumption, I contend that in the absence of a written record during the Virgin and Kayenta Branch occupations of the northern American Southwest, between ca.

300 B.C. and A.D. 1225, painted pottery style operated as a means of communication and served as a proxy for reflecting group identity. This concept does not originate with me but has been previously (and convincingly) demonstrated by other researchers studying the convergence of painted pottery style and group identity (e.g., Washburn and Crowe 2004; Washburn et al. 2010). Some of these perhaps more prominent studies conducted on the intersection of identity and pottery style have largely focused on symmetry analysis. The utility of symmetry analysis in yielding insights into questions of social interaction and connectedness has been understood among the earliest of such studies concerning Southwestern pottery (Brainerd 1942). The methodological approach of my research question on pottery style and identity here does not solely utilize symmetry analysis. Rather, I take a hierarchical approach to ceramic design style and consider six design categories. These six categories encompass the majority of the attributes recorded throughout this entire study (see Appendices A and B) and emphasize the broadest design categories known to have some form of expression among Tusayan White Ware, Virgin and Kayenta series ceramic types. The expression of particular design attributes and associated frequency counts are the primary conduit for the analytical results below.

The organization of my response to this third research question pairs archaeological periods as spans of time in which I assess the dynamics of painted style over time. Building from Chapters 4 and 5, I use the reconstructed Virgin Branch chronometry to inform the date ranges within which painted Virgin Branch ceramic types fall. Combining Lyneis' (1995) date range assignments for Pecos Classification time periods with my reconstructed Virgin Branch chronometry (see Figure 5.2), I assigned all Virgin and Kayenta Branch ceramic types in my assessment of stylistic similarity and diversity to one of three temporal groupings (see Table 7.1).

Table 7.1. Archaeological Period Assignments for Painted Virgin and Kayenta Ceramic Types.

<table>
<tr><th>Time Period</th><th>Virgin Branch Pottery</th><th>Kayenta Branch Pottery</th></tr>
<tr><td rowspan="2">Basketmaker III - Pueblo I
(300 B.C. - A.D. 1000)</td><td>Mesquite Black-on-gray
Boulder Black-on-gray</td><td>Lino Black-on-gray</td></tr>
<tr><td>Washington Black-on-gray
Boysag Black-on-gray</td><td>Kana-a Black-on-white</td></tr>
<tr><td>Early Pueblo II - Middle Pueblo II
(A.D. 1000 -1100)</td><td>St. George Black-on-gray
Trumbull Black-on-gray
Orderville Black-on-gray
Toroweap Black-on-gray</td><td>Black Mesa Black-on-white</td></tr>
<tr><td rowspan="3">Late Pueblo II - Early Pueblo III
(A.D. 1100 - 1225)</td><td>North Creek Black-on-white
Moapa Black-on-gray
Hurricane Black-on-gray
Whitmore Black-on-gray</td><td>Sosi Black-on-white</td></tr>
<tr><td>Hildale Black-on-gray
Slide Mountain Black-on-gray
Pipe Spring Black-on-gray
Fern Glen Black-on-gray</td><td>Dogoszhi Black-on-white</td></tr>
<tr><td>Glendale Black-on-gray
Poverty Mountain Black-on-gray
Parashant Black-on-gray
Tuckup Black-on-gray</td><td>Flagstaff Black-on-white</td></tr>
</table>

My investigation of Virgin Branch community identity (intra-regionally) and group affiliation (inter-regionally) is informed through observed diversity and similarity of painted stylistic design, respectively. Both of these measures are used here as relative markers to estimate changes in style over time. The following two sub-sections provide more detail regarding how each of these measures was calculated and used in this study.

Shannon Diversity Index

In this study, I used two measures of diversity: the Shannon Diversity Index and the Shannon Equitability Index (a measure of evenness). The Shannon Diversity Index—also referred to as the Shannon-Wiener Index—is a means of measuring diversity. In the case of ecological studies, the most common application of this method, the Shannon Diversity Index measures diversity as an H-statistic which ranges between zero (no diversity) and an upper limit ranging between 1 and 14 (or more), depending on the sample size. In essence, the higher the H-statistic the greater the diversity is in an environment. For the purposes of this study, the precise H-statistic is not the focus. Rather, I consider the changes in the H-statistic for a given design category, within a context (i.e., a Virgin Branch archaeological district), over time. In an attempt to control for different sample sizes in comparing these values, I calculated diversity indices only for design categories in contexts that yielded a sample size of at least 20.

The Shannon Diversity Index equation is:

$$H = -\sum[(p_i) \text{ x } \ln(p_i)]$$

where:

H = Shannon Diversity Index;

p_i = the proportion of individuals within the *i*-th species of an entire community/group;

Σ = summation;

ln = natural logarithm;

$p_i = \frac{n}{N}$, where n = the total number of individuals within a given species; and N = the total overall number of individuals within a community (inclusive of all species).

In conjunction with the H-statistic, I also consider the evenness (E_H) of the as a complementary measure of diversity that helps better contextualize the H-statistic. Evenness is measured between 0 and 1. The closer an evenness value (E_H) is to 1, the more diversity (or variety) of species is being expressed within a given environment. For example, the evenness for one community is 0.6 and later in time the evenness for that same community is again measured as being 0.7, then the diversity of species can be understood to have increased. In every instance, the H-statistic increases as corresponding evenness increases. The converse also holds true.

The Shannon Equitability Index equation is:

$$E_H = \frac{H}{\ln(S)}$$

where:

H = Shannon Diversity Index;

ln = natural logarithm; and

S = the total number of unique species (i.e., sample size).

In this second equation, evenness is indicative of how evenly (or similarly) species are represented between groups/communities. Values for evenness range between 0 and 1. Phrased differently, evenness can be viewed in terms of a percentage. An evenness value (E_H) communicates how much (as a proportion or percentage) of a community or context an associated H-statistic represents.

Brainerd-Robinson Similarity Coefficient

The Brainerd-Robinson Similarity coefficient is a statistical measure developed "with archaeology specifically for comparing assemblages in terms of the proportions of types or other categorical data" (Peeples 2011). Although use of this measure in archaeological studies have previously been criticized, Cowgill (1990) makes a compelling case for using this coefficient over other measures of similarity (particularly, Pearson's *r*) in archaeological analyses.

The Brainerd-Robinson Similarity coefficient equation is:

$$S = 200 - \sum_{k=1}^{p} \left| P_{ik} - P_{jk} \right|$$

where:

S = Brainerd-Robinson similarity coefficient;

k, p = all variables in range;

P = total percentage in assemblages i and j.

The resulting coefficient yields a similarity measure between 0 (no similarity) and 200 (perfect similarity). As with my implementation of the Shannon Diversity Index, I use this similarity coefficient on a relative basis as a means of comparing changes among design classes between contexts. Complementary to my application of diversity indices in this study, I use similarity coefficients as a comparative measure inter-regionally—between Virgin Branch districts and the Kayenta Branch heartland.

Intra-Virgin Branch and Virgin-Kayenta Branch Relations: A Comparative Regional Assessment of Technological and Painted Pottery Style

For the purposes of this study, due to a lack of sufficient (i.e., representative) samples from a relatively even number of sites within each of the three archaeological districts considered within the Virgin Branch heartland, each of the three Virgin Branch districts considered in this study are viewed a “community.” Use of this term in a broad, geographically-defined sense is applied on the assumption that discernable differences and patterns in material cultural—in this case, pottery style—can be found over time between Virgin Branch people within the region as a whole. With this stated, discussion in this section pertaining to “community identity” is presented in the sense of a shared identity among Virgin Branch people within the geographic confines of the Moapa Valley, St. George Basin, and the western Colorado Plateau, respectively. A narrower, and more conventional, application of the term “community” would perhaps yield a more nuanced reading of the archaeological record—e.g., the Main Ridge community in the Moapa Valley. However, to make such further inferences require sufficient data. In the case of this study, sample sizes of sherds and whole vessels were notably variable resulting in an insufficient number (in some cases, zero) cases to assess for a more granular, site-specific considerations across all contexts. In this section, I present my findings concerning Virgin Branch community identity intra-regionally. Using my previously stated hypotheses and expectations (see Chapter 3), I discuss how calculated diversity indices in the context of Virgin Branch community identity over time through the lens of observed ceramic design categories.

Basketmaker III *and* Pueblo I Periods

Archaeological Background and Data Expectations

During the Basketmaker III period the first painted pottery appears in the Virgin Branch heartland amidst low population densities. Virgin and Kayenta Branch populations are known to have been low and autonomous in structure (Fairley 1989). Technological styles, as partly discussed in Chapter 6, between painted Virgin and Kayenta Branch pottery were relatively distinct during this time, and through most of each group’s occupation of sites in their respective regions. As early as the Basketmaker III period, the earliest painted pottery types considered among the Virgin and Kayenta Branch people—Mesquite Black-on-gray (Tusayan White Ware, Virgin Series), Boulder Black-on-gray (Moapa Gray Ware) and Lino Black-on-gray (Tusayan White Ware, Kayenta Series) (see Figures 7.1 and 7.2), respectively—were established. During the Basketmaker III period, development Washington and Black-on-gray (Tusayan White Ware, Virgin Series) and Boysag Black-on-gray (Moapa Gray Ware) emerged after Mesquite and Boulder Black-on-gray pottery (see Figure 7.3). In the Kayenta Branch region, Kana-a Black-on-white (see Figure 7.4) was developed subsequent to Lino Black-on-gray pottery in the Kayenta Branch region—generally characterized as a pottery type composed of lines that are thicker and more crudely executed in comparison with Kana-a Black-on-white. During the Pueblo I period, the eastern portion of the Colorado Plateau was depopulated, resulting in a spatial separation between the Virgin and Kayenta Branch heartlands (Allison 2019).

Throughout the Basketmaker III and Pueblo I periods, I expected technological style to vary considerably in the context of small communities of learning. During the Basketmaker III period, I expected painted design style to be relatively homogeneous as a reflection of a desire to maintain social alliances across a broad, loosely connected landscape. Continuing into the Pueblo I period, I expected general continuation in stylistic homogeneity with indications of minor increases in more distinct intra-regional identities triggered by rises in population sizes and growing social interconnectivity within the Moapa Valley, St. George Basin, and the western Colorado Plateau, respectively. Inter-regionally, in consideration of the social structure within each heartland during the Basketmaker III and Pueblo I periods, I expected to find little variation in painted design styles, with only noticeable differences in technological style between both heartlands. In addition, during the Pueblo I period, I expected to find increasing differentiation in technological and painted design styles between both heartlands.

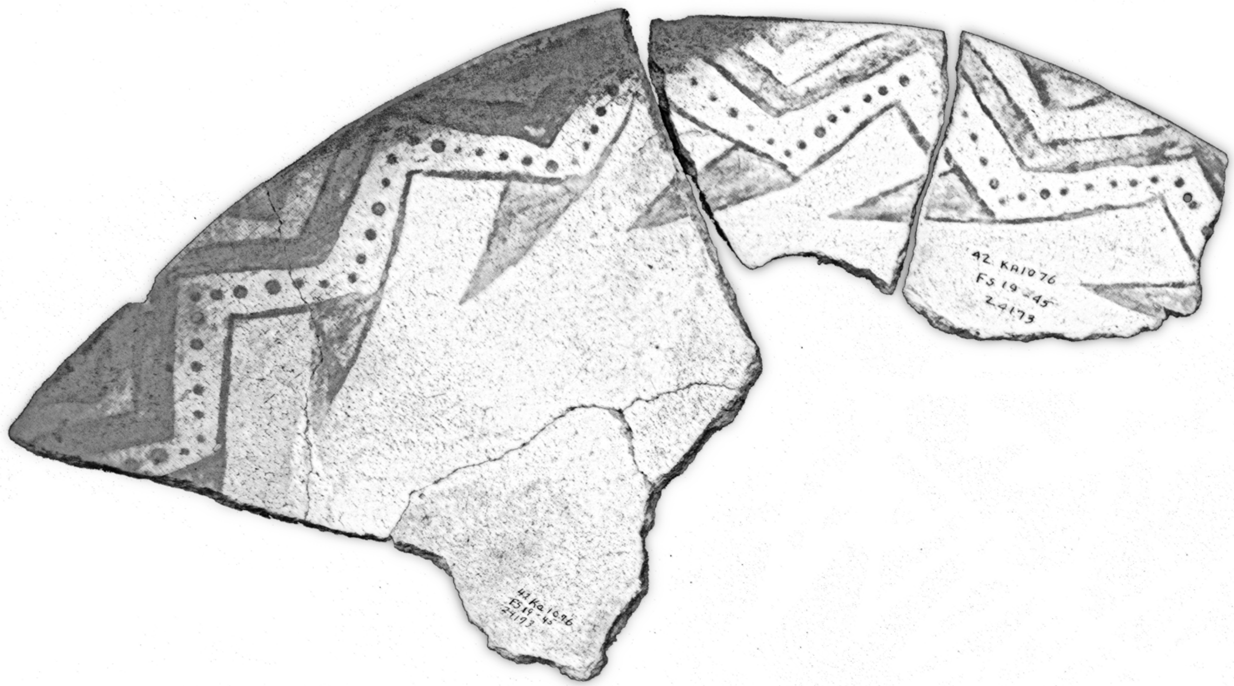


Figure 7.1. Partial Mesquite Black-on-gray bowl (Case 1105).

Figure 7.2. Lino Black-on-gray bowl (Case 2194).

Figure 7.3. Washington Black-on-gray bowl (Case 1653).

Figure 7.4. Kana-a Black-on-white bowl (Case 2197).

Intra-Virgin Branch and Virgin-Kayenta Branch Relations: Data and Interpretations

Interestingly, contrary to my original expectations of stylistic homogeneity across the Virgin Branch heartland, the Moapa Valley yielded marked diversity in primary forms (Tables 7.2 through 7.4), secondary forms, composition, and line width (Tables 7.3 and 7.4)—in relation to the St. George Basin and western Colorado Plateau districts. Although diversity indices were found for pottery assemblages in the St. George Basin across all design categories (Tables 7.2 through 7.4), the ceramics from this community were not comparable with the Moapa Valley and western Colorado Plateau communities in terms of triangle use and triangle extensions due to insufficient sample sizes (Tables 7.2 through 7.4).

In assessing the six design categories among Basketmaker III and Pueblo I pottery assemblages, no occurrences were found for the following attributes (categories): scrolls (primary forms), checks (primary forms), triangle checkerboards (triangle use), triangles attached to scrolls (triangle use), scrolls as triangle extensions (triangle extensions), and Z's and/or basketstitch (composition). Among other attributes, however, intra-Virgin Branch and inter-regional comparisons of technological and design style seem to partially support my original research expectations.

Technologically, all three Virgin Branch communities showed proportionately low (and homogeneous) occurrences of polished vessels and manufactured pots with carbon streaks (see Figures 7.5 and 7.6). Diverging from this trend, the western Colorado Plateau community yielded a proportionately higher number of slipped pottery vessels in comparison with the Moapa Valley and St. George Basin (Figure 7.6). Although sample sizes varied considerably between Virgin Branch communities, approximately 60 percent of the Moapa Gray Ware sample and approximately 40 percent of the Tusayan White Ware, Virgin Series pottery from the western Colorado Plateau. By comparison, only about 10 percent of the pottery sampled from the Moapa Valley and St. George Basin were slipped. Inter-regionally, Moapa Gray Ware (and Virgin Branch people on the western Colorado Plateau, by association) loosely tracked with the high number of slipped Tusayan White Ware, Kayenta Series vessels.

Painted design styles among Virgin Branch communities, as indicated through the diversity indices in Table 7.4 and many design categories, were found to be relatively homogenous (see Figures 7.6 – 7.17, 7.20 – 7.23). Perhaps most apparent from the available data during these time periods, the pottery from the Moapa Valley showed notably higher painted stylistic diversity in primary forms and composition. In relation to neighboring Kayenta Branch populations, Table 7.5 shows Virgin Branch pottery from the St. George Basin to carry a high similarity index with the Kayenta Branch heartland with respect to primary forms and triangle use. Complementary to the diversity indices presented in Tables 7.2 through 7.4, various distinctions among the design categories that help contextualize and provide greater meaning to these diversity indices.

Primary forms such as flags are only found on pottery sampled from within the Virgin Branch heartland (Figure 7.8). Other primary forms such as dots are found expressed (Figure 7.9) whereas the Moapa Valley is the only community too use circles on pots (Figure 7.11). Inter-regionally, Kayenta Branch pottery at this time is found to not use flags or rickrack lines (Figure 7.12).

Table 7.2. Shannon Diversity Index Results for Mesquite and Boulder Black-on-gray Pottery.

Design Category	Context	Sample Size	Diversity Measures		
			Richness	H-statistic	Evenness
Primary Forms	Moapa Valley	57	11	2.05	0.855
	St. George Basin	217	10	1.78	0.772
	Western Colorado Plateau	40	6	1.42	0.791
Secondary Forms	Moapa Valley	1	-	-	-
	St. George Basin	11	-	-	-
	Western Colorado Plateau	1	-	-	-
Triangle Use	Moapa Valley	0	-	-	-
	St. George Basin	30	3	0.468	0.426
	Western Colorado Plateau	1	-	-	-
Triangle Extensions	Moapa Valley	0	-	-	-
	St. George Basin	4	-	-	-
	Western Colorado Plateau	0	-	-	-
Composition	Moapa Valley	14	-	-	-
	St. George Basin	64	6	0.858	0.479
	Western Colorado Plateau	4	-	-	-
Line Width	Moapa Valley	18	-	-	-
	St. George Basin	82	5	1.14	0.706
	Western Colorado Plateau	13	-	-	-

Table 7.3. Shannon Diversity Index Results for Washington and Boysag Black-on-gray Pottery.

Design Category	Context	Sample Size	Diversity Measures		
			Richness	H-statistic	Evenness
Primary Forms	Moapa Valley	97	11	1.67	0.698
	St. George Basin	806	11	1.47	0.614
	Western Colorado Plateau	152	10	1.46	0.635
Secondary Forms	Moapa Valley	21	7	1.66	0.854
	St. George Basin	201	9	1.58	0.72
	Western Colorado Plateau	66	6	1.19	0.664
Triangle Use	Moapa Valley	8	-	-	-
	St. George Basin	38	3	0.825	0.751
	Western Colorado Plateau	10	-	-	-
Triangle Extensions	Moapa Valley	0	-	-	-
	St. George Basin	5	-	-	-
	Western Colorado Plateau	2	-	-	-
Composition	Moapa Valley	26	7	1.37	0.704
	St. George Basin	266	9	0.62	0.282
	Western Colorado Plateau	88	5	0.689	0.428
Line Width	Moapa Valley	49	6	1.58	0.881
	St. George Basin	366	6	1.51	0.843
	Western Colorado Plateau	73	6	1.69	0.946

Table 7.4. Shannon Diversity Index Results for Basketmaker III – Pueblo I Periods.

Design Category	Context	Sample Size	Diversity Measures		
			Richness	H-statistic	Evenness
Primary Forms	Moapa Valley	154	15	1.93	0.714
	St. George Basin	1022	14	1.61	0.61
	Western Colorado Plateau	192	12	1.61	0.649
Secondary Forms	Moapa Valley	22	7	1.64	0.843
	St. George Basin	210	9	1.61	0.735
	Western Colorado Plateau	67	6	1.21	0.675
Triangle Use	Moapa Valley	8	-	-	-
	St. George Basin	68	3	0.707	0.643
	Western Colorado Plateau	11	-	-	-
Triangle Extensions	Moapa Valley	0	-	-	-
	St. George Basin	9	-	-	-
	Western Colorado Plateau	2	-	-	-
Composition	Moapa Valley	50	8	1.16	0.558
	St. George Basin	330	9	0.692	0.315
	Western Colorado Plateau	92	5	0.667	0.415
Line Width	Moapa Valley	67	6	1.58	0.883
	St. George Basin	448	6	1.46	0.817
	Western Colorado Plateau	86	6	1.65	0.92

Figure 7.5. Polished (technological style) (top) and slipped (technological style) (bottom) pottery count frequencies during the Basketmaker III and Pueblo I periods.

Figure 7.6. Carbon streak (technological style) (top) and triangles (Primary Forms) (bottom) on pottery count frequencies during the Basketmaker III and Pueblo I periods.

Table 7.5. Brainerd-Robinson Similarity Coefficients for Basketmaker III – Pueblo I Periods.

Primary Forms				
	MV	SGB	WCP	Kayenta
MV	-	171	171	166
SGB	171	-	182	185
WCP	171	182	-	180
Kayenta	166	185	180	-
Secondary Forms				
	MV	SGB	WCP	Kayenta
MV	-	143	124	119
SGB	143	-	152	101
WCP	124	152	-	77
Kayenta	119	101	77	-
Triangle Use				
	MV	SGB	WCP	Kayenta
MV	-	126	127	123
SGB	126	-	120	176
WCP	127	120	-	96
Kayenta	123	176	96	-
Triangle Extensions				
	MV	SGB	WCP	Kayenta
MV	-	-	-	-
SGB	-	-	111	111
WCP	-	111	-	200
Kayenta	-	111	200	-
Composition				
	MV	SGB	WCP	Kayenta
MV	-	164	166	142
SGB	164	-	185	119
WCP	166	185	-	123
Kayenta	142	119	123	-
Line Width				
	MV	SGB	WCP	Kayenta
MV	-	162	185	124
SGB	162	-	167	102
WCP	185	167	-	111
Kayenta	124	102	111	-

Table 7.6. Brainerd-Robinson Similarity Coefficients for Mesquite and Boulder Black-on-gray and Lino Black-on-gray Pottery Types.

Primary Forms

	MV	SGB	WCP	Kayenta
MV	-	152	146	155
SGB	152	-	151	157
WCP	146	151	-	155
Kayenta	155	157	155	-

Secondary Forms

	MV	SGB	WCP	Kayenta
MV	-	22	0	0
SGB	22	-	44	67
WCP	0	44	-	100
Kayenta	0	67	100	-

Triangle Use

	MV	SGB	WCP	Kayenta
MV	-	-	-	-
SGB	-	-	173	173
WCP	-	173	-	200
Kayenta	-	173	200	-

Triangle Extensions

	MV	SGB	WCP	Kayenta
MV	-	-	-	-
SGB	-	-	-	-
WCP	-	-	-	-
Kayenta	-	-	-	-

Composition

	MV	SGB	WCP	Kayenta
MV	-	165	143	127
SGB	165	-	153	132
WCP	143	153	-	91
Kayenta	127	132	91	-

Line Width

	MV	SGB	WCP	Kayenta
MV	-	152	138	152
SGB	152	-	169	150
WCP	138	169	-	166
Kayenta	152	150	166	-

Table 7.7. Brainerd-Robinson Similarity Coefficients for Washington Black-on-gray and Kana-a Black-on-white Pottery Types.

Primary Forms				
	MV	SGB	WCP	Kayenta
MV	-	174	173	175
SGB	174	-	176	181
WCP	173	176	-	177
Kayenta	175	181	177	-

Secondary Forms				
	MV	SGB	WCP	Kayenta
MV	-	139	116	106
SGB	139	-	152	89
WCP	116	152	-	73
Kayenta	106	89	73	-

Triangle Use				
	MV	SGB	WCP	Kayenta
MV	-	142	120	126
SGB	142	-	123	163
WCP	120	123	-	86
Kayenta	126	163	86	-

Triangle Extensions				
	MV	SGB	WCP	Kayenta
MV	-	-	-	-
SGB	-	-	120	120
WCP	-	120	-	-
Kayenta	-	120	200	-

Composition				
	MV	SGB	WCP	Kayenta
MV	-	129	143	169
SGB	129	-	182	116
WCP	143	182	-	123
Kayenta	169	116	123	-

Line Width				
	MV	SGB	WCP	Kayenta
MV	-	158	171	115
SGB	158	-	166	81
WCP	171	166	-	88
Kayenta	115	81	88	-

Figure 7.7. Spirals (Primary Forms) (top) and terraces (Primary Forms) (bottom) on pottery count frequencies during the Basketmaker III and Pueblo I periods.

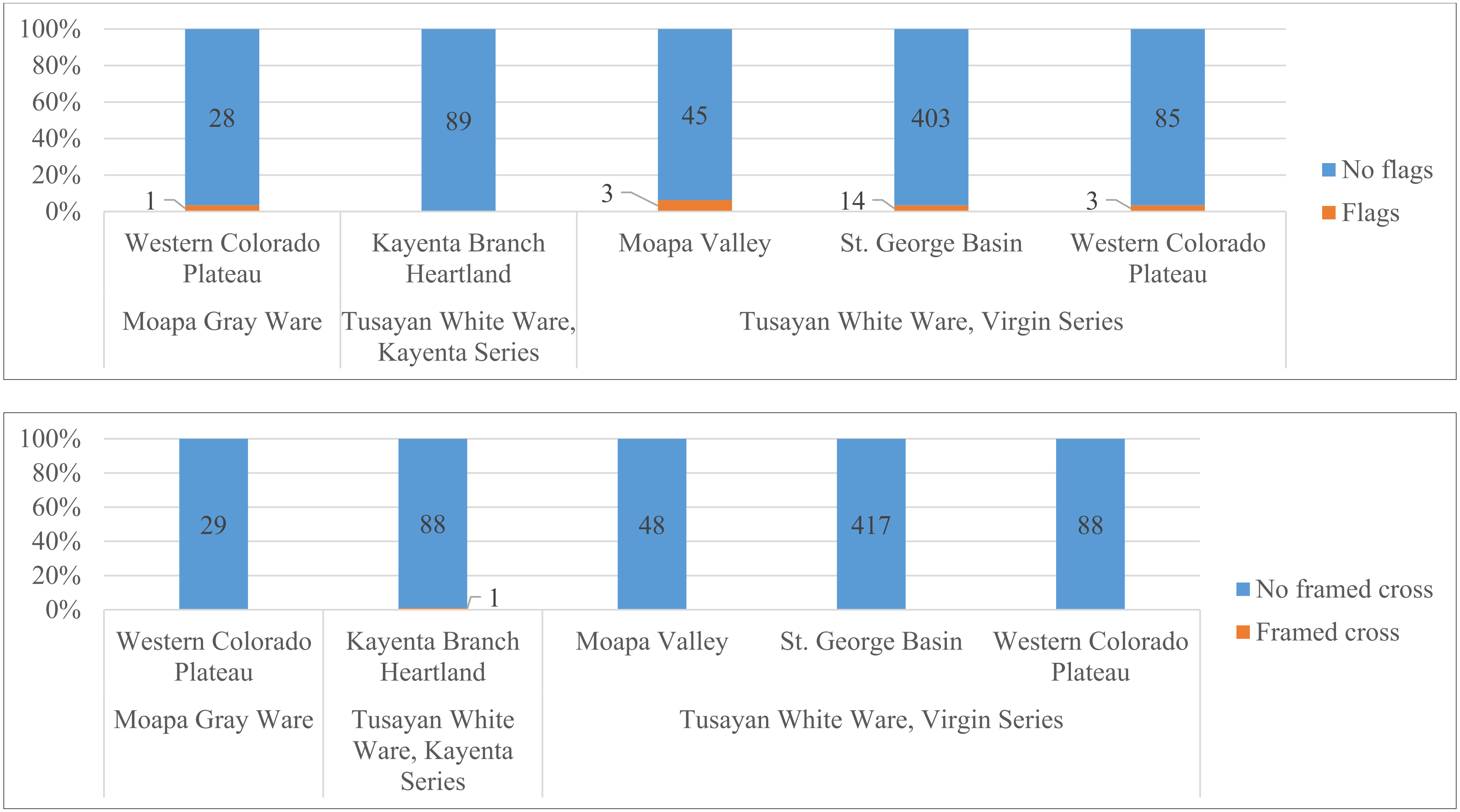


Figure 7.8. Flags (Primary Forms) (top) and framed cross (Primary Forms) (bottom) on pottery count frequencies during the Basketmaker III and Pueblo I periods.

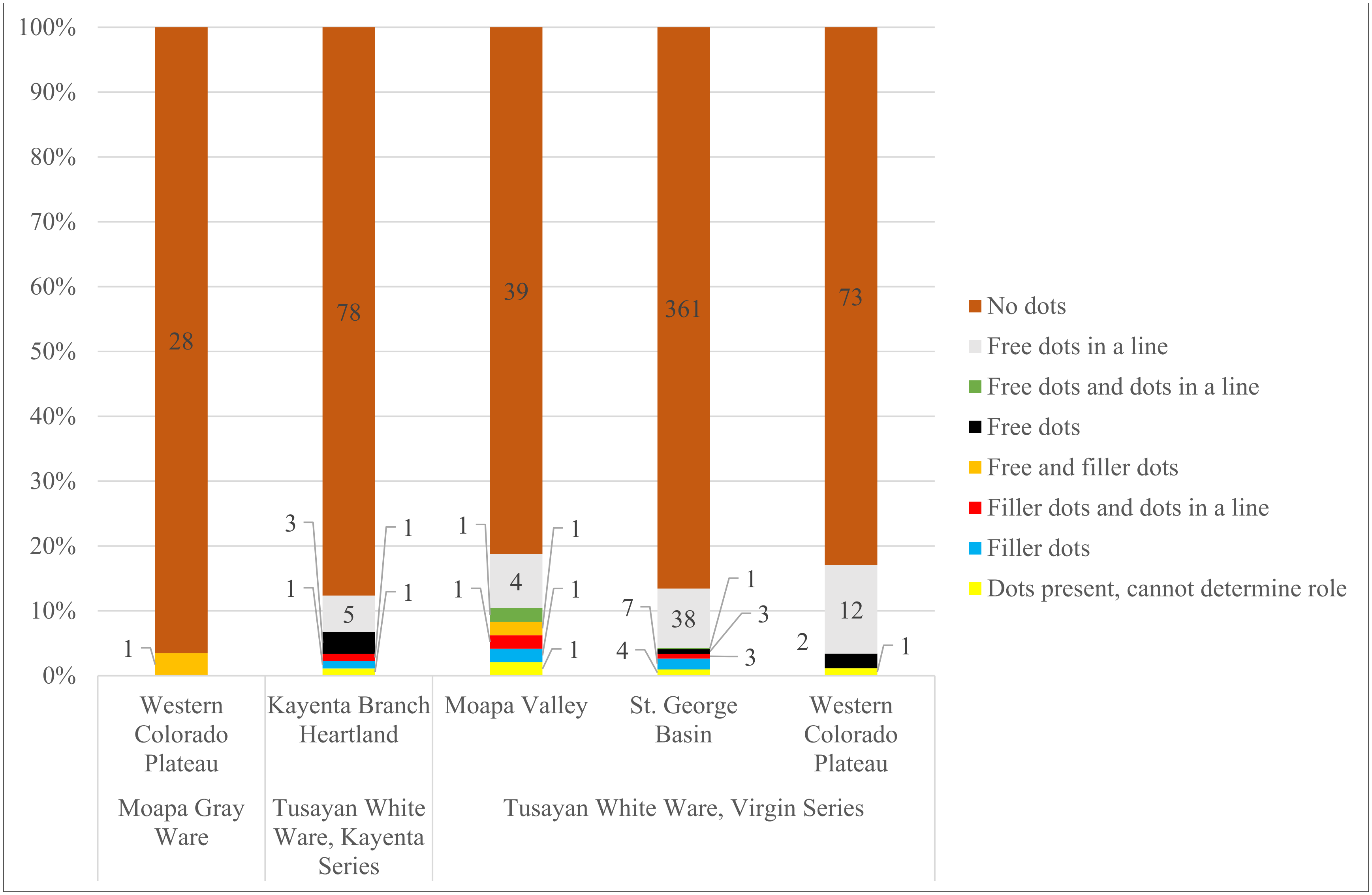
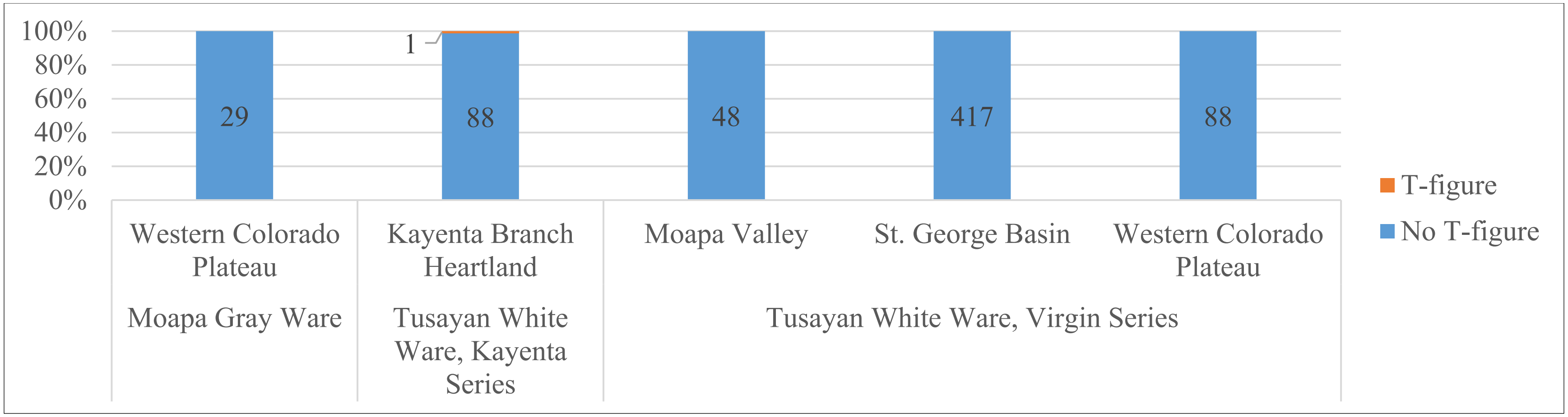


Figure 7.9. Dots (Primary Forms and Composition) on pottery count frequencies during the Basketmaker III and Pueblo I periods.



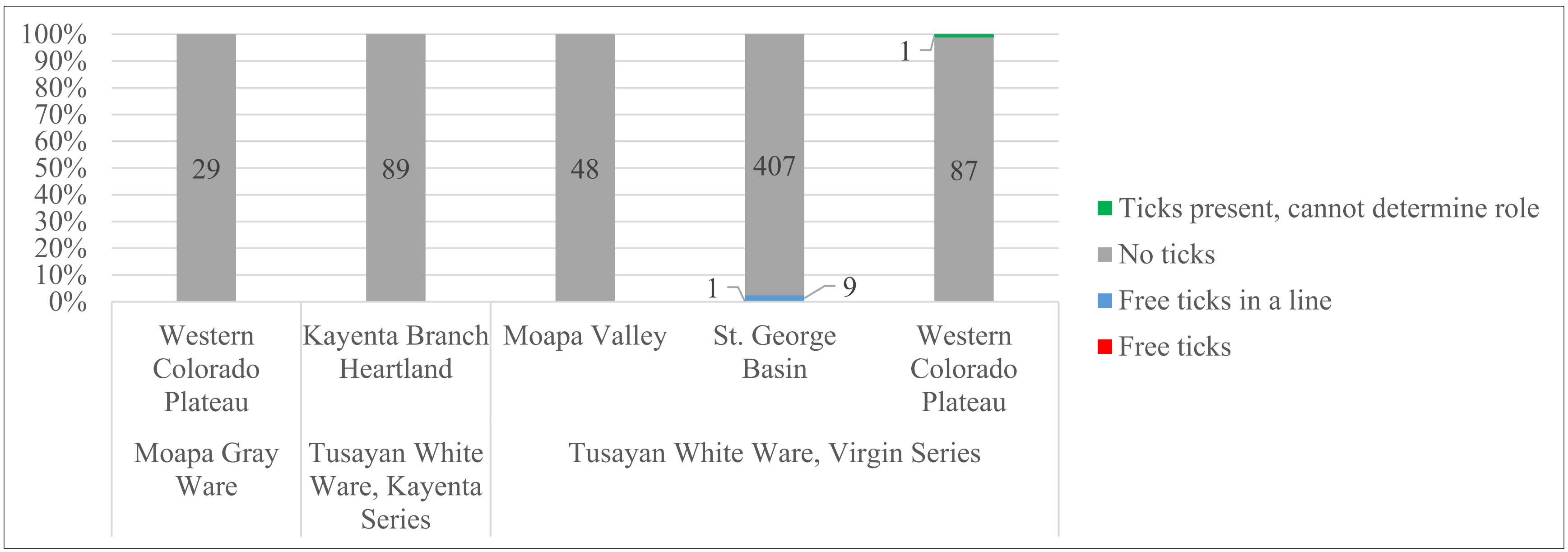
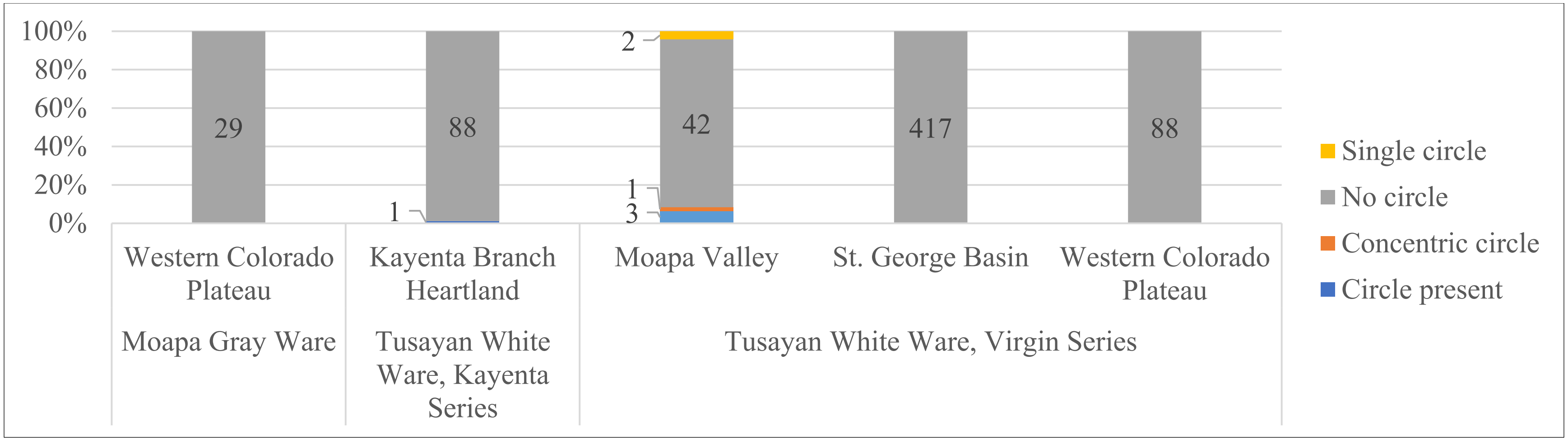


Figure 7.10. T-figure (Primary Forms) (top) and ticks (Primary Forms and Composition) (bottom) on pottery count frequencies during the Basketmaker III and Pueblo I periods.



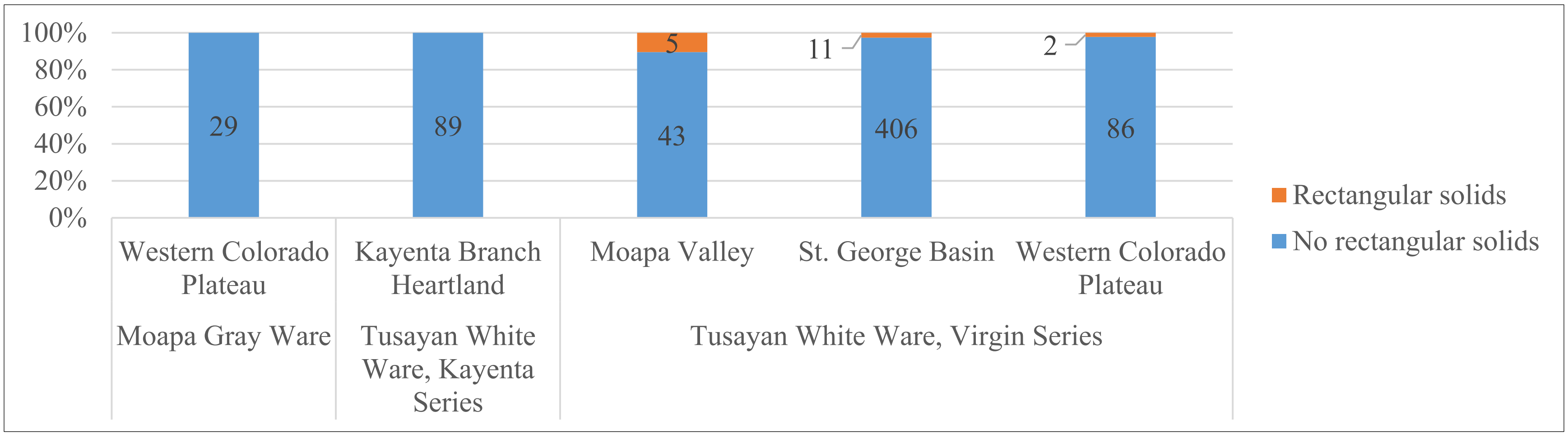


Figure 7.11. Circle (Primary Forms) (top) and rectangular solids (Primary Forms) (bottom) on pottery count frequencies during the Basketmaker III and Pueblo I periods.

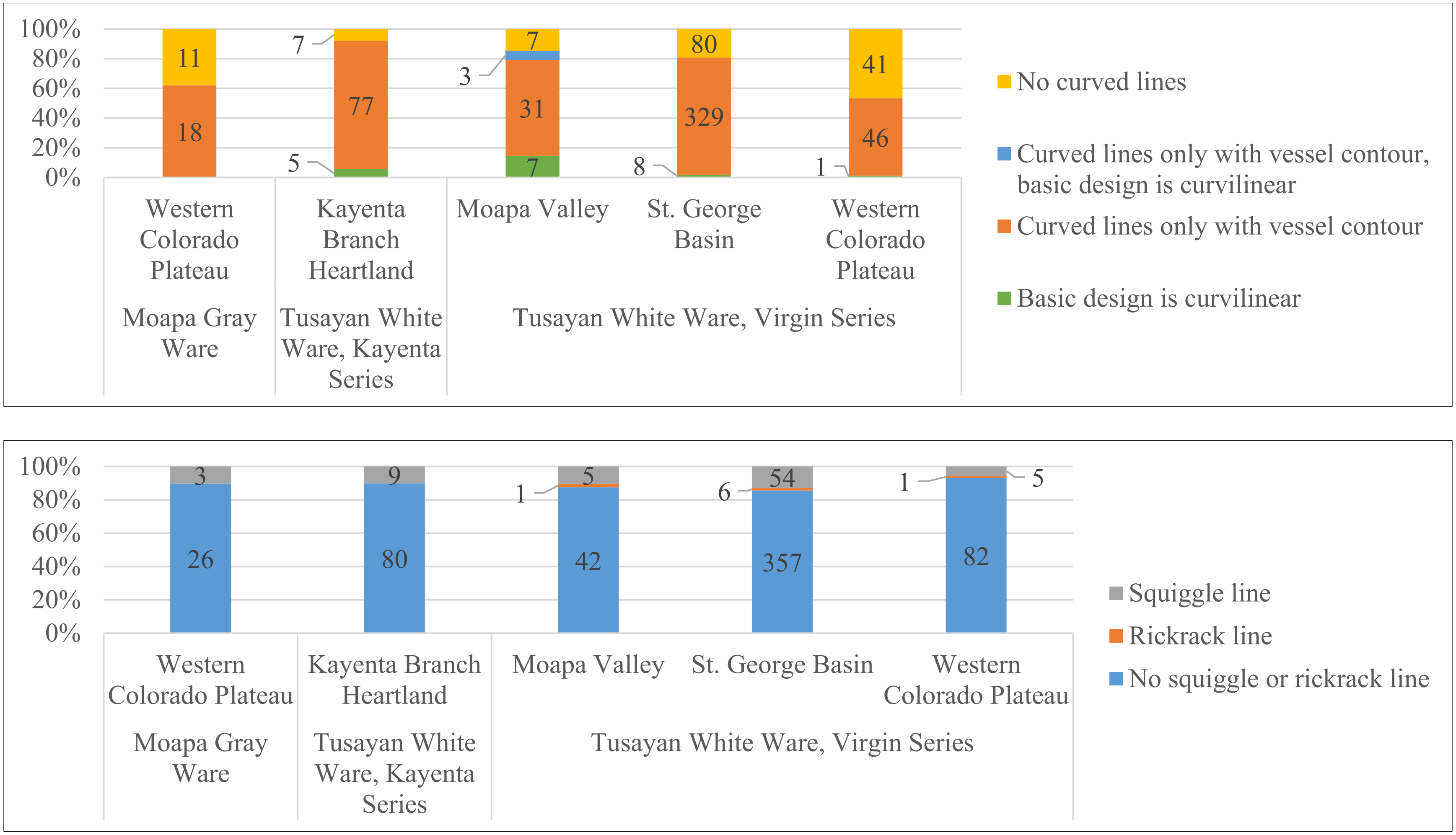


Figure 7.12. Curved lines (Primary Forms) (top) and squiggle/rickrack lines (Primary Forms) (bottom) on pottery count frequencies during the Basketmaker III and Pueblo I periods.

Among secondary forms, serrated solids are the most distinctive motif that appear exclusive to Virgin Branch pottery (as seen on Washington Black-on-gray and Boulder Black-on-gray)—appearing most prominently on the western Colorado Plateau area, followed by the St. George Basin, and least prominent in the Moapa Valley (Figure 7.13). Fringes on lines (i.e., dots on lines) were found to be used sparingly used in the Kayenta Branch heartland, St. George Basin, and on the western Colorado Plateau (Figure 7.14).

Triangle use among Virgin and Kayenta Branch populations are varied, though found used in limited occurrences. For instance, single series, alternating (flipped/reflected) triangles are a commonly expressed (though few in number) throughout the Virgin Branch heartland while absent in sampled Kayenta Branch heartland pottery assemblages (Figure 7.18). Separately, varied application of double series triangles was found in the St. George Basin and scant use in the Kayenta Branch heartland, with no expression in the Moapa Valley or on the western Colorado Plateau (Figure 7.19).

Composition, an active design category, was found expressed in low frequencies as multiple parallel lines in the Virgin and Kayenta Branch heartlands, though more so in the latter (Figures 7.23 and 7.25). Hatch composition was also found to be sparingly used in both heartlands, though not on the western Colorado Plateau (Figures 7.23 and 7.24).

Line width during the Basketmaker III and Pueblo I periods revealed marked differences between the Virgin and Kayenta Branch heartlands. In the Virgin Branch heartland, line widths were relatively varied and internally homogeneous between communities. Inter-regionally, Kayenta Branch heartland potters mostly painted vessels with much thinner lines (1 mm on average) compared to the thicker lines (3 mm on average) on Virgin Branch pottery (Figures

7.26 through 7.28). These differences in line width are most apparent in the juxtaposition of Washington/Boysag Black-on-gray and Kana-a Black-on-white.

Design layouts, among bowls in particular, are relatively homogeneous among pottery in the St. George Basin and on the western Colorado Plateau with significantly greater variation found in the Moapa Valley (Figure 7.29). Inter-regionally, rotational (c2) symmetry are common (though in low frequencies) among the Moapa Valley, western Colorado Plateau, and the Kayenta Branch heartland (Figure 7.30).

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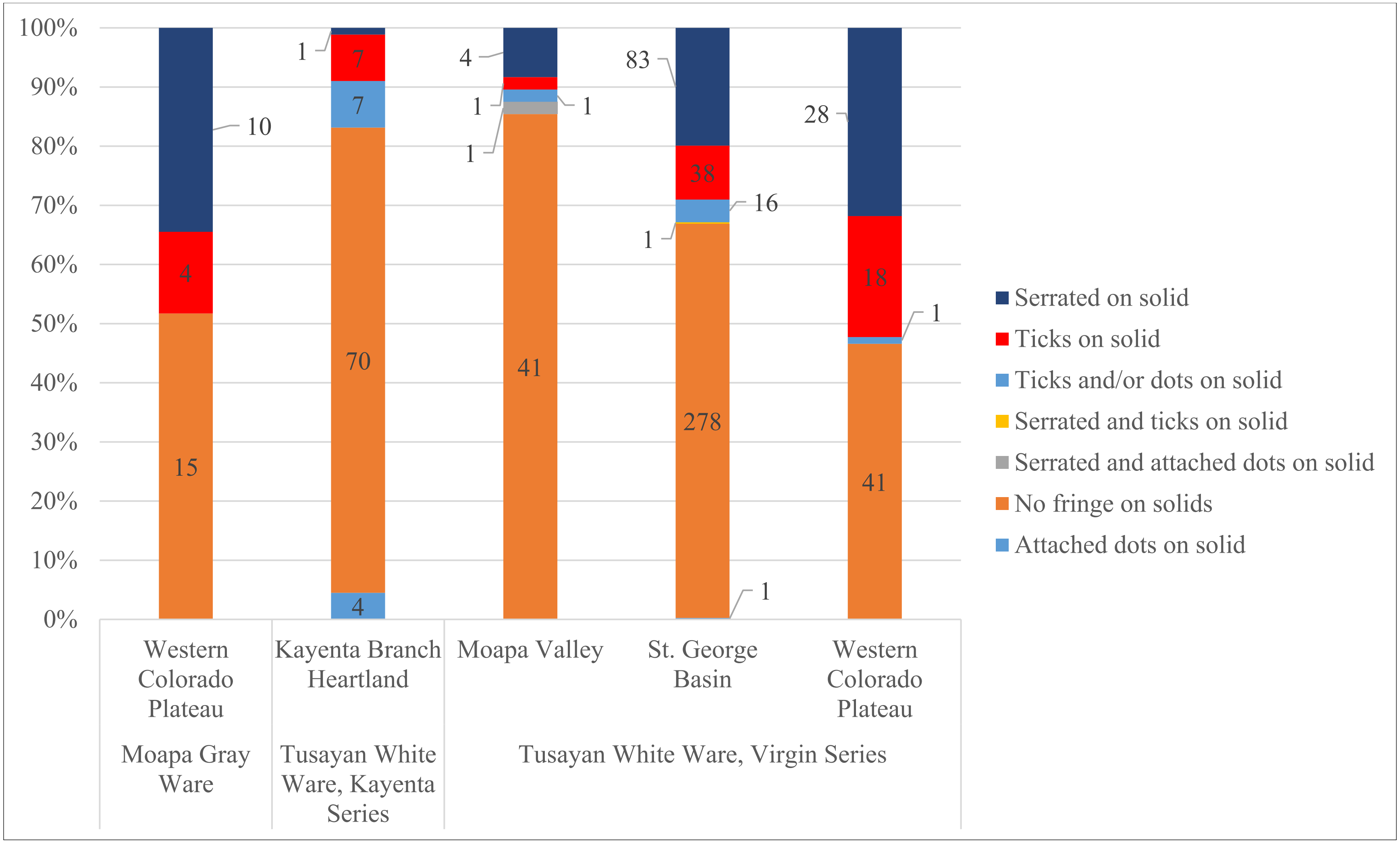


Figure 7.13. Fringe on solids (Secondary Forms) on pottery count frequencies during the Basketmaker III and Pueblo I periods.

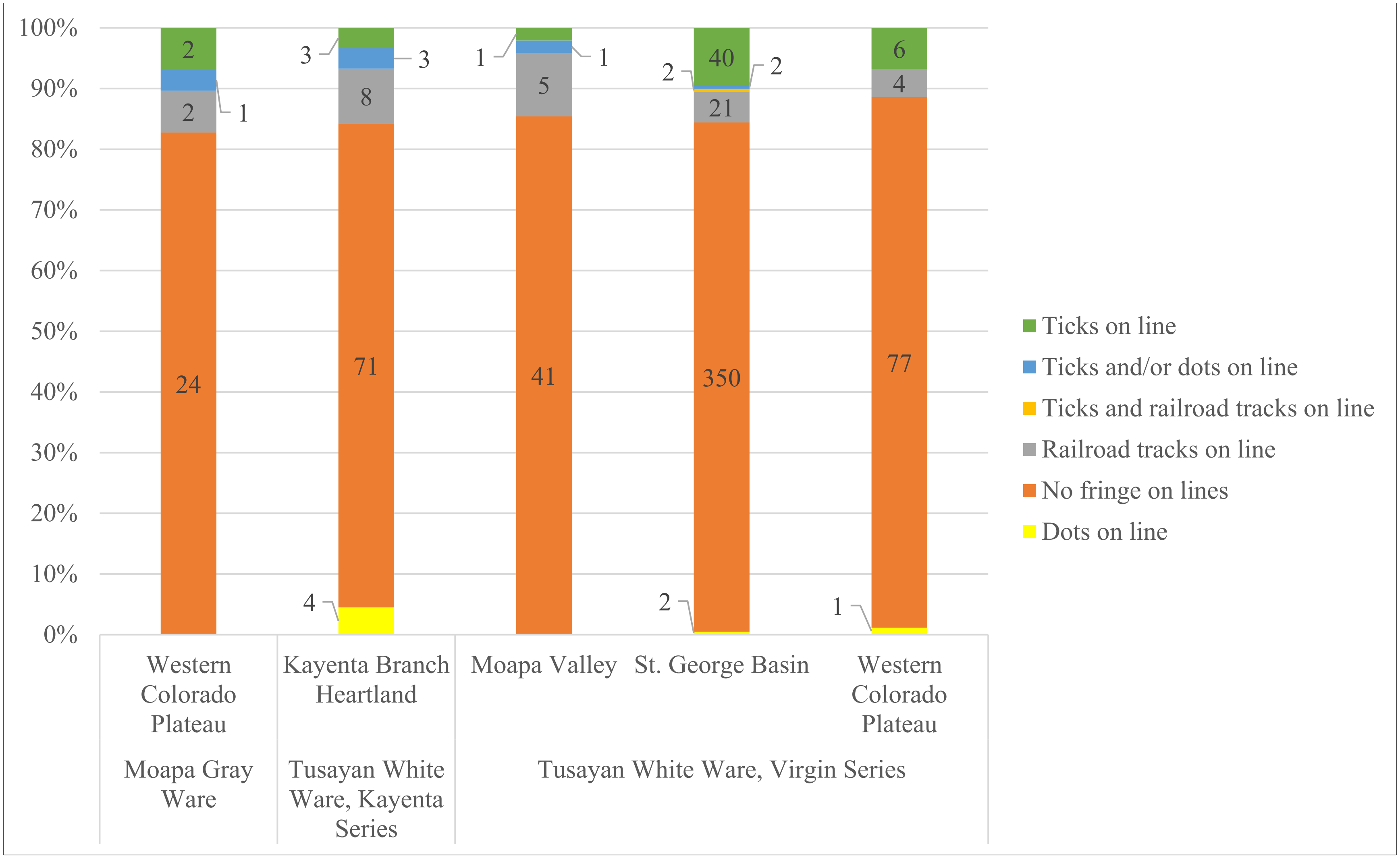
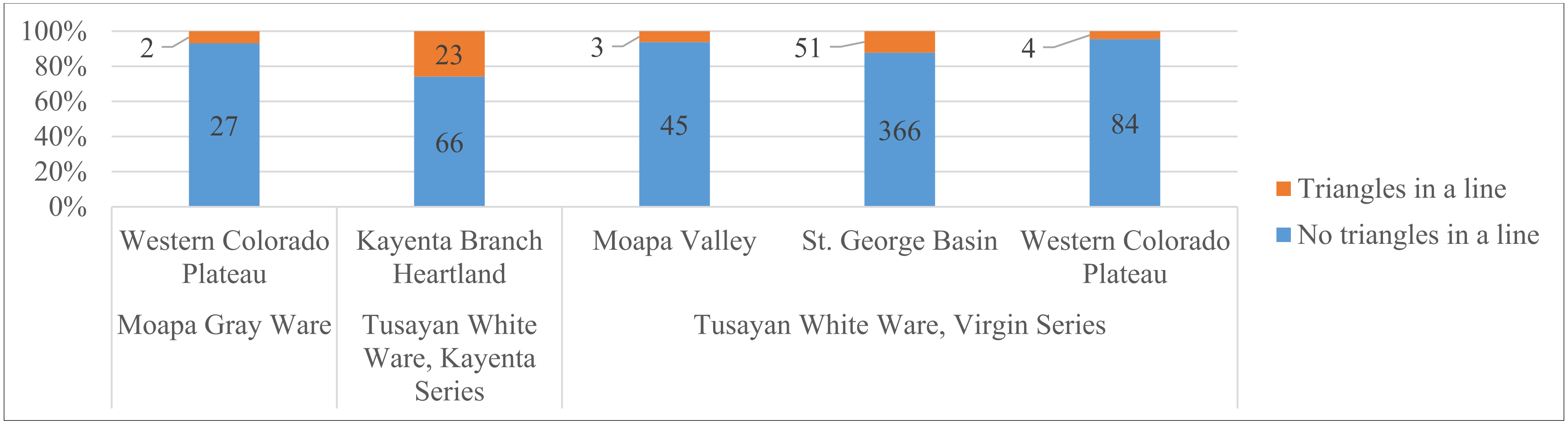


Figure 7.14. Fringe on lines (Secondary Forms) on pottery count frequencies during the Basketmaker III and Pueblo I periods.



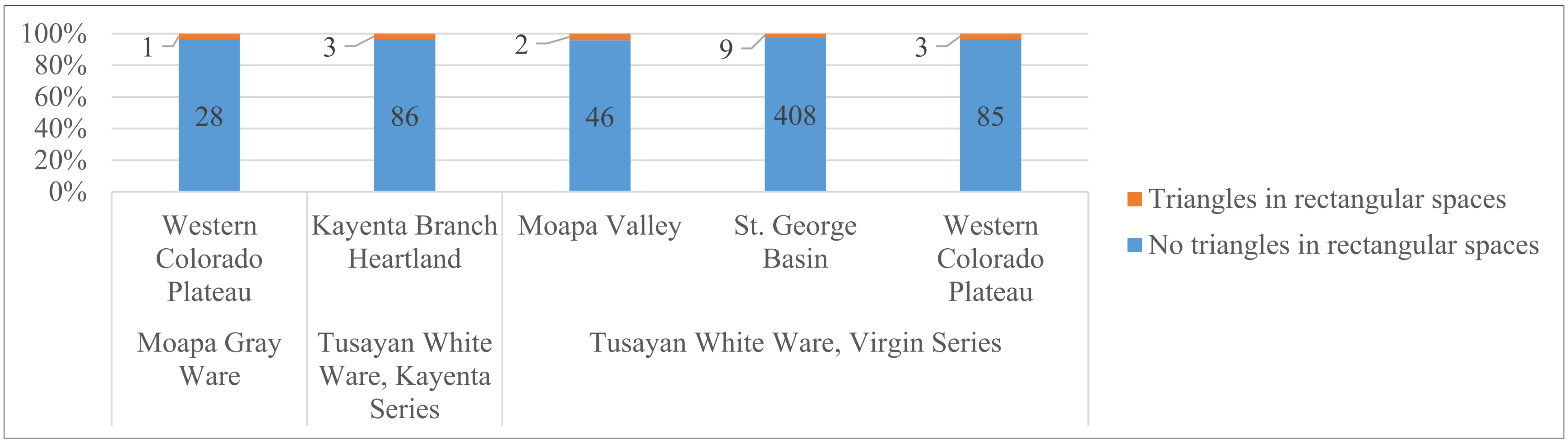


Figure 7.15. Triangles in a line (Triangle Use) (top) and triangles in rectangular spaces (Triangle Use) (bottom) on pottery count frequencies during the Basketmaker III and Pueblo I periods.

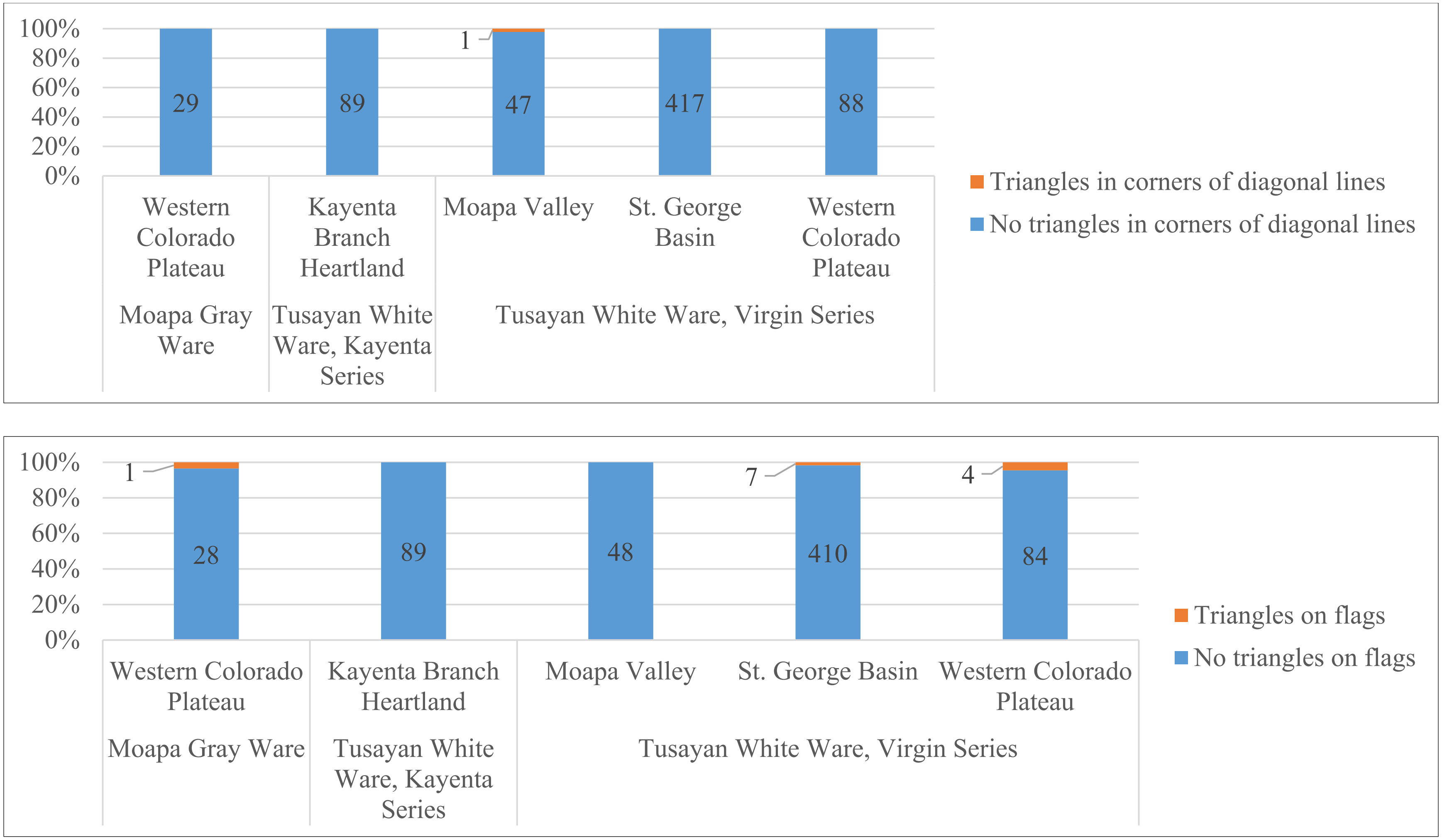


Figure 7.16. Triangles in corners of diagonal lines (Triangle Use) (top) and triangles on flags (Triangle Use) (bottom) on pottery count frequencies during the Basketmaker III and Pueblo I periods.

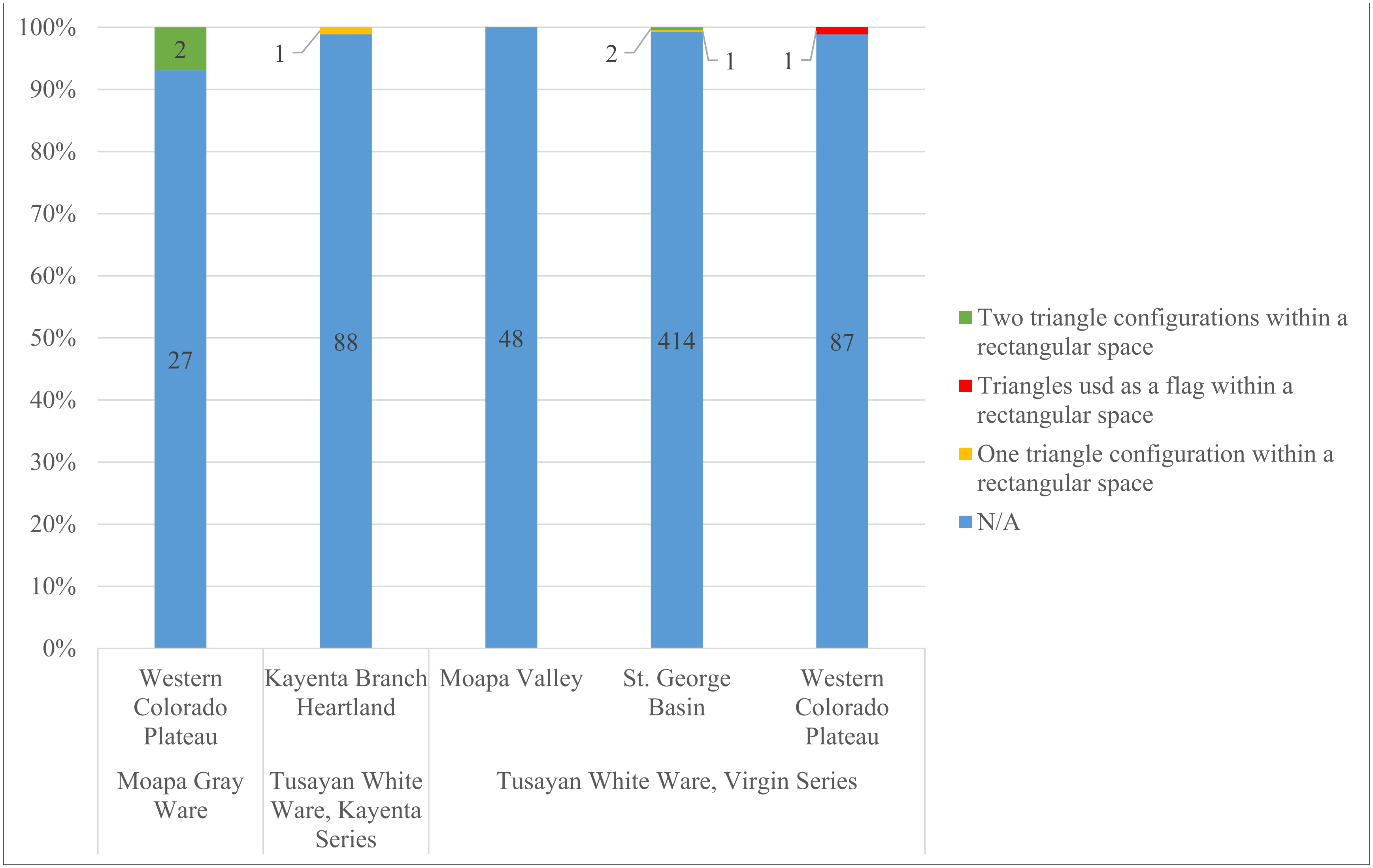


Figure 7.17. Triangle Use (rectangular spaces) on pottery count frequencies during the Basketmaker III and Pueblo I periods.

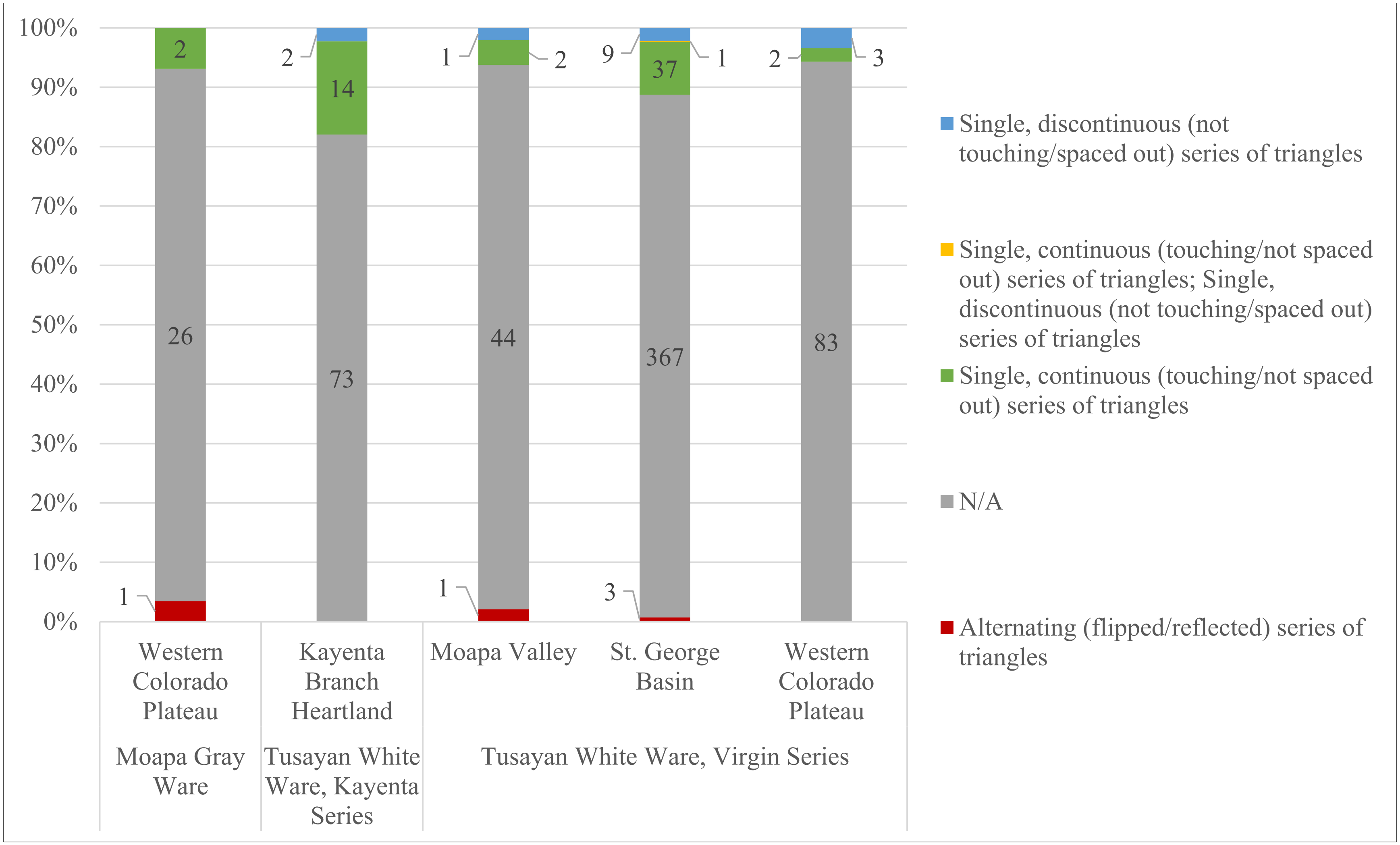


Figure 7.18. Triangle Use (single series) on pottery count frequencies during the Basketmaker III and Pueblo I periods.

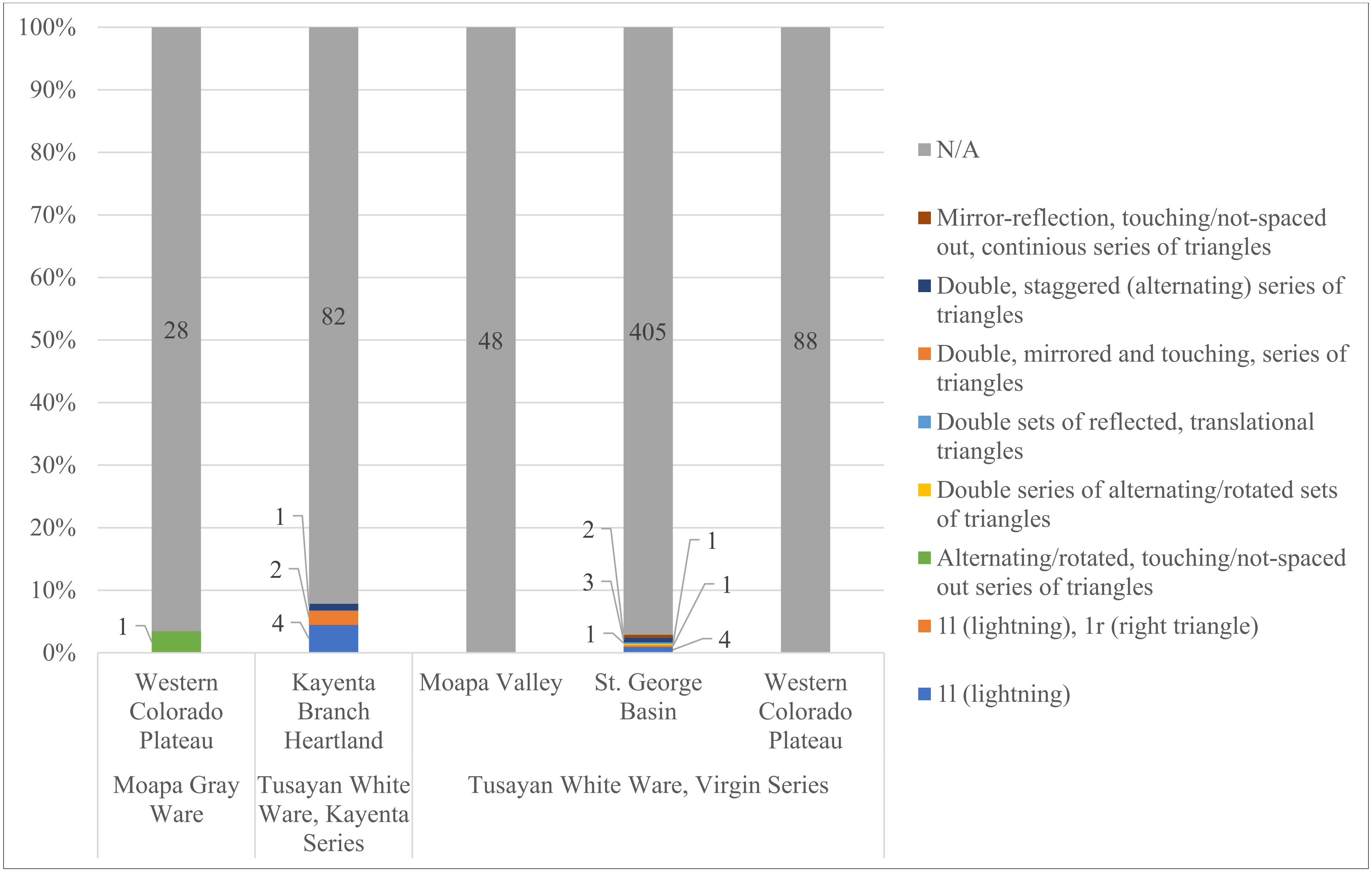


Figure 7.19. Triangle Use (double series) on pottery count frequencies during the Basketmaker III and Pueblo I periods.

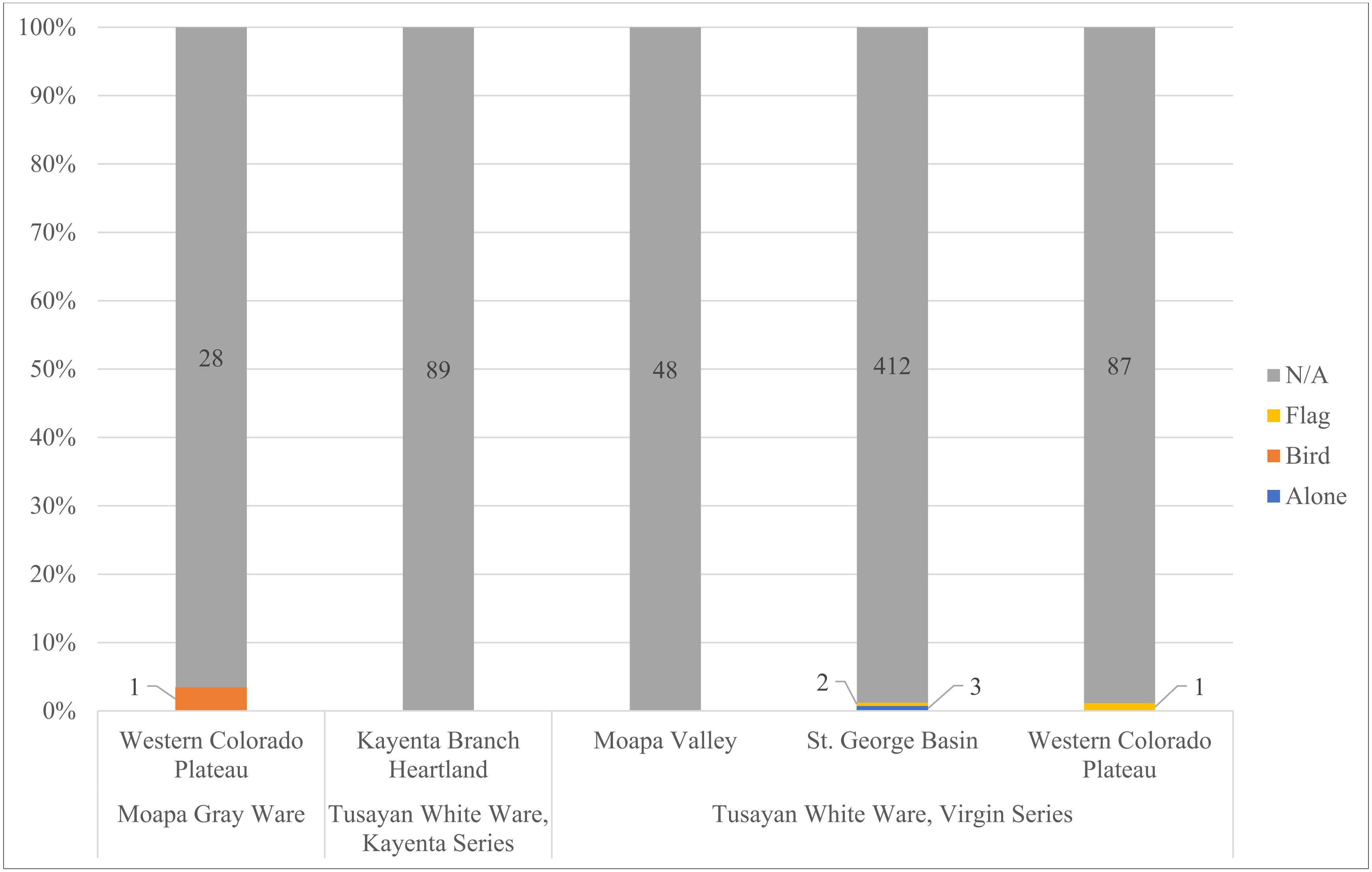


Figure 7.20. Triangle Use (other) on pottery count frequencies during the Basketmaker III and Pueblo I periods.

Figure 7.21. Triangle Use (triangle type) (top) and solid (Composition) on pottery count frequencies during the Basketmaker III and Pueblo I periods.

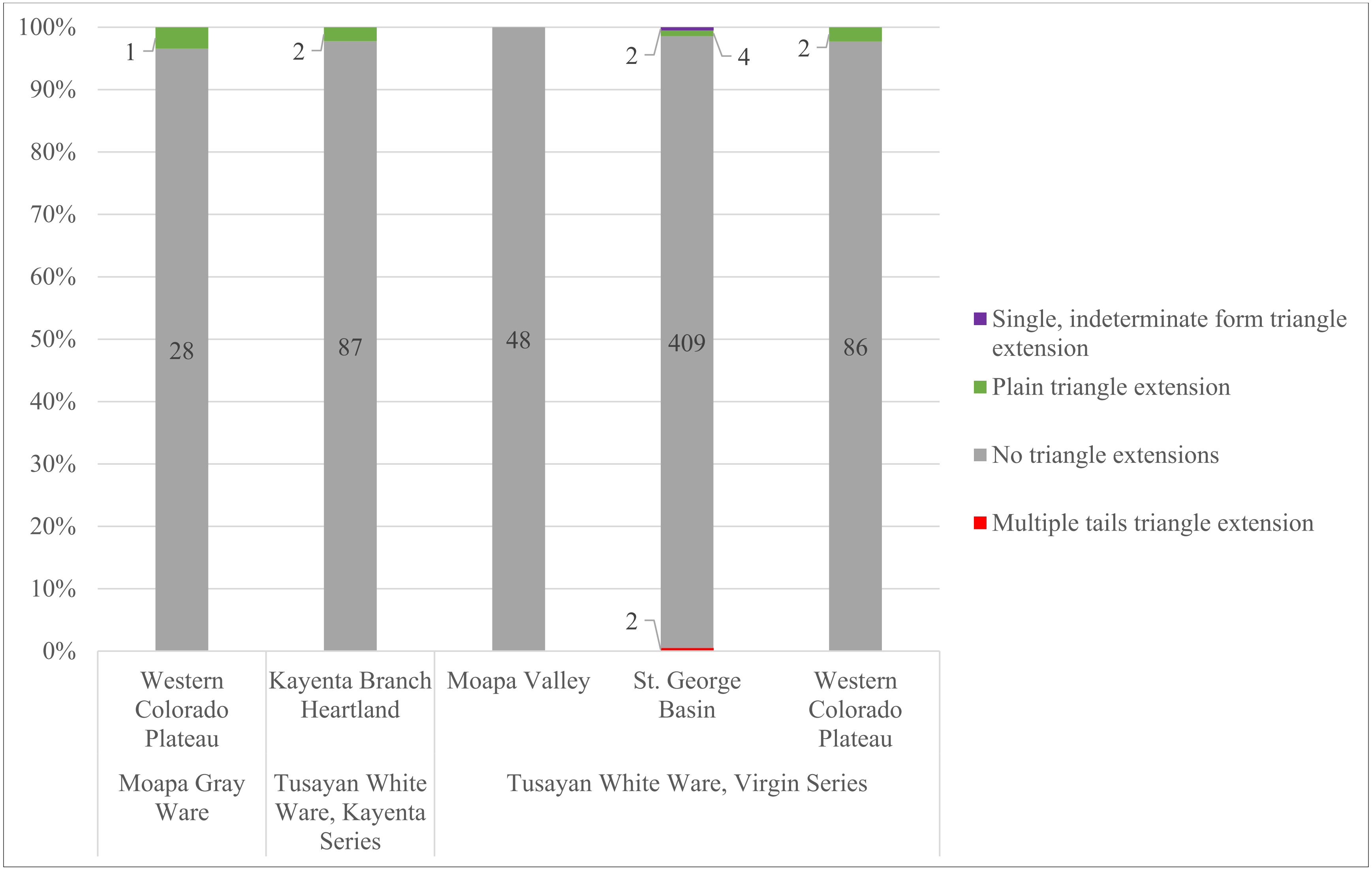


Figure 7.22. Triangle extensions on pottery count frequencies during the Basketmaker III and Pueblo I periods.

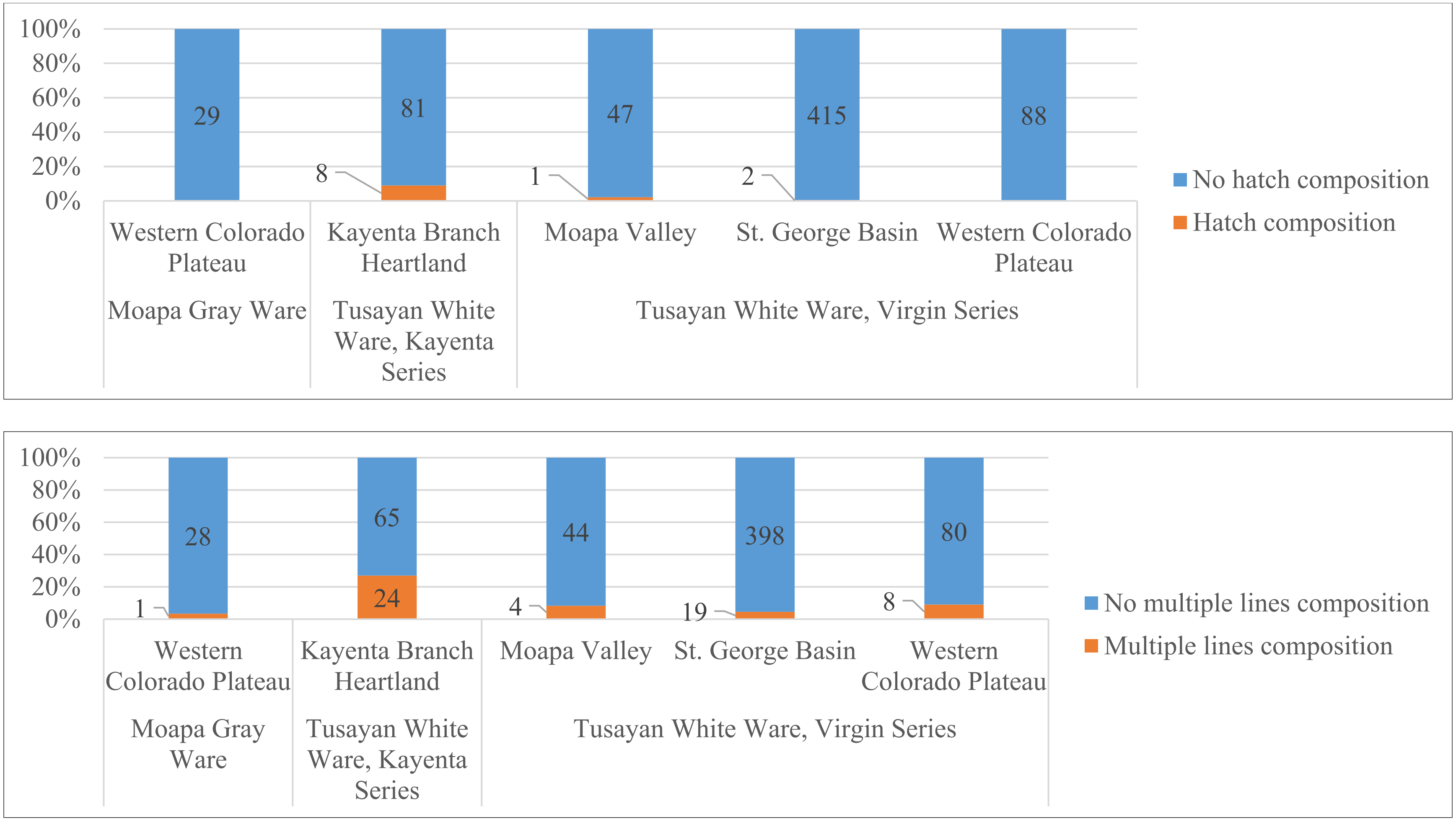


Figure 7.23. Hatch (Composition) (top) and multiple parallel lines (Composition) on pottery count frequencies during the Basketmaker III and Pueblo I periods.

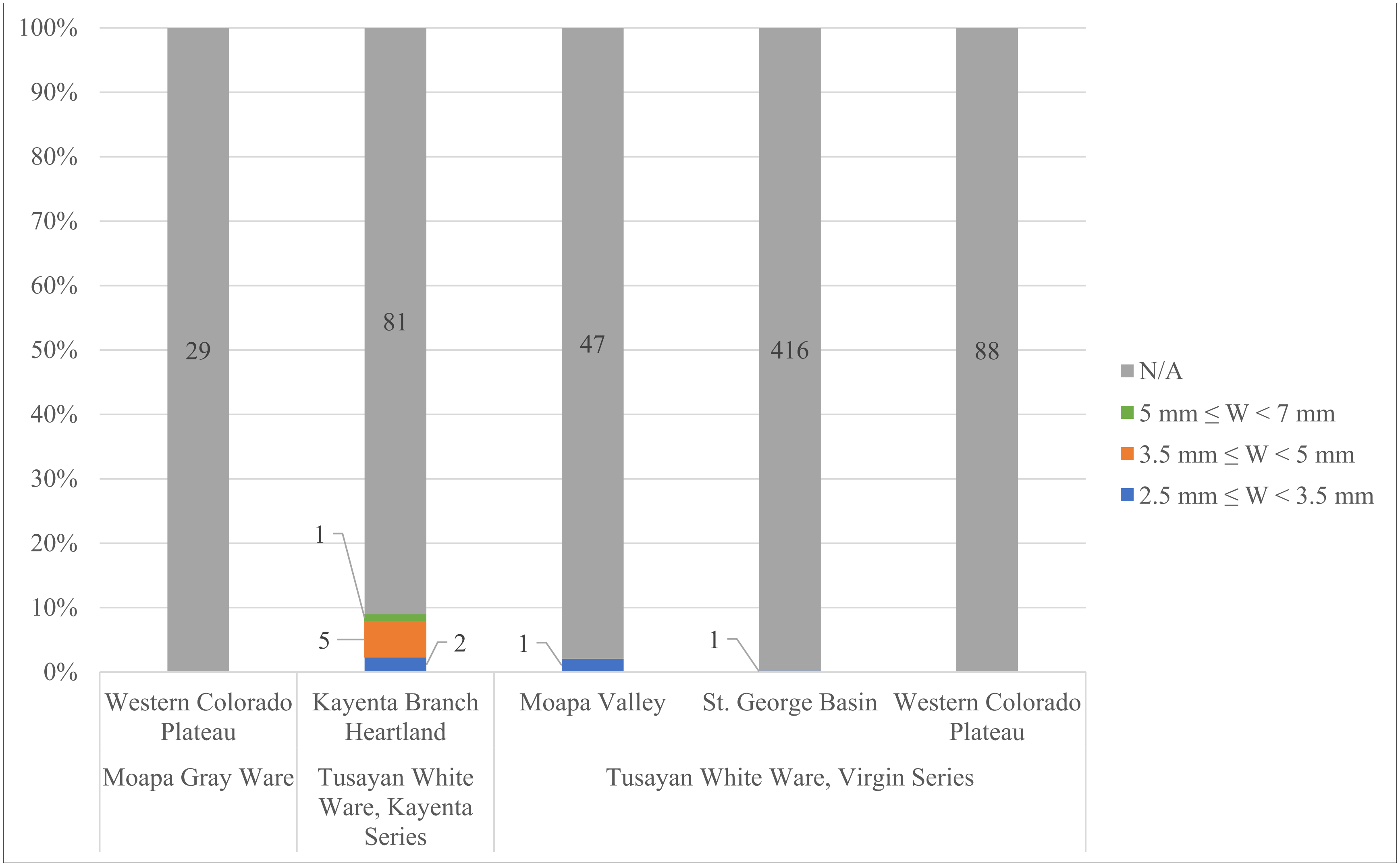


Figure 7.24. Average space between hatch lines (Composition) on pottery count frequencies during the Basketmaker III and Pueblo I periods.

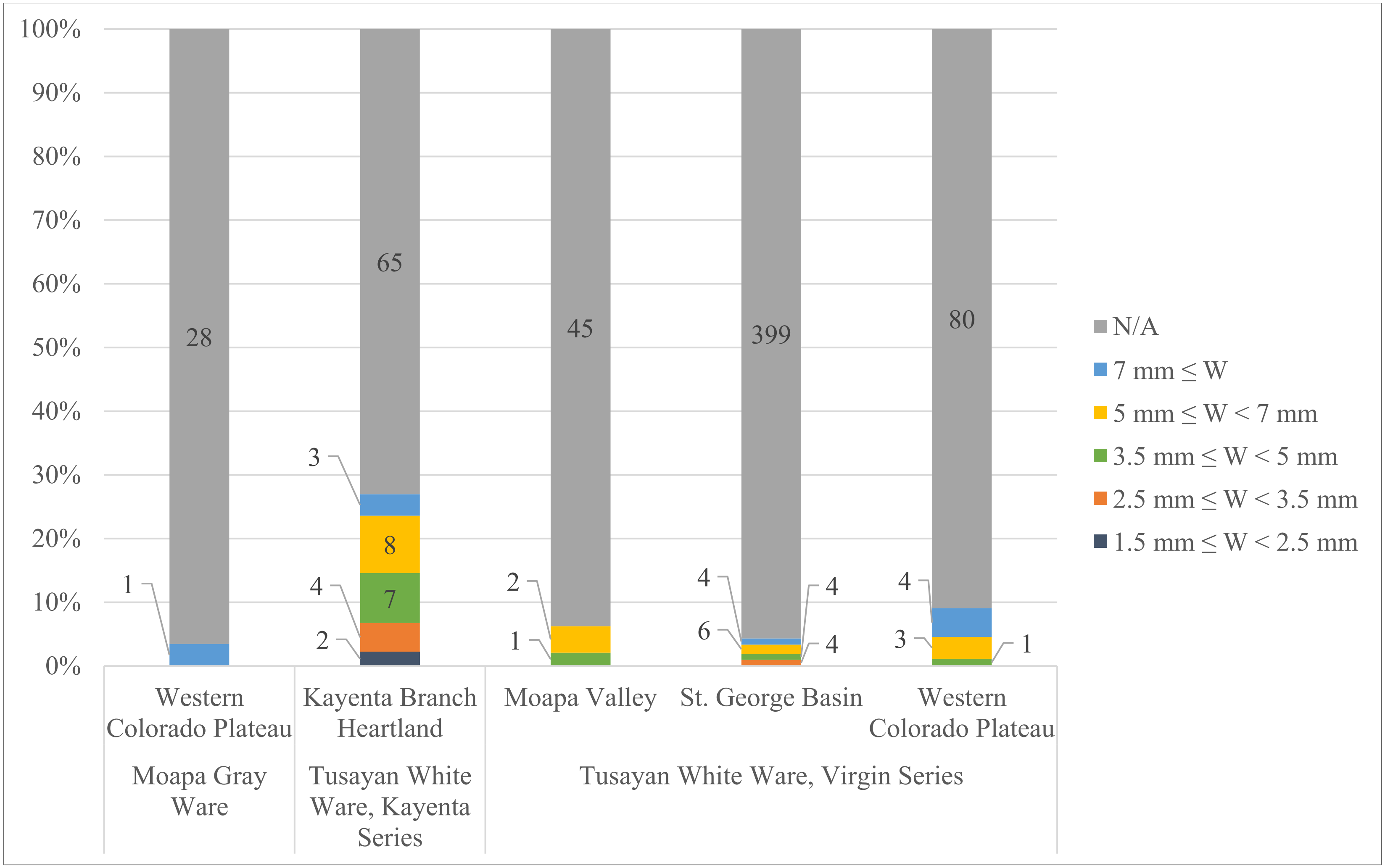


Figure 7.25. Average space between multiple parallel lines (Composition) on pottery count frequencies during the Basketmaker III and Pueblo I periods.

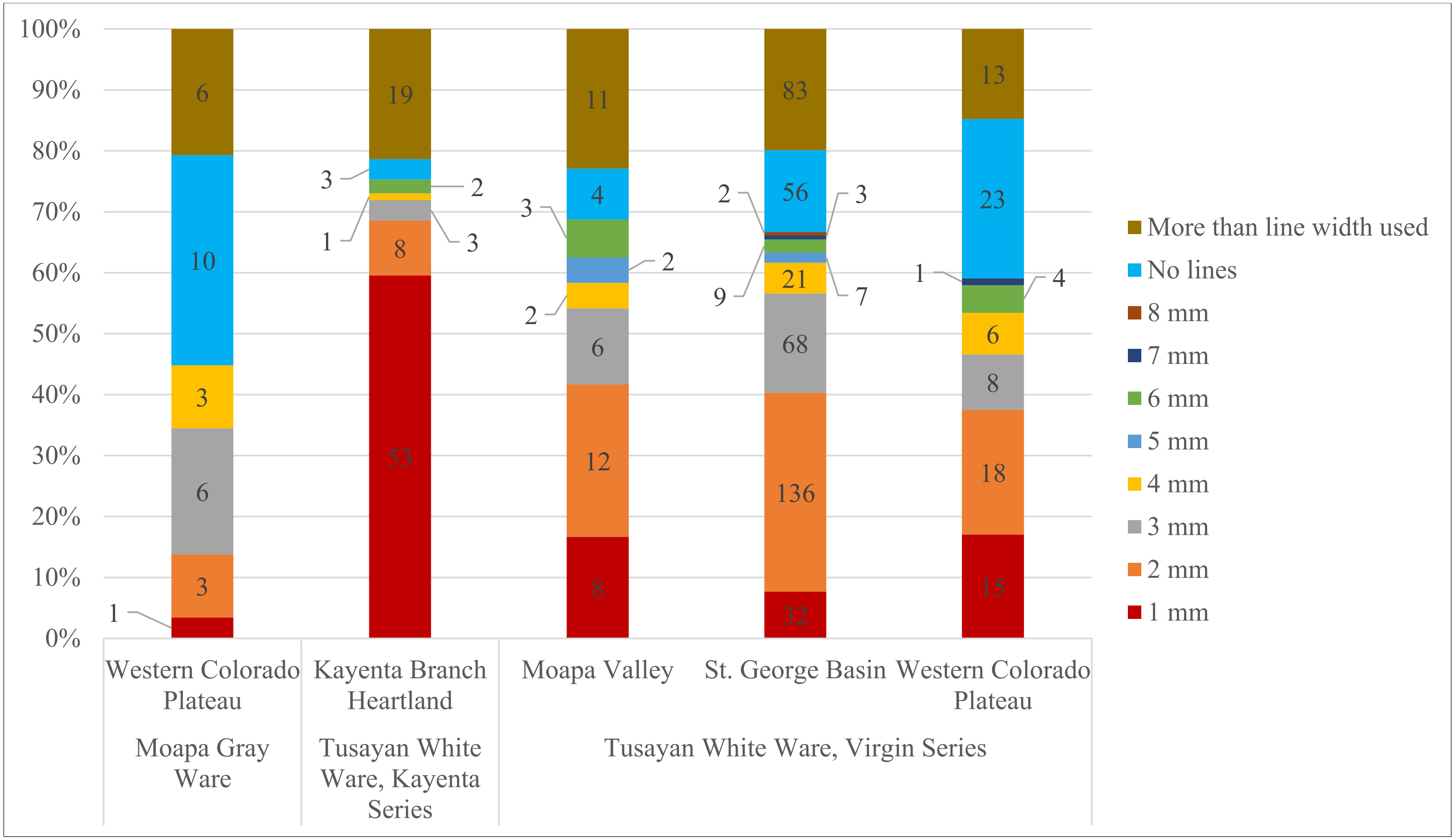


Figure 7.26. Line width modes (Line Width) on pottery count frequencies during the Basketmaker III and Pueblo I periods.

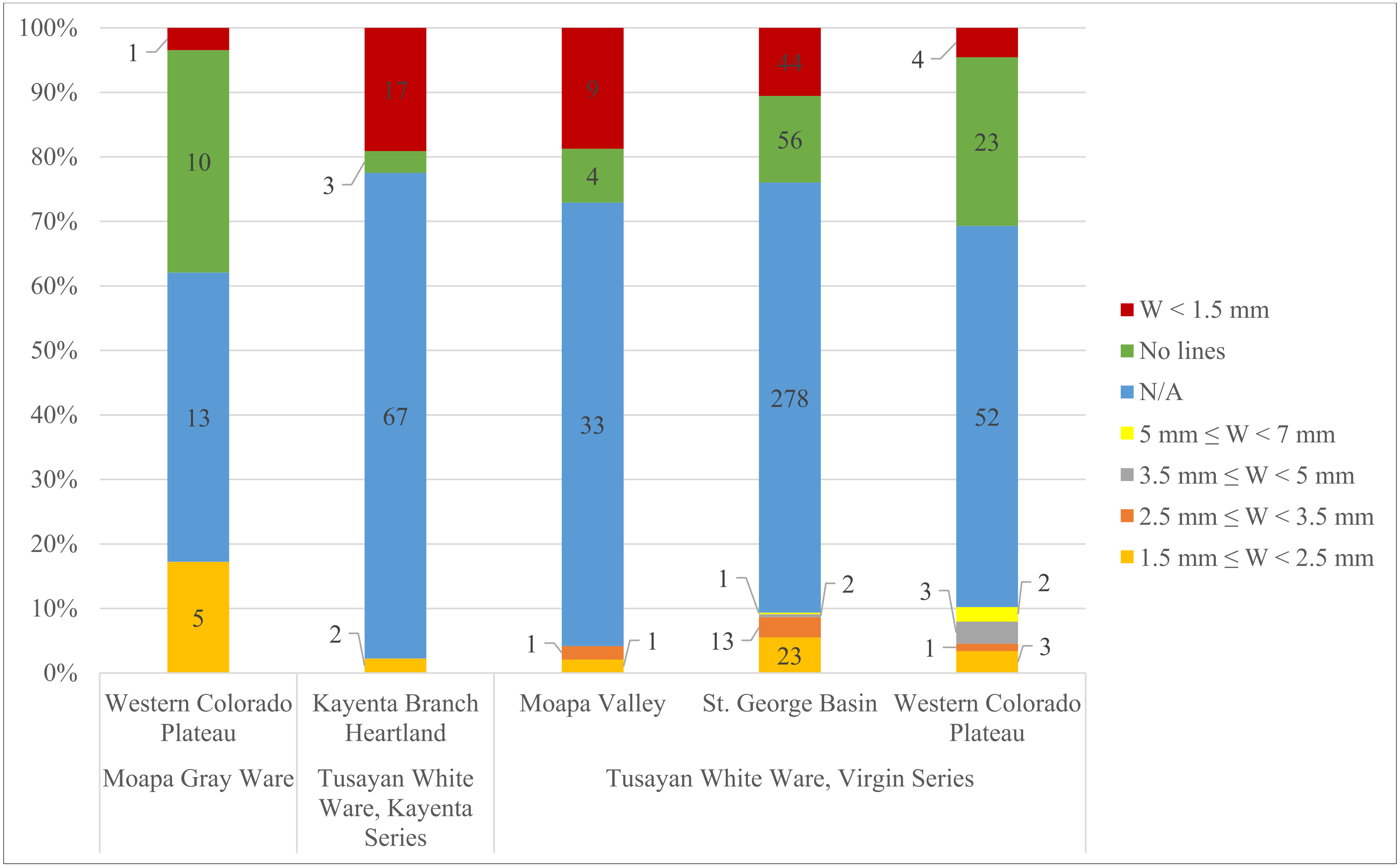


Figure 7.27. Average line width of smaller mode (Line Width) on pottery count frequencies during the Basketmaker III and Pueblo I periods.

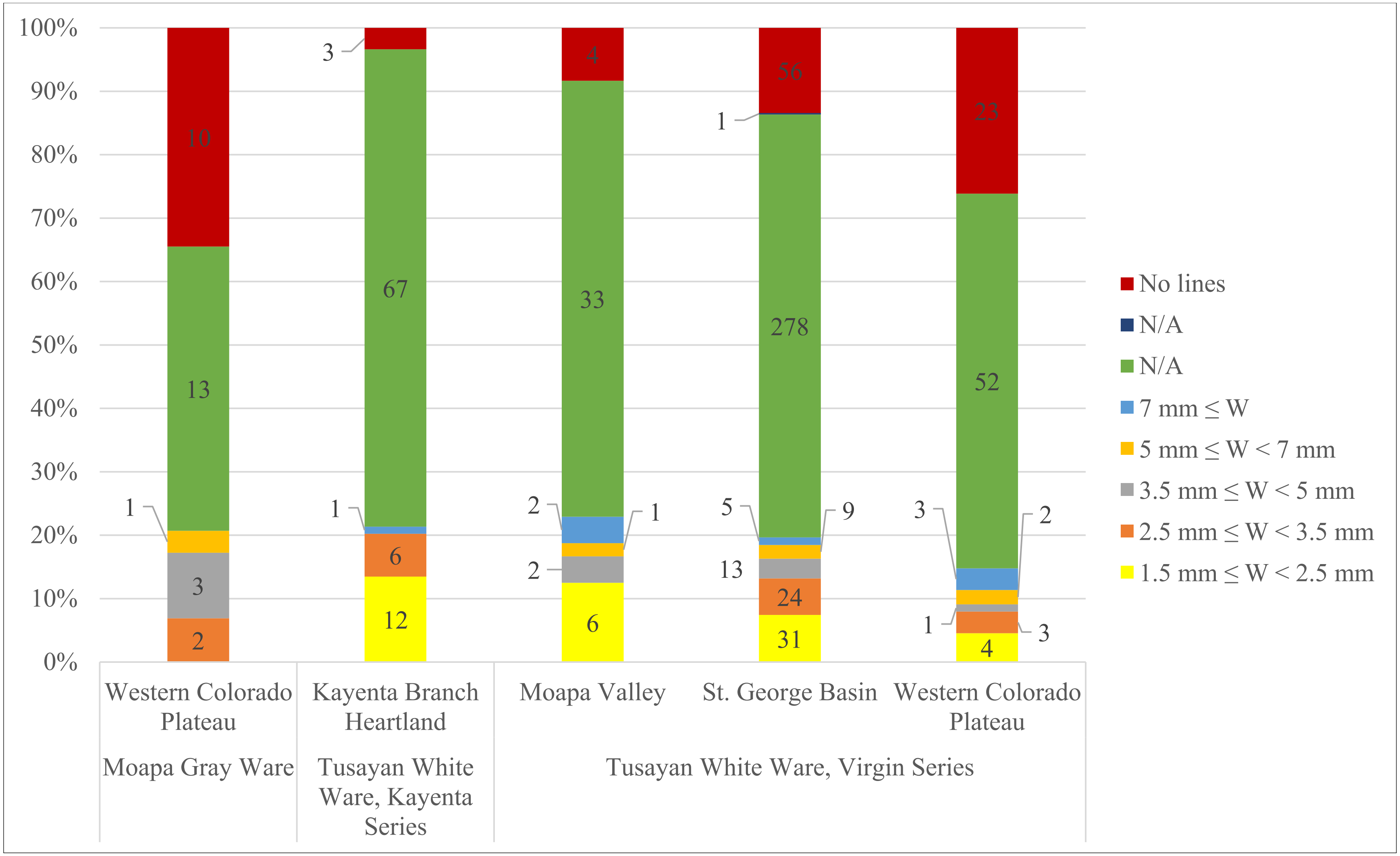


Figure 7.28. Average line width of larger mode (Line Width) on pottery count frequencies during the Basketmaker III and Pueblo I periods.

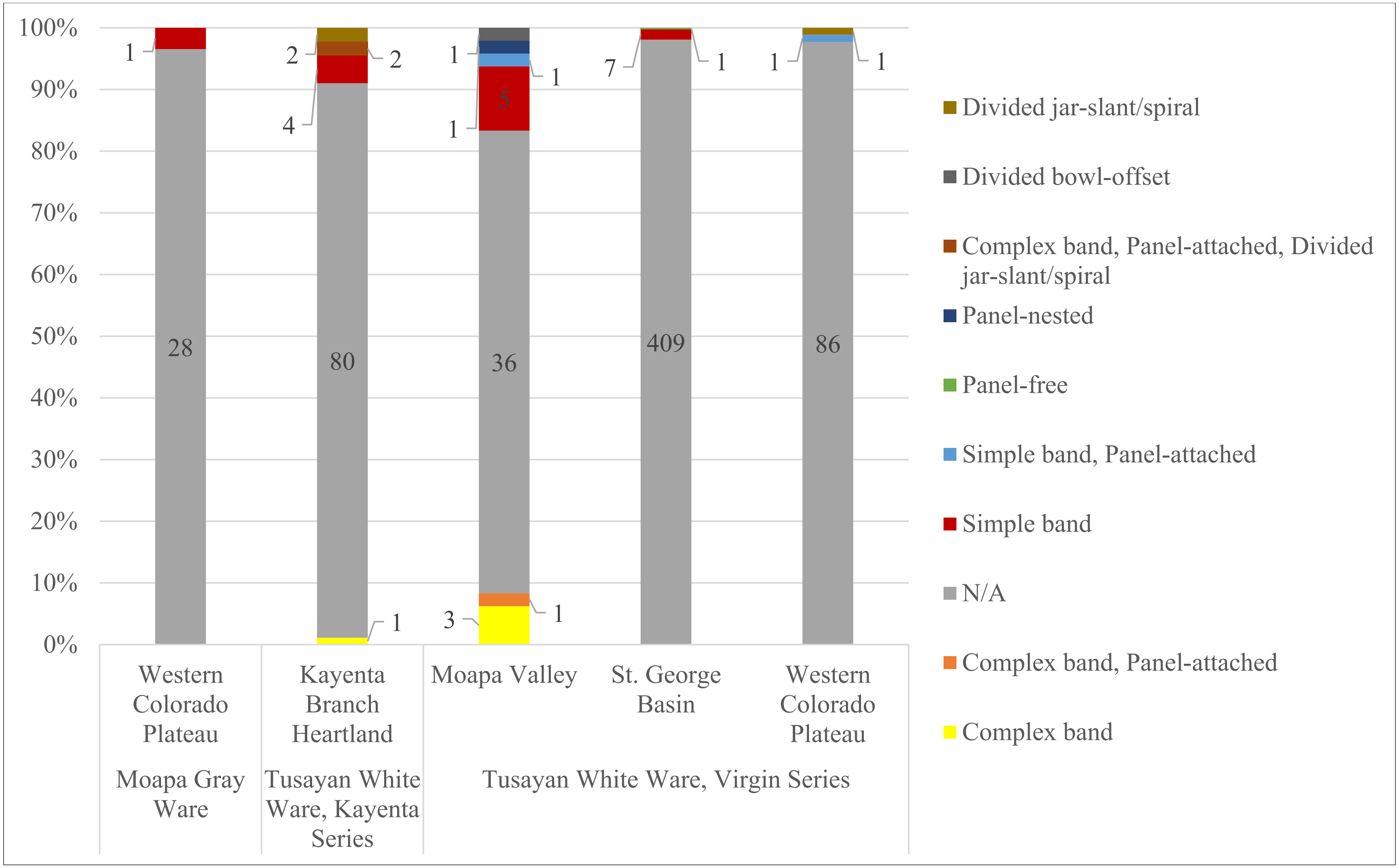


Figure 7.29. Design layout on bowls count frequencies during the Basketmaker III and Pueblo I periods.

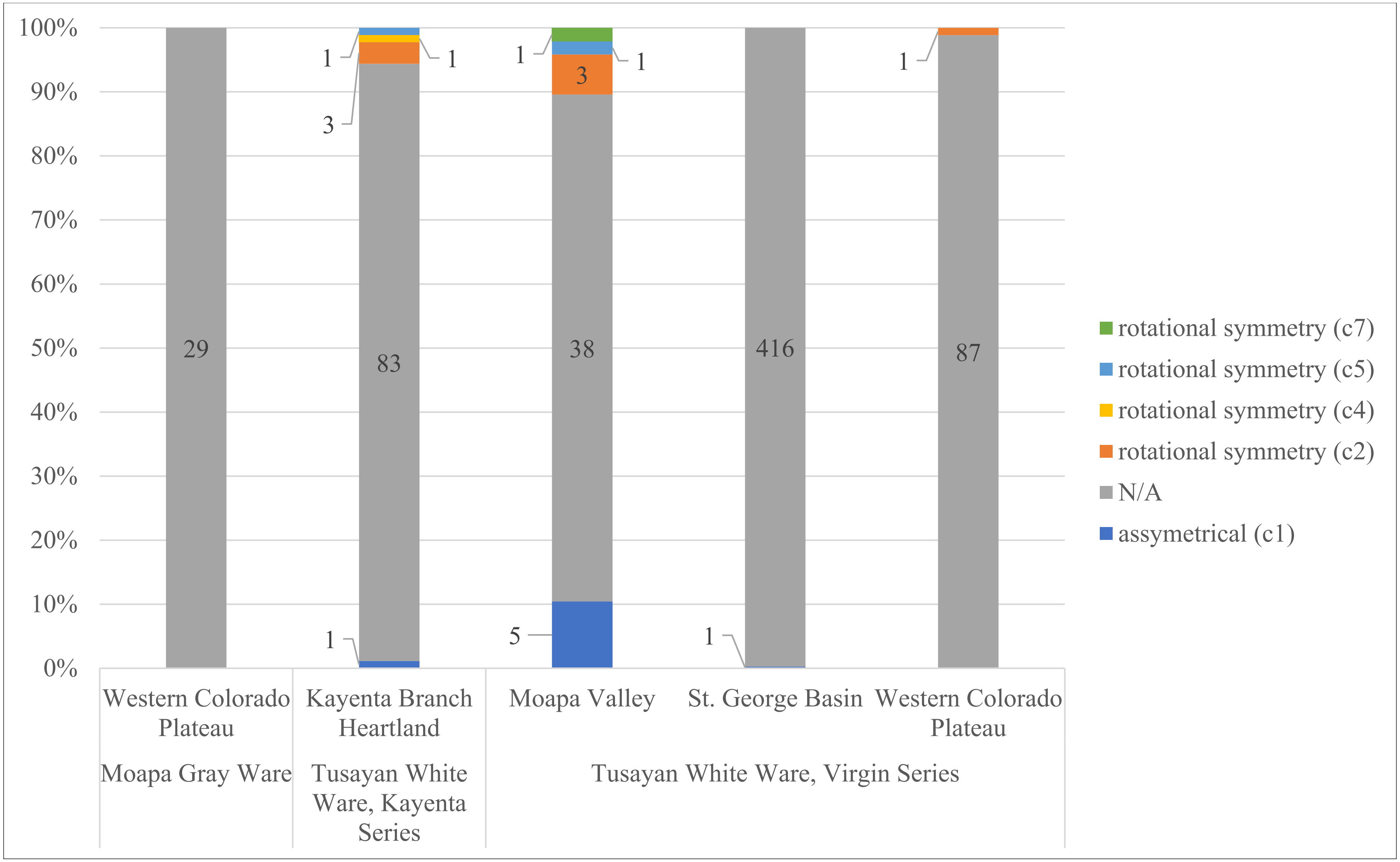


Figure 7.30. Finite symmetries on bowls count frequencies during the Basketmaker III and Pueblo I periods.

Mesquite Black-on-gray (Tusayan White Ware, Virgin Series) and Boulder Black-on-gray (Moapa Gray Ware), appear to be almost completely devoid of secondary design forms, according to the assemblages I sampled (see Table 7.2). Specifically, occurrences of secondary forms (e.g., fringes on lines or on solids) and triangle extensions (e.g., flags, scrolls) were so infrequent (well below a sample size of 20) that diversity indices were not calculated. Conversely, I found more active expressions of painted design, such as primary forms (e.g., straight/curved lines, free dots), triangle use (e.g., triangles in a line), and composition (e.g., solid figures/shapes) to be commonly found associated with Mesquite Black-on-gray and Boulder Black-on-gray pottery. Expressions of technological style among Virgin Branch pottery types, as addressed in Chapter 6, are fairly homogenous throughout the pottery sequence. Though variations and exceptions can be found, painted Virgin Branch pottery generally is tempered with either quartz sand (Tusayan White Ware, Virgin Series) or olivine (Moapa Gray Ware), lacks slipping and polishing, and occurs primarily in bowl form. (Jars are very common in the Virgin Branch region, however, they are almost never painted).

Washington Black-on-gray (Tusayan White Ware, Virgin Series) and Boysag Black-on-gray (Moapa Gray Ware) were introduced as another ceramic style among Virgin Branch potters during the Basketmaker III period and continued to be produced into the Pueblo I period. Generally characterized by straighter and bolder lines than Mesquite and Boulder Black-on-gray, Washington and Boysag Black-on-gray pottery also incorporates (really, introduces) secondary forms into Virgin Branch pottery designs (Table 7.3, Figure 7.3). Some of the most notable secondary forms found among Washington Black-on-gray pottery are solids with serrated edges (see Figure 7.3). Moreover, the introduction of Washington Black-on-gray pottery includes a marked increase of composition attributes largely not found earlier in the Basketmaker III – Pueblo I time sequence.

In consideration of the relatively low populations characterized during the Basketmaker III – Pueblo I periods, the general lack or absence of multiple design fields among Mesquite and Boulder Black-on-gray pots trends with the presence of small communities of learning (i.e., limited avenues of painted design variation available to Virgin Branch potters). Tied to low population densities at this time, these observed limited forms of painted design variation would be the result of proportionately smaller communities of learning and practice. The lack of diversity indices for Mesquite and Boulder Black-on-gray pottery (Table 7.2) further underscores this reality among the specimens I sampled. When one juxtaposes Mesquite and Boulder Black-on-gray and Washington and Boysag Black-on-gray, respectively, across the Basketmaker III – Pueblo I periods (Tables 7.2 and 7.3), the introduction of more passive design categories (secondary forms and triangle use) becomes evident later in the sequence via Washington and Boysag Black-on-gray pottery. The calculated diversity indices presented in Tables 7.2 – 7.4 serve as a baseline in considering relative intra-regional diversity of Virgin Branch painted pottery styles. The lack of diversity measures for multiple design categories for Mesquite and Boulder Black-on-gray may seem to be a symptom of inadequate sampling. While this may be possible, I think the paucity of sample sizes for this lack of design categories in Mesquite and Boulder Black-on-gray pottery is real (i.e., based in reality) and not due to sampling error.

Virgin-Kayenta relations during the Basketmaker III and Pueblo I periods, through the lens of the earliest two painted designs in each region (outlined above), the similarity indices among the six design categories I considered (see Tables 7.5 through 7.7) demonstrate proportionately low similarity both internally among Virgin Branch communities as well as in relation to the Kayenta Branch heartland. Interestingly, when one separately considers the respective juxtaposition of Mesquite/Boulder Black-on-gray and Lino Black-on-gray (Table 7.6) and Washington/Boysag Black-on-gray and Kana-a Black-on-white (Table 7.7), design categories in the St. George Basin (specifically, primary forms and triangle use) are more similar to the Kayenta Branch heartland than in relation to other Virgin Branch populations in the Moapa Valley or on the western Colorado Plateau. This high degree of similarity in primary forms and triangle use—both high visible and active forms of signaling—may suggest a greater degree of influence and interaction between Virgin Branch populations in the St. George Basin and Kayenta Branch people not previously known. In contrast, the low degree of similarity in passive expressions of style (namely, secondary forms) between Virgin Branch populations in the St. George Basin and Kayenta Branch people may indicate a Virgin Branch "distinctiveness," differentiating Virgin Branch people in the St. George Basin from Kayenta Branch culture in general. However, this reported high degree of similarity between St. George Basin and Kayenta Branch heartland may explain the presence of a kiva at the Corngrower site (AZ B:1:102 [BLM]). Kivas are well known as being associated with Kayenta Branch culture, with only one or two confirmed kivas reported in the Virgin Branch heartland—both within the St. George Basin.

Stylistic design between Virgin Branch populations in the Moapa Valley and Kayenta Branch heartland (Table 7.5) were proportionately moderate across all design categories, possibly indicative of some interaction with little to no influence of cultural institutions and values. Meanwhile, design categories among western Colorado Plateau pottery assemblages shared the lowest similarity index among primary forms, secondary forms, and triangle use in relation to the Kayenta Branch heartland. This marked stylistic differentiation between Virgin

Branch populations on the western Colorado Plateau and the Kayenta Branch heartland represents an indirect indication of a spatial separation between these two culture groups that occurred during the Pueblo I people following the depopulation of the eastern Colorado Plateau (Allison 2019). Overall, the design styles are comparatively, though moderately, similar within the Virgin Branch region. This loose correlation in design similarity—the most divergent in all other similarity index comparisons—serves as a baseline for loose-knit, autonomous communities throughout the Basketmaker III and Pueblo I periods.

Early and Middle Pueblo II Periods

Archaeological Background and Data Expectations

The transition into the early Pueblo II period was marked by significant increases in population size and aggregation in the Moapa Valley as well as intra-regional trade as well as inter-regional trade with neighboring Kayenta Branch populations. Throughout the Pueblo II period, trade between Kayenta Branch populations and Virgin Branch people in the Moapa Valley is well documented (Lyneis 1992, 1995, 1996). In addition, trade between Virgin Branch communities in the Moapa Valley and on the western Colorado Plateau is known to have increased throughout the early and middle Pueblo II periods (Harry et al. 2013). In the Kayenta Branch heartland, during the early Pueblo II period, social roles grew increasingly formalized, as seen through increasing presence of kivas and mealing rooms. With regarding painted pottery, seeming analogous pair of design styles were prevalent during the early and middle Pueblo II periods. Though by no means the only painted pottery types in use, St. George Black-on-gray (Tusayan White Ware, Virgin Series), Trumbull Black-on-gray (Moapa Gray Ware), Orderville Black-on-gray (corrugated Tusayan White Ware, Virgin Series), Toroweap Black-on-gray (corrugated Moapa Gray Ware), and Black Mesa Black-on-white (Tusayan White Ware, Kayenta Series) were among the most commonly produced painted ceramics in the Virgin and Kayenta Branch regions, respectively, during the early and middle Pueblo II periods (see Figures 7.31 and 7.32).

Figure 7.31. St. George Black-on-gray bowl (Case 1105).

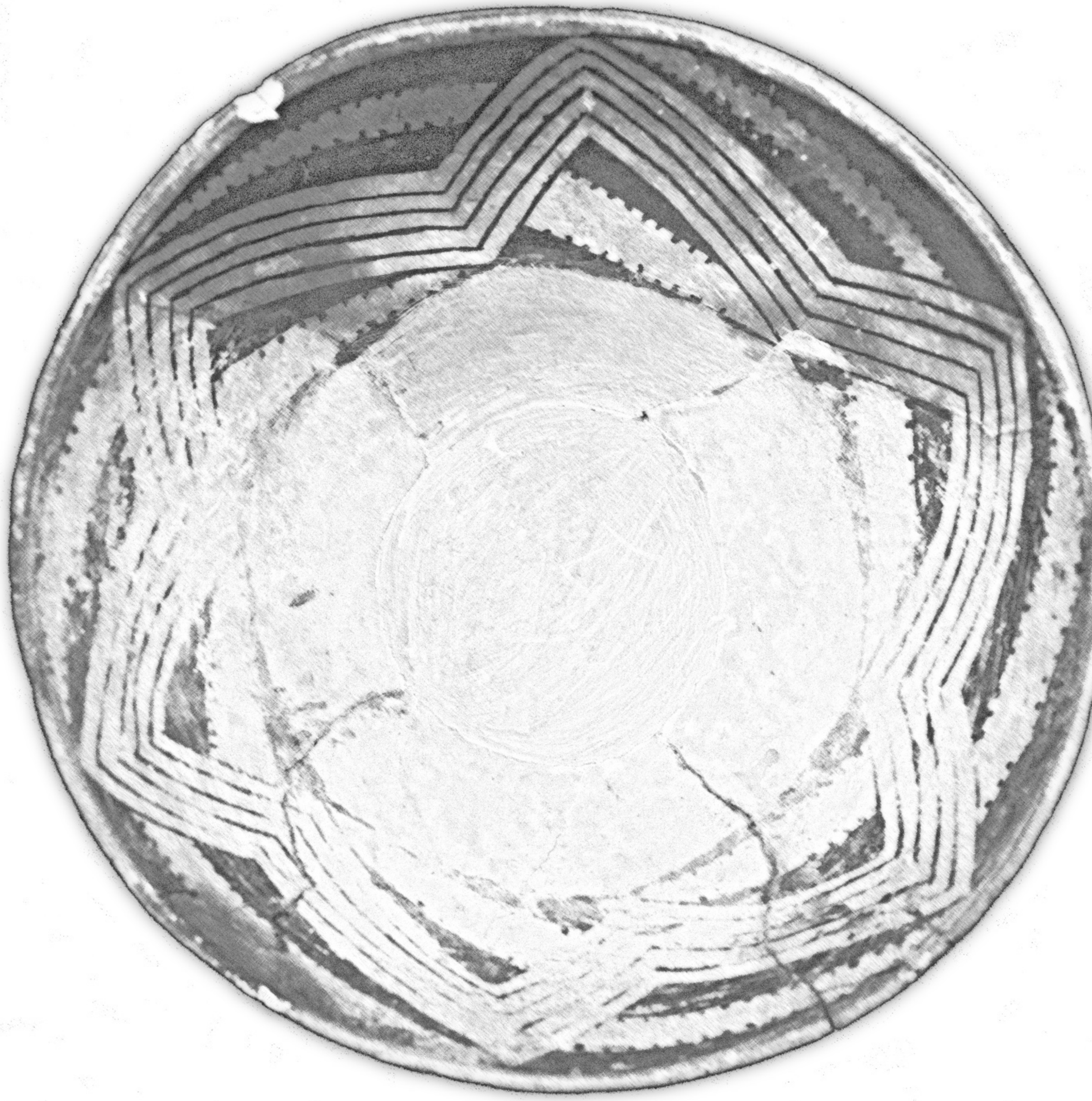


Figure 7.32. Black Mesa Black-on-white bowl (Case 2219).

Following from these population increases, and reliance on irrigation agriculture in the lowlands, I expected pottery assemblages in the Moapa Valley to demonstrate increasing consolidation of painted design and technological styles along with increases in vessel size (and potentially vessel forms). On the western Colorado Plateau, I expected relatively greater variability in painted design styles in comparison with the Moapa Valley and St. George Basin. In the St. George Basin, I expected comparative moderate stylistic diversity, in relation to ceramic assemblages in the Moapa Valley and on the western Colorado Plateau. Inter-regionally, during the early Pueblo II period, I expected painted design styles to relatively parallel these social dynamics between both heartlands. In the Virgin Branch heartland, I expected painted design styles to yield relatively low to moderate similarity indices. In the Kayenta Branch heartland, I expected to find relatively high similarity indices in technological and painted design styles compared to earlier periods. During the middle Pueblo II period, if social integration with Kayenta Branch populations were desired by Virgin Branch populations, I expected to find greater similarities in painted design styles.

Intra-Virgin Branch and Virgin-Kayenta Branch Relations: Data and Interpretations

Contrary to my original expectation of a reduction in stylistic variability in the Moapa Valley, Virgin Branch pottery in the Moapa Valley demonstrated the greatest diversity when compared to the St. George Basin and western Colorado Plateau (Table 7.8). Moreover, painted design categories on pottery assemblages from the St. George Basin and the western Colorado Plateau were proportionately similar (Table 7.8). This similarity diverges from my expectation of greater distinctions in diversity indices between these two communities. Design categories between Virgin Branch communities (i.e., districts) are shown to grow more similar in passive expressions of painted styles—particularly, secondary forms (e.g., fringes on solids)—as well as highly visible style attributes, such as triangle use (see Table 7.9). Among more active expressions, however, primary forms and composition decrease in similarity (Table 7.9).

In my assessment of the six design categories among early and middle Pueblo II pottery types, no occurrences were found for the following attributes (categories): framed cross (primary forms), T-figure (primary forms), Z's and/or basketstitch (composition), and two-dimensional symmetry. Among other attributes, however, intra-Virgin Branch and inter-regional comparisons of technological and design style seem to generally lend credence to my original research expectations.

Pottery assemblages from within the Virgin Branch heartland are approximately evenly split between polished/not polished and slipped/not slipped technological styles (Figure 7.33). In contrast, Kayenta Branch pottery during the early and middle Pueblo II periods is markedly different. Almost all of the Kayenta Branch vessels were polished and slipped (Figure 7.33). Frequencies of carbon streaks were found to be high among Kayenta Branch pottery and low among Virgin Branch assemblages (Figure 7.34).

Primary forms—namely, use of triangles, terraces, checks, and flags—were found to occur in uniformly low frequencies throughout the Virgin and Kayenta Branch heartlands (Figures 7.34, 7.36, 7.37, 7.43 through 7.50). Scrolls and spirals were found to be sparingly used within both heartlands, and not at all on western Colorado Plateau (Figure 7.35). Squiggle lines were homogenously expressed and seldomly painted, with no expressions of this motif on pottery in the St. George Basin (Figure 7.37). Dots were used exclusively as filler in the Moapa Valley, expressed in a variety of forms in the St. George Basin and Kayenta Branch heartland, and painted with moderate frequency on the western Colorado Plateau (Figure 7.38). Distinctive to the western Colorado Plateau was the exclusive (and infrequent) use of ticks on vessels

(Figure 7.39). While ticks were exclusive to western Colorado Plateau assemblages, pottery in the Moapa Valley was the only Virgin Branch communities to expressed (albeit, at low frequencies) circle motifs on bowls (Figure 7.39). Other primary forms—particularly, rectangular solids and curved line—were common and overall homogenously expressed throughout the Virgin and Kayenta Branch heartlands (Figure 7.40).

Secondary forms were found in varied expressions in the Virgin and Kayenta Branch heartlands. Fringes on solids were found to vary with expressions generally overlapping among Virgin Branch communities and in relation to the Kayenta Branch heartland (Figure 7.41). Some distinctions were found in the expression of fringes on lines. Kayenta Branch populations and the St. George Basin generally overlapping in their respective expressions in motifs, with relatively minor distinctions found among Moapa Valley and western Colorado Plateau pottery assemblages (Figure 7.42).

Expression of solid composition was found in high frequencies and demonstrated proportionate homogeneity within the Virgin Branch heartland and in relation to Kayenta Branch pottery assemblages (Figure 7.50). In contrast, hatch and multiple parallel lines composition were found to also be homogenously expressed though in low frequencies throughout both heartlands (Figures 7.51 through 7.53). Line widths, similar to my observations of solid composition, were generally expressed in similar forms throughout and between the Virgin and Kayenta Branch heartlands (Figures 7.54 through 7.56).

Occurrences of design layouts on available pottery from the St. George Basin, western Colorado Plateau, and the Kayenta Branch heartland were infrequent, with a small number of instances composed of simple bands. Conversely, pottery in the Moapa Valley exclusively demonstrated simple and complex bands as well as rotational symmetry (Figures 7.57 and 7.58).

Table 7.8. Shannon Diversity Index Results for Early Pueblo II – Middle Pueblo II Periods.

Design Category	Context	Sample Size	Diversity Measures		
			Richness	H-statistic	Evenness
Primary Forms	Moapa Valley	164	17	2.17	0.764
	St. George Basin	366	15	1.82	0.671
	Western Colorado Plateau	130	12	1.78	0.717
Secondary Forms	Moapa Valley	52	7	1.01	0.517
	St. George Basin	96	5	0.98	0.609
	Western Colorado Plateau	58	5	0.758	0.471
Triangle Use	Moapa Valley	24	5	1.18	0.731
	St. George Basin	43	4	0.985	0.711
	Western Colorado Plateau	26	4	1.17	0.844
Triangle Extensions	Moapa Valley	0	-	-	-
	St. George Basin	0	-	-	-
	Western Colorado Plateau	0	-	-	-
Composition	Moapa Valley	83	11	1.06	0.443
	St. George Basin	181	12	0.983	0.396
	Western Colorado Plateau	85	7	0.648	0.333
Line Width	Moapa Valley	60	6	1.77	0.987
	St. George Basin	163	6	1.76	0.981
	Western Colorado Plateau	50	6	1.63	0.912

Table 7.9. Brainerd-Robinson Similarity Coefficients for Early Pueblo II – Middle Pueblo II Periods.

Primary Forms				
	MV	SGB	WCP	Kayenta
MV	-	171	163	179
SGB	171	-	167	172
WCP	163	167	-	167
Kayenta	179	172	167	-
Secondary Forms				
	MV	SGB	WCP	Kayenta
MV	-	172	170	174
SGB	172	-	164	183
WCP	170	164	-	166
Kayenta	174	183	166	-
Triangle Use				
	MV	SGB	WCP	Kayenta
MV	-	182	149	148
SGB	182	-	154	144
WCP	149	154	-	170
Kayenta	148	144	170	-
Triangle Extensions				
	MV	SGB	WCP	Kayenta
MV	-	-	-	-
SGB	-	-	-	-
WCP	-	-	-	-
Kayenta	-	-	-	-
Composition				
	MV	SGB	WCP	Kayenta
MV	-	171	164	168
SGB	171	-	173	152
WCP	164	173	-	142
Kayenta	168	152	142	-
Line Width				
	MV	SGB	WCP	Kayenta
MV	-	163	153	163
SGB	163	-	152	182
WCP	153	152	-	134
Kayenta	163	182	134	-

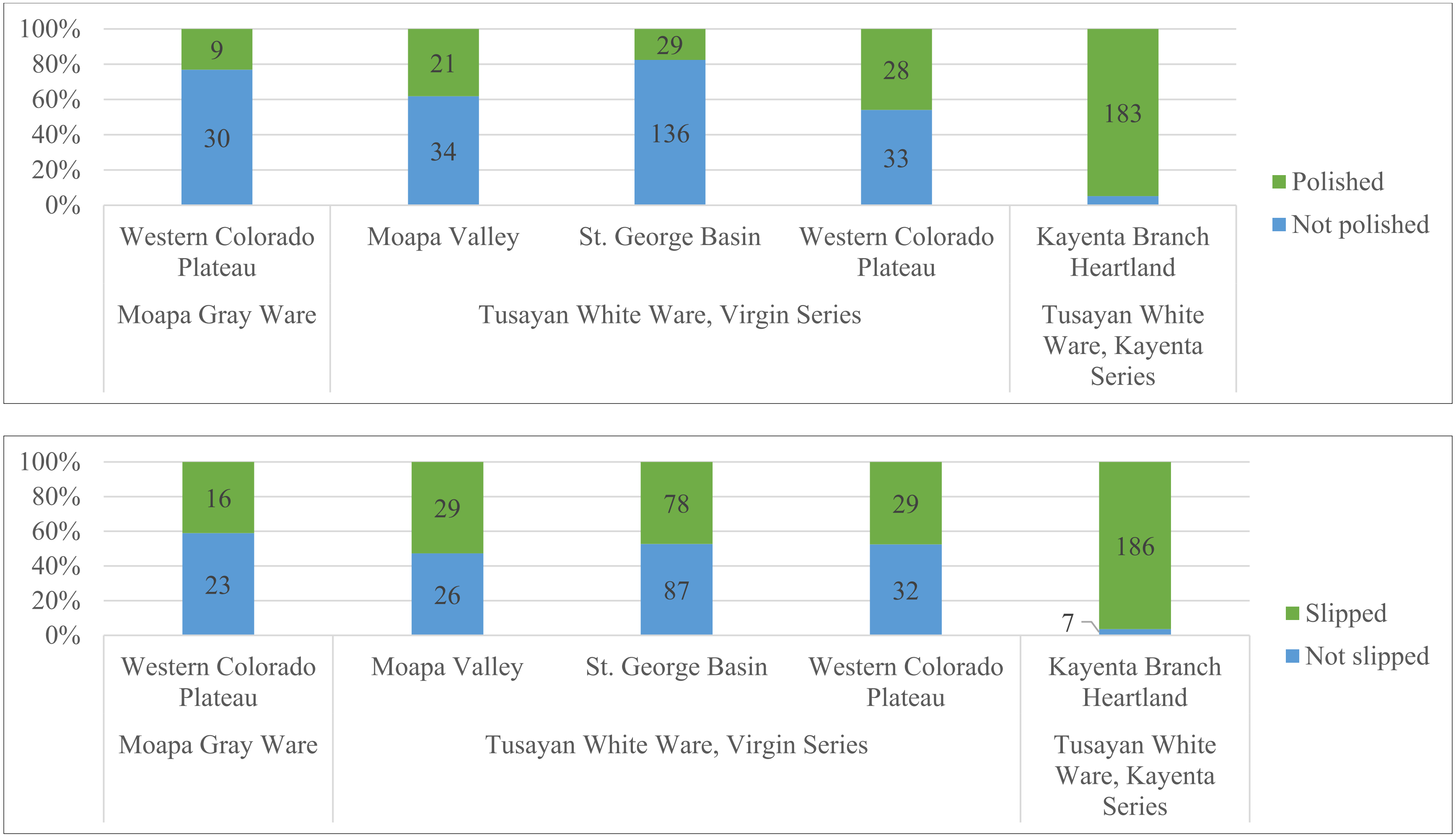
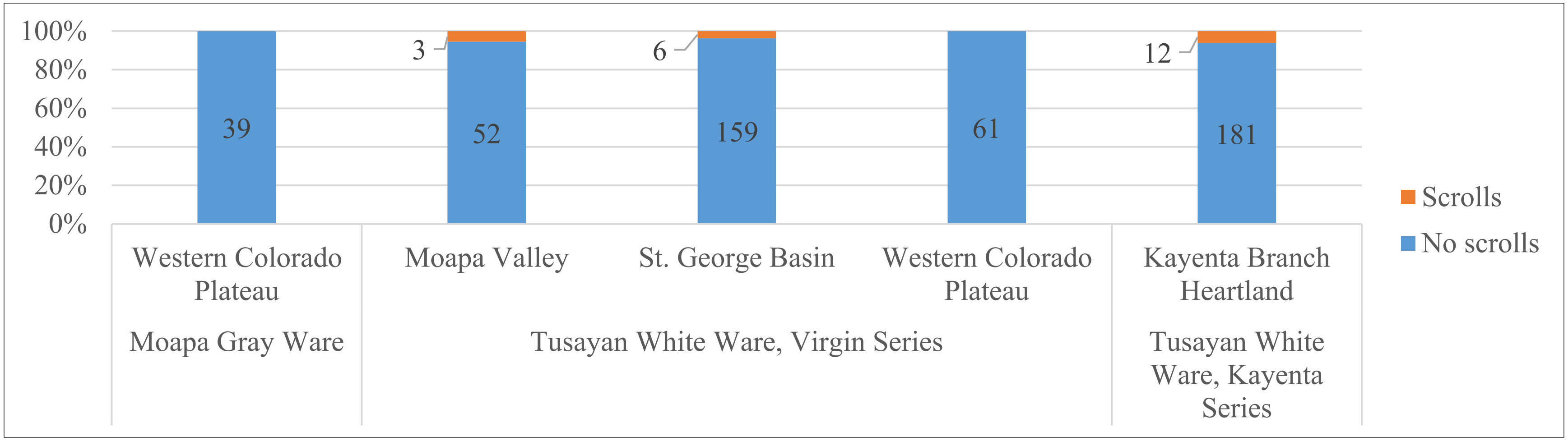


Figure 7.33. Polished (technological style) (top) and slipped (technological style) (bottom) pottery count frequencies during the early and middle Pueblo II periods.

Figure 7.34. Carbon streak (technological style) (top) and triangles (Primary Forms) (bottom) on pottery count frequencies during the early and middle Pueblo II periods.



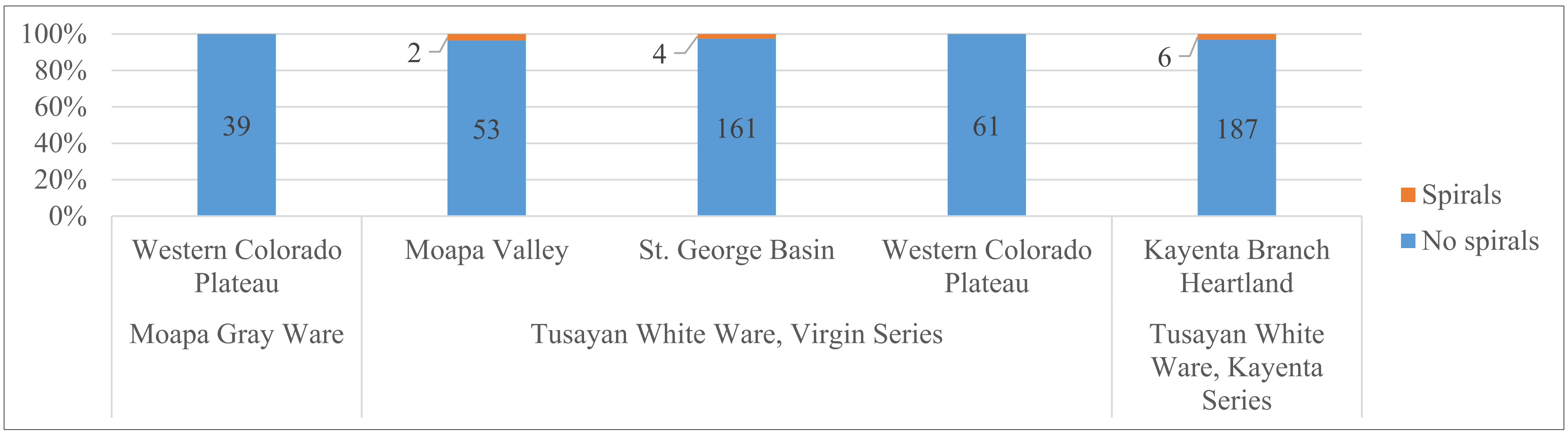
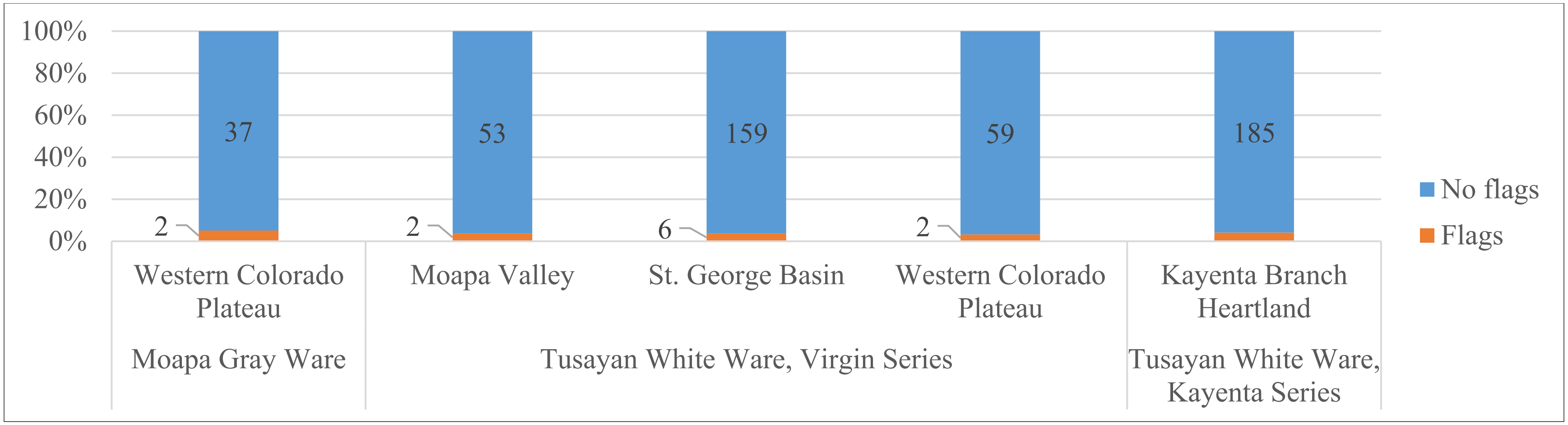


Figure 7.35. Scrolls (Primary Forms) (top) and spirals (Primary Forms) (bottom) on pottery count frequencies during the early and middle Pueblo II periods.

Figure 7.36. Terraces (Primary Forms) (top) and checks (Primary Forms) (bottom) on pottery count frequencies during the early and middle Pueblo II periods.



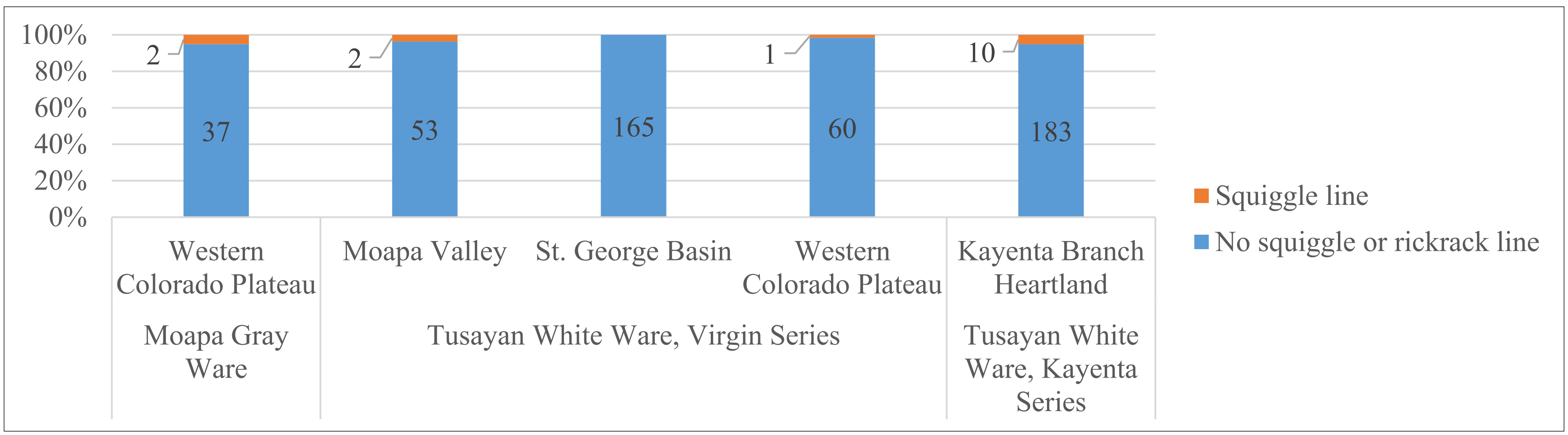


Figure 7.37. Flags (Primary Forms) (top) and squiggle/rickrack lines (Primary Forms) on pottery count frequencies during the early and middle Pueblo II periods.

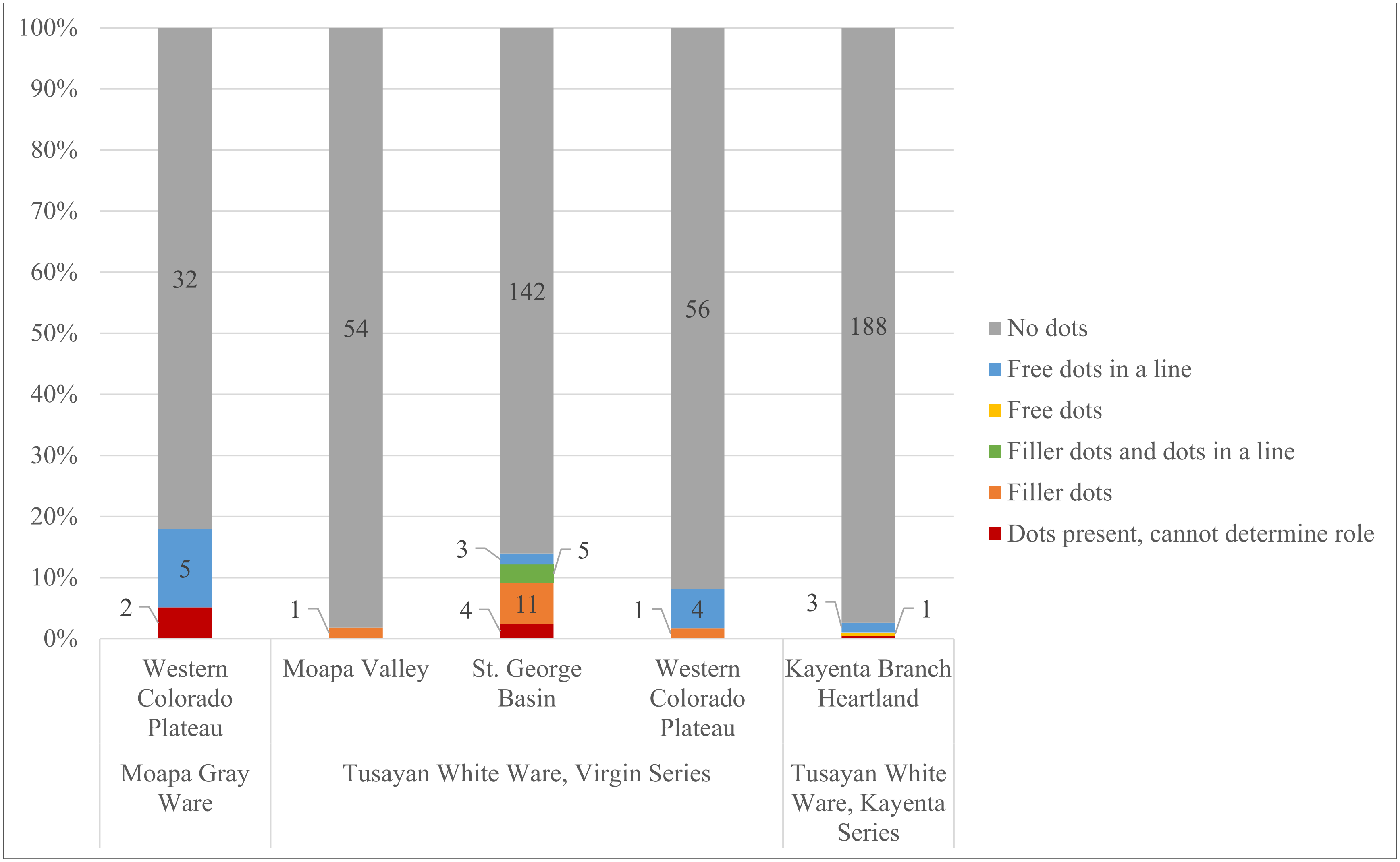


Figure 7.38. Dots (Primary Forms and Composition) on pottery count frequencies during the early and middle Pueblo II periods.

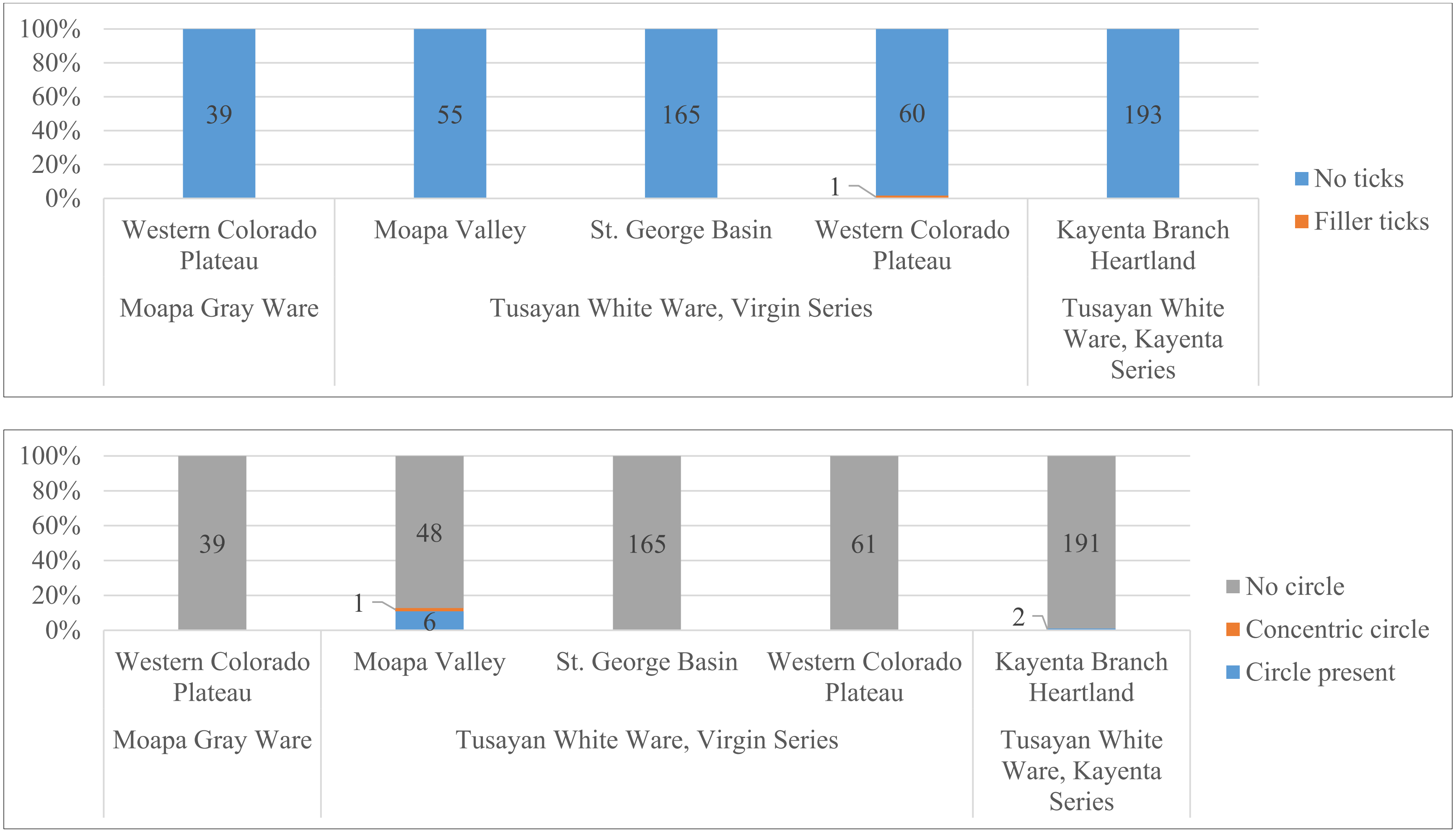
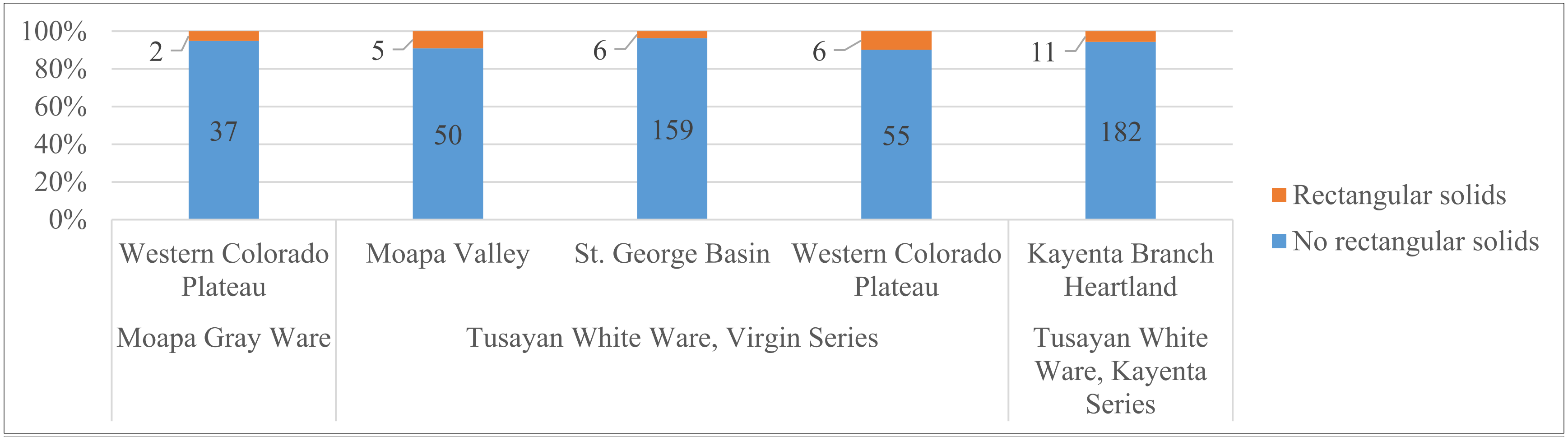


Figure 7.39. Ticks (Primary Forms and Composition) (top) and circles (Primary Forms) (bottom) on pottery count frequencies during the early and middle Pueblo II periods.



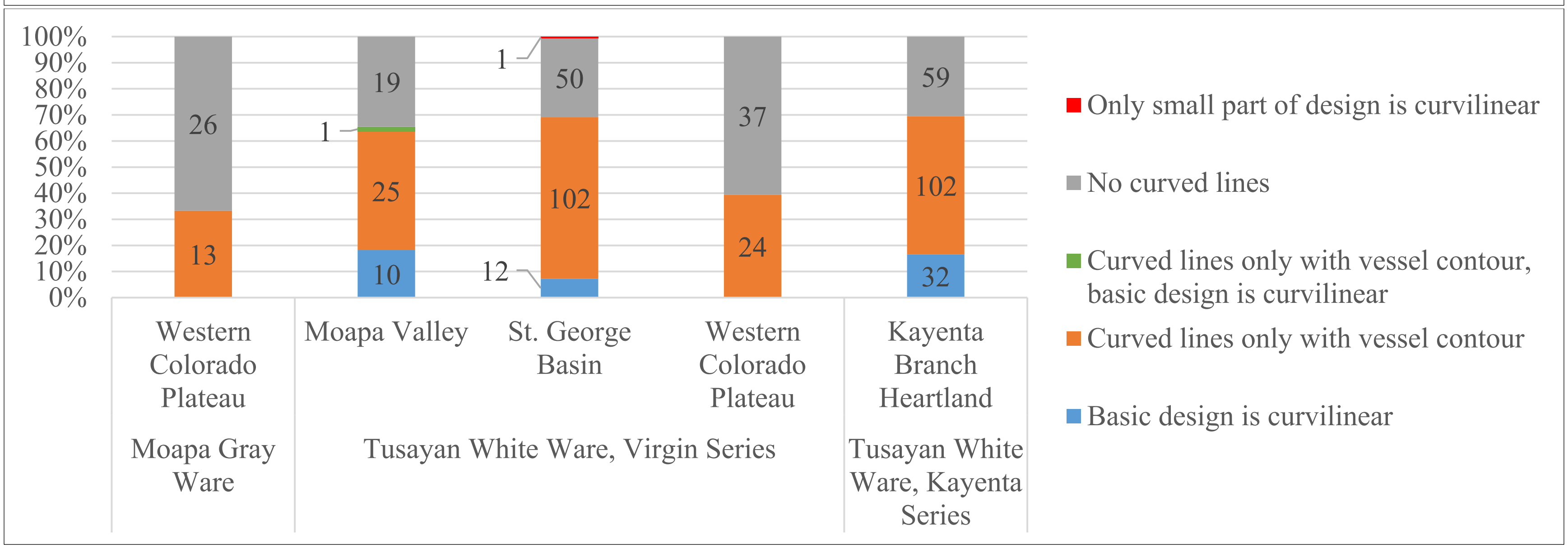


Figure 7.40. Rectangular solids (Primary Forms) (top) and curved lines (Primary Forms) (bottom) on pottery count frequencies during the early and middle Pueblo II periods.

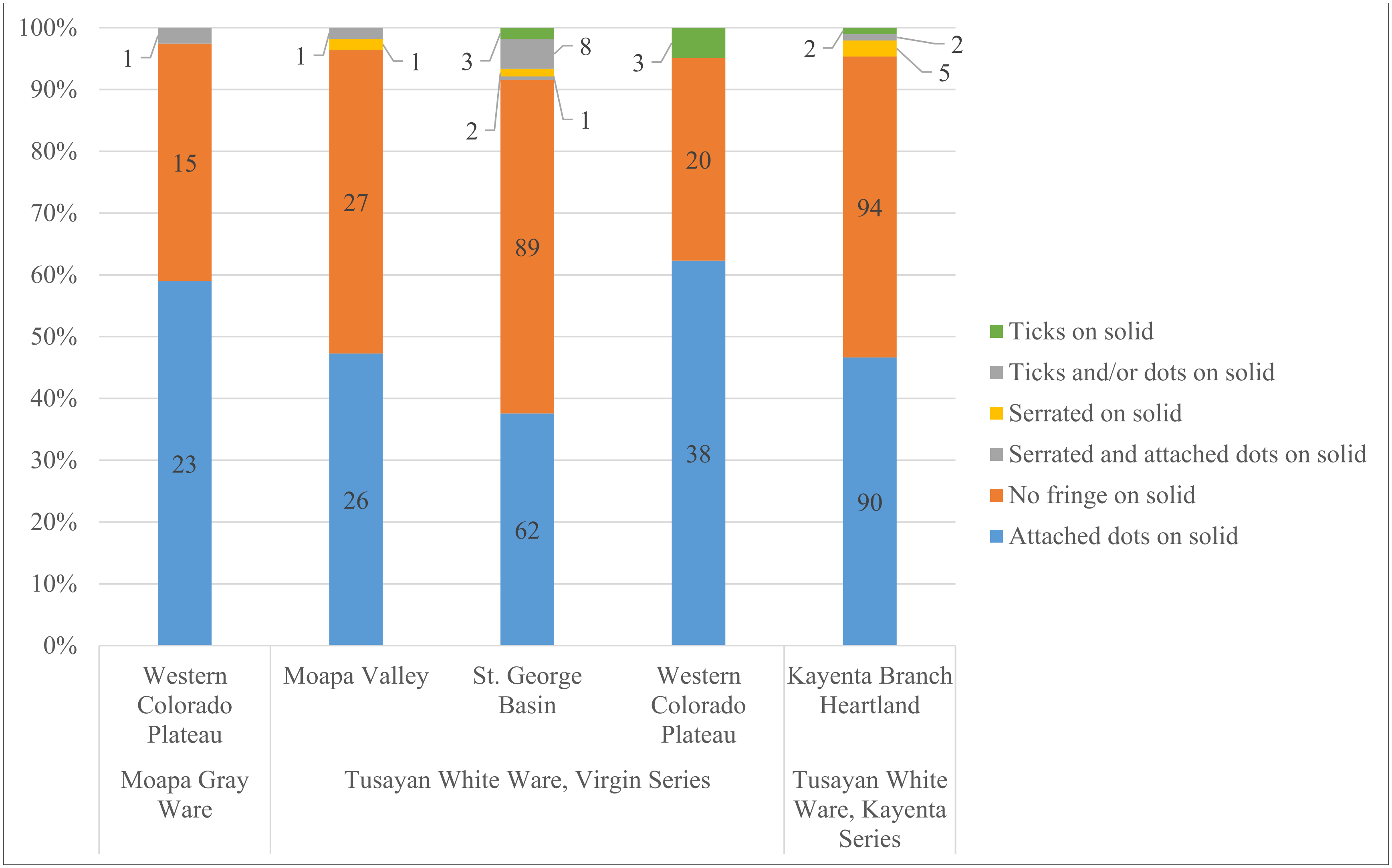


Figure 7.41. Fringe on solids (Secondary Forms) on pottery count frequencies during the early and middle Pueblo II periods.

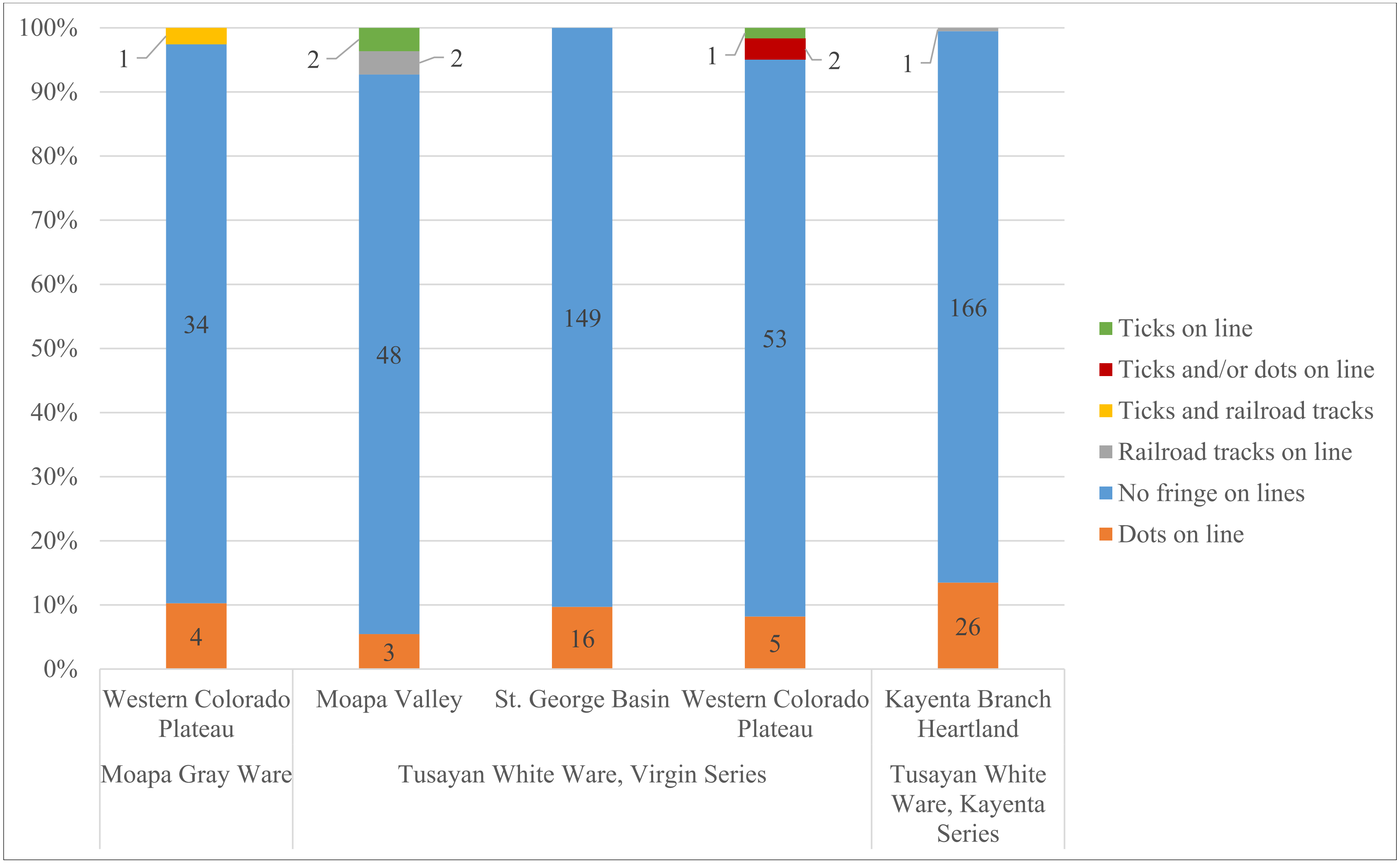
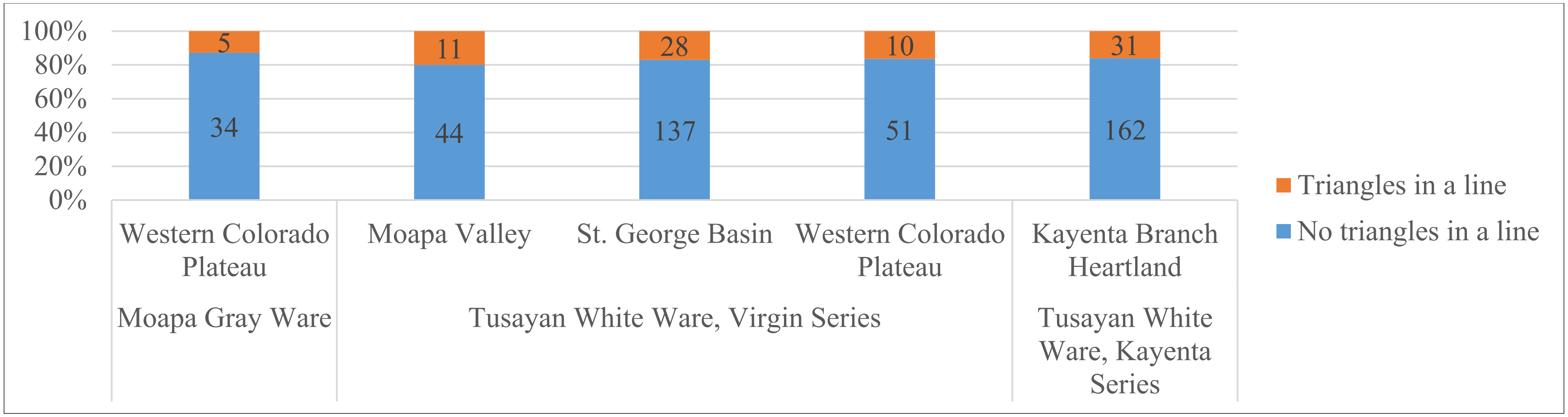


Figure 7.42. Fringe on lines (Secondary Forms) on pottery count frequencies during the early and middle Pueblo II periods.



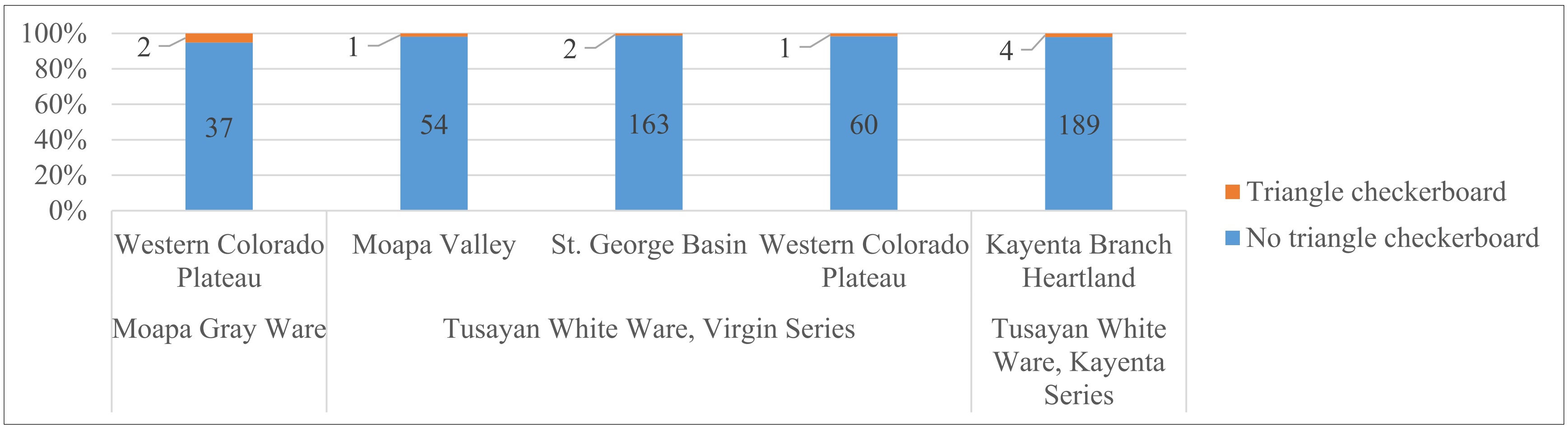
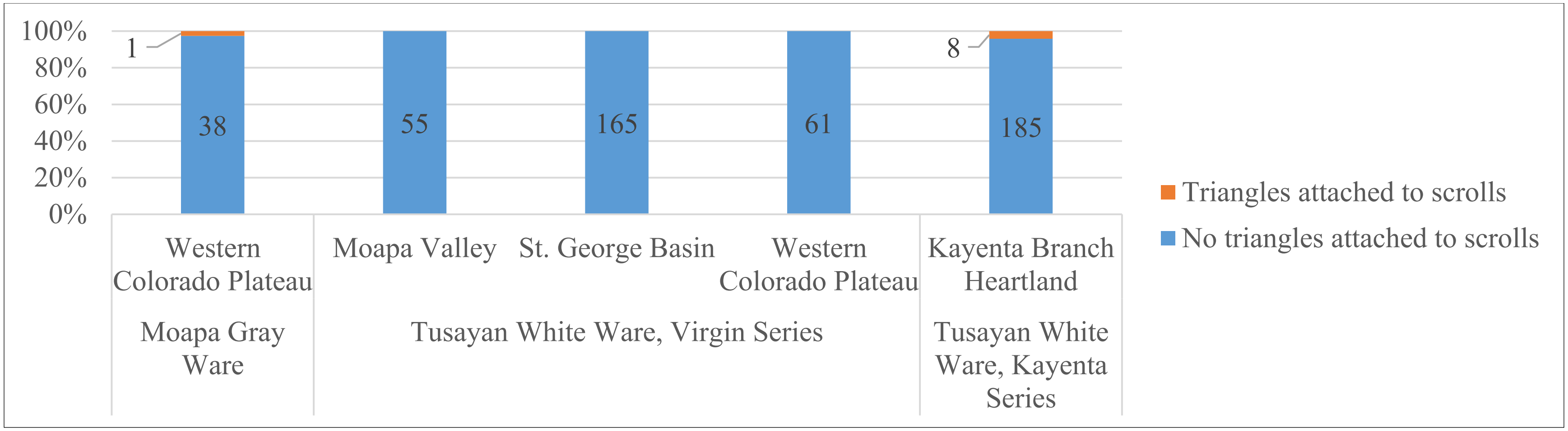


Figure 7.43. Triangles in a line (Triangle Use) (top) and triangle checkerboard (Triangle Use) (bottom) on pottery count frequencies during the early and middle Pueblo II periods.



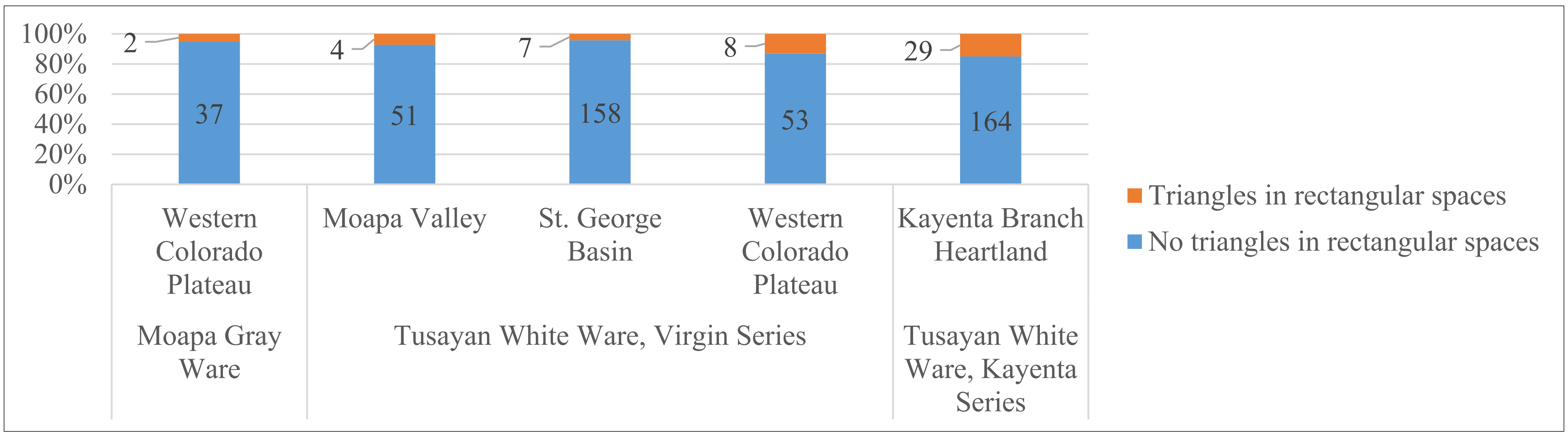


Figure 7.44. Triangles attached to scrolls (Triangle Use) (top) and triangles in rectangular spaces (Triangle Use) (bottom) on pottery count frequencies during the early and middle Pueblo II periods.

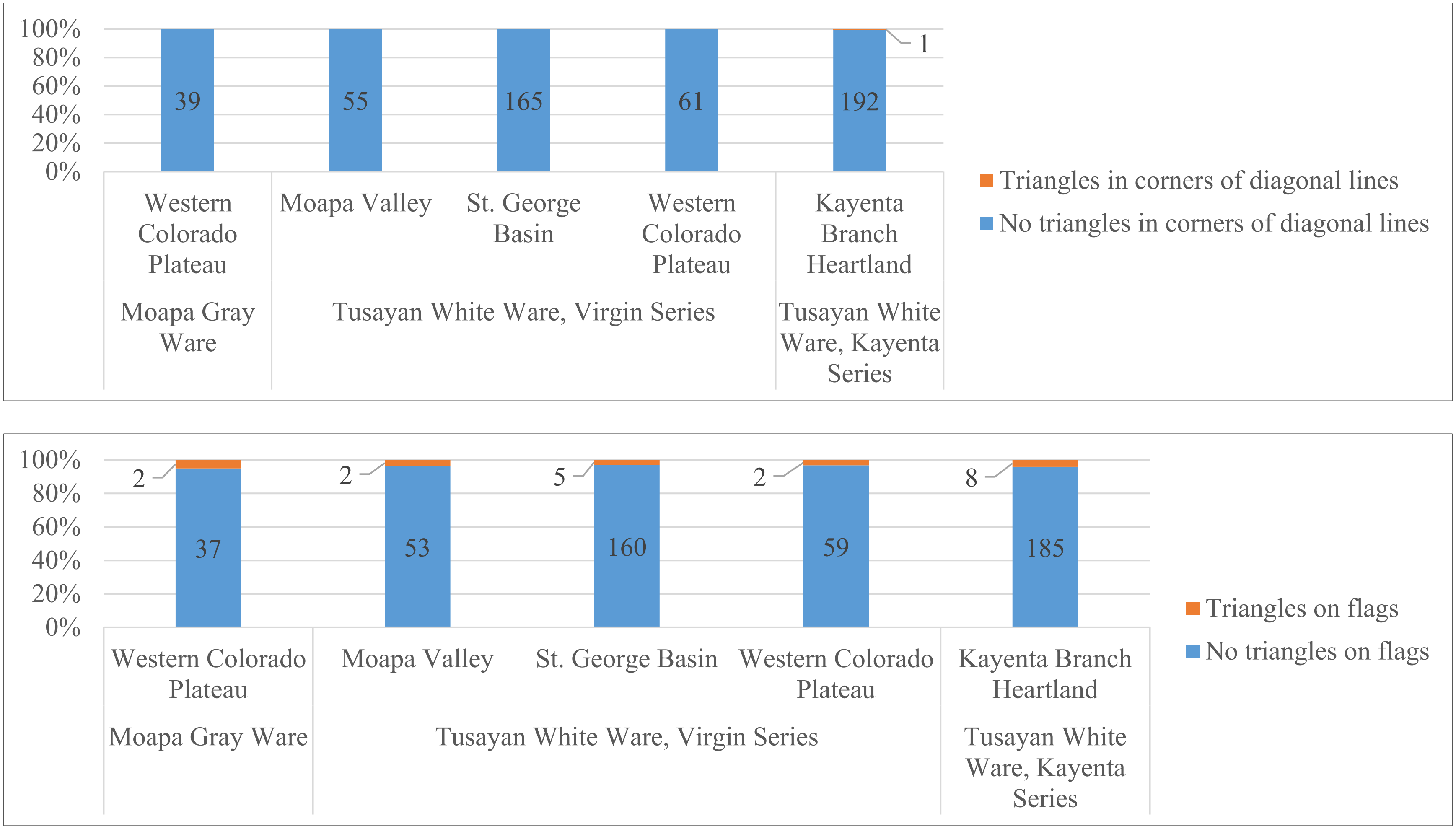


Figure 7.45. Triangles in corners of diagonal lines (Triangle Use) (top) and triangles on flags (Triangle Use) (bottom) on pottery count frequencies during the early and middle Pueblo II periods.

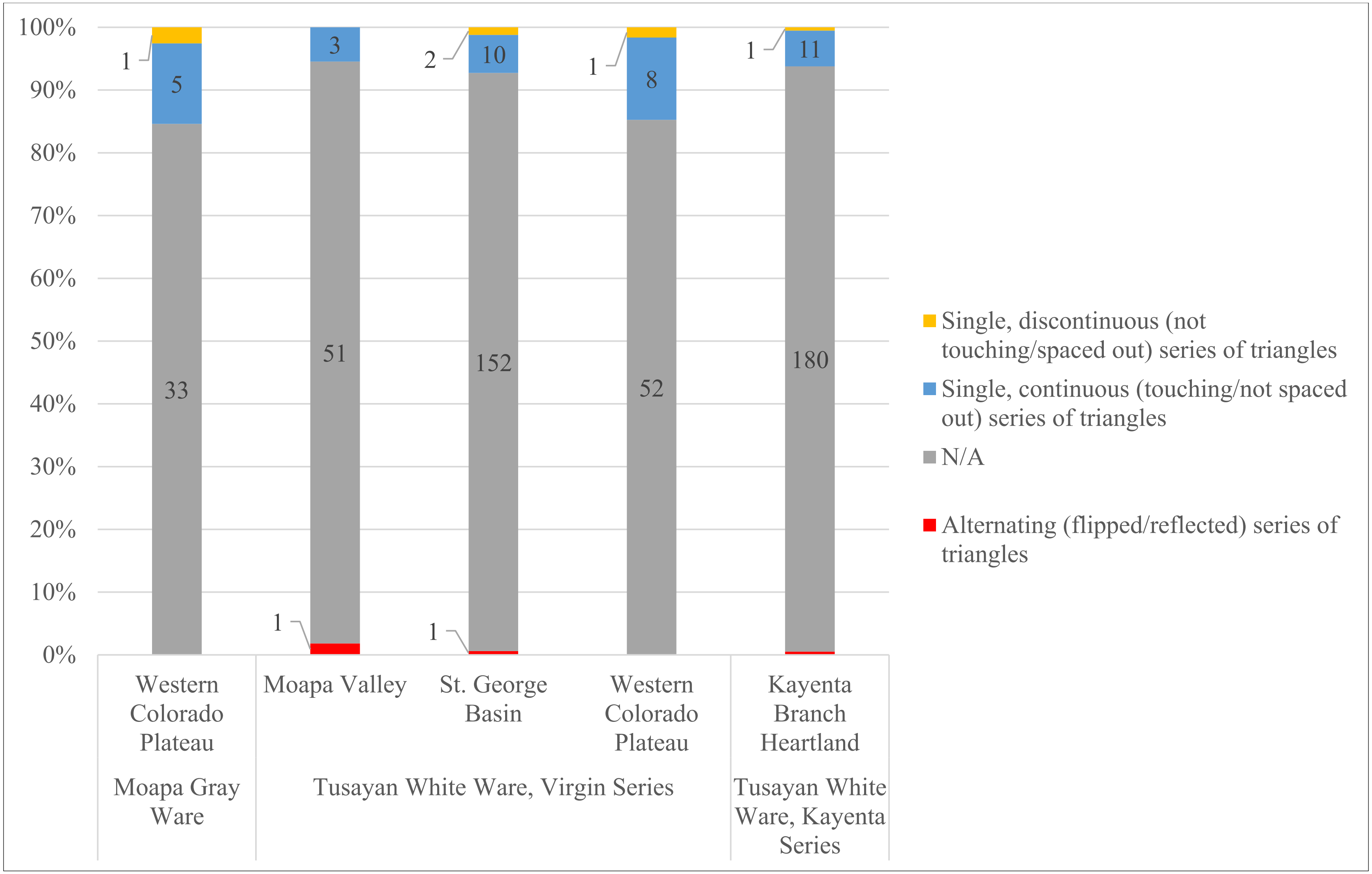


Figure 7.46. Triangle Use (single series) on pottery count frequencies during the early and middle Pueblo II periods.

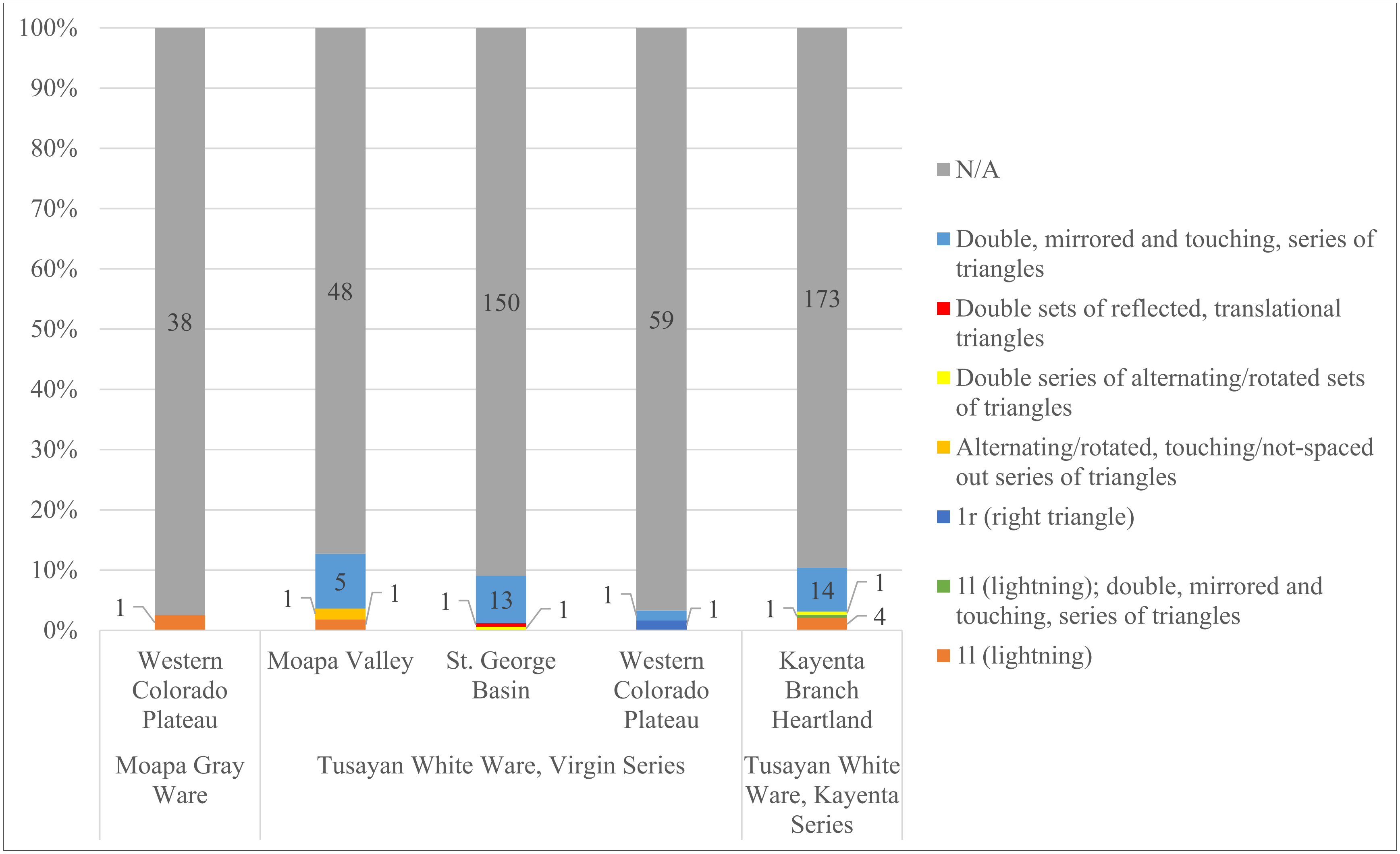


Figure 7.47. Triangle Use (double series) on pottery count frequencies during the early and middle Pueblo II periods.

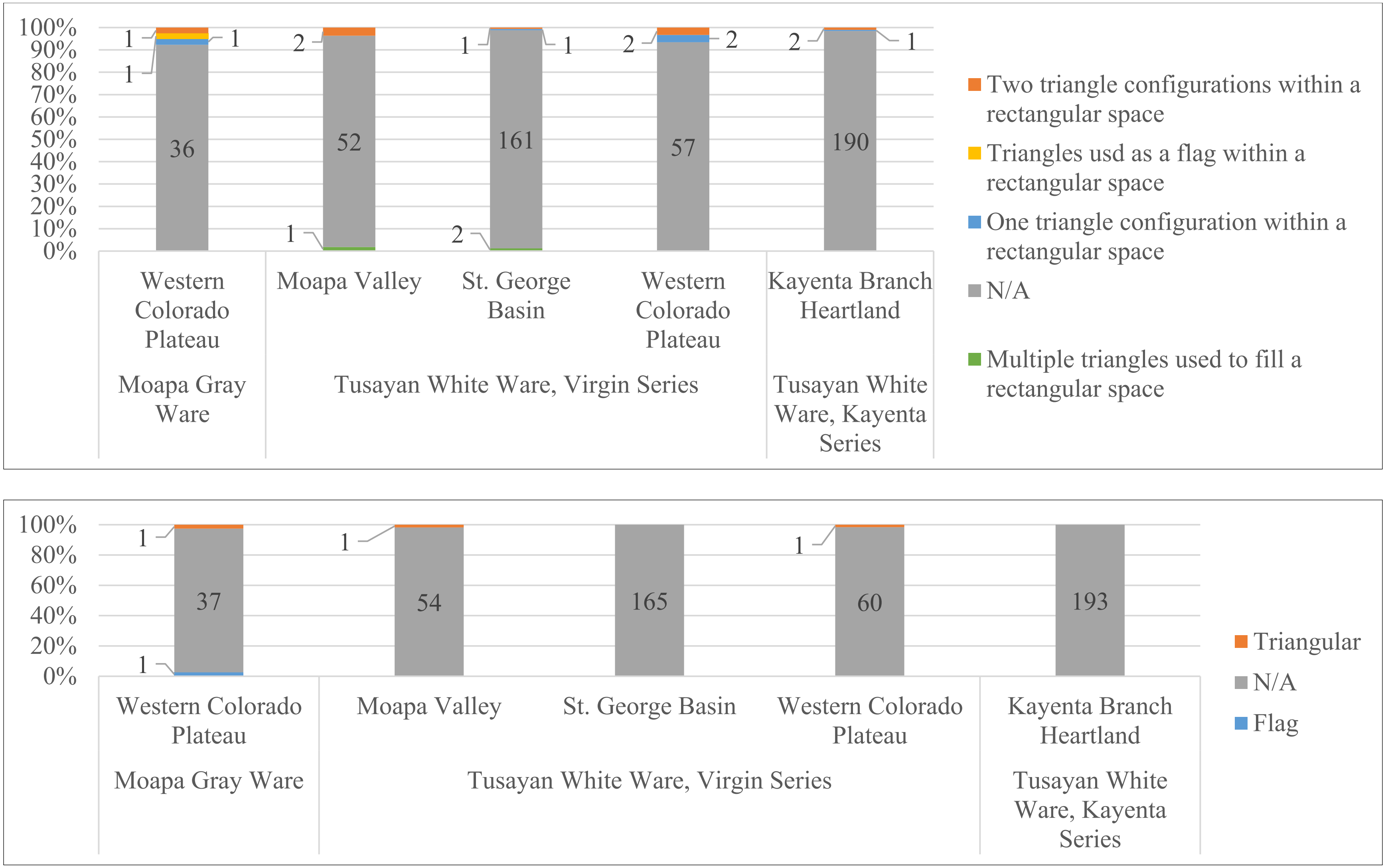


Figure 7.48. Triangle Use (rectangular spaces) (top) and Triangle Use (other) (bottom) on pottery count frequencies during the early and middle Pueblo II periods.

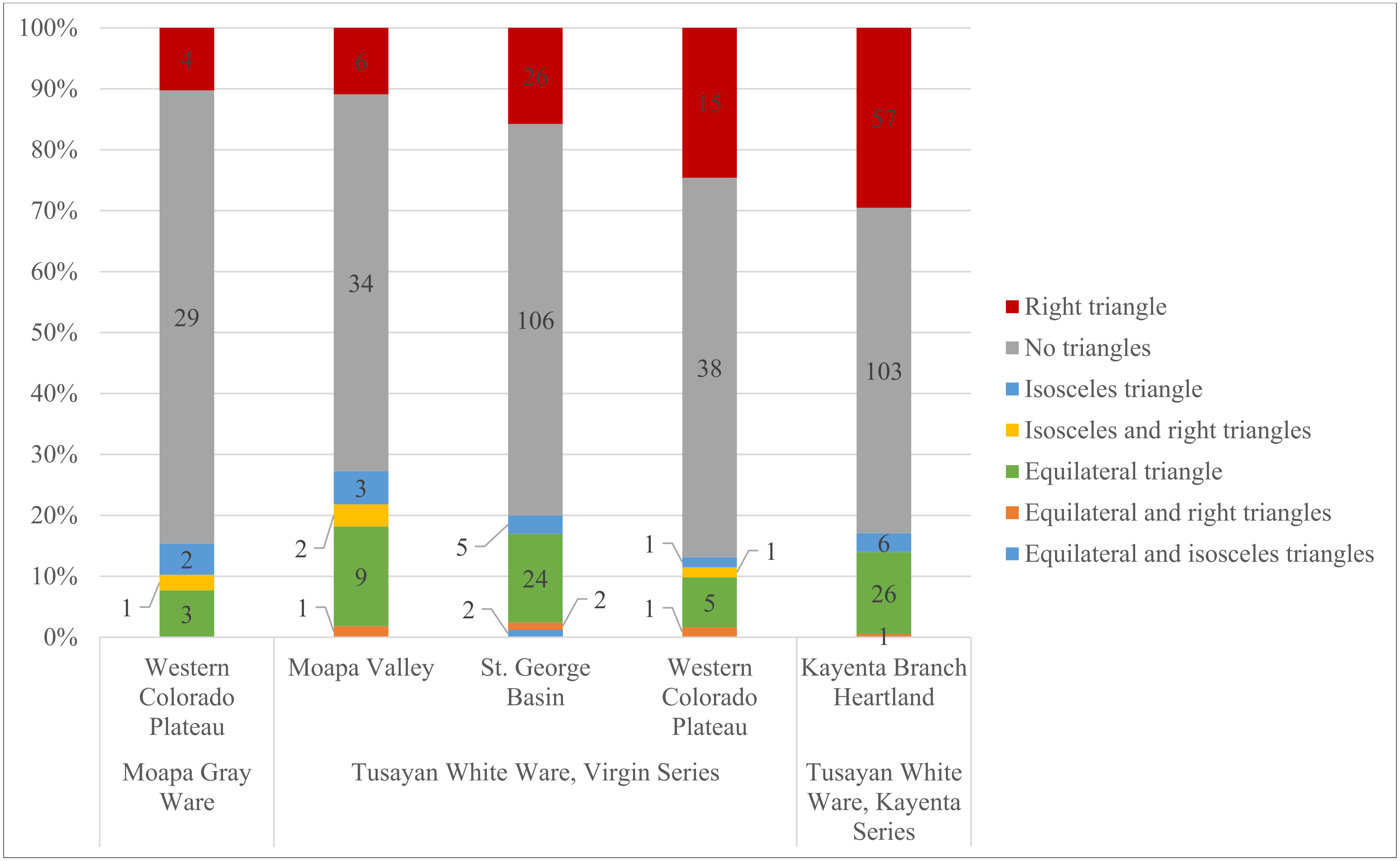


Figure 7.49. Triangle Use (triangle type) on pottery count frequencies during the early and middle Pueblo II periods.

Figure 7.50. Scrolls as triangle extensions (Triangle Extensions) (top) and solid (Composition) (bottom) on pottery count frequencies during the early and middle Pueblo II periods.

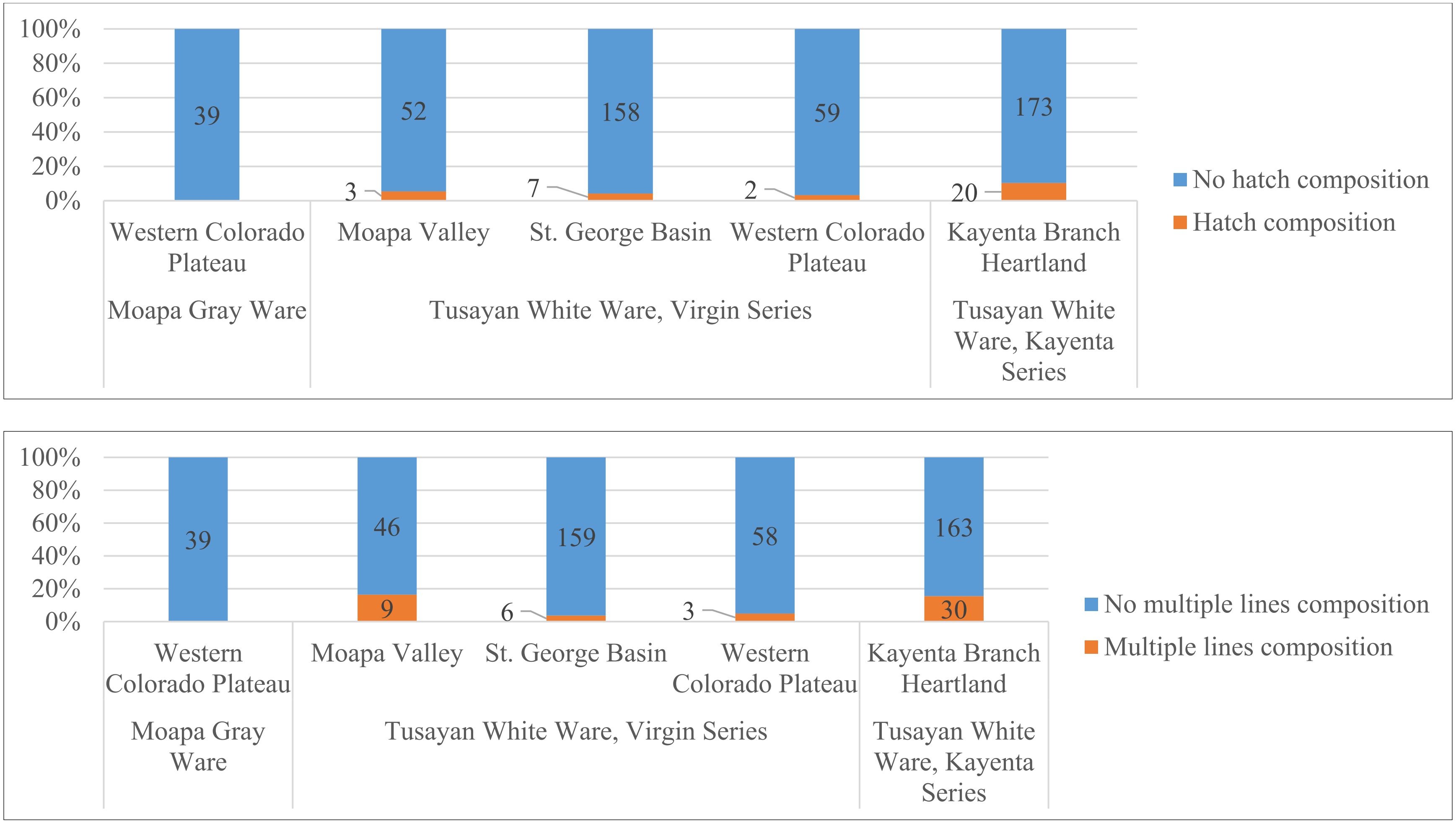


Figure 7.51. Hatch (Composition) (top) and multiple parallel lines (Composition) (bottom) on pottery count frequencies during the early and middle Pueblo II periods.

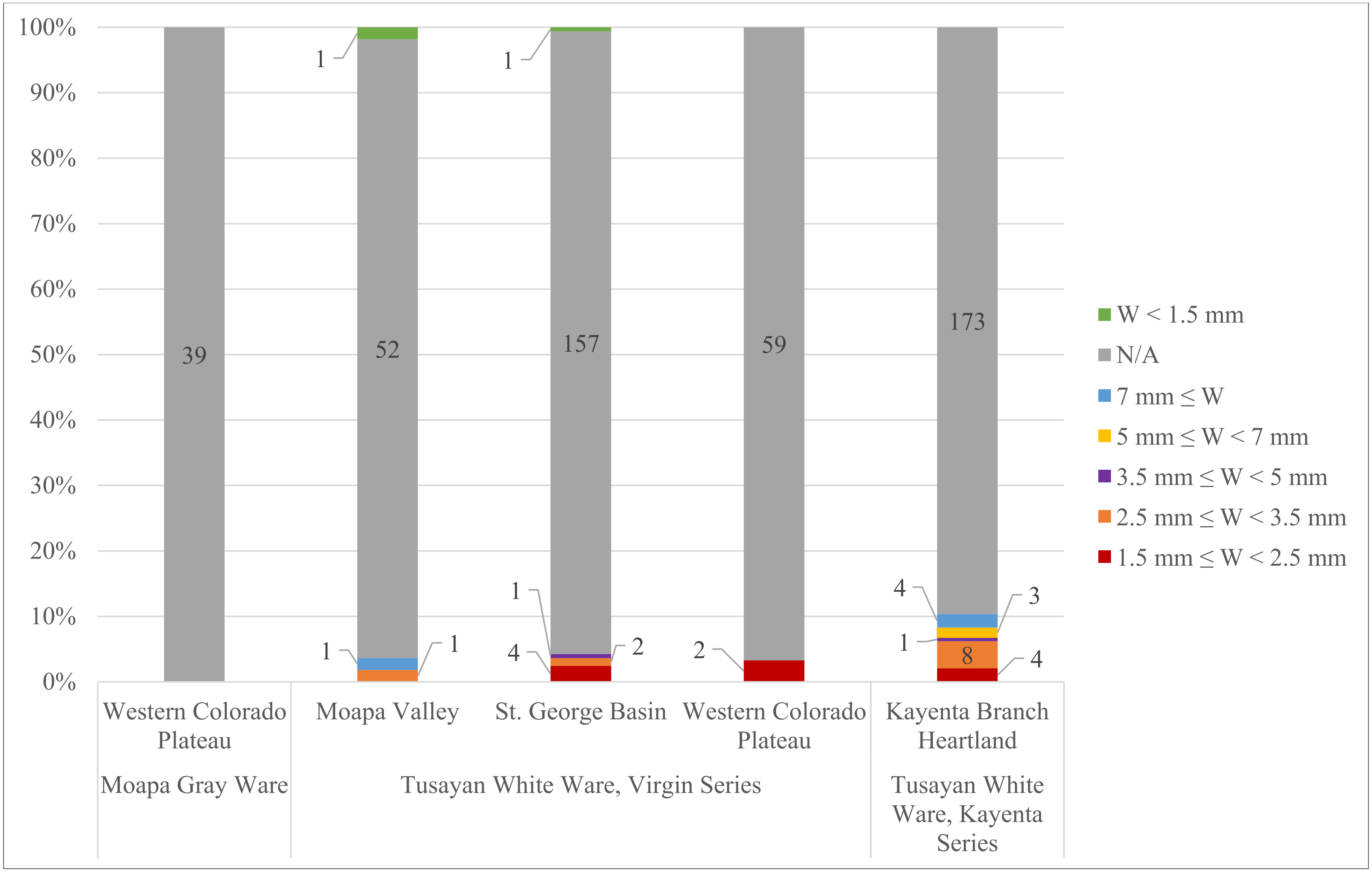


Figure 7.52. Average space between hatch lines (Composition) on pottery count frequencies during the early and middle Pueblo II periods.

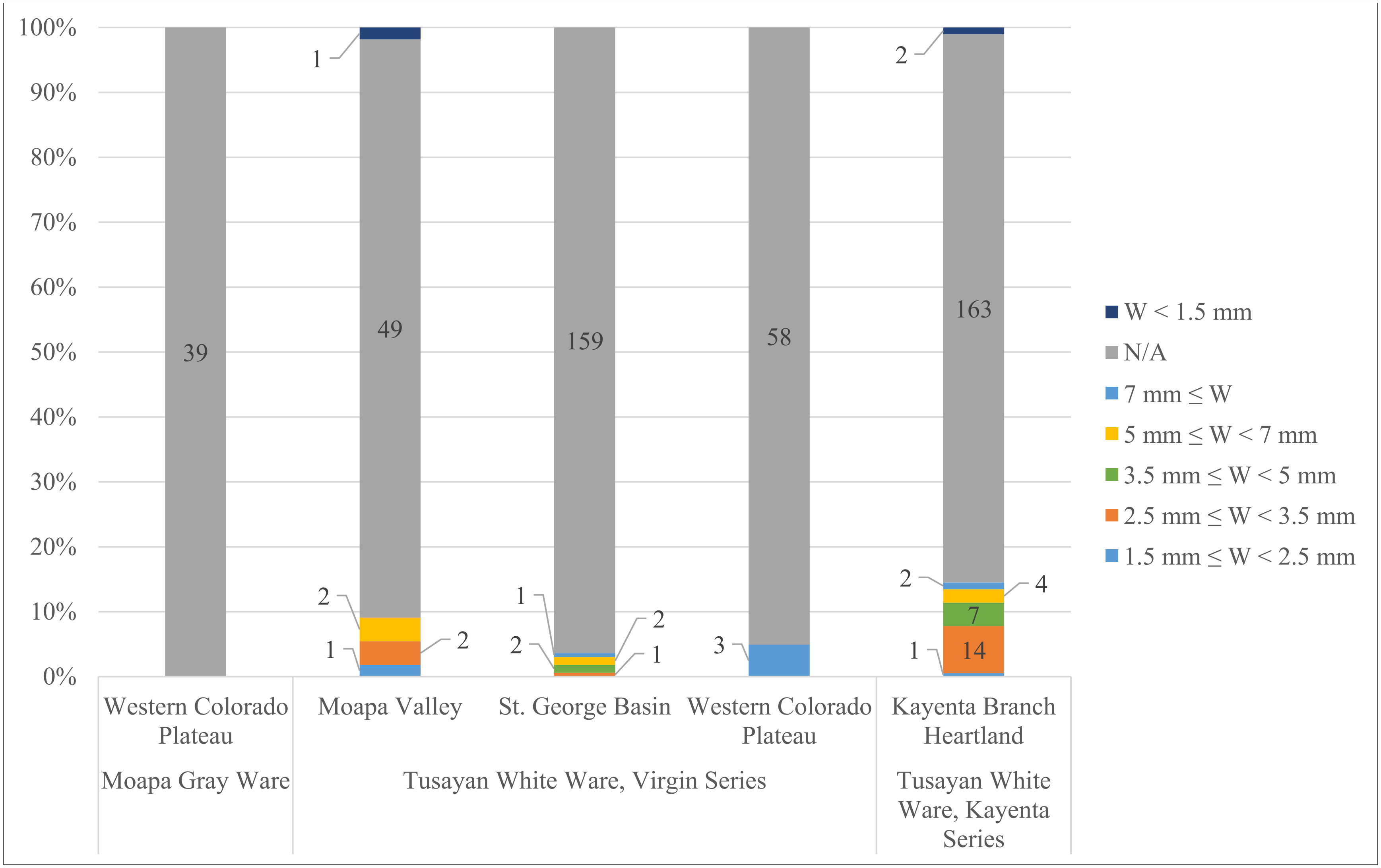


Figure 7.53. Average space between multiple parallel lines (Composition) on pottery count frequencies during the early and middle Pueblo II periods.

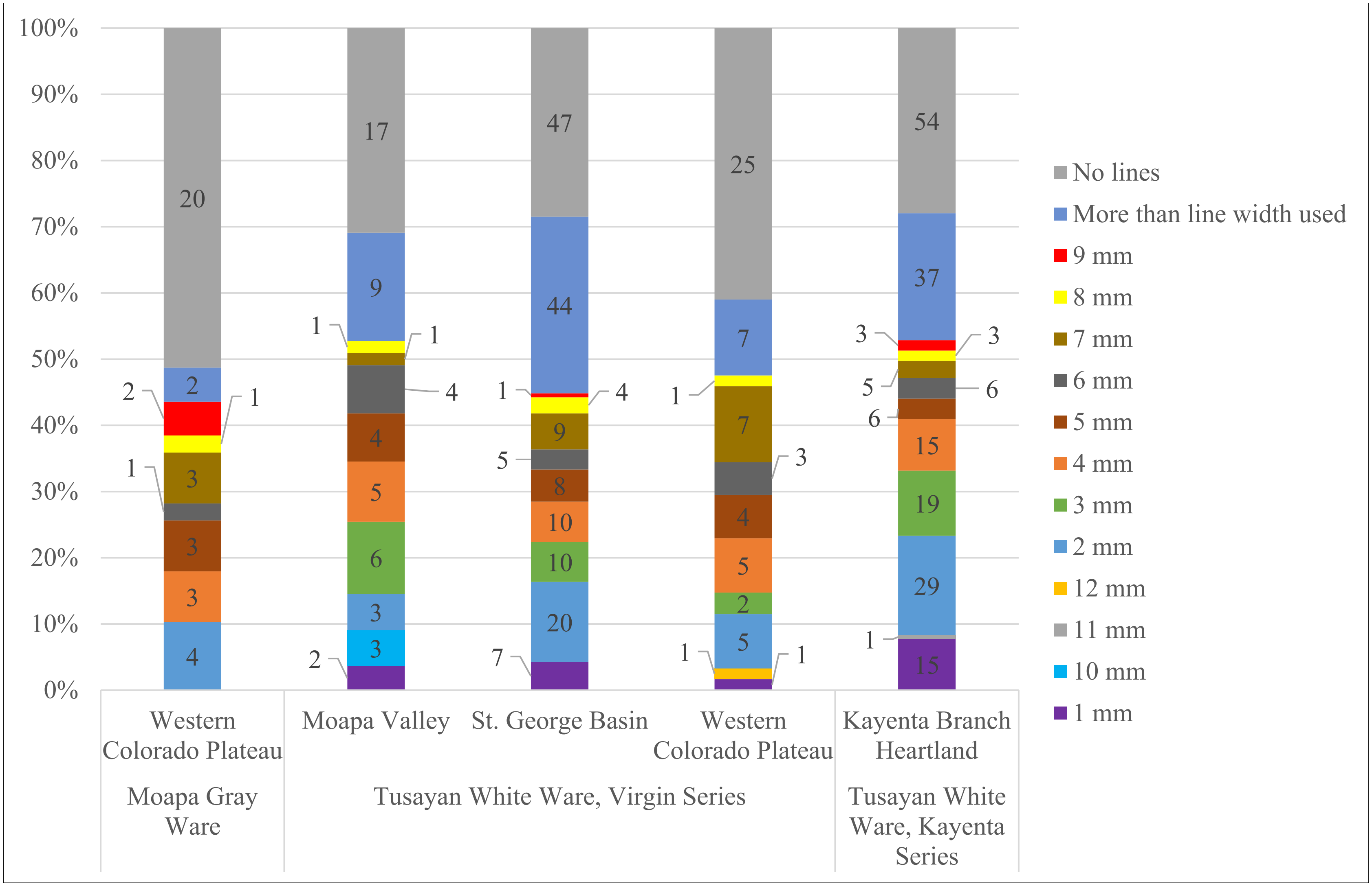


Figure 7.54. Line width mode (Line Width) on pottery count frequencies during the early and middle Pueblo II periods.

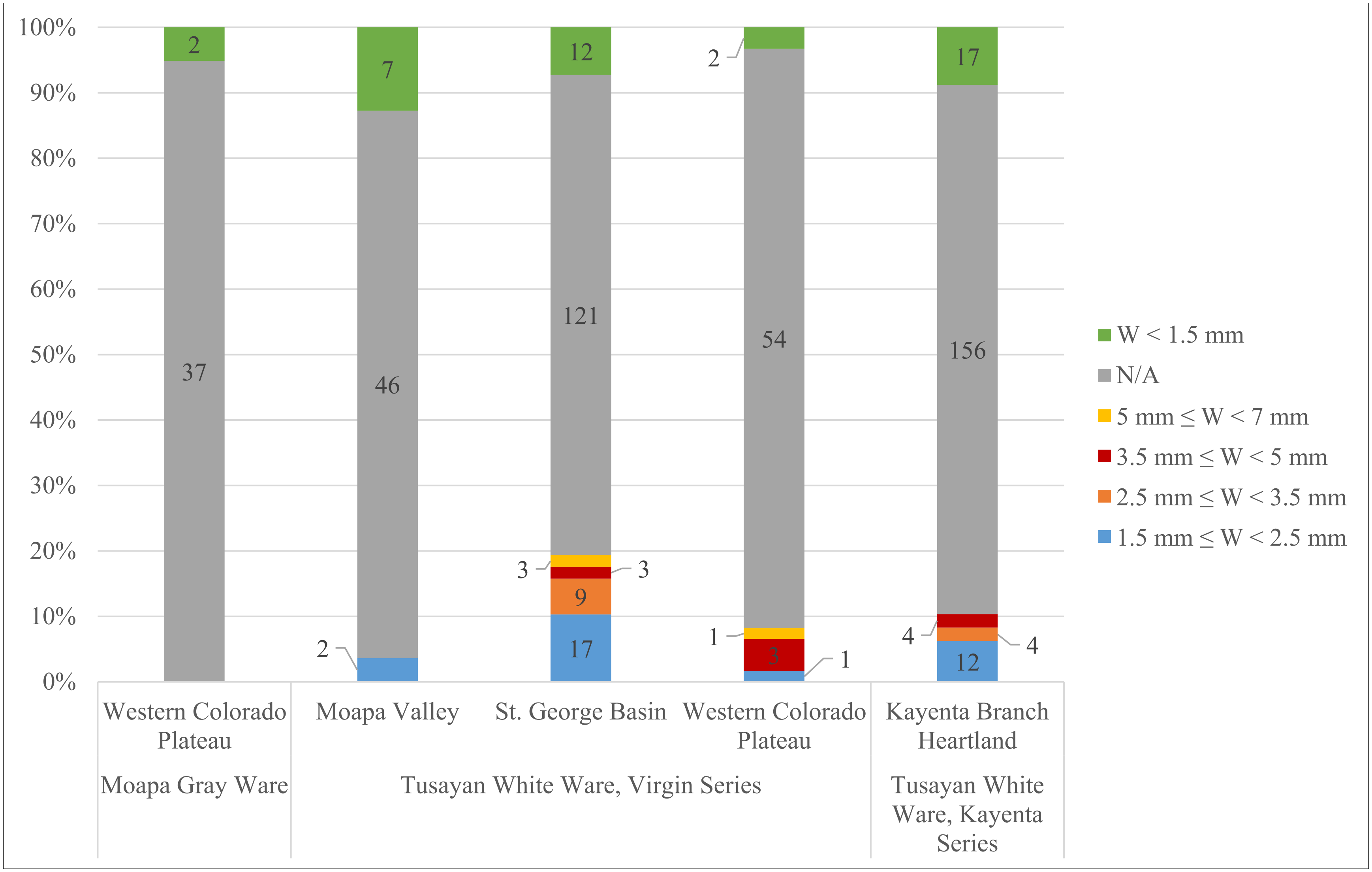


Figure 7.55. Average line width of smaller mode (Line Width) on pottery count frequencies during the early and middle Pueblo II periods.

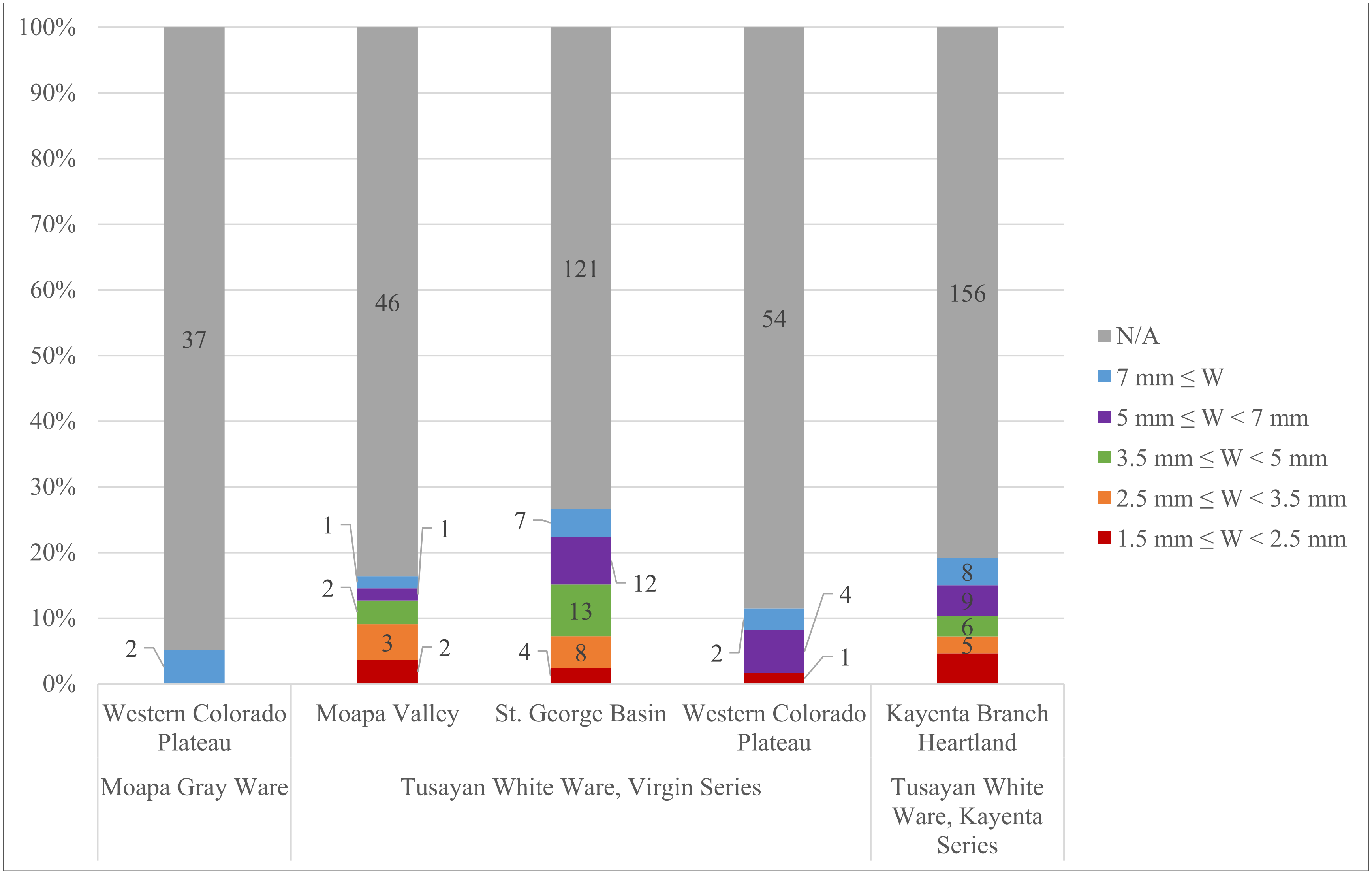


Figure 7.56. Average line width of larger mode (Line Width) on pottery count frequencies during the early and middle Pueblo II periods.

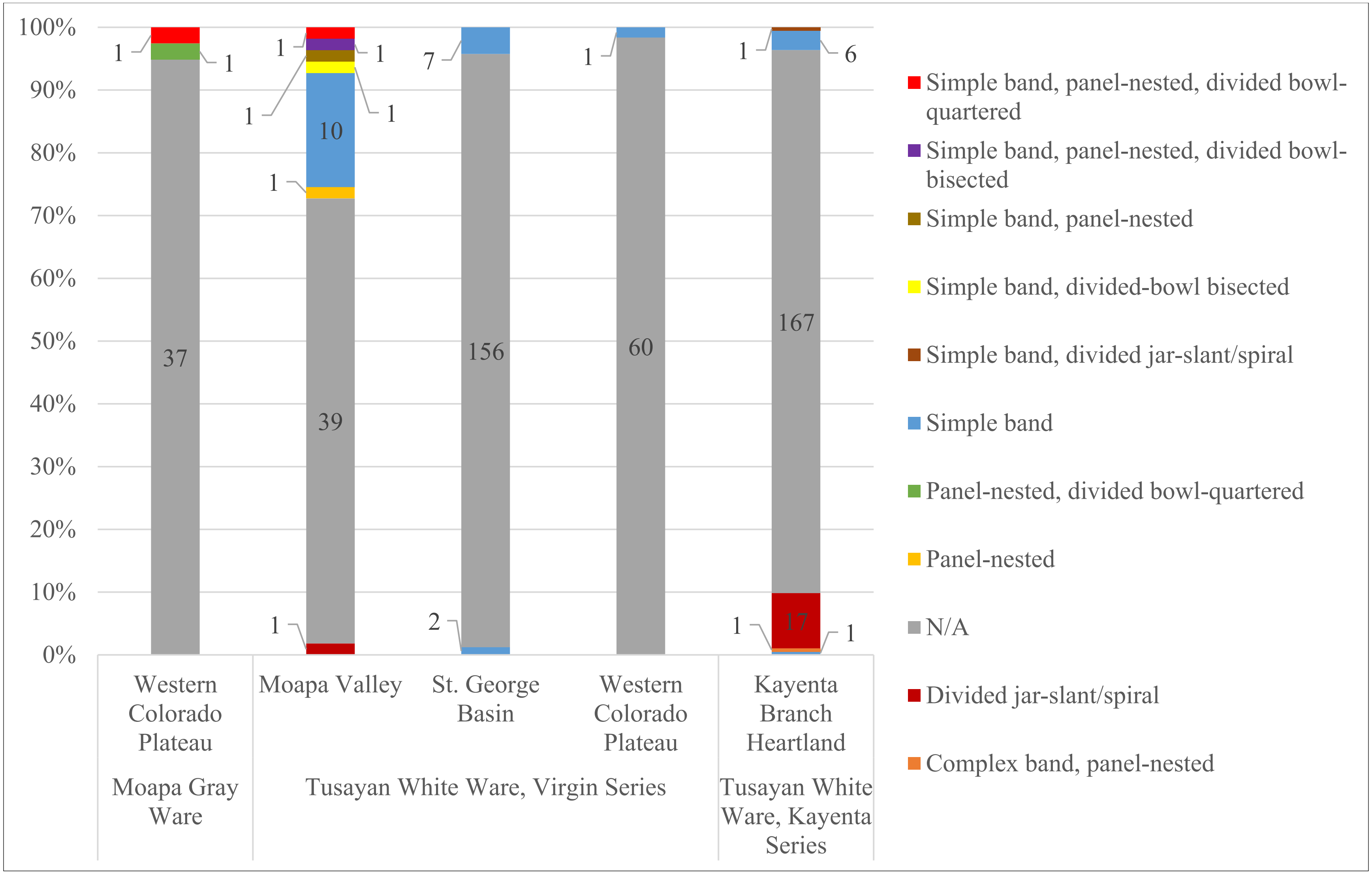


Figure 7.57. Design layout on bowls count frequencies during the early and middle Pueblo II periods.

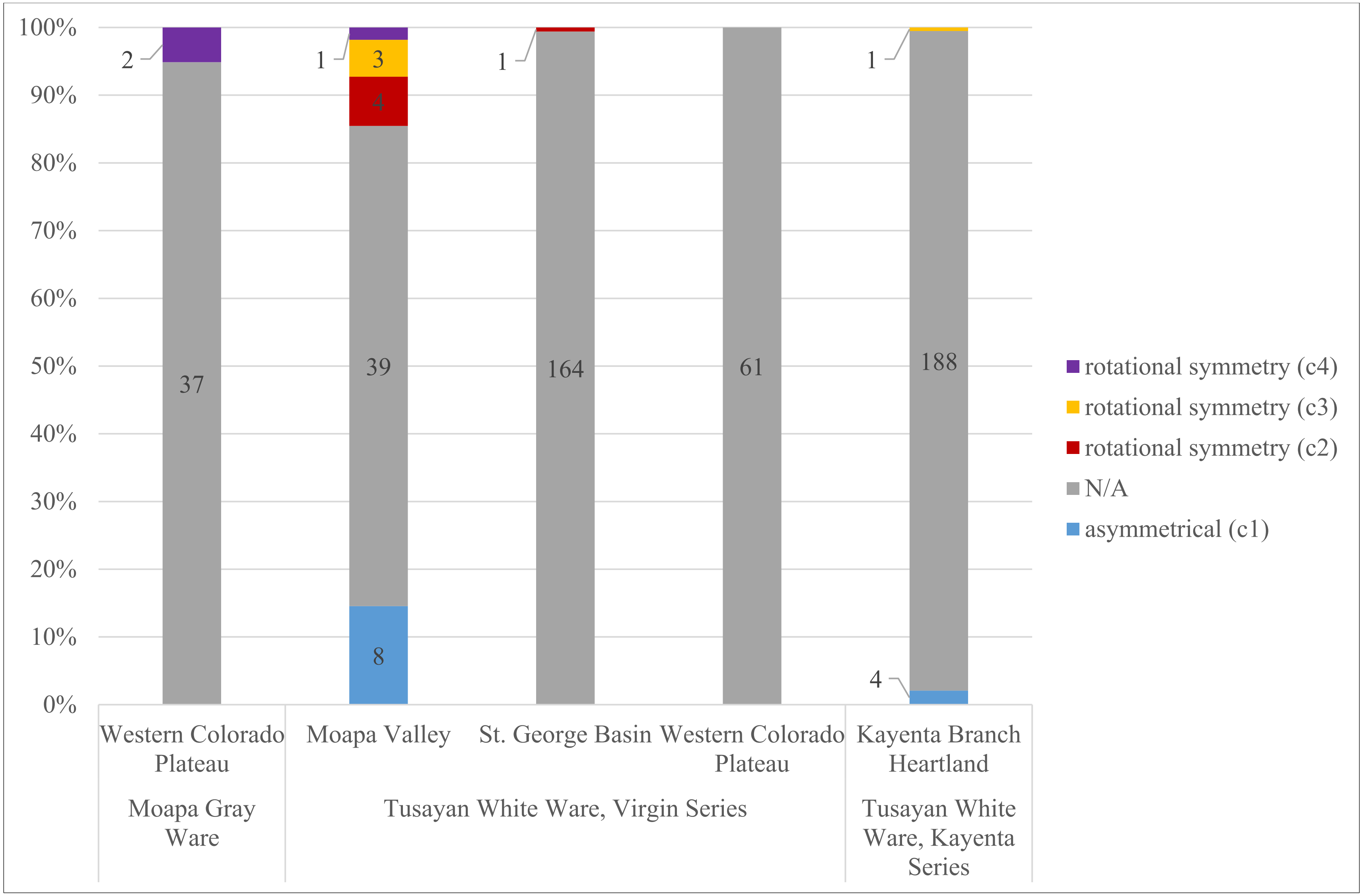


Figure 7.58. Design symmetry on bowls count frequencies during the early and middle Pueblo II periods.

During the early and middle Pueblo II periods, based on my sample, the average Tusayan White Ware, Virgin Series (inclusive of St. George Black-on-gray) bowl diameters from the Moapa Valley increased from 13 to 19 centimeters (see Table C.1 in Appendix C), in relation to Mesquite/Boulder Black-on-gray bowls. This average bowl size for St. George Black-on-gray pottery, again, based on my sample, seems to have been a continuation of the average Washington/Boysag Black-on-gray bowl diameters from the Pueblo I period. This increase in vessel size tracks with my expectation that vessel sizes would increase in the Moapa Valley during the early Pueblo II period, in keeping with overall population growth and an associated increasing reliance on irrigation agriculture. Following from population increases and greater aggregation, proportionately larger bowls sizes would result from an associated increase in feasting and other communal activities.

Among the inhabitants of the Moapa Valley during early and middle Pueblo II periods, a moderate increase in diversity can be seen in primary forms of design (e.g., spirals) on St. George Black-on-gray pottery (see Table 7.8 and Figure 7.31). While this increase stylistic variability is potentially linked to a diminishment of associated social unity, other variables point to a more likely alternative scenario. Aside from this modest diversity measure increase in St. George Black-on-gray primary forms, composition and secondary forms markedly diminish. This relatively large decrease in diversity and variability among highly-visible (composition) and passive (secondary forms) expressions of style seems consistent with a consolidation of social relationships and a minimization of individualistic expression during a time of economic and population growth in the Moapa Valley.

On the western Colorado Plateau, during the early and middle Pueblo II periods, I expected Virgin Branch people to exhibit non-exclusionary practices—in contrast to populations in the Moapa Valley—as a means of signaling inclusivity. (This expectation was informed by the juxtaposition of a reliance on irrigation agriculture in the Moapa Valley that would require widespread social cooperation and the western Colorado Plateau as a frontier zone, with low populations, that would better maintain social ties through inclusive signaling). Contrary to this expectation, higher diversity indices in primary forms and decreases in secondary forms and composition track very closely with the same design category proportions found on pots in the Moapa Valley during this time. Perhaps similar to the limited subsistence options available to populations in the Moapa Valley, this similar stylistic trend among upland Virgin Branch people may indicate some unknown reason for signaling a relatively cohesive community identity on the western Colorado Plateau.

In the St. George Basin, primary forms on St. George Black-on-gray pottery were found to increase in proportion with those found in the Moapa Valley and on the Colorado Plateau. In contrast to these two districts however, secondary forms on pottery in the St. George Basin decreased moderately (i.e., shifting to less diversity and variability in passive designs) while notably increasing diversity in composition, relative to the preceding Basketmaker III – Pueblo I periods. This increase in compositional diversity, a highly visible design category, may indicate noted inclusionary practices by Virgin Branch people in the St. George Basin, given the moderate populations and flexible subsistence practices utilized in the area during the Pueblo II period.

Contrary to my expectation to find less variability in stylistic design on pots in the Moapa Valley, in relation to those found on the Colorado Plateau, evidence of design similarities presented above (Figures 7.33 through 7.58) between these two districts serves to underscore the increasing social relations and growing inter-dependence among Virgin Branch populations during the Pueblo II period. If similarities were also found in highly visible design categories such as symmetry and layout, then that could perhaps lend further insights into social relations at this time. Unfortunately, a paucity of data from my sample of pottery from the Colorado Plateau was not useful in determining those particular categorical determinations. Among the St. George Black-on-gray pottery from the Moapa Valley, I found bowls with bisected and quartered divisions associated with various forms rotational symmetry (e.g., c2, c3). I contend that joint consideration of these symmetry and layout observations on bowls in Moapa Valley, along with the paralleling marked decreases in the diversity of compositional and secondary form design attributes, facilitate greater insight into the intra-regional social relations between Virgin Branch populations in the Moapa Valley and on the western Colorado Plateau.

Similar to a model advanced by Dorothy Washburn, in more than one study, the prevalence of finite rotational symmetries (not unrelated to the one-dimensional bifold symmetries) in association with shared decreases in diversity of design composition and secondary forms may represent visual metaphors of social realities (Washburn 2011:276; Washburn et al. 2010:766). Specifically, Washburn (2011) refers to other studies that seem to indicate that analytical constructions such as design symmetries may lend insights into structures of emic importance (e.g., Washburn 1999). In the consideration of my observations pertaining to parallel diversity index decreases in composition and secondary forms on St. George Black-on-gray pottery from the Moapa Valley and on the Colorado Plateau, along with the contemporaneous prevalence of finite rotational symmetry, I argue, as proposed by Washburn et al. (2010:766-767), that the convergence of these stylistic phenomena is not coincidental or insignificant. Instead, I propose that the overlap of these design attributes are representations that signal visual integration within the Virgin Branch heartland and lend to communicating investments into social reciprocity and integration during the early and middle Pueblo II periods. (explain: why would finite symmetries = investing in social reciprocity).

The combined increase of secondary forms (passive expression) and triangle use (active expression), along with a decrease in primary forms and composition (both highly visible, active expressions of style), are consistent with an overall rejection of exclusionary Virgin Branch identity with a focus on greater flexibility as a means of nurturing trade for the benefit of highly-aggregated communities at this time.

In the context of Virgin-Kayenta Branch relations, pottery assemblages from the Moapa Valley demonstrate an increase in similarity in all six design categories in relation to the Kayenta Branch heartland (Table 7.9). As the only Virgin Branch district to uniformly grow more similar in stylistic expression during the early and middle Pueblo II periods, this uniform increase in design similarity among communities in the Moapa Valley may suggest a greater acceptance of Kayenta Branch values (i.e., enculturation). This seeming likelihood stands in contrast with the mixed adoption by Virgin Branch populations in the St. George Basin and on the western Colorado Plateau who both demonstrated decreased similarity in primary forms (active expression) and shared growing similarity in passive expressions of style (i.e., secondary forms) with the Kayenta Branch heartland. With these mixed responses in view, the overall increase in stylistic similarities between Virgin and Kayenta Branch populations during the early and middle Pueblo II periods may indicate more so an acceptance (even tacit integration) of Kayenta Branch values and increased social relations, as opposed to exclusionary signaling through a divergent use of design attributes as means of marking distinction with Kayenta Branch populations.

Late Pueblo II *and* Early Pueblo III Periods

Archaeological Background and Data Expectations

Transitioning out of the middle Pueblo II, sites continued to grow in size and populations aggregated to a greater extent than earlier periods throughout the Virgin Branch heartland. The transition into the late Pueblo II period included ever-growing population aggregations within the Virgin Branch heartland. Communities at Adam 2 in the Moapa Valley and at the Corngrower site in the St. George Basin represent two of the larger known Virgin Branch sites during the late Pueblo II period. Among the predominant Virgin Branch ceramic types during the late Pueblo II and early Pueblo III periods were: North Creek Black-on-gray (Tusayan White Ware, Virgin Series) (Figure 7.59), Hildale Black-on-gray (Tusayan White Ware, Virgin Series) (Figure 7.60), Glendale Black-on-gray (Tusayan White Ware, Virgin Series) (Figures 7.61 – 7.63), Moapa Black-on-gray (Moapa Gray Ware), Slide Mountain Black-on-gray (Moapa Gray Ware), Poverty Mountain Black-on-gray (Moapa Gray Ware), Hurricane Black-on-gray (corrugated Tusayan White Ware, Virgin Series), Pipe Spring Black-on-gray (corrugated Tusayan White Ware, Virgin Series), Parashant Black-on-gray (corrugated Tusayan White Ware, Virgin Series), Whitmore Black-on-gray (corrugated Moapa Gray Ware), Fern Glen Black-on-gray (corrugated Moapa Gray Ware), and Tuckup Black-on-gray (corrugated Moapa Gray Ware). In the Kayenta Branch heartland, the prevailing painted types during the same period were Sosi Black-on-white (Tusayan White Ware, Kayenta Series) (Figure 7.64), Dogoszhi Black-on-white (Tusayan White Ware, Kayenta Series) (Figure 7.65), and Flagstaff Black-on-white (Tusayan White Ware, Kayenta Series) (Figure 7.66).

Figure 7.59. North Creek Black-on-gray bowl (Case 2085).

Figure 7.60. Hildale Black-on-gray bowl (Case 287).

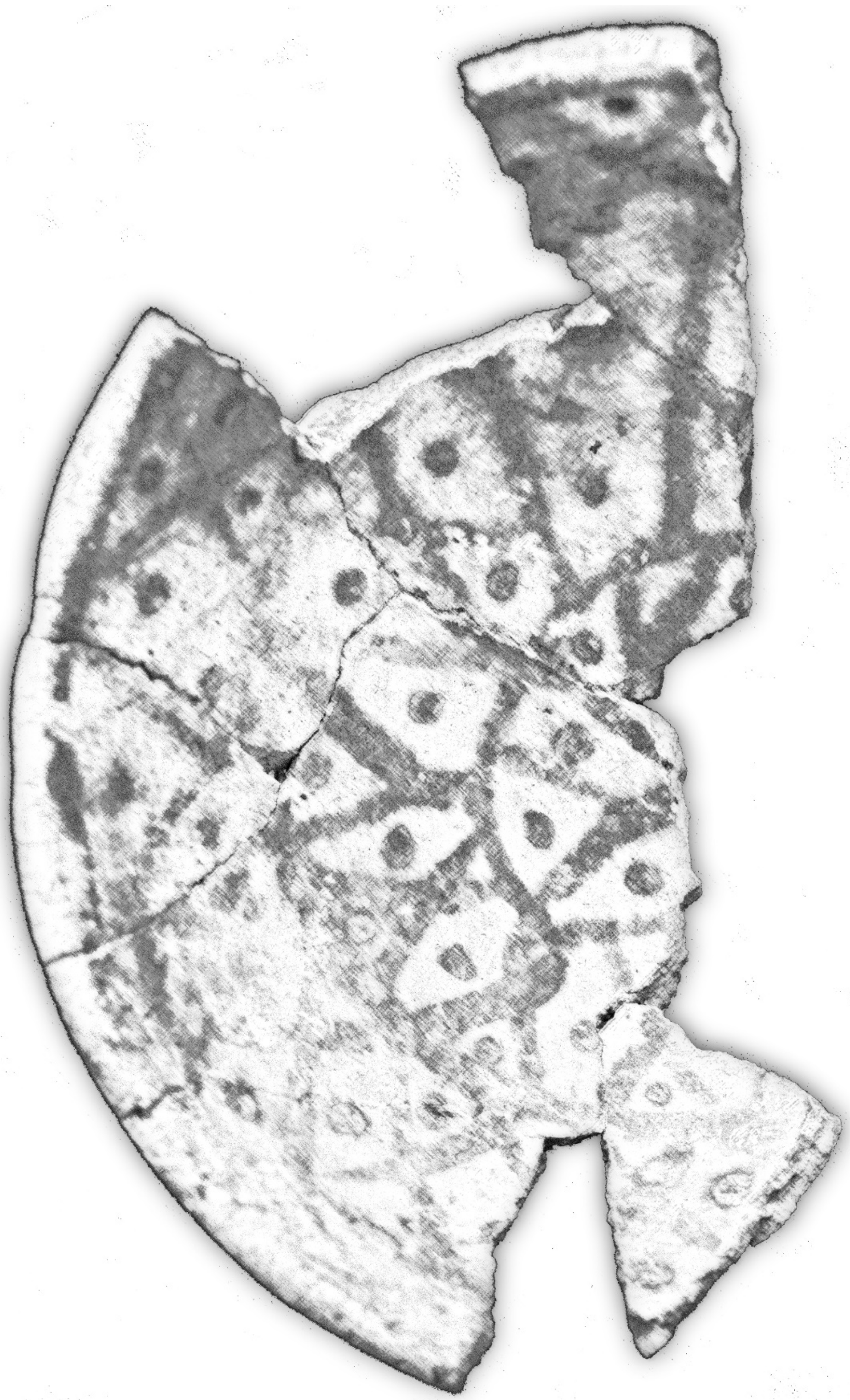


Figure 7.61. Partial Glendale Black-on-gray bowl (Case 390).

Figure 7.62. Partial Glendale Black-on-gray bowl (Case 1006).

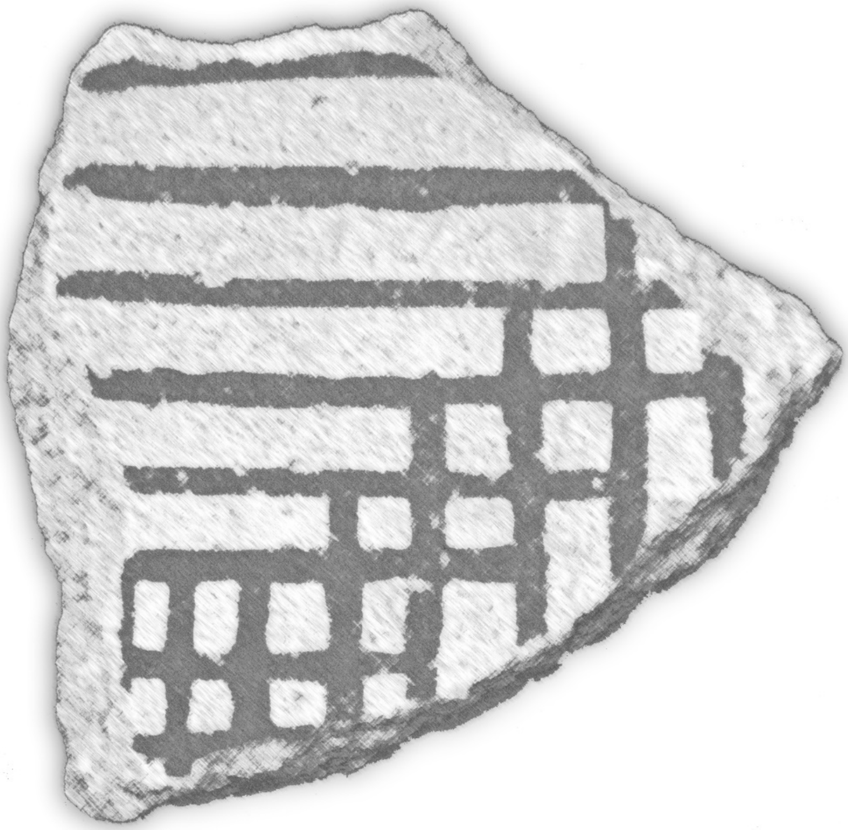


Figure 7.63. Glendale Black-on-gray bowl sherd (Case 1541).

Figure 7.64. Sosi Black-on-white bowl (Case 2245).

Figure 7.65. Dogoszhi Black-on-white bowl (Case 2261).

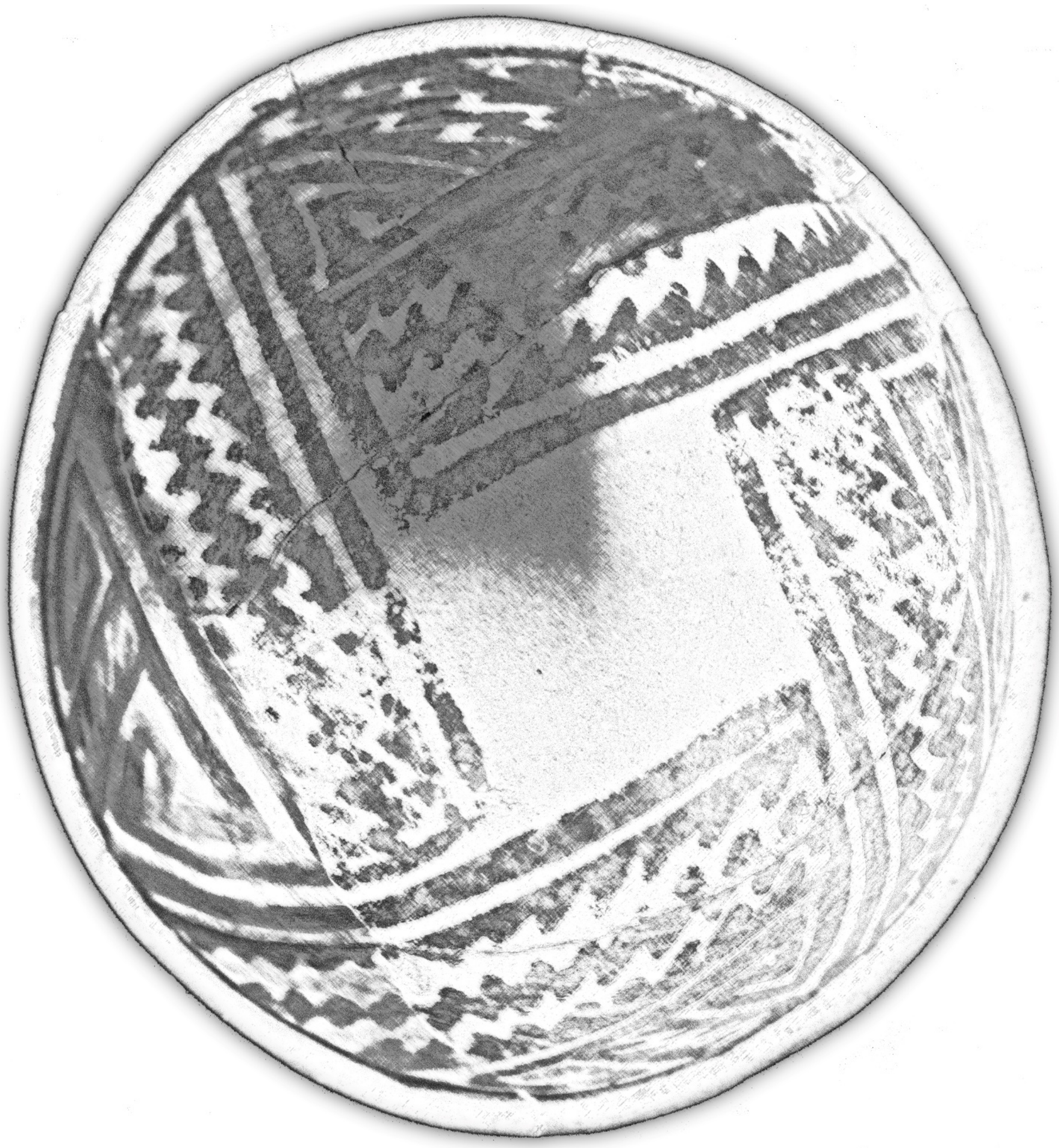


Figure 7.66. Flagstaff Black-on-white bowl (Case 2263).

As a result of these changes, I expected to find an increase in vessel size, intra-regional differentiation (seen through markedly comparatively different diversity indices) between Virgin Branch communities, and discernable distinctions in design layout and symmetry on pottery vessels. During the late Pueblo II period, I expected to find no significant diminishment in either rules of design or similarity indices between Virgin and Kayenta Branch populations. Throughout the overarching late Pueblo II and early Pueblo III periods, if Virgin Branch populations migrated east and assimilated with Kayenta Branch populations—as suggested by Aikens (1966) and Hall (1942)—then I expected to find decreasing variability in technological styles between the two heartlands.

Intra-Virgin Branch and Virgin-Kayenta Branch Relations: Data and Interpretations

Contrary to my original expectation of marked stylistic variability between Virgin Branch communities, the diversity indices for through the Virgin Branch heartland are relatively similar (Tables 7.10 and 7.11). Moreover, the stylistic diversity (Table 7.10) and internal comparative similarity coefficients among Virgin Branch communities and in relation to the Kayenta Branch heartland (Table 7.10) were found to trend towards a decrease in stylistic variability intra- and inter-regionally.

In my assessment of the six design categories among early and middle Pueblo II pottery types, no occurrences were found for the following attributes (categories): triangles in corners of diagonal lines (triangle use), Z's and/or basketstitch (composition), and use of ticks in any form. Among other attributes, however, intra-Virgin Branch and inter-regional comparisons of technological and design style generally tracked with my expectations for the late Pueblo II and early Pueblo III periods.

Table 7.10. Shannon Diversity Index Results for Late Pueblo II – Early Pueblo III Periods.

Design Category	Context	Sample Size	Diversity Measures		
			Richness	H-statistic	Evenness
Primary Forms	Moapa Valley	437	16	1.91	0.687
	St. George Basin	1606	11	1.24	0.518
	Western Colorado Plateau	302	7	1.2	0.615
Secondary Forms	Moapa Valley	3	-	-	-
	St. George Basin	3	-	-	-
	Western Colorado Plateau	0	-	-	-
Triangle Use	Moapa Valley	52	4	0.887	0.64
	St. George Basin	67	3	0.48	0.437
	Western Colorado Plateau	19	-	-	-
Triangle Extensions	Moapa Valley	1	-	-	-
	St. George Basin	0	-	-	-
	Western Colorado Plateau	0	-	-	-
Composition	Moapa Valley	259	16	1.99	0.718
	St. George Basin	1264	15	2.16	0.799
	Western Colorado Plateau	247	14	1.87	0.71
Line Width	Moapa Valley	224	6	1.77	0.988
	St. George Basin	1091	6	1.66	0.926
	Western Colorado Plateau	218	6	1.61	0.898

Table 7.11. Brainerd-Robinson Similarity Coefficients for Late Pueblo II – Early Pueblo III Periods.

Primary Forms				
	MV	SGB	WCP	Kayenta
MV	-	144	145	156
SGB	144	-	196	138
WCP	145	196	-	138
Kayenta	156	138	138	-

Secondary Forms				
	MV	SGB	WCP	Kayenta
MV	-	67	-	67
SGB	67	-	-	67
WCP	-	-	-	-
Kayenta	67	67	-	-

Triangle Use				
	MV	SGB	WCP	Kayenta
MV	-	169	176	164
SGB	169	-	177	190
WCP	176	177	-	178
Kayenta	164	190	178	-

Triangle Extensions				
	MV	SGB	WCP	Kayenta
MV	-	-	-	0
SGB	-	-	-	-
WCP	-	-	-	-
Kayenta	0	-	-	-

Composition				
	MV	SGB	WCP	Kayenta
MV	-	137	100	149
SGB	137	-	149	133
WCP	100	149	-	111
Kayenta	149	133	111	-

Line Width				
	MV	SGB	WCP	Kayenta
MV	-	158	149	171
SGB	158	-	168	179
WCP	149	168	-	160
Kayenta	171	179	160	-

Differences in technological style between Kayenta and Virgin Branch populations remain apparent into the late Pueblo II and early Pueblo III periods. Kayenta Branch pottery is characterized by high frequencies of polished and slipped technological style and associated moderate occurrences of carbon streaks in vessels (Figures 7.67 and 7.68). Deviating from these frequencies, among Virgin Branch communities, instances of polished and slipped technologies are moderate in relation to the Kayenta Branch heartland (Figure 7.67). Carbon streaks were also found to occur with low to moderate frequency among Virgin Branch pottery (Figure 7.68).

Triangles, as both primary forms and all other uses, appear in low to moderate frequencies with little differentiation between Virgin Branch communities and in relation to the Kayenta Branch heartland (Figures 7.67 – 7.82). Other primary forms, such as scrolls and spirals, were found with similarly low frequencies throughout both heartlands (Figure 7.69). Differences in the use of check motifs were found among pottery assemblages, though in a generally low number of occurrences. Four-sided checks were found exclusively in among Kayenta Branch pottery, while Virgin Branch pottery in the Moapa Valley demonstrated triangular checkerboards (Figure 7.70). No instances of checks were found in the St. George Basin or on the western Colorado Plateau. Similar to scrolls/spirals, terraces and flags were found in very low numbers within both heartlands (Figure 7.71).

Dots, as primary forms and compositional as filler, were found in low, homogeneous instances among Virgin Branch communities and in varied forms in the Kayenta Branch heartland (Figure 7.72). One instance of a framed cross and T-figure, respectively, was found on Virgin Branch pottery in the Moapa Valley (Figure 7.73). Circle motifs were used infrequently in the Moapa Valley, on the western Colorado Plateau, and in the Kayenta Branch heartland (Figure 7.74). Use of both rectangular solids and curved lines were found to occur in low numbers and be homogeneously depicted, respectively, between the Virgin and Kayenta Branch heartlands (Figure 7.75). Squiggle lines and triangles in a line were found in low frequencies and homogenous uses between Virgin Branch communities and in relation to the Kayenta Branch heartland (Figure 7.76).

Secondary forms—fringes on solids and lines—as with many other design attributes during the late Pueblo II and early Pueblo III periods, were found in low frequencies with little differentiation among Virgin Branch pottery assemblages (Figure 7.77). In slight contrast, Kayenta Branch pottery demonstrated greater variability in fringes on lines (Figure 7.78).

Among other forms of triangle use, application of double series triangles was found to vary between Virgin Branch communities as well as between the Virgin and Kayenta heartland (Figure 7.83). Overall, triangle types were found to vary within both heartlands and did not show distinctive uses between communities (Figure 7.84). Triangle extensions were found in extremely limited instances (Figures 7.85 and 7.86).

Compositional categories—solid, hatch, and multiple parallel lines—were found to occur in low to moderate frequencies throughout the Virgin and Kayenta Branch heartlands (Figures 7.86 through 7.89). Line width modes varied but were found to be similar between both heartlands (Figures 7.90 through 7.92). With respect to design layout, pottery in the Moapa Valley yielded the highest variety of design layout attributes, with pottery from the St. George Basin, western Colorado Plateau, and Kayenta Branch heartland consisting of a comparatively low to moderate level of variation (Figure 7.93). Similar to the trends observed for design layout, the Moapa Valley demonstrated the greatest variation in design symmetry (asymmetrical and rotational) with the St. George Basin, western Colorado Plateau, and Kayenta Branch heartland showing comparatively less variation (Figure 7.94).

Figure 7.67. Polished (technological style) (top) and slipped (technological style) (bottom) pottery count frequencies during the late Pueblo II and early Pueblo III periods.

Figure 7.68. Carbon streak (technological style) (top) and triangles (Triangle Use) (bottom) on pottery count frequencies during the late Pueblo II and early Pueblo III periods.

Figure 7.69. Scrolls (Primary Forms) (top) and spirals (Primary Forms) (bottom) on pottery count frequencies during the late Pueblo II and early Pueblo III periods.

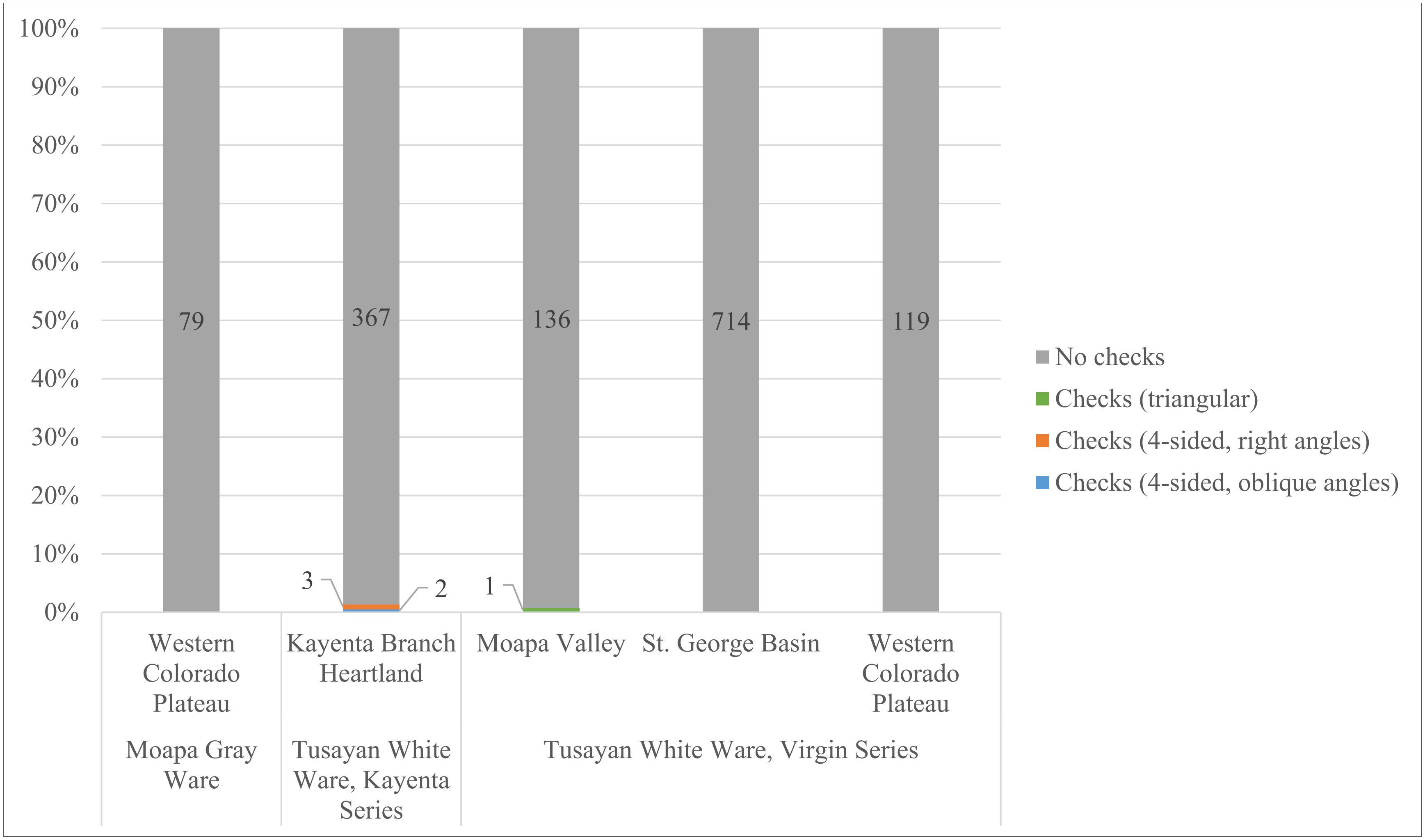


Figure 7.70. Checks (Primary Forms) on pottery count frequencies during the late Pueblo II and early Pueblo III periods

Figure 7.71. Terraces (Primary Forms) (top) and flags (Primary Forms) (bottom) on pottery count frequencies during the late Pueblo II and early Pueblo III periods.

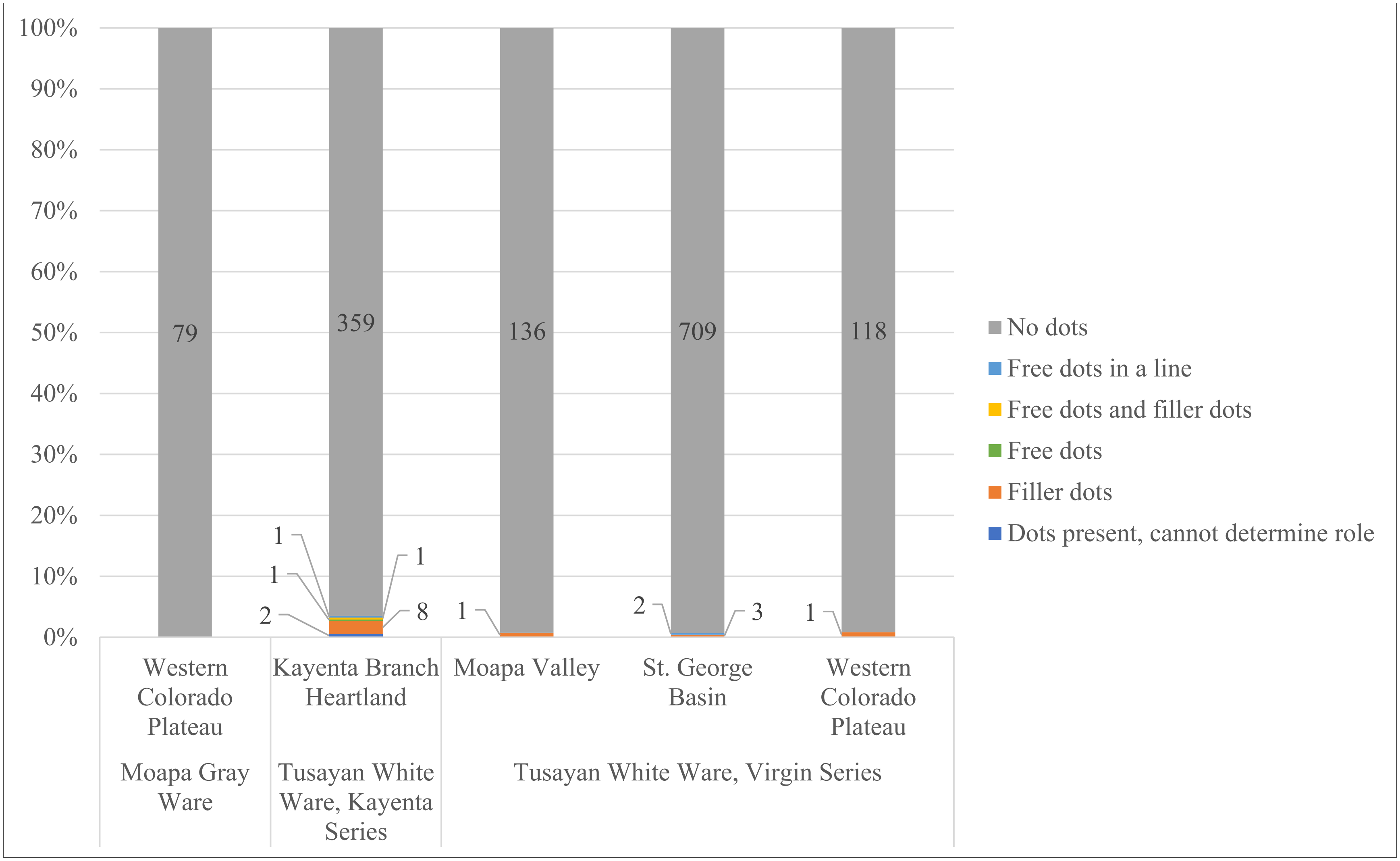
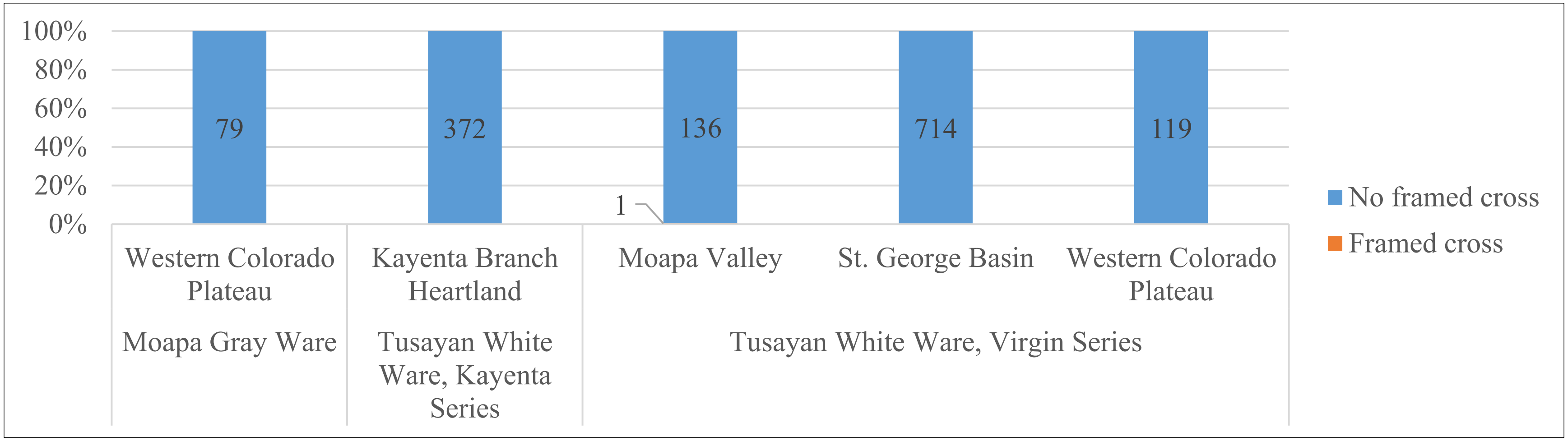


Figure 7.72. Dots (Primary Forms and Composition) on pottery count frequencies during the late Pueblo II and early Pueblo III periods.



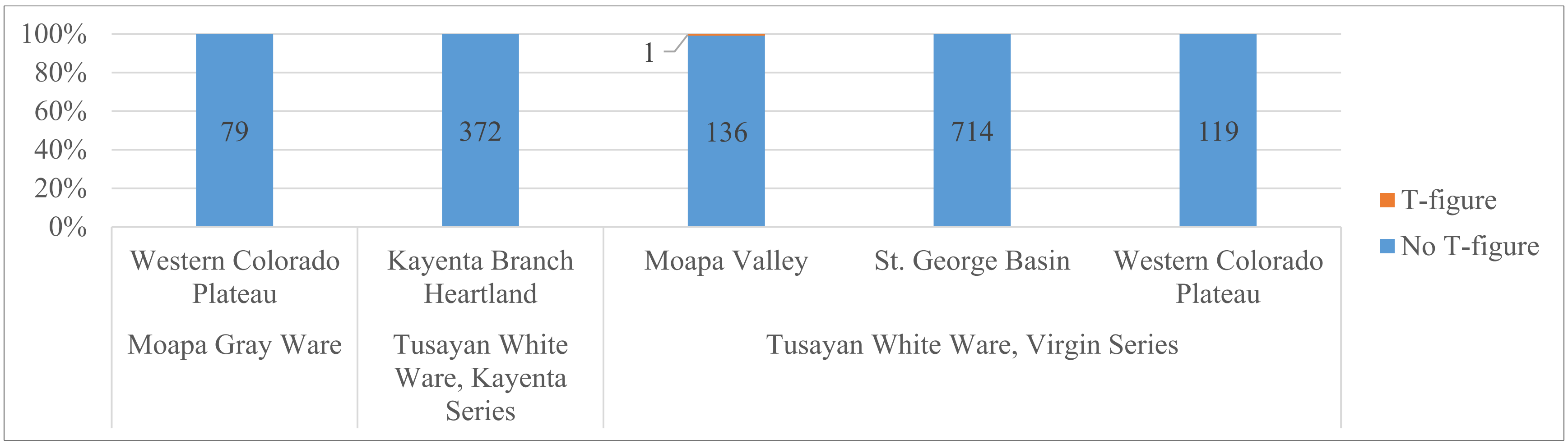


Figure 7.73. Framed cross (Primary Forms) (top) and T-figure (Primary Forms) (bottom) on pottery count frequencies during the late Pueblo II and early Pueblo III periods.

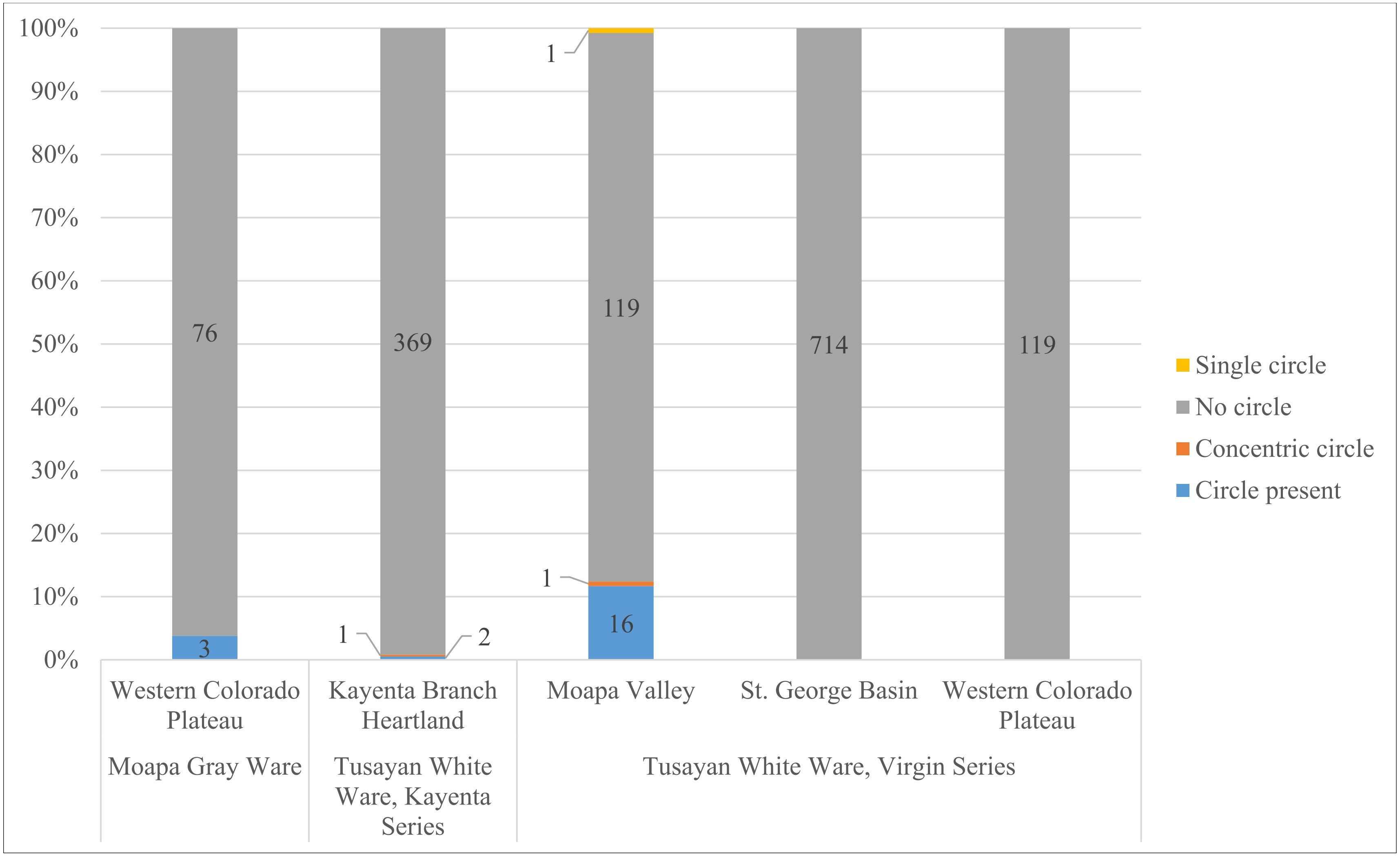


Figure 7.74. Circles (Primary Forms) on pottery count frequencies during the late Pueblo II and early Pueblo III periods.

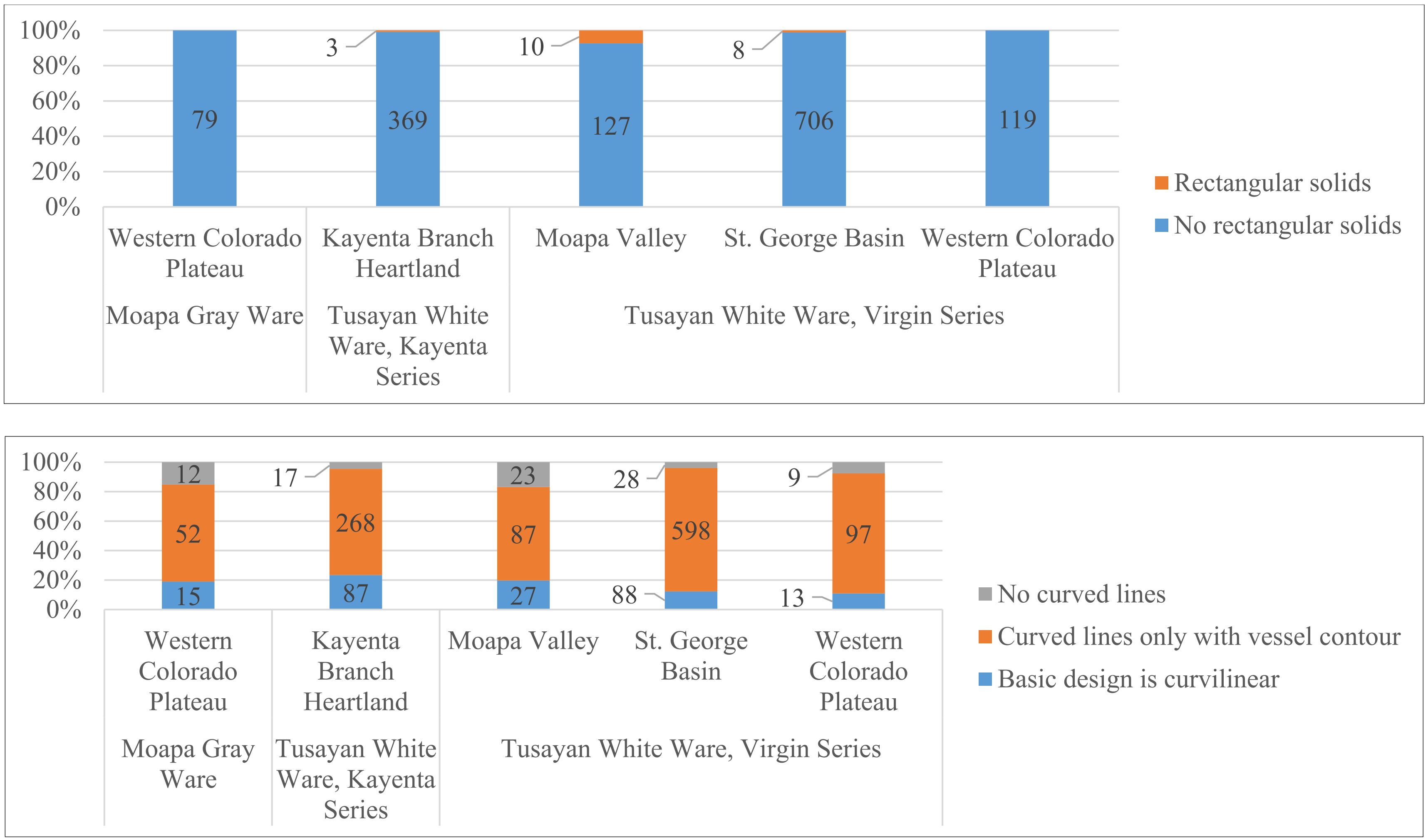


Figure 7.75. Rectangular solids (Primary Forms) (top) and curved lines (Primary Forms) (bottom) on pottery count frequencies during the late Pueblo II and early Pueblo III periods.

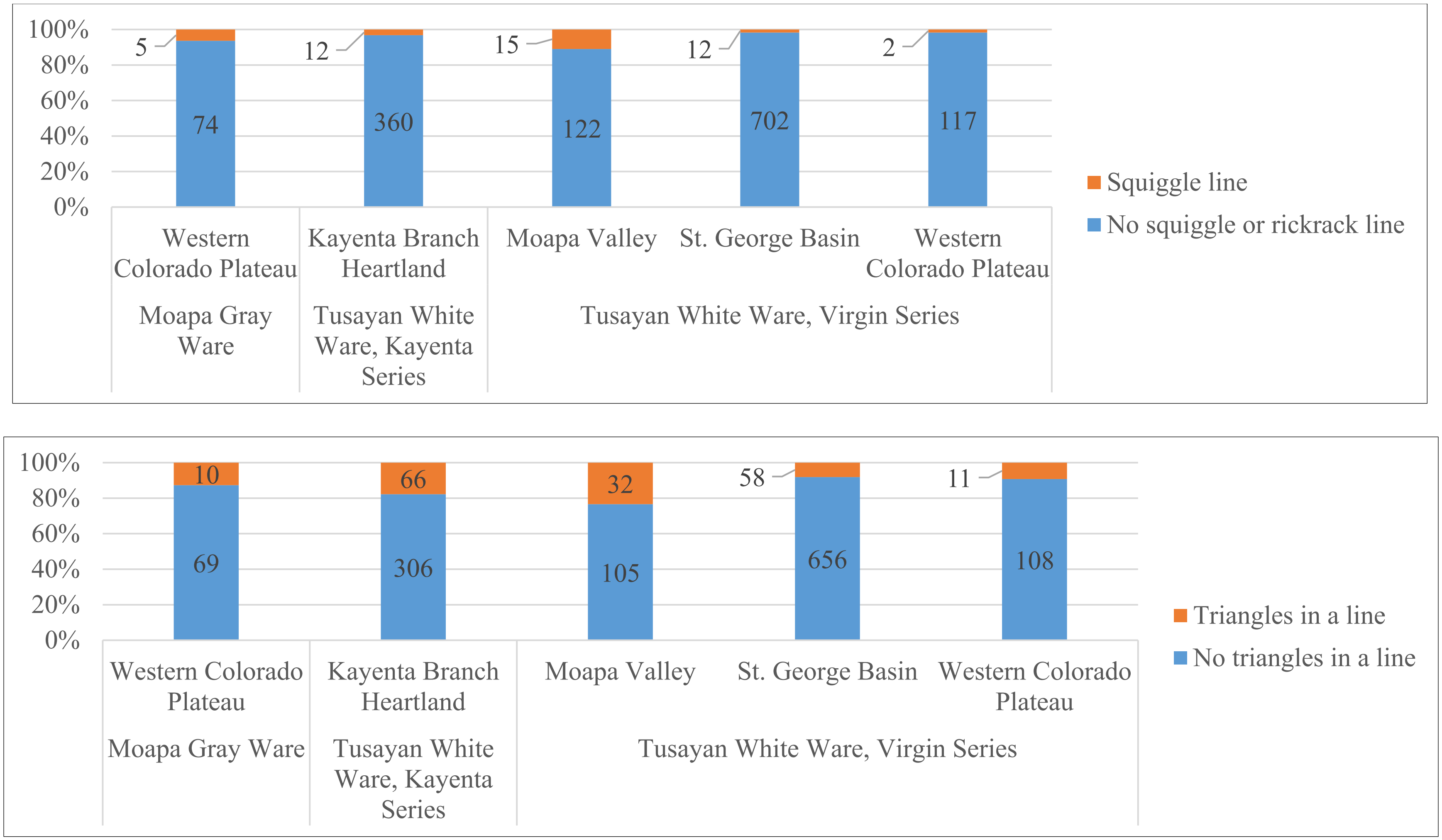


Figure 7.76. Squiggle/rickrack lines (Primary Forms) (top) and triangles in a line (Triangle Use) (bottom) on pottery count frequencies during the late Pueblo II and early Pueblo III periods.

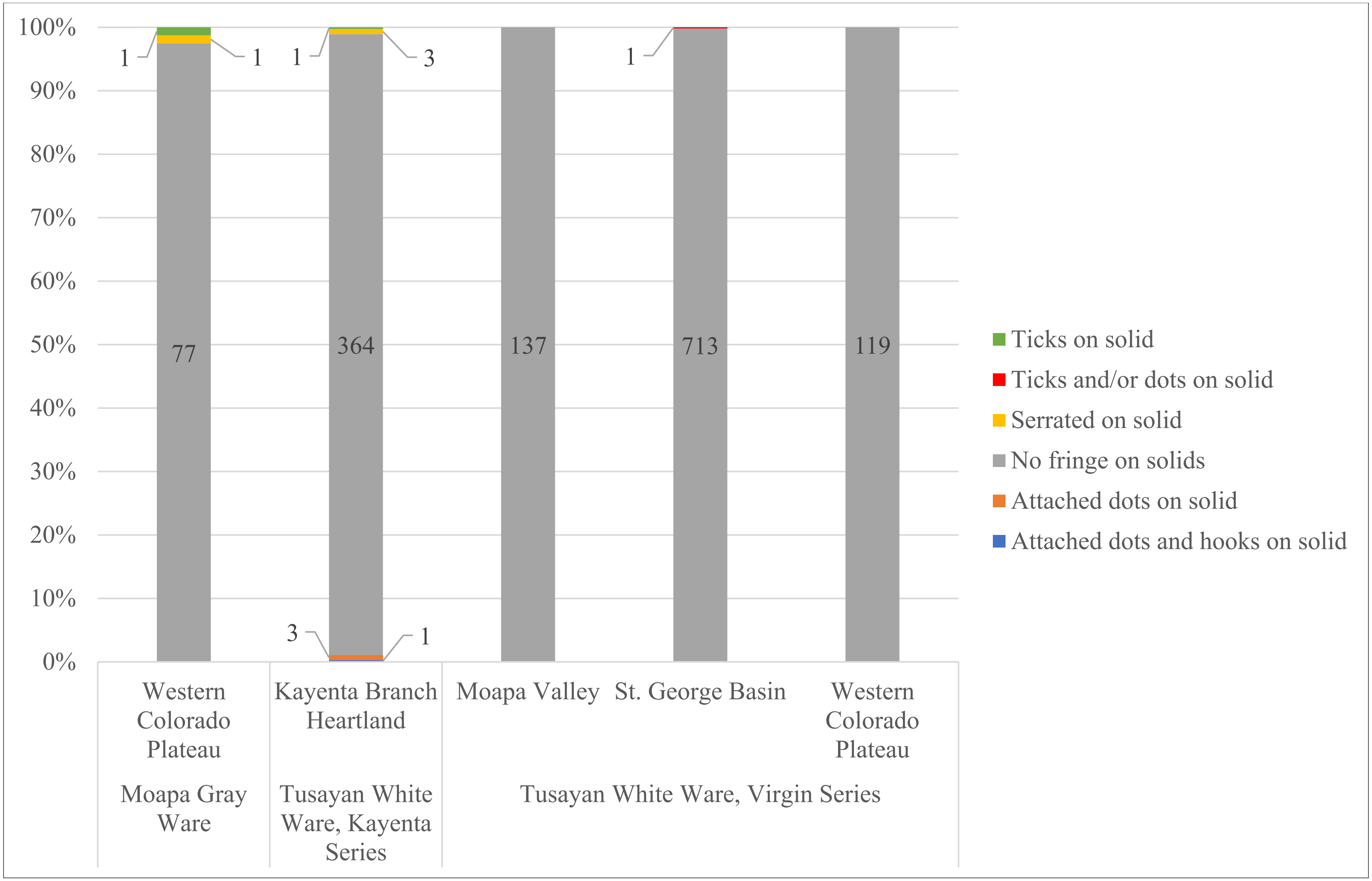


Figure 7.77. Fringe on solids (Secondary Forms) on pottery count frequencies during the late Pueblo II and early Pueblo III periods.

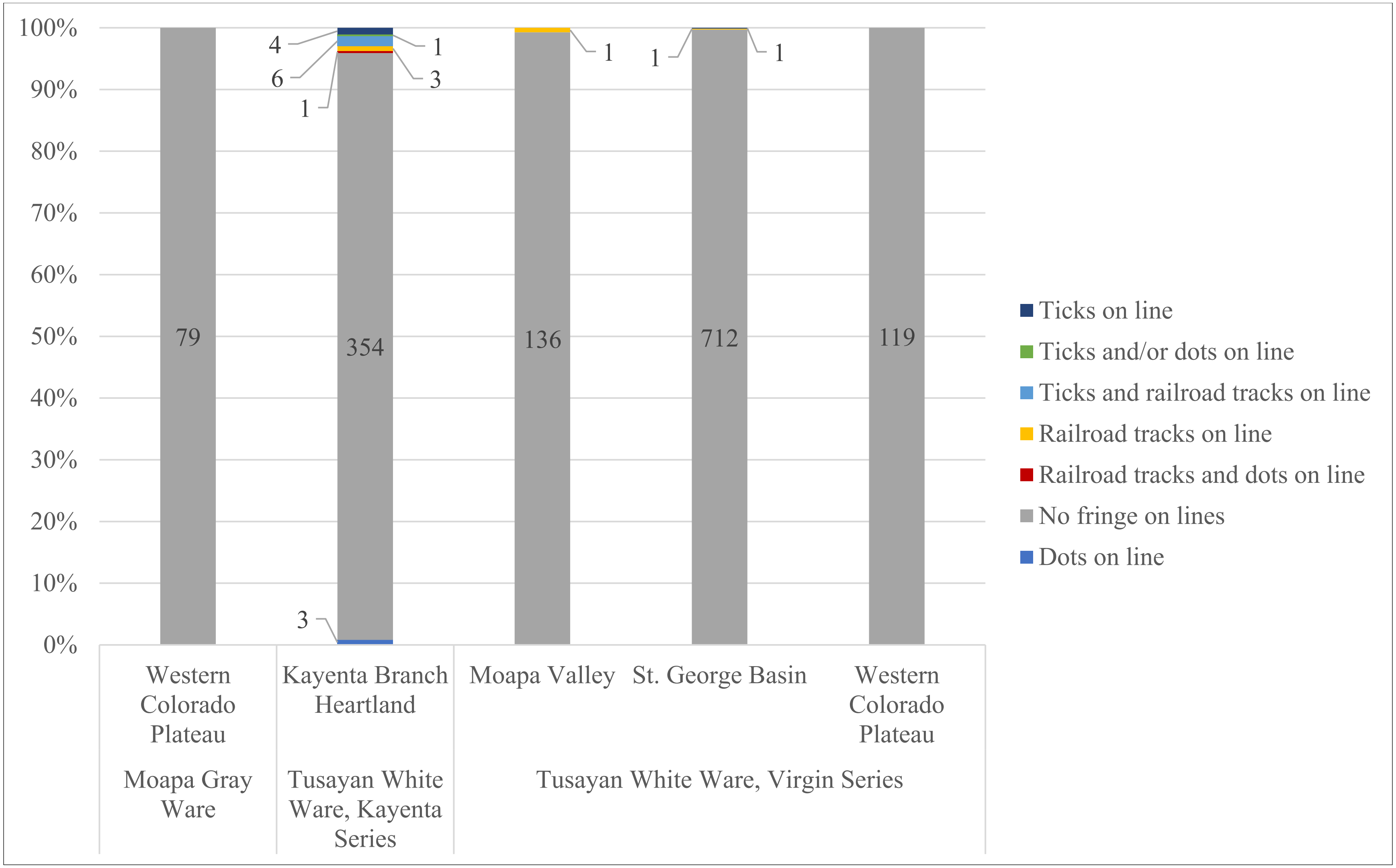
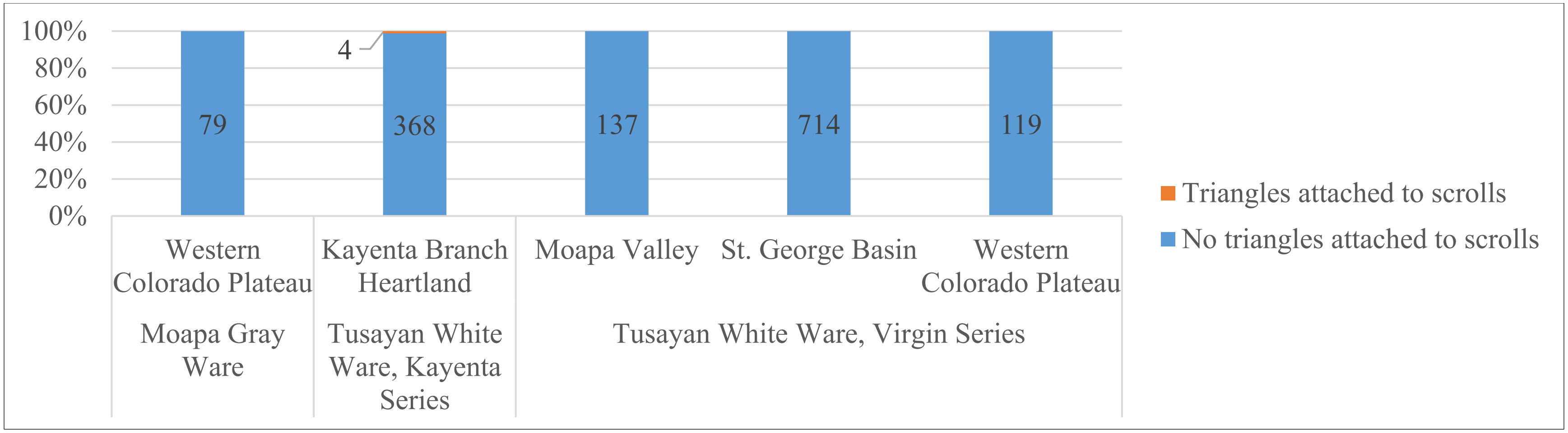


Figure 7.78. Fringe on lines (Secondary Forms) on pottery count frequencies during the late Pueblo II and early Pueblo III periods.



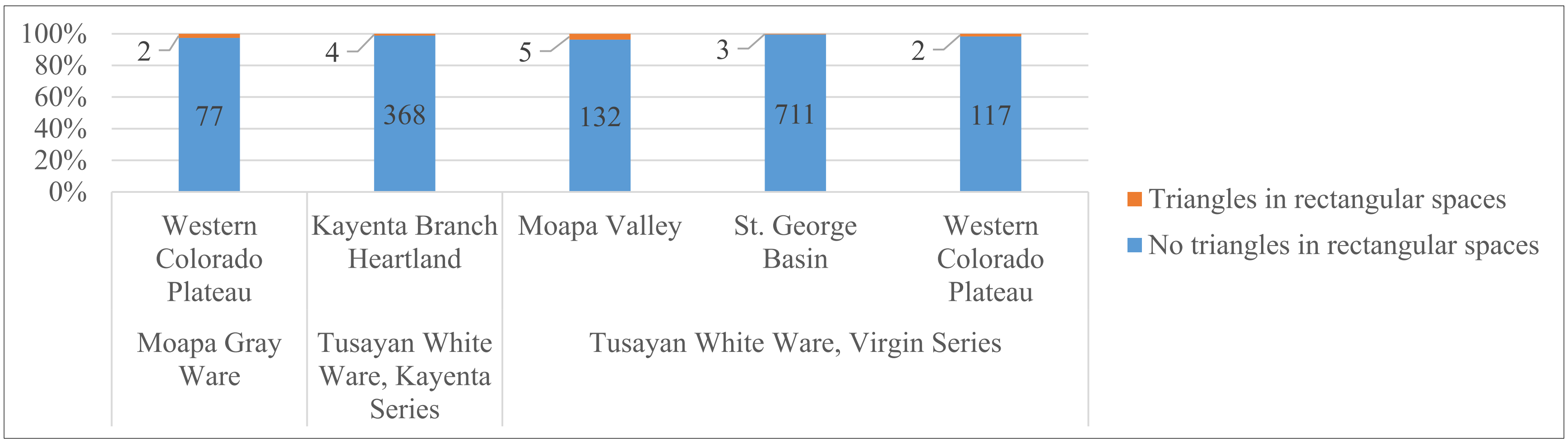
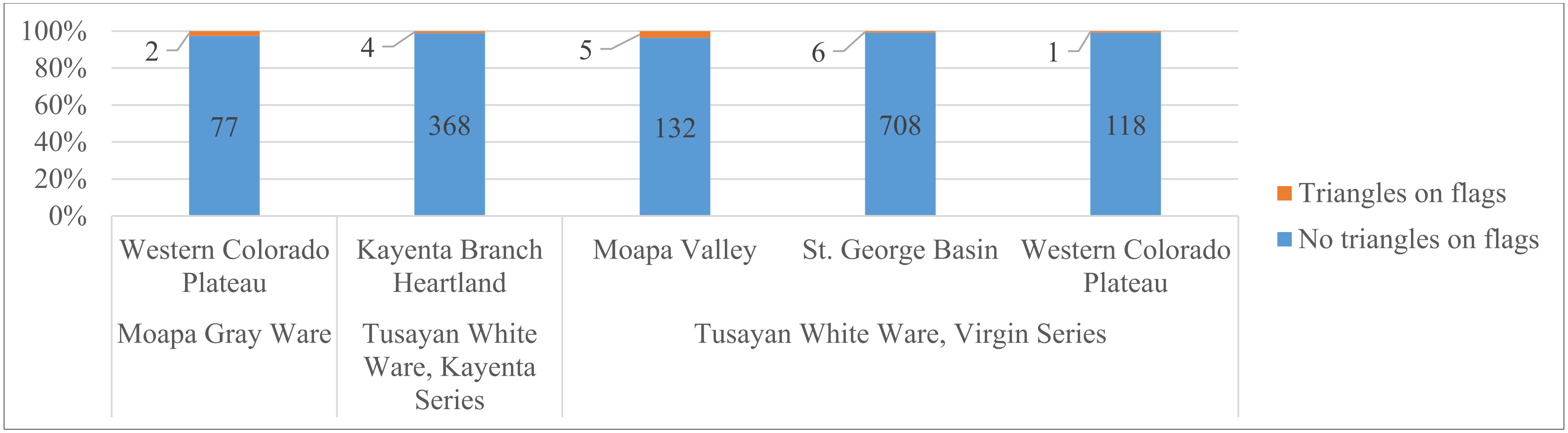


Figure 7.79. Triangles attached to scrolls (Triangle Use) (top) and triangles in rectangular spaces (Triangle Use) (bottom) on pottery count frequencies during the late Pueblo II and early Pueblo III periods.



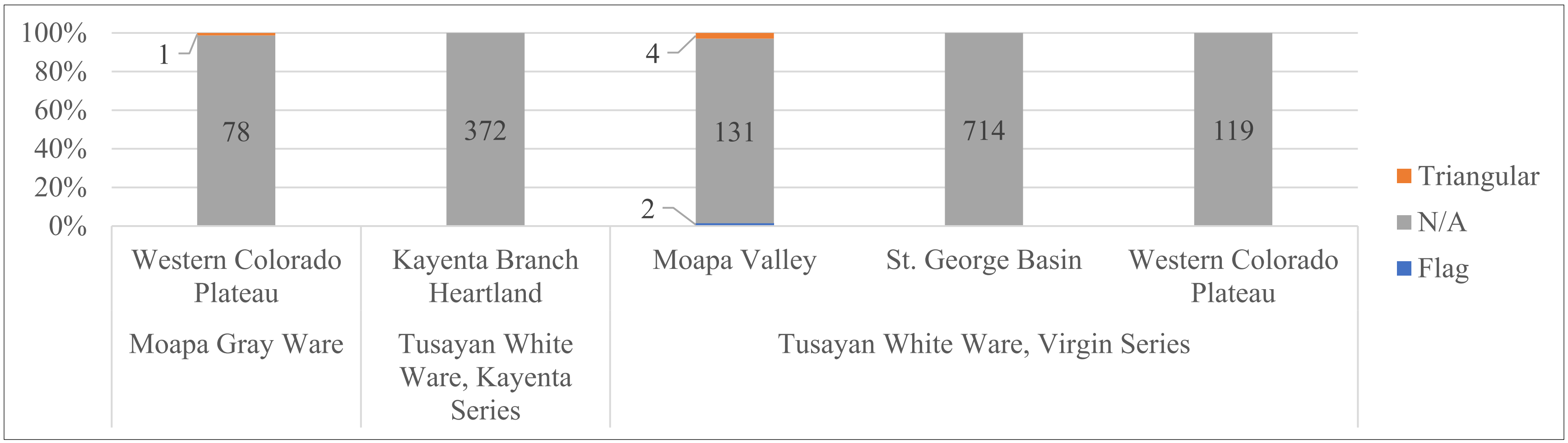


Figure 7.80. Triangles on flags (Triangle Use) (top) and Triangle Use (other) (bottom) on pottery count frequencies during the late Pueblo II and early Pueblo III periods.

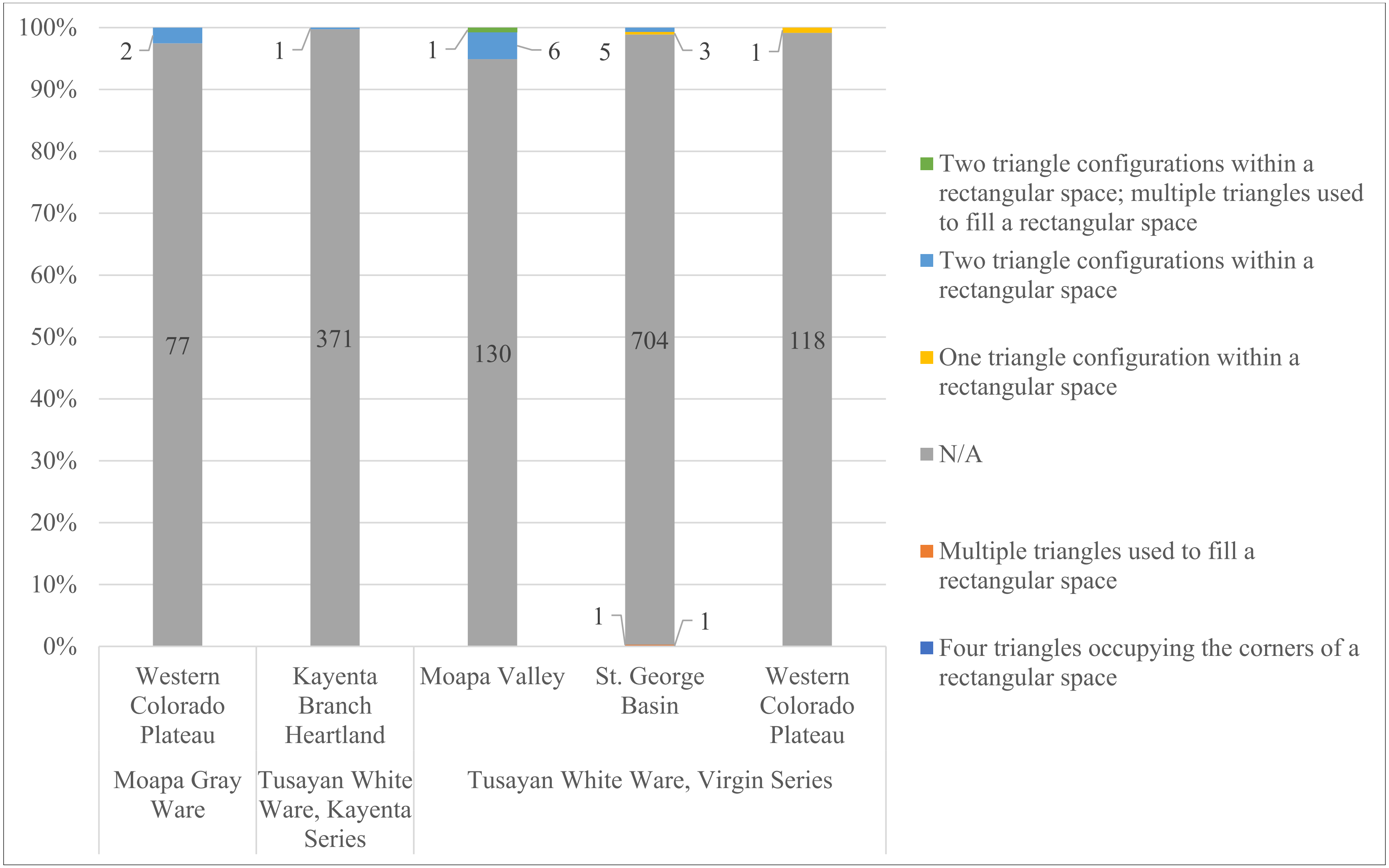


Figure 7.81. Triangle Use (rectangular spaces) on pottery count frequencies during the late Pueblo II and early Pueblo III periods.

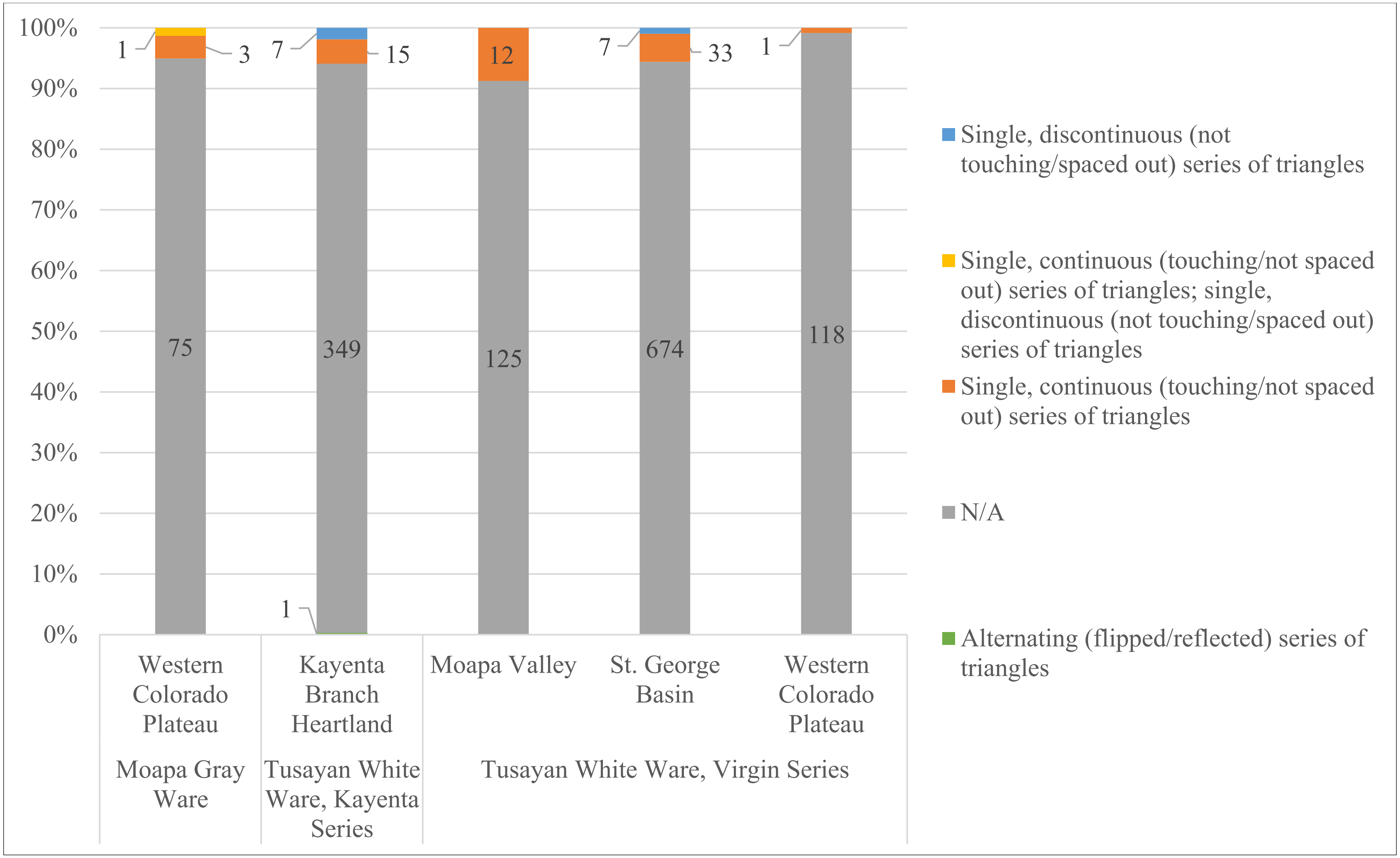


Figure 7.82. Triangle Use (single series) on pottery count frequencies during the late Pueblo II and early Pueblo III periods.

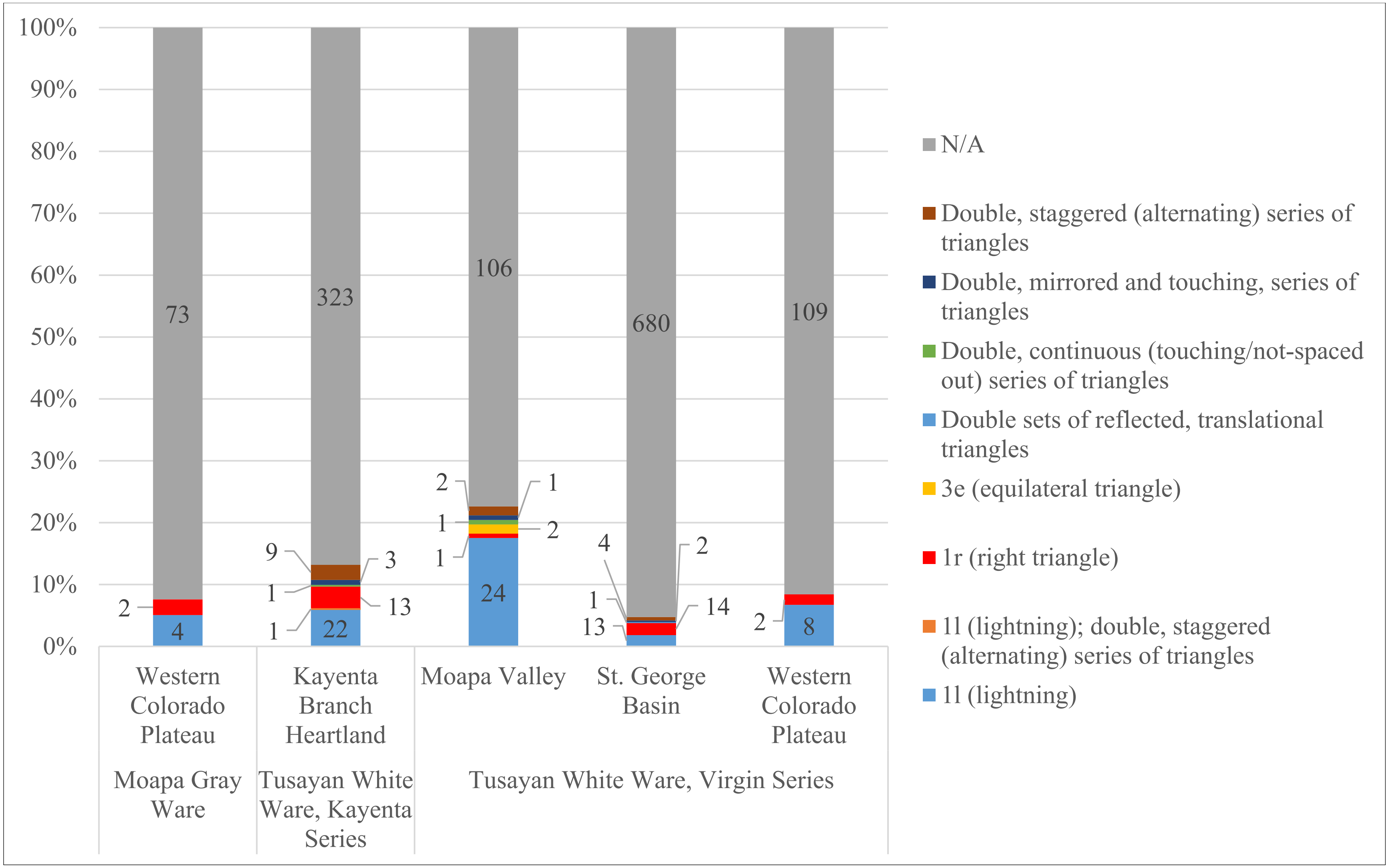


Figure 7.83. Triangle Use (double series) on pottery count frequencies during the late Pueblo II and early Pueblo III periods.

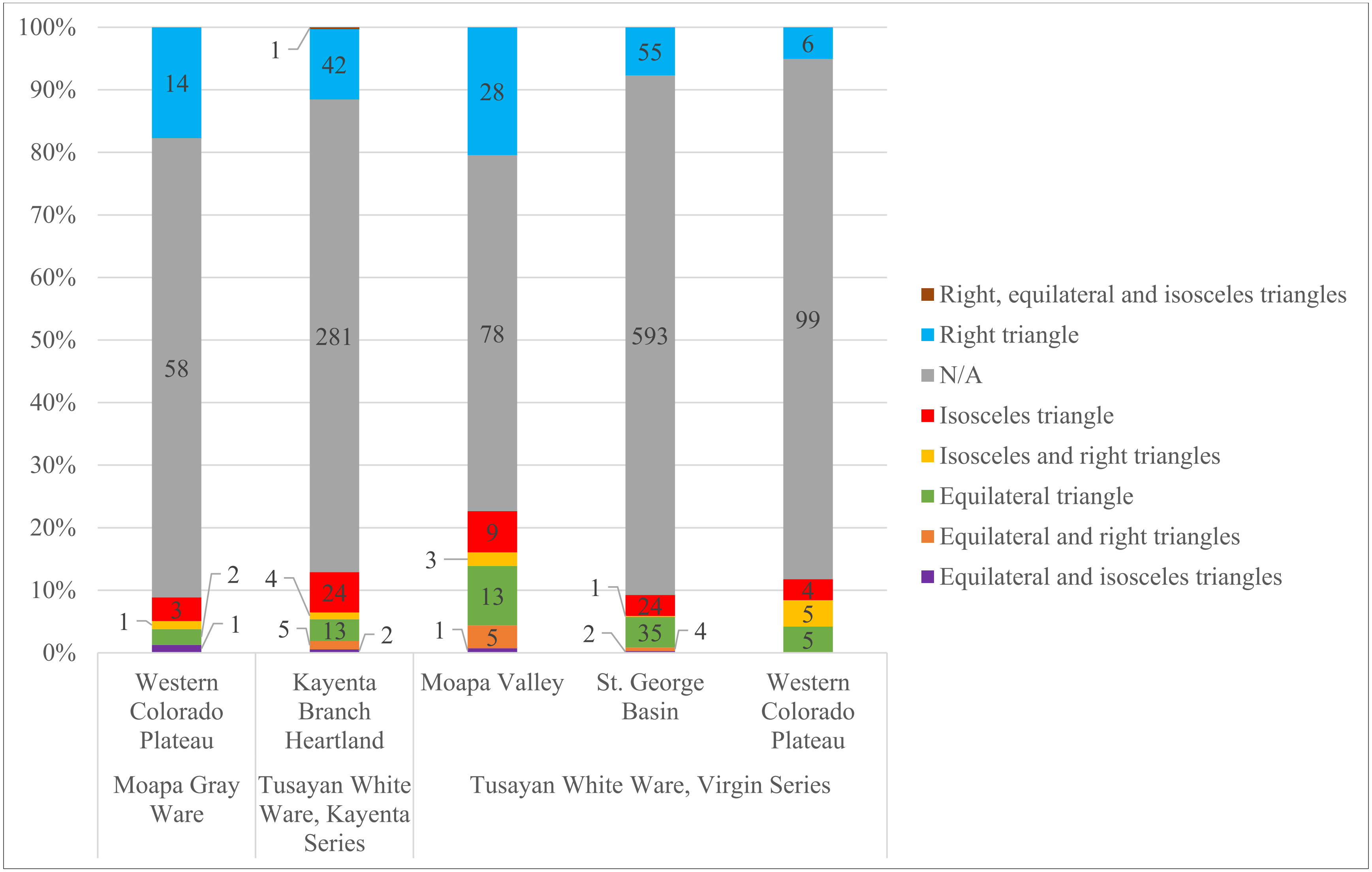


Figure 7.84. Triangle Use (triangle type) on pottery count frequencies during the late Pueblo II and early Pueblo III periods.

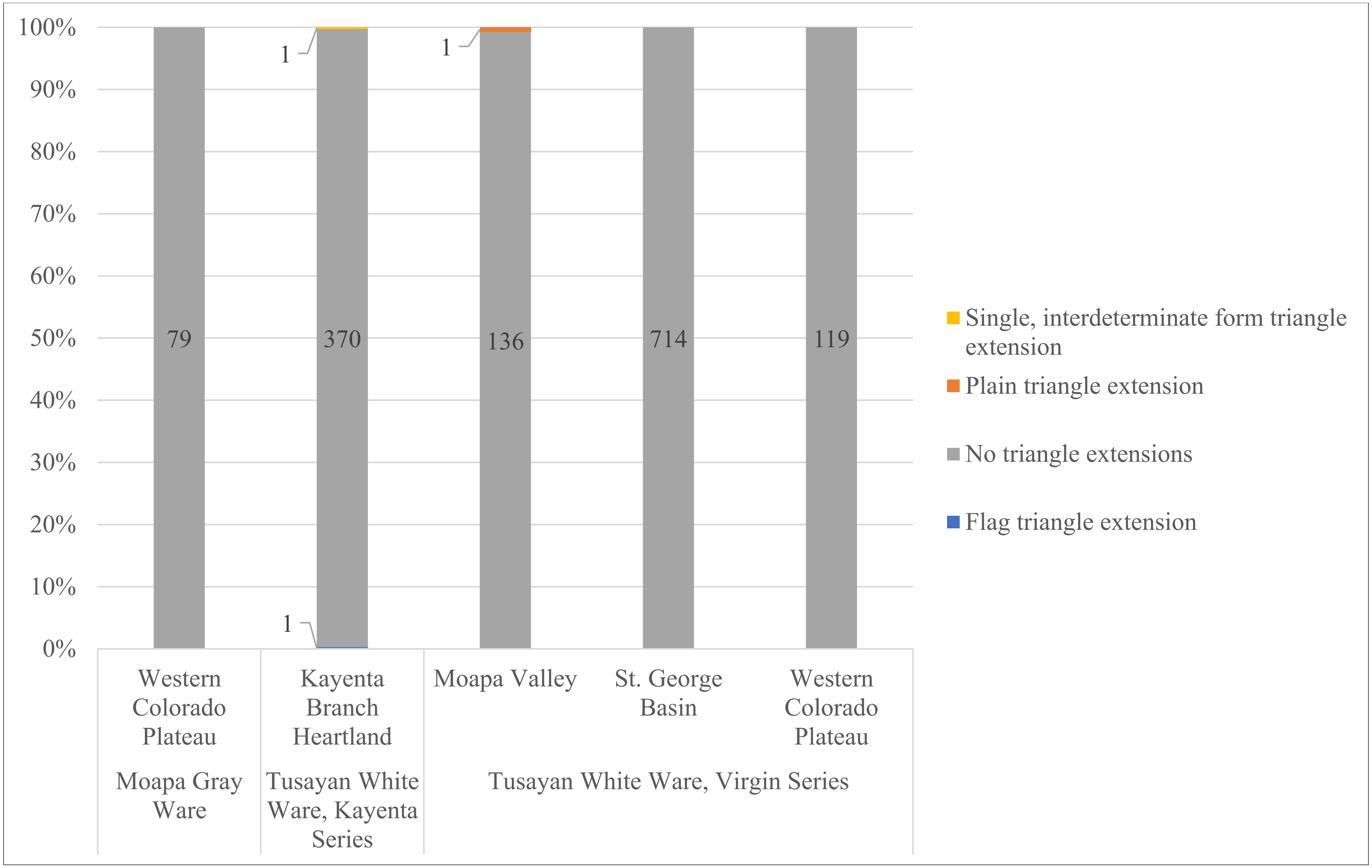


Figure 7.85. Triangle extensions on pottery count frequencies during the late Pueblo II and early Pueblo III periods.

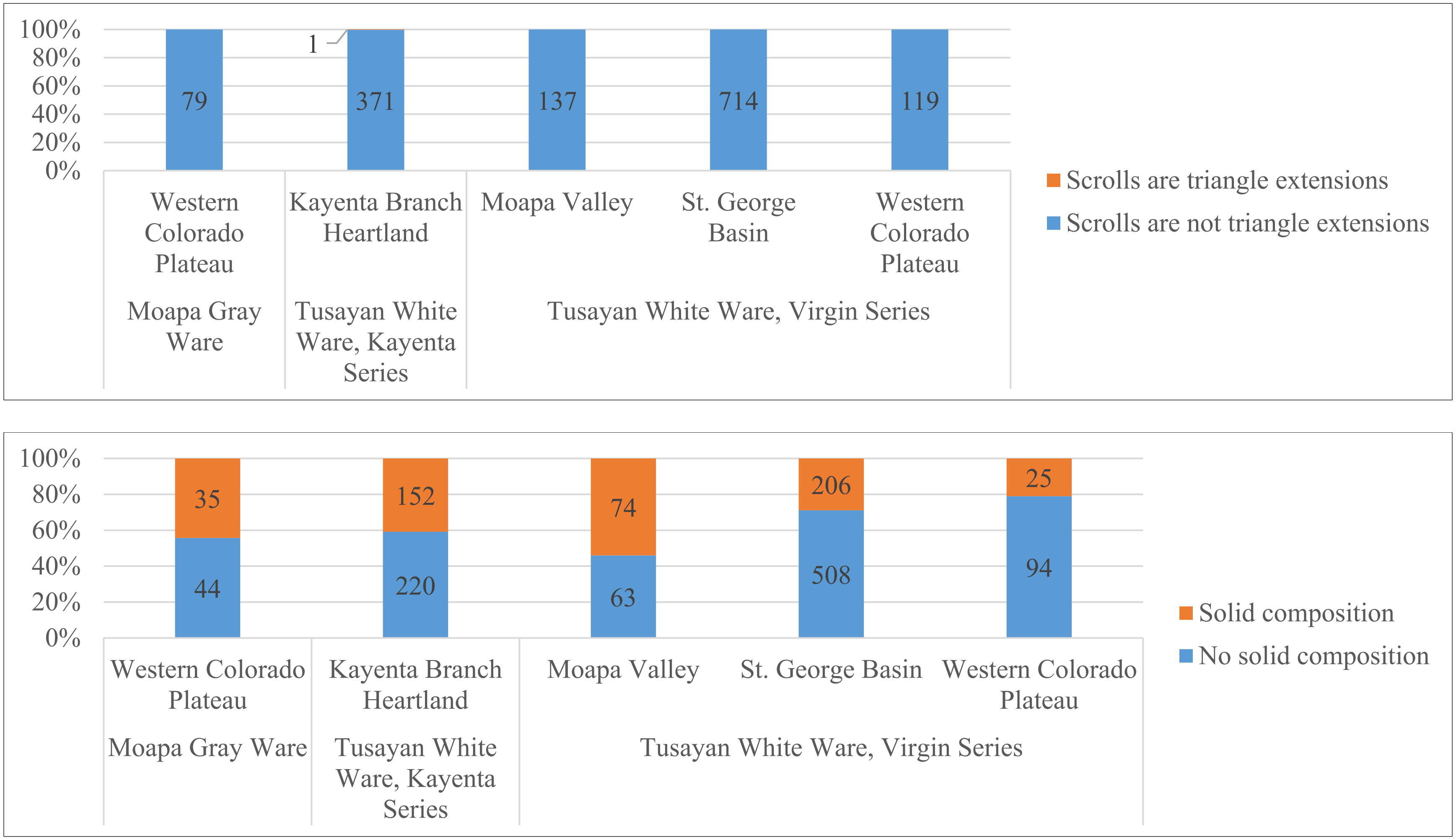
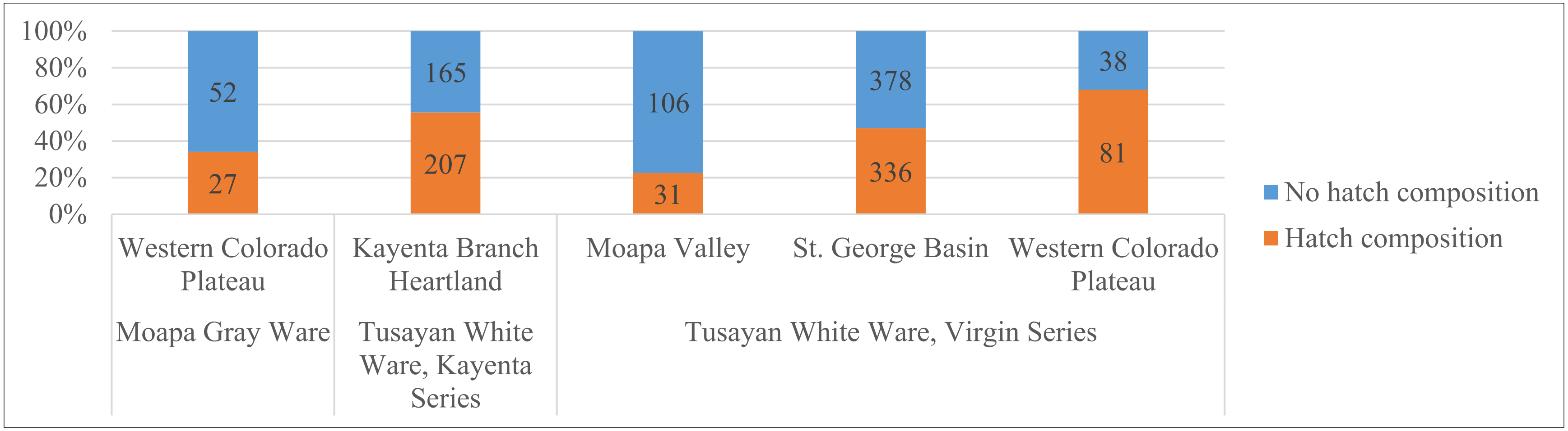


Figure 7.86. Scrolls as triangle extensions (Triangle Extensions) (top) and solid (Composition) (bottom) on pottery count frequencies during the late Pueblo II and early Pueblo III periods.



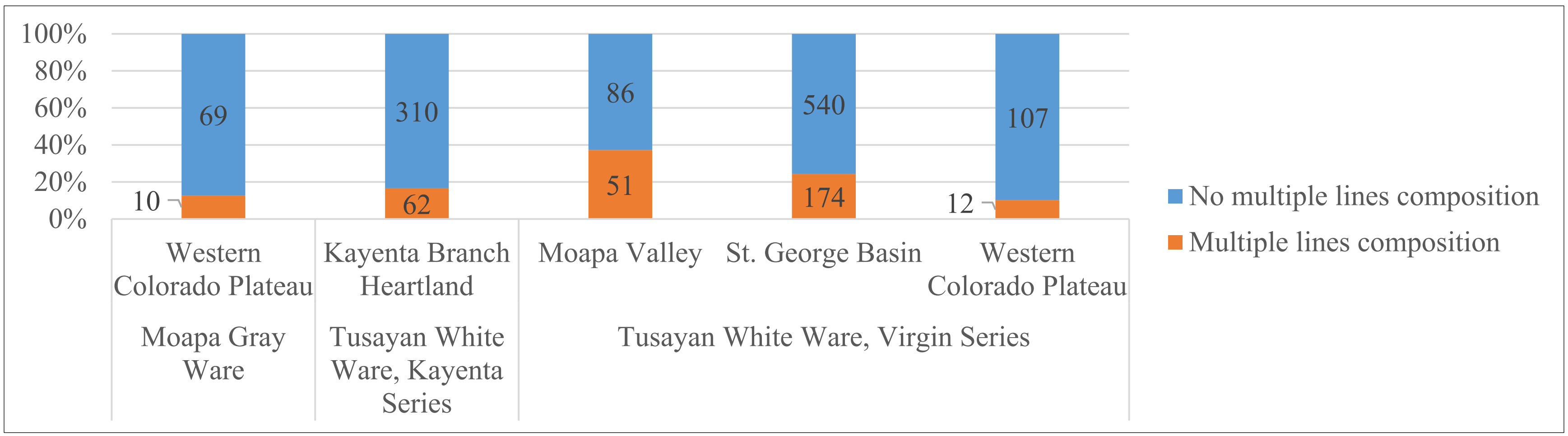


Figure 7.87. Hatch (Composition) (top) and multiple parallel lines (Composition) (bottom) on pottery count frequencies during the late Pueblo II and early Pueblo III periods.

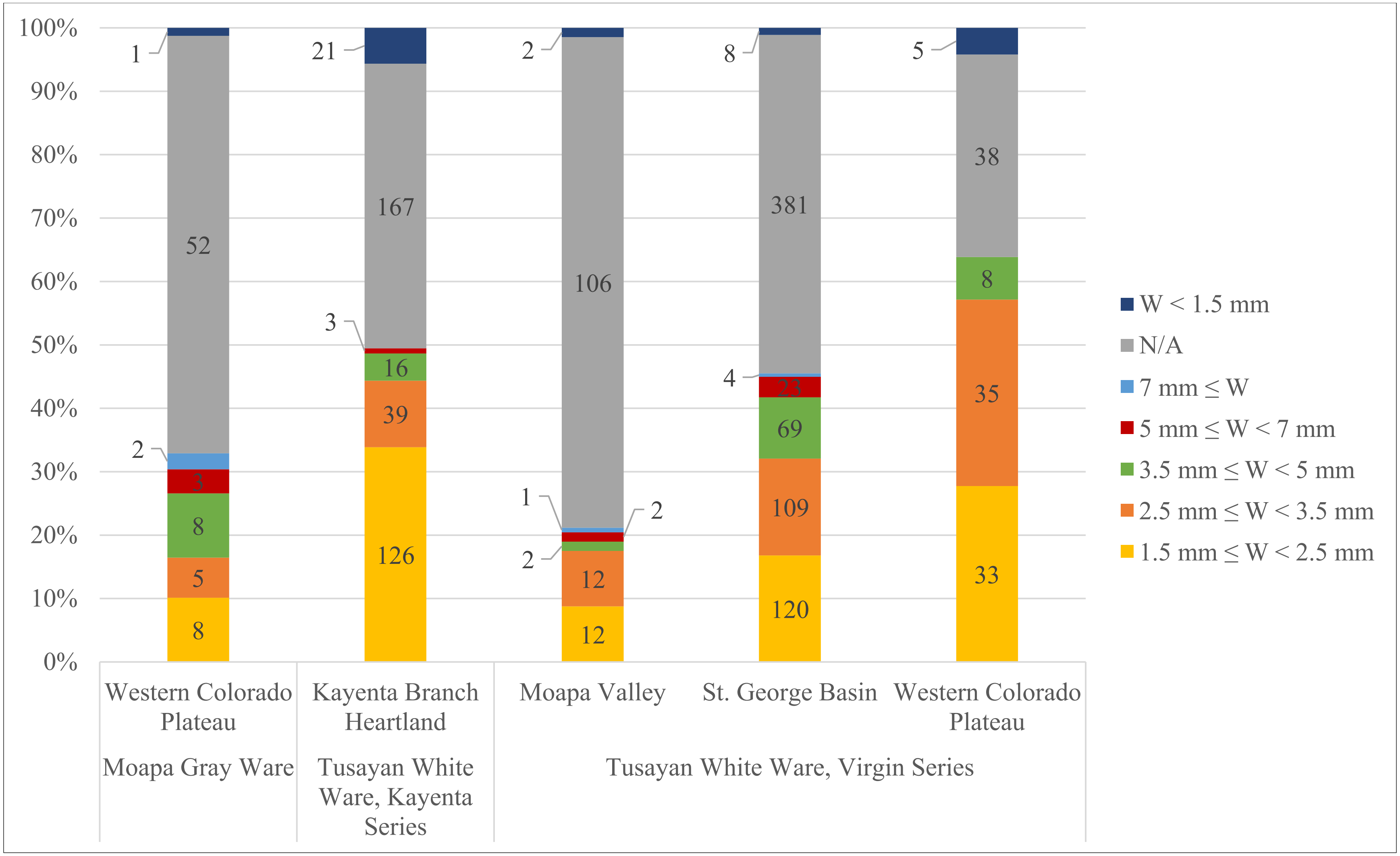


Figure 7.88. Average space between hatch lines (Composition) on pottery count frequencies during the late Pueblo II and early Pueblo III periods.

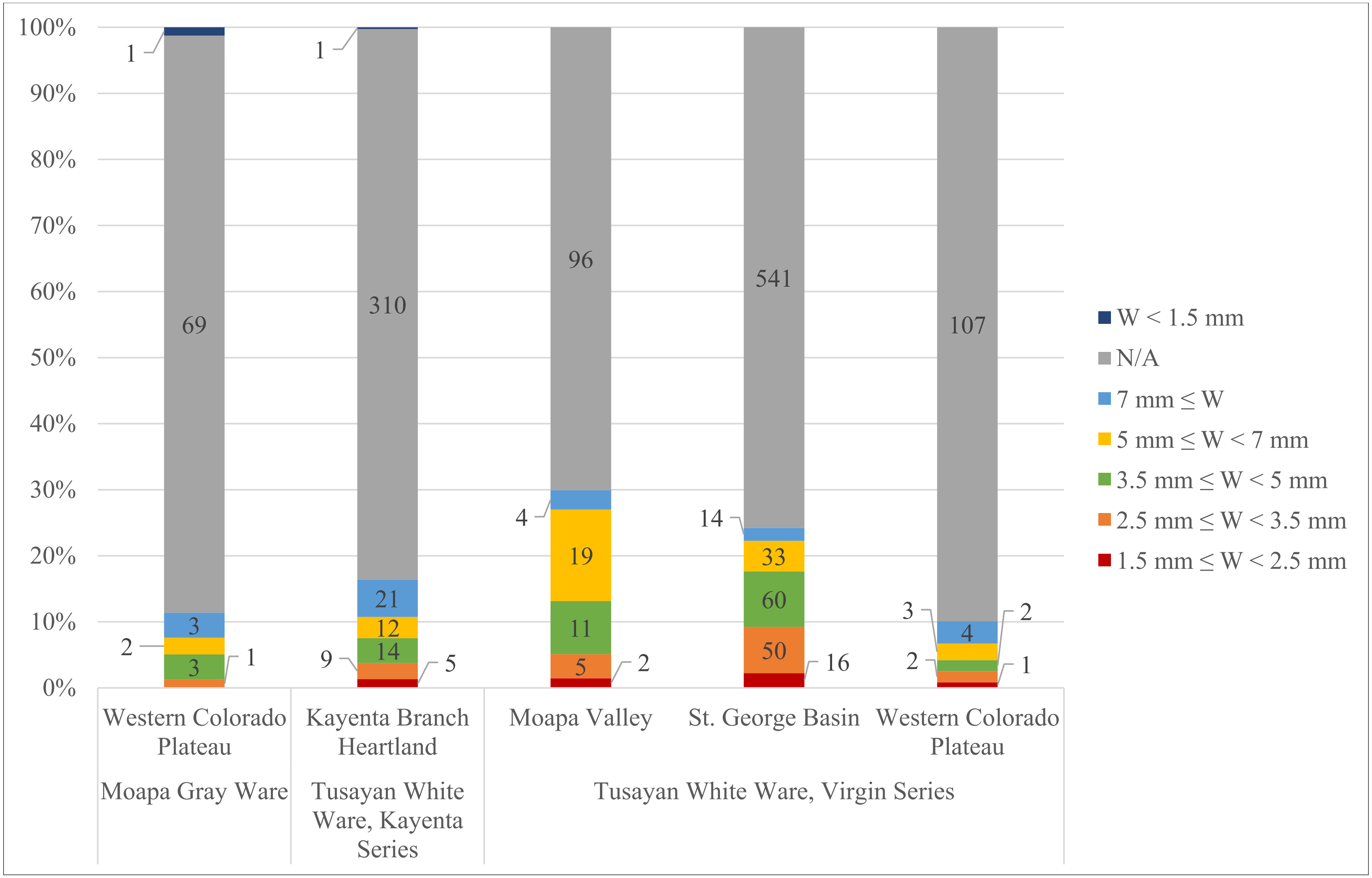


Figure 7.89. Average space between multiple parallel lines (Composition) on pottery count frequencies during the late Pueblo II and early Pueblo III periods.

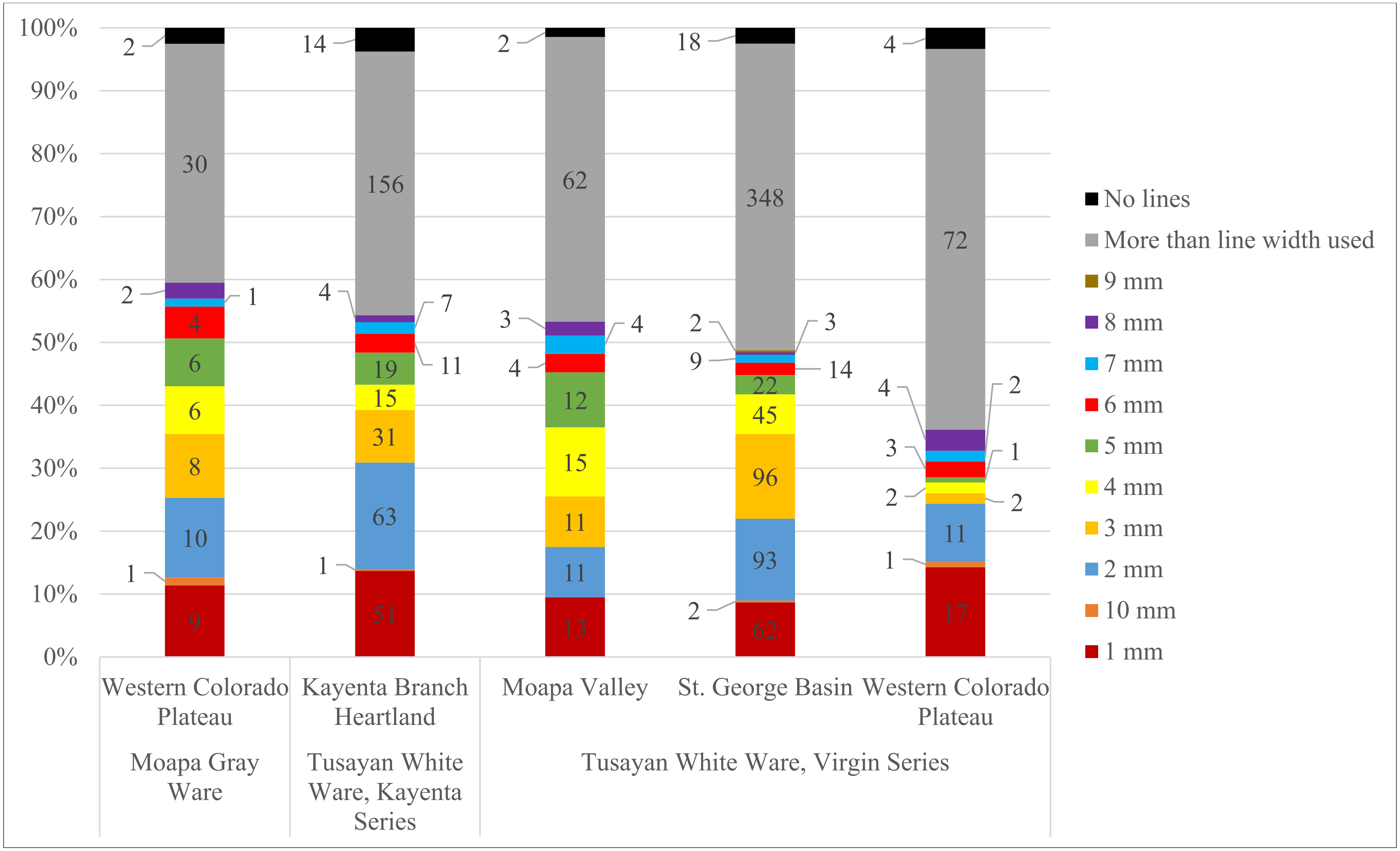


Figure 7.90. Line width modes (Line Width) on pottery count frequencies during the late Pueblo II and early Pueblo III periods.

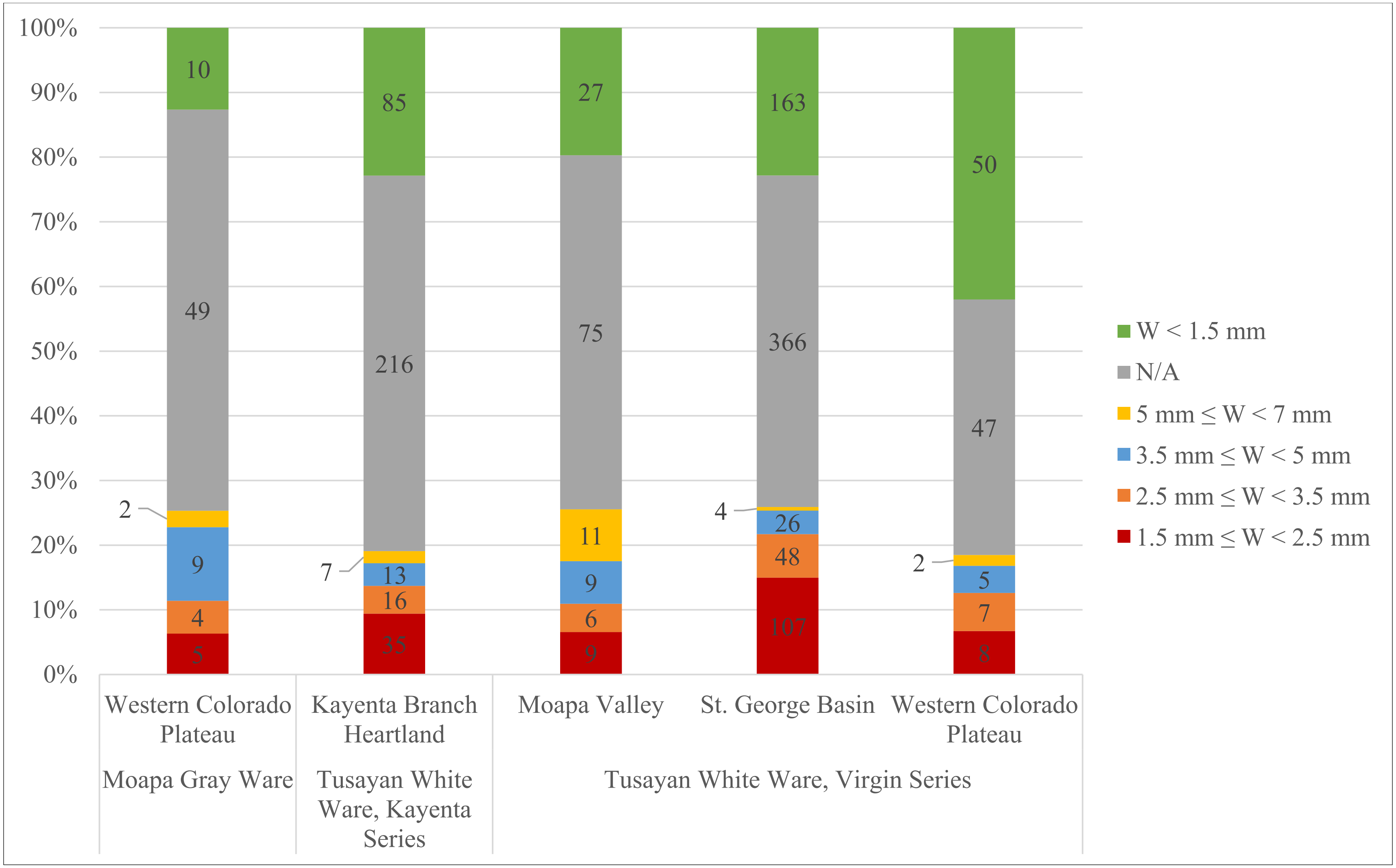


Figure 7.91. Average line width of smaller mode (Line Width) on pottery count frequencies during the late Pueblo II and early Pueblo III periods.

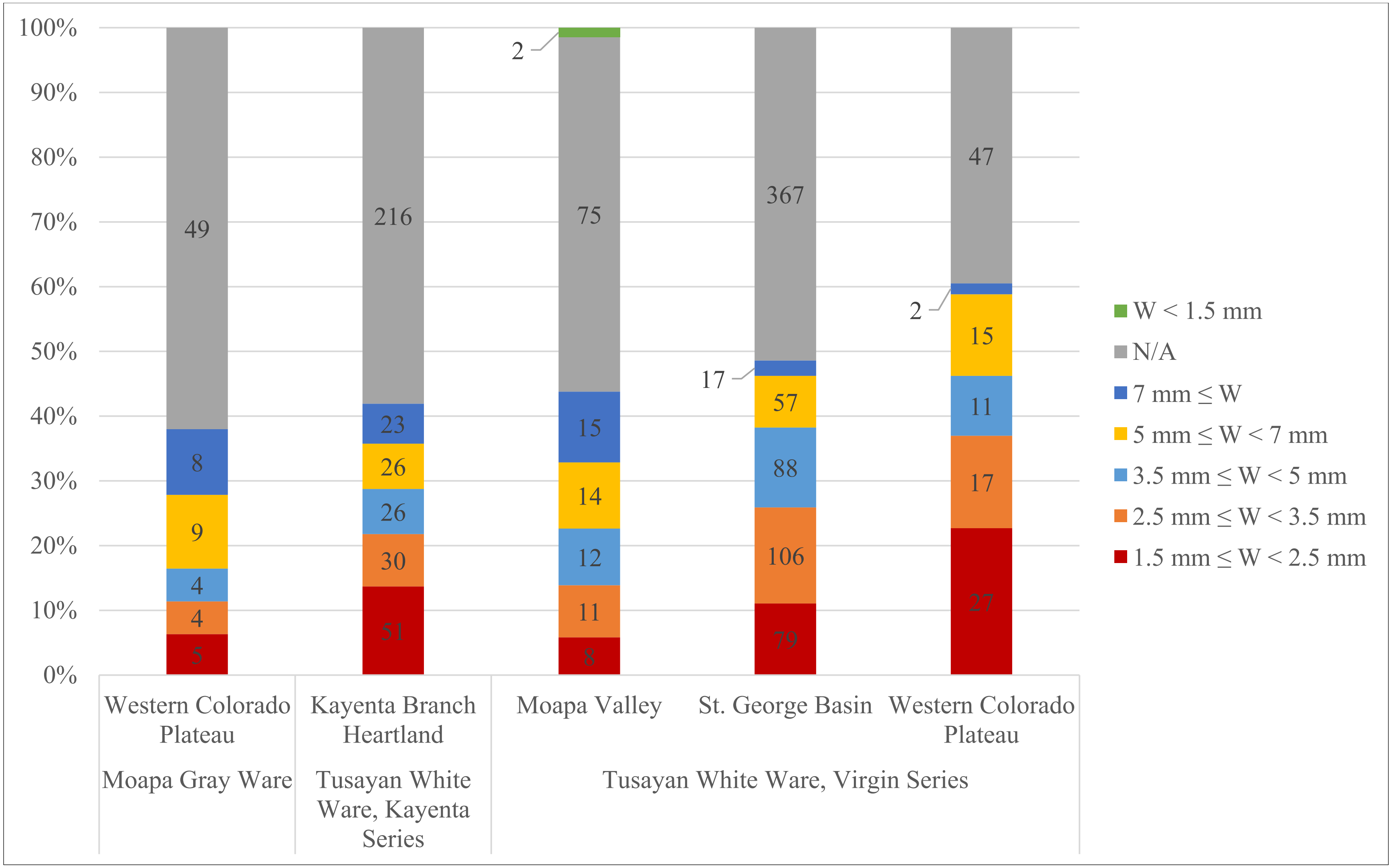


Figure 7.92. Average line width of larger mode (Line Width) on pottery count frequencies during the late Pueblo II and early Pueblo III periods.

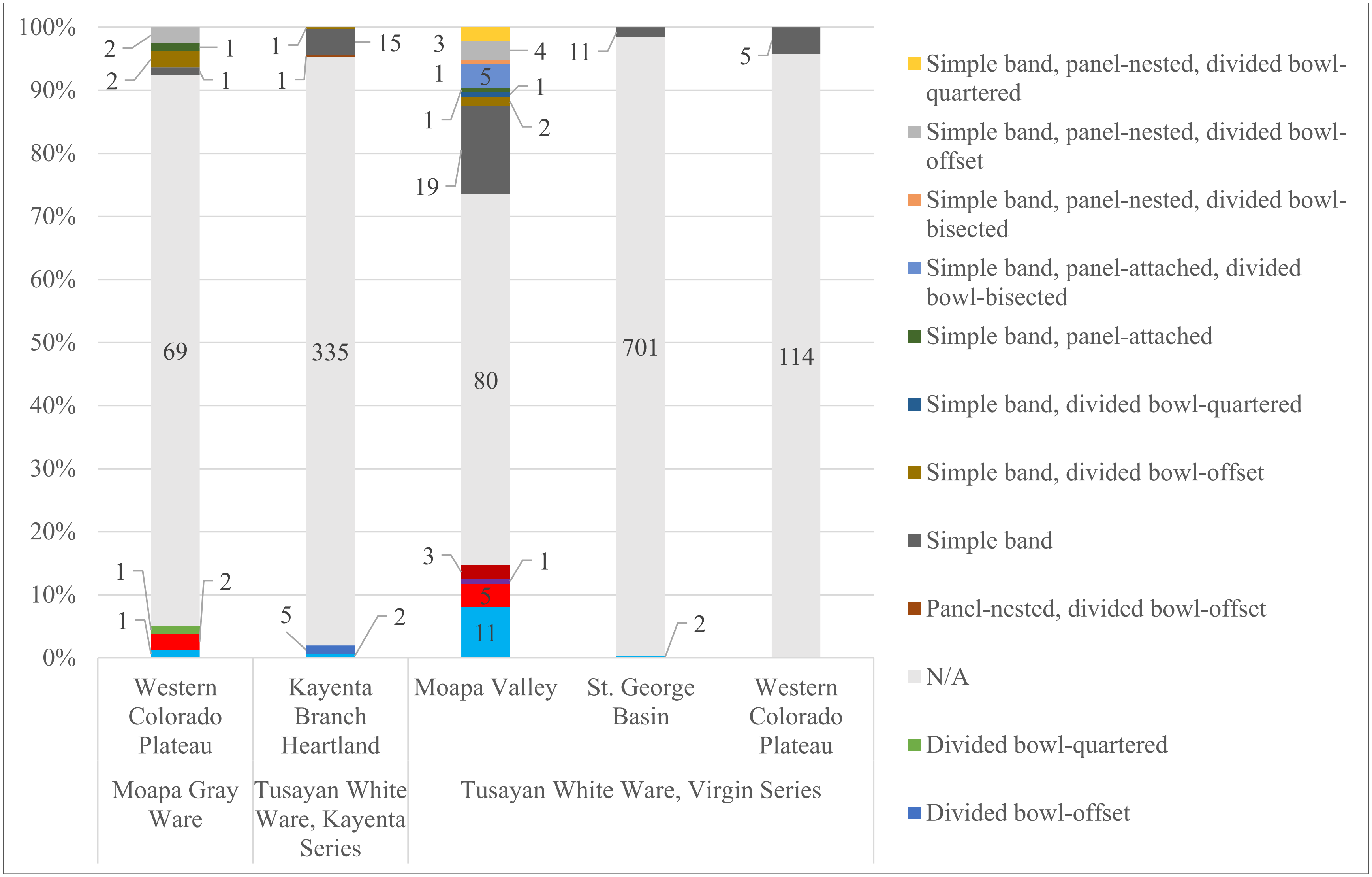


Figure 7.93. Design layout on bowls count frequencies during the late Pueblo II and early Pueblo III periods.

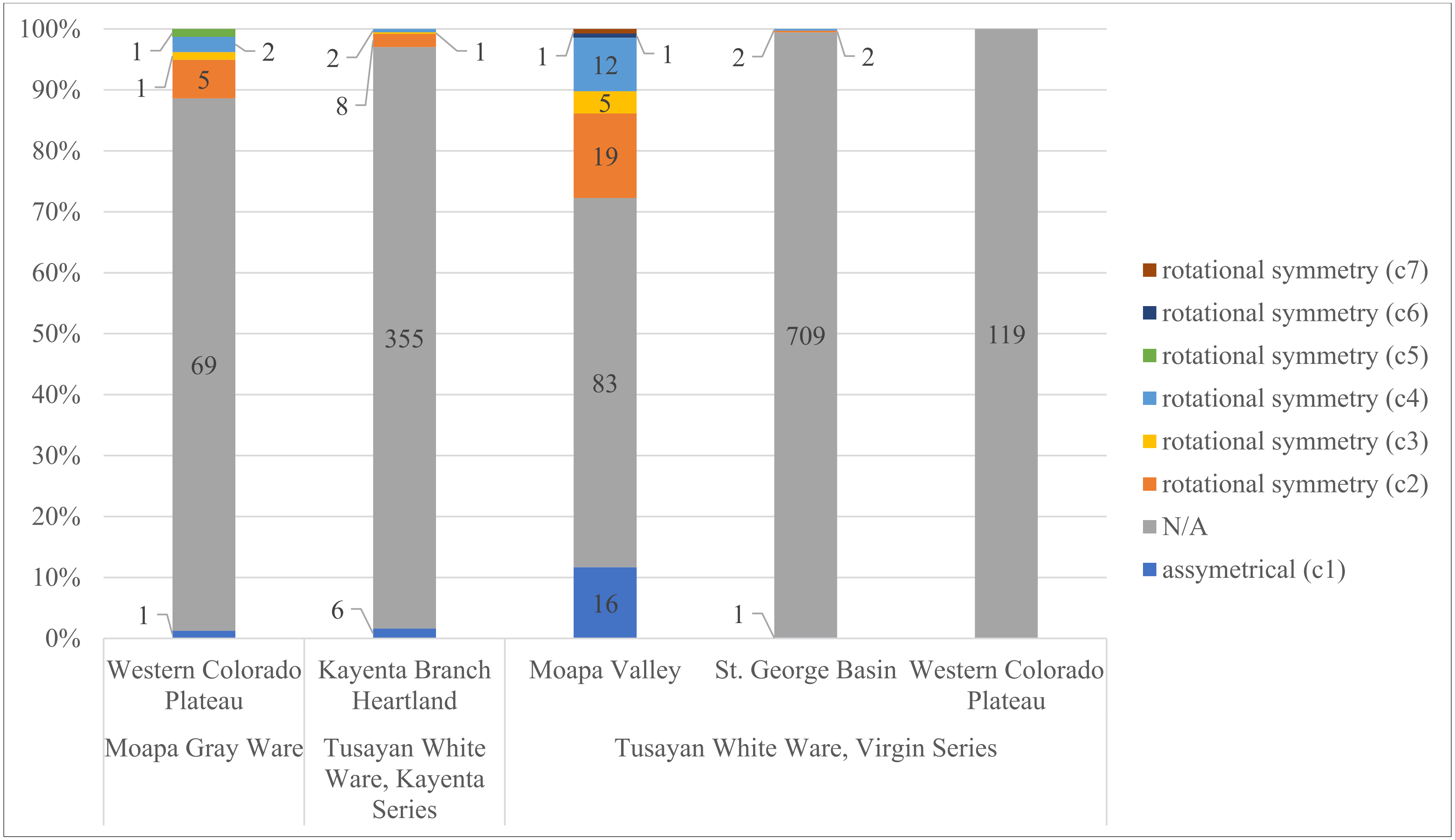


Figure 7.94. Design symmetry on bowls count frequencies during the late Pueblo II and early Pueblo III periods.

Tracking with continued site size and population growth into the late Pueblo II and early Pueblo III periods, pottery vessel size is found to have increased as well. These changes in technological style, noted specifically among bowls from my sample, increased from an average bowl diameter of 19 centimeters (St. George Black-on-gray) to 24 centimeters (North Creek Black-on-gray), 22 centimeters (Hildale Black-on-gray), and maintained the same rim diameter I observed with early to middle Pueblo II ceramic assemblages (19 centimeters) among Glendale Black-on-gray bowls. (See Appendix C to see all bowl rim diameter measurement data).

Changes in vessel size and proportionately uniform decreases in stylistic diversity throughout the Virgin Branch heartland, I argue, support the idea of increasingly isolated local identities during the late Pueblo II – early Pueblo III periods. In addition, I found design layouts and symmetries among St. George Basin and Moapa Valley ceramic assemblages to diverge and, only partially, overlap. These observed differences and related decreases in stylistic variation further underscore an increased fragmentation in the rules of design among painted Virgin Branch ceramic types. While one can reasonably state that a relatively narrow range of stylistic attributes (or, rules of design) can be found articulated among North Creek Black-on-gray (Figure 7.59) and Hildale Black-on-gray (Figure 7.60) pottery vessels—generally characterized by solid composition with triangles and hachured composition, respectively—Glendale Black-on-gray pottery is found to considerably vary in relation to these other two pottery styles.

As stated in Chapters 4 and 5, I cannot definitively provide a firm date for the inception of Glendale Black-on-gray pottery. Based on my survey of the occurrence of this ceramic type in systemic deposits (e.g., room fills, on floor surfaces), as reported in archaeological reports, Glendale Black-on-gray seems to be the latest pottery style iteration among Tusayan White Ware, Virgin Series types. This inference most certainly should not be new information to archaeologists working in the Virgin Branch region. Moreover, the variety of design elements and attributes painted on Glendale Black-on-gray pottery is also well understood among archaeologists. Given these two widely-accepted premises, I submit that the increase in stylistic variability among Glendale Black-on-gray vessels—such as, crisscrossed line composition with dot fills (Figure 7.61), a mix of solid composition with sharp diagonal angles and opposing triangle sets (Figure 7.62), or a pinnate composition (Figure 7.63)—is associated, at least in part, with diminished relations between populations within the Virgin Branch heartland. When one compares changes in design category diversity from the early to middle Pueblo II periods (Table 7.8) with diversity measures I calculated for the late Pueblo II – early Pueblo III periods (Table 10), the most striking change found over time is a sharp increase in compositional diversity—indicative of a wider variety of design compositions. The juxtaposition of high increases in compositional diversity and low to moderate decreases in diversity among all other listed design categories may suggest regional reorganization among Virgin Branch communities where shared rules of design are discontinued and more insular, local community identities are adopted.

Among Virgin Branch sites during the late Pueblo II and early Pueblo III periods, similarities in design categories appear to uniformly drop across all three districts in primary forms, secondary forms, and composition. In addition to this trend, pottery assemblages from the St. George Basin and the western Colorado Plateau demonstrate very high (nearly perfect) similarity with respect to primary forms (Table 7.11). This sharp increase in design similarity, among a highly visible and active expression of style, represents the only instance of near perfect similarity among Virgin Branch communities in this study. Interestingly, similarities in triangle use (another active design category) are shown to sharply increase between St. George Basin and Kayenta Branch heartland populations (Table 7.11). Similarity coefficients for triangle extensions were unreported for the late Pueblo II and early Pueblo III periods due to insufficient sample sizes. The exception to this lack of reporting, however, is the instance of no similarity in the expression of triangle extensions between the Moapa Valley and Kayenta Branch heartland. The significance of this particular finding of no similarity in painted triangle extensions is unclear due to a lack of reported data from the early and middle Pueblo II periods.

In reflecting on the observation of nearly perfect similarity in primary forms during this time, it is not clear if the Virgin Branch people in the St. George Basin and on the western Colorado Plateau migrated into one or the other district—or if this occurrence signifies enculturation. Equally unclear is whether the high shared similarity in triangle use between the St. George Basin and the Kayenta Branch heartland is associated with high similarities in primary forms. If so, the question then turns to investigating the extent and/or ways in which this potential overlap exists. In the scope of this study, however, this question remains open and unanswered.

At some point during the early Pueblo III period, the Virgin Branch region was depopulated and Kayenta Branch populations are known to have retracted to the east and reorganized south of the Colorado River. My study of similarity coefficients for design categories among painted ceramic types spanning the late Pueblo II and early Pueblo III periods appears to suggest a persistence of social ties between Virgin Branch people in the St. George Basin and Kayenta Branch populations, either through enculturation and/or migration. The association of a high degree similarity in primary form design, between Virgin Branch people in the St. George Basin and Kayenta Branch populations, seems to lend plausibility to the commonly-held idea that Virgin Branch populations ultimately migrated east and assimilated with Kayenta Branch populations—as suggested by Aikens (1966) and Hall (1942). In contrast, the divergence, or stagnation, from the relatively high similarity indices between pottery assemblages from the Moapa Valley and the Kayenta Branch heartland observed during the early and middle Pueblo II periods. This trends toward marked dissimilarity between respective Moapa Valley and Kayenta Branch populations may suggest a weakening of social ties that preceded depopulation of the Virgin Branch region. With regard to the specific instance of Virgin Branch people in the Moapa Valley, these data seem to lend credence to the model, suggested by Roberts and Ahlstrom (2012), of Virgin Branch populations not migrate eastward into the Kayenta Branch region. If this is the case, then further investigation is required into Virgin Branch population movements from the Moapa Valley.

Discussion

In this chapter, I presented and discussed the results of my investigation into the third, and final, research question of this study: *How is Virgin Branch group identity communicated and reflected through expressions of technological and painted design styles on pottery amidst intra- and inter-regional events and interactions over time; and what implications do these findings carry with respect to Virgin Branch agency?* The answer to this question is nuanced. Yet, at the risk of oversimplification, Virgin Branch pottery styles seem to generally communicate and reflect nuances of social events and interactions. In this study, I used groupings of painted pottery types as both temporal bins and an organizational framework to investigate this question. Applying the reconstructed chronometry for the Virgin Branch heartland—presented in Chapters 4 and 5—I then used associated painted Tusayan White Ware Virgin Series ceramic types as both time markers and a means through which to investigate painted design categories over time.

Technological styles between painted Virgin and Kayenta Branch pottery, as discussed in Chapter 6 and alluded to in this chapter, seem to be relatively distinct between these two cultural groups. Variations in use of technological styles such as polishing and slipped a vessel can be found in pottery assemblages from both heartlands, with greater use of these specific technological applications found among Kayenta Branch potters than among those in the Virgin Branch heartland. Other forms of technological style, particularly temper and vessel form, seem to be fairly distinct. While both jars and bowls can be found as the most prevalent vessel forms in pottery assemblages from both heartlands, other vessel forms most certainly are utilized as well. Jars with painted designs, based on my sample, seem to be a rare phenomenon among Virgin Branch pottery assemblages with painted jars being quite common within the Kayenta Branch heartland.

In consideration of the results in this chapter, painted pottery designs (as presented here through the lens of design categories) seem to generally track with, provide some nuance to, Virgin and Kayenta Branch social dynamics known throughout the Basketmaker III through early Pueblo III sequence. Additional work should be done to further parse the degree to which social and even environmental dynamics can be discerned through a study of painted design style. As presented in this study, however, Virgin Branch group identity seems to be generally communicated both intra-regionally and inter-regionally, in the context of neighboring Kayenta Branch populations, through varying combinations and implementations of active and passive expressions of painted design style over time. The dynamic nature in painted Virgin Branch style that I observed, both intra-regionally and inter-regionally, convey a picture of Virgin Branch communities possessing dynamic agency that should not be viewed as a monolithic culture group. Instead, Virgin Branch agency should be considered as dynamic parts within a whole.

CHAPTER 8. CONCLUSION

In this chapter, I conclude by providing a summary of my findings, the limitations of this study, my recommendations for future research, and how this dissertation contributes to the field of archaeology of the North American Southwest, generally, and Virgin Branch archaeology in particular.

Summary of Findings

This study aimed to provide clarity on Virgin Branch chronometry and painted pottery styles with objective of addressing the higher-level topic of group identity and social dynamics intra-regionally (between Virgin Branch communities) and inter-regionally (in the context of neighboring Kayenta Branch populations). My investigation of this overarching aim was organized along two guiding themes: (1) chronometric reconstruction of the Virgin Branch heartland (defined as the portion of the Virgin Branch region west of Kanab Creek); and (2) the structure of style and rules of design for select painted Virgin and Kayenta Branch pottery. To organize my study, I asked three research questions:

4) How does a refined Virgin Branch heartland chronometry clarify current understandings of Virgin Branch chronology and correlate with the established chronometry of the Kayenta Branch heartland?
5) What are the technological styles and rules of design (i.e., design layout, design symmetry, and design elements) associated with painted pottery from the Virgin and Kayenta Branch heartlands over time?
6) How is Virgin Branch group identity communicated and reflected through expressions of technological and painted design styles on pottery amidst intra- and

inter-regional events and interactions over time; and what implications do these findings carry with respect to Virgin Branch agency?

Each of the above questions were addressed in Chapters 5, 6, and 7, respectively. In this section, I will summarize the findings of this study in the context of the above three research questions.

The Temporal Framework of Painted Virgin Branch Pottery

In Chapters 4 and 5, I presented and discussed my efforts in reconstructing a Virgin Branch heartland chronometry through the medium of painted pottery styles. Using mean ceramic dating and ceramic cross-dating methods, I ascertained provisional dates for the Virgin Branch heartland—informed through mean ceramic dating a subset of Virgin Branch sites. In turn, the mean ceramic dates for these select Virgin Branch sites were used in tandem with tree-ring date ranges associated with imported Kayenta Branch ceramic types. In turn, I cross-dated all available painted Virgin Branch ceramic types found in association with these imported Kayenta Branch pottery types, found within living contexts (e.g., on floors, in room or pithouse fill deposits). As a result, I arrived at a partial (by no means, fully-representative) chronometry for select painted Virgin Branch ceramic types. The following list summarizes my findings for select Virgin Branch painted ceramic types. (As a note, I do not presume these results to represent the full extent of each pottery type. Rather, I propose that the dates I ascribe to a given Virgin Branch ceramic type should at a minimum be considered as being rooted in the archaeological record, of the associated Virgin Branch sites, since these reconstructed dates are contextually dated with tree-ring dated non-local ceramics.

Proposed Chronometric Revision for Select Painted Virgin Branch Pottery Styles

<u>Tusayan White Ware, Virgin Series</u>

Mesquite Black-on-gray:	A.D. 719 – 900?
Washington Black-on-gray:	A.D. 896 – 1075
St. George Black-on-gray:	A.D. 918 – 1175
North Creek Black-on-gray:	A.D. 1060 – 1169
Hildale Black-on-gray:	A.D. 1100 – 1169
Glendale Black-on-gray:	Post-A.D. 1100 – 1200/1225?

<u>Moapa Gray Ware</u>

Boulder Black-on-gray:	A.D. 900? – 975
Trumbull Black-on-gray:	A.D. 1112
Moapa Black-on-gray:	A.D. 1060 – 1173

<u>Tusayan White Ware, Virgin Series (Corrugated)</u>

Hurricane Black-on-gray:	A.D. 1088 – 1122
Pipe Spring Black-on-gray:	A.D. 1116 – 1150

The Structural Framework of Painted Virgin Branch Pottery

In Chapter 6, I investigated the structure of style for painted Virgin and Kayenta Branch pottery types. The purpose of the chapter was to see if consistent patterns in technological and painted design styles could be established any particular painted Virgin and Kayenta pottery type(s). Using statistical testing, primarily in the form of a Chi-Square Test of Independence, I conducted an exploratory data analysis of specific painted design categories as a means of detecting any patterns in data tables. If patterns were found—established on the basis of observed and expected count frequencies—then such instances were used in my construction of "rules of design" for a given pottery type. As a result of my exploratory data analysis, I established the following rules of design (i.e., patterns in either technological or painted design style that were found to occur frequently enough to be called a "rule of design").

Rule 1: Bands and Finite Symmetry

Mesquite Black-on-gray uses simple bands with rotational symmetry. Lino Black-on-gray uses simple bands with rotational symmetry. Washington Black-on-gray uses simple bands with asymmetrical designs. (Exceptions include complex bands with rotational symmetry). Kana-a Black-on-white uses complex bands with rotational symmetry. North Creek Black-on-gray use simple bands nested panel layouts on divided bowls with c2 rotational symmetry and complex bands with asymmetrical designs. Sosi Black-on-white uses complex bands with one-dimensional symmetry and simple bands with rotational symmetry. Dogoszhi Black-on-white uses simple bands with one-dimensional symmetry or rotational symmetry. Glendale Black-on-gray uses simple bands. Flagstaff Black-on-white uses simple bands with rotational symmetry.

Rule 2: Divided Layouts

St. George Black-on-gray use bisected divided layouts. (Exceptions include use of quartered divided layouts). Black Mesa Black-on-white uses slant/spiral divided layouts. North Creek Black-on-gray use divided layouts in association with rotational symmetry. Hildale Black-on-gray uses quartered divided layouts. Dogoszhi Black-on-white uses slant/spiral divided layouts. Flagstaff Black-on-white uses offset divided layouts.

Rule 3: Panel Layouts

Mesquite Black-on-gray use free panel layouts with asymmetrical designs. Washington Black-on-gray use attached panel layouts. St. George Black-on-gray uses nested panels with rotational symmetry. Black Mesa Black-on-white uses slant/spiral divided layouts. North Creek

Black-on-gray bowls use nested panel layouts c2 symmetry. (Exceptions include asymmetrical and other forms of rotational symmetry). Sosi Black-on-white uses nested panel layouts with rotational symmetry. Hildale Black-on-gray use nested panel layouts with rotational symmetry. Flagstaff Black-on-white uses nested panel layouts with rotational symmetry.

Rule 4: Finite Symmetry

Lino Black-on-gray uses c2 symmetry. Black Mesa Black-on-white uses asymmetrical designs. Sosi Black-on-white uses c2 and c4 symmetry. Dogoszhi Black-on-white uses c3 symmetry.

Rule 5: One-dimensional Symmetry

All applicable Tusayan White Ware, Virgin and Kayenta series, jars demonstrated 11 (translation only) symmetry. (Exceptions include use of p1 [vertical and horizontal translation] two-dimensional symmetry on a Sosi Black-on-white jar.

Rule 6: Dots and Triangle Use

Mesquite Black-on-gray uses free dots as filler in association with a single series of non-touching triangles. (Exceptions include using free dots in a line). Lino Black-on-gray uses free dots as filler in association with a single series of triangles. Washington Black-on-gray uses free dots as filler in association with single and double series of triangles.

Rule 7: Fringe on Solid and Triangle Use

Washington Black-on-gray uses serrated solids in associations with equilateral triangles.

Rule 8: Multiple Parallel Lines and Triangle Use

Kana-a Black-on-white uses equilateral triangles on jar bodies. Sosi Black-on-white uses right triangles in association with diagonal spiral multiple parallel lines on jar bodies.

Rule 9: Technological Style of Tusayan White Ware, Virgin Series

Painted Tusayan White Ware, Virgin Series pottery is not polished or slipped, and does not have a carbon core.

Rule 10: Technological Style of Tusayan White Ware, Kayenta Series

Painted Tusayan White Ware, Kayenta Series pottery is polished, slipped, and has a carbon core.

The Role of Style in Virgin Branch Community Identity and Group Affiliation

In Chapter 7, I used my results from Chapters 4 through 6 as the foundation of my investigation into the role of technological and painted design styles in Virgin Branch group identity. In my examination into the role of style, I used diversity indices (via Shannon Diversity indices) and similarity coefficients (via Brainerd-Robinson Similarity coefficients), along with a hierarchical consideration of painted design and technological style categories to test various hypotheses regarding the extent to which style reflects/communicates Virgin Branch social dynamics intra-regional and inter-regionally in the context of Kayenta Branch populations. The details of this portion of the overarching dissertation are nuanced within each time period, both inter-regionally and intra-regionally. On the basis of this study, I concluded that Virgin Branch communities acted in dynamic ways in the archaeological past, among each other and with Kayenta Branch populations, that can be discerned through technological and painted design styles over time.

Limitations

The scope of this study was appropriate; however, greater efforts could have been made with respect to analytical methods and sampling. The analytical methods used for the chronometric component of this dissertation, from my perspective, were wholly appropriate.

However, additional statistical testing would help underscore the practical significance of my structure of style (Chapter 6) and role of style (Chapter 7) findings. With respect to my findings in Chapter 6, I think greater care should have been taken in finding ceramic sherds within assemblages that yielded complex painted designs that could have then been used in establishing a more robust assessment of rule of design for Virgin and Kayenta Branch pottery.

Recommendations for Future Research

Further research is needed to better understand Virgin Branch chronometry as well as the larger extent to which style is connected with Virgin Branch group identity. In addition to using mean ceramic dating, other absolute dating methods (such as TL or OSL dating) should utilized to establisher a deeper understanding of Virgin Branch chronometry. Beyond an investigation of painted style, as presented in this dissertation, additional considerations should be given to other painted Virgin Branch pottery wares and types as well as non-painted, plain and corrugated ceramics. In addition, further investigation into Virgin Branch identity should explore the nebulous mixed contexts on the eastern Colorado Plateau to see how Virgin Branch populations beyond the heartland are impacted through interactions with neighboring groups. Finally, in consideration of future studies on painted design styles, I think concerted efforts should be made in integrated artificial intelligence machine-based learning (see Pawlowicz and Downum 2021). Use of such AI-based learning methods will help researchers yield more consistent, and faster, identifications of painted pottery styles that will help advance our understanding of painted design styles in the Virgin Branch region.

Contribution

On a research level, this study presents the first known efforts (at least, to the author) to cross-date Virgin Branch pottery with tree-ring dated imported ceramic types as well as conduct mean dating on Virgin Branch sites. Moreover, my efforts in establishing a comparative set of rules of design for Virgin and Kayenta Branch pottery represents the first such attempt (again, to my knowledge) in the archaeological literature. On a practical level, the resulting reconstructed chronometry for the Virgin Branch heartland, in Chapter 5, can help inform future research within this area of the North American Southwest, helping enable researchers to pursue more fine-grained questions within the Virgin Branch region. On a theoretical level, this study supports using technological and painted design style as a proxy for reflecting group identity and social dynamics within the Virgin Branch heartland.

Conclusion

This dissertation study set out to investigate the role of technological and painted design style on pottery in reflecting and communicating Virgin Branch group identity on an intra- and inter-regional level. As a result, this study yielded a differing perspective on Virgin Branch chronometry that challenges previous temporal frameworks used by researchers working in the region. In addition, this research project also presented a challenge to previous untested models of Virgin Branch social dynamics. This chapter serves as a reflection on the merits, limitations, and future considerations for research on these topics in the context of Virgin Branch archaeology.

APPENDIX A. DATA COLLECTION CODING SYSTEM AND KEY

Table A.1 provides the complete data collection system used in this study. The coding system used for this research was modeled closely after the structure used by Hegmon (1995). Enclosed categories, variable numbers, and definitions should be used in conjunction with abbreviated references found in different chapters

Table A.1. Attribute Coding and Recording System Used in this Dissertation Research.

V1		**Case**
V2		**Site number** (and site name, if applicable)
V3		**Repository**
	ASM	Arizona State Museum, University of Arizona
	MPC	Museum of Peoples and Culture, Brigham Young University
	LAKE	Lake Mead National Recreation Area
	LCM	Lost City Museum
	LVNHM	Las Vegas Natural History Museum
	MNA	Museum of Northern Arizona
	NHMU	Natural History Museum of Utah
	NMAI	National Museum of the American Indian, Smithsonian Institution
	SUU	Southern Utah University
V5		**Catalog number; FS number**
V6		**Provenience information (Strat., Level, GPS coordinates, etc.)**
V10		**Wholeness**

1 Whole/almost whole vessel

2 Partial vessel (more than 1/8 but less than 3/4 present)

3 Sherd

V12 **Polish**

1 Unpolished, rough

2 Smooth

3 Polished

V13 **Slip**

1 Unslipped

2 Wash

3 Obvious slip

V14 **Paint type**

1 Organic

2 Mineral

V15 **Temper**

1 Quartz sand

2 Feldspar

3 Mixed lithogy sand

4 Crushed xenoliths (olivine)

5 Grog (crushed sherds)

6 Limestone

7 Basalt

8 Sandstone

9 Volcanic ash

10 Unidentifiable opaque angular fragments

20 Indeterminate (whole vessel or unidentifiable)

V16 **Carbon Streak**

1 Present

99 Absent

V17 **Type (organized by Ware)**

Tusayan White Ware, Virgin Series

1 Mesquite Black-on-gray (Lino style)

2 Washington Black-on-gray (Kana-a style)

3 St. George Black-on-gray (Black Mesa style)

4 North Creek Black-on-gray (Sosi style)

5 Hildale Black-on-gray (Dogoszhi style)

6 Glendale Black-on-gray (Flagstaff style)

7 Tusayan White Ware, Virgin Series, cannot determine type

Moapa Gray Ware

11 Boulder Black-on-gray (Lino style)

12 Boysag Black-on-gray (Kana-a style)

13 Trumbull Black-on-gray (Black Mesa style)

14 Moapa Black-on-gray (Sosi style)

15 Slide Mountain Black-on-gray (Dogoszhi style)

16 Poverty Mountain Black-on-gray (Flagstaff style)

17 Moapa Gray Ware, cannot determine type

Tusayan Gray Ware, Kayenta Series

21 Lino Black-on-gray

Tusayan White Ware, Kayenta Series

22 Kana-a Black-on-white

23 Black Mesa Black-on-white

24 Sosi Black-on-white

25 Dogoszhi Black-on-white

26 Flagstaff Black-on-white

27 Tusayan White Ware, Kayenta Series, cannot determine type

Shinarump Red Ware

31 Middleton Black-on-red (Dogoszhi style)

32 Kanab Black-on-red (Dogoszhi style)

33 Middleton Polychrome

34 Nankoweap Polychrome

Tsegi Orange Ware

41 Tusayan Black-on-red (Dogoszhi style)

42 Medicine Black-on-red

San Juan Red Ware

51 Deadmans Black-on-red

Tusayan White Ware, Virgin Series (Corrugated)

63 Orderville Black-on-gray (Black Mesa style)

64 Hurricane Black-on-gray (Sosi style)

65 Pipe Spring Black-on-gray (Dogoszhi style)

66 Parashant Black-on-gray (Flagstaff style)

67 Tusayan White Ware, Virgin Series (Corrugated), cannot determine type

Shinarump White Ware

71 Virgin Black-on-white

72 Toquerville Black-on-white

Tusayan White Ware, Moapa Series (Corrugated)

83 Toroweap Black-on-gray (Black Mesa style)

84 Whitmore Black-on-gray (Sosi style)

85 Fern Glen Black-on-gray (Dogoszhi style)

86 Tuckup Black-on-gray (Flagstaff style)

87 Tusayan White Ware, Moapa Series (Corrugated), cannot determine type

V18		**Vessel form**
	1	Bowl
	2	Jar
	3	Plate
	4	Mug
	5	Scoop
	6	Disk/whorl
	7	Handle
	8	Colander
	9	Pitcher
	10	Canteen
	11	Ladle
	12	Pipe
V21		**Triangles (primary forms)**
	1	Present
	99	Absent

V24		**Triangles in a line (triangle use)**
	1	Present
	99	Absent
V25		**Triangle checkerboard (triangle use)**
	1, 2, 3, 4	Present
	99	Absent
V26		**Triangles attached to scrolls (triangle use)**
	1, 2, 3	Present
	99	Absent
V27		**Triangles in rectangular spaces (triangle use)**
	1, 2, 3, 4, 5, 6, 7, 8	Present
	99	Absent
V28		**Triangles in corners of diagonal lines (triangle use)**
	1	Present
	99	Absent
V29		**Triangles on flags (triangle use)**

	1, 2, 3	Present
	99	Absent
V34		**Triangle extensions (triangle extensions)**
	1	Plain
	2	Flag
	3	Scroll
	4	Multiple tails
	5	Single, indeterminate form (i.e., plain or flag)
	99	None
V36		**Scrolls (primary forms)**
	1	Present
	99	Absent
V38		**Spirals (primary forms)**
	1	Present
	99	Absent
V42		**Scrolls are triangle extensions (triangle extensions)**

1 Yes, present

99 Absent

V46 **Checks (primary forms)**

1 4-sided, right angles

2 4-sided, oblique

3 4-sided, miscellaneous

4 triangular (see V25)

99 None

V48 **Terraces (primary forms)**

1 Present

99 Absent

V50 **Fringe on solids (secondary forms)**

1 Serrated

2 Ticks

3 Attached dots

4 Ticks and/or dots (both or cannot distinguish)

	5	Hooks
	99	None
V51		**Flags present in any form (see V29) (primary forms)**
	1	Present
	99	Absent
V52		**Dots**
	1	Free (primary forms)
	3	Filler (composition)
	4	Free dots in a line (primary forms)
	7	Present, cannot determine role
	99	None
V53		**Z's and/or basketstitch (composition)**
	1, 2, 3	Present
	99	Absent
V54		**Framed cross (primary forms)**
	1	Present

	99	Absent
V55		**T-figure (primary forms)**
	1	Present
	99	Absent
V56		**Ticks**
	1	Free (primary forms)
	3	Filler (composition)
	4	Free ticks in a line (primary forms)
	7	Present, cannot determine role
	99	None
V62		**Circle (primary forms)**
	1	Present, miscellaneous
	2	Single
	3	Concentric
	99	None
V63		**Rectangular solids (primary forms)**

	1, 2, 3, 4, 5	Present
	99	Absent
V66		**Straight lines**
	1	Present
	99	None
V67		**Curved lines**
	1	Curved only with contour of vessel
	3	Basic design is curvilinear (primary forms)
	2, 4	Only small part of design is curvilinear
	99	None
V68		**Squiggle/rickrack lines (primary forms)**
	1	Squiggle
	2	Rickrack
	3	Squiggle and/or rickrack
	99	None
V69		**Fringe on lines (secondary forms)**

1 Railroad tracks

2 Ticks

3 Dots

4 Ticks and/or dots (both or cannot distinguish)

5 Hooks

6 Ticks and railroad tracks

99 None

V70 **Line width mode (mm) (line width)**

1 More than one mode of line width present

V71 **Average line width of smaller mode (mm) (line width)**

A $W < 1.5$

B $1.5 \leq W < 2.5$

C $2.5 \leq W < 3.5$

D $3.5 \leq W < 5$

E $5 \leq W < 7$

F $7 \leq W$

V72 **Average line width of larger mode (mm) (line width)**

A W < 1.5

B 1.5 ≤ W < 2.5

C 2.5 ≤ W < 3.5

D 3.5 ≤ W < 5

E 5 ≤ W < 7

F 7 ≤ W

V73 **Solid (composition)**

1 Present

99 Absent

V74 **Hatch (composition)**

1, 2, 3 Present

99 Absent

V75 **Multiple lines (composition)**

1 Present

99 Absent

V76 **Average space between hatch lines (mm) (composition) (see V74)**

A W < 1.5

B 1.5 ≤ W < 2.5

C 2.5 ≤ W < 3.5

D 3.5 ≤ W < 5

E 5 ≤ W < 7

F 7 ≤ W

V77 **Average space between multiple parallel lines (mm) (composition) (see V75)**

A W < 1.5

B 1.5 ≤ W < 2.5

C 2.5 ≤ W < 3.5

D 3.5 ≤ W < 5

E 5 ≤ W < 7

F 7 ≤ W

Design field (for jars only): Location of the design is recorded

V80 **(neck, shoulder, and/or body)**

C Collar

N Neck

S Shoulder

B Body

Design layout: Three general categories of layouts--bands, panels, and dividing design--are coded for both bowls and jars. Each category is

V81 **subdivided according to details of design organization.**

Bands

B-1 Lines only, with or without secondary elements

B-2 Repeated elements, with one or no framing lines

B-3 Repeated single elements framed above and below

B-4 Repeated motifs (combinations of elements) framed above and below

B-5 Divided panels framed above and below

Panels

P-f Free

P-a Attached

P-n Nested

Divided bowls

D-b Bisected

D-q Quartered

D-o Offset

Divided jars

D-v Vertical

D-s Slant/spiral

V82 **Center**: The presence or absence of a separate design in the center of a bowl is recorded.

1 Present

99 Absent

V83 **Relationship**: How are the designs in different fields (neck, shoulder, and body of a jar; center and border of a bowl) related?

V84 **Symmetry (finite designs)**

cn (cyclic) Has n-fold rotational symmetry, but no bilateral symmetry (e.g., n =2).

dn (dihedral) Has n distinct mirror reflection lines (e.g., n = 2).

cd$n$ Has both rotational and mirror symmetry (e.g., n = 4).

ccdd The code cc, dd, or ccdd indicates a very large n (>6).

V85 **Symmetry (one-dimensional designs)**

11 Translation only

m1 Vertical reflection

1m Horizontal reflection

12 Half turns

mm Horizontal and vertical reflection with half turns

mg Horizontal reflection with half turns

mm/mg Horizontal reflection, questionable vertical reflection

V86 **Symmetry (two-dimensional designs)**

p1 Vertical and horizontal translation

p2 Two maximum rotations with vertical and horizontal translation

pm	One maximum rotation with mirror reflection across the vertical axis only
pg	One maximum rotation with glide reflection about the vertical axis only
cm	Centered; one maximum rotation, mirror reflection across the vertical axis only
pmm	Two maximum rotations with mirror reflection across both the vertical and horizontal axes
pmg	Two maximum rotations with mirror reflection about the vertical axis and glide reflection about the horizontal axis
pgg	Two maximum rotations comprising of glide reflection about both the vertical and horizontal axes
cmm	Centered; two maximum rotations with mirror reflection about both the vertical and horizontal axes
p4	Four maximum rotations
p4m	Four maximum rotations with mirror reflection about both the vertical and horizontal axes
p4g	Four maximum rotations with mirror reflection about both vertical and horizontal axes and glide reflection at a 45-degree angle

	p3	Three maximum rotations
	p3m1	Three maximum rotations with mirror reflection about the vertical axis only
	p31m	Three maximum rotations with mirror reflection at 60-degree rotations
	p6	Six maximum rotations
	p6m	Six maximum rotations with mirror reflection about the horizontal axis and at a 60-degree trajectory
V87		**Framing lines**
	1	Present
	99	Absent
V88		**Multiple parallel lines (Dead-end)**
	R	Right angle
	Dm	Diagonal that meets at a non-end location
	De	Diagonal that meets at end(s) of line
V89		**Multiple parallel lines (Complex)**
	CCr	Crisscross, right angle
	CCd	Crisscross, diagonal

	Sc	Spiral, circular
	Sr	Spiral, right angle
	Sd	Spiral, diagonal
	BC2	Bend & cross, 2
	BC4	Bend & cross, 4
V90		**Multiple parallel lines (Bend)**
	R	Right angle
	D	Diagonal
	C	Circular
V91		**Triangle use (Rectangular spaces)**
	1	One triangle configuration within a rectangular space
	1f (flag)	Triangles used as a flag within a rectangular space
	2	Two triangle configurations within a rectangular space
	2	Two triangles forming part of a rectangular space
	4	Four triangles occupying the corners of a rectangular space
	6	Multiple triangles used to fill a rectangular space

V92 **Triangle use (Single series)**

1 Single, continuous (touching/not spaced out) series of triangles

2 Alternating (flipped/reflected) series of triangles

3 Single, discontinuous (not touching/spaced out) series of triangles

V93 **Triangle use (Double series)**

1 Double, continuous (touching/not-spaced out) series of triangles

1l 1l (lightning)

1r 1r (right triangle)

2 Double, staggered (alternating) series of triangles

3 Double, mirrored and touching, series of triangles

3e 3e (equilateral triangle)

3r 3r (right triangle)

4 Alternating/rotated, touching/not-spaced out series of triangles

5 Mirror-reflection, touching/not-spaced out, continuous series of triangles

6 Double series of alternating/rotated sets of triangles

7 Double sets of reflected, translational triangles

8 Double series of translational triangles connected with hook element

V94 **Triangle use (Other)**

T Triangular

F Flag

A Alone

B Bird

V95 **Triangle use (Triangle type)**

E Equilateral

I Isosceles

R Right

V98 **Rim eversion (degrees)**

A No eversion

B Less than 25 degrees

C 25 - 50 degrees

D 50 - 90 degrees

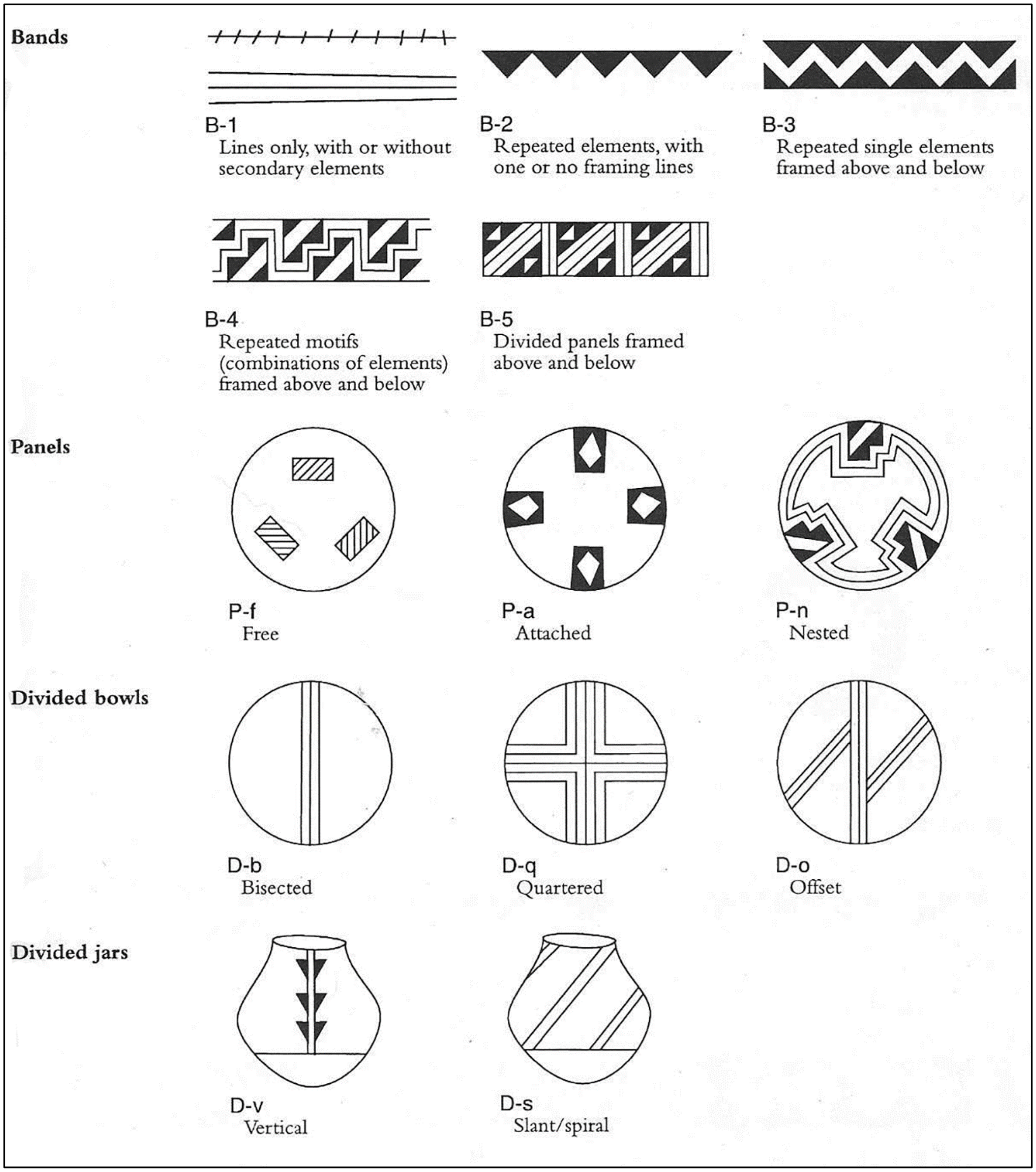
E Greater than 90 degrees

V99	**Rim diameter (cm)**
V100	**Rim arc (degrees)**
V101	**Notes**

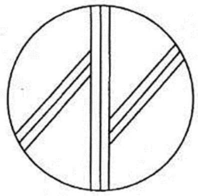
APPENDIX B. ATTRIBUTES FOR DESIGN STYLE ANALYSIS

Table B.1 lists the attributes, and associated explanations, considered in the structure of analysis and rules of design analysis in Chapter 6. Table B.2 provides a list of the attributes, with explanations, used in the analysis in Chapter 7. The pictorial depictions of the design style attributes selected for consideration in this study, as presented in this appendix, are a complement to the written attribute descriptions provided in Appendix A. The images used in this appendix section are adapted after the illustrations used by Hegmon (1995).

Table B.1. Attributes Considered in Structure of Style Analysis.



Finite designs

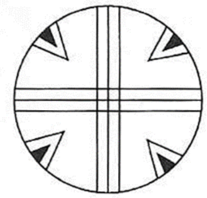


cn

cn (cyclic):
Has n-fold rotational symmetry, but no bilateral symmetry.
Example: $n = 2$.

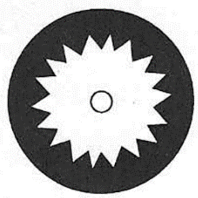
dn

dn (dihedral):
Has n distinct mirror reflection lines.
Example: $n = 2$.



cd$n$

cd$n$:
Has both rotational and mirror symmetry.
Example: $n = 4$.



ccdd

The code cc, dd, or ccdd indicates a very large n (>6).

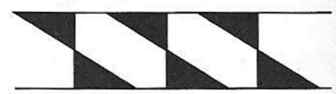
One-dimensional designs

11

Translation only

m1

Horizontal reflection



12

Half turns

mm

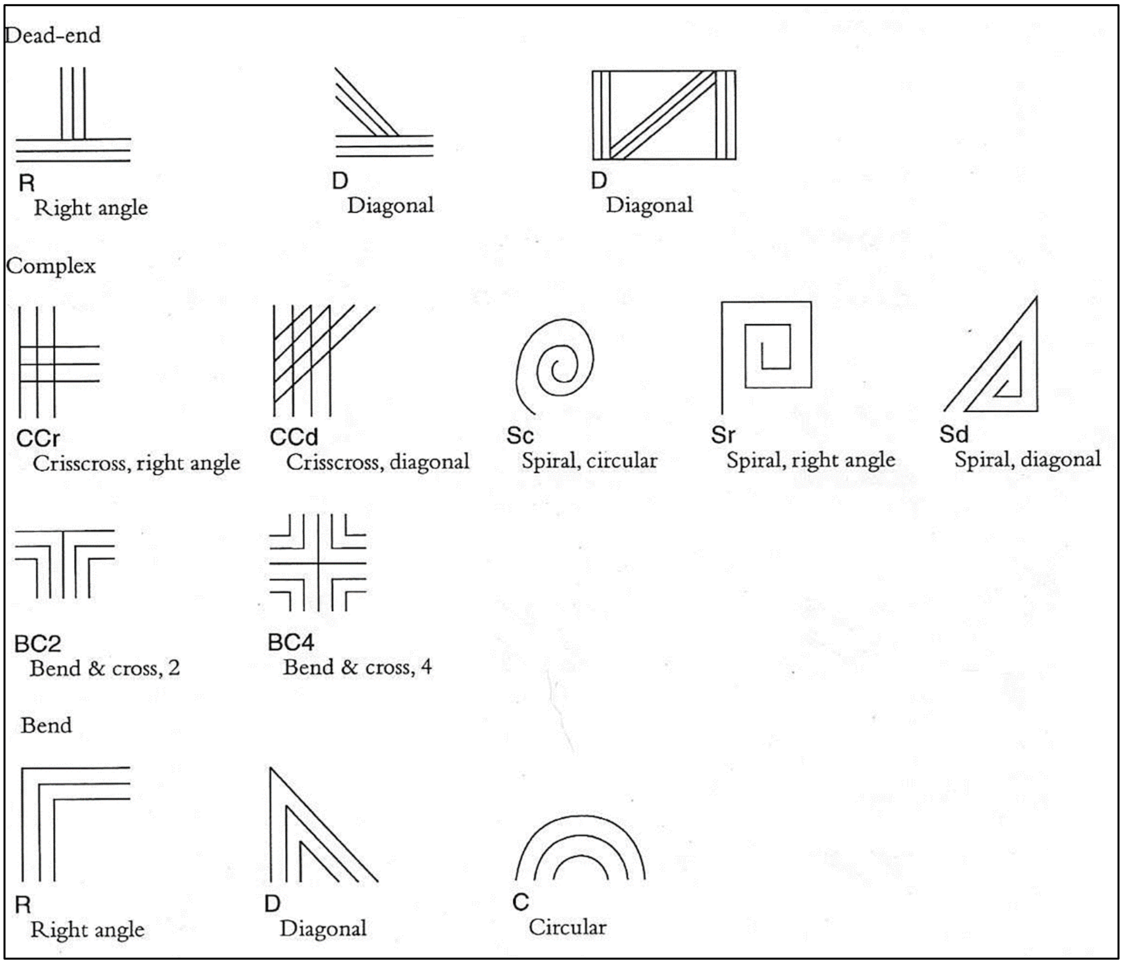
Horizontal and vertical reflection with half turns

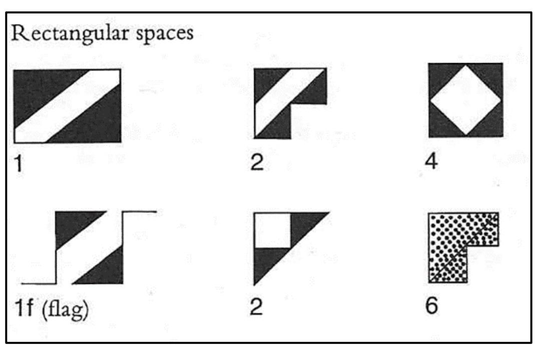
mg

Horizontal reflection with half turns

mm/mg

Horizontal reflection, questionable vertical reflection


Dead-end
R
Right angle
D
Diagonal
D
Diagonal
Complex
CCr
Crisscross, right angle
CCd
Crisscross, diagonal
Sc
Spiral, circular
Sr
Spiral, right angle
Sd
Spiral, diagonal
BC2
Bend & cross, 2
BC4
Bend & cross, 4
Bend
R
Right angle
D
Diagonal
C
Circular


Rectangular spaces
1
2
4
1f (flag)
2
6

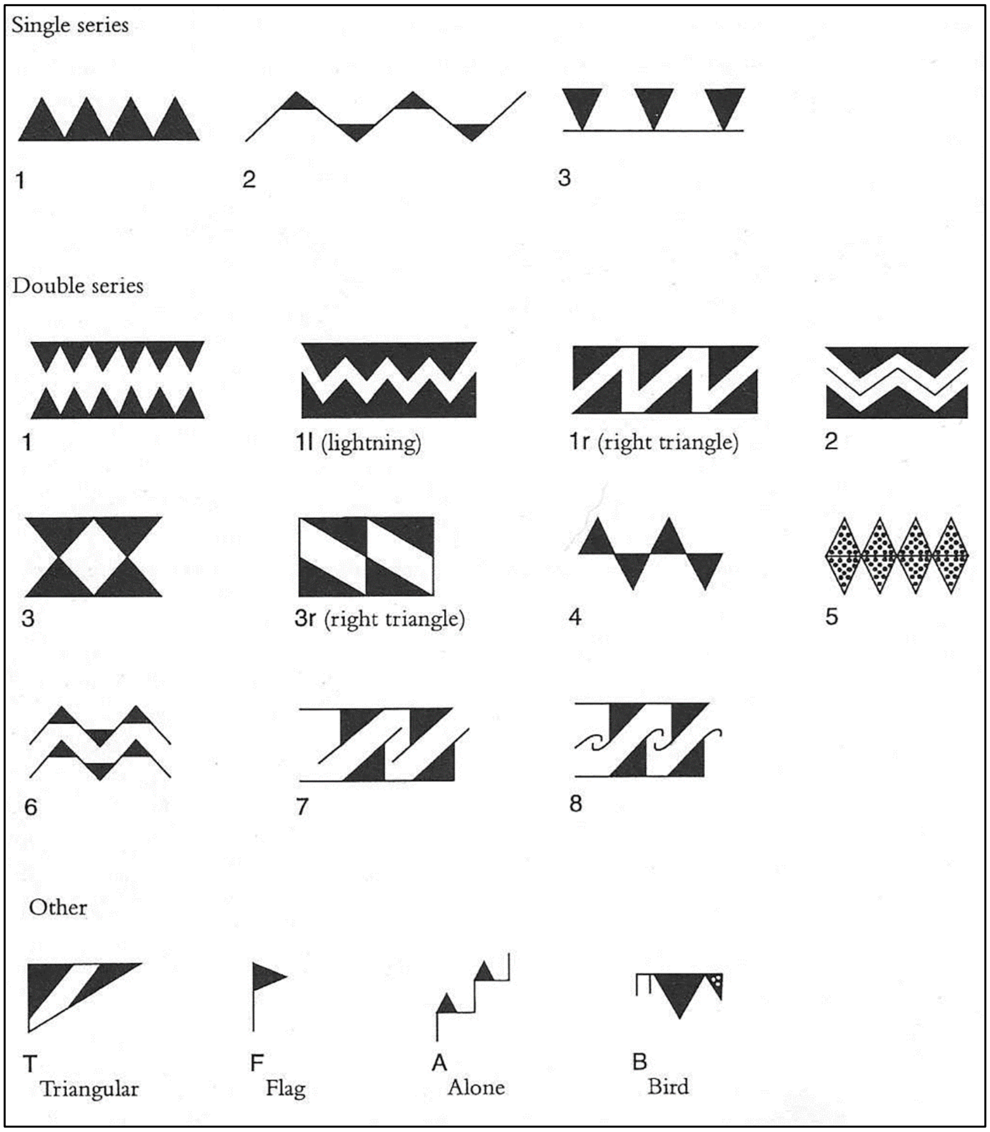

Single series
1
2
3
Double series
1
1l (lightning)
1r (right triangle)
2
3
3r (right triangle)
4
5
6
7
8
Other
T
Triangular
F
Flag
A
Alone
B
Bird

Table B.2. Design Categories Used in Assessing Stylistic Diversity and Similarity.

Primary forms	triangle; scroll/spiral; checks; terrace; flag; free dots; framed cross; T-figure; circle; rectangular solid; straight lines; curved line; squiggle and rickrack lines
Secondary forms	serrated; ticks; attached dots; railroad tracks; hooks; none
Triangle use	in a line; checkerboard; attached to scrolls; in rectangular spaces; in corners of diagonal lines; on flags
Triangle extensions	plain; flag; scroll; multiple tails; none
Composition	filler dots; Z's (basketstitch); solid; hatch; multiple lines
Line width (mm)	W < 1.5; 1.5 ≤ W < 2.5; 2.5 ≤ W < 3.5; 3.5 ≤ W < 5; 5 ≤ W < 7; 7 ≤ W

APPENDIX C. BOWL (SHERD, PARTIAL AND COMPLETE) MEASURMENTS

Table C.1 lists the pottery type, rim eversion, rim diameter, and rim arc (where available) for all bowl sherds as well as partial and complete bowls analyzed over the course of this study that yielded vessel size information.

Table C.1. Vessel Size Measurements for Bowls Sherds, Partial, and Complete Bowls.

Case	Pottery Type	Rim Eversion (degrees)	Rim Diameter (cm)	Rim Arc (degrees)
1	North Creek Black-on-gray	No eversion	17	360
2	Tuckup Black-on-gray	No eversion	20	360
3	St. George Black-on-gray	No eversion	27	360
4	North Creek Black-on-gray	No eversion	26	360
5	North Creek Black-on-gray	No eversion	23	360
8	Trumbull Black-on-gray	No eversion	32	25
9	Middleton Polychrome	No eversion	28	25
11	Nankoweap Polychrome	No eversion	31	25
12	Tusayan Black-on-red	No eversion	21	360
13	North Creek Black-on-gray	No eversion	24	360
14	North Creek Black-on-gray	No eversion	26	360
15	St. George Black-on-gray	No eversion	20	360
16	St. George Black-on-gray	No eversion	15	360
17	North Creek Black-on-gray	No eversion	27	342
18	Tusayan Black-on-red	No eversion	19	360
20	North Creek Black-on-gray	No eversion	30 x 33.5	360
21	North Creek Black-on-gray	No eversion	23	360
22	Washington Black-on-gray	No eversion	23	39.6
24	Washington Black-on-gray	No eversion	12 x 15.5	360

25	St. George Black-on-gray	No eversion	17.5	360
26	Tusayan Black-on-red	No eversion	13	360
28	Mesquite Black-on-gray	No eversion	15.5	360
29	St. George Black-on-gray	No eversion	16	360
30	North Creek Black-on-gray	No eversion	15	360
64	North Creek Black-on-gray	No eversion	21	14
72	TWW, Virgin Series, cannot determine type	No eversion	36	5
73	Medicine Black-on-red	No eversion	29	9
74	Medicine Black-on-red	No eversion	27	14
75	Moapa Gray Ware, cannot determine type	No eversion	27	7
76	Trumbull Black-on-gray	No eversion	25	14
78	North Creek Black-on-gray	No eversion	20	11
81	TWW, Virgin Series, cannot determine type	No eversion	25	7
88	Moapa Black-on-gray	No eversion	30	14
89	Moapa Gray Ware, cannot determine type	No eversion	26	11
90	TWW, Virgin Series, cannot determine type	No eversion	20	7
91	Moapa Gray Ware, cannot determine type	No eversion	26	7
92	Moapa Gray Ware, cannot determine type	No eversion	32	14
94	TWW, Virgin Series, cannot determine type	No eversion	25	7
95	Moapa Gray Ware, cannot determine type	No eversion	26	7
96	Moapa Gray Ware, cannot determine type	N/A	24	18
98	Moapa Gray Ware, cannot determine type	No eversion	25	14

99	Moapa Gray Ware, cannot determine type	No eversion	29	7
102	Washington Black-on-gray	No eversion	24	18
103	North Creek Black-on-gray	No eversion	37	22
104	North Creek Black-on-gray	No eversion	27	7
107	Moapa Black-on-gray	No eversion	26	18
108	Moapa Gray Ware, cannot determine type	No eversion	31	14
114	St. George Black-on-gray	No eversion	24	47
115	St. George Black-on-gray	No eversion	25	16
118	TWW, Virgin Series, cannot determine type	No eversion	30	13
119	TWW, Virgin Series, cannot determine type	No eversion	27	11
120	TWW, Virgin Series, cannot determine type	No eversion	23	25
121	Washington Black-on-gray	No eversion	19	32
122	TWW, Virgin Series, cannot determine type	No eversion	18	36
123	Washington Black-on-gray	No eversion	18	11
124	TWW, Virgin Series, cannot determine type	No eversion	29	18
125	Washington Black-on-gray	No eversion	25	11
126	TWW, Virgin Series, cannot determine type	No eversion	37	7
127	North Creek Black-on-gray	No eversion	24	18
128	Washington Black-on-gray	No eversion	29	7
129	North Creek Black-on-gray	No eversion	19	25
130	Washington Black-on-gray	No eversion	24	36
132	TWW, Virgin Series, cannot determine type	No eversion	30	7

133	Washington Black-on-gray	No eversion	29	7
134	Washington Black-on-gray	No eversion	27	11
136	Washington Black-on-gray	No eversion	30	7
139	Hurricane Black-on-gray	No eversion	23	25
145	Washington Black-on-gray	No eversion	41	7.2
148	TWW, Virgin Series, cannot determine type	N/A	20	10.8
149	TWW, Virgin Series, cannot determine type	No eversion	20	10.8
150	St. George Black-on-gray	No eversion	20	18
153	TWW, Virgin Series, cannot determine type	No eversion	24	21.6
154	TWW, Virgin Series, cannot determine type	No eversion	30	7.2
155	TWW, Virgin Series, cannot determine type	No eversion	36	10.8
156	TWW, Virgin Series, cannot determine type	No eversion	30	7.2
157	TWW, Virgin Series, cannot determine type	No eversion	21	21.6
160	Washington Black-on-gray	No eversion	25	39.6
163	St. George Black-on-gray	No eversion	29	21.6
164	TWW, Virgin Series, cannot determine type	No eversion	19	25.2
165	TWW, Virgin Series, cannot determine type	No eversion	26	25.2
166	Washington Black-on-gray	No eversion	25	10.8
167	TWW, Virgin Series, cannot determine type	No eversion	21	7.2
168	Washington Black-on-gray	No eversion	20	10.8
169	North Creek Black-on-gray	No eversion	12	32.4
170	North Creek Black-on-gray	No eversion	14	54

171	North Creek Black-on-gray	No eversion	26	14.4
172	TWW, Virgin Series, cannot determine type	No eversion	23	18
175	Washington Black-on-gray	No eversion	32	39.6
176	Washington Black-on-gray	No eversion	19	10.8
177	St. George Black-on-gray	No eversion	25	25.2
178	Washington Black-on-gray	No eversion	25	10.8
186	St. George Black-on-gray	No eversion	28	28.8
187	TWW, Virgin Series, cannot determine type	No eversion	18	50.4
188	St. George Black-on-gray	No eversion	26	21.6
189	North Creek Black-on-gray	No eversion	23	14.4
190	Washington Black-on-gray	No eversion	33	18
191	TWW, Virgin Series, cannot determine type	No eversion	23	18
192	TWW, Virgin Series, cannot determine type	No eversion	30	21.6
195	Moapa Gray Ware, cannot determine type	No eversion	30	18
197	Moapa Gray Ware, cannot determine type	No eversion	38	14.4
205	Tusayan Black-on-red	No eversion	19	7.2
206	Deadmans Black-on-red	No eversion	25	18
207	Moapa Black-on-gray	No eversion	38	18
209	North Creek Black-on-gray	No eversion	26	21.6
210	TWW, Virgin Series, cannot determine type	25 - 50	20	14.4
211	Hurricane Black-on-gray	No eversion	34	14.4
212	Toquerville Black-on-white	No eversion	30	18

216	Dogoszhi Black-on-white	No eversion	24	14.4
217	Black Mesa Black-on-white	No eversion	20	28.8
219	Tusayan Black-on-red	No eversion	19	25.2
221	St. George Black-on-gray	No eversion	39	14.4
226	St. George Black-on-gray	No eversion	39	18
229	Washington Black-on-gray	No eversion	20	18
233	Tusayan Black-on-red	No eversion	23	28.8
250	Tusayan Black-on-red	No eversion	14	18
255	Middleton Black-on-red	No eversion	10	36
259	Orderville Black-on-gray	No eversion	15.5	360
261	Washington Black-on-gray	No eversion	36	14.4
262	St. George Black-on-gray	No eversion	22	18
263	St. George Black-on-gray	No eversion	19	18
269	Tusayan Black-on-red	No eversion	26	21.6
286	North Creek Black-on-gray	No eversion	32	54
287	Hildale Black-on-gray	No eversion	35	360
288	Slide Mountain Black-on-gray	No eversion	20	360
290	Washington Black-on-gray	No eversion	19	18
292	Washington Black-on-gray	No eversion	24	10.8
293	Washington Black-on-gray	No eversion	20	25.2
294	Washington Black-on-gray	No eversion	30	14.4
295	TWW, Virgin Series, cannot determine type	No eversion	30	10.8

297	Washington Black-on-gray	No eversion	35	21.6
298	TWW, Virgin Series, cannot determine type	No eversion	28	10.8
301	Washington Black-on-gray	No eversion	25	21.6
303	Washington Black-on-gray	No eversion	24	18
306	Washington Black-on-gray	No eversion	24	25.2
311	Washington Black-on-gray	No eversion	29	18
312	TWW, Virgin Series, cannot determine type	No eversion	30	18
313	North Creek Black-on-gray	No eversion	24	32.4
315	Orderville Black-on-gray	< 25	17	54
316	Hildale Black-on-gray	No eversion	28	39.6
317	North Creek Black-on-gray	No eversion	21	90
318	North Creek Black-on-gray	No eversion	17	93.6
319	Hildale Black-on-gray	No eversion	27	54
320	St. George Black-on-gray	No eversion	21	225
353	North Creek Black-on-gray	No eversion	24	18
367	Middleton Black-on-red	No eversion	27	54
371	Middleton Black-on-red	50 - 90	22	6
374	Middleton Black-on-red	No eversion	29	18
376	Washington Black-on-gray	50 - 90	29	21.6
378	TWW, Virgin Series, cannot determine type	No eversion	18	36
379	North Creek Black-on-gray	No eversion	20	39.6
381	St. George Black-on-gray	No eversion	18	57.6

389	St. George Black-on-gray	No eversion	23	25.2
390	Glendale Black-on-gray	No eversion	12	198
391	Hildale Black-on-gray	No eversion	25	54
392	Hildale Black-on-gray	No eversion	22	21.6
393	Hildale Black-on-gray	No eversion	14	32.4
394	Hildale Black-on-gray	No eversion	33	18
397	Slide Mountain Black-on-gray	No eversion	20	32.4
399	Hildale Black-on-gray	No eversion	24	18
402	Hildale Black-on-gray	No eversion	27	18
406	St. George Black-on-gray	No eversion	14	43.2
410	St. George Black-on-gray	No eversion	30	18
412	Tuckup Black-on-gray	No eversion	19	18
415	Tusayan Black-on-red	No eversion	20	21.6
416	Medicine Black-on-red	No eversion	19	18
417	Tusayan Black-on-red	No eversion	19	43.2
420	Kana-a Black-on-white	No eversion	24	18
421	Kana-a Black-on-white	No eversion	16	21.6
431	Medicine Black-on-red	No eversion	25	61.2
432	Medicine Black-on-red	No eversion	19	50.4
433	Medicine Black-on-red	No eversion	25	21.6
434	Medicine Black-on-red	No eversion	27	18
435	Medicine Black-on-red	No eversion	14	28.8

438	Medicine Black-on-red	No eversion	25	25.2
440	Medicine Black-on-red	No eversion	26	28.8
442	Tusayan Black-on-red	No eversion	31	25.2
446	Tusayan Black-on-red	No eversion	18	25.2
447	Tusayan Black-on-red	No eversion	21	21.6
448	Tusayan Black-on-red	No eversion	25	28.8
450	Tusayan Black-on-red	No eversion	19	54
454	Kana-a Black-on-white	No eversion	25	28.8
473	Black Mesa Black-on-white	No eversion	17	18
478	Sosi Black-on-white	No eversion	28	25.2
479	Sosi Black-on-white	No eversion	19	25.2
488	Dogoszhi Black-on-white	No eversion	18	28.8
499	Sosi Black-on-white	No eversion	20	36
505	Flagstaff Black-on-white	No eversion	19	32.4
511	Dogoszhi Black-on-white	No eversion	12	36
514	Tusayan Black-on-red	No eversion	30	21.6
521	Black Mesa Black-on-white	No eversion	30	18
527	Black Mesa Black-on-white	No eversion	21	32.4
537	Black Mesa Black-on-white	No eversion	17	25.2
540	Black Mesa Black-on-white	No eversion	18	18
541	Sosi Black-on-white	No eversion	24	36
558	Sosi Black-on-white	25 - 50	22	32.4

559	Sosi Black-on-white	No eversion	24	32.4
560	Sosi Black-on-white	No eversion	31	28.8
561	Sosi Black-on-white	No eversion	24	25.2
562	Sosi Black-on-white	No eversion	16	18
564	Sosi Black-on-white	No eversion	20	28.8
570	Dogoszhi Black-on-white	No eversion	13	28.8
587	Dogoszhi Black-on-white	No eversion	14	54
590	Black Mesa Black-on-white	No eversion	13	28.8
592	Black Mesa Black-on-white	No eversion	24	21.6
593	Black Mesa Black-on-white	No eversion	23	32.4
594	Black Mesa Black-on-white	No eversion	14	25.2
595	Black Mesa Black-on-white	No eversion	12	64.8
596	Black Mesa Black-on-white	No eversion	23	25.2
597	Black Mesa Black-on-white	No eversion	15	39.6
598	Black Mesa Black-on-white	No eversion	15	18
680	Washington Black-on-gray	No eversion	23	111.6
681	Washington Black-on-gray	No eversion	15	18
682	Washington Black-on-gray	No eversion	10	25.2
686	Washington Black-on-gray	No eversion	10	93.6
687	Hildale Black-on-gray	25 - 50	21	25.2
688	Hildale Black-on-gray	No eversion	27	18
692	Hildale Black-on-gray	No eversion	26	21.6

693	Hildale Black-on-gray	No eversion	18	25.2
713	Dogoszhi Black-on-white	No eversion	35	21.6
714	Dogoszhi Black-on-white	No eversion	22	25.2
718	Dogoszhi Black-on-white	No eversion	34	21.6
742	Hildale Black-on-gray	No eversion	20	25.2
743	Hildale Black-on-gray	No eversion	30	18
745	Hildale Black-on-gray	25 - 50	15	32.4
747	Dogoszhi Black-on-white	No eversion	14	43.2
748	Hildale Black-on-gray	50 - 90	20	28.8
768	Hildale Black-on-gray	No eversion	26	18
776	Pipe Spring Black-on-gray	No eversion	30	25.2
777	Fern Glen Black-on-gray	No eversion	25	21.6
791	Hildale Black-on-gray	No eversion	23	32.4
792	Pipe Spring Black-on-gray	50 - 90	27	18
797	Glendale Black-on-gray	No eversion	25	21.6
798	Glendale Black-on-gray	25 - 50	25	21.6
805	Flagstaff Black-on-white	No eversion	24	25.2
810	Washington Black-on-gray	No eversion	20	28.8
812	St. George Black-on-gray	No eversion	26	18
818	Washington Black-on-gray	No eversion	34	18
820	Washington Black-on-gray	No eversion	24	36
821	St. George Black-on-gray	No eversion	25	39.6

822	St. George Black-on-gray	No eversion	27	28.8
824	TWW, Virgin Series, cannot determine type	No eversion	20	18
831	Washington Black-on-gray	No eversion	31	25.2
832	Washington Black-on-gray	No eversion	29	21.6
838	North Creek Black-on-gray	No eversion	28	25.2
841	Washington Black-on-gray	No eversion	25	25.2
846	Washington Black-on-gray	No eversion	25	21.6
849	Washington Black-on-gray	No eversion	31	64.8
850	North Creek Black-on-gray	No eversion	34	75.6
851	St. George Black-on-gray	No eversion	16.5	198
852	St. George Black-on-gray	No eversion	39	43.2
853	St. George Black-on-gray	No eversion	31	64.8
854	St. George Black-on-gray	No eversion	26	28.8
855	Washington Black-on-gray	No eversion	25	140.4
856	Washington Black-on-gray	No eversion	16	36
860	St. George Black-on-gray	No eversion	21	18
866	Washington Black-on-gray	No eversion	27	18
873	Black Mesa Black-on-white	No eversion	24	32.4
890	North Creek Black-on-gray	No eversion	24	18
910	St. George Black-on-gray	No eversion	18	18
924	North Creek Black-on-gray	No eversion	24	36
925	North Creek Black-on-gray	No eversion	21	21.6

926	Washington Black-on-gray	No eversion	17	18
929	Hildale Black-on-gray	< 25	13	43.2
932	Hildale Black-on-gray	No eversion	17	25.2
934	Hildale Black-on-gray	No eversion	25	21.6
935	Hildale Black-on-gray	No eversion	20	18
941	Hildale Black-on-gray	No eversion	29	32.4
942	Hildale Black-on-gray	No eversion	21	21.6
978	Glendale Black-on-gray	No eversion	21	25.2
979	Glendale Black-on-gray	No eversion	18	25.2
983	North Creek Black-on-gray	< 25	26	39.6
984	Hildale Black-on-gray	No eversion	19	18
985	Hildale Black-on-gray	No eversion	14	21.6
989	Pipe Spring Black-on-gray	No eversion	22	25.2
990	Pipe Spring Black-on-gray	No eversion	19	25.2
995	Glendale Black-on-gray	No eversion	23	25.2
1006	Glendale Black-on-gray	No eversion	22	82.8
1007	Pipe Spring Black-on-gray	No eversion	20	79.2
1009	Glendale Black-on-gray	No eversion	20	54
1010	North Creek Black-on-gray	No eversion	27	43.2
1011	North Creek Black-on-gray	No eversion	26	28.8
1012	St. George Black-on-gray	No eversion	13	36
1022	Dogoszhi Black-on-white	No eversion	26	28.8

1033	Sosi Black-on-white	No eversion	26	28.8
1034	Sosi Black-on-white	No eversion	21	32.4
1036	Sosi Black-on-white	No eversion	25	25.2
1037	Black Mesa Black-on-white	No eversion	24	21.6
1041	Washington Black-on-gray	No eversion	10	21.6
1050	Washington Black-on-gray	No eversion	20	46.8
1065	Tusayan Black-on-red	No eversion	16	25.2
1066	Boysag Black-on-gray	No eversion	28	32.4
1070	Moapa Black-on-gray	No eversion	17	75.6
1073	TWW, Virgin Series, cannot determine type	No eversion	26	25.2
1074	North Creek Black-on-gray	No eversion	25	28.8
1075	Washington Black-on-gray	No eversion	13	28.8
1077	Mesquite Black-on-gray	No eversion	23	21.6
1080	St. George Black-on-gray	No eversion	15	28.8
1084	Washington Black-on-gray	No eversion	12	18
1086	Mesquite Black-on-gray	No eversion	20	18
1087	Mesquite Black-on-gray	No eversion	23	18
1088	Washington Black-on-gray	No eversion	27	21.6
1105	Mesquite Black-on-gray	No eversion	24	172.8
1107	Washington Black-on-gray	No eversion	45	25.2
1108	St. George Black-on-gray	No eversion	24	25.2
1109	North Creek Black-on-gray	No eversion	30	54

1110	Tusayan Black-on-red	No eversion	15	36
1113	Washington Black-on-gray	No eversion	17	36
1122	St. George Black-on-gray	No eversion	33	32.4
1123	Flagstaff Black-on-white	50 - 90	26	54
1124	Flagstaff Black-on-white	No eversion	20	36
1125	Washington Black-on-gray	No eversion	24	18
1126	Washington Black-on-gray	No eversion	29	25.2
1131	St. George Black-on-gray	No eversion	15	46.8
1133	Glendale Black-on-gray	No eversion	25	18
1134	Washington Black-on-gray	No eversion	18	18
1138	St. George Black-on-gray	No eversion	23	28.8
1139	St. George Black-on-gray	No eversion	21	28.8
1144	St. George Black-on-gray	No eversion	28	46.8
1145	North Creek Black-on-gray	No eversion	20	36
1148	North Creek Black-on-gray	No eversion	12	50.4
1149	North Creek Black-on-gray	No eversion	40	21.6
1150	North Creek Black-on-gray	No eversion	25	36
1152	St. George Black-on-gray	No eversion	23	36
1153	North Creek Black-on-gray	50 - 90	20	28.8
1160	St. George Black-on-gray	No eversion	37	18
1161	Hildale Black-on-gray	No eversion	39	18
1175	Washington Black-on-gray	No eversion	29	28.8

1189	Mesquite Black-on-gray	No eversion	23	21.6
1194	Washington Black-on-gray	No eversion	33	86.4
1195	Washington Black-on-gray	No eversion	26	86.4
1196	St. George Black-on-gray	No eversion	24	212.4
1197	Medicine Black-on-red	No eversion	31	338.4
1198	Mesquite Black-on-gray	No eversion	18	349.2
1199	North Creek Black-on-gray	No eversion	17	331.2
1200	North Creek Black-on-gray	No eversion	35	21.6
1201	North Creek Black-on-gray	No eversion	25	18
1202	North Creek Black-on-gray	No eversion	22	18
1212	Moapa Black-on-gray	No eversion	24	18
1219	Washington Black-on-gray	No eversion	26	28.8
1220	Washington Black-on-gray	No eversion	21	25.2
1223	North Creek Black-on-gray	No eversion	28	18
1227	Mesquite Black-on-gray	No eversion	25	46.8
1233	North Creek Black-on-gray	No eversion	30	18
1234	Moapa Gray Ware, cannot determine type	25 - 50	14	28.8
1238	Moapa Black-on-gray	No eversion	30	25.2
1248	North Creek Black-on-gray	No eversion	29	360
1249	Lino Black-on-gray	No eversion	26	324
1250	Hurricane Black-on-gray	No eversion	31	335
1252	Washington Black-on-gray	No eversion	27	18

1253	Washington Black-on-gray	No eversion	12	21.6
1256	Washington Black-on-gray	No eversion	32	25.2
1257	Mesquite Black-on-gray	No eversion	32	25.2
1258	Mesquite Black-on-gray	No eversion	17	43.2
1259	Washington Black-on-gray	No eversion	28	25.2
1275	Mesquite Black-on-gray	No eversion	20	18
1280	Washington Black-on-gray	No eversion	13	61.2
1290	Hurricane Black-on-gray	No eversion	26	18
1295	North Creek Black-on-gray	No eversion	34	43.2
1298	North Creek Black-on-gray	No eversion	20	21.6
1299	North Creek Black-on-gray	25 - 50	15	21.6
1300	Moapa Black-on-gray	No eversion	27	32.4
1301	North Creek Black-on-gray	No eversion	29	18
1302	North Creek Black-on-gray	No eversion	20	18
1304	North Creek Black-on-gray	No eversion	20	36
1305	North Creek Black-on-gray	No eversion	30	18
1309	North Creek Black-on-gray	No eversion	20	21.6
1318	Hildale Black-on-gray	No eversion	30	21.6
1329	TWW, Virgin Series, cannot determine type	No eversion	20	21.6
1334	TWW, Virgin Series, cannot determine type	No eversion	10	36
1335	Washington Black-on-gray	No eversion	29	18
1367	St. George Black-on-gray	No eversion	15	36

1397	St. George Black-on-gray	No eversion	30	25.2
1399	North Creek Black-on-gray	No eversion	31	18
1402	North Creek Black-on-gray	No eversion	20	57.6
1403	North Creek Black-on-gray	No eversion	30	25.2
1404	North Creek Black-on-gray	No eversion	20	25.2
1405	North Creek Black-on-gray	No eversion	25	21.6
1407	North Creek Black-on-gray	No eversion	31	18
1417	North Creek Black-on-gray	No eversion	30	21.6
1419	North Creek Black-on-gray	No eversion	31	21.6
1422	North Creek Black-on-gray	No eversion	28	18
1423	North Creek Black-on-gray	No eversion	20	21.6
1427	North Creek Black-on-gray	No eversion	20	21.6
1435	North Creek Black-on-gray	No eversion	21	18
1494	St. George Black-on-gray	No eversion	29	28.8
1511	North Creek Black-on-gray	No eversion	18	129.6
1514	Hildale Black-on-gray	No eversion	28	18
1526	North Creek Black-on-gray	No eversion	17	25.2
1535	Glendale Black-on-gray	No eversion	20	25.2
1536	Hildale Black-on-gray	No eversion	29	18
1537	Glendale Black-on-gray	No eversion	19	28.8
1550	Hildale Black-on-gray	No eversion	15	25.2
1552	North Creek Black-on-gray	No eversion	21	36

1554	North Creek Black-on-gray	No eversion	30	28.8
1565	TWW, Virgin Series (Corrugated), cannot determine type	No eversion	23	18
1569	TWW, Virgin Series, cannot determine type	No eversion	22	36
1586	Slide Mountain Black-on-gray	No eversion	25	18
1595	Glendale Black-on-gray	No eversion	25	21.6
1596	Hildale Black-on-gray	No eversion	19	18
1614	Moapa Black-on-gray	No eversion	25	25.2
1615	St. George Black-on-gray	No eversion	25	39.6
1617	Moapa Black-on-gray	No eversion	24	39.6
1621	Slide Mountain Black-on-gray	No eversion	24	32.4
1623	Moapa Black-on-gray	No eversion	25	25.2
1629	St. George Black-on-gray	No eversion	25	25.2
1630	Moapa Black-on-gray	25 - 50	14	82.8
1633	North Creek Black-on-gray	No eversion	25	21.6
1651	Washington Black-on-gray	No eversion	35	21.6
1653	Washington Black-on-gray	No eversion	19	360
1654	St. George Black-on-gray	No eversion	23	90
1659	Slide Mountain Black-on-gray	No eversion	15	18
1661	Poverty Mountain Black-on-gray	No eversion	15	32.4
1681	Trumbull Black-on-gray	No eversion	13	18
1683	Trumbull Black-on-gray	No eversion	24	25.2

1684	Whitmore Black-on-gray	No eversion	20	32.4
1696	Mesquite Black-on-gray	No eversion	8	18
1702	Mesquite Black-on-gray	No eversion	20	18
1713	Washington Black-on-gray	No eversion	26	18
1718	Poverty Mountain Black-on-gray	50 - 90	8	36
1730	Washington Black-on-gray	No eversion	11	36
1763	Tusayan Black-on-red	No eversion	26	32.4
1764	Tusayan Black-on-red	No eversion	24	18
1765	Tusayan Black-on-red	No eversion	16	25.2
1766	Tusayan Black-on-red	No eversion	18	18
1767	Tusayan Black-on-red	No eversion	20	21.6
1783	Lino Black-on-gray	No eversion	25	25.2
1806	Tusayan Black-on-red	No eversion	15	21.6
1823	TWW, Kayenta Series, cannot determine type	No eversion	13	54
1824	Tusayan Black-on-red	No eversion	21	18
1825	Tusayan Black-on-red	No eversion	14	43.2
1826	Tusayan Black-on-red	No eversion	24	25.2
1832	Kana-a Black-on-white	No eversion	19	64.8
1838	Black Mesa Black-on-white	No eversion	19	36
1846	Sosi Black-on-white	No eversion	30	21.6
1871	Flagstaff Black-on-white	No eversion	10	43.2

1898	Sosi Black-on-white	No eversion	24	32.4
1899	Sosi Black-on-white	25 - 50	15	25.2
1966	Tusayan Black-on-red	No eversion	24	21.6
1967	Tusayan Black-on-red	No eversion	22	21.6
1980	Black Mesa Black-on-white	No eversion	24	21.6
1989	Medicine Black-on-red	No eversion	25	43.2
2003	Black Mesa Black-on-white	No eversion	23	32.4
2009	Black Mesa Black-on-white	No eversion	15	28.8
2021	Kana-a Black-on-white	No eversion	19	21.6
2052	Dogoszhi Black-on-white	No eversion	21	108
2057	Black Mesa Black-on-white	No eversion	21	43.2
2058	North Creek Black-on-gray	No eversion	16.5	360
2059	Hurricane Black-on-gray	No eversion	23	360
2060	Boysag Black-on-gray	No eversion	8	36
2061	Hildale Black-on-gray	No eversion	19	18
2082	Washington Black-on-gray	No eversion	24	288
2083	Hildale Black-on-gray	No eversion	17	360
2085	North Creek Black-on-gray	No eversion	25.5 x 26.5	360
2088	North Creek Black-on-gray	No eversion	13	360
2089	North Creek Black-on-gray	No eversion	18.5	360
2091	North Creek Black-on-gray	No eversion	26	360
2092	North Creek Black-on-gray	No eversion	15	360

2093	St. George Black-on-gray	No eversion	17.5	360
2094	North Creek Black-on-gray	No eversion	22	360
2095	Moapa Black-on-gray	No eversion	18 x 19.5	360
2096	Trumbull Black-on-gray	No eversion	21.5	360
2097	Trumbull Black-on-gray	No eversion	28.5	360
2098	Tusayan Black-on-red	No eversion	25	360
2099	North Creek Black-on-gray	No eversion	21 x 22	360
2100	St. George Black-on-gray	No eversion	20	360
2101	St. George Black-on-gray	No eversion	17	360
2102	North Creek Black-on-gray	No eversion	30.5	360
2103	Hurricane Black-on-gray	No eversion	22	360
2104	St. George Black-on-gray	No eversion	23.5	360
2105	North Creek Black-on-gray	No eversion	24	144
2106	North Creek Black-on-gray	No eversion	23	360
2107	Hurricane Black-on-gray	No eversion	26	360
2108	North Creek Black-on-gray	No eversion	20	360
2109	Moapa Black-on-gray	No eversion	23	360
2110	North Creek Black-on-gray	No eversion	32	360
2111	Moapa Black-on-gray	No eversion	26.5	360
2112	North Creek Black-on-gray	No eversion	30.5	360
2113	North Creek Black-on-gray	No eversion	21	360
2115	Washington Black-on-gray	No eversion	11	36

2120	Moapa Black-on-gray	No eversion	23.5 x 24.5	342
2123	Trumbull Black-on-gray	No eversion	27	21.6
2127	Black Mesa Black-on-white	No eversion	14	21.6
2129	Moapa Black-on-gray	No eversion	23	50.4
2130	North Creek Black-on-gray	No eversion	22	43.2
2135	North Creek Black-on-gray	No eversion	15	18
2138	Hildale Black-on-gray	No eversion	18	18
2141	Glendale Black-on-gray	No eversion	11	36
2152	North Creek Black-on-gray	No eversion	25	36
2155	North Creek Black-on-gray	No eversion	16	21.6
2158	Hildale Black-on-gray	No eversion	18	21.6
2160	Hildale Black-on-gray	No eversion	27	21.6
2165	St. George Black-on-gray	No eversion	29	115.2
2166	Moapa Black-on-gray	No eversion	30	64.8
2167	Washington Black-on-gray	No eversion	27	360
2168	North Creek Black-on-gray	No eversion	19.5 x 30.5	360
2169	Moapa Black-on-gray	No eversion	15.5 x 17.5	360
2170	Tusayan Black-on-red	No eversion	24.5	360
2171	St. George Black-on-gray	No eversion	24	360
2172	Boysag Black-on-gray	No eversion	27	151.2
2173	North Creek Black-on-gray	No eversion	30	360
2175	Washington Black-on-gray	No eversion	20	360

2176	North Creek Black-on-gray	No eversion	20	360
2177	St. George Black-on-gray	No eversion	24.5	360
2178	North Creek Black-on-gray	No eversion	12 x 18	360
2179	North Creek Black-on-gray	No eversion	18	360
2180	North Creek Black-on-gray	No eversion	21.5 x 25	360
2181	St. George Black-on-gray	No eversion	24	360
2182	North Creek Black-on-gray	No eversion	25.5	360
2183	Moapa Black-on-gray	No eversion	28	360
2184	Medicine Black-on-red	No eversion	19.5 x 20.5	360
2186	North Creek Black-on-gray	No eversion	29	360
2188	Moapa Black-on-gray	No eversion	28	360
2189	Moapa Black-on-gray	No eversion	19.5	360
2190	North Creek Black-on-gray	No eversion	233	298.8
2191	Hurricane Black-on-gray	No eversion	16.5	360
2193	Lino Black-on-gray	No eversion	19	360
2194	Lino Black-on-gray	No eversion	17	360
2195	Lino Black-on-gray	No eversion	9	151.2
2197	Kana-a Black-on-white	No eversion	17	360
2199	Kana-a Black-on-white	No eversion	13	313.2
2201	Kana-a Black-on-white	No eversion	17.5	360
2202	Kana-a Black-on-white	No eversion	16	360
2206	Lino Black-on-gray	No eversion	17	360

2207	Lino Black-on-gray	No eversion	16	259.2
2209	Washington Black-on-gray	No eversion	29	39.6
2213	Black Mesa Black-on-white	No eversion	16.5	360
2219	Black Mesa Black-on-white	No eversion	22	360
2229	Black Mesa Black-on-white	No eversion	19.5	360
2235	Sosi Black-on-white	No eversion	9 x 11 (both bowls)	360
2237	Sosi Black-on-white	No eversion	9.5	360
2242	Black Mesa Black-on-white	No eversion	16 X 18	360
2244	Black Mesa Black-on-white	No eversion	16	360
2245	Sosi Black-on-white	50 - 90	12	360
2261	Dogoszhi Black-on-white	No eversion	17.5	360
2263	Flagstaff Black-on-white	No eversion	11.5 x 12.5	360
2264	Flagstaff Black-on-white	No eversion	17	360
2274	Flagstaff Black-on-white	50 - 90	16 x 16.5	352.8
2276	Flagstaff Black-on-white	No eversion	13.5	360
2277	Flagstaff Black-on-white	No eversion	11	360
2281	Flagstaff Black-on-white	No eversion	26.5	349.2
2289	Flagstaff Black-on-white	No eversion	15.5	360
2293	Medicine Black-on-red	No eversion	17	360
2301	Medicine Black-on-red	No eversion	11.5	360
2321	Tusayan Black-on-red	No eversion	14.75	360

2322	Tusayan Black-on-red	No eversion	20	291.6
2324	Tusayan Black-on-red	No eversion	12	360
2325	Tusayan Black-on-red	No eversion	13	360
2327	Tusayan Black-on-red	No eversion	19.5 x 21.5	360
2330	Tusayan Black-on-red	No eversion	15.5	360
2345	Flagstaff Black-on-white	No eversion	13.5	144
2921	Mesquite Black-on-gray	No eversion	13	360
2922	Mesquite Black-on-gray	No eversion	9.5	360
2923	Mesquite Black-on-gray	No eversion	11.5	360
2924	North Creek Black-on-gray	No eversion	11	360
2925	North Creek Black-on-gray	No eversion	11	360
2926	Washington Black-on-gray	No eversion	11.5	360
2927	North Creek Black-on-gray	No eversion	14	360
2955	Tusayan Black-on-red	No eversion	11	360
2956	Medicine Black-on-red	No eversion	9.5	360
2958	North Creek Black-on-gray	No eversion	14	360
2959	St. George Black-on-gray	No eversion	10	360
2960	North Creek Black-on-gray	No eversion	6.5	360
2961	Washington Black-on-gray	No eversion	10	360
2962	North Creek Black-on-gray	No eversion	14	360
2963	North Creek Black-on-gray	No eversion	14	360
2964	St. George Black-on-gray	No eversion	14	360

2965	North Creek Black-on-gray	No eversion	13	360
2966	North Creek Black-on-gray	No eversion	10	360
2967	North Creek Black-on-gray	No eversion	13.5	360
2969	North Creek Black-on-gray	No eversion	14	360
2982	Tusayan Black-on-red	No eversion	10	360
2983	North Creek Black-on-gray	No eversion	21	360
2984	Mesquite Black-on-gray	No eversion	11	360
2985	North Creek Black-on-gray	No eversion	15	360
2986	St. George Black-on-gray	No eversion	14	360
2987	Medicine Black-on-red	No eversion	14.5	360
2990	North Creek Black-on-gray	No eversion	12x17	360
2991	St. George Black-on-gray	No eversion	14.5	360
2992	Hildale Black-on-gray	No eversion	13.5x14.5	360
2993	Parashant Black-on-gray	No eversion	17	360
3002	Trumbull Black-on-gray	No eversion	22	21.6
3005	Mesquite Black-on-gray	No eversion	13	36
3006	Mesquite Black-on-gray	No eversion	15	21.6
3049	St. George Black-on-gray	No eversion	29	25.2
3076	North Creek Black-on-gray	No eversion	20	39.6
3077	Washington Black-on-gray	No eversion	10	32.4
3084	Mesquite Black-on-gray	No eversion	20	25.2
3087	Mesquite Black-on-gray	No eversion	18	151.2

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CURRICULUM VITAE
Daniel Melvin Perez

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EDUCATION

2023	Ph.D. Anthropology (Archaeology), University of Nevada, Las Vegas
2011	M.A. Anthropology (Archaeology), Northern Arizona University
2008	B.S. Anthropology, California State Polytechnic University, Pomona

PROFESSIONAL EMPLOYMENT

2020 – 2023	Part-Time Anthropology Instructor, University of Nevada, Las Vegas
2020 Fall and Spring	Part-Time Anthropology Instructor, College of Southern Nevada, Las Vegas
2019 – 2020	Field Director, HRA, Inc. Conservation Archaeology, Las Vegas, Nevada
2016 – 2019	Project Archaeologist, HRA, Inc. Conservation Archaeology, Las Vegas, Nevada
2013 – 2016	Museum Coordinator, Lynn H. Wood Archaeological Museum, Collegedale, Tennessee
2012 – 2013	Project Archaeologist, CRM Tech, Colton, California
2011 – 2012	Archaeological Field Technician, Statistical Research, Inc., Tucson, Arizona
2011 Fall	Archaeological Surveyor, Institute for the Study of the Ancient World (ISAW), New York University, Surhkondaryo, Uzbekistan

RESEARCH INTERESTS

Archaeology; North American Southwest; Syro-Palestine; Geographic Information Systems (GIS); archaeological surveying methods; ceramic analysis; archaeological style; identity; cultural exchange; migration; chronometric studies; Cultural Resource Management; archaeological ethics.

PUBLICATIONS

Peer-Reviewed Journal Articles:

2019 **Perez, Daniel M**. Use-wear analysis on manos from a Virgin Branch Puebloan site on the Shivwits Plateau: preliminary results from the To'tsa site (AZ A:14:283). *Nevada Archaeologist* 32:73-91.

2019 Harry, Karen G. and **Daniel M. Perez**. Examining the Pueblo II-III Transition in the Moapa Valley, Southern Nevada. *Kiva* 85(4):345-369.

Peer-Reviewed Book Chapters:

2014 **Perez, Daniel M.** Area D Formation Processes and Construction Events through Re-usage of Iron Age Structures in Hellenistic Architecture: An Application of Harris Matrices". In *Khirbet Qeiyafa Vol. 2. Excavation Report 2009 – 2011: Stratigraphy and Architecture*, edited by Martin G. Klingbeil, pp. 41-57. Israel Exploration Society, Jerusalem.

2014 **Perez, Daniel M.**, Scot Anderson, Michael Dant, and Dean A. Scott. Survey Recording Techniques and GIS Referencing. In *Khirbet Qeiyafa Vol. 2. Excavation Report 2009 – 2011: Stratigraphy and Architecture*, edited by Martin G. Klingbeil, pp. 21-28. Israel Exploration Society, Jerusalem.

Peer-Reviewed Brief Contributions:

2015 **Perez, Daniel M.** Notes for the Next Century. *Kiva* 81(1 – 2):156.

M.A. Thesis:

2011 **Perez, Daniel M.** *Formation Processes and Site Occupation: An Analysis of Area D at Khirbet Qeiyafa (Israel)*. Unpublished M.A. thesis, Anthropology Department, Northern Arizona University, Flagstaff.

Technical Reports:

2020 **Perez, Daniel**. Flaked Stone Analysis. In *Phase I Data Recovery Investigations at Six Historic and Prehistoric Sites in the Etna and Jumbo Exploration Areas, State Line Mining District, Iron County, Utah*. HRA, Inc. Conservation Archaeology. Utah State Project No. U17HQ0633.

2020 **Perez, Daniel**. Ground Stone Analysis. In *Phase I Data Recovery Investigations at Six Historic and Prehistoric Sites in the Etna and Jumbo Exploration Areas, State Line Mining District, Iron County, Utah*. HRA, Inc. Conservation Archaeology. Utah State Project No. U17HQ0633.

2020 **Perez, Daniel**. Ceramic Analysis. In *Phase I Data Recovery Investigations at Six Historic and Prehistoric Sites in the Etna and Jumbo Exploration Areas, State Line Mining District, Iron County, Utah*. HRA, Inc. Conservation Archaeology. Utah State Project No. U17HQ0633.

2019 **Perez, Daniel**. Ceramics. In *Fremont Pine Nut Camps in the Mahogany Mountains in Southwestern Utah: Data Recovery Investigations for the Jumbo Exploration Project, Iron County, Utah*. HRA, Inc. Conservation Archaeology. Utah Project No. 16UT85123.

2013 Hogan, Michael and **Daniel M. Perez**. *Sol – Tract No. 36525, City of Palm Springs*. (Letter Report). CRM TECH. Contract No. 2682.

2013 **Perez, Daniel M.** and Harry M. Quinn. *Paleontological Monitoring Report: The Thermal Club Motorsports, LLC Project*. CRM TECH. Contract No. 2615.

2013 Quinn, Harry M. and **Daniel M. Perez**. *Paleontological Resources Impact Mitigation Program: America's Tire Cross Dock Facility; Assessor's Parcel Numbers 314-110-004, -064, & - 066 and 314-260-013 & -014*. CRM TECH. Contract No. 2687.

2013 Tang, Bai "Tom" and **Daniel M. Perez**. *Plot Plan No. 25060; APN 941-230-001*. (Letter Report). CRM TECH. Contract No. 2672.

2013 Tang, Bai "Tom" and **Daniel M. Perez**. *Plot Plan No. 24279; Chapin Family Vineyards; APNs 915-690-001 and -002*. (Letter Report). CRM TECH. Contract No. 2631.

2013 Tang, Bai "Tom" and **Daniel M. Perez**. *Sol – Tract No. 36525, City of Palm Springs*. (Letter Report). CRM TECH. Contract No. 2682.

2013 Tang, Bai "Tom" and **Daniel M. Perez**. *Lewis Center for Educational Research New Gym Construction Project*. (Letter Report). CRM TECH. Contract No. 2669.

2013 Hogan, Michael and **Daniel M. Perez**. *University High School Soil Testing Project*. (Letter Report). CRM TECH. Contract No. 2666.

2013 Tang, Bai "Tom," Michael Hogan, **Daniel M. Perez**, and Daniel Ballester. *Assessor's Parcel Nos. 189-180-003, -007, and -010; 189-190-004 and -005*. CRM TECH. Contract No. 2651.

2013 Tang, Bai "Tom" and **Daniel M. Perez**. *Yucaipa Valley Water District Non-Potable Water Project*. (Letter Report). CRM TECH. Contract No. 2657.

2013 Tang, Bai "Tom" and **Daniel M. Perez**. *The NNR-10.3 Reservoir Project*. (Letter Report). CRM TECH. Contract No. 2594.

2012 Tang, Bai "Tom" and **Daniel M. Perez**. *Subsurface Archaeological Sensitivity Assessment: Water Main Project, Northpark Boulevard at University Parkway*. (Letter Report). CRM TECH. Contract No. 2633.

2012 Tang, Bai "Tom," John D. Goodman, II, and **Daniel M. Perez**. *Identification and Evaluation of Historic Properties: Big Bear Sugarloaf Reservoir and Pipeline Project*. CRM TECH. Contract No. 2609.

2012 **Perez, Daniel M.**, Daniel Ballester, and Nina Gallardo. *Identification and Evaluation of Historic Properties: Discharge Ditches at the San Bernardino International Airport*. CRM TECH. Contract No. 2620.

2012 **Perez, Daniel M.**, Daniel Ballester, and Nina Gallardo. *Phase I Archaeological Assessment: Madison Street Improvement Project, Avenue 50 to Avenue 52.* CRM TECH. Contract No. 2614.

2012 Hogan, Michael, **Daniel Perez**, and Daniel Ballester. *Archaeological Testing and Evaluation Program of Site 19-004288 (CA-LAN-4288)*. CRM TECH. Contract No. 2607.

2008 Allen, Mark W. and Gregory R. Burns. *The Archaeological Collections of CA-KER-229 and CA-KER-230, Tomo-Kahni State Historic Park, Tehachapi, CA* with contributions by **Daniel M. Perez** and Susan M. Wood.

AWARDS AND HONORS

2022	Outstanding Minority-Serving Institution Student Council (MSISC) Member of the Year [awarded jointly to the entire inaugural MSISC members]—UNLV Rebel Awards Ceremony, April 26th.
2021	Honorable mention, Cordell/Powers Prize Competition—The 2021 Pecos Conference, August 7th ($175)
2021	Charles R. Jenkins Award Certificate of Distinguished Achievement—Lambda Alpha National Collegiate Society
2020	Honorable mention in Social Sciences Poster Session at the 22nd Annual Graduate & Professional Student Research Forum—University of Nevada, Las Vegas, February 29th
2019	Second-place award in Social Sciences Poster Session at the 21st Annual Graduate & Professional Student Research Forum—University of Nevada, Las Vegas, February 23rd ($125)
2018	College of Liberal Arts (COLA) Ph.D. Student Summer Research Stipend Award (Faculty Advisor: Dr. Karen G. Harry)—University of Nevada, Las Vegas ($3,000)
2017 March	Inducted into the Lambda Alpha National Collegiate Society of Anthropology—University of Nevada, Las Vegas chapter
2008	Inducted into the Pi Gamma Mu International Honor Society in Social Sciences—California State Polytechnic University, Pomona
2006 – 2008	Dean's List, College of Letters, Arts, and Social Sciences—California State Polytechnic University, Pomona

SCHOLARSHIPS, GRANTS, AND FELLOWSHIPS

2022 Spring	Graduate Honors Access Grant—University of Nevada, Las Vegas ($2,000)
2022 Spring	Grad Rebel Advantage Scholarship—University of Nevada, Las Vegas ($500)
2022 Spring	Graduate Honors Access Grant—University of Nevada, Las Vegas ($500)
2022 Spring	Higher Education Emergency Relief Fund (HEERF)—University of Nevada, Las Vegas ($500)
2022 Spring	Graduate College General Scholarship—University of Nevada, Las Vegas ($1,711.57)
2021 – 2023	UNLV Foundation Board of Trustees Fellowship—Graduate College, University of Nevada, Las Vegas ($60,000)
2021 Fall	Graduate Honors Access Grant—University of Nevada, Las Vegas ($2,000)

2021 Fall	Grad Rebel Advantage Scholarship—University of Nevada, Las Vegas ($500)
2021 Fall	Higher Education Emergency Relief Fund (HEERF)—University of Nevada, Las Vegas ($500)
2021 Fall	Graduate College General Scholarship—University of Nevada, Las Vegas ($1,180.66)
2021	Summer Doctoral Research Fellowship—Graduate College, University of Nevada, Las Vegas ($7,000)
2021	Lambda Alpha Graduate Research Grant—Lambda Alpha National Anthropology Honor Society ($2,000)
2021	AAHS Standard Research Grant—Arizona Archaeological and Historical Society (AAHS) ($860)
2021 Spring	Graduate College General Scholarship—University of Nevada, Las Vegas ($500)
2021 Spring	Graduate Honors Access Grant—University of Nevada, Las Vegas ($600)
2021 Spring	Edward & Olswang Scholarship—Department of Anthropology, University of Nevada, Las Vegas ($725)
2021 Spring	Promoting Postbaccalaureate Opportunities for Hispanic Americans (PPOHA) Program Support Grant—University of Nevada, Las Vegas ($100)
2020 Fall	Graduate Honors Access Grant—University of Nevada, Las Vegas ($600)
2020 Fall	Promoting Postbaccalaureate Opportunities for Hispanic Americans (PPOHA) Program Support Grant—University of Nevada, Las Vegas ($100)
2020 Spring	Higher Education Emergency Relief Fund—University of Nevada, Las Vegas ($150)
2020 Spring	COVID-19 CARES Grant—University of Nevada, Las Vegas ($500)
2020 Spring	Graduate and Professional Student Association 2020 Conference Travel Scholarship—University of Nevada, Las Vegas ($407)
2020 Spring	Friends of World Anthropology Scholarship—Department of Anthropology, University of Nevada, Las Vegas ($1,100)
2019 Winter	Graduate and Professional Student Association 2020 Conference Travel Scholarship—University of Nevada, Las Vegas ($340.52)
2019 Fall	Graduate Honors Access Grant—University of Nevada, Las Vegas ($100)
2019 Fall	Graduate Honors Access Grant—University of Nevada, Las Vegas ($250)
2019 – 2020	State-Funded Anthropology Graduate Assistantship—University Nevada, Las Vegas (Maximum Package Value: $21,393.50)
2019 Spring	Graduate and Professional Student Association 2019 Emergency Sponsorship Funding Scholarship—University of Nevada, Las Vegas ($450)
2018 Fall	Edward & Olswang Scholarship—Department of Anthropology, University of Nevada, Las Vegas ($500.29)

2018 Fall	Graduate and Professional Student Association 2019 Conference Travel Scholarship—University of Nevada, Las Vegas ($350)
2018 – 2019	State-Funded Anthropology Graduate Assistantship—University Nevada, Las Vegas (Maximum Package Value: $21,195.50)
2018	Nevada Archaeological Association (NAA) – Am-Arcs Student Research Grant—Nevada Archaeological Association and Am-Arcs of Nevada ($3,000)
2017 Fall	Patricia A. Rocchio Memorial Scholarship—Department of Anthropology, University of Nevada, Las Vegas ($600)
2017 Fall	Graduate and Professional Student Association 2018 Conference Travel Scholarship—University of Nevada, Las Vegas ($550)
2017 – 2018	State-Funded Anthropology Graduate Assistantship—University Nevada, Las Vegas (Maximum Package Value: $35,284.50)
2017 – 2018	Graduate Access Grant—University of Nevada, Las Vegas ($2,000)
2017 Spring	Graduate and Professional Student Association 2017 Research Scholarship—University of Nevada, Las Vegas ($1,000)
2017 Spring	Patricia A. Rocchio Memorial Scholarship—Department of Anthropology, University of Nevada, Las Vegas ($1,380)
2016 – 2017	State-Funded Anthropology Graduate Assistantship—University Nevada, Las Vegas (Maximum Package Value: $34,111.80)
2016 – 2017	Graduate Access Scholarship—University of Nevada, Las Vegas ($6,000)
2006 Summer	Cal Poly Pomona Grant—California State Polytechnic University, Pomona ($1,000)

INVITED TALKS

2022 "MSI Graduate Student Open Access Fund: Helping Unlock Student Research at UNLV." Extended Minority-Serving Institution Student Success Speaker Series, Minority-Serving Institution Student Council, University of Nevada, Las Vegas, Nevada, February 24th.

2019 "Toward Refinement of the Chronometric Record in the Virgin Branch Puebloan Region, Moapa Valley, Nevada. Am-Arcs of Nevada, Fall 2019 Lecture Series, Reno, Nevada, September 11th.

2018 "The Pueblo II-III Transition in the Moapa Valley, Southern Nevada." Archaeo-Nevada Society, Fall 2018 Lecture Series, Las Vegas, Nevada, September 13th.

DEPARTMENTAL TALKS

2021 "Virgin Branch Puebloan Chronology: New Dates from the Moapa Valley, Southern Nevada." Spring 2021 Proseminar, Department of Anthropology, University of Nevada, Las Vegas, March 22nd.

CONFERENCE ACTIVITY

Fora and Symposia Organized:

2023 **Forum**— "The 18th Annual Ethics Bowl." The 88th Annual Meeting of the Society for American Archaeology, Portland, Oregon, March 30th. Co-organized with Katherine L. Chiou.

2022 **Forum**— "Archaeological Ethics in the Past, Present, and Future: Lessons from the SAA Ethics Bowl." The 87th Annual Meeting of the Society for American Archaeology, Chicago, Illinois, March 31st. Co-organized with Katherine L. Chiou and Patricia Markert.

2022 **Forum**— "The 17th Annual Ethics Bowl." The 87th Annual Meeting of the Society for American Archaeology, Chicago, Illinois, March 31st. Co-organized with Katherine L. Chiou and Krystiana Krupa.

2021 **Forum**— "The 16th Annual Ethics Bowl." The 86th Annual Meeting of the Society for American Archaeology, San Francisco, California, April 15th. Online/virtual conference. Co-organized with Katherine L. Chiou.

2019 **Symposium**— "Archaeology of Grand Canyon-Parashant National Monument." The 84th Annual Meeting of the Society for American Archaeology, Albuquerque, New Mexico, April 11th. Co-organized with William M. Willis.

2019 **Forum**— "The 15th Annual Ethics Bowl." The 84th Annual Meeting of the Society for American Archaeology, Albuquerque, New Mexico, April 11th. Lead organizer; co-organized with Katherine L. Chiou, Margaret Conkey, Dru McGill, and Kenneth Aitchison.

2018 **Forum**— "The 14th Annual Ethics Bowl." The 83rd Annual Meeting of Society for American Archaeology, Washington, District of Columbia, April 12th. Co-organized with Katherine L. Chiou, Margaret Conkey, Dru McGill, and Kenneth Aitchison.

Fora, and Symposia Chaired and Moderated:

2022 **General Session**—"Recent Archaeological Investigations in the North American Southwest." The 87th Annual Meeting of the Society for American Archaeology, Chicago, Illinois, April 3rd. Sole chair.

2022 **Forum**—"Archaeological Ethics in the Past, Present, and Future: Lessons from the SAA Ethics Bowl." The 87th Annual Meeting of the Society for American Archaeology, Chicago, Illinois, March 31st. Co-moderated with Katherine L. Chiou.

2022 **Forum** —First Round A, "The 17th Annual Ethics Bowl". The 87th Annual Meeting of the Society for American Archaeology, Chicago, Illinois, March 31st. Sole moderator.

2021 **General Session**—The 37th Great Basin Anthropological Conference, Las Vegas, Nevada. Sole chair.

2021 **General Session**—"Archaeometry, Material Analysis, and Mitogenome Analysis: Results from around the Globe." The 86th Annual Meeting of the Society for American Archaeology, San Francisco, California, April 16th. Online/virtual conference. Sole chair.

2021 **Forum** —Final Round, "The 16th Annual Ethics Bowl". The 86th Annual Meeting of the Society for American Archaeology, San Francisco, California, April 15th. Online/virtual conference. Sole moderator.

2019 **Symposium**—"Archaeology of Grand Canyon-Parashant National Monument". The 84th Annual Meeting of the Society for American Archaeology, Albuquerque, New Mexico, April 11th. Co-chaired with William M. Willis.

Panels:

2022 Carino, Ava, **Daniel Perez**, and Renee' Watson. "The Minority-Serving Institution Student Council at the University of Nevada, Las Vegas (UNLV)." The 2022 American Association of Hispanics in Higher Education, Inc. (AAHHE) National Conference, Henderson, Nevada, March 11th.

Workshops:

2022 WAC Archaeological Ethics Bowl. World Archaeological Congress, WAC-9 Prague 2022. Prague, Czech Republic, July 7th. Co-led with Kenneth Aitchison and Katherine Chiou.

2021 Register of Professional Archaeologists "Archaeological Ethics Workshop." The 2021 Annual Meeting of the American Anthropological Association, Baltimore, Maryland, November 19th. Co-led with Kenneth Aitchison and Thomas Turck.

2020 "Ceramic Identification Workshop—Southern Nevada Ceramics." The 49th Annual Meeting of the Nevada Archaeological Association, Pahrump, Nevada, March 6th. Co-presented with Karen G. Harry.

Papers Presented:

2022 **Perez, Daniel M.** "Exploring Virgin Branch Social Complexity in the Moapa Valley of Southern Nevada through Painted Ceramic Design and Style." The 9th Biennial Three Corners Conference, Las Vegas, Nevada, October 15th.

2022 **Perez, Daniel M. "**Understanding Virgin Branch Social Dynamics in Light of New Chronometric Data from the Moapa Valley, Southern Nevada." The 87th Annual Meeting of the Society for American Archaeology, Chicago, Illinois, April 3rd.

2021 **Perez, Daniel M.** "Experimental Approach to Understanding Virgin Branch Ground Stone Use-Wear from the Shivwits Plateau, Arizona." The 37th Great Basin Anthropological Conference, Las Vegas, Nevada, October 15th.

2021 **Perez, Daniel M.** "Chronometry and Virgin Branch Social Dynamics in the Moapa Valley, Southern Nevada." The 2021 Pecos Conference, Mancos, Colorado, August 6th.

2021 **Perez, Daniel** and Karen Harry. "Virgin Branch Puebloan Adaptations on the Colorado Plateau: Recent Excavations at Granary House (AZ A:14:46)." The 86th Annual Meeting of the Society for American Archaeology, San Francisco, California, April 16th. Online/virtual conference.

2021 Van Alstyne, Benjamin, Karen Harry, and **Daniel Perez**. “Archaeological Investigations at a Multicomponent Site on the Shivwits Plateau.” The 86th Annual Meeting of the Society for American Archaeology, San Francisco, California, April 15th. Online/virtual conference.

2019 **Perez, Daniel M.** and Karen G. Harry. “Excavations on the Shivwits Plateau: Preliminary Findings from Granary House (AZ A:14:46)”. The 8th Biennial Three Corners Conference, Las Vegas, November 2nd.

2019 **Perez, Daniel M.** “New Dates from the Lowland Virgin Branch Puebloan Region: Preliminary Considerations and Implications”. The College of Southern Nevada’s Department of Human Behavior & Archaeo-Nevada Society 3rd Annual Anthropology Conference, Las Vegas, Nevada, May 4th.

2019 **Perez, Daniel M.** “Substance and Subsistence: A Use-Wear Analysis on Ground Stone from the Virgin Branch Puebloan Region”. The 84th Annual Meeting of the Society for American Archaeology, Albuquerque, New Mexico, April 11th.

2019 **Perez, Daniel M.** “Toward Refinement of the Chronometric Record in the Virgin Branch Puebloan Region, Moapa Valley, Nevada”. The 48th Annual Meeting of the Nevada Archaeological Association, Elko, Nevada, March 29th.

2018 **Perez, Daniel M.** and Karen G. Harry. “Insights into the Pueblo II-III Transition in the Moapa Valley, Southern Nevada”. The College of Southern Nevada’s Department of Human Behavior & Archaeo-Nevada Society 2nd Annual Anthropology Conference, Las Vegas, Nevada, May 4th.

2018 **Perez, Daniel M.** and Karen G. Harry. “House 47: A Case Study of Abandonment and Trade in the Lowland Virgin Branch Puebloan Region”. The 83rd Annual Meeting of the Society for American Archaeology, Washington, District of Columbia, April 13th.

2017 **Perez, Daniel M.** “Use-Wear Analysis on Ground Stone from To’tsa Site AZ A:14:283”. The 7th Biennial Three Corners Conference, Las Vegas, Nevada, October 21st.

2017 Carroll, Jon W. and **Daniel M. Perez**. “Using Aerial Remote Sensing to Assess Error and Uncertainty in Archaeological Site Mapping”. The 82nd Annual Meeting of the Society for American Archaeology, Vancouver, British Columbia, April 1st.

2016 **Perez, Daniel M.** and Jon W. Carroll. “Mapping and Modeling at Tel Lachish”. The 2016 Annual Meeting of the American Schools of Oriental Research, San Antonio, Texas, November 17th.

2016 **Perez, Daniel M.** and Jon W. Carroll. “Reconstructing the History of Archaeological Research at Tel Lachish”. The 81st Annual Meeting of the Society for American Archaeology, Orlando, Florida, April 9th.

2014 **Perez, Daniel M.** “Technology and Archaeology: Survey Techniques and Photogrammetry at Lachish (2013–2014)”. The 2014 Annual Meeting of the American Schools of Oriental Research, San Diego, California, November 20th.

Posters Presented:

2021 Goold, Kari and **Daniel Perez**, and Karen Harry. "An Experimental Approach to Understanding Virgin Branch Puebloan Ground Stone Technology on the Shivwits Plateau." University of Nevada, Las Vegas Spring 2021 Virtual Office of Undergraduate Research Symposium, May 3rd – 7th.

2021 **Perez, Daniel M.** and Kari Goold. "An Experimental Approach to Understanding Virgin Branch Puebloan Ground Stone Technology on the Shivwits Plateau." The 23rd Annual Graduate & Professional Student Research Forum, Las Vegas, Nevada, April 2nd.

2020 **Perez, Daniel M.** "The Daily Grind: Virgin Branch Puebloan Subsistence Technology on the Colorado Plateaus". The 22nd Annual Graduate & Professional Student Research Forum, Las Vegas, Nevada, February 29th.

2020 **Perez, Daniel M.** "A Comparative Understanding of Virgin Branch Puebloan Ground Stone Technology through Grinding Experimentation and Use-Wear Analysis". The 17th Biennial Southwest Symposium, Tempe, Arizona, January 31st – February 1st.

2019 **Perez, Daniel M.** "Use-Wear Analysis on Ground Stone from To'tsa Site AZ A:14:283". The 21st Annual Graduate & Professional Student Research Forum, Las Vegas, Nevada, February 23rd.

2018 **Perez, Daniel M.** "Assessing Ceramic Vessel Size Variation Between the Harris Site and Elk Ridge, New Mexico". The 20th Annual Graduate & Professional Student Research Forum, Las Vegas, Nevada, February 3rd.

2018 **Perez, Daniel M.** "Use-Wear Analysis on Ground Stone from To'tsa Site AZ A:14:283". The 16th Biennial Southwest Symposium, Denver, Colorado, January 4th.

Judge:

2018 Preliminary Round, "The 14th Annual Ethics Bowl". The 83rd Annual Meeting of Society for American Archaeology, Washington, District of Columbia, April 12th.

Case Writer:

2022 "The 17th Annual Ethics Bowl". The 87th Annual Meeting of the Society for American Archaeology, Chicago, Illinois, March 31st.

2021 "The 16th Annual Ethics Bowl". The 86th Annual Meeting of the Society for American Archaeology, San Francisco, California, April 15th. Online/virtual conference.

2019 "The 15th Annual Ethics Bowl". The 84th Annual Meeting of the Society for American Archaeology, Albuquerque, New Mexico, April 11th.

2018 "The 14th Annual Ethics Bowl". The 83rd Annual Meeting of Society for American Archaeology, Washington, District of Columbia, April 12th.

TEACHING EXPERIENCE (^{w} = web-based course)

College of Southern Nevada (Solo Instructor):
Introduction to Physical Anthropology (^{w}Fall 2020, ^{w}Spring 2020)
University of Nevada, Las Vegas (Solo Instructor):
Essentials of Data Analysis for Anthropologists (Spring 2022)

Introduction to Physical Anthropology	(Spring 2021)
Introduction to Cultural Anthropology	(Spring 2021, [w]Fall 2020)
Physical Anthropology Laboratory	(Fall 2019, Spring 2019, Fall 2018, Spring 2018, Fall 2017)

Southern Adventist University (Solo Instructor):

Spatial Archaeology	(Winter 2016)

University of Nevada, Las Vegas (Teaching Assistant):

Native Americans of the Southwest	(Fall 2019, Spring 2019)
Introduction to World Archaeology	(Fall 2019, Fall 2018)
Near Eastern and Mediterranean Prehistory	(Fall 2017)
Archaeology of Complex Societies and Archaic States	(Fall 2016)
Archaeology of Mexico and Central America	(Fall 2016)
Health and Disease in Antiquity	(Fall 2016)

Northern Arizona University (Teaching Assistant):

Humankind Emerging	(Spring 2011)
Anthropology of Sports: Ancient and Modern Sports in Cross-Cultural Perspective	(Fall 2010)
Ancient Civilizations: The Roots of Cultural Diversity	(Spring 2010)
Exploring Cultures	(Spring 2010)
Principles of Archaeology	(Spring 2011, Fall 2010, Fall 2009)

Chaffey Joint Union High School District (California):

Substitute Teacher	(2009 – 2014)

Montclair High School (Montclair, California):

Advancement Via Individual Determination (AVID) Program Tutor	(2007 – 2009)

ARCHAEOLOGICAL RESEARCH AND FIELD EXPERIENCE

2022 Summer — Excavation Director/Excavation Supervisor of Unmarked Human Burials, Nuestra Señora de Belén Archaeological Project, Belén, **New Mexico**

2022 Season (May – June)

Assisted in supervision of fieldwork. Conducted excavation, documentation, and total station mapping of a historic-period church site—a joint project between the University of Nevada, Las Vegas and Mount Holyoke College. PIs: Drs. Debra Martin and Pamela Stone).

2020 Summer — Ethics Intern, Register of Professional Archaeologists, Baltimore, **Maryland**

2020 (June – August)

Served as one of three graduate student archaeological ethics interns, in a collaborative effort with the Register of Professional Archaeologists (RPA) Ethics Committee, to: develop public and professional outreach resources, write archaeological ethics case scenarios, and further develop the Archaeological Ethics Database developed by the RPA and Chartered Institute for Archaeologists (CIfA).

2019 Summer — Field Director, Shivwits Research Project, Shivwits Plateau, Grand Canyon-Parashant National Forest, **Arizona**

2019 (June – July)

Supervision and training of undergraduate students in excavation methods, GPS and total station operation, plan and profile mapping methods, artifact identification, and sample collection. Excavation was part of the UNLV Summer Archaeological Field School 2019 Shivwits Research Project (PI: Dr. Karen G. Harry).

2018 – 2019 — Archaeological Field Technician, Nuestra Señora de Belén Archaeological Project, Belén, **New Mexico**

2019 Season (July)

2018 Season (July)

Assisted in excavation, documentation, and total station mapping of a historic-period church site—a joint project between the University of Massachusetts, Amherst, Hampshire College, and the University of Nevada, Las Vegas. Participation spanned one week each field season. PIs: Drs. Ventura Pérez, Pamela Stone, and Debra Martin).

2019 – 2020 — Field Director, HRA, Inc. Conservation Archaeology, Las Vegas, **Nevada**

Archaeological Monitor (May 2019 – October 2020)

Monitoring of and mitigation of impact on archaeological sites within SR-160 expansion project area, conducted by Nevada Department of Transportation (NDOT)—Las Vegas, Nevada.

2018 Summer — Crew Chief, Elk Ridge Archaeological Field School, Mimbres, **New Mexico**

2018 Season (May – July)

Supervision and training of undergraduate anthropology students in excavation methods, field recording, and use of total station and transit. Duties also comprised documenting excavation data across all excavation units in collaboration with PIs Drs. Barbara Roth and Darrell Creel.

2017 Summer — Archaeological Field Technician, Elk Ridge Archaeological Field School, Mimbres, **New Mexico**

2017 Season (May – June)

Archaeological excavation of the Elk Ridge site in Mimbres, New Mexico as a UNLV doctoral student. Assisted in limited supervision of select undergraduate anthropology students.

2016 – 2019 — Project Archaeologist, HRA, Inc. Conservation Archaeology, Las Vegas, **Nevada**

Ceramic Analyst (August – December 2018)

Analysis of ceramics from three archaeological sites in the North Jumbo Exploration Area, Gold Springs Mining District, Iron County, Utah.

Lithic Analyst (August – December 2018)

Analysis of lithics from three archaeological sites in the North Jumbo Exploration Area, Gold Springs Mining District, Iron County, Utah.

Ground Stone Analyst (August – December 2018)

Analysis of ground stone from three archaeological sites in the North Jumbo Exploration Area, Gold Springs Mining District, Iron County, Utah.

Lithic Analyst (January 2018)

Analysis of lithics from six archaeological sites comprising a Phase I data recovery effort in the Bullfrog area, Garfield County, Utah.

Lithic Analyst (December 2017)

Analysis of lithics from four archaeological sites in the North Jumbo Exploration Area, Gold Springs Mining District, Iron County, Utah.

Ceramic Analyst (December 2016 – August 2018)

Analysis of ceramics from three archaeological sites in the North Jumbo Exploration Area, Gold Springs Mining District, Iron County, Utah.

2013 – 2017 Director of Survey and Mapping, *The Fourth Expedition to Lachish*, Tel Lachish, **Israel**

- 2017 Season (June – July)
- 2016 Season (June – July)
- 2015 Season (June – July)
- 2014 Season (June – July)
- 2013 Season (July)
  - Performed a static/differential GPS and total station survey, managed the project data, and producing detailed topographic maps for *The Fourth Expedition to Lachish* archaeological project. Overall GIS and survey effort led to the building of a working spatial database—managed in a GIS—for past and present archaeological research at Tel Lachish.

2012 – 2013 Project Archaeologist, CRM Tech, Colton, **California**

- Archaeological/Paleontological Monitor (June 12–18, 2013)
  - Phase IV 52 and Jefferson SEC Monitoring Program (#1648), La Quinta, California.
- Archaeological Field Technician (May 17, 2013)
  - Phase I survey and recording of historic-period structures and features for the Agua Mansa Paint Project (#2712), Colton, California.
- Archaeological/Paleontological Monitor (May 16, 2013)
  - Phase IV Cactus Jurupa Monitoring Program (#2706), Rialto, California.
- Archaeological Field Technician (April 23, 2013)
  - Phase I survey and recording of potential historic-period features for the Palmyrita Michigan Project (#2700), Riverside, California.
- Archaeological Monitor (April 18–22, April 24–May 15, 20, 24, June 3–11, 19–28, 2013)
  - Phase IV Bagdad Avila Monitoring Program (#2697), Coachella, California.
- Archaeological Laboratory Technician (April 17–18, 2013)
  - Dry-sift of soil samples and preparation of charcoal samples for radiocarbon analyses for the Lewis Center Trenching exploratory excavations project (#2667), Apple Valley, California.
- Archaeological Field Technician (April 12, 2013)
  - Phase I survey and hand mapping of archaeological sites and features for the Alessandro Lasselle Project (#2698), Moreno Valley, California.

2012 – 2013 Project Archaeologist, CRM Tech, Colton, **California**

Archaeological Monitor (April 11, 2013)

Mitigation monitoring concerning the impact of archaeological resources on Bureau of Land Management (BLM) property for the AES Solar Wells Project (#2699), Plaster City, California. (Project sub-contracted by Ultra Systems, Inc.).

Archaeological Field Technician (April 10, 2013)

Phase I survey for the Calle Contento Rancho California Project (#2690), Rancho California, California.

Archaeological Monitor (April 8, 2013)

Monitoring of geotechnical boring activity related to a geotechnical study conducted for the YMCA II Project (#2696), West Los Angeles, California.

Archaeological Monitor (April 2, 2013)

Phase IV University High School HVAC Monitoring Program (#2663), West Los Angeles, California.

Archaeological Monitor (March 28–April 1, 2013)

Phase IV University High School Sewer monitoring program (#2686), West Los Angeles, California.

Archaeological Field Technician (March 25–27, 2013)

Phase III data recovery excavation of prehistoric Native American remains for the University High School Project (#2663), West Los Angeles, California.

Paleontological Consultant (March 18, 2013)

California Environmental Quality Act (CEQA) and local city ordinances regarding paleontological resources for the Carbon Paleo Project #2689), Chino, California.

Archaeological Monitor (February 28, March 11, 2013)

Phase IV Vino Oro Monitoring Program (#2672), Rancho California area, California.

Archaeological Monitor (March 1 and April 17, 2013)

Phase I survey and site inspection for the Amado Caballeros Monitoring Program (#2682), Palm Springs, California.

Paleontological Soils Analyst (February–April 2013)

The Thermal Club Monitoring Program (#2615), Thermal, California.

Archaeological Field Technician (February 21–22, 25, 2013)

Phase I field survey for the Winchester Stetson Project (#2677), Winchester, California.

Archaeological Field Technician (February 20, 2013)

Phase I pedestrian field survey for the Palm Canyon Chino Project (#2680), Palm Springs, California.

2012 – 2013 Project Archaeologist, CRM Tech, Colton, **California**

Crew Chief, (February 20, 2013)

Phase I field survey for the Adams and 40th Project (#2679), La Quinta, California.

Archaeological Monitor (January 28–30, 2013)

Phase IV Lewis Center for Educational Research Gym Monitoring Program (#2669), Apple Valley, California.

Archaeological-Paleontological Monitor (October 8–November 1, 2012).

Phase IV Tenaska Wistaria Solar Project (#2555), El Centro, California. (Project sub-contracted by Ultra Systems, Inc.).

Paleontological Field Technician (October 1–5, 2012)

Phase I field survey for the Tenaska-Wistaria Solar Project (#2649), El Centro, California. (Project sub-contracted by Ultra Systems, Inc.).

Archaeological Field Technician (September 12-14, 2012)

Phase II exploratory excavations for the Winchester Crossroads Test Project (#2630), Winchester, California.

Archaeological Field Technician (July 6, 2012)

Phase I field survey for the Cat City Annex Project (#2624), Cathedral City, California.

Archaeological Monitor (May and June 2012)

Phase IV Brine Line II Monitoring Program (#2570), Loma Linda, California.

Archaeological-Paleontological Monitor (May 16–September 28, 2012; November 5, 2012–January 17, 2013)

Phase IV of The Thermal Club Monitoring Program (#2615), Thermal, California.

Archaeological Field Technician (May 11, 2012)

Phase II test excavations for the Sunlight Test Project (#2607), Lancaster, California.

Paleontological Monitor (March 6, 2012 – May 10, 2012)

Phase IV Yucaipa Valley Water District Reservoir Monitoring Program (#2594), Calimesa, California.

2011 – 2012 Archaeological Field Technician, Statistical Research, Inc., Tucson, **Arizona**

(November 28, 2011 – February 9, 2012)

Total station and GPS mapping effort for the Luke Solar Data Recovery Project at Luke Air Force Base in Glendale, Arizona, directed by the Cartography & Geospatial Technologies Department, Statistical Research, Inc.

2011 Fall — Archaeological Surveyor, Institute for the Study of the Ancient World (ISAW), New York University, **Uzbekistan**

(October 2, 2011)

Total station survey of archaeological features and structures at the site of Tarmita (Old Termez) for Professor Sh. Pidaev (Uzbekistan), including the production of a plan view map.

(September – October 2011)

Total station-based archaeological survey, top plan generation of excavation trenches using ArcGIS and Adobe Illustrator software programs, and production of a contour map for the Kyzyltepa Excavation Project (Surhkondaryo, Uzbekistan).

2010 Fall — Archaeological Surveyor/GIS Technician, Institute of Archaeology, Southern Adventist University, **Israel**

(October 2010)

Real-time kinematic (RTK) GPS archaeological survey of Khirbet Shuweikah (Tel Socoh), Israel, and generation of a basic map presenting the results of the reconnaissance.

2009 Winter — Archaeological Laboratory Technician, Department of Anthropology, Northern Arizona University, Flagstaff, **Arizona**

(December 2009)

Data-entry of archaeological sites in Grand Canyon National Park.

2009 – 2011 — Archaeological Field Technician, National Park Service and Northern Arizona University, Flagstaff, **Arizona**

(September 2009 – May 2011)

Hand-mapping and site recording of late prehistoric Ancestral Puebloan archaeological sites at Walnut Canyon and Wupatki National Monuments.

2009 – 2011 — Archaeological Surveyor, Institute of Archaeology, Southern Adventist University, **Israel**

2011 Season (June – July)
2010 Season (June – July)
2009 Season (June – July)

Total station survey and management of spatial data in a GIS for Area D, as part of the Khirbet Qeiyafa Archaeological Project (Israel).

2008 Spring — Archaeological Field Technician, Department of Geography and Anthropology, California State Polytechnic University, Pomona, Kern County, **California**

(March – April 2008)

Test excavations for the Sage Canyon Archaeological Research Project, Kern County, California.

2008 Spring — Archaeological Laboratory Technician, Department of Geography and Anthropology, California State Polytechnic University, Pomona, **California**

Cataloged and analyzed late prehistoric and protohistoric Kawaiisu artifacts from Tomo-Kahni State Historic Park (CA-KER 229 and 230).

2007 Summer — Archaeological Field School, Tel Hazor Excavation Project, **Israel**

2007 Season (June – July)

Undergraduate archaeological field school training—enrolled through Southern Adventist University. Co-directed by Drs. Amnon Ben-Tor and Sharon Zuckerman (Hebrew University of Jerusalem).

2006 Spring — Archaeological Field School, Sage Canyon Archaeological Research Project, Kern County, **California**

Multi-weekend, undergraduate archaeological field school training in pedestrian survey, test unit set-up and excavation, site recording, and archaeological lab work through the Department of Geography and Anthropology, California State Polytechnic University, Pomona for the California. Directed by Dr. Mark W. Allen (California State Polytechnic University, Pomona).

MUSEUM EXHIBITIONS

2016 – 2019 — *A World in Miniature: Creation, Cosmos, and Ecology on Seals from Biblical Times*

Organized and led the development and execution of this special exhibition of archaeological stamp and cylinder seals from the Yale Babylonian Collection (Yale University) and the Badè Museum of Biblical Archaeology (Pacific School of Religion)—displayed at the Lynn H. Wood Archaeological Museum, Southern Adventist University (Collegedale, **Tennessee**).

SERVICE TO PROFESSION

National:

2021 – 2023 — Member, SAA Principles of Archaeological Ethics Task Force 3, **Society for American Archaeology**

2021 – 2025 — Member, Ethics Committee, **Register of Professional Archaeologists**

2017 – 2026 Member, Committee on Ethics, **Society for American Archaeology**

Regional:

2021 – 2022 Treasurer, **Archaeo-Nevada Society**

2018 – 2021 Board Member, **Archaeo-Nevada Society**

UNIVERSITY SERVICE

University of Nevada, Las Vegas:

2021 – 2022 Grad Rebel Ambassador, Graduate College

2022 Spring and Fall President, Latinx Graduate Student Association

2021 Fall Scheduling Liaison, Latinx Graduate Student Association

2020 – 2022 Member, Graduate Student Advisory Board, Graduate College

2020 – 2022 Member, UNLV Minority-Serving Institution (MSI) Student Council

2020 – 2021 Graduate Student Research Mentor, Graduate College Rebel Research and Mentorship Program (RAMP)

2019 – 2022 Graduate Student Mentor, Grad Rebel Advantage Program

PUBLIC PRESENTATIONS

2019 Introduction to Ground Stone: Tool Types and Analysis. Shivwits Research Project Archaeological Field School (Shivwits Plateau, Arizona), June 18th.

2018 Introduction to Ground Stone: Tool Types and Analysis. Elk Ridge Archaeological Field School (Mimbres, New Mexico), June 11th.

2017 Using GPS and Total Station Technology for Plans and 3-D Imaging (with Jon W. Carroll). *The Fourth Expedition to Lachish* (Israel), July 4th.

2016 Using GPS and Total Station Technology for Plans and 3-D Imaging (with Jon W. Carroll). *The Fourth Expedition to Lachish* (Israel), June 27th.

2015 Technology and Archaeology: GIS and GPS, Aerial Photography, and Top Plans (with Emma Khan and Chris Dant). *The Fourth Expedition to Lachish* (Israel), June 24th.

2014 A Bird's-eye View of Archaeology (with Michael Dant and Sarahi Remolína). *The Fourth Expedition to Lachish* (Israel), June 23rd.

2012 Archaeology as a Career Choice. Montclair High School (Montclair, California), September 28th.

2011 Computers in Archaeology: Surveying, Computers, and Daily Top Plans. (with Roland Dell'mour and Michael Dant). The Khirbet Qeiyafa Archaeological Project (Israel), July 20th.

2010 Total Station Surveying and GIS at Khirbet Qeiyafa (with Scot Anderson and Dean Scott). The Khirbet Qeiyafa Archaeological Project (Israel), July 13th.

CERTIFICATIONS

2022 Excavation Supervisor of Unmarked Human Burials on State and private lands in New Mexico—State of New Mexico Department of Cultural Affairs Historic Preservation Division. [Approval of this status does not expire].

2022 Graduate Research Certification—The Grad Academy: Innovative Leadership, Professional, and Career Development, University of Nevada, Las Vegas

2021 Graduate Mentorship Certification—The Grad Academy: Innovative Leadership, Professional, and Career Development, University of Nevada, Las Vegas

2020 Graduate Teaching Certification—The Grad Academy: Innovative Leadership, Professional, and Career Development, University of Nevada, Las Vegas

REGISTRATIONS

Registered Professional Archaeologist 989619

PROFESSIONAL MEMBERSHIPS AND AFFILIATIONS

American Anthropological Association
Arizona Archaeological and Historical Society
Register of Professional Archaeologists
Society for American Archaeology