2011-12-12

Dirty Talking Cracked Pots: Inferring Function and Use of Decorated Ceramic Bowls at Fourmile Ruin, AZ

Heather E. Bullock
Brigham Young University - Provo

Dirty Talking Cracked Pots: Inferring Function and Use of Decorated Ceramic Bowls at Fourmile Ruin, AZ

Heather Elisabeth Bullock

A thesis submitted to the faculty of
Brigham Young University
in partial fulfillment of the requirements for the degree of

Master of Arts

James R. Allison, Chair
John E. Clark
Donald W. Forsyth

Department of Anthropology

Brigham Young University

December 2011

ABSTRACT

Dirty Talking Cracked Pots: Inferring Function and Use of
Decorated Ceramic Bowls at Fourmile Ruin, AZ

Heather Elisabeth Bullock
Department of Anthropology, BYU
Master of Arts

In this thesis, I discuss the function and use of decorated ceramic bowls at Fourmile Ruin, a Pueblo IV site located in east-central Arizona. My research focused on three wares dating to the Pueblo IV period of the American Southwest (AD 1275-1450): White Mountain Red Ware, Salado Polychrome, and Jeddito Yellow Ware. These wares represent the most abundant type of decorated ceramic bowls found at Fourmile Ruin. Ceramic wares and types are described, followed by a description of their physical and stylistic characteristics and functions, an analysis of how vessels were used, and, lastly, a discussion of the contexts within which ceramic bowls may have been used. I found that decorated ceramic bowls likely functioned as serving containers, and were used on a day-to-day basis. They also may have had a symbolic function, as evidenced by the use of decoration, color, and texture, and because of their possible uses in various social or religious rituals. Furthermore, the meaning of the vessels and their uses in rituals may have changed over time. From this information, I suggest that White Mountain Red Ware, Salado polychrome, and Jeddito Black-on-yellow bowls served as utilitarian serving containers, and as a means of communicating information about personal and group identity. They were used in contexts in which expressing, teaching and reinforcing important concepts may have been integral.

Keywords: Native Americans, Arizona, Ancestral Puebloan, Four Mile Ruin, ceramics

ACKNOWLEDGEMENTS

I would like to thank, first, the Department of Anthropology for their support and their interest in me and my education. I particularly wish to thank Jim Allison for acting as my thesis advisor, and for his advice and training during this project. I also thank the other members of my committee, John Clark and Donald Forsyth, for their comments, suggestions, patience, and willingness to help. Special thanks to Paul Stavast for, first, being a friend, and second, for his help in setting up my data analysis and allowing me access to museum collections. I am extremely grateful for Evie Fosyth and her tremendous efforts on my behalf throughout my years at BYU; she has always been a true friend. I also express my appreciation to Scott Ure and Mike Searcy for their help in analyzing much of my data. I would also like to thank my friends within the department, Jaime Bartlett and my fellow graduate students, for their love, understanding, and compassion over the years. Lastly, I express my appreciation to my family for their tireless and unconditional love and support; they kept me moving forward yet grounded in what is truly important. I want to thank Melissa for her listening ear and steady hand, and Jared for his wonderful and clever sense of humor. I am extraordinarily grateful to my parents for their love and support in my triumphs and failures, and for continually reminding me, and showing me by their example, that I can do anything.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1 INTRODUCTION

In his 1880 publication, *A Tramp Abroad*, Mark Twain wrote, "The very 'marks' on the bottom of a piece of rare crockery are able to throw me into a gibbering ecstasy" (Twain 1880). Surely this is how the pottery analyst feels when he or she picks up a vessel to examine every chip, scratch, residue, and crack. For every 'mark' on a piece of pottery tells a story; each one tells us about the vessel's birth, life, death, and resurrection, and about the vessel's relationship with its owner. Small, seemingly insignificant, scratches and nicks on a vessel's surface can give us insights into a society's most complex cultural processes.

Pottery holds a special place in the study of the past. People make pots, distribute them, use and break them, and discard them in the context of everyday life (Skibo and Feinman 1999). Because of their durable and ubiquitous nature in pottery producing cultures, archaeologists use ceramics as tools to answer all sorts of questions about human behavior, and about things like trade and exchange, migration, ethnicity, the spread of ideas and traditions, or technology.

Ceramic studies have been particularly useful in the study of American Southwestern cultures where pottery dominates artifact assemblages. For more than one hundred years archaeologists have used pots to understand social, political, economic, religious, and demographic processes of Southwestern societies (Fewkes 1904; Colton and Hargrave 1937; Gladwin and Gladwin 1930; Colton 1941; Haury 1958; Kintigh 1985; Spielmann 1998). Many studies have focused on clay sourcing (Triadan 1997; Zedeno 1998), pottery production and distribution (Upham 1982; Crown 1994), interpreting decorative styles (Adams 1991; Crown 1994), and use-wear analysis (Schiffer and Skibo 1989; Skibo 1992).

The Pueblo IV period of the Southwest (AD 1275-1450) was a time of great pottery diversity and experimentation in association with widespread social upheaval and reorganization. Just prior to this period, potters began to understand the benefits and unique characteristics of glaze-paints; during this time potters experimented with different firing techniques, paint recipes, and decorative styles (Haubicht-Mauche 2006). Linda Cordell (1997), writing of this period and the archaeologists who study it, said,

> "If there is one pattern that all who work on this period of adjustment recognize, it may be summed up in the word *crystallization*. That is, many of the specific forms, designs, symbols, or motifs can be traced to much earlier periods, but in the fourteenth century, they came together in new ways, forming new patterns."

As diverse cultures and people came together through the process of migration to forge new identities, so did their distinct pottery traditions. Many of the pottery types of this time represent an amalgamation of different manufacturing techniques and decorative styles. Three of the most significant and widely exchanged decorated ceramic wares of the Pueblo IV period were White Mountain Red Ware, Salado polychromes, and Jeddito Yellow Ware. Each of these wares was distinctive and unique in terms of their manufacture and decorative style. Each expressed and conveyed different messages and ideas. Regardless of these differences, Pueblo IV decorated wares served similar functions and uses, and may have even been associated with similar social contexts.

In archaeology, however, it is simply not enough to understand a culture's technology. The technology must be understood in terms of *how* it relates to human behavior. In *Symbols in Action,* Ian Hodder (1982) discussed the idea that material culture reflects human behavior; that is, there is a predictive link between material culture and behavior. His argument is that material

culture *does not* simply 'reflect' human behavior, but it takes an active role in the social relations of a society. Decorated pottery may, therefore, fill an active role in Pueblo IV society beyond its utilitarian function and use.

Although decorated vessels were manufactured to fill a primarily utilitarian role, they had a social or symbolic function as well. In this paper, I define *utilitarian* as the physical functions of an object, distinguished from its symbolic functions, which assist the user in exchanging substances or matter (Banning 2000). The term *symbolic* refers to the use of an object to exchange information (Hodder and Preucel 1996). White Mountain Red Ware, Salado polychrome, and Jeddito Black-on-yellow bowls served as utilitarian serving containers, and as a means of communicating information about personal and group identity. They were used in contexts in which expressing, teaching and reinforcing important concepts may have been integral. I propose to defend this supposition through the framework of Behavioral Archaeology, and by (1) evaluating the morphological attributes and technological properties of these three wares; (2) analyzing patterns of post-firing modification, or use-wear; and (3) discussing possible contexts of vessel use in which the expression of ideological concepts or identity may have been essential.

In Chapter 2, I review the historical and social contexts of White Mountain Red Ware, Salado polychrome, and Jeddito Black-on-yellow vessels. I familiarize the reader with the general history and events of the Pueblo IV period, followed by a more detailed introduction of the Silver Creek drainage and Fourmile Ruin. I then describe the modern history of, and archaeological excavations at, Fourmile Ruin.

In Chapter 3, I describe the data set used in this project, its history, its acquisition by the Museum of Peoples and Cultures, and its contents. I discuss briefly each of the three ceramic wares within the data set, including their production, decoration, spatial and temporal distributions, and use in archaeological research. The points discussed in this chapter will be

running themes throughout the paper.

Chapter 4 includes a brief discussion of Behavioral Archaeology and use-wear studies, and their place in archaeological research. In the remainder of the chapter I discuss the morphological traits and performance characteristics of White Mountain, Salado, and Jeddito vessels. An understanding of these traits is important for determining the intended function of vessels, and the choices potters made while manufacturing pottery. It is also essential to understand the inherent traits that make decorated bowls appropriate media for conveying information.

The physical performance traits of the bowls suggest that decorated vessels were produced to transport and serve food. The visual performance traits, such as color, texture, and decoration, indicate that decorated bowls also had an inherent symbolic function. There are some differences, potentially important ones, in the visual performance traits among White Mountain, Salado, and Jeddito vessels.

In Chapter 5, I discuss the physical traces of use present on the vessels in the data set. These include the categories of abrasion, pitting, scratches, chips, and repair holes, and the differences among the three wares in terms of these categories. The patterns of use show how the vessels were *actually* used, if they were used in the same ways, and how use can be correlated with human behavior. Based on use wear patterns, White Mountain, Salado, and Jeddito vessels had the same basic utilitarian use. There is one use wear pattern, however, among Fourmile Polychrome which may suggest a significant difference in the symbolic function of decorated vessels at Fourmile Ruin. Furthermore, the frequency of repair among Fourmile and Jeddito bowls may indicate a greater value of these vessels based on their non-utilitarian qualities.

Chapter 6 is dedicated to understanding the contexts of vessel use and discard at Fourmile Ruin. I discuss three contexts of vessel use that may have served as arenas for instruction, reinforcing important concepts, and expressing personal or group identity: (1) community

feasting, (2) household, and (3) mortuary contexts. I reiterate and expand upon the physical and visual qualities of the vessels and patterns of use that suggest association with these contexts. Vessel size, for example, may be correlated with the scale of the meal, while different abrasion patterns may indicate differences in the ways vessels were displayed. In all of three of these contexts, the dual role of decorated bowls was utilized.

In Chapter 7 I summarize my research results and restate my conclusions for this project.

2 HISTORICAL AND SOCIAL BACKGROUND

Around the year AD 1275, the people of the American Southwest experienced great changes that impacted virtually every aspect of their lives. Almost simultaneously, people across the region uprooted their lives, homes, and communities *en masse*; entire landscapes were left vacant. Migrations on a massive scale occurred as individuals and groups from the Tusayan and Kayenta regions moved south and east into parts of east-central Arizona and western New Mexico (Figure 1). Some people were looking for protection, some stability, and others opportunity (LeBlanc 1999). Many may have sought a new home in response to environmental degradation and drought, and increasing social and political unrest (Kahldahl et al 2004; Cordell 1997; Plog 1997). People from diverse cultural and historical backgrounds came together into new communities, and struggled to forge new identities.

Pueblo IV settlements generally consisted of large, multi-story structures. This represents a break from previous settlements, which were smaller and more broadly spread across the landscape. There were fewer Pueblo IV settlements, overall, but they were much larger and more densely populated than those that came before. Residents lived in contiguous, multi-room block buildings that surrounded central plazas. Many of these large communities were organized into associated groups, called clusters (Figure 2), that were possibly based upon economic, political, or filial alliances (LeBlanc 1999).

Over the course of the Pueblo IV period, life continued to change for the inhabitants of the Southwest as communities struggled to reorganize and redefine themselves. Archaeologists have divided the Pueblo IV period into two distinct periods of development (Plog 1997; Mills

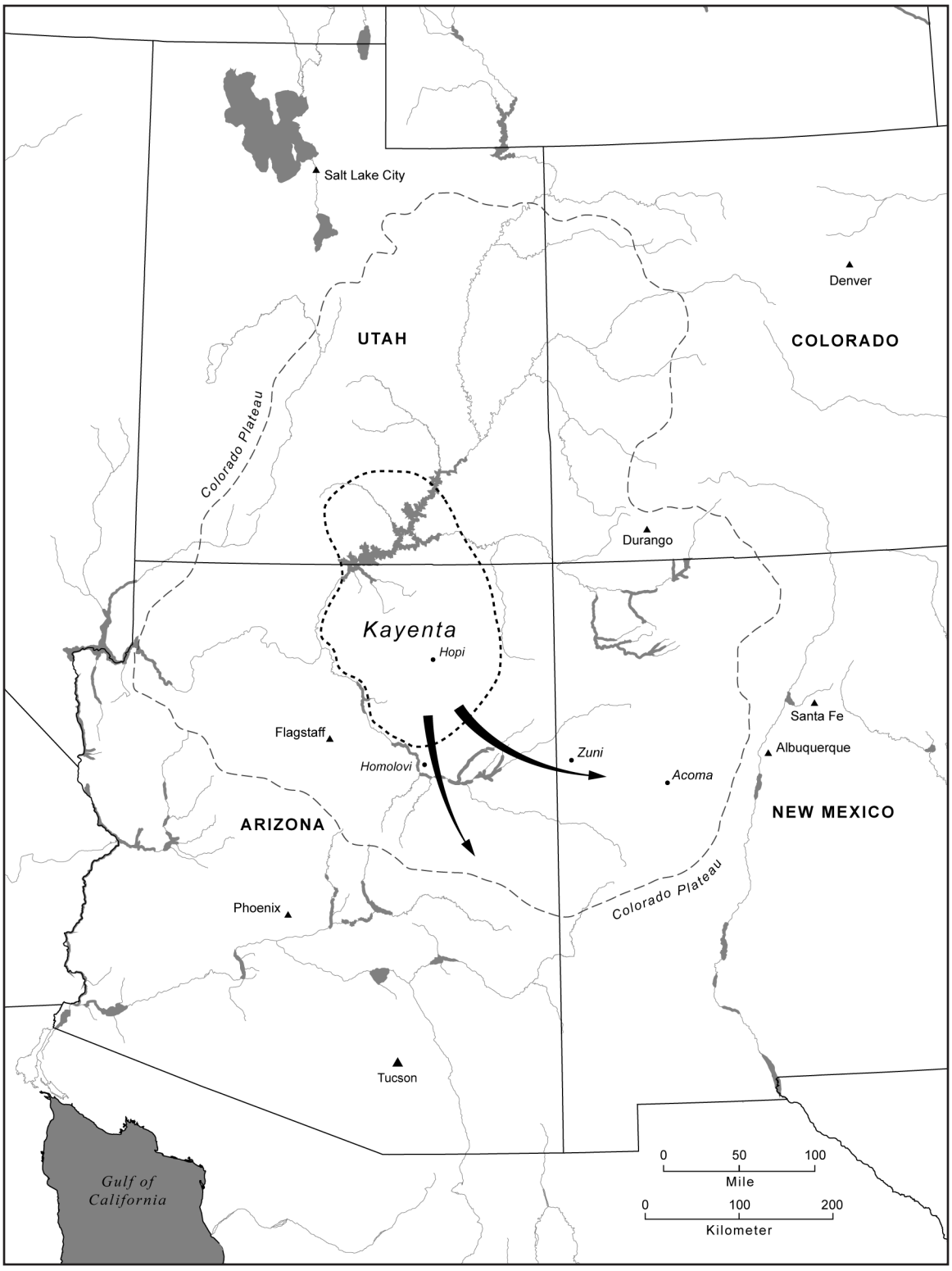

Figure 1. The Tusayan and Kayenta pattern of migration beginning in AD 1275.

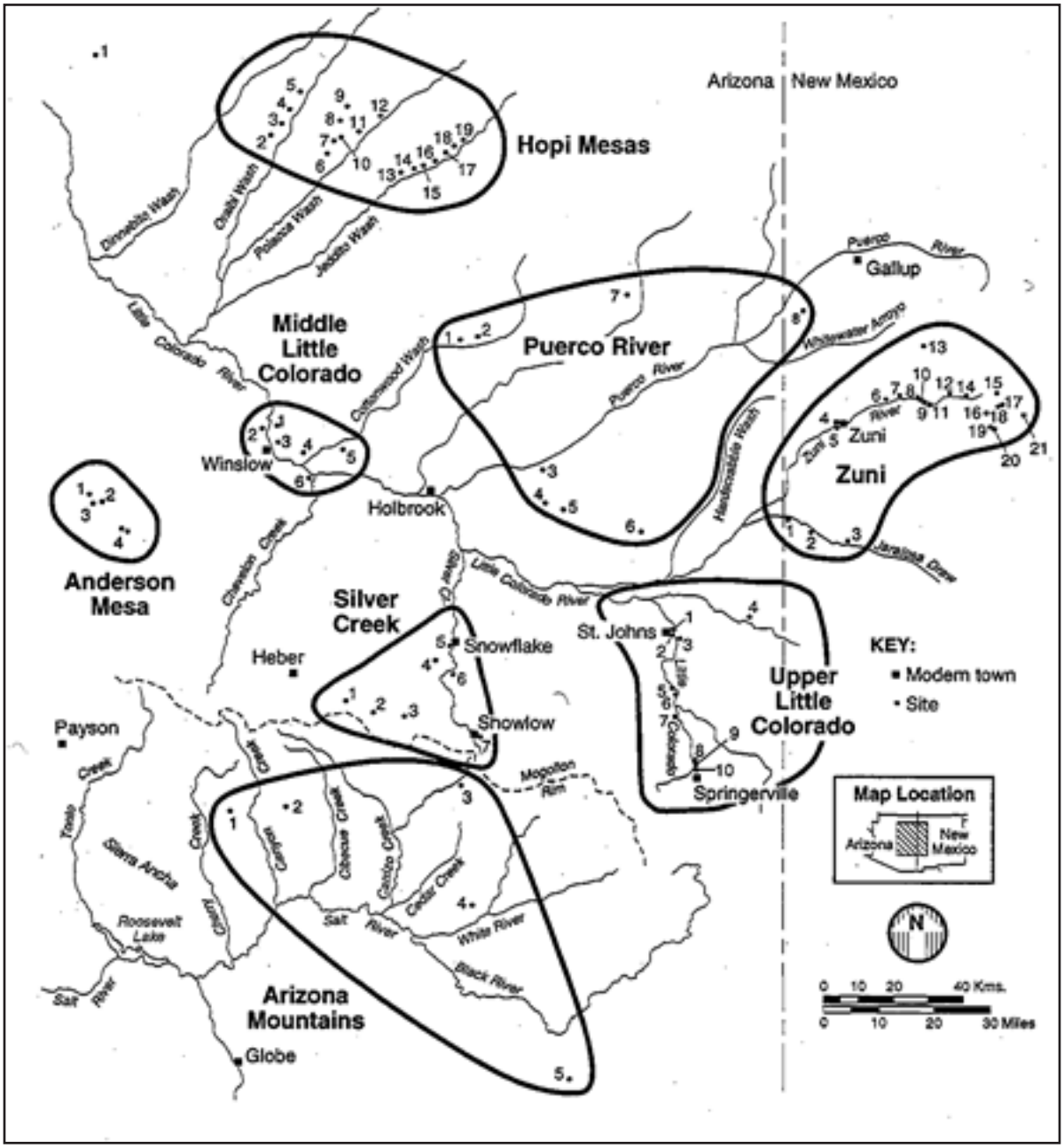

Figure 2. Pueblo IV settlement clusters. Figure from *Western Pueblo Identities* by Andrew I. Duff © 2002 The Arizona Board of Regents. Reprinted by permission of the University of Arizona Press.

and Herr 1999; Duff 2000, 2002; Adams 2002). The *Early Period*, from AD 1275 to 1325, is characterized by the process of aggregation; all, or most Southwestern populations merged into contiguous masonry or adobe structures. During the *Late Period*, from AD 1325 to 1400, many of the settlements built in the Early Period were abandoned or drastically depopulated, and a second phase of major construction and settlement restructuring occurred. More people moved to the larger communities, and those sites were expanded to accommodate new residents.

The movement and reorganization of populations during this time period also had ideological and material correlates. Many new religious beliefs and practices were introduced and adopted; settlement hierarchy and social power was restructured. As populations from diverse historical and cultural backgrounds came together, many changes occurred in the ways everyday items were produced, decorated, and used.

The transformations that occurred during the Pueblo IV period were mirrored in dramatic changes to decorated pottery production and traditions. Potters introduced new color schemes, used new paints and painting techniques, developed innovative firing techniques, and experimented with overall design structure and symmetry (Plog 1997). Pottery traditions became regionally distinct, and vessels were traded over a much wider geographical area, with some reaching the Great Plains, California, and northern Mexico (Adams and Duff 2004).

Each settlement cluster seems to have traveled along its own cultural trajectory, creating and developing a unique set of traditions and beliefs. A few of these clusters even influenced the broader region with their practices and traditions. One of the smaller, more loosely allied settlement clusters that had a significant impact on much of the Southwest, was the Silver Creek cluster, located in the Silver Creek drainage of the Upper Little Colorado River. The Silver Creek drainage lies just above the Mogollon Rim, at the southern edge of the Colorado Plateau (Figure 3). This area, in particular, is known for its wide diversity of environmental zones. Dense ponderosa pine and pinon-juniper grow at the highest elevations, while the lower

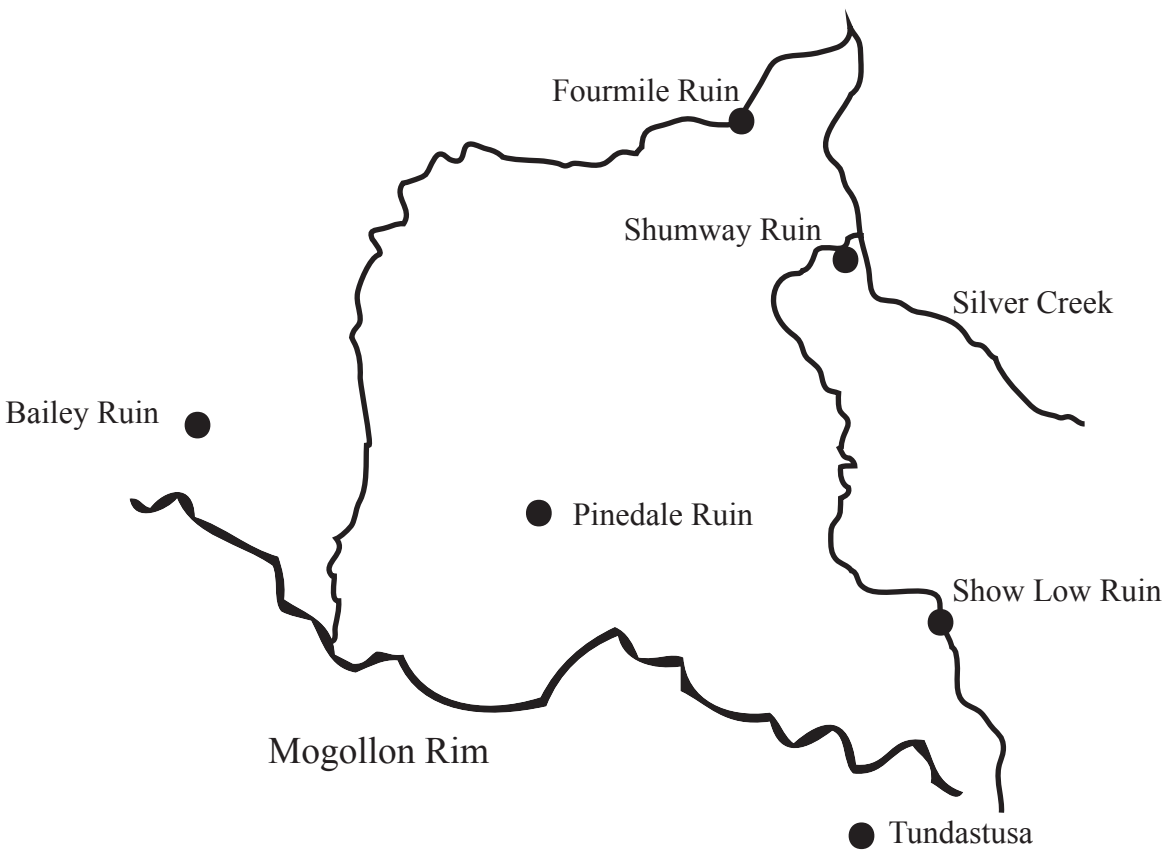

Figure 3. The Silver Creek cluster in the Pueblo IV period.

elevations see few trees and broad grasslands. Because of its elevation—from 1740 to 2210 m—the Silver Creek drainage receives greater amounts of moisture than many other areas of the Southwest (Kahldahl and Dean 1999).

The Silver Creek cluster experienced an influx in populations beginning in the late thirteenth century as immigrants from the Tusayan and Kayenta regions settled at one of the many pueblos in the area. By the early decades of the fourteenth century, most residents of the cluster were living at Pinedale, Showlow, or Fourmile pueblos. Immigrants established Fourmile Pueblo in AD 1275, at the onset of the Pueblo IV period. It was the largest settlement in the Silver Creek drainage, and exceeded five hundred rooms at the height of its occupation (Figure 4).

Figure 4. Aerial view of Fourmile Ruin. Photo courtesy of Adriel Heisey. © Adriel Heisey

Fourmile Pueblo, like other Pueblo IV sites, was a large, multi-story community. Residents constructed two semi-enclosed plazas, and a variety of ritual architecture (Kahldahl et al 2004). This site, possibly most significantly, was one of the few loci in the Silver Creek drainage for the production of White Mountain Red Ware, a widely traded decorated ceramic ware. For various reasons that will be discussed throughout this paper, White Mountain Red Ware was of particular significance to the residents of Silver Creek. Notwithstanding its great importance, it was not the only decorated ceramic ware at Fourmile Pueblo. The ceramic assemblage also included Salado polychrome and Jeddito Yellow Ware in varying amounts. Each of these three wares may have represented the ethnicity of their owners, membership in a cult organization, or acceptance of certain ideologies.

Although Fourmile Pueblo (now called Fourmile Ruin) was the largest in the Silver Creek drainage, it is also the least well understood archaeologically. It has been, for decades, a site of interest for archaeologists for reasons such as its sheer size, and the paucity of records and information pertaining to it. Clearly visible on the landscape, the remains of Fourmile Ruin first garnered attention from explorers and archaeologists in the late nineteenth and early twentieth century (Bandelier 1892; Fewkes 1904; Spier 1918).

JESSE WALTER FEWKES' EXCAVATION 1897

Jesse Walter Fewkes, of the Smithsonian Institution, was the first to professionally excavate the site. Fewkes's scholarly interests lay primarily in the ethnographic studies of the people of the American Southwest, chiefly, the Hopi and the Zuni. To this end, he spent several seasons among them recording their day-to-day activities, their ceremonies and rituals, and their myths, and he sought to understand their historical and ethnic origins (Fewkes 1904).

With the objective of understanding the histories and origins of contemporary Puebloan people, and gaining comparative data concerning pottery and its decoration from various sites in

the area, Fewkes undertook archaeological fieldwork at several sites throughout the Southwest beginning in 1896. His excavation and collecting strategies reflected his own interests in population movements, and the Smithsonian's quest for accumulating objects of interest for their own collections. Fewkes began formal excavations at Fourmile Ruin in the summer of 1897, and his findings were reported through the Bureau of American Ethnology in 1904.

Accompanied by Walter Hough, also of the Smithsonian, Fewkes's team excavated portions of Fourmile Ruin, including two burial sites and one structure. Smithsonian records, unfortunately, do not contain Fewkes's field notes and journal from the Fourmile excavation, but there is a good deal of useful information in his report *Two Summers' Work in Pueblo Ruins* (1904). Fewkes, who had not visited the site previous to 1897, observed that Fourmile Ruin, located about four miles from Snowflake, Arizona, appeared to be largest in the area, and to his knowledge, had not yet been explored.

Fewkes reported that the remains of Fourmile Ruin were situated on a bluff that overlooked a tributary of the Little Colorado River, and described the ruin as irregularly rectangular, with a central open plaza and scattered rooms in the eastern section (Figure 5). Having observed contemporary Puebloan people, Fewkes conjectured that this central plaza was well suited to ceremonial dances and other gatherings. He suggested that a majority of the population lived in the western part of the site based upon the concentrated number of what he determined to be domestic structures in that area.

One of Fewkes's primary objectives in his 1897 excavation was to discover the site's burial grounds as they contained the highest number of whole ceramic vessels for collection. Based upon his report, the majority of the ceramic vessels and other objects he collected came from two cemeteries. His ability, however, to preserve the ceramics from these two areas varied greatly. Much of the northern burial site had eroded away, and most human remains were found less than a foot below the surface. Frequent flooding had

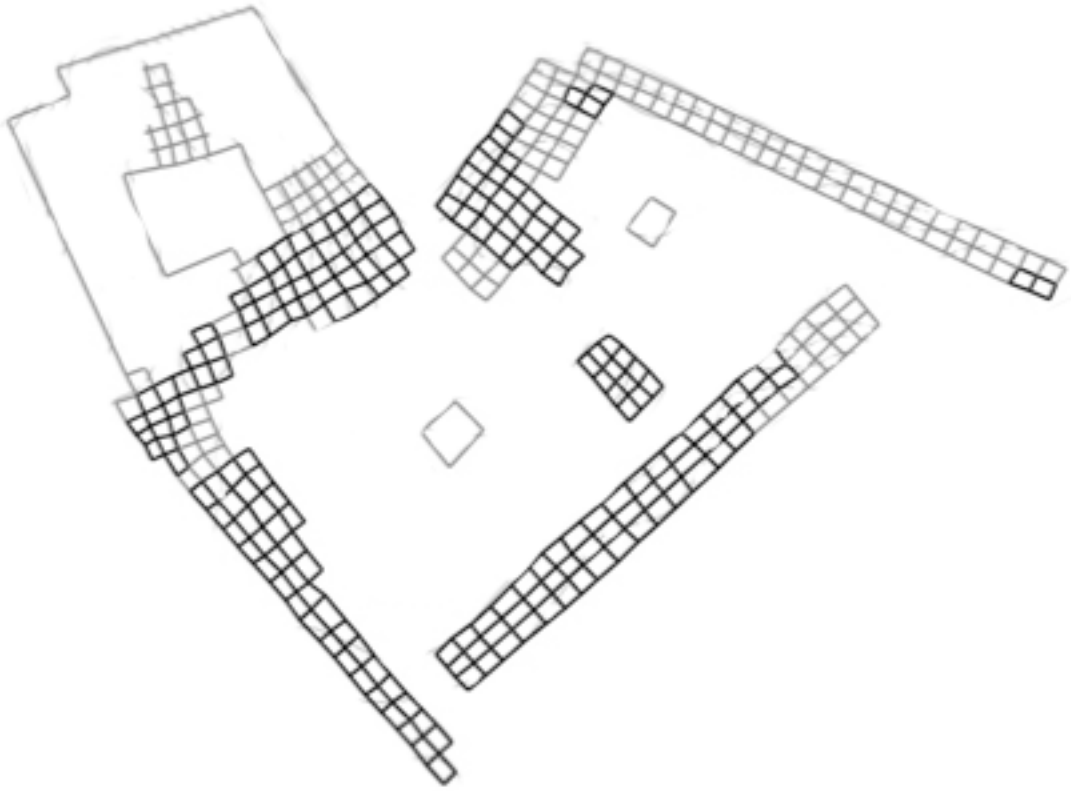

Figure 5. Map of Fourmile Ruin. Modified from original courtesy of Scott Van Keuren.

also washed in several large stones. Fewkes reports that because excavators had to dig among the stones to extract artifacts, many vessels were broken as they were pulled from the earth. The greatest number of broken vessels in the Fewkes collection came from this area. In the southern cemetery, however, the burials were much deeper, and the soils consisted of a sandy alluvium resulting in better preservation of mortuary items. Fewkes noted that the best-preserved and finest vessels came from this area.

In his study of the collection, Fewkes made several observations concerning vessel forms and decoration. His analysis, however, pre-dated the use of the southwestern archaeological lexicon, established in the early 1900s by the Colton and Hargrave. Fewkes observed that the ceramic assemblage from Fourmile Ruin was dominated by red bowls and small vases with white and black decorations—likely White Mountain Red and Salado wares. The collection, though, has

not been analyzed in great detail to this day, and the vessels have not been firmly identified. The researcher, however, will note a striking similarity between it and the Reidhead Collection (discussed in the next section) after merely viewing the Fewkes Collection.

In the decades following the Fewkes excavation little professional archaeology was conducted at Fourmile Ruin. Leslie Spier (1918) simply documented the site, along with many other sites in the area, and his publication produced the first map of the pueblo. Fourmile Ruin, fortunately and unfortunately, did not go unnoticed over the years.

TERRENCE REIDHEAD EXCAVATION, LATE 1960S

In the late 1960s, Terrence Reidhead and his family excavated a portion of Fourmile Ruin with the permission of the landowner, a Mr. Shumway. The Reidheads began their excavation on the northeastern side of Fourmile Ruin. This area had been excavated prior to this time by Fewkes who had uncovered a layer of shallow burials. Unaware of Fewkes's findings, the Reidheads continued excavating through several strata. Using a front loader, Terrence removed several centimeters of soil at a time. Meanwhile, his family screened the soil for beads and other small artifacts. As layers of soil were removed, the Reidhead's discovered additional levels. They discontinued the use of the front loader when the soil changed color, and opted for small hand tools to extract ceramic vessels and other items.

Terrence and his family did not excavate additional areas of Fourmile Ruin. Although the Reidheads only excavated a small area of the site, they collected several hundred ceramic vessels and other artifacts. Several decades later these items—and objects from other sites they excavated—were donated to the Museum of Peoples and Cultures (Harris 2009).

OTHER RESEARCH IN THE SILVER CREEK DRAINAGE

Fourmile Ruin and the other sites in the Silver Creek have played a key and central role in models about Pueblo IV political, social, economic, and ritual organization (Mills 1999).

Emil Haury (1931) gathered much of the information known about the Silver Creek drainage in the early 20th century. Recent work, conducted under the Silver Creek Archaeological Research Project (SCARP), has focused on some of the smaller, less well-known sites, such as Bailey Ruin. SCARP has undertaken a variety of projects including reconstructing the paleoenvironment, understanding settlement pattern and demography, interpreting the spatial structure and occupational histories of each site, understanding craft production and distribution, refining chronologies, and reconstructing subsistence. Archaeologists' main goals have been to understand the causes and consequences of community reorganization during the 11th through 14th centuries, and the role of the Silver Creek drainage in the Western Pueblo region.

Fourmile Ruin was one of the largest settlements in the region during the Pueblo IV period, but it is also one of least understood archaeologically. In this chapter Fourmile Ruin was contextualized within the framework of historical and social events of the Pueblo IV period, and its excavation history was established. In the next chapter I will define and discuss the ceramic assemblage associated with Fourmile Ruin.

3 THE REIDHEAD COLLECTION

The Reidhead Collection was acquired by the Museum of Peoples and Cultures in 2006, and comprises over one thousand whole and partial ceramic vessels, hundreds of stone tools, and many beads, shells, and other artifacts indigenous to the prehistoric American Southwest. Most of these items were collected by the Reidhead family from various southwestern sites—including Fourmile Ruin, Pinedale Ruin, Skousen Ranch, and others—over the course of twenty years. Some artifacts were also acquired through trade or purchase.

There are several factors that contribute to the complexity of the Reidhead Collection, and make a complete understanding of it difficult to achieve. First, the collection is large, and includes objects from various localities and time periods. The Reidheads, furthermore, did not document the provenience of collected items. Second, some collection items were traded to increase the variety of the collection, and the provenience of those acquired objects is unknown. Third, Terrence Reidhead has passed away, and the memories of his surviving family members, though helpful, have proven insufficient for reconstructing collection provenience. The following is a brief summary of what is known about the history of the Reidhead Collection.

The Museum of Peoples and Cultures acquired the Reidhead Collection in 2006 under the direction of Paul Stavast. Stavast pursued the acquisition of this collection following the encouragement of James Allison, a faculty member in Brigham Young University's Department of Anthropology and several others (Harris 2009; Harris 2011 *in press*). This collection was well known for its research and academic potential.

In the process of acquiring the Reidhead Collection, the MPC conducted interviews with

surviving members of the Reidhead family who were willing to provide information. Jean, Terrence's wife, and Teri, his daughter provided the information they remembered regarding the sites they excavated, when they excavated, what they found, and how the collection changed and moved over time. MPC staff members were also able to contact others involved in the collection's history to contribute additional perspectives on this unique collection.

The Reidhead family first began excavating archaeological sites in 1962, and, over the years, amassed large numbers of artifacts from sites across Arizona. Their most productive undertaking occurred in the late 1960s at Fourmile Ruin, situated on the private land of Mr. Shumway, a local rancher. Many hundreds of vessels and other items were collected here, and were initially stored in the rancher's barn. Because Fourmile Ruin is located on privately owned land, it was the rancher who owned the associated artifacts. According to the Reidheads, Shumway feared the retribution of disturbed ancient spirits, and he allowed Terrence Reidhead to transfer the collection to his home just outside of Showlow, Arizona.

Over the years, the Reidheads' collection of pottery and other artifacts increased in number and variety. Objects were acquired through additional excavations, trade, and purchase, and some were given as gifts to the family. The artifacts from Fourmile Ruin, however, make up over half of the Reidhead Collection. The collection was initially stored in a shed on the Reidheads' land, but was moved at one time to a special room inside the family home, and then into an insulated room in the barn for security reasons. While the collection was growing over time in number, variety, and research value, it was also increasing in monetary value, and Terrence feared robbery attempts.

While the collection was in his possession, Terrence pursued the idea of building a museum for exhibiting his large, and growing, collection. Above all else, he wanted to use his collection to educate the public. Eventually Reidhead partnered with a friend to open the Museum of the Americas, which exhibited Reidhead's collection, a few South American pieces, and dinosaur

fossils. Although initially successful, the relationship between the owning families declined over time, and actually worsened after Terrence's death in 2003. After considerable effort, Jean Reidhead, Terrence's widow, reestablished ownership of the collection and donated it to the Museum of Peoples and Cultures in 2006.

At the time of its donation, the collection included several hundred whole and partial vessels, many boxes of various sherds, worked turquoise and shell, projectile points, and ground stone. Since 2006 the collection has been involved in three MPC exhibitions, been the subject of several student research papers, and the focus of course curriculum. Most of the objects are in a good to excellent state of preservation, and the MPC has stored the collection in such a way to ensure its long-term preservation. The current condition of approximately one-quarter of the vessels in the collection—those that date to the Pueblo IV period of the Southwest—will be discussed in detail throughout the remainder of this chapter.

THE DATASET

The Reidhead Collection, as discussed, is comprised of ceramic vessels (whole and partial), ceramic sherds, worked stone and shell, projectile points, and ground stone. The Reidheads, however, did not keep excavation records and the memories of the family are somewhat vague; it is unclear, therefore, where and how certain items were acquired. But given the information we do have, it is possible to say—with some confidence—that specific ceramic wares were used at Fourmile Ruin in the late thirteenth and the fourteenth centuries. These are the White Mountain Red, Salado, and Jeddito Yellow vessels.

The following is a brief summary of each of the ceramic types in the Reidhead Collection included in the sample, as well as their manufacture, forms, decoration, temporal and spatial distributions, and their use in archaeology over the years.

White Mountain Red Ware

White Mountain Red Ware is the term given to the red-slipped ceramics produced in the Western Pueblo region—east-central Arizona and western New Mexico—from around AD 1000 to AD 1450 (Figure 6). Using a coil and scrape method, potters constructed jars, bowls, effigies, and other forms, applied a red slip, and decorated the vessels in elaborate black and white designs (Carlson 1970).

White Mountain Red Ware was used as a tool for archaeological research and analysis beginning in the early twentieth centuries with Walter Hough, Jesse Walter Fewkes, and Leslie Spier, who used these vessels to establish a southwestern chronology. It was not until the 1930s, however, that this ware was described in detail (Haury 1930; Haury and Hargrave 1931; Gladwin and Gladwin 1931; Kidder and Shepard 1936), and organized into the taxonomic units still in use today (Colton and Hargrave 1937). In 1970, Carlson published an in-depth analysis of White Mountain Red Ware, which examined the technological elements of vessel manufacture, decoration, and spatial and temporal distributions of each type of vessel.

Although White Mountain Red Ware is taxonomically organized based upon similar technological and stylistic traits, there are unique characteristics distinguishing the different vessel types. The most dramatic transformations, particularly in decoration, within the White Mountain Red Ware series occur just before, and then throughout, the Pueblo IV period. Three distinct types mark this period of time: Pinedale Polychrome, Cedar Creek Polychrome, and Fourmile Polychrome. The three types share some technological similarities, but they are stylistically different.

The production of White Mountain Red Ware initially centered in the Cibola area—along the Puerco River and the Zuni and Upper Little Colorado regions—but shifted to the Silver Creek region after AD 1275 (Triadan 1997). Potters used local clay and tempered it with sherds or crushed rock. Vessels, fired in an oxidizing atmosphere, generally have a dark core when fired.

Figure 6. White Mountain Red Ware types from the Pueblo IV period from the Reidhead Collection. Vessels to the right and left are Pinedale Polychrome; central vessel is Fourmile Polychrome.

After applying a red slip, potters decorated vessels with white and black designs made of kaolin and mineral paint. The similarities among the Pueblo IV White Mountain Red wares, however, generally end here.

Pinedale Polychrome AD 1275-1325

Pinedale Polychrome emerges in the Western Pueblo region—specifically the Mogollon Rim region, between Roosevelt Lake and the Silver Creek area—around AD 1275, and is produced until AD 1325. Pinedale vessels are a striking departure from previous White Mountain Red wares. Although manufactured in much the same way as its predecessors, the introduction of these vessels represents the first widespread use of glaze and matte glaze paints on ceramic wares.

Pinedale Polychrome is decorated in the Pinedale style; a style marked by bold geometric designs and patterns (Figure 7). The decoration often covers the interior wall surfaces of the vessel, and usually covers the whole interior surface. The Pinedale style is distinguished by repeating and alternating symmetrical patterns of interlocked and hatched units, frets, scrolls, running diamonds, barbs, steps, and other geometrical shapes. Decoration also includes large triangular, curvilinear, and rectilinear motifs that are elaborated with dots, dotted lines, parallel lines, and squiggled lines. Banding lines, both single and double, appear frequently on interior and exterior surfaces.

Single unit motifs appear on the exteriors of Pinedale vessels, as well as continuous bands of repeated elements. Some examples of exterior decoration include zigzags, rattlesnake head and tails, checkerboards, lightening, meanders, diamonds, hands, butterflies, spirals, birds, etc.

The most defining characteristics of the Pinedale style include, first, the use of bold geometric designs; second, the overall symmetry of the design field which covers most, if not all, the interior surface; and third, the application of exterior single unit motifs.

Cedar Creek Polychrome AD 1300-1330

Western Pueblo potters began manufacturing Cedar Creek Polychrome around AD 1300. This type appears to be transitional between Pinedale and Fourmile polychromes because of the similarities it shares with both types. It is, however, distinct in many ways from preceding and succeeding types (Figure 8).

Vessels were decorated on both interior and exterior surfaces. The exterior surfaces, in contrast to Pinedale Polychrome, were decorated with elements such as black frets, fine white lines, and combinations of fine white lines and black units. Often these elements were elaborated with black and white dots. Another significant change from Pinedale exteriors is the application of continuous banding lines that have a white upper and lower border.

Figure 7. Pinedale Polychrome vessel from the Reidhead Collection.

The interiors of Cedar Creek Polychrome vessels were decorated in the Pinedale style, which, as previously discussed, was distinguished by the use of bold geometric patterns in a symmetrical design layout. Over time, however, potters increasingly elaborated motifs and design elements, and often these designs covered the entirety of the interior up to the rim.

Although Cedar Creek Polychrome is very similar to Pinedale Polychrome in terms of its interior design, it is distinct on the basis of its exterior decoration and its elaboration of interior designs.

Fourmile Polychrome AD 1325-1450

Fourmile Polychrome was produced in abundance along the Mogollon Rim from AD 1325 to AD 1400. The emergence of these vessels represents a radical departure from all previous White

Figure 8. Cedar Creek Polychrome bowl from the Reidhead Collection.

Figure 9. Fourmile Polychrome bowl from the Reidhead Collection.

Mountain Red Ware. Although quite similar in terms of technological elements, the design and decorative layout of Fourmile Polychrome is strikingly different than anything that had come before (Figure 9).

Pinedale and Cedar Creek polychromes, as previously discussed, are decorated on both the interior—most commonly in the Pinedale style—and exterior surfaces—with bands or single units. Among Fourmile potters, however, this decorating pattern was not necessarily the rule. The exteriors of Fourmile Polychrome are always decorated; the interiors, on the other hand, may or may not be. There are instances in the Reidhead Collection in which interiors are not decorated, or simply have an interior banding line near the rim.

Over a period of approximately fifty years, the exteriors of White Mountain Red Ware underwent a decorative transformation. Potters decorated the upper exterior walls of Pinedale Polychrome with repeating or single unit decorative elements. These included diamonds, meanders, spirals, snakes, and other singular elements. Beginning with Cedar Creek Polychrome, and becoming increasingly popular with Fourmile Polychrome, potters opted for a continuous decorative band, which, over time, became more and more standardized. The exterior vessel wall were decorated with black frets, keys, barbed lines, or terraced figures in combination with arrangements of fine white lines.

When the interiors of Fourmile Polychrome vessels are decorated, they are decorated in the Fourmile style. This style is characterized by an asymmetrical layout, and highly fluid and curvilinear decorative motifs. Vessels are often decorated with large biomorphic figures such as birds. Potters also focused their decoration away from the walls of the vessel and applied decorative elements primarily to the center of the vessel.

Fourmile Polychrome and Fourmile style, for various reasons, become widely popular in the fourteenth century. These vessels are distinct from previous White Mountain Red wares, primarily in the use of Fourmile style. This style is characterized by bold, curvilinear, and asymmetrical designs.

Salado Polychrome

Salado polychromes were produced over a broad geographical area during the late Pueblo III and Pueblo IV periods, and represent the most widespread kind of pottery of the Pueblo IV period. A suite of traits that includes unique architectural features and burial practices accompanies vessels. For further discussion of these associated traits the reader is referred to more comprehensive analyses (Gladwin and Gladwin 1930; Colton and Hargrave 1937; Crown 1994).

The term "Salado polychromes" refers to ten different types. I will, however, discuss only the three major types dating to the Pueblo IV found in the Reidhead Collection: Pinto, Gila, and Tonto polychromes.

Because Salado polychromes were produced over a broad area, there are some variations in manufacturing techniques and vessel forms. Crown (1994) notes that there are no clearly definable regional styles of technology or morphology. Because of this, archaeologists suggest that Salado vessels are the result of a combination of a variety of technological traditions from diverse populations. Large-scale population movements in the Pueblo III and IV periods brought together pottery traditions from Anasazi, Hohokom, and Mogollon culture groups. Rather than being imported from the Tonto Basin—the Salado heartland—vessels were produced locally from local materials, and they have been found in Arizona, New Mexico, and as far as northern Mexico. There are, however, some similarities that aid in classifying Salado vessels.

Like White Mountain Red Ware, Salado polychrome is known for its characteristic red slip and use of white and black paint. Vessels—usually jars and bowls—were formed using small coils and scrape thinning from iron rich clays. The paste of Salado vessels is generally a mixture of clay, sand, and angular sherd fragments. Once formed, potters applied a white kaolin slip in the desired areas of the vessel, and painted over it with a black organic or mineral paint. After that a red slip made from hematite was applied to the surface and polished with a smooth pebble.

The red slipped areas of the vessel were often polished separately from the black-on-white areas, resulting in a matte appearance to the black and white decoration. Vessels were then fired in a neutral-to-reducing atmosphere at a low temperature (Houk 1992; Crown 1994; Simon 1996).

Salado polychromes of the Pueblo IV period were decorated in a variety of geometric styles, including the Pinedale style discussed previously. Common icons appearing on Salado polychrome include the flower, sun, cloud, bird, serpent, and star.

Salado vessels also exhibit diversity in how decoration was laid out on the vessel surface. Crown identified three categories of design field found among Pueblo IV Salado pottery. The first structures the design around a line or banded design; the second around a point or finite designs; and the third is characterized by asymmetrical designs.

These elements generally distinguish Salado polychrome vessels. I will now discuss the three Salado types from the Pueblo IV period individually: Pinto, Gila, and Tonto polychromes. Each of these is distinct from one another in terms of vessel forms, decorative style, and design layout.

Pinto Polychrome AD 1275-1300

Pinto Polychrome (Figure 10), the earliest of the Salado polychromes, was short-lived in comparison with the other types in this collection. Production began around AD 1275 and only continued until 1300. In addition to its short production life span, Pinto vessels also had the most restricted spatial distribution. They were manufactured and circulated only in east-central and southern Arizona.

Vessels, primarily bowls, have incurved, outcurved, or straight walls. Pinto potters decorated their vessels in a geometric style, and solid and hatched designs are frequently seen. The design field comprised either the entire interior of the vessel or left a small square or circular area unpainted in the center. Exterior designs, where present, are typically isolated black or thick line white motifs repeated around the bowl.

In 1994, Patricia Crown published a study of over 1,000 Salado vessels from various collections. In her analysis, she noted a high degree of variation among Pinto Polychrome vessels in terms of their shape, size, and painting techniques. She argues that Pinto vessels represent a period of experimentation in which potters tested new technologies and color combinations that would become traditional on later Salado types.

Pinto Polychrome is distinct based upon its short production span, its restricted distribution, and its interior decoration.

Gila Polychrome AD 1300-1400

Gila Polychrome (Figure 11), produced sometime after AD 1300 until possibly the early 1400s, has the widest distribution of the Salado polychromes. It can be found throughout east-central and southern Arizona, southwestern New Mexico, and in northern Mexico.

In contrast to earlier decoration, Gila vessels are painted with much bolder and blacker designs. Solid and hatched designs are still found, but the hatching is thicker on Gila vessels. Potters also decorated bowls with scalloped edges and diamond "eyes" on triangles, scrolls, keys, and mazes (Crown 1994; Houk 1992). Unlike the earlier Pinto Polychrome, Gila Polychrome designs have a "lifeline", or a line occurring directly below the interior rim or below a thin banded design on the interior, just below the rim. These lines are often continuous but can also have an unpainted break in the line. Exterior designs are typically continuous bands with black-on-white designs separated from the red bowl base.

The design field changes with the transition from Pinto to Gila. Pinto bowl walls were decorated but the interior base was usually left blank. With the onset of Gila vessel production, the design field shifted down the vessel walls, and the interior base became the focus of decoration.

Gila vessels are defined by a much bolder and blacker interior design, and more complex

Figure 10. Pinto Polychrome vessel from the Reidhead Collection.

Figure 11. Gila Polychrome vessel from the Reidhead Collection.

decorative structure. It is different from previous wares in terms of its design layout, and increasing variety of decorative elements and elaboration.

Tonto Polychrome AD 1350-1450

The latest of the three major Pueblo IV Salado types is Tonto Polychrome (Figure 12). Produced from around AD 1350 to 1450, Tonto Polychrome has the same spatial distribution as Gila Polychrome: throughout the Western Pueblo region and into northern Mexico.

Tonto Polychrome is distinct from Pinto and Gila polychromes in several ways. Tonto vessels are most commonly jars rather than bowls. They are also different in the ways potters executed designs. Tonto vessels are decorated, first, with a white paint as a background. Potters then applied the black design over the white background. Red slip was used to fill in the spaces between the designs. Decoration, although it continues to be bold, lacks hatched elements. Tonto vessels, furthermore, may or may not have lifelines. While Pinto and Gila vessels usually have a black and white banded decoration on the exterior, Tonto vessels have black-on-white designs of varied shapes surrounded by red slipped areas.

Tonto vessels have a distinctly different appearance in comparison to other Salado polychromes. Those elements that define Tonto Polychrome include the order of paint application, its variety of vessel forms, and its exterior decoration.

Jeddito Yellow Ware

Jeddito Yellow Ware, produced on the Hopi Mesas beginning around AD 1300 (Bishop et al 1988; Hays 1991), is a division of Hopi Yellow Ware. These vessels were widely traded across the Western Pueblo region from the Verde Valley to the Rio Grande Valley (Colton and Hargrave 1937), and into Utah, California, northern Mexico, and the Great Plains (Bernardini 2007). Jeddito Yellow Ware is known for its characteristic bright yellow surface and black, brown, or red decoration.

Figure 12. Tonto Polychrome bowl from the Reidhead Collection.

Hopi Yellow Ware was first recorded and described by Jesse Walter Fewkes in 1898, who wrote detailed descriptions of vessels he had excavated from Sikyatki and Awatovi. A few others (Hough 1903; Spier 1918) briefly described them, but it was not until 1924 that yellow wares were given a taxonomic classification by A.V. Kidder. The term "Jeddito" was introduced by the Gladwins (1930), and Hargrave published the first formal descriptions in 1931. Colton (1956) published the first typological breakdown of Jeddito Yellow Ware, and included brief type descriptions, temporal and spatial distributions, and type-sites. From the 1970s through the 1990s, yellow ware was analyzed in greater detail, and classifications were refined and standardized (Smith 1971; Hays 1991; Benitez 1998).

Jeddito Black-on-yellow AD 1350-1625

Jeddito Black-on-yellow vessels (Figure 13) were produced during the Pueblo IV period, beginning around AD 1350, and were contemporary with Fourmile Polychrome as well as Gila

and Tonto polychromes, and are present at Fourmile Ruin during this time.

Jeddito Black-on-yellow bowls represent an amalgamation of technologies originating from the south and decorative styles from the north. Smith (1971) referred to them as the "bastard issue of the Northern Polychromes by Tusayan Black-on-white, with some mid-wifely assistance by St. John's Polychrome." As differing groups of people came together they began to produce a ware unique to their environment, resources, and people.

Hopi potters used low-iron clays that, when fired, became a creamy or bright yellow color. Clay was procured from a source near Antelope Mesa (Bishop 1988), and tempered on rare occasion with quartz sand or crushed sherd. Yellow wares, however, are known for their relative absence of temper in the clay body. Bowls, jars, and ladles were formed through coiling and scraping the clay into the desired shape, and vessels were decorated with paint containing iron-manganese and iron oxide pigments. Potters fired their vessels at a high temperature using coal fuel. An oxidizing atmosphere helped produce the desired yellow surface.

The decoration on Jeddito Black-on-yellow vessels is characteristically free in its execution of brushwork, and depicts organic figures such as people, plants, food, insects, and animals. Bowl interiors are decorated with a banding line that frames the interior decorative field (Hays 1991). Exteriors are commonly decorated with a single unit element that may or may not be repeated (Hays 1991; LeBlanc and Henderson 2009).

Jeddito Black-on-yellow, as well as other Hopi Yellow Wares, is known for being well fired and well-polished, having a fine paste, and strong walls (Colton 1956; Hays 1991).

DATA COLLECTION

The Reidhead Collection contains hundreds of various kinds of vessels. Of these hundreds there are approximately 369 White Mountain Red, Salado, and Jeddito vessels that date to the Pueblo IV period (Table 1).

Figure 13. Jeddito Black-on-yellow vessels from the Reidhead Collection.

Table 1. The Numerical Breakdown of Ceramic Types in the Reidhead Collection. The Sample Includes Partial and Whole Vessels

Type	***n***
Pinedale Polychrome	104
Cedar Creek Polychrome	21
Fourmile Polychrome	97
Pinto Polychrome	12
Gila Polychrome	82
Tonto Polychrome	17
Jeddito Black-on-yellow	36
Total	369

Each of these vessels was assessed on an individual basis, and information was recorded regarding the vessels' production, decoration, primary and secondary uses, post-depositional condition, and post-excavation treatment. This information is essential to defining the intended function and actual uses of the bowls, and will be discussed in detail in the chapters that follow.

4 PERFORMANCE CHARACTERISTICS

Behavioral archaeologists are concerned with studying the relationships between people and things in all times and in all places, and focus on the behaviors and activities of everyday life (Schiffer and Skibo 2008). Within this approach, understanding the interactions between humans and material objects is paramount. Human behavior "forms the archaeological record through making, using, and disposing of material items (Nielsen 1995, *referenced in Schiffer and Skibo 2008*).

Use wear analysis, a method used by Behavioral archaeologists, is a valuable tool for understanding vessel function and use, and for inferring human behavior (Rice 1987; Fenner 1977; Skibo 1992). Although use wear studies began with lithic and bone tools, archaeologists learned that the same principles could be applied to ceramic vessel analysis. In short, use wear is patterned and represents vessel use. Moreover, an understanding of vessel function may aid in inferring human behavior as it relates to vessel use (Chernela 1979; Bray 1982).

Ceramic use wear analysis began quite early in the twentieth century, but it was many decades before it became a well-defined approach for understanding vessel function and use. Wesley Bradfield (1931) was the first to both observe and describe patterns of use wear on vessels in his analysis of Mimbres bowls from Cameron Creek Village. Although he recorded the patterns, he did not use the information to infer vessel use or human behavior.

Four decades after Bradfield, Matson (1965) suggested an approach to pottery analysis, called *ceramic ecology*, which encouraged archaeologists to focus on pottery manufacturing and use rather than on cultural-historical reconstructions (Skibo 1992). Only a few years later,

Janet Chernela (1969) published an article suggesting that ceramic use wear analyses should be conducted with the *purpose* of making functional and behavioral inferences. She proposed that use wear was patterned and reflected vessel use, and that wear will be localized in specific areas on different types of vessels. Despite this renewed interest in analyzing vessel function and use, it was another several years before the significance of this approach was realized.

Throughout the 1970s and early 80s archaeologists began to utilize use wear studies in behavioral approaches to the archaeological record. An increasing number of use wear studies were undertaken during this time with the intent of gaining insight into vessel function, use, and associated human behavior (DeGarmo 1975; Fenner 1977; Griffiths 1978; Braun 1980; Bray 1982; Hally 1983; Schiffer and Skibo 1988; Jones 1989).

Studies in Behavioral archaeology can utilize three lines of evidence to determine vessel function (Griffiths 1978; Tite 1999). I define *function* as the use for which something is designed. The first line of evidence deals with the morphological characteristics and technical properties of the vessels, such as shape, size, paste, firing, etc. The second includes the traces and marks left on the vessels resulting from its use. The third line of evidence includes the contexts of vessel use. When vessel function and use is understood, the interactions between humans and vessels may be elucidated. I will discuss each of these lines of evidence in the chapters that follow, and how they can be used to understand or infer the function of decorated Pueblo IV bowls recovered from Fourmile Ruin, and how people used and interacted with them.

PHYSICAL AND VISUAL PERFORMANCE CHARACTERISTICS

The first line of evidence requires the analyst to examine the morphological characteristics and technological properties of the vessels. Ceramics vessels of all kinds were made to facilitate storage, transportation, preparation, and serving of goods; some may have been produced simply for decoration. Certain kinds of ceramics were produced to fulfill a specific or an

intended function. Jars with restricted orifices, for example, make excellent storage vessels; some pots were made for the sole purpose of cooking. So that a vessel might fulfill its intended function within a society, potters used technologies, materials, and vessel forms suited to that use. Schiffer and Skibo (2008) refer to these as *performance characteristics*. Based upon the performance characteristics of a vessel one can determine its likely intended function.

White Mountain, Salado, and Jeddito Black-on-yellow bowls were manufactured to perform a role in Fourmile society that was both utilitarian and symbolic. As defined in Chapter 1, *utilitarian* refers to the physical functions of an object, which assist the user in exchanging substances or matter, and *symbolic* as the use of an object to exchange information. In order for pots to fulfill their role, potters employed physical and visual performance traits such as vessel form, size and capacity, materials, surface enhancements, and decoration.

Vessel Forms

Although there is not a simple or straightforward correlation between vessel form and function, analyzing a vessel's form can provide insights into its intended function. Although some of the wares in the data set occur as jars, ladles, and effigies, analysis was focused on bowl forms. Pueblo IV White Mountain Red Ware occurs almost exclusively as bowls with slightly incurving rims. The variety of Salado vessel forms increases over time; Pinto vessels occur mostly as bowls, Gila as bowls and jars, and Tonto vessels are predominately jars with few bowls produced. The Salado bowls in the dataset have straight or incurving rims, with the exception of one outcurving Tonto bowl.

Jeddito Black-on-yellow vessels were produced in bowl, jar, and ladle forms. The bowls all have incurved rims. LeBlanc and Henderson (2009) discuss the possible reasoning behind incurved rims in their study of Hopi Yellow Ware. They suggest that one of the reasons Yellow Ware bowls had incurved rims was because they sometimes held the corn batter for making piki

Table 2. The Mean, Minimum, and Maximum of Diameter of Vessels by Type (cm)

Type	Min	Max	Mean	Standard Deviation
Pinedale	7.3	34.5	22.6	4
Cedar Creek	15.8	30.5	23.7	4.2
Fourmile	10.2	33.3	22.8	3.8
Pinto	21.9	35.5	27.1	5
Gila	10.9	27.8	20.5	3.8
Tonto	14.4	27.4	21.5	3.9
Jeddito	15.6	24	20.8	2.4

Table 3. The Mean, Minimum, and Maximum of Height of Vessels by Type (cm)

Type	Min	Max	Mean	Standard Deviation
Pinedale	6.6	15.5	10.2	1.9
Cedar Creek	7.5	14.5	10.8	2.1
Fourmile	6.6	14.6	10.1	1.7
Pinto	7.5	15.8	11.1	2.9
Gila	5.2	13	8.7	1.7
Tonto	5.5	12.8	9.1	1.9
Jeddito	5.6	11.5	8.5	1.3

bread. Women scooped the batter out by hand, and scraped the excess off the hand on the edge of the bowl. An incurved rim may have facilitated this process.

Pueblo IV decorated bowls were wide-mouthed and shallow; they had flat bases and thick wall measuring 5 mm on average. Tables 2 and 3 illustrate the average, maximum, and minimum of diameter and height of the seven types in the data set. Each type has roughly the same mean proportion of diameter to height; the height is approximately half the diameter. The shallow and unrestricted nature of the bowl orifices speaks to the ease of accessing the contents of the vessel. The shape of the vessel provides stability and immediate access to contents. Bowls, by nature then, make excellent food preparation and serving vessels. They are open, making the contents easily visible, and permit ease of access; their rims primarily curve inward, reducing spillage of contents. Depending on their size, bowls may serve one or many quite easily.

Size and Capacity

White Mountain Red Ware, Jeddito Black-on-yellow Ware, and Salado polychrome vary greatly in size. Many Southwestern archaeologists recognize bimodal vessel size divisions, at the very least, that may have existed in the past (Mills 1999; Van Keuren 2001). Others (Jones 1989) arbitrarily divide them based upon vessel diameter into small, medium, and large units of analysis. It is not my intent to establish size ranges or categories that existed in the Pueblo IV period as the sample is certainly not large enough. Rather, at the outset of this project I wanted to group the vessels in the sample in some logical and simple manner that would allow me to analyze and compare bowls of different sizes.

In order to determine possible size groupings in the Reidhead Collection, the height, diameter, and volume of each of the bowls was measured. Measurement variables were evaluated separately and in combination for potential size patterns.

Bowls measure between 5.2 and 15.8 cm in height. Bowl diameters for Salado polychrome and White Mountain Red Ware samples show parallels in their average measurements. The mean diameter for both Salado polychrome and White Mountain Red Ware is 23.0 cm. Jeddito vessels are slightly smaller on average (20.8 cm), but their range is not nearly as wide as any of the White Mountain Red Ware types or the early Pinto vessels; Jeddito bowls range from 15.6 to 24.0 cm.

Mean vessel size seems to increase only very slightly within the White Mountain Red Ware over time; mean vessel size for Pinedale is 22.6 cm and Fourmile is 22.8 cm. The results of other analyses suggest that vessel size increases over the course of the fourteenth century (Spielmann 1998; Mills 1999; Potter 2000; Van Keuren 2001). With only a difference of .2 cm, it is difficult to see that pattern within this sample. I cannot, therefore, argue with confidence that a significant change occurs in vessel size over time from Pinedale to Fourmile polychromes.

Within the Salado polychromes, diameter seems to decrease a great deal throughout

the fourteenth century. Mean vessel diameter for Pinto Polychrome is 27.1 cm and Tonto Polychrome is 21.5 cm. This, however, is likely due to insufficient sample sizes of both Pinto and Tonto polychromes. Gila Polychrome, manufactured at the same time as Pinedale, Cedar Creek, and Fourmile polychromes, is approximately, two centimeters smaller in diameter than White Mountain Red Ware.

The volumetric capacity of each type of ceramic is detailed in Table 4. Again, Salado and White Mountain vessels are similar in their average volumes, with the Salado measuring slightly larger. This is, again, likely due to insufficient sample size, and one, very large Pinto outlier measuring at 8.0 liters. Jeddito vessels are significantly smaller in terms of mean and maximum volumetric measurement. The data shows that decorated bowls were produced in a wide range of sizes, from small (.6 liters) to very large (7.0 liters).

Vessel diameter and volume are potentially the best indicators of size classes among Pueblo IV decorated bowls. When volume was plotted against orifice diameter, the result is a steady ascending ratio of diameter to volume (Figure 14). No clear size groupings are evident. Bowls, produced on a household level, were not likely manufactured according to specific or set measurements. Potters, however, may have manufactured bowls within certain ranges of measurement. Figure 15 shows the relative frequencies and distributions of vessel diameters in the sample. It illustrates the possibility of three distinct size modes for White Mountain, Salado, and Jeddito bowls (Table 5). Table 6 represents the frequency of small, medium, and large vessels in the sample.

Size and capacity are important factors when considering vessel function. Serving and eating vessels, like the decorated wares from Fourmile Ruin, can vary in size depending upon the number of people participating in the meal (Rice 2006). The smaller and mid-range bowls, therefore, could have been used by an individual or at a household level, while the very large may have been used at a supra-household or community level.

Table 4. The Minimum, Maximum, and Mean of Vessel Volume by Type (Liters)

Type	Min	Max	Mean	Standard Deviation	Ware	Mean
Pinedale	0.8	7.5	2.6	1.3	WMRW	2.8
Cedar Creek	0.7	6.5	3.1	1.5	Salado	2.9
Fourmile	0.9	6.7	2.6	1.1	Jeddito	1.8
Pinto	1.8	8	4.4	2.5		
Gila	0.3	4.3	2	1		
Tonto	0.6	4.2	2.2	1.2		
Jeddito	0.7	2.6	1.8	0.6		

Table 5. Size Categories Based on Vessel Diameters (cm)

Ware	Small	Medium	Large
WMRW	<18	18.2-22.5	>22.7
Salado	<18.9	19.4-23.5	>23.8
Jeddito	<17.2	18.5-21	>21.6

Table 6. Numerical Breakdown of White Mountain, Salado, and Jeddito Size Categories. A Total of Four Vessels Lacked Measurements

Ware	Small	Medium	Large	Total
WMRW	22	83	116	221
Salado	39	33	36	108
Jeddito	6	12	18	36
Total	67	128	170	365

Material

Another clue into the intended function of a vessel is the materials used to produce it. The cooking and storage vessels at Fourmile Ruin tend to be made of coarse materials; they are thick and often corrugated. Decorated vessels, on the other hand, are made of much finer materials.

The materials used to produce the White Mountain Red Ware and the Salado polychromes may have been very similar; compositional analyses of these two wares have the potential to show where potters were getting their clays from. It is generally believed that White Mountain Red Ware was manufactured at a handful of sites within the Silver Creek drainage (Triadan 1997; Duff 2002), and Salado polychromes were produced across the Mogollon Rim using

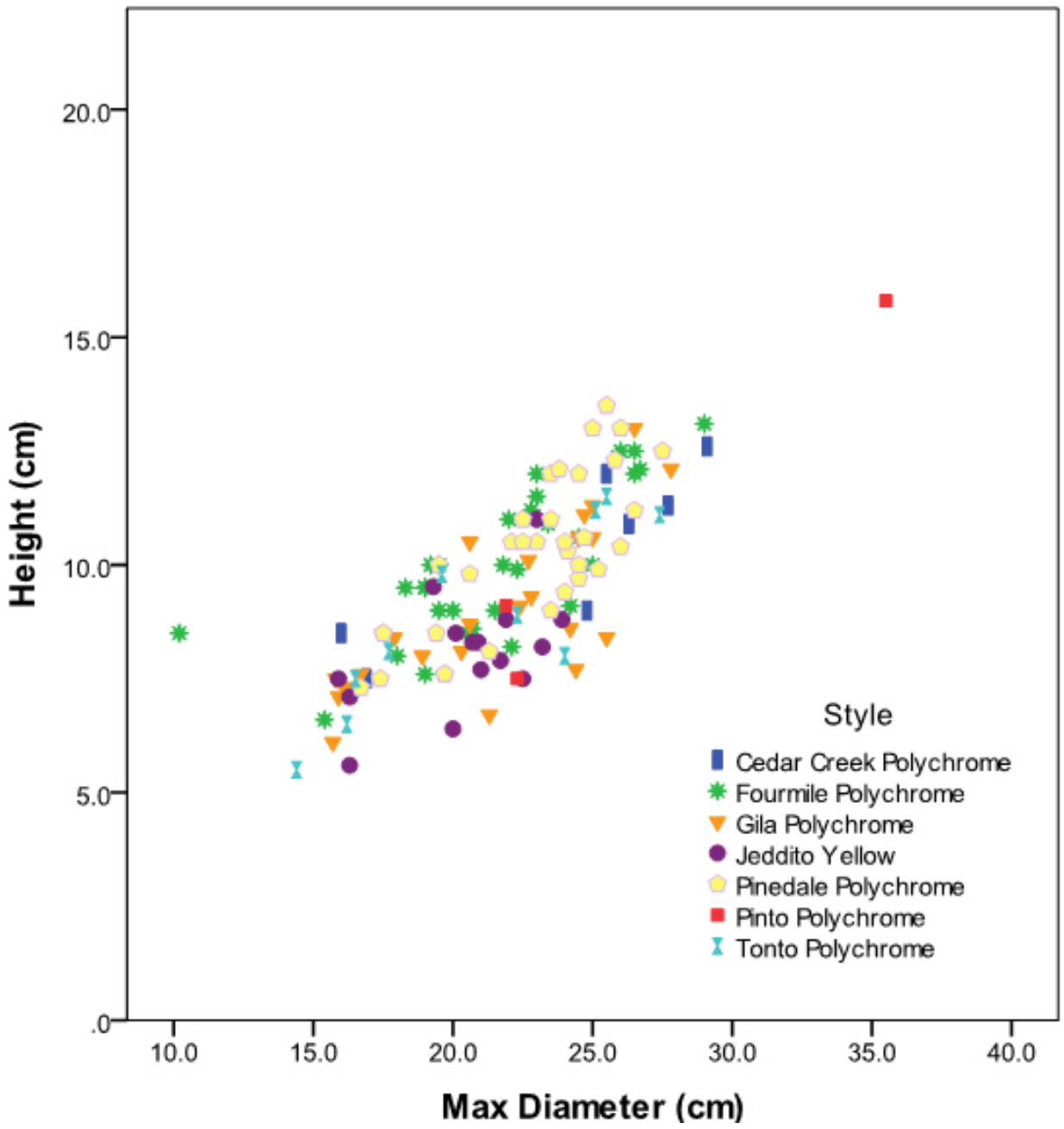

Figure 14. Scatter plot showing diameter versus height by type.

local materials (Crown 1994). The paste for both of these wares was composed of clays with sufficient iron to fire a buff, reddish-brown, or gray color. The clay was tempered with, and usually contains inclusions of sand or finely crushed sherds.

Jeddito Black-on-yellow vessels, on the other hand, were either imported or brought by

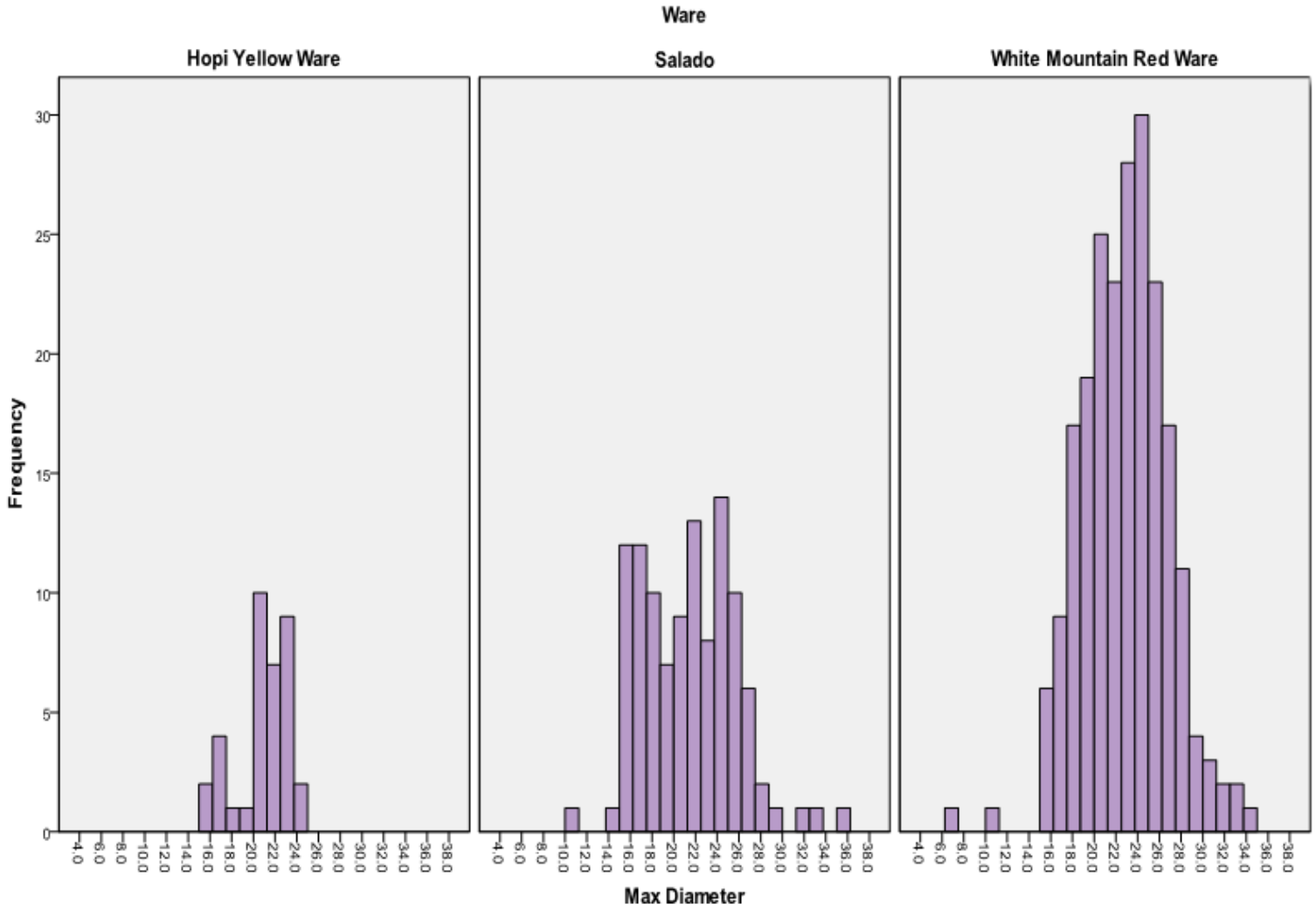

Figure 15. Bar chart of vessel diameter frequencies by ware.

migrants from the Hopi Mesas. Compositional analysis shows that the production of Jeddito Yellow wares is unique to the Hopi region (Bishop et al 1988). Black-on-yellow vessels were made with low-iron clay that fired pale yellow. The properties of the clay were such that it precluded the need for temper inclusion in a majority of vessels. The paste, as a result, is generally quite smooth.

The vessels in the sample were, for the most part, produced with fine materials having finely crushed or no inclusions. There are a few cases, however, particularly among the Salado polychromes, where temper inclusions and temper pocks are quite large. The finer materials used by potters suggest that these bowls were meant as serving vessels. The differences in the materials used to produce various wares could simply have been the result of available materials. More likely, however, the choices potters made to produce decorated bowls were related to the symbolic function of the vessels. Clay color and texture may have been important factors in deciding what materials to use.

Surface Enhancement and Qualities

The treatment or enhancement of vessel surfaces is an important visual performance characteristic, and may have a variety of utilitarian and symbolic functions (Rice 2006). The application of a slip may decrease the porosity of a vessel, while color, texture, and reflectance may convey messages and ideas to the viewer. The surfaces of the White Mountain Red Ware, Salado polychrome, and Jeddito Black-on-yellow were each enhanced in different ways, using different materials, presumably to convey different meanings.

Prior to firing, potters applied an iron-rich slip to the interior and exterior surface of White Mountain Red Ware bowls, which turned red or orange in an oxidizing firing atmosphere. The vessel surfaces were polished by hand with a small pebble that gave the finished vessel a distinctive sheen. White Mountain Red Ware was also decorated with glaze paint; a relatively

new innovation in the Pueblo IV period. Glaze paints were often used to create texture, add color, and outline matte-painted and slipped designs (Haubicht-Mauche 2006). Compositional analyses of glaze-painted sherds from other sites in the Silver Creek drainage show that glaze paints were made with lead, copper, manganese, and silica in varying amounts (Carlson 1970; Haubicht-Mauche 2006). Black was achieved through the use of copper minerals such as azurite or malachite, and also through significantly increasing the manganese content (Fenn et al 2006). Depending upon the paint recipe used, glaze paints could be shiny or matte in appearance.

Over the course of the Pueblo IV period the recipe for glaze paint changed. Pinedale Polychrome was the first type of White Mountain Red Ware manufactured in the Silver Creek drainage. Its production also marks the first deliberate use of lead or other metal-bearing mineral fluxes to produce glaze paints (Fenn et al 2006). Early in its production, the black paint on Pinedale vessels actually appears brown in color. Over time, however, the paint fires blacker and appears bolder due to increased levels of manganese and decreased amounts of lead and copper. Fenn et al (2006) suggest that the change in paint recipe indicates trial and error experimentation until potters achieved the desired look.

Salado polychromes were also slipped on interior and exterior surfaces and hand polished. Although White Mountain Red Ware and Salado potters used these same techniques of surface enhancement, Salado vessels have a unique appearance. The polishing process of White Mountain Red Ware produced an all-over sheen. According to Crown's study of over one thousand pots (1994), the polishing of Salado polychrome produced striations that appear alternately shiny and matte depending on how the vessel is held or viewed.

In contrast to White Mountain Red Ware potters, Salado potters did not use glaze paints on their vessels. The use of glaze paints was exclusive to White Mountain Red Ware vessels in the Silver Creek drainage. Salado potters used organic and mineral based paints, which are distinctly different in appearance from each other. Organic paints, derived from charcoal or

plants, sink into the vessel walls, and appear transparent and feathery at the edges. Because of its transparency, any polishing on the vessel surface shows through the paint; painted sections of the vessel reflect light as much as unpainted sections. Mineral paints, on the other hand, sit on top of the vessel surface, are opaque, and lines have crisp edges. They do not reflect light to the same degree as the slip. Organic and mineral paints have a matte appearance, so the glossiness of the slip stands in stark textural contrast to the matte decoration (Fenn et al 2006).

Jeddito Black-on-yellow vessels are strikingly different from both White Mountain Red Ware and Salado polychromes. As discussed previously, yellow wares were produced with low-iron clay. Early in the fourteenth century coal replaced wood as a firing material on the Hopi Mesas, resulting in higher firing temperatures. Higher temperatures combined with low iron content clay produced the characteristic yellow color of the Jeddito vessels (Bishop et al 1988; LeBlanc and Henderson 2009)). A slip was not applied to the vessel surface; surfaces were only highly polished. The paint used to decorate bowls and other vessels was manganese based, and fires brown to black.

Although each of these three wares was highly polished, they each exhibit different patterns of reflectance. White Mountain Red Ware was uniformly polished, creating an all-over sheen; Salado vessels were also polished, but appear alternatingly glossy and matte. Jeddito vessels are highly polished, but their uniqueness lays in the combination a yellow surface and a glossy appearance. The quality of reflectance may have been important in the contexts of vessel use or in the contexts in which vessels were viewed.

Vessel color and color combinations were *not* simply a product of materials available to potters. Colors symbolized and carried meaning. Even among the historic pueblos colors are associated with directional symbolism. Red, representing the south, is associated with the sun, blood, fertility, and abundance. Black, associated with night, rain clouds, and the earth, represents up or down. White, symbolizing the east, is connected with the sun and the earth.

Yellow denotes north or northwest, and is related to summer, sunset, or corn (Crown 1994).

Red slipped vessels became increasingly significant in the late thirteenth and fourteenth centuries. Toward the end of the Pueblo III period red wares completely replaced Cibola White Ware in the Western Pueblo region, and dominated ceramic assemblages in the Silver Creek drainage. White Mountain Red Ware and Salado polychrome become extraordinarily popular, while yellow ware only occurs in small numbers. Adams et al (1991) report that Jeddito vessels comprise only 4% of ceramic assemblages in the Silver Creek drainage. By combining the Reidhead and Fewkes collections, it is estimated that Jeddito vessels comprise 5% to 7% of the Fourmile Ruin decorated ceramic assemblage.

In the Hopi area, however, yellow wares completely replace black-on-white and orange vessels at the beginning of the fourteenth century. LeBlanc and Henderson (2009) suggest that yellow bowls were produced in response to a demand for buff and yellow colored vessels; a trend throughout the Southwest and northern Mexico in the fourteenth century. Although yellow bowls were produced in large numbers, they were not extensively traded into the Silver Creek drainage.

Clearly, red wares held some greater significance for the inhabitants of Fourmile Ruin than yellow wares. Jeddito Black-on-yellow bowls may have been difficult to procure or access may have been restricted to certain segments of the population. The meaning of red on ceramic vessels is, however, unclear. Slip and vessel color may have reflected social relationships such as ethnic groups or religious sodalities (Crown 1994; Graves and Eckert 1998; Adams and Lamotta 2006), or corresponded to the vessels' role in ceremonial usage (Carlson 1982). These possible interpretations will be discussed further in Chapter 6.

Although some of these vessels were enhanced in similar ways, such as in the application of slip and surface polishing, each of the three wares exhibits unique surface qualities. These differences may signal ethnic or religious affiliation, or be integral to the vessels' function in a particular context.

Decoration

Inferences regarding vessel function can be drawn by studying vessel decoration. As decoration typically serves no utilitarian purpose, it is assumed that any embellishment to the vessel's surface is meant to be appreciated or admired, or be emblematic of an idea or belief. The decoration is meant to be seen, and the vessel is usually used in public view.
The interior and exterior decorative styles of Pueblo IV ceramics are iconographically rich and present complex imagery. I do not attempt to interpret the meanings behind the imagery; rather, I am interested in *how* the images are presented and the visual impacts of the decorative elements, their sizes, placements, and layouts. Each of the Pueblo IV types in the sample exhibit different styles and combinations of decorative elements.

White Mountain Red Ware underwent a radical transformation over the course of the Pueblo IV period. The production of Pinedale Polychrome marks the first intentional and widespread use of glaze paints (Fenn et al 2006). The decorative style, however, is derived from an earlier tradition associated with migrants from the Kayenta-Tusayan area. The Pinedale style is characterized by its use of geometric elements and symmetrical layout on the interior of vessels, while the exterior can exhibit large single element designs that may or may not repeat around the bowl (Figure 16).

Beginning in the fourteenth century, a shift occurred in the execution of exterior decoration. Rather than single element designs, potters began using circumferential banded designs (Figure 16), which were markedly homogenous compared to Pinedale exteriors. Cedar Creek Polychrome, the transitional type between Pinedale and Fourmile polychromes, is the first White Mountain Red Ware type in the fourteenth century to exhibit the new exterior decoration. Cedar Creek potters combined the geometric design style and symmetrical layout of the Pinedale style on the interior with the new trend in vessel exteriors.

Eventually, Silver Creek potters adopted the Fourmile style for White Mountain Red Ware,

which is characterized by its use of curvilinear designs, animal and human life forms, and asymmetrical layouts. Designs are bold; lines are a dark black as a result in the change in glaze paint technology. The images contained on Fourmile interiors is complex, and Adams (1991, 1994) suggests that they are representative of the Katchina Cult, and analogous to the subject matter of kiva murals and rock art. Van Keuren (2000, 2006) argues that the images embodied knowledge that was complexly rooted within the cultural identity of Fourmile Polychrome potters, and that some of the images may have evoked the origin myths or allegories of specific clans or social groups. According to Van Keuren, the changes that occurred from Pinedale to Fourmile polychromes suggest a shift in the social or ritual identity of the inhabitants of Fourmile Ruin.

Potters continue to use the banded exterior design, which increased in uniformity and width over time. Fourmile exterior designs are confined to a horizontal zone beginning immediately below the rim and extending downwards from 4 cm to 8 cm. The zone is enclosed by two parallel thick black lines; the upper being outlined in white on the lower edge only, and the lower outlined in white on both sides. Fourmile style vessels are always decorated on the exterior with the banded decoration, though their interiors may be undecorated.

Vessel decoration was a significant visual performance characteristic of White Mountain Red Ware, and may have been integral to the function of the vessels in Fourmile society. Over the fourteenth century, potters changed the ways they decorated pots; they moved away from geometric and symmetrical designs and began painting more curvilinear and fluid decorations. Although it is unclear what exactly the shift in style represented, clearly something changed in the Silver Creek drainage and it was reflected in pottery decoration.

The early Pueblo IV Salado wares were decorated in the Pinedale style, which was generally homogenous across Western Pueblo decorated wares. The widespread use of the Pinedale style was likely a result of migration and intermixing of different populations. Salado interiors

Figure 16. Exterior decoration changes over the course of the Pueblo IV period from single units to banded designs. On the right and left are Pinedale vessels; in the center is Fourmile Polychrome. These bowls come from the Reidhead Collection.

were composed of bold geometric and symmetrical figures, while the exteriors were decorated with single unit motifs, similar to Pinedale Polychrome bowls, or wide band black-on-white bands. The interior imagery found on Salado interiors is thought to have represented important ideologies relating to the Southwestern Regional Cult (Crown 1994). Later Salado polychromes, however, did not follow the same stylistic trajectory as White Mountain Red Ware. Rather than becoming curvilinear and asymmetrical, Salado vessels continued to be painted in geometric styles. Van Keuren (2006) has suggested that this separation may have been due to the increased differentiation and exclusivity of social and ideological networks. In the fourteenth century, Salado polychromes continued to be painted in geometric styles while, simultaneously, potters were painting Fourmile Polychrome in a totally unique and different way.

The decorative style observed on Jeddito Black-on-yellow bowls also evolved from the earlier Kayenta-Tusayan style (LeBlanc and Henderson 2009). Vessel interiors contained geometric motifs—with an occasional life form—in a rotationally symmetrical layout. The design fills the interior with little negative space. These designs, too, are arguably meant to signify elements of cult ceremonialism. The exterior decoration is similar to Pinedale vessels,

and exhibit single unit motifs which LeBlanc and Henderson (2009) call glyphs. The use of exterior glyphs on yellow ware post-dates the introduction of the Pinedale style, suggesting that Hopi area potters derived the exterior glyph from Pinedale ceramics. The meaning of the glyphs has been the subject of research since Jesse Walter Fewkes (1919) suggested they were a language of signs. Recently, LeBlanc and Henderson have argued that Jeddito potters were identifying themselves and their work through the glyphs (2009). The exterior glyph, however, could have had many social uses such as an expression of identity, ownership, or social or ritual affiliation.

White Mountain Red Ware, Salado polychromes, and Jeddito Black-on-yellow vessels were all produced during the fourteenth century. The differences observed in decoration among White Mountain Red Ware, Salado polychrome, and Jeddito Black-on-yellow vessels suggest that each of these types may have represented different things such as social or ritual networks, affiliation with particular set of ideas or associations, or use in different contexts.

The intended function of a vessel can be understood by looking at the physical and visual performance characteristics of the vessel. Pueblo IV decorated vessels from Fourmile Ruin had performance characteristics relating to their utilitarian functions; they are open, wide-mouth, shallow bowls, with incurving rim. Potters manufactured bowls in varying sizes and used fine materials to produce them. Decorated bowls were primarily used as serving vessels, though they may also have been used for limited food preparation.

White Mountain, Salado, and Jeddito vessels also exhibit non-utilitarian traits, such as vessel color, varying reflectance, and complex decoration on both the interior and exterior surfaces. Besides being utilitarian, Pueblo IV decorated bowls were a means of conveying or expressing information. The decorative and symbolic traits of bowls must have been indivisibly connected to their intended function. Even from their production, bowls were meant to convey information. The intended function of decorated ceramics, therefore, was both utilitarian and symbolic.

There are differences in the performance characteristics among ceramic types, however, particularly in visual performance traits. These differences may be related to their use in Fourmile society.

This chapter focused on the inherent physical and visual performance characteristics that define the function of Pueblo IV decorated bowls. Having both utilitarian and non-utilitarian qualities, White Mountain, Salado, and Jeddito vessels were meant to be functional as well as symbolic. Although bowls were produced to fill an intended purpose, it does not necessarily follow that they were used for that purpose. A vessel may be produced to function in a serving capacity or to mark one's association with a cult, but the owner is free to choose for him or herself what to actually use the vessel for. In the next chapter I will discuss patterns of actual use which are the result of the vessels' interactions with people and the environment. I will also explore the correlation between the differences in performance traits of ceramic types and possibly different uses. The data illustrate how use patterns relate to human behavior, and the vessels' effectiveness in fulfilling their intended function.

5 POST-FIRING MODIFICATION

In Chapter 4, I discussed the physical and visual performance traits of White Mountain Red Ware, Salado polychrome, and Jeddito Black-on-yellow vessels, and suggested that decorated bowls have inherent utilitarian and symbolic qualities. They were made to serve and transport food, and may have been involved in food production in a limited capacity. They were also made to express information through color, decoration, and other surface enhancements. Many archaeologists have suggested that the differences among decorated ceramic vessels correlate to their use in different contexts. This chapter focuses on the post-firing modifications, or use wear patterns, of the ceramics in the sample in order to determine if there were differences in the ways ceramic types were used. In doing so, I will assess the validity of the claims that different types of decorated vessels were used in different contexts.

Behavioral studies and use wear analysis allows the researcher to infer human behavior and interaction with artifacts based upon the physical traces of use recorded on the artifact's surfaces. Pueblo IV decorated ceramic bowls were produced to serve and possibly prepare food. In the process of fulfilling its intended function, a vessel's contents may be stirred, pounded, scooped, or ground; vessels may be scrubbed, dropped, or dragged across a surface. These processes can mechanically stress a vessel, and cause numerous instances of damage.

The ability of a researcher to infer vessel use through wear studies has been greatly facilitated by experimental archaeology and ethnoarchaeology. Archaeologists conducting ethnoarchaeological studies have observed and recorded uses of vessels; these studies provide control data for inferring use wear in archaeological contexts (Hodder 1988; Skibo 1992). James

Skibo (1992) undertook a long term study of the surface wear found on the resin-coated, low-fired cooking pots of the Kalinga people in the Philippines. The results of his study provide a framework for understanding the use of archaeological ceramics. He and his team recorded various kinds of uses for the cooking pots, and the kinds of physical damage that occurred as a result. I have applied several of his criteria to understanding the uses of Pueblo IV decorated ceramics and the kinds of behavior that produced use wear patterns.

The physical condition of each vessel in the dataset was assessed in detail. First, each vessel was measured, and height, diameter, and volume were recorded. Next, each vessel was examined with the naked eye and also under magnification to determine instances of use or damage. Throughout the analysis, patterns emerged that allowed me to create general categories associated with different stages of the vessels' lives. These categories are listed in Table 7. Each occurrence of these different categories was recorded, described, and measured (if necessary), and inputted into a Microsoft Access database.

The current condition of the Reidhead Collection is a result of the various stages of the vessels' lives, from manufacture to curation. Each of these stages has impacted the vessels in different ways, depending on their interaction with their makers, their owners, or contexts of use. Because each life stage affected the vessels differently, it is essential to differentiate the diverse patterns of use and damage to the vessels' structure; and differentiate modern from prehistoric use. Before discussing patterns of primary and secondary use of White Mountain, Salado, and Jeddito bowls, I will explain the kinds of damage sustained in other stages of the vessels' lives.

Some of the most common issues observed in the Reidhead Collection in regards to manufacture and firing include large inclusions and over-firing. These two issues may cause numerous problems with the vessel. When large inclusions are present in the temper, the potter runs the risk of the inclusion exploding during the firing process, resulting in a pocked surface. While temper pocks do occur with frequency in the sample, they are the largest and most

Table 7. Stages of Vessel Life and Categories of Use and Damage

Production and Firing	Primary Use	Secondary Use	Deposition	Excavation and Curation
Crackling	Abrasion	Repair/drill holes	Accretion	Reconstructed
Over-firing	Chip		Rootmarks	Adhesive Residue
Fire Cloud	Crack		Breakage	Masking Tape
Temper Pock	Pitting			Loss
Distortion	Gouge			Scratch
	Scratch			

numerous among the Salado polychromes.

Firing White Mountain and Salado vessels in an oxidizing atmosphere frequently causes the appearance of gray or black fire clouds, primarily on the exterior of the vessel. Again, while common on both, fire clouds occur with regularity among the Salado vessels. Fire clouding on Jeddito bowls is less common, but can appear reddish-brown in color rather than black or gray. Over firing the vessel may cause the general darkening of the vessel surface and painted decoration, as well as crackling, bubbling, and eventual flaking of painted surfaces. There are many instances of over firing among the pots in the sample.

Vessels in this collection were further impacted by their depositional environment. This is evidenced through the accrual of various types of deposits or accretions on the vessel surface. These most commonly include dirt, dust, plant roots, manganese dioxide accretions, and calcium deposits that occur regularly in thin layers or as small spots. Fewkes (1904) reported that most of the pottery he excavated was covered with a “tenacious, white, calcareous deposit, which is easily removed by washing”, suggesting that this results from a site-wide quality of the soil. Although much of this evidence has since been removed on the Reidhead bowls, there are still some remnants left on the vessels. While most accretions are harmless, there are some that are abrasive, such as dirt, and some which cannot be removed without also removing layers of paint, slip, or clay.

Though many of the vessels were broken through excavation or bioturbation, the Reidhead

family took great care to clean, repair, and preserve them. It is unfortunate, however, that many of the methods that were used caused irreparable damage to the vessels and loss of important information. Following excavation, the Reidheads cleaned most of the vessels and sherds they collected. Based upon the interviews conducted by Museum staff with members of the Reidhead family, a variety of cleaning agents were used, most notably, toilet bowl cleaner. The chemicals in this kind of cleanser are abrasive, and can damage ceramic surfaces. It is difficult, therefore, to differentiate some of the modern damage from the prehistoric. Some of the small scratches that seem to cover the interior and exterior surfaces of most vessels may be attributed to the use of abrasive cleaners and a scrubbing action to remove dirt, plant roots, calcium deposits, and other accretions.

Where possible, the Reidheads repaired broken vessels using at least three different—though unknown—adhesives. The Reidheads glued and fitted vessel fragments together, and in almost every case, painted glue over the joins. They then placed pieces of masking tape across the joins to ensure they stayed together while drying (Figure 17). Many pieces of tape remain on the vessels until now, although the adhesive bond of the tape has clearly weakened. Where the tape has been left on the vessel for some time, but has fallen off or been removed, a brown adhesive residue remains.

At each stage of the vessels' lives, they have sustained numerous types of damage. These, however, are not all a result of the vessels' primary and secondary use environments. I have identified abrasion, pitting, chips, scratches, gouges, cracks, and repair holes as evidence of primary and secondary usage. These categories are indicative of how White Mountain, Salado, and Jeddito vessels were used at Fourmile Ruin, both as utilitarian items and as mediums of personal and group expression. They are also the criteria used to judge if vessels were actually used in different ways.

Figure 17. Fourmile Polychrome vessel from the Reidhead Collection. Tape placed over the exterior of the vessel holds sherds together while adhesive dries. In many cases, the tape was not removed after reconstruction.

ABRASION

The term *abrasion* is defined here as "a trace that was formed by removal or deformation of material on a ceramic's surface by mechanical contact, specifically the sliding, scraping, or, in some cases, striking action of an abrader" (Schiffer and Skibo 1989; Skibo 1992). Two concepts will be explored in association with an analysis of the abrasion patterns on Salado, Jeddito, and White Mountain vessels. The first is the abrasions themselves as a category of traces. The second is the abrasive *process*; or the actions that created the abrasion.

Schiffer and Skibo (1989) differentiate categories of abrasion based on the intensity of abrasion. Individual instances, or marks, of abrasion may manifest in various ways, such as scratches, chips, or nicks on the ceramic surface. The most extensive damage occurs from repetitive abrasive action. Over time, the surface of the ceramic is worn down, and an

abraded patch appears. Abraded patches can help archaeologists identify use activity, or, more specifically, an action that was repeated during the normal use of the vessels (Schiffer and Skibo 1989).

The second important concept relates to the interaction of the ceramic with its owner and its environment. An examination of the marks and abraded patches of the vessel, as well as an understanding of the contexts of vessel use, can reveal the abrasive processes at work on the vessels, and the activities and behaviors of people and nature that produced the abrasions.

Although abrasion patterns have been recorded in other analyses of Pueblo IV ceramics, they primarily identify abrasion on a presence or absence basis (Jones 1989; Crown 1994). For this project, however, that generalization is insufficient. I am interested in determining if one ware, type, or size of vessel was used more, less, or differently than another. I, therefore, recorded general size (small, medium, or large) and depth (light, medium, or heavy) of abrasion patches (with an exception that will be explained in the next section). Although these categories are also quite simple and general, they do reveal insights into how intensively a vessel was used. For statistical analysis, each general designation was given a ranking from 1 (being the smallest or lightest) to 3 (being the largest or heaviest).

Each vessel in the data set was examined on an individual basis. White Mountain, Salado, and Jeddito Black-on-yellow bowls each showed patterns of abrasion consistent with the ways in which they were manufactured and the ways in which they were used. In general there are five zones of abrasion seen on a majority of vessels, regardless of ware (Figure 18). These are the (1) exterior base, (2) upper exterior side, (3) rim edge, (4) upper interior side, and (5) interior base. Each of these abraded areas was caused by a different abrasive action that was common to the vessels' daily uses.

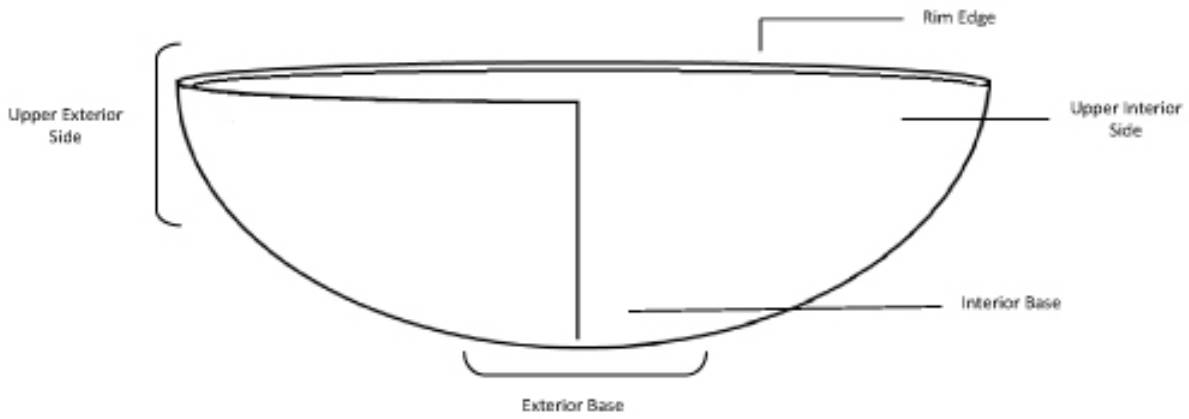

Figure 18. Five zones of abrasion.

Exterior Base

The greatest amount—both in area and in depth—of abrasion was observed on the exterior bases of the vessels. Unlike other areas of abrasion on the vessels, the exterior base abrasion could be calculated with greater precision. The amount of abrasion was calculated using two methods. First, the area of the abraded patch was measured by tracing the perimeter of the patch onto tracing paper (Figure 19). These tracings were scanned into Adobe Illustrator, and the area of each was calculated using archaeological mapping software. Second, the depth of abrasion was recorded using a simple intensity scale; was the abrasion light, medium, or heavy?

Light: A patch is clearly visible, but the abrasion does not result in the exposure of the temper beneath the slip; often accompanied by pitting.

Medium: The abrader removed some of the slip or paint revealing small areas of exposed temper.

Heavy: The slip is mostly, if not completely, removed, exposing the temper underneath.

Exterior basal abrasion frequently consists of a core patch surrounded by a periphery (Figure 20). The core patch is the area where the abrasive action is concentrated. The periphery, surrounding the core, is characterized by the appearance of small patches and marks. The core and periphery abraded patch is generally confined to the base of the bowl, but in some cases

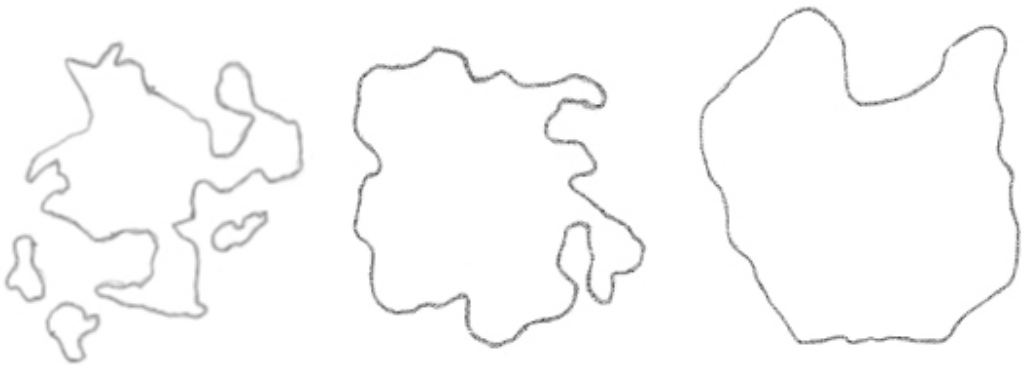

Figure 19. Tracings of exterior basal abrasion (actual size).

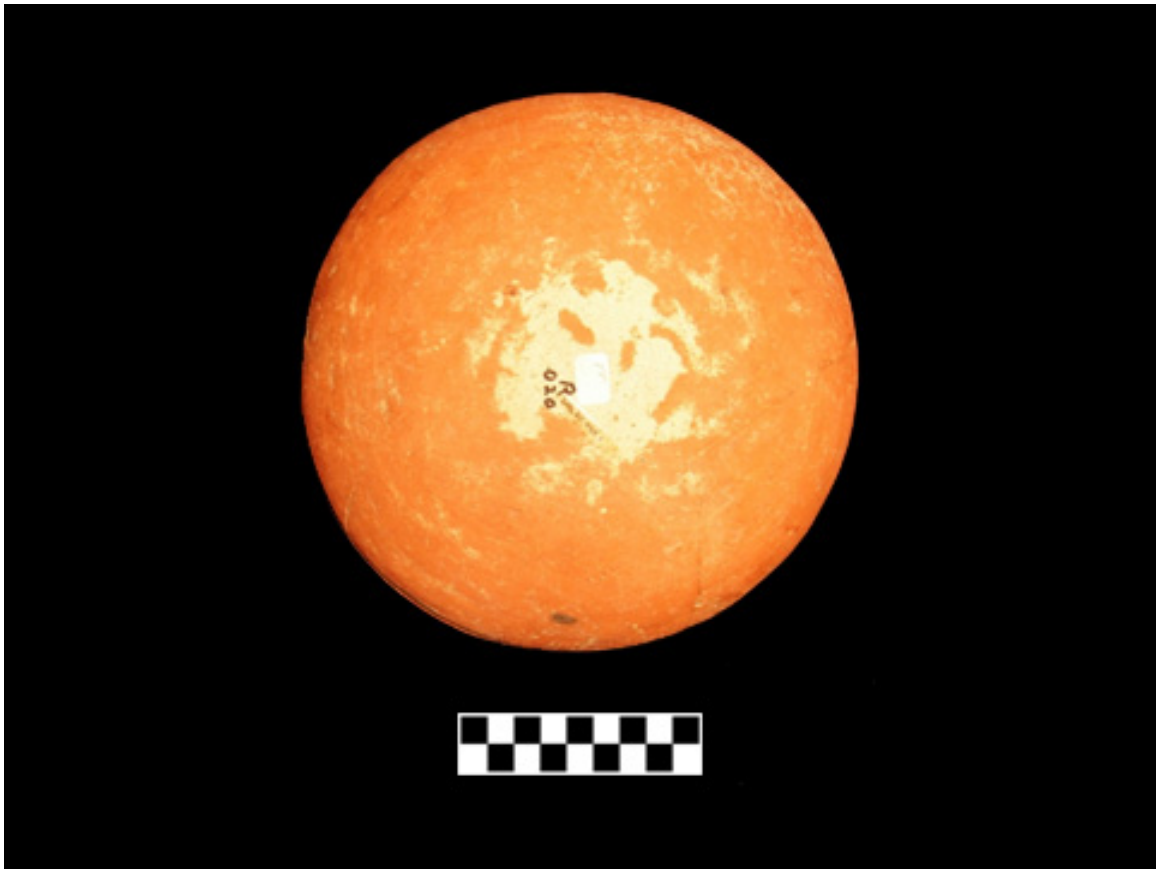

Figure 20. The core and periphery of exterior basal abrasion on a Fourmile Polychrome bowl from the Reidhead Collection.

extends up the sides. This core and periphery pattern can be observed on lightly, medium, or heavily abraded vessels.

Abrasion on the exterior base is the result of contact between the base of the vessel and an abrasive surface. The owner or user of the vessel repeatedly dragged or slid the bowl across a surface. This kind of abrasion can also be caused over time by placing or turning the vessel on the ground. Exterior basal abrasion may also have been exacerbated through curation, cleaning, or display since the 1960s. The point of direct contact between the vessel and the abrader—the core—shows the greatest depth and amount of abrasion.

Each ware, however, shows different patterns of wear, which may be related to the technological properties of the vessels. White Mountain Red Ware was slipped with a thin red slip that is very soft and easily abraded. The light color of the clay also contrasts with the red of the slip. Salado bowls abraded differently than White Mountain vessels. They do not exhibit the same distinction between slip and paste color. This may have been due to the materials used to produce Salado vessels. It may also have been a result of the firing process. Over 90% of Salado vessels have extensive fire clouding on the exterior surface. When vessel exteriors are abraded, there is little distinction between the dark gray fire clouds and dark gray paste underneath.

Abrasion on Jeddito bowls, if present, was very light. Pitting and scratching were more frequently found on their bases, but the area was difficult to calculate. The clay, itself is much harder and higher fired than White Mountain or Salado vessels, and Jeddito vessels are not slipped on their surfaces. It would not, it seems, have the same appearance of abrasion as the red wares. Basal pitting occurs on 80.6% of Jeddito Black-on-yellow bowls, indicative of the same kind of use as White Mountain and Salado bowls.

Whenever present and possible, each instance of exterior basal abrasion was documented and described. Of the 256 vessels that exhibited abrasion (or basal pitting for the Jeddito bowls), I was able to calculate the areas of 177. On the remaining 79 vessels there was either too much

structural loss or damage to determine the extent of abrasion or the abrasion was so light that a definite patch was indiscernible.

Based upon simple percentages, White Mountain Red Ware exhibits higher numbers of exterior basal abrasion than Salado or Jeddito (Table 8). The argument, however, cannot be simply made that White Mountain bowls were used with more frequency and intensity than the others. The data from the area calculations suggest that Salado bowls were used with greater intensity (Table 9).

The exterior base of 73 percent of White Mountain Red Ware vessels exhibited abrasion with areas averaging 34.8 square centimeters. Exterior basal abrasion occurred in 58.6 percent of Salado vessels, but areas averaged 42 square centimeters. It is difficult to make the argument that White Mountain Red Ware was used more frequently but Salado polychromes were use more intensively. These differences can be attributed to different materials and firing conditions.

Comparing exterior basal abrasion among the three wares is tricky because they abrade in different ways. Comparisons may be drawn, however, within wares to track possible change over time. Exterior basal abrasion increases over time within White Mountain Red Ware. From Pinedale to Fourmile Polychrome, the instances of abrasion increase by about five percent. This may be due, perhaps, to the greater involvement of ceramics in social, political, and ritual contexts. Average area decreases over time, which may be attributed to the length of time vessels were in service; Pinedale precedes Fourmile chronologically, and perhaps Pinedale was used over a longer period.

The same trends seem to be occurring within the Pinto, Gila, and Tonto polychromes. The instances of abrasion increases over time, while the mean area decreases. I am hesitant, however, to say these numbers reflect the reality of Salado vessels at Fourmile Ruin because the sample sizes of Pinto and Tonto vessels are so small.

There are also differences in basal abrasion patterns among vessel sizes. The largest of the

Table 8. Number of Vessels with Exterior Basal Abrasion by Type and Ware

Type	Abrasion n	%	Ware	Abrasion n	%
Pinedale	74	71.2	WMRW	162	73
Cedar Creek	14	66.7	Salado	65	58.6
Fourmile	74	76.3	Jeddito	29	80.6
Pinto	7	58.3			
Gila	45	54.9			
Tonto	13	76.5			
Jeddito (pitting)	29	80.6			
Total	256	69.4			

Table 9. Area of Exterior Basal Abrasion Measured by Type and Ware (cm2)

Type	Min	Max	Mean	Ware	Min	Max	Mean
Pinedale	2.3	119.4	43.7	WMRW	0.4	131.5	34.8
Cedar Creek	4.4	131.5	32.8	Salado	0.6	150	42
Fourmile	0.4	127.7	27.9	Jeddito	N/A	N/A	N/A
Pinto	22.1	72.8	47.5				
Gila	0.6	150	37.7				
Tonto	9.1	88	41				
Jeddito	N/A	N/A	N/A				

vessels—above 25 cm—exhibit the least amount of wear. Fifty-six of the eighty-two larges vessels show abrasion, but most of these patches are small—less than fifty square centimeters—and many of them are of light intensity (Tables 10 and 11, and Figure 21). Most small, medium, and large vessel sizes, however, show extensive and frequent use.

Exterior basal abrasion occurred as vessels came in contact with sandy or stony ground surfaces. Although the evidence suggests that White Mountain, Salado, and Jeddito bowls do not differ in terms of exterior basal abrasion, there are differences, potentially important ones, among bowls of various sizes and between Pinedale and Fourmile polychromes.

Upper Exterior Side

Abraded areas are also commonly seen on the upper exterior sides of the bowls. The abrasion in this zone occurs in two forms: patches and circumferential abrasion. Patches are

Table 10. Number of Vessels Above 25 cm in Diameter With Exterior Basal Abrasion

Size	n of sample	n With Abrasion	n With Abrasion >50 cm2
Very Large (above 25 cm)	82	56	43

Table 11. The Intensity and Area of Abrasion For Vessels Above 25 cm in Diameter by Type. Missing Information For Area Indicates That Abrasion Was Too Light to Calculate

Type	Bowl Diameter	Intensity	Area (cm20)
Pinedale Polychrome	28	3	
	27.8	3	28.32
	28.8	3	14.7
	26.3	3	28.26
	26.2	3	5.85
	30	3	38.45
	29.7	3	31.89
	25.2	3	32.96
Cedar Creek Polychrome	27.5	3	6.84
	25.5	3	20.29
	29.1	1	
	29.1	3	16.36
	26.3	3	20.7
	26.2	1	
Fourmile Polychrome	26.1	1	
	25.7	2	
	26.7	3	41.74
	26.5	3	46.55
	26.6	3	4.66
	25.5	3	15.12
	27.5	3	28.68
	25	3	12.79
	25.7	1	9.97
	26.3	1	
	25	3	16.87
	26.5	3	37.92
	26	3	
	28.1	1	
	26.5	3	30.49
Gila Polychrome	25.1	3	35.17
	25	3	
Tonto Polychrome	25.2	3	40.92
	27.4	3	
Total	43		

Figure 21. Tracing of exterior basal abrasion measuring 50 centimeters square (actual size). Forty-three of the largest vessels in the sample exhibit exterior basal abrasion equal to or less than this.

typically small to medium in size (2-6 cm in diameter), but can extend one quarter to halfway around the vessel. Vessels may also exhibit from one to four patches on upper exterior surfaces. Circumferential abrasion extends around the entirety of the vessel, may be of light or medium depth, and can measure from two to seven centimeters in diameter.

Circumferential abrasion is the kind most commonly seen on the Salado, Jeddito, and White Mountain vessels, accounting for 59.6% of all abrasion found in this zone. Abraded *patches* were present on 40.4% of bowls, and occur with the greatest frequency and intensity on Fourmile and Gila polychromes (Figure 22). The frequency of patches increases from Pinedale to Fourmile by 15% over time (Table 12). Chronological patterns are unclear for Salado polychromes due to sample size. In many instances, multiple patches occur on the bowls' surfaces, particularly among Fourmile Polychrome. Patches seem to be spaced in some possibly significant way around the vessel (Figure 23).

White Mountain Red Ware bowls exhibit a greater frequency of upper exterior side abrasion than both Salado and Jeddito wares. That is not to say, however, that White Mountain bowls were used more often, though it is a possibility. Wear patterns may be impacted by vessel materials. As noted at the beginning of this chapter, Salado, White Mountain, and Jeddito vessels wear differently.

Table 12. Number of Vessels with Patch and Circumferential Abrasion on the Upper Exterior Side

Type	n	Patch %	Circ. %	Ware	Patch %	Circ. %
Pinedale	38	28.9	71.1	WMRW	35.4	64.6
Cedar Creek	5	20.0	80.0	Salado	50.0	50.0
Fourmile	39	43.6	56.4	Jeddito	37.5	62.5
Pinto	5	20.0	80.0			
Gila	17	58.8	41.2			
Tonto	2	50.0	50.0			
Jeddito	8	37.5	62.5			
Total	109	n=44	n=65			

Finally, there does not seem to be any significant difference in abrasion frequency and intensity among vessel sizes, although it occurs less frequently in vessels with a diameter greater than 25 cm.

Abrasion on the upper exterior side of the vessel may be caused by contact with another vessel as bowls are nested for storage or placed side by side on a surface. Bowls may also be abraded in this zone by coming into contact with the ground or other surface as bowls are propped up for storage or display (discussed further in Chapter 6). The cause of the abrasion, whatever it may be, is the result of a repetitive process.

The fact that definite patches occur on both White Mountain and Salado bowls suggests that this patterning cannot be associated with differences in vessel materials as was the case with exterior basal abrasion. Thus, this may be an indication that perhaps Gila and Fourmile pots were used in different ways than other types.

Rim Edge

The exterior and interior rims of vessels are prone to accruing small abrasions and marks. These almost always extend around the entire bowl rim on the interior and exterior edges. No general pattern could be seen as to whether one surface (interior or exterior) was more abraded than the other. Rim edge abrasion occurs on less than 50% of the vessels in the data set, and

Figure 22. Example of abraded patch on a Fourmile vessel in the Reidhead Collection.

Figure 23. Example of abraded patch on a Pinto Polychrome in the Reidhead Collection.

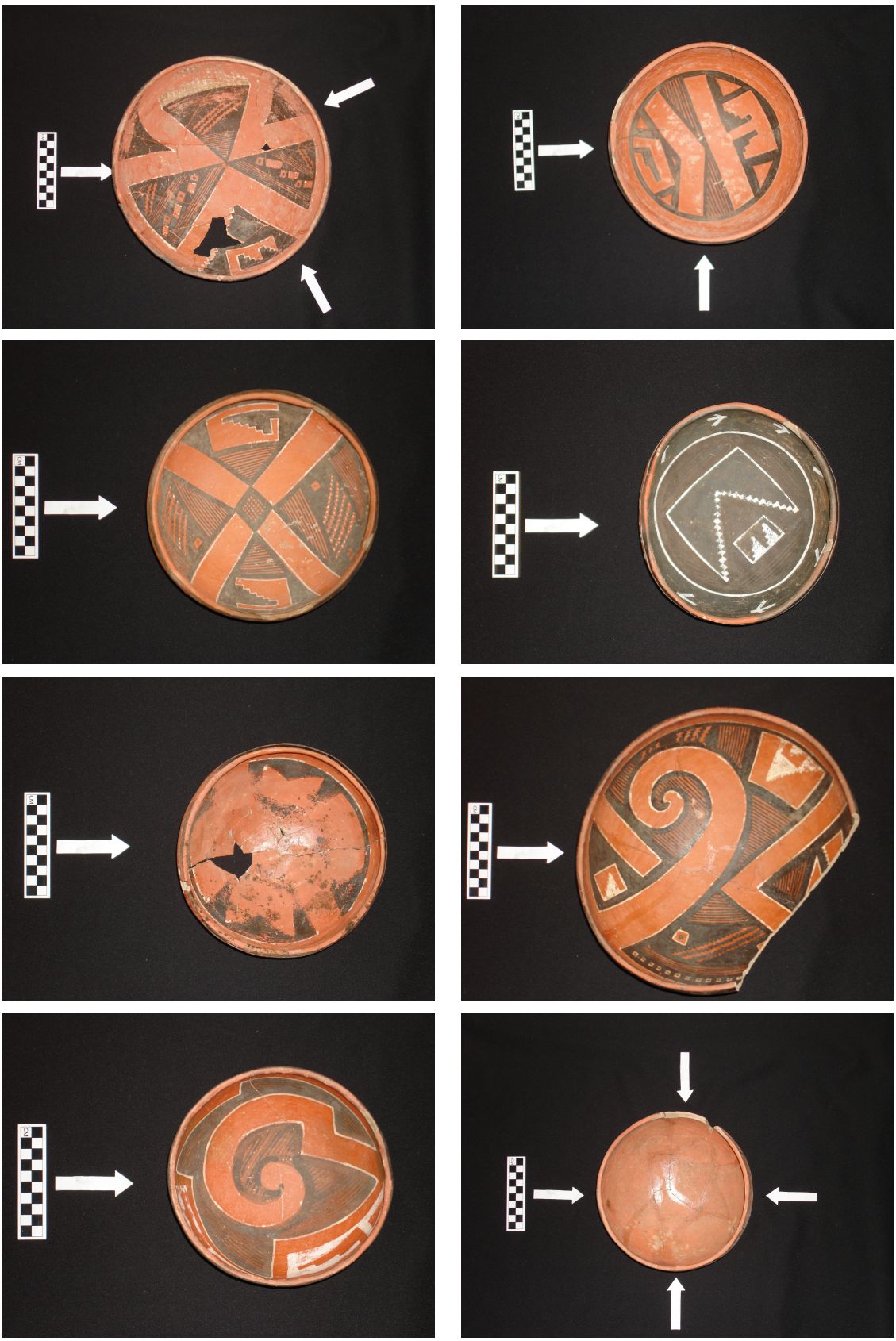

Figure 24. Examples of abraded patches on the upper exterior sides of Fourmile polychromes in the Reidhead Collection. Arrows indicate locations of patches.

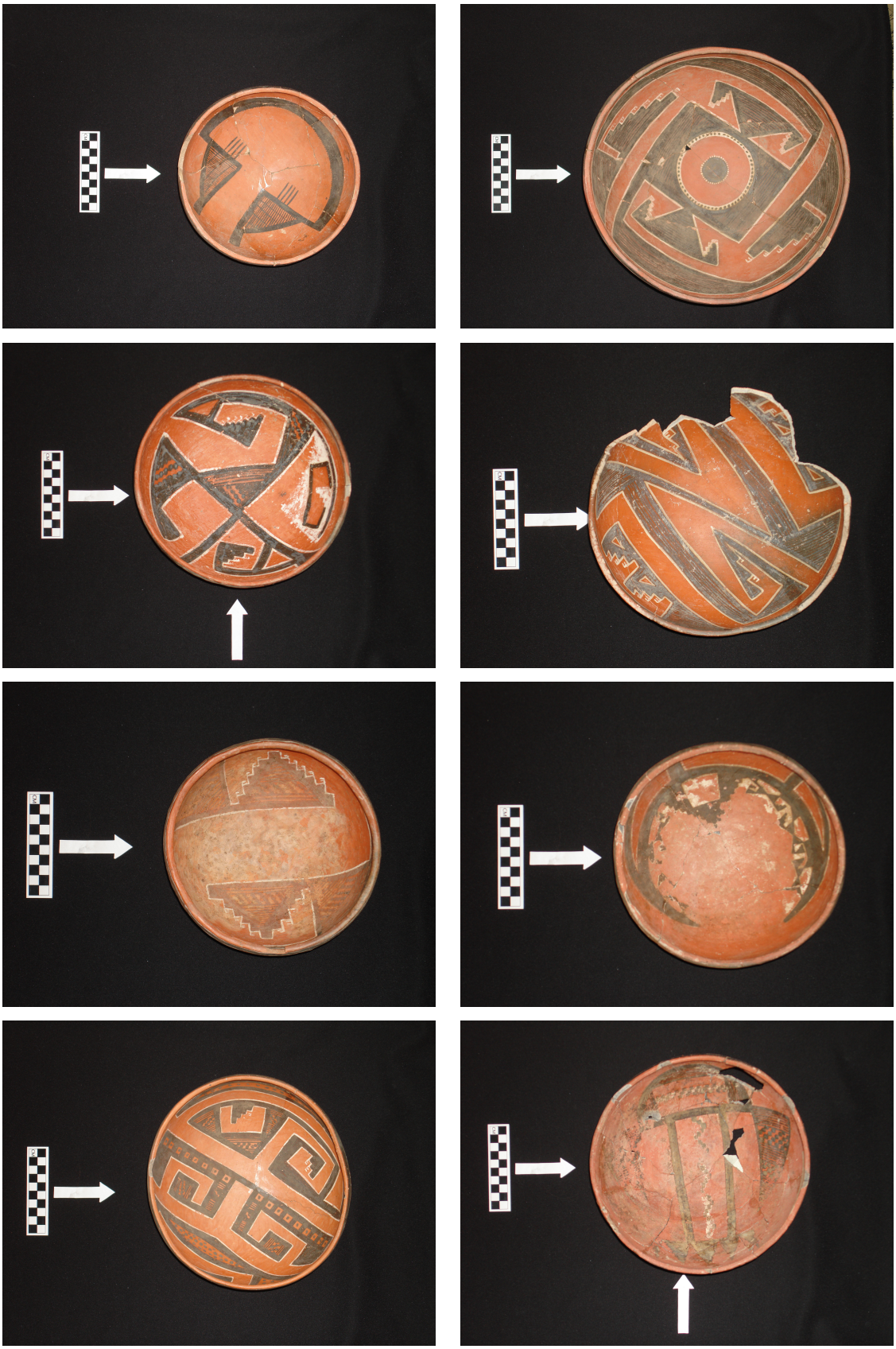

Figure 24. (Con't) Examples of abraded patches on the upper exterior sides of Fourmile polychromes in the Reidhead Collection. Arrows indicate locations of patches.

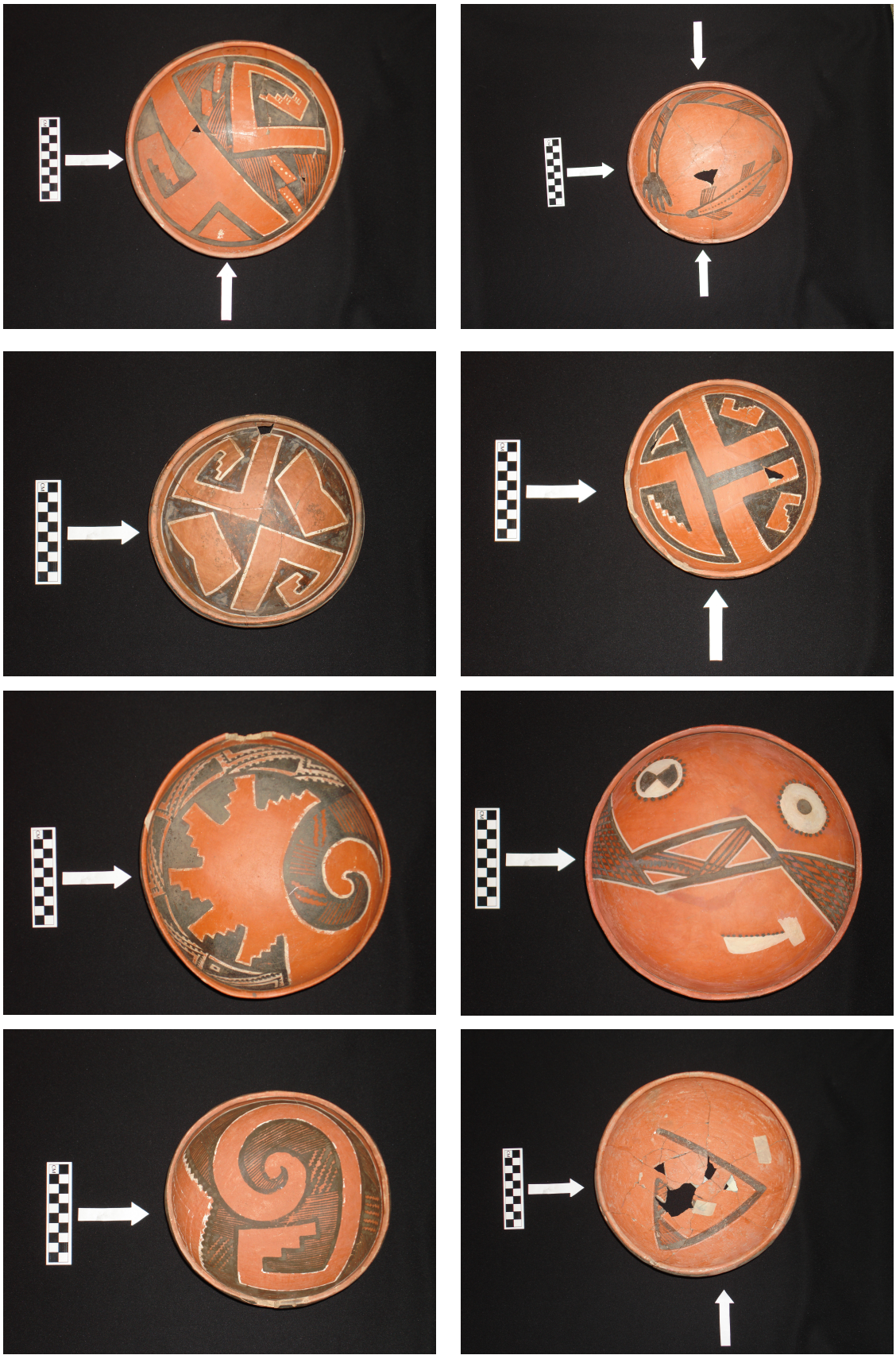

Figure 24. (Con't) Examples of abraded patches on the upper exterior sides of Fourmile polychromes in the Reidhead Collection. Arrows indicate locations of patches.

abrasion is typically medium to heavy in intensity (Table 13). The level of intensity does not vary among types or sizes that have rim edge abrasion, with the exception of the Jeddito vessels. I, again, attribute this to the way the Jeddito vessels abrade. It is interesting, though, that the vessels in the collection are either abraded to a medium or heavy intensity depth or they are not abraded at all. But, as explained previously, marks can be caused by single attritional events. The rim edge, in particular, is prone to sustaining damage marks.

Abraded areas on the rim edge are also accompanied by chipping and micro-chipping. The causes of abrasion and chipping may include the contact of wooden or ceramic utensils against the rim edge while serving, stacking the bowls for transport or storage, frequent handling, scrubbing, or placing the bowls upside down so that the rims come in contact with the ground surface.

There are no significant differences in rim damage among vessel types to suggest that they were used in different ways or in different contexts.

Upper Interior Side

Another area that is frequently prone to abrasion is the interior of the vessel, just below the rim (Figure 25). Where this occurs, the abrasion generally extends around the circumference of the vessel, and is generally light to medium in intensity. The painted and slipped surface of the vessel is impacted by the abrasion, but it appears unlike other abraded areas of the vessel. The abrader, either mechanical or chemical, and the abrasive action have caused the painted decoration to deteriorate or completely flake off. The black paint, for example, often appears flakey or patchy. The red and white slip in White Mountain and Salado vessels also appears thin and patchy.

Abrasion on the upper interior sides of bowls occurs in the greatest frequency among White Mountain Red Ware, though it is still well below 50% (Table 14). The behaviors that may result

Table 13. Numbers and Percentages of Rim Edge Abrasion For the Vessels in the Sample

Type	n	%	Ware	n	%
Pinedale	46	44.2	WMRW	109	49.1
Cedar Creek	8	38.1	Salado	63	56.8
Fourmile	55	56.7	Jeddito	6	16.7
Pinto	10	83.3			
Gila	43	52.4			
Tonto	10	58.8			
Jeddito	6	16.7			
Total	178	48.2			

in the formation of this kind of abrasion may include scooping contents out of the vessel with a ladle or other utensil, or stirring contents. It may also be the result of chemical abrasion if maize, for example, were soaked in the bowls for an extended period of time, or if fruits were allowed to ferment. The nature and frequency of abrasion, however, suggests that the abrader was soft; softer, at least, than the material(s) abrading the exterior surface. Again, this evidence does not suggest that White Mountain, Salado, and Jeddito vessels were used differently at Fourmile Ruin.

Interior Base

The last zone of abrasion is the interior base, which is frequently, though lightly, abraded (Figure 26). The abrasive action rarely exposes the temper, unlike on the exterior base of the vessels. Again, this suggests that the abrader impacting the interior was soft.

Interior basal abrasion occurs on approximately 33% of vessels, with really no differing use patterns among the types or sizes of vessels (Table 15). Interior basal abrasion is frequently accompanied by small scratches; 46% of vessels with interior basal abrasion also have scratches. It is difficult, as discussed earlier in this chapter, to distinguish the prehistoric scratch patterns from the modern. It is possible that many of these scratches are the result of cleaning the bowls after excavation with harsh chemicals.

Interior basal abrasion occurs when contents of the vessel are stirred, the vessel's base is

Figure 25. Abrasion on the upper interior side of a Gila Polychrome bowl.

scraped with ceramic or wooden ladles or other utensils, or the bowl is scrubbed clean. This pattern may also be due to chemical abrasion if liquids are allowed to sit in the bottom of the bowl over a period of time. The evidence from the interiors of the vessels in the sample does not suggest distinctions in the ways vessel types were used.

Chips, Cracks, Pitting, Gouges, and Scratches

Other types of damage that result from vessel use include chipping, cracks, pitting, gouges, and scratches (Table 16). All of these result from normal day-to-day activities involved in preparing and serving food, and from storing vessels.

Chipping, which occurs infrequently in the sample, can be caused by ladles or other utensils contacting the rim or as vessels are stacked for storage or transport. Chipping may also be the result of the vessels' depositional context or breakage during excavation. White Mountain Red

Table 14. Numbers of Vessels With Abrasion on the Upper Interior Side

Type	n	%	Ware	n	%
Pinedale	45	41.7	WMRW	88	39.6
Cedar Creek	6	28.6	Salado	24	21.6
Fourmile	37	38.1	Jeddito	12	33.3
Pinto	1	8.3			
Gila	19	23.2			
Tonto	4	23.5			
Jeddito	12	33.3			
Total	**124**	**33.6**			

Ware bowls are chipped much more frequently than any other vessels in the sample, which may be indicative of different or more frequent use.

Cracks or fractures can form in the vessel in straight or branching lines, and may have been caused by careless handling or pressure placed on the vessel during transport, storage, or in its post-depositional environment. Pitting appears as small, shallow pinholes in the vessel's surface, and can be the result of mechanical or chemical abrasion. Gouges are defects in the ceramic surface where material has been drilled or scooped out. As discussed previously, scratches are frequently observed in association with abraded areas, but prehistoric and modern scratch patterns are difficult to differentiate.

The small differences among vessel types in cracks, pitting, gouges, and scratches are not sufficient to suggest that Pueblo IV decorated bowls were used in different ways.

The use patterns on White Mountain, Salado, and Jeddito bowls indicate that these wares were used in similar, if not the same ways. If all three kinds of pots were owned by one person, the evidence suggests that decorated bowls were interchangeable in their utilitarian function. All three wares had similar value in terms of their utility. The only major difference among the types in the sample is the kind of abrasion (patch vs. circumferential) present on the upper exterior sides of vessels. This is likely not due, however, to differences in utilitarian function. It may be evidence of the symbolic role of certain kinds of decorated bowls.

Figure 26. Interior basal abrasion of a Pinedale Polychrome bowl.

Table 15. Numbers of Vessels With Interior Basal Abrasion

Type	n	%	Ware	n	%
Pinedale	33	31.7	WMRW	70	31.5
Cedar Creek	7	33.3	Salado	37	33.3
Fourmile	30	30.9	Jeddito	15	41.7
Pinto	3	25			
Gila	24	29.3			
Tonto	10	58.8			
Jeddito	15	41.7			
Total	**122**	**33.1**			

In addition to patterns of use, vessels show evidence of being cared for by their original owners. While this is not evidence of direct or indirect use, it may indicate that certain vessels were valued over others at Fourmile Ruin; perhaps that value was related to the symbolic function of decorated Pueblo IV bowls.

Table 16. Frequencies of Chips, Cracks, Pitting, Gouges, and Scratches Among Pueblo IV Bowls

Type	Chip (n)	Crack (n)	Pitting (n)	Gouge (n)	Scratch (n)
Pinedale	46	44	66	16	80
Cedar Creek	10	6	9	4	13
Fourmile	39	29	56	15	57
Pinto	1	1	1	1	9
Gila	7	29	19	10	72
Tonto	2	7	6	0	13
Jeddito	1	13	28	6	31
Total	**106**	**129**	**185**	**52**	**275**

Repair/Drill Holes

Although vessels must have broken frequently, many were not removed from active service. Bowls were repaired and people continued to use them in their primary contexts. Even if a vessel's ability to hold liquid contents was restricted, it could still hold dry goods. There are many examples of attempts to repair broken or cracked vessels in the Reidhead Collection. Prehistorically, this was done through the use of pairs of drilled holes. The criterion used to distinguish between repair holes and other drill holes—such as those used to hang vessels—is the placement of the holes on the vessel. Repair holes occur in pairs and are associated with a break or crack in the bowl. They are placed primarily just below the rim, though in some rare instances they are located toward the center of the vessel (Figure 27).

According to Senior (1995), American Southwest groups used a system of drilled holes to repair their vessels. Sherds were tightened using strips of hide or vegetal twine, and possibly sealed with resin. Repaired specimens in the Reidhead Collection show evidence that holes were primarily drilled from the exterior surface of the vessel, and rough edges were simply smoothed on the interior. (As a side note, two of the vessels in the sample exhibit possible drilling mistakes, as if the repairer misjudged his or her placement of the repair holes (Figure 28). The individual, possibly a beginner, began to drill from the interior, and ended up drilling a completely different set of holes.)

Figure 27. Repair holes drilled into the rims of Pinedale Polychrome vessels from the Reidhead Collection.

In all, 369 vessels were examined and 53 repaired vessels were identified (Table 17). When encountered, several aspects of the drilled holes were assessed. These include the diameter(s) of the hole, the distance between drilled holes, the distance of the drilled holes from the rim of the vessel, and, where applicable, the distance between sets of drilled holes.

The sizes of these holes were generally standardized, although very slight variations do occur. One hole, for example, may be slightly larger or smaller than the corresponding hole; the repair holes of one vessel might vary in size from those of another. Drilled holes typically fall between 2 mm and 3 mm in diameter. This data suggests that a standardized or common tool may have been used to create the holes.

The placement of the holes in relation to each other was likely chosen for the stability of the vessel; if holes were drilled too near the crack or break, it may cause further breakage of the vessel; holes drilled too far apart may not provide a sufficiently stable bond between vessel

Figure 28. Drilling 'mistakes' on a Fourmile Polychrome bowl.

fragments. There are instances of both of these occurrences in the dataset.

Some specimens in the Reidhead Collection exhibit multiple sets of repair holes (Figure 29). The number of repair holes present on a vessel suggests that two types of damage were being repaired. The first, and most common, type is the treatment or prevention of a crack. This was done through drilling one set of repair holes. The second type is the treatment of a break. When a complete break occurred, one is likely to find at least two sets of repair holes on opposite ends of the break.

Approximately 14 % of sample shows evidence of prehistoric mending. In order to determine the frequency of prehistoric mending using drilled holes within the Pueblo IV wares of the Reidhead Collection a statistic was used called the Frequency-of-Mending statistic (Senior 1995). This statistic expresses the incidence of mending per pottery type, and is determined

Table 17. Number of Vessels Exhibiting Repair Holes

Type	n	%	Ware	n	%
Pinedale	12	11.5	WMRW	35	15.8
Cedar Creek	2	9.5	Salado	8	7.2
Fourmile	21	21.4	Jeddito	10	27.8
Pinto	1	8.3			
Gila	4	4.9			
Tonto	3	17.6			
Jeddito	10	27.8			
Total	**53**	**14.4**			

from the percentage of mended vessels of type X divided by the percentage of type X in the total assemblage, when the percentage of mended vessels of type X is greater than the percentage of total vessels of type X.

$$\frac{\%\text{ of type X}}{\%\text{ of type X in assemblage}} = \text{Frequency of Mending}$$

When vessels are repaired at a rate considered expected or random, the Frequency-of-Mending statistic (Freq-Mend) is close to 1.0 because the percentages being compared would be very close in value. Values greater than 1.0 indicate that vessels in that type were repaired much more frequently than expected. Negative values are given if the percentage of mended vessels of type X is less than the percentage of type in the total assemblage. Negative values indicate a lower than expected frequency of mending.

The Freq-Mend statistic shows that the frequency of repair among Cedar Creek, Pinto, and Tonto vessels is much higher than the rest, with the exception of the Jeddito sample (Table 18). These types represent such a small part of the sample that I am hesitant to draw any significant conclusions about the value of these specific vessels in Fourmile Ruin society. It is more reasonable to consider and compare wares rather than vessel types.

Figure 29. Jeddito Black-on-yellow bowl from the Reidhead Collection exhibiting three sets of repair holes.

The Freq-Mend statistic shows that the frequency of repair among White Mountain Red Ware and Salado polychrome is less than 1.0, or random. Jeddito Black-on-yellow bowls, on the other hand, were mended at a frequency of +2.8. The rank order of the Frequency-of-Mending statistic is believed to represent a ranking of prehistoric value. The percentage of mended types, too, represents value rank (Senior 1995). Fourmile and Jeddito vessels were mended above 20%; other types were repaired much less frequently. According to this reasoning, Fourmile and Jeddito bowls held the greatest value at Fourmile Ruin. Furthermore, there is no link between vessel size and frequency of repair. Small, medium, and large vessels were repaired at similar rates.

There must have been a reason Jeddito and Fourmile vessels were mended more often than the others. It may have been related to the messages or information expressed in these two ceramic types. On a utilitarian level, a vessel was repaired in order to extend its use life as

Table 18. Frequency of Mending of Pueblo IV Decorated Bowls. The Greater Frequencies Occurring Within Cedar Creek, Pinto, and Tonto Vessels are Errors Based on Insufficient Sample Sizes

Type	% Mended	% Total	Freq-Mend	Ware	% Mended	% Total	Freq-Mend
Pinedale	11.5	28.2	0.4	WMRW	15.8	60.2	0.3
Cedar Creek	9.5	5.7	1.7	Salado	7.2	30.1	0.2
Fourmile	21.6	26.3	0.8	Jeddito	27.8	9.8	2.8
Pinto	8.3	3.3	2.6				
Gila	4.9	22.2	0.2				
Tonto	17.6	4.6	3.8				
Jeddito	27.8	9.8	2.8				

a serving container. In Chapter 4, it was suggested that the intended function of a decorated bowl was both utilitarian and symbolic. Individuals repaired vessels in an effort to keep them functioning at acceptable levels in both of these contexts.

Jeddito Black-on-yellow vessels, aside from being mediums of expression, also possessed the quality of rarity and the power of a distant place (Spielmann 2002). Yellow bowls only make up 5% to 7 % of the ceramic assemblage at Foumile Ruin; vessels may have been hard to get via trade or access could have been restricted to elite groups. Some individuals could have had greater access to yellow vessels than others by virtue of family ties or other personal connections to the Hopi region. It is possible that the inhabitants of Fourmile Ruin saw the Hopi area as a meaningful and powerful place. Jeddito vessels may have had particular value because they were rare, perhaps difficult to acquire, or associated with sacred places.

The intended function of Pueblo decorated bowls was both utilitarian and symbolic. An examination of the patterns of actual use suggests that the bowls in the sample fulfilled their intended utilitarian role. The data illustrates that bowls were used as serving vessels that were placed and moved along stony and sandy surfaces; were scrubbed and stored away when not in use; they held contents that were stirred, ground, and pounded; and served both foods and liquids. Some archaeologists have suggested that the differences among decorated vessels correlated to their use in different contexts. The patterns of wear observed in the sample,

however, demonstrate that decorated bowls were not used differently in terms of their utilitarian function. The only noteworthy exception is the abrasion patterns seen on the upper exterior sides of vessels; these will be discussed more in the next chapter. Use patterns are generally the same across types of vessels and over time.

The major differences among vessels are their symbolic and visual qualities discussed in Chapter 4. These qualities may have been integral to the proper functioning of the bowls in Fourmile society; so much so that a portion of the ceramic assemblage was treated in such a way to preserve its symbolic function. Many bowls—primarily Jeddito and Fourmile—were mended so that they could continue to serve in their intended capacities. If decorated bowls did not function differently in terms of their utility, why, then, was the decorative variation among vessels necessary?

The diversity of surface enhancements and decoration were necessary because White Mountain, Salado, and Jeddito bowls expressed different kinds of information; information about the individual who owned the vessel and the group to which the individual belonged. A decorated bowls helped its owner express his or her identity, and may have been used in contexts in which expressing or teaching that information was important. In the next chapter, I will explore three contexts of vessel consumption that may have required the use of both the utilitarian and symbolic functions of decorated bowls.

6 SYMBOLIC CONTEXTS OF VESSEL USE

In the foregoing chapters, I have argued that Pueblo IV decorated bowls were produced to fill a largely utilitarian role, but they also served as a means of conveying information. Specific performance characteristics, such as form, size, and materials, show that bowls were manufactured as food preparation and serving vessels. The patterns of abrasion, pitting, chipping, and other forms of use are demonstrative of bowls fulfilling their intended utilitarian role. Moreover, based on this evidence, it is clear that decorated bowls at Fourmile Ruin had a similar utilitarian function.

Bowls, however, exhibit non-utilitarian, or symbolic, traits such as color and decoration, suggesting that they had a role that extended beyond simple utility. As defined in Chapter 1, the term *symbolic* refers to the use of an object to exchange information (Hodder and Preucel 1996). If, as has been illustrated in previous chapters, decorated bowls shared the same utilitarian function, why were bowls decorated in different ways?

Archaeologists have proposed many interpretations for the diversity among decorated ceramics in the Pueblo IV period. Fenn et al (2006) suggest that different ceramics were used in different social contexts and marked regional and local social distinctions; some contend that vessel decoration indicated an individual or group's association with a cult or other sodality like groups, and expressed ritual knowledge (Adams 1991; Crown 1994; Adams and Lamotta 2006; Hays-Gilpin 2006); Van Keuren (2000, 2006) has argued that decorative style communicated the cultural identity of the people of Fourmile Ruin, and may have articulated the allegories or origin myths of specific clans or social groups. He further states that the changes that occur over time,

especially from Pinedale to Fourmile polychromes, suggest a shift in the social or ritual identity of the people of Fourmile Ruin.

The precise meaning of symbolic performance traits is certainly debatable. All of these interpretations, however, have common themes running through them: the people of Fourmile Ruin used decorated bowls to transmit information about themselves, and bowls may have been used in situations at Fourmile Ruin in which instructing others and reinforcing important concepts was important.

Over the last several decades, many models have been developed in archaeology to interpret ceramic vessel production, distribution, and use in the Southwest. According to these models, decorated ceramics were associated with political, economic, social, or religious processes in the Pueblo IV period (Crown 1994). Within these contexts of vessel use it may have been important for individuals and groups to express information about themselves, such as their ethnicity, or their political or ritual associations. Civic or religious leaders may have used these situations as opportunities to instruct community members.

A significant problem with these models, however, is that they do not address one of the primary roles of decorated ceramic bowls: serving and eating food. They do not account for the patterns of use accrued in the vessels' primary contexts of use. These models also do not adequately address the contexts in which vessels were discarded, such as in burials. I will use the remainder of this chapter to discuss three possible contexts of vessel use in which the dual function of decorated bowls was utilized, and in which expressing important information, teaching, and reinforcing key concepts may have been achieved: communal feasting, household vessel use, and mortuary rituals.

COMMUNAL FEASTING

Feasting represents a viable interpretation for vessel consumption because it crosscuts the

political, economic, social, and ritual models mentioned above. Feasting provides an arena for the assertion of power or authority, for the creation or strengthening of economic relationships, for encouraging social cooperation, or for conducting rituals. In all of these feasting situations, expressing one's identity or other information, and teaching important ideas must have been fundamental.

Before beginning a discussion of feasting at Fourmile Ruin, it is necessary to state that I do not suppose a cause and effect relationship between feasting and vessel production and distribution. Rather, I see a *correlation* between feasting and vessel use. Regardless of the political, economic, social, or ritual factors responsible for vessel production and distribution, one thing is clear: ceramic vessels were used. The act of feasting provides a context for vessel use; one that may account for the physical and visual performance characteristics and post-firing use of White Mountain, Salado, and Jeddito Black-on-yellow ceramics.

Hayden (2001) has defined *feasting* as any sharing of special foods—those not served at daily meals—between two or more people for a special purpose or occasion. In the same publication, Deitler defines it as a form of public ritual centered on the communal consumption of food and drink. Feasting, however, can take place in many contexts, not just ritually; it can be political, economic, or social (Gumerman 1997). I, therefore, opt for Hayden's broader definition of feasting. Feasting has many different contexts, and can be organized at the family or communal level.

Feasting may have had a political function. With the influx of migrants into Fourmile Ruin, community leaders may have had need to regularly legitimize and enforce their authority. While feasts provided food for those in attendance, they could have also created an obligation and dependency relationship between hosts and guests. Hosts put on impressive displays of food and other goods in an effort to recruit and maintain followers (Hayden 1995; Potter and Ortman 2002).

Feasting may have also had an economic function (Hayden 1995; Mills 1999). Feasts were probably held in one of the communal plazas at Fourmile Ruin. This space would have provided an excellent area to redistribute food in times of need. One of the possible causes of migration into the Silver Creek drainage was the impact of environmental degradation and drought on agricultural output. The Silver Creek drainage, however, located along the Mogollon Rim, had shorter growing seasons due to its elevation. These issues may have necessitated communal feasts where food was redistributed to the population. It may also have been an arena for the exchange of other goods, such as containers, tools, textiles, or the exchange of marriage partners (Plog 1997). Economically driven feasts may have also helped to create and maintain ties with other settlements or clusters.

Feasting may have been a means of negotiating, encouraging, or celebrating social solidarity (Hayden 1995; Lindauer 2000; Van Keuren 2002). The processes of migration to and aggregation at large pueblo communities resulted in mixed populations from different cultural backgrounds. Community leaders faced the challenge of integrating diverse populations and encouraging cooperation. Communal feasts may have been used to bring people together for special meals, to socialize, and build relationships. Ethnographic studies show that, even now, food is important in the definition and maintenance of social relationships in many societies (Whalen and Minnis 2001). The use of decorated ceramics may have facilitated the negotiation of social relationships by identifying the individual and the individual's group associations. How individuals and groups related to each other may have changed over time with the shift toward using Fourmile style on ceramic vessels.

Communal feasting may also have been a part of the ritual organization of Fourmile Ruin. Around the beginning of the fourteenth century new ideas and rituals were introduced into the Western Pueblo region in the form of cult religions. Cults were adopted and suited to fit the needs of migrating populations, and functioned as an integrative mechanism for groups

coming from disparate backgrounds. They emphasized the well-being of the community, unity, a harmonious relationship and balance among people, and between people and the universe (Schaafsma 2000). Participation in the cult encouraged the flow of information, services, materials, and people across ethnic and political lines (Crown 1994).

Two of the most frequently discussed cults in archaeological literature are the *Katchina* (Adams 1991) and the *Southwestern Regional* (Crown 1994) cults, although these are not two discrete and mutually exclusive phenomena. In fact, these two names likely represent the same ideas and practices occurring across the Western Pueblo region. Adams's term, Katchina Cult, is much more specific in its meaning and associations than Crown's Southwestern Regional Cult. Where cults are present, they impact almost every aspect of Pueblo IV life.

Decorated vessels may have functioned to signify membership in ritual groups. The imagery depicted on vessels, perhaps, taught important ritual concepts in the feasting environment. The dramatic changes that occur in vessel decoration throughout the fourteenth century could indicate a shift in ritual behavior at Fourmile Ruin. Adams (1991), for example, has argued that the transition from Pinedale to Fourmile iconography represents a visual sign of the intensification of cult ceremonialism relating to katchinas.

Cult beliefs and activities may have been adopted at Fourmile Ruin as a means of integrating diverse populations through common ritual practices. Cult ceremonialism included various communal festivals throughout the course of the year. In 1932, Leslie White observed that important ceremonies were accompanied by feasting at Acoma Pueblo, and included the preparation of special foods, use of special cooking features, and serving food before, during, and after special ceremonies (White 1932). Food preparation and sharing is an important component of all Pueblo ceremonies even today (Mills 1999). Rituals and feasting may have been conducted in association with births, marriages, or deaths; they may have marked points within a religious calendar (Phillips and Sebastian 2002).

The communal consumption and sharing of food was likely integral to the ceremonial, sociopolitical, and socioeconomic fabric of Fourmile Ruin (Van Keuren 2002). Determining the evidence for communal feasting in the Southwest, however, has been challenging for archaeologists. One reason for this is because feasting in the Southwest did not occur at the same extravagant level as other locations, such as Cahokia (Potter and Ortman 2002). The abundance of feasting evidence found at other sites is not archaeologically visible in the Southwest. A second reason is that Southwestern feasting occurred on multiple scales, from individual families to the corporate level. It is difficult to separate communal from domestic meals because they both utilize the same tools and containers.

Southwestern archaeologists must, therefore, rely upon many kinds of evidence to determine the presence of feasting at Southwestern sites. These are (1) the presence of ritual features and architecture, (2) communal cooking features, (3) analyzing faunal assemblages, and (4) studying ceramic containers (Whalen and Minnis 2001; Mills 2002).

One of the hallmarks of Pueblo IV architecture was the addition of an enclosed or semi-enclosed plaza to large pueblo communities. Settlements were constructed so as to create open public spaces, and they focused community interaction toward common areas (Duff 2002). Plazas were likely used as a communal space for exchange, rituals, and meals. Fewkes (1904) noted the presence of two plazas at Fourmile Ruin, which he argued were used to perform public dances and rituals. Plazas provided the context and space in which community gatherings and interaction could take place.

The second piece of evidence is the presence of large communal cooking and roasting features. Based upon ethnographic accounts (White 1932), archaeologists infer that these were used to cook large amounts of food to feed guests of the feast. While excavating Fourmile Ruin, Fewkes discovered several large ovens outside the pueblo walls filled with ashes and charred wood. He suggested that cooking took place outside. These larger ovens, however, were likely

used for community wide feasts, rather than simply day-to-day domestic meals.

Archaeologists also analyze faunal assemblages to determine the presence of feasting at Southwestern sites. Evidence from other sites in the Silver Creek cluster, such as Bryant Ranch and Bailey Ruin, suggest that the consumption of large game increases over time in the Pueblo IV period (Horner 1999; Dean 2001). Horner (1999) argues that this is directly related to the intensification of feasting over the course of the fourteenth century.

This evidence—communal plazas, public cooking and roasting features, and the increase in the consumption of large game—are signals of public consumption events. Moreover, they occur with regularity at Pueblo IV sites in the Silver Creek drainage. Based upon the limited excavation of the site, Fourmile Ruin exhibits two of these evidences: communal plazas and public cooking features. Given the evidence from other sites in the Silver Creek cluster, it is logical to assume that the consumption of large game also increased at Fourmile Ruin during this time. It can be argued that feasting may have occurred on a regular basis at Fourmile Ruin for political, economic, social, and ritual reasons. Feasting activities encouraged community interaction on a variety of levels, and decorated ceramic bowls played an integral role in helping to negotiate those interactions.

Decorated bowls were utilitarian; they were used to transport, present, and display food used in feasting. This is documented in Pueblo IV period kiva wall murals from Awatovi, Pottery Mound, Kawaik-a, and Kuaua (Mills 1999). Decorated bowls are shown in profile in the context of a feast, and vessels are filled with food. Ethnographic and ethnoarchaeological studies also illustrate the importance of serving containers in feasting (Mills 2002). As discussed in Chapter 4, White Mountain, Salado, and Jeddito vessels have performance characteristics that make them ideal for use in a feasting environment. They are wide-mouthed, stable, and can be large.

Because decorated vessels also had a symbolic role in the feasting environment, potters must have ensured that their vessels had a certain level of visibility in order to communicate the

intended information. This was done through the vessels' sizes, the use and placement of color, surface enhancement, and interior and exterior designs.

Feasting vessels were likely the same vessels used on a day-to-day basis (Crown 1994; Mills 1999; Potter and Ortman 2002; Van Keuren 2002). Use wear analysis shows that the smaller, individual or family sized vessels were used extensively, and not used solely for feasting activities. The largest vessels (those greater than 25 cm), however, may have had a more specialized function for use in feasts. Larger vessels exhibit less intense abrasion, scratching, and pitting patterns. Van Keuren (2001) also observed this pattern in his study of White Mountain Red Ware; smaller vessels showed a greater intensity of use than the larger ones.

Previous analyses of White Mountain Red Ware and Salado polychrome indicate that vessel size increases over time (Crown 1994; Mills 1999), although this pattern seems unclear within the Reidhead sample. According to the data set, Fourmile Polychrome only increases by .2 cm from Pinedale. Several interpretations for size change have been proposed that have both ethnoarchaeological and archaeological support. These include an increase in household size, household wealth or status, and the presence and scale of communal feasting (Mills 1999; Fenn et al 2006). The use wear patterns on the largest vessels in the sample do not support the first two suppositions, however. It seems logical to assume that if vessel size increased to accommodate larger households, the largest vessels should exhibit the same intensity and frequency of use as the smaller. The same logic should hold true for the idea that vessel size relates to an increase in household wealth or status. If the largest vessels functioned in the same contexts as the smaller, the wear patterns should be the same. The largest vessels are, therefore, anomalous. They have much less evidence of use than smaller vessels.

It seems plausible that the largest vessels had a more restricted use, based upon the amount and intensity of use wear observed on them. The increase in size over time may suggest an intensification of feasting activities at Fourmile Ruin.

Although large vessels do occur among Salado polychromes, White Mountain Red Ware bowls are larger on average. Jeddito Black-on-yellow vessels occur primarily as small and medium size bowls. The difference in sizes may reflect the social contexts of vessel consumption, such as the nature or scale of the feast (Fenn et al 2006). Large bowls, like the largest Salado polychrome and White Mountain Red Ware bowls, would have held larger amounts of food. They would also have been more visible in a community-wide feast in terms of their size than would the Jeddito vessels.

Color, as discussed in Chapter 4, is an important visual performance characteristic of Pueblo IV pottery that would be instantly processed by viewers. White Mountain Red Ware and Salado polychrome potters used a combination of red, black, and white on their vessels. The combination of these colors does not really change over time, but the *appearance* of the colors does. When potters altered the glaze paint recipes, Fourmile decoration appeared much blacker and bolder than earlier vessels (Fenn et al 2006). Among Salado vessels, the use of mineral paint increases over time, and lines become crisper and bolder. These changes may have also altered the visual perception and experience of the viewer; the later vessels, because their colors were much more vivid, would have been viewed differently in a feasting situation. Perhaps new information was being conveyed, or old principles were being reinforced or understood in a different way.

One of the distinguishing traits of Jeddito Black-on-yellow bowls is its yellow color. If used in feasting, the yellow color would have stood out in comparison with the red wares, and have conveyed messages about its rarity and distinctness. The yellow color of the vessel made it distinct among other feasting pottery, and may have singled out the owner. Given that Jeddito vessels only make up five to seven percent of the decorated ceramic assemblage, owning such a vessel may have been limited to a certain segment of the population.

Vessel decoration and style were an important non-verbal means through which people

expressed information about relative identity (Weissner 1990). They would also have been important to the visibility of the bowl. The exterior decorations of Pueblo IV vessels at Fourmile Ruin are diverse in form and layout. Designs would have been quickly and easily seen even from different viewing distances.

The exterior decoration of White Mountain Red Ware changed over time. Early in the fourteenth century, exterior designs underwent a transformation with the shift from Pinedale to Cedar Creek Polychrome, and then to Fourmile Polychrome. Rather than the bold, single element design characteristic of Pinedale vessels, these new vessels exhibited circumferential banded designs. Van Keuren (2002) suggests that the transition from single element to banded designs represents a shift in ritual or other knowledge conveyed by the vessels and their function at social events. For some reason, he argues, there was a need for red ware bowls with easily viewed circumferential decoration. The exterior decoration, unique to Cedar Creek and Fourmile polychromes, is a visual performance characteristic tied to feasting; one that carried specific information to the viewer.

Salado vessels, particularly the later Gila and Tonto polychromes, have iconographically rich exterior designs. Salado exterior designs are typically bolder, bigger, and more contrasting in color than White Mountain Red Ware. Mills (2002) has argued that these would have been better to display in the large open plazas during a feast than Fourmile vessels because they have greater visibility. The visual experience of seeing a vessel with bold single element exterior imagery could have been different than seeing those that have circumferential bands with repeating designs. Fenn et al (2006) suggest that, based upon this difference, White Mountain and Salado vessels were used in different feasting situations.

The Jeddito bowls, too, would have had great visibility in communal feasting situations. The iconographically rich exterior glyphs combined with the characteristic yellow color separated Jeddito vessels from red wares.

Vessel interiors, as discussed in Chapter 4, change (dramatically in some cases) over time. These changes are most likely due to much larger social changes than are discussed here. Nonetheless, these changes impacted the visual experience of the participant in the feast and in the associated rituals. Salado polychromes, Jeddito Black-on-White, and White Mountain Red Ware all contain iconographically rich interior designs. The designs may refer to the origin stories of social groups, display cosmological or religious concepts, or have held personal meaning for the owner.

The depiction of decorated bowls in the kiva murals at Awatovi and other sites do not show the interiors of the vessels; simply the profile. Hegmon (1992) has argued that the exterior decoration may have spoken to a wider, more communal audience; it may have expressed more general information about the group. The interior, however, was important to those consuming the food from that particular vessel. Only those surrounding the vessel could view the imagery on the inside as the contents were consumed. Interior decoration conveyed more specific and individual information to the owner of the vessel. This could suggest an individual as well as communal element to feasting.

Potters may have meant White Mountain, Jeddito, and Salado bowls to be seen and read. Bowl visibility increased as they got larger, and through the use of color and intricate decoration. But there may have been other ways to draw attention to bowls. Archaeological and ethnographic evidence suggests that bowls were displayed and carried in such a way to enhance their visibility during a feast (Mills 2002). Bowls could be carried on the heads of servers, placed in the center of the room or plaza, or positioned on a raised bench or pedestal. If bowls were carried or displayed in this, or similar, ways it would greatly increase their visibility and further emphasize the messages being sent.

Communal feasting was a social context in which individuals could express information associated with identity or group membership; they could teach or reinforce concepts that were

important to individuals, families or the community. Decorated ceramics, perhaps, provided a tangible means of conveying that information, while also fulfilling a utilitarian role by transporting, displaying, and serving food.

HOUSEHOLD DISPLAY

The reasons for communal feasting can be political, economic, social, or ritual in nature; there may even be elements of all of these in southwestern feasting. Some decorated ceramic bowls probably functioned as serving vessels for the feast, particularly the largest vessels. The interior and exterior decoration and surface embellishments carried important information and messages. When vessels were brought back home, they may have acted as a reminder of the ideological concepts associated with the feast, and served to reinforce the messages contained within them.

Van Keuren (2002) has argued that vessels brought the intangible elements of the feast back to the household. The decorated bowls were reminders that the messages, rituals, and ideas exhibited during the feast were also important in day-to-day life. In their discussion of why pots are decorated, David, Sterner, and Gavua (1988) say, "Designs on pottery, far from being 'mere decoration'…are low-technology channels through which society implants values in the individual—every day at mealtimes." The information encoded in pottery is both presented and reinforced in domestic and communal contexts. It is in the home, furthermore, that vessels probably sustained the most use-related damage like chipping and abrasion.

In between feasts and while not in use, ceramics were stored. Decorated bowls, because of the information encoded in the decoration, may have been displayed in some way in the public areas of the household. Several researchers (Mills 2002; LeBlanc and Henderson 2009) have argued that the exterior decoration—the banded designs or the glyphs— evoked general themes of membership or identity, and the interior decorations carried information and messages to the

individual. Might individuals and families have displayed the bowls in their homes in such a way to reinforce or show their acceptance of those ideas?

The wear patterns on many vessels indicate that the upper exterior sides of bowls were in contact with some abrasive surface regularly and frequently. As discussed in Chapter 5, there are two types of abrasion present on the upper exterior sides of vessels: (1) circumferential abrasion and (2) single or multiple patches. The circumferential abrasion present on 59% of vessels with upper exterior side abrasion can be light to heavy in intensity, which reflects the frequency and intensity of vessel use. Single and multiple patches of abrasion also occur frequently on vessel exteriors, but most often on Fourmile Polychrome.

The location and nature of abrasion on the upper exterior sides of some vessels could be related to the decoration on the interior. Bowl owners may have been displaying their vessels according to a specific orientation (Figure 30). The interior designs of Pinedale, Cedar Creek, the Salado polychromes, and Jeddito Black-on-yellow vessels are derived from a similar source, and are characterized by the use of geometric elements and rotational symmetry. This means that no matter how the vessel is held, the interior may appear the same. If pottery owners displayed their vessels, say by propping them up against a wall, then a specific orientation may not have been critical; the researcher should expect to find random and circumferential abrasion around the vessel.

Fourmile style emerges around AD 1325 in the Silver Creek drainage, and may be the result of many other social, political, and ritual changes. It is completely different than earlier and contemporary pottery types in the region. Potters may have intended that their vessels be viewed in a particular way. If the imagery was meant to be viewed in a specific orientation, then the wear patterns on the exterior of the vessel may not be so random. If vessels were propped up against a wall for display then abrasion should be localized in a specific area, which is the case for 43% of Fourmile Polychrome that have exterior rim abrasion.

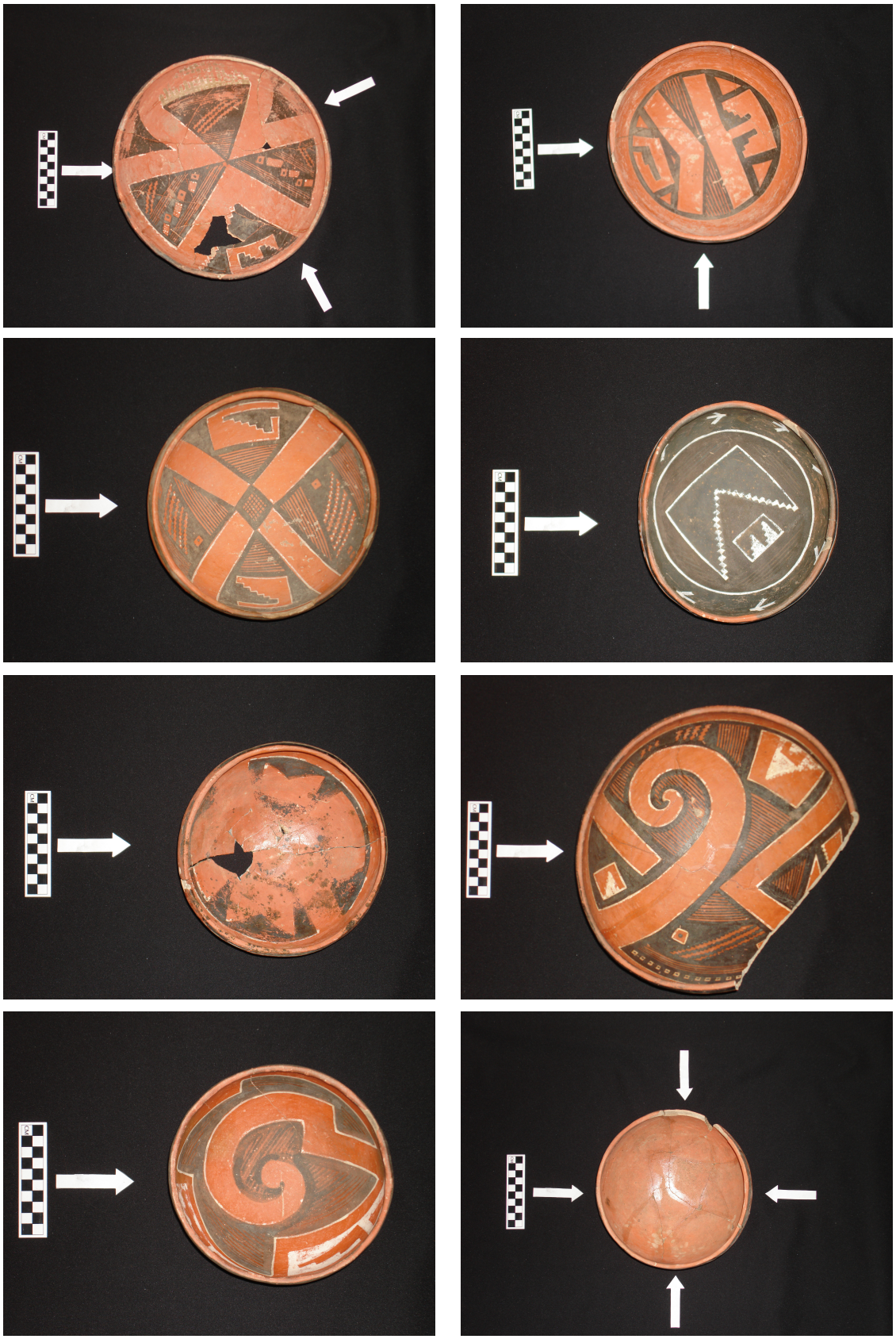

Figure 30. Examples of abraded patches on the upper exterior sides of Fourmile polychromes in the Reidhead Collection. Arrows indicate locations of patches.

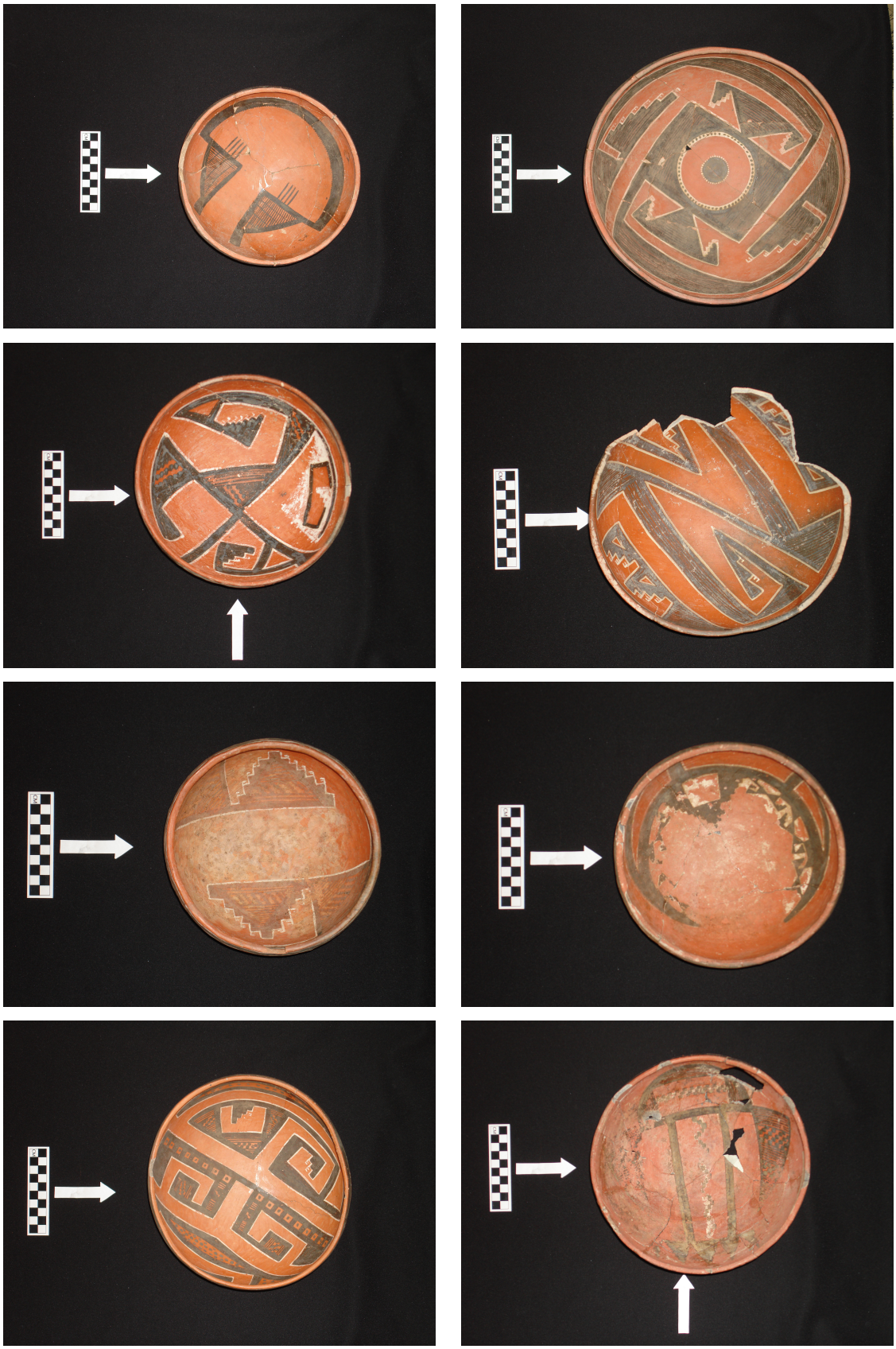

Figure 30. (Con't) Examples of abraded patches on the upper exterior sides of Fourmile polychromes in the Reidhead Collection. Arrows indicate locations of patches.

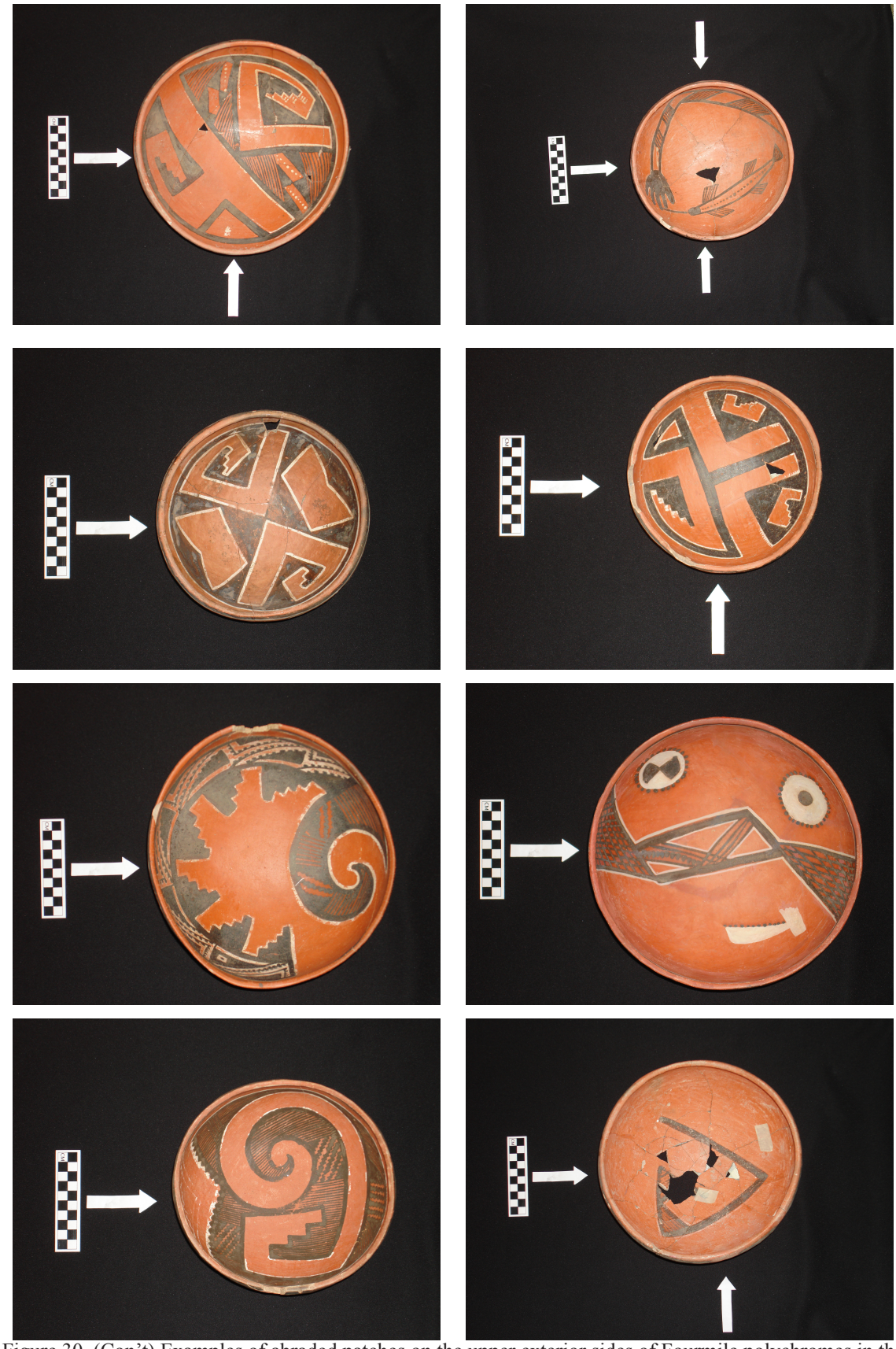

Figure 30. (Con't) Examples of abraded patches on the upper exterior sides of Fourmile polychromes in the Reidhead Collection. Arrows indicate locations of patches.

The home may also have been a place where expressing or reinforcing certain key concepts was essential. Decoration inside of displayed bowls perhaps called to mind certain ideological concepts. General messages evoked from exterior decorations and more specific information contained on vessel interiors were always visible, and served as a continual reminder of concepts that were important to the people of Fourmile Ruin.

DECORATED VESSEL USE IN PUEBLO BURIALS

Decorated ceramic bowls are regularly found in the context of burials in the American Southwest. Burial practices in the Pueblo IV period were varied, and included inhumations and cremations. Decorated bowls were not associated with a fixed burial ritual, but were used in numerous ways in burials, including as cremation urns and lids, as containers for food and water, and alone as mortuary offerings. Vessels have been found inverted over the face of the dead, placed on the chest, or by the head, shoulders, elbows, hands, pelvis, and feet (Crown 1994). Pottery, both decorated and undecorated, was the most frequent type of mortuary offering in Pueblo IV period (Simon and Ravesloot 1995; Loendorf 2001).

Within burials, decorated bowls continued to function as both utilitarian containers and as mediums of communication. Some bowls were used as part of mortuary rituals (Loendorf 2001), and may have held offerings of food and water buried with the dead for the journey of death into the next world (Ravesloot 1994). Decorated bowls also expressed information about deceased's identity and standing in the community.

Very little is known about the cemeteries at Fourmile Ruin and how interments here compare to other contemporary sites. What little information is known comes from Jesse Walter Fewkes's excavation report. The Reidheads claim to have excavated burials at Fourmile Ruin, but their testimonies do not suggest that they found any human remains. Thus, it is unclear whether by 'burial' they meant an actual cemetery or perhaps a midden Thus Fewkes's report is the most

reliable information available.

When Fewkes excavated Fourmile Ruin in 1897, one his primary goals was to find the site's cemetery. He reported,

> "It was with considerable difficulty that the author was able to find the burial places of this pueblo, and some time was consumed in the search…In the course of an examination of the level region some distance north of the mounds, near the river bank, the author unexpectedly discovered a human bone projecting from the soil. This indication was sufficient, and systematic work in the vicinity brought to light many skeletons and mortuary objects…A second larger cemetery was found on the opposite side of the ruin…Most of the finest specimens were obtained at this point, but the supply was by no means exhausted (Fewkes 1904)."

As Fewkes excavated these two areas of the site, he noted that individuals were buried in an extended position with seemingly no effort made at a common orientation. And, contrary to what he had seen at Chavez Pass and Homol'ovi, there was no attempt to cover the bodies with logs or flat stones. There were also no fragments of wrappings of mats or basketry that were found. Ceramic vessels were found placed with or over the dead. The vessels Fewkes excavated from the cemeteries include White Mountain Red Ware, Salado polychrome, and Jeddito Black-on-yellow vessels. Based on Fewkes's data and information from other sites, White Mountain, Salado, and Jeddito vessels were placed in burials as accompaniments for the dead.

The placement of decorated ceramics and other funerary accompaniments in burials may have reflected various aspects of the deceased individual's identity, such as personal wealth, social standing, ethnicity, association with a clan or sodality, or religious beliefs (Simon and Ravesloot 1995; Whittlesy and Reid 2001). In death, as in life, it may have been important for

an individual to express messages about him or herself, and to carry that information into the spirit world.

The images represented on decorated vessels have been associated with a mortuary cult or with the concept of the Flower world; these provide a description for life after death in the Pueblo world. Whittlesey and Reid (2001) describe a *mortuary cult* as "a group with a set of beliefs about the cosmos and the afterlife"; mortuary cults have specific ways in which the dead should be prepared for the afterlife and how they should be represented in it. Adams (1991), for example, has argued that the icons depicted on Fourmile Polychrome and on vessels exhibiting Fourmile style motifs, such as Jeddito Yellow Ware, were associated with the Katchina Cult. The presence of these vessels in the burials of different sites, including Fourmile Ruin, may indicate the vessels' use as mortuary offerings and the cult's association with a mortuary cult.

Some of the imagery found on decorated Pueblo IV decorated bowls, such as flowers, butterflies, and birds, may be related to the concept of the Flower World, a spirit land where the dead go and where the living have a spiritual dimension (Crown 1994; Hays-Gilpin and Hill 1999). The Flower World concept is not considered a cult, like the Katchina or Southwestern cults, but is a set of general symbolic tools that were available to all Southwestern people (Hays-Gilpin and Hill 1999). A belief in the Flower World was probably an important part of Pueblo cult ideologies (Crown 1994).

Certain decorative elements on White Mountain, Salado, and Jeddito vessels may have related to an individual's afterlife, or what they believed to be their existence and identity after they died. If mortuary vessels were used during their owner's lives, as they clearly were based on use wear patterns, then post-mortem imagery was also important in day to day contexts. Perhaps it served to remind individuals or teach others of the ideological concepts associated a spirit world.

Decorated ceramic bowls probably functioned in contexts that utilized both their utilitarian

and symbolic roles. Within these contexts important information and concepts were taught, expressed, or reinforced through pottery. Some decorated bowls were used in communal feasting as food transporting, presenting, and serving containers. During these feasts, the group may have conveyed messages about its identity through exterior decoration, while the interior decorated may have depicted information about the individual. Color, decoration, surface texture, vessel size, and vessel display all contribute to the visibility of decorated vessels in community-wide feasting activities.

When decorated vessels were brought home after the feast, they may have served as tangible and continual reminders of those concepts that were important to the people of Fourmile Ruin. People used their pots on a daily basis to serve meals. Some people may have displayed their decorated wares in their homes and according to a specific orientation relative to the vessels' interior decoration. It may have been essential to display certain pots in a specific way.

At death, some decorated bowls were placed in burials to accompany the dead into the spirit world. They may have held food, water, or other offerings, or been used a cremation urns. If individuals used decorated bowls to convey information about themselves in life, they may have used them in a similar way at death: to express messages about personal and group identity. Decorated bowls may have been an important part of sending the deceased to, and representing them, in the future world.

In all of these contexts, the twofold function of decorated bowls was utilized, and they played an active part in the individual and group's social experience. Vessels helped people negotiate their social relationships by identifying the person, their beliefs, and their associations. Vessels assisted in teaching and reinforcing important concepts when they were used in the home on a day-to-day basis. Decorated bowls aided in sending the individual into the afterlife and representing him or her in the spirit world. White Mountain, Salado, and Jeddito vessels did all of these things while still transporting and serving food and drinks.

7 CONCLUSION

The Pueblo IV period was a time of intense migration, reorganization, and re-identification for the people of the American Southwest. As different people from diverse social and historical backgrounds came together in large pueblo communities, they developed and adopted new ideas and traditions. Some of these new ideas and traditions were expressed in the production of diverse kinds of decorated ceramics. Decorated bowls were used as utilitarian containers and may also have served as as a way of expressing information about personal and group identity.

Both the utilitarian and symbolic roles of White Mountain, Salado, and Jeddito bowls were integral to the proper functioning of the vessels in Fourmile Ruin society. Bowls possessed inherent physical and visual performance traits chosen specifically by potters for their utilitarian and non-utilitarian qualities.

The intended function of decorated bowls at Fourmile Ruin was utilitarian; to serve consumables in household or communal meals. Vessels were open and wide-mouthed; they were short to increase stability, and had incurving rims to reduce any spillage of contents. They were also produced in a wide variety of sizes, which may have been necessary to accommodate different scales of household and communal meals.

The use wear patterns illustrate that decorated bowls were used in ways that caused abrasion to the exterior and interior surfaces, chipping, pitting, cracking, and scratching. Damage to vessels likely occurred from day-to-day use and storage. The evidence from White Mountain, Salado, and Jeddito bowls suggests that these three wares were used in similar ways, with only few exceptions. These exceptions may be indicative of how bowls were displayed while not

in use, which could be associated with the orientation of the decoration on the interiors. Some individuals may have found it important to display their decorated bowls in a particular way. Because Fourmile Polychrome bowls exhibit the greatest amount of abraded patches on the upper exterior walls, it is possible that these vessels were meant to be viewed in a specific way.

White Mountain, Salado, and Jeddito vessels exhibit many non-utilitarian, or symbolic, traits, such as color, texture, reflectance, and interior and exterior decoration. These traits represent the greatest differences in physical and visual performance characteristics among decorated ceramic types. The diversity of ceramic types in the Pueblo IV period may be related to the messages encoded in them. The information communicated through color, decoration, and other visual performance traits may have expressed messages about group and individual identity as it changed over time. The people of Fourmile Ruin may have used decorated bowls to teach or reinforce important concepts and implant values. Because the communicative role of painted bowls was important and may have contributed to the vessels' value, people found it necessary to repair broken vessels.

Decorated bowls were used in contexts that utilized their dual role. People used them as food transporting and serving vessels in communal and household meals, and as containers for food and water offerings for the journey of the dead into the spirit world. In public, domestic, and mortuary contexts, it may have been important for an individual to express personal and group identity. Messages were conveyed through specific visual performance characteristics, such as vessel color, texture, and decoration. Clearly, decorated bowls were significant in both the life and death of the individual.

White Mountain Red Ware, Salado polychrome, and Jeddito Black-on-yellow vessels served a twofold function at Fourmile Ruin: to serve their owners and convey information about them. Decorated bowls were important to the people of this site because they were used in public and private arenas of life, and also used in death.

REFERENCES

Adams, E. Charles

1991 *The Origin and Development of the Pueblo Katsina Cult*. University of Arizona Press, Tucson.

1994 The Katsina Cult: A Western Pueblo Perspective. In *Kachinas in the Pueblo World,* edited by Polly Schaafsma, pp. 35-46. The University of New Mexico Press, Albuquerque.

1998 Late Prehistory in the Middle Little Colorado River Area: A Regional Perspective. In Migration and Organization: The *Pueblo IV Period in the American Southwest,* edited by Katherine A. Spielmann, pp. 31-52. The Arizona State University Anthropological Research Papers 51, Tucson.

2002 *Homol'ovi: An ancient Hopi settlement cluster.* University of Arizona Press, Tucson.

Adams, E. Charles, and Andrew I. Duff (editors)

2004 *The Protohistoric Pueblo World, A.D. 1275-1600*. University of Arizona Press, Tucson.

Adams, E. Charles, and Violet M. Lamotta

2006 New Perspectives on an Ancient Religion: Katsina Ritual and the Archaeological Record. In *Religion in the Prehispanic Southwest*, edited by C. S. VanPool, T. L. VanPool and D. A. Phillips, Jr., pp. 53-66. Altamira Press, Langham, Maryland.

Adams, Charles, Miriam T. Stark, and Deborah S. Dosh

1991 Ceramic Distribution and Exchange: Jeddito Yellow Ware and Implications for Social Complexity. *Journal of Field Archaeology* 20(1): 3-21.

Bandelier, A.F.

1892 *Final Report of Investigations Among the Indians of the Southwestern United States, Carried on Mainly in the Years from 1880 to 1885: Parts 1 and 2.* John Wilson and Son, University Press, Cambridge.

Banning, E.B.

2000 *The Archaeologist's Laboratory*. Plenum Publishing, New York.

Benitez, Alexander V.

1998 Refining 14th Century Jeddito Yellow Ware Chronology and Its Distribution in Central Arizona. M.A. Thesis, Department of Anthropology, University of Texas, Austin.

Bernardini, Wesley
2007 Jeddito Yellow Ware and Hopi Social Networks. *Kiva* 72(2): 295-328.

Bishop, Ronald, Veletta Counouts, Suzanne De Atley, Alfred Qöyawayma, and C.W. Aikens
1988 The Formation of Ceramic Analytical Groups: Hopi Pottery Production and Exchange, A.D. 1300-1600. *Journal of Field Archaeology* 15: 317-337.

Bradfield, Wesley
1931 *Cameron Creek Village: A Site in the Mimbres Area in Grant County, New Mexico*. Monograph of the School of American Research, No. 1. Santa Fe.

Bray, Alicia
1982 Mimbres Black-on-White, Melamine or Wedgewood? A Ceramic Use-Wear Analysis, *Kiva* 47: 133-150.

Bunzel, R.
1929 *The Pueblo Potter.* Colombia University Contributions in Anthropology 8, New York.

Carlson, R. L.
1970 *White Mountain Redware: A Pottery Tradition of East-Central Arizona and Western New Mexico*. Anthropological Papers of the University of Arizona 19, Tucson.
1982 *The Polychrome Complexes: A Pottery Tradition of East-Central Arizona and Western New Mexico.* Anthropological Paper of the University of Arizona, 19, Tucson.

Chernela, Janet
1979 In Praise of the Scratch: The Importance of Aboriginal Abrasion on Museum Ceramic Wear. *Curator* 12(3): 174-179.

Colton, H.S.
1941 Prehistoric Trade in the Southwest. *The Scientific Monthly* 32: 308-319.
1956 *Pottery Types of the Southwest: Tsegi Orange Ware, Winslow Orange Ware, Homol'ovi Orange Ware, Jeddito Yellow Ware, Awatovi Yellow Ware.* Museum of Northern Arizona Ceramic Series No. 3C. Northern Arizona Society of Science and Art, Flagstaff.

Colton, H.S. and L.L. Hargrave
1937 *Handbook of Northern Arizona Pottery Wares.* Museum of Northern Arizona Bulletin 11, Flagstaff.

Cordell, Linda
1997 *Archaeology of the Southwest*. Left Coast Press, California.

Crown, Patricia
1994 *Ceramics and Ideology: Salado Polychrome Pottery.* University of New Mexico Press, Albuquerque.

David, N., J. Sterner, and K. Gavua
1988 Why Pots are Decorated. *Current Anthropology* 29(3): 365-389

Dean, Rebecca M.
2001 Social Change and Hunting in Pueblo IE to Pueblo Transition in East-Central Arizona. *Journal of Field Archaeology* 28: 271-285.

DeGarmo, Glenn
1979 Coyote Creek: Site 01: A Methodological Study of a Prehistoric Pueblo Population. Unpublished Ph.D dissertation, Department of Anthropology, University of California at Los Angeles, Los Angeles.

Dietler, M. and B. Hayden
2001 Digesting the Feast—Good to Eat, Good to Drink, Good to Think: An Introduction. In *Feasts: Archaeological and Ethnographic Perspectives on Food, Politics, and Power*, edited by M. Dietler and B. Hayden, pp. 1-20. Smithsonian Institution Press, Washington, D.C.

Duff, Andrew I.
1998 The Process of Migration in the Late Prehistoric Southwest. In *Migration and Organization: The Pueblo IV Period in the American Southwest,* edited by Katherine A. Spielmann, pp. 53-64. The Arizona State University Anthropological Research Papers 51, Tucson.
2000 Scale, Interaction and Regional Analysis in Late Pueblo Prehistory. In *The Archaeology of Regional Interaction: Religion, Warfare and Exchange Across the American Southwest and Beyond*, edited by M. Hegmon, pp. 71–98. University Press of Colorado, Boulder.
2002 *Western Pueblo Identities: Regional Interaction, Migration, and Transformation.* The University of Arizona Press, Tucson.

Eckert, Suzanne L.
2006 The Production and Distribution of Glaze-Painted Pottery in the Pueblo Southwest: A Synthesis. In *The Social Lives of Pots*, edited by Judith Habicht-Mauche, Suzanne L. Eckert, and Deborah Huntley, pp. 34-59. The University of Arizona Press, Tucson.

Feinman, Gary M., Steadman Upham, and Kent D. Lightfoot
1981 The Production Step Measure: An Ordinal Index of Labor Input in Ceramic Manufacture. *American Antiquity* 46(4): 874-884.

Fenn, Thomas R., Barbara J. Mills, and Maren Hopkins
2006 The Social Contexts of Glaze Paint Ceramic Production and Consumption in the Silver Creek Area. In *The Social Lives of Pots*, edited by Judith Habicht-Mauche, Suzanne L. Eckert, and Deborah Huntley, pp. 60-85. The University of Arizona Press, Tucson.

Fenner, Gloria J.
1977 Flare-rimmed Bowls: A Subtype of Mimbres Classic Black-on-White? *Kiva* 43(2): 129-141.

Fewkes, Jesse Walter
1904 *Two Summers' Work in Pueblo Ruins*. In Twenty-second Annual Report of the Bureau of American Ethnology, part I, Washington, D.C.
1919 *Designs on Prehistoric Hopi Pottery.* In Thirty-Third Annual Report of The Bureau of American Ethnology, Washington, D.C.

Gladwin, Winifred, and Harold S. Gladwin
1930 *Some Southwestern Pottery Types, Series I.* Medallion Papers 8, Arizona.

Graves, William M., and Suzanne L. Eckert
1998 Decorated Ceramic Distributions and Ideological Developments in the Rio Grande Valley, New Mexico. In *Migration and Reorganization: The Pueblo IV Period in the American Southwest* edited by K. Spielmann. Arizona State University Anthropological Research Papers Series.

Griffiths, Dorothy M.
1978 Use-Marks on Historic Ceramics: A Preliminary Study. *Historical Archaeology* 12: 78-91.

Gumerman, George
1997 Food and complex societies. *Journal of Archaeological Method and Theory* 4(2): 105–39.

Habicht-Mauche, Judith A.
2006 The Social History of Southwestern Glaze Wares. In *The Social Lives of Pots,* edited by Judith Habicht-Mauche, Suzanne L. Eckert, and Deborah Huntley, pp. 3-16. The University of Arizona Press, Tucson.

Hally, David J
1983 Use Alteration of Pottery Vessel Surfaces: An Important Source of Evidence for the Identification of Vessel Function. *North American Archaeologist* 4: 3-26.

Harris, Rachel
2009 Collecting, Protecting, and Sharing the Past: The History of the Terrence and Jean Reidhead Collection. University Honors Thesis, Department of Anthropology, Brigham Young University.

Haury, E.W.
1958 Evidence at Point of Pines For a Prehistoric Migration From Northern Arizona. In *Migrations in New World Culture History*, edited by R.H. Thomas, pp. 1-6. University of Arizona Bulletin 29, Tucson.

Haury, E.W., and L.L. Hargrave
1931 *Recently Dated Pueblo Ruins in Arizona*. Smithsonian Miscellaneous Collections, vol. 82, no. 11, Publication 3069. U.S. Government Printing Office, Washington, D.C.

Hays, Kelley Ann
1991 Ceramics. In *Homol'ovi II: Archaeology of an Ancestral Hopi Village, Arizona.* Edited by E. Charles Adams and Kelley Ann Hays, pp. 23-48. University of Arizona Press, Tucson.
2006 *Murals and Metaphors*. Museum of Northern Arizona, Flagstaff.

Hays-Gilpin, Kelly Ann, and Jane Hill
1999 The Flower World in Material Culture: An Iconographic Complex in the Southwest and Mesoamerica. *Journal of Anthropological Research* 55(1): 1-37.

Hayden, Brian
1995 Pathways to Power: Principles for Creating Socioeconomic Inequalities. In *Foundations of Social Inequality*, edited by T. Douglas Price and Gary M. Feinman, pp. 15-86. Plenum Press, New York.

Hegmon, Michelle
1992 Archaeological Research on Style. *Annual Review of Anthropology* 21: 517-36.
1995 *The Social Dynamics of Pottery Style in the Early Puebloan Southwest*. Occasional Papers NO 5. Crow Canyon Archaeological Center, Colorado.

Hodder, Ian
1982 *Symbols in Action: Ethnoarchaeological Studies of Material Culture*. Cambridge University Press, Cambridge.
1988 *Reading the Past: Current Approaches to Interpretation in Archaeology.* Cambridge University Press, Cambridge.

Hodder, Ian and Robert W. Preucel
1996 *Contemporary Archaeology in Theory.* Blackwell Publishing, Massachusettes.

Horner, Jennifer
1999 Aggregation and the Silver Creek Faunal Record. In *Living on the Edge of the Rim: Excavations and Analysis of the Silver Creek Archaeological Research Project, 1993-1998*, edited by Barbara J. Mills, S.A. Herr, and Scott Van Keuren, pp. 433-457. Arizona State Museum Archaeological Series 192. University of Arizona, Tucson.

Houk, Rose
1992 *Salado: Prehistoric Cultures of the Southwest*. Southwest Parks and Monument Association, Tucson.

Jones, Bruce, A.
1989 Use-Wear Analysis of White Mountain Redwares at Grasshopper Pueblo, Arizona. *Kiva* 54(4): 353-360.

Kahldahl, Eric J., and J.S. Dean
1999 Climate, Vegetation, and Dendrochronology. In *Living on the Edge of the Rim: Excavations and Analysis of the Silver Creek Archaeological Research Project, 1993-1998*, edited by Barbara J. Mills, S.A. Herr, and Scott Van Keuren, pp. 11-29. Arizona State Museum Archaeological Series 192. University of Arizona, Tucson.

Kahldahl, Eric J., Scott Van Keuren, and Barbara J. Mills
2004 Migration, Factionalism, and the Trajectories of Pueblo IV Period Clusters in the Mogollon Rim Region. In *The Protohistoric Pueblo World, AD 1275-1600*, edited by E. Charles Adams and Andre I. Duff, pp. 85-94. The University of Arizona Press, Tucson.

Kidder, Alfred V., and Anna O. Shepard
1936 *The Pottery of Pecos, Volume 2: The Glaze Paint, Culinary, and Other Wares*. Papers of the Southwestern Expedition, Phillips Academy, No. 7. Yale University Press, New Haven.

Kintigh, K.W.
1985 *Settlement, Subsistence, and Society in Late Zuni Prehistory*. Anthropological Papers of the University of Arizona, Tucson.

LeBlanc, Steven A.
1999 *Prehistoric Warfare in the American Southwest.* University of Utah Press, Salt Lake City.

LeBlanc, Steven A., and Lucia R. Henderson
2009 *Symbols in Clay: Seeking Artists' Identities in Hopi Yellow Ware Bowls*. Papers of the Peabody Museum of Archaeology and Ethnology, Harvard University, Cambridge.

Lindauer, O.
2000 A Schoolhouse Point Perspective on Salado Community Development. In *Salado*, edited by J. Dean, pp. 219-40. University of New Mexico Press, Albuquerque.

Loendorf, C.
2001 Salado Burial Practices. In *Ancient Burial Practices in the American Southwest. Archaeology, Physical Anthropology and Native American Perspectives,* edited by D.R. Mitchell and J.L Brunson-Hadley, pp. 123-48. University of New Mexico Press, Albuquerque.

Lyons, Patrick D.
2003 *Ancestral Hopi Migrations.* Anthropological Papers of the University of Arizona 68, Tucson.

McGuire, Randall H.
1991 On the Outside Looking In: The Concept of Periphery in Hohokom Archaeology. In *Exploring the Hohokom: Prehistoric Desert Peoples of the American Southwest,* edited by George J. Gumerman, pp. 347-382. University of New Mexico Press, Albuquerque.

Mills, Barbara J.
1998 Migration and Pueblo IV Community Reorganization in the Silver Creek Area. In *Migration and Organization: The Pueblo IV Period in the American Southwest,* edited by Katherine A. Spielmann, pp. 65-80. The Arizona State University Anthropological Research Papers 51, Tucson.
1999 Ceramic Ware and Type Systematics. In *Living on the Edge of the Rim: Excavations and Analysis of the Silver Creek Archaeological Research Project, 1993-1998*, edited by Barbara J. Mills, S.A. Herr, and Scott Van Keuren, pp. 243-268. Arizona State Museum Archaeological Series 192. University of Arizona, Tucson.
2002 *Identity, Feasting, and the Archaeology of the Greater Southwest*. University Press of Colorado, Boulder.

Mills, Barbara J., and S.H. Herr
1999 Chronology of the Mogollon Rim Region. In *Living on the Edge of the Rim: Excavations and Analysis of the Silver Creek Archaeological Research Project, 1993-1998*, edited by Barbara J. Mills, S.A. Herr, and Scott Van Keuren, pp. 269-293. Arizona State Museum Archaeological Series 192. University of Arizona, Tucson.

Phillips, David A., and Lynne Sebastian
2002 Large-Scale Feasting and Politics: An Essay on Power in Precontact Southwestern Societies. In *Identity, Feasting, and the Archaeology of the Greater Southwest,* edited by Barbara J. Mills. University Press of Colorado, Boulder.

Plog, Stephen
1997 *Ancient Peoples of the American Southwest.* Thames and Hudson Ltd., London.

Potter, James M.
2000 Pots, Parties, and Politics: Communal Feasting in the American Southwest. *American Antiquity* 65(3): 471-492.

Potter, James M., and Scott G. Ortman
2002 Community and Cuisine in the Prehistoric American Southwest. In *Identity, Feasting, and the Archaeology of the Greater Southwest*, edited by Barbara J. Mills. University Press of Colorado, Boulder.

Ravesloot, J.C.
1994 Burial Practices in the Livingston Area. In *Archaeology of the Salado in the Livingston Area of Tonto Basin: Report on the Livingston Management Group, Pinto Creek Complex, Roosevelt Platform Mound Study*, pp. 833-850. Roosevelt Monograph Series 3,

Anthropological Field Studies 32. Department of Anthropology, Arizona State University, Tempe.

Rice, Glen E.
1990 Gila Polychrome: An Investigation of the Hallmark of the Salado Tradition. In *A Design for Salado Research*, edited by G. Rice, pp. 85-102. Arizona State University Anthropological Field Studies 22, Tempe.

Rice, Prudence
2006 *Pottery Analysis: A Sourcebook*. University of Chicago Press.

Roberts, F. H. H., Jr.
1932 *The Village of the Great Kivas on the Zuni Reservation, New Mexico*. Bulletin 111, Smithsonian Institution, Washington, D.C.

Schaffsma, Polly (editor)
2000 *Kachinas in the Pueblo World.* University of Utah Press, Salt Lake City.

Schiffer, Michael B. and James M. Skibo
1989 A Provisional Theory of Ceramic Abrasion. *American Anthropologist, New Series* 91(1): 101-115.

Senior, Louise M.
1995 The Estimation of Prehistoric Values. In *Expanding Archaeology*, edited by James Skibo, William H. Walker, and Axel E. Nielson, pp. 92-110. The University of Utah Press, Salt Lake City.

Simon, Arleyn W.
1996 *Pottery and Pigments in Arizona: Salado Polychrome.* Materials Research Society Bulletin 21(12): 38-47.

Simon, A.W., and J.C. Ravesloot
1995 Salado Ceramic Burial Offerings: A Consideration of Gender and Social Organization. In *The Archaeology of Gender in the American Southwest,* edited by Kathernine Spielmann, pp. 103-24. Journal of Anthropological Research 51(2).

Skibo, James M.
1992 *Pottery Function: A Use-Alteration Perspective*. Plenum Press, New York.

Skibo, James M., and Gary M Fienman (editors)
1999 *Pottery and People: A Dynamic Interaction*. University of Utah Press, Salt Lake City.

Skibo, James M., and Michael Brian Schiffer
2008 *People and Things: A Behavioral Approach to Material Culture.* Springer, New York.

Smith, Watson
1971 *Painted Ceramics of the Western Mound at Awatovi, Reports of the Awatovi Expedition, Report No. 8.* Papers of the Peabody Museum of Archaeology and Ethnology, Harvard University, Vol. 38. Peabody Museum, Cambridge.

Spielmann, Katherine A.
1998 The Pueblo IV Period: History of Research. In *Migration and Organization: The Pueblo IV Period in the American Southwest*, edited by Katherine A. Spielmann, pp. 1-30. The Arizona State University Anthropological Research Papers 51, Tucson.
2002 Feasting, Craft Specialization, and the Ritual Mode of Production. *American Anthropologist* 104: 195-207

Spier, Leslie
1918 *Notes on Some Little Colorado Ruins*. Anthropological Papers of the American Museum of Natural History, part IV, New York.

Stark, Miriam T.
2006 Glaze Ware Technology, the Social Lives of Pots, and Communities of Practice in the Late Prehistoric Southwest. In *The Social Lives of Pots*, edited by Judith Habicht-Mauche, Suzanne L. Eckert, and Deborah Huntley, pp. 17-33. The University of Arizona Press, Tucson.

Tite, M.S.
1999 Pottery Production, Distribution, and Consumption—The Contribution of the Physical Sciences. *Journal of Archaeological Method and Theory* 6(3): 181-233.

Triadan, Daniela
1997 *Ceramic Commodities and Common Containers: Production and Distribution of White Mountain Red Ware in the Grasshopper Region, Arizona.* Anthropological Papers of the University of Arizona 61, Tucson.
1998 Socio-Demographic Implications of Pueblo IV Ceramic Production and Circulation: Sourcing White Mountain Red Ware from the Grasshopper Region, Arizona. In *Migration and Organization: The Pueblo IV Period in the American Southwest,* edited by Katherine A. Spielmann, pp. 233-254. The Arizona State University Anthropological Research Papers 51, Tucson.

Twain, Mark
1880 *A Tramp Abroad*. American Publishing Company, Connecticut.

Upham, Steadman
1982 *Polities and Power: An Economic and Political History of the Western Pueblo.* Academic Press, New York.

Upham, Steadman, Kent D. Lightfoot, and Gary M. Feinman
1981 Explaining Socially Determined Ceramic Distributions in the Prehistoric Plateau Southwest. *American Antiquity* 46(4): 822-833.

Van Keuren, Scott
1999 *Ceramic Design Structure and the Organization of Cibola White Ware Production in the Grasshopper Region, Arizona*. Arizona State Museum Archaeological Series 191, Tucson.
2000 Ceramic Decoration as Power: Late Prehistoric Design Change in East-central Arizona. In *Alternative leadership strategies in the Prehispanic Southwest*, edited by B.J. Mills, pp. 79–94. University of Arizona Press, Tucson.
2001 White Mountain Red Ware and the Reorganization of Pueblo Communities in East-Central Arizona, AD 1275-1375. Doctoral Dissertation, Department of Anthropology, University of Arizona.
2002 Crafting Feasts in the Prehispanic Southwest. In *Identity, Feasting, and the Archaeology of the Greater Southwest*, edited by Barbara J. Mills. University Press of Colorado, Boulder.
2006 Decorating Glaze-Painted Pottery in East-Central Arizona. In *The Social Lives of Pots*, edited by Judith Habicht-Mauche, Suzanne L. Eckert, and Deborah Huntley, pp. 86-104. The University of Arizona Press, Tucson.

Wiessner, Polly
1990 Is There a Unity to Style? In *The Uses of Style in Archaeology,* edited by M. Conkey and C. Hastorf, pp. 105-112. Cambridge University Press, Cambridge.

Whalen, Michael E., and Paul E. Minnis
2001 *Casas Grandes and Its Hinterlands: Prehistoric Regional Organization in Northwest Mexico.* University of Arizona Press, Tucson.

White, Leslie
1932 *The Acoma Indians*. Annual Report of the Bureau of American Ethnology 47: 17-192. Washington, D.C.

Whittlesey, Stephanie and J. Jefferson Reid
2001 Mortuary Ritual and Organizational Inferences at Grasshopper Pueblo, Arizona. In *Ancient Burial Practices in the American Southwest: Archaeology, Physical Anthropology, and Native American Perspectives*, edited by D.R. Mitchell and J.L. Brunson-Hadley, pp. 68-96. University of New Mexico Press, Albuquerque.

Zedeno, Maria Nieves
1994 *Sourcing Prehistoric Ceramics at Chodistaas Pueblo, Arizona: The Circulation of People and Pots in the Grasshopper Region.* Anthropological Papers of the University of Arizona 58, Tucson.

APPENDIX A

Ware	Style	Catalog Number	Height (cm)	Max Diameter (cm)	Volume (ml)
Hopi Yellow	Jeddito Yellow	2006.060.00406.001	7.10	16.30	700.00
		2006.060.00565.001	7.50	22.50	2,300.00
		2006.060.00510.001	8.30	22.50	2,300.00
		2006.060.00246.001	7.50	15.90	800.00
		2006.060.00431.001	9.10	20.40	1,800.00
		2006.060.00673.001	11.00	23.00	2,200.00
		2006.060.00650.001	7.80	17.10	1,000.00
		2006.060.00515.001	8.80	23.90	2,450.00
		2006.060.00455.001	9.50	23.40	2,400.00
		2006.060.00239.001	6.90	15.60	800.00
		2006.060.00407.001	8.10	20.00	1,500.00
		2006.060.00414.001	8.50	22.00	1,900.00
		2006.060.00424.001	8.80	21.90	1,900.00
		2006.060.00425.001	6.40	20.00	1,500.00
		2006.060.00428.001	8.20	23.20	2,550.00
		2006.060.00429.001	9.40	21.80	2,000.00
		2006.060.00430.001	8.80	22.50	2,300.00
		2006.060.00964.001	8.30	22.40	2,500.00
		2006.060.00563.001	7.50	20.20	2,000.00
		2006.060.00075.001	8.30	22.30	2,000.00
		2006.060.00074.001	9.52	19.30	2,000.00
		2006.060.00249.001	9.80	18.50	1,500.00
		2006.060.00516.001	10.40	21.60	2,300.00
		2006.060.00517.001	8.50	20.10	1,800.00
		2006.060.00098.001	11.50	24.00	2,600.00
		2006.060.00078.001	8.30	20.70	2,000.00
		2006.060.00537.001	9.10	23.10	2,100.00
		2006.060.01014.001	7.70	21.00	1,800.00
		2006.060.00100.001	7.80	20.80	1,600.00
		2006.060.00104.001	6.20	17.20	800.00
		2006.060.00111.001	8.30	20.90	1,700.00

Ware	Style	Catalog Number	Height (cm)	Max Diameter (cm)	Volume (ml)
		2006.060.01092.001	11.00	22.50	2,300.00
		2006.060.00423.001	5.60	16.30	750.00
		2006.060.00115.001	7.90	21.70	1,500.00
		2006.060.00122.001	9.50	22.50	1,800.00
		2006.060.00564.001	8.70	20.50	1,500.00
Salado	Gila	2006.060.00608.001	8.20	16.50	
		2006.060.00607.001	9.20	25.10	2,600.00
		2006.060.00605.001	7.40	15.60	700.00
		2006.060.00599.001	8.00	18.90	1,250.00
		2006.060.00590.001	9.30	21.40	2,400.00
		2006.060.00587.001	7.70	18.80	1,200.00
		2006.060.00586.001	8.10	20.30	2,000.00
		2006.060.00645.001	11.40	24.50	3,100.00
		2006.060.00566.001	8.50	20.10	1,900.00
		2006.060.00600.001	7.70	24.40	3,500.00
		2006.060.00663.001	10.10	22.70	2,600.00
		2006.060.00763.001	9.50	21.00	2,500.00
		2006.060.00760.001	11.30	24.40	4,300.00
		2006.060.00745.001	7.50	15.80	1,100.00
		2006.060.00723.001	9.40	24.50	3,400.00
		2006.060.00697.001	7.90	21.00	2,000.00
		2006.060.00695.001	10.00	25.50	3,000.00
		2006.060.00683.001	11.10	23.00	2,600.00
		2006.060.00633.001	10.60	24.50	2,900.00
		2006.060.00680.001	6.20	15.80	700.00
		2006.060.00620.001	9.00	21.20	1,850.00
		2006.060.00662.001	7.80		1,600.00
		2006.060.00658.001	10.70	22.60	2,400.00
		2006.060.00641.001	9.80	25.50	3,200.00
		2006.060.00562.001	9.30	23.80	2,650.00
		2006.060.00628.001	8.20	18.10	1,400.00
		2006.060.01125.001	11.50	23.00	3,400.00
		2006.060.00624.001	7.40	16.80	1,100.00
		2006.060.00682.001	11.10	24.70	3,000.00
		2006.060.00220.001	10.60	25.00	3,000.00
		2006.060.00470.001	7.50	17.40	1,200.00
		2006.060.00279.001	7.10	15.90	1,400.00
		2006.060.00278.001	9.80	17.50	1,550.00

Ware	Style	Catalog Number	Height (cm)	Max Diameter (cm)	Volume (ml)
Salado	Gila	2006.060.00275.001	9.10	22.40	2,000.00
		2006.060.00271.001	10.50	24.50	2,800.00
		2006.060.00262.001	9.30	22.80	2,550.00
		2006.060.00293.001	7.90	19.40	1,500.00
		2006.060.00229.001	8.40	17.90	1,500.00
		2006.060.00364.001	10.50	23.80	2,400.00
		2006.060.00213.001	7.00	18.90	1,400.00
		2006.060.00212.001	7.70	17.30	1,100.00
		2006.060.00203.001	6.50	18.30	1,050.00
		2006.060.00084.001	7.60	24.20	2,750.00
		2006.060.00039.001	9.60	26.40	3,500.00
		2006.060.00009.001	6.00	17.30	1,000.00
		2006.060.00006.001	5.70	15.00	600.00
		2006.060.00259.001	8.10	23.60	2,400.00
		2006.060.00770.001	7.10	16.50	700.00
		2006.060.00546.001	6.40	15.20	500.00
		2006.060.00538.001	8.00	17.60	1,100.00
		2006.060.00523.001	7.60	16.40	1,000.00
		2006.060.00513.001	9.50	21.00	1,700.00
		2006.060.00509.001	9.00	21.50	2,200.00
		2006.060.00504.001	6.50	15.00	800.00
		2006.060.00281.001	9.20	23.40	2,500.00
		2006.060.00474.001	6.50	16.90	800.00
		2006.060.00549.001	7.20	16.20	1,000.00
		2006.060.00469.001	6.70	21.30	1,500.00
		2006.060.00626.001	5.20	10.90	270.00
		2006.060.00454.001	10.70	26.50	3,500.00
		2006.060.00452.001	10.10	24.50	2,700.00
		2006.060.00438.001	8.70	20.60	1,500.00
		2006.060.00416.001	11.30	25.00	3,400.00
		2006.060.00371.001	6.10	15.70	850.00
		2006.060.00476.001	8.50	23.50	2,700.00
		2006.060.00981.001	7.20	18.20	1,400.00
		2006.060.00799.001	8.30	18.50	1,600.00
		2006.060.00954.001	7.60	16.70	1,000.00
		2006.060.00823.001	13.00	26.50	2,100.00
		2006.060.00876.001	7.20	15.90	1,000.00
		2006.060.00804.001	8.60	24.20	2,600.00

Ware	Style	Catalog Number	Height (cm)	Max Diameter (cm)	Volume (ml)
Salado	Gila	2006.060.00809.001	8.50	21.80	2,000.00
		2006.060.00623.001	7.30	16.30	700.00
		2006.060.00983.001	8.40	25.50	3,400.00
		2006.060.01009.001	9.60	25.00	2,800.00
		2006.060.00812.001	8.90	17.80	1,500.00
		2006.060.01090.001	13.00	21.20	
		2006.060.00817.001	8.60	16.30	1,200.00
		2006.060.00820.001	10.50	20.60	2,000.00
		2006.060.00792.001	12.10	27.80	4,000.00
		2006.060.00975.001	7.80	15.50	800.00
		2006.060.01026.001	7.60	18.10	900.00
	Pinto	2006.060.00824.001	7.50	22.00	
		2006.060.00721.001	11.10	24.40	3,100.00
		2006.060.00934.001	11.80	27.40	
		2006.060.00783.001			
		2006.060.00865.001	15.00	33.50	7,200.00
		2006.060.00725.001	13.60	32.30	6,000.00
		2006.060.00649.001	9.10	21.90	2,300.00
		2006.060.00584.001	8.70	22.10	1,800.00
		2006.060.00481.001	9.40	27.70	
		2006.060.00343.001	12.20	29.00	4,900.00
		2006.060.00767.001	15.80	35.50	8,000.00
		2006.060.00974.001	7.50	22.30	2,000.00
	Tonto	2006.060.00210.001	7.30	19.70	1,550.00
		2006.060.00351.001	8.10	17.70	1,200.00
		2006.060.00702.001	12.80	27.00	4,200.00
		2006.060.00557.001	6.50	16.20	1,100.00
		2006.060.00583.001	9.80	19.60	1,600.00
		2006.060.00226.001	8.90	22.30	2,000.00
		2006.060.00844.001	11.50	25.50	3,400.00
		2006.060.00539.001	11.20	25.10	3,400.00
		2006.060.00613.001	11.10	27.40	4,000.00
		2006.060.00814.001	8.80	21.90	1,600.00
		2006.060.00679.001	11.50	22.00	2,300.00
		2006.060.00768.001	8.00	24.00	3,800.00
		2006.060.00668.001	7.50	16.50	1,000.00
		2006.060.00685.001	8.60	19.50	1,500.00
		2006.060.00483.001	9.10	25.20	3,000.00

Ware	Style	Catalog Number	Height (cm)	Max Diameter (cm)	Volume (ml)
		2006.060.00477.001	9.10	21.30	1,700.00
		2006.060.00235.001	5.50	14.40	600.00
WMRW	Cedar Creek	2006.060.00837.001	14.50	30.50	6,500.00
		2006.060.00348.001	14.30	24.00	4,000.00
		2006.060.01048.001	7.50	16.90	1,200.00
WMRW	Cedar Creek	2006.060.00346.001	13.00	27.50	4,400.00
		2006.060.00335.001	10.00	19.00	1,400.00
		2006.060.00893.001	11.50	22.80	2,700.00
		2006.060.00994.001	11.50	26.00	3,300.00
		2006.060.00319.001	8.70	22.30	2,100.00
		2006.060.00318.001	8.00	21.60	2,000.00
		2006.060.00315.001	8.50	16.00	1,000.00
		2006.060.00529.001	7.70	15.80	700.00
		2006.060.00885.001	8.50	19.60	1,600.00
		2006.060.00310.001	11.30	27.70	4,220.00
		2006.060.00856.001	10.90	26.30	3,400.00
		2006.060.00372.001	12.30	26.20	4,000.00
		2006.060.00280.001	9.00	24.80	2,500.00
		2006.060.00967.001	10.50	24.70	2,800.00
		2006.060.00895.001	13.00	26.20	4,000.00
		2006.060.00727.001	12.60	29.10	4,700.00
		2006.060.00722.001	12.00	25.50	4,500.00
		2006.060.00713.001	11.30	24.50	3,250.00
	Fourmile	2006.060.00434.001	10.60	24.50	3,000.00
		2006.060.00367.001	11.50	24.00	3,000.00
		2006.060.00126.001	12.00	24.50	3,400.00
		2006.060.00373.001	9.00	19.50	1,350.00
		2006.060.00952.001	10.00	21.80	2,000.00
		2006.060.00949.001	10.50	24.20	3,100.00
		2006.060.00791.001	9.60	25.00	2,800.00
		2006.060.00945.001	9.00	19.50	1,500.00
		2006.060.00112.001	9.00	20.00	1,900.00
		2006.060.00998.001	10.00	28.10	2,700.00
		2006.060.01001.001	9.70	26.40	3,100.00
		2006.060.00489.001	13.10	29.00	
		2006.060.00101.001	12.50	27.70	4,300.00
		2006.060.00726.001	12.50	24.60	3,500.00
		2006.060.00436.001	12.50	24.50	3,500.00

Ware	Style	Catalog Number	Height (cm)	Max Diameter (cm)	Volume (ml)
WMRW	Fourmile	2006.060.01003.001	11.90	26.50	2,700.00
		2006.060.00896.001	10.90	22.70	3,400.00
		2006.060.00718.001	12.00	27.50	4,100.00
		2006.060.00717.001	9.70	21.80	2,000.00
		2006.060.00789.001	7.20	24.00	2,000.00
		2006.060.00978.001	10.20	26.50	3,500.00
		2006.060.00891.001	12.50	26.00	4,000.00
		2006.060.00730.001	6.60	15.40	1,300.00
		2006.060.00479.001	9.00	17.50	1,340.00
		2006.060.00711.001	9.70	23.80	2,430.00
		2006.060.00709.001	11.30	25.50	3,400.00
		2006.060.00918.001	12.20	26.40	3,500.00
		2006.060.00301.001	10.10	22.60	2,300.00
		2006.060.00976.001	9.30	26.00	3,000.00
		2006.060.00255.001	9.60	20.60	2,000.00
		2006.060.00750.001	10.80	19.50	1,500.00
		2006.060.00244.001	8.40	20.50	2,000.00
		2006.060.00795.001	7.60	19.00	1,480.00
		2006.060.00240.001	7.50	18.50	1,400.00
		2006.060.00973.001	9.00	19.50	1,500.00
		2006.060.00979.001	11.40	25.50	3,000.00
		2006.060.00277.001	9.70	23.70	2,300.00
		2006.060.00744.001	8.80	19.50	1,500.00
		2006.060.00237.001	7.90	16.90	1,000.00
		2006.060.00958.001	9.90	25.50	3,700.00
		2006.060.00955.001	9.00	21.50	2,000.00
		2006.060.00300.001	10.90	23.40	3,200.00
		2006.060.00355.001	12.10	26.70	4,000.00
		2006.060.00302.001	8.50	18.30	1,500.00
		2006.060.00304.001	10.30	25.70	3,800.00
		2006.060.00754.001	8.70	20.00	1,500.00
		2006.060.00228.001	9.80	22.20	2,100.00
		2006.060.00737.001	10.00	19.50	1,890.00
		2006.060.00736.001	10.00	18.50	1,500.00
		2006.060.00758.001	11.90	26.40	3,400.00
		2006.060.00211.001	7.70	18.20	1,000.00
		2006.060.00734.001	8.80	18.30	2,250.00
		2006.060.00151.001	7.40	17.80	1,000.00

Ware	Style	Catalog Number	Height (cm)	Max Diameter (cm)	Volume (ml)
		2006.060.00666.001	9.50	19.00	1,700.00
		2006.060.00888.001	11.00	21.50	2,350.00
		2006.060.00956.001	8.20	22.10	3,100.00
		2006.060.00708.001	12.20	26.60	4,100.00
		2006.060.00036.001	12.00	28.00	5,000.00
		2006.060.00827.001	11.00	25.70	3,400.00
		2006.060.00014.001	10.00	23.40	2,400.00
		2006.060.00053.001	8.00	19.50	1,500.00
		2006.060.00640.001	9.10	24.20	3,000.00
WMRW	Fourmile	2006.060.00780.001	8.40	21.40	2,000.00
		2006.060.00691.001	11.50	23.00	3,000.00
		2006.060.00042.001	13.40	30.60	5,750.00
		2006.060.00585.001	8.60	20.70	2,400.00
		2006.060.00851.001	10.00	27.70	4,300.00
		2006.060.00829.001	12.80	26.30	3,500.00
		2006.060.00849.001	11.20	22.80	2,700.00
		2006.060.00012.001	10.90	21.00	2,100.00
		2006.060.00892.001	8.50	20.50	1,600.00
		2006.060.00034.001	11.40	27.30	4,400.00
		2006.060.00033.001	11.20	26.10	3,300.00
		2006.060.00842.001	6.90	15.80	900.00
		2006.060.00001.001	11.50	23.50	3,200.00
		2006.060.00836.001	8.50	20.50	2,000.00
		2006.060.00032.001	14.60	31.50	6,100.00
		2006.060.00687.001	9.10	20.70	1,600.00
		2006.060.00040.001	14.30	33.30	6,700.00
		2006.060.00863.001	12.00	23.00	3,000.00
		2006.060.00665.001	7.90	18.40	1,400.00
		2006.060.00095.001	10.10	23.20	2,800.00
		2006.060.00874.001	12.00	26.50	3,500.00
		2006.060.00712.001	8.50	10.20	1,600.00
		2006.060.00868.001	10.00	22.00	2,300.00
		2006.060.00092.001	10.00	23.00	2,800.00
		2006.060.00707.001	10.20	26.30	3,400.00
		2006.060.00825.001	9.50	18.30	1,660.00
		2006.060.00642.001	12.50	26.50	3,580.00
		2006.060.00705.001	8.00	19.50	1,565.00
		2006.060.00681.001	9.90	22.30	2,000.00

Ware	Style	Catalog Number	Height (cm)	Max Diameter (cm)	Volume (ml)
		2006.060.00003.001	9.00	21.20	2,000.00
		2006.060.00648.001	11.00	22.00	2,500.00
		2006.060.00857.001	10.00	25.00	
		2006.060.00077.001	10.00	19.20	1,500.00
		2006.060.00703.001	10.70	23.10	2,400.00
		2006.060.00860.001	8.00	18.00	1,250.00
WMRW	Pinedale	2006.060.00066.001	10.50	23.00	2,600.00
		2006.060.00013.001	11.00	23.50	2,600.00
		2006.060.01061.001	15.50	29.70	5,200.00
		2006.060.00751.001	8.20	20.20	2,400.00
		2006.060.00011.001	9.80	22.40	2,100.00
WMRW	Pinedale	2006.060.00258.001	7.80	18.50	1,200.00
		2006.060.00756.001	10.50	24.20	2,700.00
		2006.060.01120.001	9.90	25.20	2,900.00
		2006.060.00231.001	8.00	20.12	1,900.00
		2006.060.00116.001	9.70	20.80	1,900.00
		2006.060.00096.001	12.30	25.80	2,900.00
		2006.060.00093.001	9.90	28.00	3,100.00
		2006.060.00097.001	10.00	19.50	2,000.00
		2006.060.01012.001	12.40	30.00	4,900.00
		2006.060.00772.001	9.00	24.50	3,400.00
		2006.060.00076.001	9.70	23.90	2,500.00
		2006.060.01027.001	10.50	22.10	2,300.00
		2006.060.00774.001	9.80	19.90	1,500.00
		2006.060.00108.001	9.80	20.60	2,000.00
		2006.060.00064.001	10.30	21.00	2,200.00
		2006.060.01049.001	10.30	22.00	2,000.00
		2006.060.00058.001	11.00	27.40	3,700.00
		2006.060.00986.001	13.50	25.50	3,100.00
		2006.060.00119.001	10.50	21.00	3,000.00
		2006.060.00991.001	9.90	7.30	3,000.00
		2006.060.00044.001	15.10	34.50	7,500.00
		2006.060.00130.001	12.50	27.50	5,400.00
		2006.060.00132.001	9.70	24.50	2,700.00
		2006.060.00133.001	8.00	20.00	1,500.00
		2006.060.00147.001	9.30	21.40	2,000.00
		2006.060.00202.001	10.00	20.50	2,000.00
		2006.060.00988.001	10.50	23.50	2,100.00

Ware	Style	Catalog Number	Height (cm)	Max Diameter (cm)	Volume (ml)
		2006.060.00761.001	10.00	20.50	2,000.00
		2006.060.00987.001	9.80	23.40	2,600.00
		2006.060.00061.001	7.50	17.40	1,200.00
		2006.060.00693.001	11.00	24.20	3,000.00
		2006.060.00732.001	8.50	17.00	1,260.00
		2006.060.00690.001	9.50	20.90	2,000.00
		2006.060.00577.001	7.60	19.70	1,600.00
		2006.060.00576.001	12.10	23.80	3,100.00
		2006.060.00850.001	10.80	26.20	3,400.00
		2006.060.00853.001	14.50	33.40	7,500.00
		2006.060.00846.001	12.00	22.50	2,890.00
		2006.060.00692.001	9.80	21.30	2,200.00
		2006.060.00845.001	8.00	21.00	2,300.00
WMRW	Pinedale	2006.060.00544.001	8.10	21.30	2,000.00
		2006.060.00862.001	12.20	24.70	3,000.00
		2006.060.00864.001	9.30	20.00	1,500.00
		2006.060.00867.001	10.30	24.10	3,100.00
		2006.060.00514.001	11.80	23.50	2,700.00
		2006.060.00869.001	15.50	32.00	6,700.00
		2006.060.00855.001	10.50	22.50	2,500.00
		2006.060.00833.001	8.50	19.40	1,500.00
		2006.060.00821.001	11.00	22.50	2,900.00
		2006.060.00667.001	8.30	21.50	1,200.00
		2006.060.00669.001	8.00	16.20	900.00
		2006.060.00646.001	9.00	23.50	2,500.00
		2006.060.00826.001	7.50	18.80	900.00
		2006.060.00644.001	10.50	23.60	2,700.00
		2006.060.00847.001	11.10	25.40	3,500.00
		2006.060.00634.001	6.60	16.30	800.00
		2006.060.00715.001	9.60	20.00	1,800.00
		2006.060.00834.001	9.50	21.00	2,000.00
		2006.060.00835.001	11.20	24.80	3,000.00
		2006.060.00684.001	8.00	18.70	1,500.00
		2006.060.00840.001	10.60	24.70	2,900.00
		2006.060.00843.001	8.70	23.60	2,500.00
		2006.060.00689.001	12.00	23.50	3,000.00
		2006.060.00639.001	11.80	25.20	3,500.00
		2006.060.00740.001	7.30	16.70	1,000.00

Ware	Style	Catalog Number	Height (cm)	Max Diameter (cm)	Volume (ml)
		2006.060.00458.001	10.90	26.30	3,100.00
		2006.060.00340.001	10.40	26.00	4,000.00
		2006.060.00339.001	6.90	18.80	1,400.00
		2006.060.00327.001	9.00	23.20	2,600.00
		2006.060.00325.001	8.00	17.30	1,100.00
		2006.060.00322.001	8.10	23.00	2,400.00
		2006.060.00507.001	13.00	25.00	4,000.00
		2006.060.00735.001	13.00	27.00	4,000.00
		2006.060.00358.001	8.50	20.00	1,900.00
		2006.060.00309.001	12.00	22.50	4,400.00
		2006.060.00743.001	9.30	21.40	2,700.00
		2006.060.00959.001	8.70	18.30	2,100.00
		2006.060.00971.001	10.00	24.50	3,000.00
		2006.060.00269.001	8.50	17.50	1,500.00
		2006.060.00260.001	9.60	17.00	1,350.00
WMRW	Pinedale	2006.060.00321.001	11.20	27.80	4,400.00
		2006.060.00948.001	11.90	23.90	3,200.00
		2006.060.00248.001	9.50	17.20	1,300.00
		2006.060.00716.001	11.80	24.20	3,000.00
		2006.060.00903.001	8.90	22.10	1,800.00
		2006.060.00433.001	12.00	24.50	3,100.00
		2006.060.00919.001	7.20	15.10	1,000.00
		2006.060.00927.001	10.80	22.30	2,000.00
		2006.060.00344.001	7.50	18.40	1,200.00
		2006.060.00938.001	11.30	24.30	3,200.00
		2006.060.00350.001	13.40	27.50	4,500.00
		2006.060.00951.001	10.50	24.00	3,500.00
		2006.060.00379.001	8.00	18.50	1,050.00
		2006.060.00376.001	8.50	17.50	1,000.00
		2006.060.00720.001	11.20	26.50	3,100.00
		2006.060.00362.001	8.10	21.50	1,600.00
		2006.060.00361.001	13.10	28.80	4,600.00
		2006.060.00484.001	9.40	24.00	2,100.00
		2006.060.00719.001	13.00	26.00	3,700.00