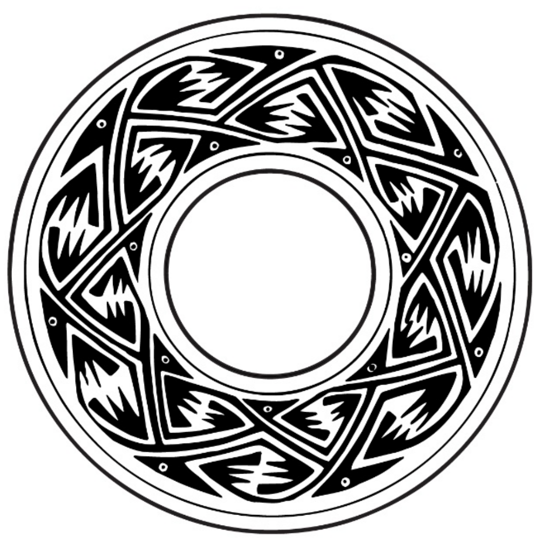
The Basketmaker Communities Project

Edited by
Shanna R. Diederichs



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Acknowledgments

This project was funded in part by grants from the National Science Foundation, the History Colorado State Historical Fund, and Earthwatch. Funding for field and laboratory programs related to the Basketmaker Communities Project was also provided by participants in those programs and Crow Canyon Archaeological Center. We extend sincere thanks to all who contributed funding toward the completion of the project.

The Basketmaker Communities Project fieldwork took place on private lands outside of Cortez, Colorado. Indian Camp Ranch, a 12,000-acre development, was the primary study area for the project. Crow Canyon's fieldwork on the property was conducted in a partnership with the Indian Camp Ranch Homeowners Association and individual landowners. Instrumental in this partnership were Archie and Mary Hanson, the Ranch's developers, and two consecutive Presidents of the Homeowners Association, Hal Shepherd and Mike Kistler, all of whom displayed unwavering support for this project during the seven years of field research. Jane Dillard, former owner of the Dillard site, was an essential partner to the project, granting multi-year investigations of three sites (Dillard, Switchback, and Ridgeline) on her property, hosting numerous Crow Canyon events at her home, and doggedly analyzing pottery temper for the project. Sarah and Pat Hatch were also wonderful hosts, granting expansive investigations of the Hatch site complex (Pasquin, Badger Den, Dry Ridge, and Sagebrush House) on their property. Karen Kristin joined the project early with testing of Sites 5MT10718 and 5MT10719 on her property in 2011. Other landowners also hosted excavations: Portulaca Point on Robert and Diane Greenlee's property, the Shepherd site on Hal Shepherd's land, Mueller Little House on property belonging to Jerry and Lisa Mueller, and the TJ Smith site on Jerry and Tammy Smith's lot. These property owners were gracious and accommodating partners and we are grateful for their participation in the project. We also thank Archie and Mary Hanson, Sue Anschutz-Rodgers, Michael and Ginny Kistler, Fred and Laura Watson, and Lee Bergman and Susanne Devich for allowing geophysical imaging surveys and soil augering of sites on their property. Gayle Larson and all Indian Camp Ranch lot owners allowed us to document surface elements of sites on their property. To these project partners, our appreciation cannot be overstated—the project would not have been possible without their support.

We owe Scott Ortman a debt of gratitude for conceiving of this extraordinary project and writing the initial research design. Thanks go to Mark Varien for writing the Indian Camp Ranch Archaeological District nomination to the National Register of Historic Places. Thanks also to the Canyons of the Ancients Visitors Center and Museum and the Bureau of Land Management museum and curation facility near Dolores, Colorado, for permanently curating all artifacts and records associated with the Basketmaker Communities Project; Field Manager, Marietta Eaton and Supervisory Museum Curator, Bridget Ambler deserve special recognition for their invaluable assistance.

The Basketmaker Communities Project has been a nine-year-long research endeavor requiring a large team effort. The sustained support of Crow Canyon's Board of Trustees, Chairman's Council, and many other supporters has been crucial to the successful completion of this project—their interest, advice, and encouragement are greatly appreciated. Members of Crow Canyon's Native American Advisory Group offered thoughtful comments, suggestions, and guidance on the research design and other aspects of the project; as always, their perspectives enriched our own and the project as a whole.

Virtually everyone who worked in Crow Canyon's archaeology and education departments was involved in some aspect of the Basketmaker Communities Project. Over six dozen undergraduate and graduate student interns contributed their time, energy, and enthusiasm to the project. Various researchers generated and analyzed field and laboratory data, conducted special analyses, and prepared the collections for curation. Special thanks to our contracted special analysts, Karen Adams, Susie Smith, Cynthia Fadem, Kari Kates, and Kathy Mowrer for their patience, partnership, and contribution to this volume and to Heather Stettler for her quality copy edit of this volume. A dedicated cadre of volunteers also made significant contributions to the project. It is impossible to recognize every staff member, intern, volunteer, and colleague by name, but their individual and collective contributions to the success of the project cannot be overstated.

Crow Canyon extends special thanks to the thousands of students and adults who participated in Crow Canyon's excavation and lab programs during the Basketmaker Communities Project. These individuals provided much of the field labor, assisted with the processing and analysis of field materials, and provided necessary funding for the project. Their enthusiastic labors expanded our knowledge of Basketmaker III lifeways—the project would not have been possible without them, and their contribution is deeply appreciated.

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How to Cite This Publication

To cite the entire publication:

Shanna R. Diederichs (editor)
2020 *The Basketmaker Communities Project*. Electronic document, https://www.crowcanyon.org/baskemakercommunitiesproject, accessed day month year.*
**Example:* accessed 15 November 2025.

To cite an individual chapter, e.g., Chapter 7:

Adams, Karen R.
2020 Archaeobotanical Remains. In *The Basketmaker Communities Project,* edited by Shanna R. Diederichs, pp. 586–644. Electronic document, https://www.crowcanyon.org/baskemakercommunitiesproject, accessed day month year.*
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Chapter 1

Introduction to the Basketmaker Communities Project

by Shanna R. Diederichs

Introduction

This report details work by the Crow Canyon Archaeological Center (Crow Canyon) during the Basketmaker Communities Project, a multi-faceted research and public education archaeological initiative undertaken by Crow Canyon from 2011 through 2017. The primary purpose of the Basketmaker Communities Project was to study the history and social organization of a large Basketmaker III period (A.D. 500–750) settlement in the central Mesa Verde region and to track the long-term impacts of that settlement on later populations (Figure 1.1). The Basketmaker Communities Project was guided by two consecutive research designs: "A Proposal to Conduct Archaeological Testing at Indian Camp Ranch, Montezuma County, Colorado" Ortman et al. 2011, which guided fieldwork from 2011 to 2014, and "A Proposal to Expand Basketmaker Communities Project Research: An Addendum to A Proposal To Conduct Archaeological Testing at Indian Camp Ranch, Montezuma County, Colorado" (Ryan and Diederichs 2014), which guided work from 2015 to 2017. The project was conducted in partnership with the University of Colorado Boulder and funded with grants from the National Science Foundation, Earthwatch, and the History Colorado State Historical Fund.

The fieldwork portion of the project was conducted on 31 lots in the Indian Camp Ranch subdivision outside of Cortez, Colorado, and on private property belonging to Gayle Larson just north of the Indian Camp Ranch subdivision. Additional collections analysis was undertaken on artifacts from the Payne site (5MT12205) curated at the Canyons of the Ancients Visitors Center and Museum. Over the course of the Basketmaker Communities Project, 75 archaeological sites were recorded or rerecorded, and forms were submitted to the Office of Archaeology and Historic Preservation. Crow Canyon excavated 13 of the recorded sites and conducted intensive surface artifact analysis and/or geophysical imaging at an additional 18 sites (Figure 1.2). All sites investigated during the Basketmaker Communities Project are in Montezuma County in southwest Colorado.

The Basketmaker Communities Project supported Crow Canyon's mission, which is to conduct archaeological research and education in partnership with American Indians and institutions with common interests. Programs at Crow Canyon seek to broaden public understanding of American cultural heritage, build a constituency for the conservation of archaeological resources, facilitate understanding between the archaeological community and American Indian peoples, and conduct research that produces important contributions to the social sciences and humanities.

National Register District

In September 2011, Crow Canyon nominated the Indian Camp Ranch Archaeological District to the National Register of Historic Places (Varien and Diederichs 2011), and on March 28, 2012, the District was listed on the National Register of Historic Places and on the Colorado State Register of Historic Properties (Figure 1.3). The Ranch is listed under the district number 12000145 and was given the Smithsonian trinomial designation 5MT19927. This District, which includes all contributing Basketmaker III sites within Indian Camp Ranch, was accepted to the Register because of its unique ability to convey information about the Basketmaker III era, a period that provided the foundation for the development of Pueblo Indian society (Figure 1.4).

Public Involvement

Basketmaker Communities Project research was conducted in the context of Crow Canyon's public education program. A diverse public was exposed to ancestral Pueblo history and conservation archaeology over the course of the project.

Crow Canyon employed 68 interns during the Basketmaker Communities Project and incorporated them into many facets of the undertaking (Figure 1.5). These individuals were archaeologists and anthropologists in training, generally finishing or studying for bachelors, masters, or doctorate degrees in universities across the country. Crow Canyon provided internships to these individuals in laboratory and field archaeology methods, archaeobotanical analysis, public education, and American Indian initiatives.

Through Crow Canyon's research and education programs, 2,730 people—ranging in age from middle school through adult—assisted in Basketmaker Communities Project field and laboratory work, including remote sensing, surface recording, excavations, artifact analysis, and clay sourcing surveys (Figure 1.6). These participants included school groups, Middle School Archaeology Camp participants, High School Field School participants, High School Archaeology Camp participants, Adult Research participants, National Endowment for the Humanities teachers, College Field School, and Earthwatch volunteers. An additional 3,414 individuals were given formal tours and/or participated in laboratory work offered as part of single-day field trips, multiday non-excavation school group programs, or other Crow Canyon–sponsored activities (Figure 1.7). The number of people participating in these programs reflects not only Crow Canyon's commitment to involving the public in its research but also the level of public interest in the ancient past of the central Mesa Verde region.

Several outreach products were produced over the course of the Basketmaker Communities Project. In June 2012, Oregon Public Broadcasting filmed remote sensing and excavation at the Dillard site for a one-hour episode, "The Lost Pueblo Village," of *Time Team America*, a popular PBS science-archaeology series (Figure 1.8). *Time Team America* joined Crow Canyon staff at the Dillard site to help identify pit structures with geophysical imaging and map the extent of the settlement (see Chapter 3). "The Lost Pueblo Village" episode aired on August 26, 2014, was viewed by approximately 1.5 million people, and has continued to air cyclically on PBS channels over the last six years (Oregon Public Broadcasting 2014). The Basketmaker Communities Project was highlighted in several public venues in 2013. The History Colorado Center incorporated photographs of Crow Canyon archaeologists at work into its new Living West exhibit. CNN filmed participants in the Archaeology Research Program excavating at the Dillard site in September 2013 for a travel segment aired in U.S. airports during the winter of 2013–2014. Through public outreach products such as these, Crow Canyon aims to widen its audience and spread the message of an inclusive American past and the application of science to its study.

American Indian Involvement

As part of Crow Canyon's mission, we conduct archaeological research and education programs in partnership with American Indians. Crow Canyon's Native American Advisory Group was formed in 1995. At meetings held two to four times each year, this group reviews the Crow Canyon research and education programs with staff members. Over the course of the Basketmaker Communities Project, the advisory group reviewed and commented on the research designs, field and laboratory methods, archaeological finds, and educational materials. This feedback contributed to the development of the project's research questions, procedures, and, in some cases, archaeological interpretation.

Native educators and students participated in Crow Canyon's experiential education programs during the Basketmaker Communities Project through both the standard programs and sponsored projects such as the Pueblo Pathways Project, Brave Girls, *Time Team America* Field School, Futures for Children, Zuni Youth Enrichment Program, and the Summer Arts and Archaeology Program. Native participants were affiliated with a wide variety of Pueblos and Tribes, including Santa Ana Pueblo, Isleta Pueblo, Nambé Pueblo, Southern Ute, Ute Mountain Ute, Zia, Laguna, Navajo, Apache, and Oglala Sioux.

Permissions, Permits, and Curation

At the outset of the project, the Indian Camp Ranch Homeowners Association granted Crow Canyon permission to conduct field research within the Ranch subject only to restrictions imposed by individual landowners and provided that the work complied with the professional and ethical standards established by the Society for American Archaeology and the Register of Professional Archaeologists. For intensive surface documentation and/or excavation, Crow Canyon created contracts with individual landowners outlining permissions, timelines, and scopes of the work. All archives, data, and materials generated or collected during the course of the Basketmaker Communities Project became the property of Crow Canyon until curated with a museum facility at the end of the project. Basketmaker Communities Project fieldwork was conducted under a Colorado State Permit for Archaeological or Paleontological Work issued between 2011 and 2017. All archives, samples, and artifacts created and collected during the Basketmaker Communities Project investigations will be curated with Bureau of Land Management Canyons of the Ancients Visitor Center and Museum in Dolores, Colorado.

Publications

The Basketmaker Communities Project is reported in two overlapping publications: an interactive online database and a synthetic interpretive volume, presented here. The *Database*

Report for the Basketmaker Communities Project (Crow Canyon Archaeological Center 2020) hosts site-specific databases with descriptive text and analytic data for artifacts, features, middens, stratigraphy, dating, surfaces, masonry, structures, and background information. Also contained in the database are 430 AutoCAD maps and over 8,400 color photographs, only a small fraction of which are contained within this interpretive report. The reader is encouraged to consult the database resource for detailed information. The 23 interpretive text chapters, along with Appendices A and B, presented here, compose the second publication. This volume summarizes, interprets, and synthesizes Crow Canyon's research results for the Basketmaker Communities Project.

The information in this, the introductory chapter, is supplemented by material in the site-specific "Background Information" sections of the *Database Report for the Basketmaker Communities Project* (Crow Canyon Archaeological Center 2020). Much information that has been traditionally presented in the introductory chapter of a printed site report can be found in that section of the database, including a brief description of each site's physiography and land status along with permitting details and field methods employed at each site.

The second chapter of this volume, "Research Questions and Methods," presents the research questions and models that guided the Basketmaker Communities Project research. The third chapter, "Remote Sensing Methods and Results," explains the need for, methods employed, and results of geophysical imaging to locate and study buried pit structures. The fourth chapter, "Geomorphology," assesses anthropogenic impacts to soils under dry land cultivation through a combination of soil analysis, evaluation of Basketmaker III settlement patterns, and ethnographic comparisons. Chapters 5 through 16 summarize results from 13 sites excavated on Indian Camp Ranch. These chapters are organized chronologically, early to late, by their dominant site component. Chapter 17 summarizes surface investigations at two sites on private land belonging to Gayle Larson, north of Indian Camp Ranch. Chapter 18, "Architecture of the Basketmaker III Period," describes, types, and interprets 79 pit structures investigated during the Basketmaker Communities Project. Comparative and absolute dating results from the project are presented in Chapter 19 along with a reconstructed settlement history of the Indian Camp Ranch Basketmaker III community. Chapter 20, "Faunal Remains," presents descriptive and interpretive information about the excavated assemblage of animal bone. In Chapter 21, "Archaeobotanical Remains," evidence of specialized activities, plant foods, perishable artifacts, construction woods, and fuelwoods are presented along with a discussion of the paleoenvironment in the project area. Similar topics are approached through pollen analysis results in Chapter 22, "Pollen Analysis." Data and inferences regarding the human skeletal remains found during the project are reported in Chapter 23. In Chapter 24, "Artifacts," the results of pottery and stone artifact analyses are presented and interpreted. In the final chapter, "Basketmaker Communities Project Synthesis," inferences are drawn from all varieties of data and all lines of evidence available and are used to address the research questions posed in the project research designs (Ortman et al. 2011; Ryan and Diederichs 2014).

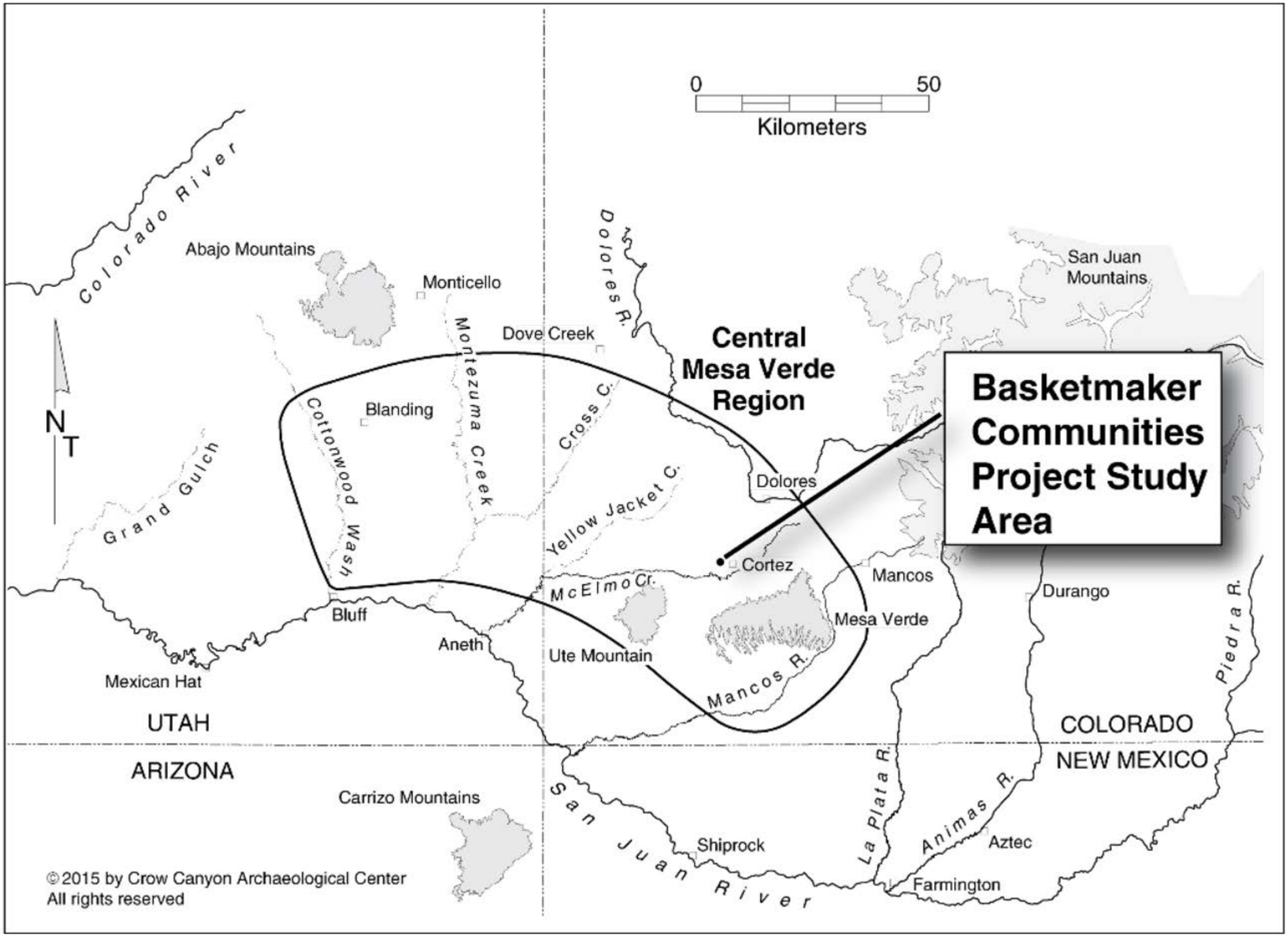

Figure 1.1. Location of the Basketmaker Communities Project within the central Mesa Verde region.

Figure 1.2. Partially excavated great kiva at the Dillard site (5MT10647) on private land in the Indian Camp Ranch subdivision.

Figure 1.3. National Register of Historic Places plaque for the Indian Camp Ranch Archaeological District.

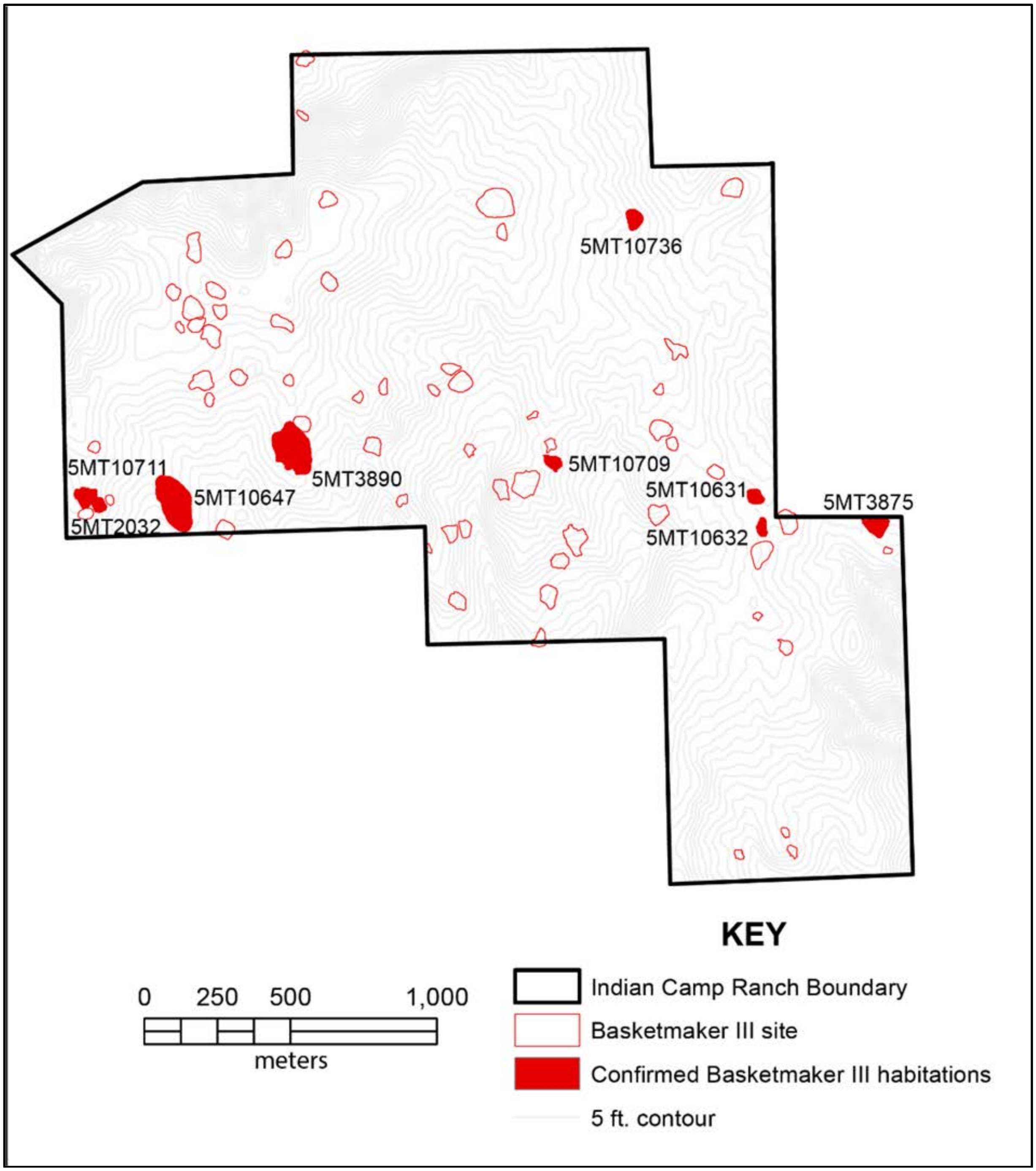

Figure 1.4. The Indian Camp Ranch Archaeological District with contributing sites dating to the Basketmaker III period.

Figure 1.5. Crow Canyon Archaeological Center 2014 summer interns.

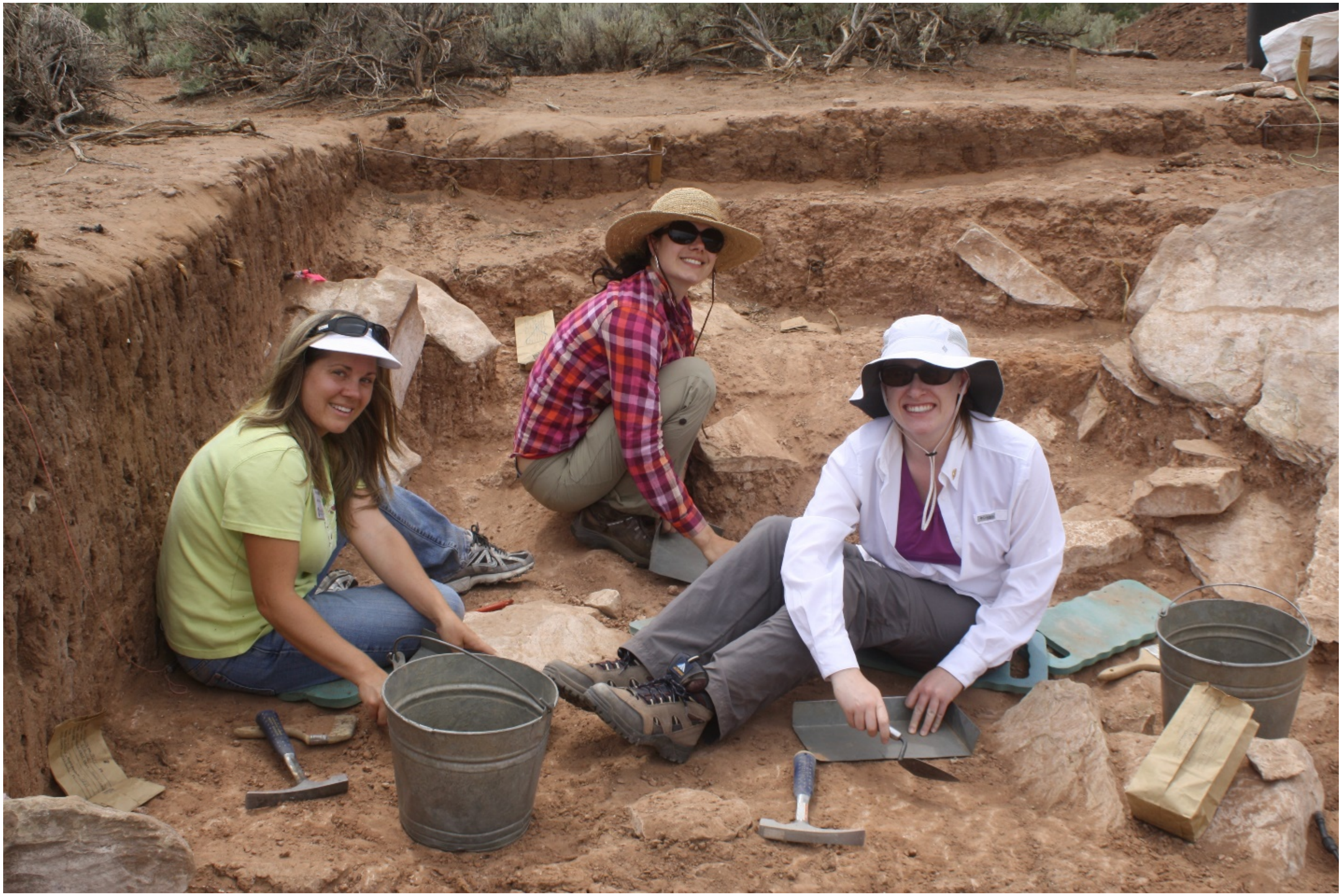

Figure 1.6. High School Field School students excavating at the Dillard site (5MT10647) in 2013.

Figure 1.7. Field intern giving a tour of the Basketmaker Communities Project excavations to Earthwatch volunteers in 2013.

Figure 1.8. ***Time Team America*** **film crew, host, and archaeologists alongside Crow Canyon staff, research associates, and Dillard site landowner, Jane Dillard, at the end of three days of filming the "Lost Pueblo Village" episode for the Oregon Public Broadcasting series** ***Time Team America*** **in 2012.**

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Chapter 2

Research Questions and Methods

by Shanna R. Diederichs and Scott G. Ortman

Introduction

Crow Canyon chose the Indian Camp Ranch development as a primary focus of the Basketmaker Communities Project because the study area had potential to provide new data on Basketmaker III period (A.D. 500–750) immigration, population growth, and social organization. The project was designed to provide insight into the initial expansion of farmers and agricultural lifeways across the northern Southwest and the replacement of hunting and gathering societies. The adoption of domesticated food production is widely acknowledged as a fundamental technological advance that dramatically increased the human carrying capacity of local environments and dramatically expanded the niches in which human populations could thrive. Kohler and others (Kohler and Glaude 2008; Kohler et al. 2008) have made a convincing argument that the population growth during the Basketmaker III period in the central Mesa Verde region resembles the phenomenon that Bocquet-Appel (2002) has identified as the Neolithic Demographic Transition in early agricultural societies in Europe. Studying the Basketmaker III occupation of the Indian Camp Ranch study area had the potential to provide data relevant to the sociocultural dynamics in the American Southwest and to place the early agricultural occupation of the central Mesa Verde region in a broader, cross-cultural context.

The Basketmaker Communities Project study area consists of gently rolling uplands between Crow Canyon and Alkali Canyons, two north–south trending tributaries of the McElmo drainage system in the central Mesa Verde region. The uplands are covered by varying thicknesses of eolian silt loam known as the Mesa Verde loess, a highly productive agricultural soil. The elevation at the center of the project area is about 1,890 m (6,200 ft). Approximately 100 million years of geologic history dating from the late Triassic/Jurassic through the middle Cretaceous are exposed to the west in Alkali Canyon. The various geologic strata provided ancestral Pueblo people with construction stone and raw material for tools, and the permeable layers form a high-quality aquifer with the potential for springs. Indian Camp Ranch was probably once completely covered by pinyon-juniper woodland, dominated by pinyon pine and Utah juniper, with an understory of bunch grasses, yucca, and prickly pear cactus. Today, the native vegetation across most of the Ranch has been replaced by sagebrush-covered ranch land or mechanically cultivated winter wheat fields.

The first significant Basketmaker III use of the central Mesa Verde region and specifically the Basketmaker Communities Project study area occurred late in the sixth century, and the population rapidly grew over the next century (Kohler et al. 2008). Prior to the Basketmaker Communities Project the Basketmaker III culture had not been studied at the settlement scale in the central Mesa Verde region. The Basketmaker Communities Project addressed this deficiency by (a) conducting new fieldwork in a well-preserved cluster of settlements dating to this period,

(b) gathering and refining chronological data to establish momentary population levels, and (c) conducting new analyses of existing artifact collections from sites dating to this period.

The goals of our Basketmaker Communities Project research reflect Crow Canyon's multi-faceted approach to historical, anthropological, and methodological issues as well as our commitment to pursue topics of stated American Indian interest. This chapter presents the broad context of our study and research questions specified in the research designs (Ortman et al. 2011; Ryan and Diederichs 2014) that guided our investigations. Also addressed are specific research topics that guided our field and laboratory techniques and sampling. The questions and topics presented in this section will be revisited and addressed in Chapter 25. Additional background on the environmental setting and history of Basketmaker III archaeological investigations can be found in the Basketmaker Communities Project research designs (Ortman et al. 2011; Ryan and Diederichs 2014) and the Indian Camp Ranch National Register District Nomination (Varien and Diederichs 2011).

Previous Research at Indian Camp Ranch

Indian Camp Ranch is a 1,200-acre private tract of land 2 miles west of the town of Cortez in the southwest corner of Colorado. In 1989, the owners of Indian Camp Ranch, Archie and Mary Hanson, divided the property into 31 parcels, each of which is a little over 35 acres in size. The development is a unique experiment in cultural resource stewardship. Individual lots are sold to private citizens who are required by deed restrictions to protect the archaeological resources on their property. Excavation may take place, but all such work must be done under the guidance of an approved archaeologist who properly reports all work, findings, and results.

In conjunction with development of the property in the late 1980s, Woods Canyon Archaeological Consultants (Woods Canyon) was contracted to identify archaeological sites and help formulate a plan for future cultural resource stewardship (Fetterman and Honeycutt 1994). A comprehensive Class III survey of Indian Camp Ranch between 1989 and 1991 identified a total of 204 sites, including 77 Basketmaker III components. Site types included single habitation, multiple habitation, public architecture, activity area, limited activity area, processing area, and a possible field house. A preliminary report was generated describing the most common site types for each period, an information packet was created for each lot owner, and state site forms were submitted to the Colorado Office of Archaeology and Historic Preservation (Fetterman and Honeycutt 1994).

One of the most intriguing features recorded during the initial Woods Canyon survey was a 10-m-wide depression at Site 5MT10647 on property owned by Jane Dillard. Two years later, the depression was trenched by Woods Canyon (Fetterman 1991). A 12-m-long angled trench was excavated through the structure, entering the south side and exiting the northwest edge of the building (Figure 2.1). Materials recovered from the structure in this trench date to the seventh century. The structure was proven to be round, about 11 m in diameter, with an encircling bench and was supported by a four-post support system—all morphological traits of a Basketmaker III great kiva (Figure 2.2).

The Basketmaker III great kiva was a surprising find at Indian Camp Ranch; the only other confirmed examples come from south of the San Juan River in northwest New Mexico and northeast Arizona. From their inception during the Basketmaker III period, great kivas functioned as communal spaces for public gathering. The presence of a great kiva among the numerous Basketmaker III habitations recorded on the Ranch suggests that the larger settlement functioned as a community rather than a disparate cluster of independent farming hamlets.

Basketmaker Communities Project Research Domains

Crow Canyon's Basketmaker Communities Project initiative addressed a wide range of research questions and objectives. The project was designed to create a detailed picture of when the central Mesa Verde region was homesteaded in the sixth and seventh centuries A.D. We also assessed how subsistence technologies may have fueled the Neolithic Demographic Transition in the northern Southwest and whether these practices had long-term detrimental effects for later Pueblo occupations. Prior to the Basketmaker Communities Project only isolated Basketmaker III households along linear project swaths had been studied in the central Mesa Verde region. The Basketmaker Communities Project provided an opportunity to holistically study an entire settlement to determine the existence and nature of social organization during this period. Finally, the possibility of Pueblo ethnogenesis was considered based on the contributions of Basketmaker III culture to later ancestral Pueblo society.

Research Domain I: Chronology

The Basketmaker Communities Project builds on research conducted by the Village Ecodynamics Project, which focuses on long-term interactions between Mesa Verde Pueblo society and the ecosystem it inhabited. A significant accomplishment of the Village Ecodynamics Project is a new paleodemographic reconstruction for a 1,817 km^2 area of the central Mesa Verde region (Ortman et al. 2007; Varien et al. 2007).

This research demonstrated that the central Mesa Verde region was first colonized by ancestral Pueblo farmers around A.D. 600. Based on the calibration data, the ancestral Pueblo sequence was subdivided into 14 modeling periods dating between A.D. 600 and 1280 (Figure 2.3). Most of these periods were 40 years in duration; however, the initial period, which corresponds to Basketmaker III, could not be subdivided. As a result, the initial modeling period in the Village Ecodynamics Project reconstruction is 125 years long, more than three times longer than the average.

The inability to subdivide Basketmaker III into more refined chronological intervals is troublesome because artifact accumulations associated with pithouses dating to this period suggest they were only inhabited for 8–15 years (Varien and Ortman 2005). This means that, over the course of the initial Village Ecodynamics Project modeling period of 125 years, each family lineage could have built, inhabited, and 9–16 pithouses that are archaeologically "contemporaneous." Thus, even though the most common site type in the Village Ecodynamics Project database is a Basketmaker III habitation, the average momentary population of this period is the lowest of the entire sequence. Without a refined Basketmaker III chronology it will

not be possible to determine how many people "seeded" this landscape around A.D. 600, how fast the population grew, and how many people lived in a settlement at the same time.
Research Domain I Questions:

> How large was the initial A.D. 600s immigration into the central Mesa Verde region?
> How did the momentary population of the Indian Camp Ranch Basketmaker III settlement change through time?
> Can the Basketmaker III period chronology be divided into smaller time ranges based on the surface signatures of habitation sites?

Research Domain II: Origins of the Central Mesa Verde Basketmaker III Population

Research on the origins of the ancestral Pueblo tradition suggest that it formed through the intermingling of immigrant agricultural groups from southern Arizona who settled in canyons west of the central Mesa Verde area with indigenous farming groups south and east of the central Mesa Verde region (Charles et al. 2006; LeBlanc 2008; Matson 2002, 2006; Morris 1980; Roberts 1929; Van Dyke 2007:63–70; Wills and Windes 1989). Colonization of the central Mesa Verde region must have also involved immigration from one or all of these populations, but due to the coarse dating of Basketmaker III sites it is not yet possible to gauge the relative contributions of immigration and intrinsic growth to the population that was in place by A.D. 750. The Basketmaker Communities Project attempted to assess whether the immigrants who entered the central Mesa Verde region after A.D. 600 came from these or other areas of the northern U.S. Southwest.

Research Domain II Questions:

> What is the source population for the A.D. 600 immigrants into the central Mesa Verde region?
> Is there evidence for a multi-ethnic immigration into the region from a variety of different geographic areas?
> What is the case for a Basketmaker III ethnogenesis?

Research Domain III: Basketmaker III Community Structure and Social Organization

The central Mesa Verde region lies between the centers of Eastern and Western Basketmaker II culture groups (Charles and Cole 2006), and the area was only colonized as a full Neolithic economy was adopted. This suggests that the social transformations set in motion by the adoption of a Neolithic economy were still in progress as the central Mesa Verde region was settled.

If the ethnographic literature is any guide, Late Archaic foragers of the Colorado Plateau were probably organized into residential kinship groups that would have aggregated into bands recognizing a common leadership and territory during the summer and dispersed into kinship groups with individual territories during the winter (Jorgensen 1980:215). In addition, interband ceremonies similar to Numic round dances would have taken place during the summer when food was plentiful (Callaway et al. 1986; Murphy and Murphy 1986; Shimkin 1986). Nonkinbased ritual sodalities like those of historic Plains tribes may have existed (Meadows 2010), but these organizations would have emphasized warfare, dancing, and policing of ritual encampments as opposed to year-round governance of the community. The archaeological record in the larger region lends support to this model by suggesting that Late Archaic foragers aggregated near lowland grasslands during the spring and early summer and then shifted to family-based camps in the uplands during the fall and winter (Irwin-Williams 1973; Sesler and Hovezak 2002:132–136).

In contrast, by the mid–A.D. 800s there is evidence that Pueblo I period villages were organized around sodalities with governing functions like those of the historic Pueblos (Dozier 1970; Eggan 1950; Ortiz 1969; White 1930). This is suggested by the appearance of a distinctive architecture consisting of U-shaped roomblocks that enclosed plazas containing an oversized pit structure with ritual features—including altar support pits, prayer-stick holes, and roofed sipapus—that are still found in Pueblo kivas today (Ware 2002; Wilshusen 1986, 1989). These oversized pithouses may have been used for exclusive, sodality-based rituals (Schachner 2001, 2010; Wilshusen 1989), but community-scale potluck feasting might also have taken place in the vicinity of these structures (Blinman 1989; Potter 1997; Potter and Ortman 2004).

Importantly, the Pueblo I period U-shaped roomblocks also contained several unit pueblo residences consisting of a small pit structure in association with surface living and storage rooms. These rooms contained more storage space and evidence of manufacturing activity than other roomblocks (Schachner 2010). Thus, U-shaped roomblocks appear to have been settings for exclusive and public ritual, homes of community leaders, and loci of economic activity. Given the likelihood that early Pueblo villages were governed through sodality institutions, such institutions must have been invented or adopted by the mid–A.D. 800s. In addition, sodality functions may have expanded through time, from an early emphasis on ceremony to an eventual role in community governance, including land allocation and orchestration of communal labor projects (Adler 1994, 1996; Whiteley 1988).

This left us to question whether the Basketmaker III society living in the central Mesa Verde was already organized around sodalities, and if so, how they functioned. Unlike mobile foragers, sedentary people cannot avoid most social problems simply by moving away. As such, social integration can be viewed as the way that conflict is avoided in sedentary societies through cooperation and communication (Hegmon 1989a:6). To assess the role of the Dillard site great kiva in sodality formation and community integration we developed three organizational models: Big Man, Permanent, Episodic.

The *Big Man Model* derives from the work of Lightfoot and Feinman (1982), who suggest that Basketmaker III society was organized around a “big-man” system in which aspiring leaders sought to achieve and maintain decision-making authority by accumulating agricultural surplus, by increasing the size of their residential kinship group, and by participating in regional trade and ceremonial exchange systems. They suggest these activities are reflected in the association of larger pithouses with surplus storage space, nonlocal goods, and great kivas in several sites. Under this model, ritual sodalities would not have existed during Basketmaker III, and highly ranked residential kinship groups would have held both ritual and managerial authority.

The *Permanent Model* of Basketmaker III social organization derives from the work of Wills and Windes (1989), who argue that great kiva sites were loci of periodic group assembly where only a small group of "core" families lived year-round. This is reflected in the large number of storage structures that are not clearly associated with individual pithouses and the fact that the pithouses surrounding great kivas were not all occupied at once. This is suggested by the fact that most Basketmaker III sites contain only a single pithouse, that great kiva sites contain more storage space per pithouse than small sites, and that the resident populations of great kiva sites were too small to have been fully endogamous. According to this second model, sodalities with ritual and managerial functions already existed in Basketmaker III society, and great kiva sites played the same role in Basketmaker III dispersed communities that U-shaped roomblocks played in early Pueblo village communities.

The *Episodic Model* of social organization suggests that sodalities with ritual functions existed in Basketmaker III society, but that they did not yet have managerial functions. This hybrid supposes that Basketmaker III "communities" might not have existed on a year-round basis. Instead, community organization may have existed only episodically, when residential kinship groups gathered for dances and the members of ritual sodalities performed their ritual functions. This form of organization would be similar to that of nineteenth-century Plains tribes such as the Kiowa (Levy 2001; Meadows 2010).

To evaluate these three models, Crow Canyon investigated Basketmaker III sites across the Indian Camp Ranch study area. All Basketmaker III sites in the study area were rerecorded to better understand their size, function, and relationship with surrounding sites. Intensive investigation centered on the great kiva, which was partially excavated, to determine the range and frequency of activities that took place inside of it. Sites of various sizes and distances from the great kiva were also excavated to capture architectural and artifactual variation. This information was compared against the expectations for the three models of community organization discussed below and summarized in Table 2.1.

Big Man Model: Under this system, one would expect ritual and managerial authority to have been structured primarily by competition among residential kinship groups. Surplus storage, ritual elaboration, hosting behavior, and long-distance exchange would all be associated with larger pithouses more so than proximity to the great kiva. Periodic group assemblies would not have been governed by sodalities and would not have emphasized communal feasting. The pithouses of highly ranked households would also tend to occur on above-average agricultural land and would have longer occupation spans than the pithouses of lower-ranked households.

Permanent Model: Under this system, one would expect ritual and managerial authority to have been vested in sodalities. The size and ritual elaboration of pithouses, surplus storage, long-distance exchange, and feasting would all be structured by proximity to the great kiva, and there would be evidence of feasting and surplus storage at the great kiva itself. The great kiva, and associated highly ranked households, would be situated in above-average agricultural land and would have longer occupation spans than the pithouses of lower-ranked households.

Episodic Model: Under this system, one would expect ritual authority to have been vested in sodalities and managerial authority in residential kinship groups. Pithouse size would be independent of proximity to the great kiva, and surplus storage and long-distance exchange would be associated with larger pithouses. Potluck feasting may have occurred in the great kiva but without associated surplus storage. Finally, ritual elaboration of pithouses would be independent of pithouse size and location with respect to the great kiva and agricultural productivity.

Research Domain III Questions:

> Can Basketmaker III community(ies) be delineated in the Indian Camp Ranch settlement?
> Was Basketmaker III society in the central Mesa Verde already organized around sodalities? If so, what were their functions?
> Are the identified communities organized under a Big Man, Permanent, or Episodic Model?
> Is there evidence for changes in community organization over time?
> Are community structures contemporary with the surrounding households?
> Do additional as-yet-unidentified community structures exist in the study area?
> Do assemblages from community structures indicate that they functioned to integrate households across a large or small region?
> How were community structures decomissioned, and does the mode of decommissioning match that of contemporary domestic structures?

Research Domain IV: Basketmaker III and the Neolithic Demographic Transition

The first significant Basketmaker III use of the central Mesa Verde region occurred late in the sixth century, and the population rapidly grew over the next century. Kohler and others (2008) have made a convincing argument that this growth resembles the phenomenon that Bocquet-Appel (2002; Bocquet-Appel and Bar-Yosef 2008) has identified as the Neolithic Demographic Transition in early agricultural societies in Europe. Bocquet-Appel proposes that there is a multi-century period he calls the Neolithic Demographic Transition when there is high population growth and significant settlement change during a region's transition to an agricultural economy. The Basketmaker Communities Project evaluated whether the demographic growth in the central Mesa Verde region during the Basketmaker III region was the result of a Neolithic Demographic Transition in the northern Southwest by recreating the settlement history over the period for the Indian Camp Ranch settlement.

Research Domain IV Questions:

> Is there evidence of a Neolithic Demographic Transition in the northern San Juan during the seventh century A.D.?
> If so, what technological advances made this transition possible?

Research Domain V: Anthropogenic Legacy

Recent perspectives on human-environment relationships suggest the adoption of Neolithic lifeways was associated with unprecedented transformations in ancient landscapes (Fisher et al.

2009; Redman 1999; Van der Leeuw and Redman 2002). From this perspective, one might expect Basketmaker III colonists to have significantly altered the central Mesa Verde landscape. These people would have cleared fields, harvested timbers, collected fuelwood, and hunted wild game in an environment with no recent history of substantial human use. Basketmaker III colonists also appear to have pursued an upland dry-farming strategy, where cultigens were raised using stored soil moisture from the previous winter combined with summer monsoonal rains. These farmers may have used swidden (slash-and-burn or burn plot) techniques, where land was cleared by burning and then farmed until nutrient levels in the burned area returned to the background condition, at which time the household moved to a new patch and the cycle began again (Kohler and Matthews 1988; Matson 1991; Matson et al. 1988). Because pinyon-juniper woodland takes several centuries to regenerate, swidden techniques would have impacted local forests in proportion to the number of households pursuing the strategy and the length of time they pursued it. The Basketmaker Communities Project considered whether these early agricultural practices had significant impacts on local environments, making farming and subsistence difficult in subsequent centuries.

Domain V Research Questions:

> <u>Is there evidence for environmental change related to land-use patterns of the Basketmaker III period?</u>
> <u>How large was the initial A.D. 600s immigration into the central Mesa Verde region, and how did this impact the environment?</u>
> <u>How did the momentary population of the Indian Camp Ranch Basketmaker III settlement change through time, and is there evidence linking this change to environmental degradation?</u>
> <u>Is there evidence for environmental change related to land-use patterns of the Basketmaker III–Pueblo III periods? How did the momentary population change though time, and is there evidence linking this change to environmental degradation?</u>

Research Methods

Field Sampling Methods

All Basketmaker Communities Project excavations were done in accordance with the Crow Canyon Archaeological Center Field Manual (Crow Canyon Archaeological Center 2001). Sampling parameters specific to the Basketmaker Communities Project are detailed here. The research questions outlined above target chronological, environmental, and social patterns in the archaeological record. To capture data regarding these patterns, Crow Canyon employed targeted field and laboratory methods (Table 2.2). We used surface recording and geophysical imaging to capture information on the location, distribution, size, and morphology of pit structures from Basketmaker III and later ancestral Pueblo habitations across the Ranch and on two-thirds of the Dillard great kiva. A quarter or half of examples of all other Basketmaker III pit structure types were excavated to capture construction details. Other architecture, whether dating to the Basketmaker III or later ancestral Pueblo periods, was sampled with small excavation units positioned to capture a structure’s central floor features: hearth, ritual features, and intramural storage features. All sampling of architecture aimed to collect information on chronology,

function, use life, and decommisioning. Refuse deposits associated with specific structures were randomly sampled to capture accumulation and subsistence data.
The Basketmaker Communities Project investigated Basketmaker III agricultural technology and the impacts of the first population boom in the region (Research Domains IV and V) by analyzing carbonized plant remains and pollen from Basketmaker III sites and comparing these results with samples from later ancestral Pueblo period sites.

Collections Research

The Basketmaker Communities Project addressed the research domains of chronology, origins, community structure, the Neolithic Demographic Transition, and anthropogenic legacy by utilizing existing collections and data. This complemented data recovered from the Basketmaker Communities Project excavations. Lab methods, identification criteria, and other standards are detailed in the Crow Canyon Laboratory Manual (Ortman et al. 2005). Basketmaker Communities Project researchers analyzed collections from previously excavated sites curated at the University of Colorado Boulder, the Canyon of the Ancients Visitor Center and Museum in Dolores, Colorado, and at Mesa Verde National Park.

In the past, analysts have noted subtle yet potentially significant differences among collections dating to different portions of Basketmaker III (Blinman 1988; Gross 1992). Thus, a primary goal of the Basketmaker Communities Project was to identify chronological markers in artifact assemblages to enable the Basketmaker III period to be subdivided into phases. The central Mesa Verde region archaeological literature indicates that the earliest excavated and well-dated Basketmaker III collections (A.D. 600–650) derive from sites in the Yellow Jacket area (Sites 5MT1, 5MT3, 5MT9168, and 5MT9387) (Chenault and Motsinger 2004; Mitchell 2003; Wilshusen and Mobley-Tanaka 2005) and from Mesa Verde National Park (Sites 5MV117, 5MV118, 5MV283, 5MV1060, 5MV1285, 5MV1644, 5MV1937, and 5MV1938) (Hayes and Lancaster 1975). For the A.D. 650–750 period, in contrast, collections from well-reported and well-dated sites are widespread and abundant (Ortman et al. 2007:Table 2; Wilshusen 1999:Table 6-1).

A related goal of the Basketmaker Communities Project research into chronology includes developing new methods for assigning Basketmaker III sites to refined chronological phases (Figure 2.4). These methods were tested at the cluster of previously recorded sites within Indian Camp Ranch. These results produced much firmer estimates of the size and spatial distribution of population as the central Mesa Verde region was first colonized by ancestral Pueblo farmers. This will in turn dramatically improve understanding of the initial conditions from which Mesa Verde Pueblo society evolved and will improve the "seeding" conditions of the agent-based models developed by the Village Ecodynamics Project (see Kohler et al. 2007).

Recent research suggests that long-distance exchange networks offer a good means of defining migration streams between source and destination areas (Anthony 1990; Arakawa et al. 2011; Duff 1998). Thus, the sources of nonlocal materials in Basketmaker III Mesa Verde region sites provide clues as to source areas from which early settlers came. Thus, if early Mesa Verde region colonists derived from a particular region, one might expect these colonists to have maintained long-distance trade relationships with people who remained in their homeland and for these relationships to be reflected in the form of temper and lithic raw materials from that region in Mesa Verde region sites. This work was accomplished using pottery temper identification via a binocular microscope, thin-section and compositional analyses of selected sherds, and identification of stone raw materials.

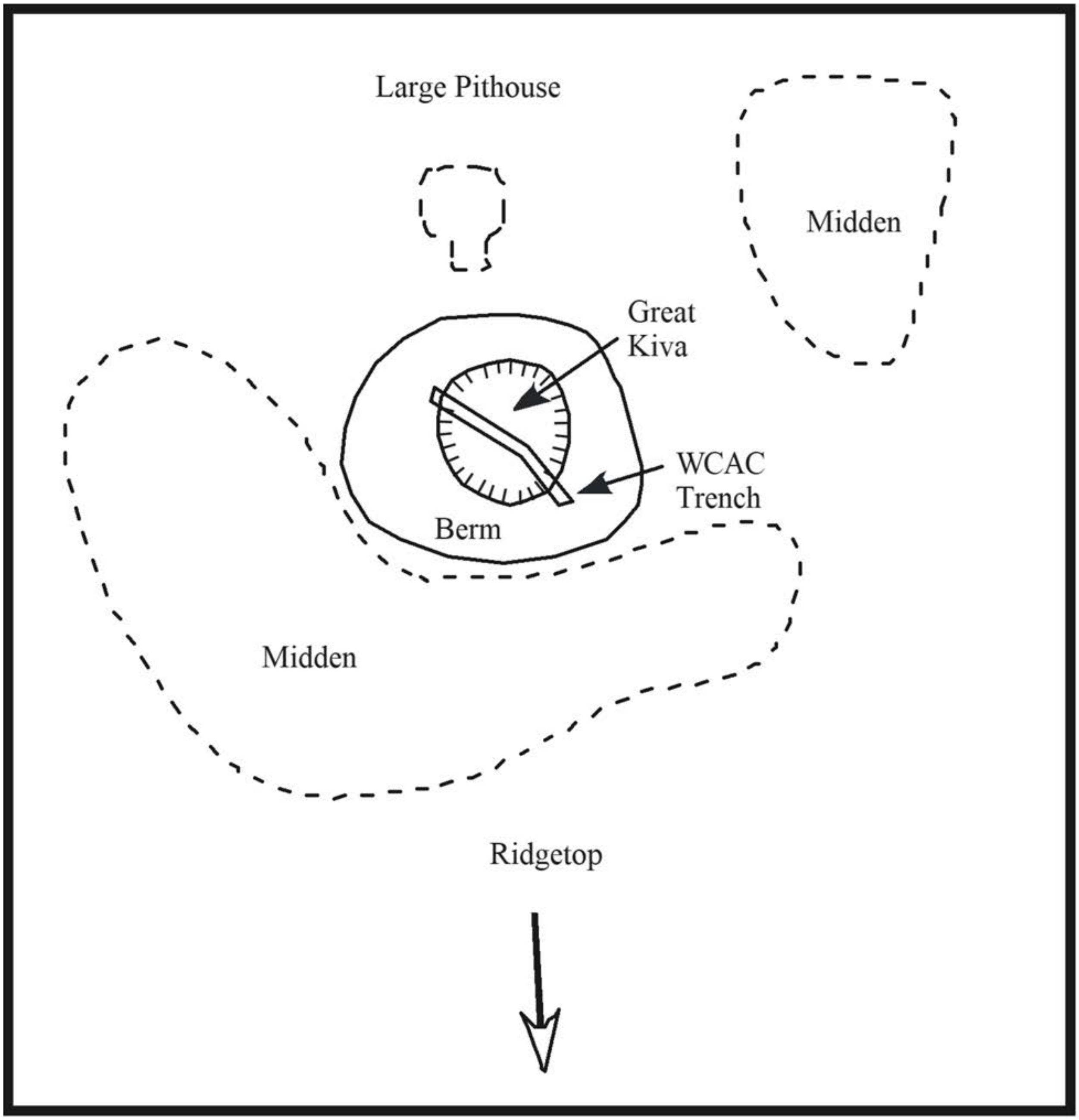

Figure 2.1. Sketch of the location of the test trench across the Dillard great kiva (5MT10647) excavated by Woods Canyon Archaeological Consultants (Fetterman 1991).

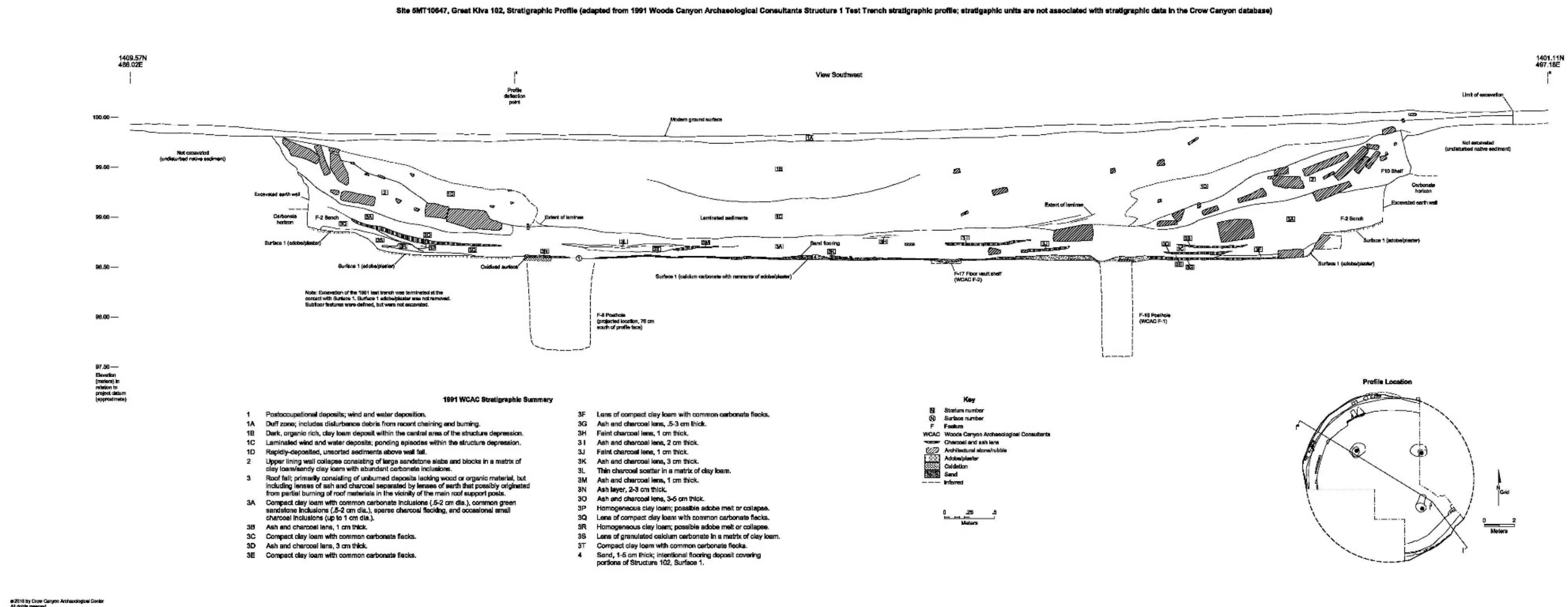

Figure 2.2. Stratigraphic profile of the southwest face of the trench excavated through the great kiva at 5MT10647 in 1991. (Adapted from Woods Canyon Archaeological Consultants Structure 1 Test Trench, stratigraphic units associated with stratigraphic data captured by Crow Canyon during the Basketmaker Communities Project.)

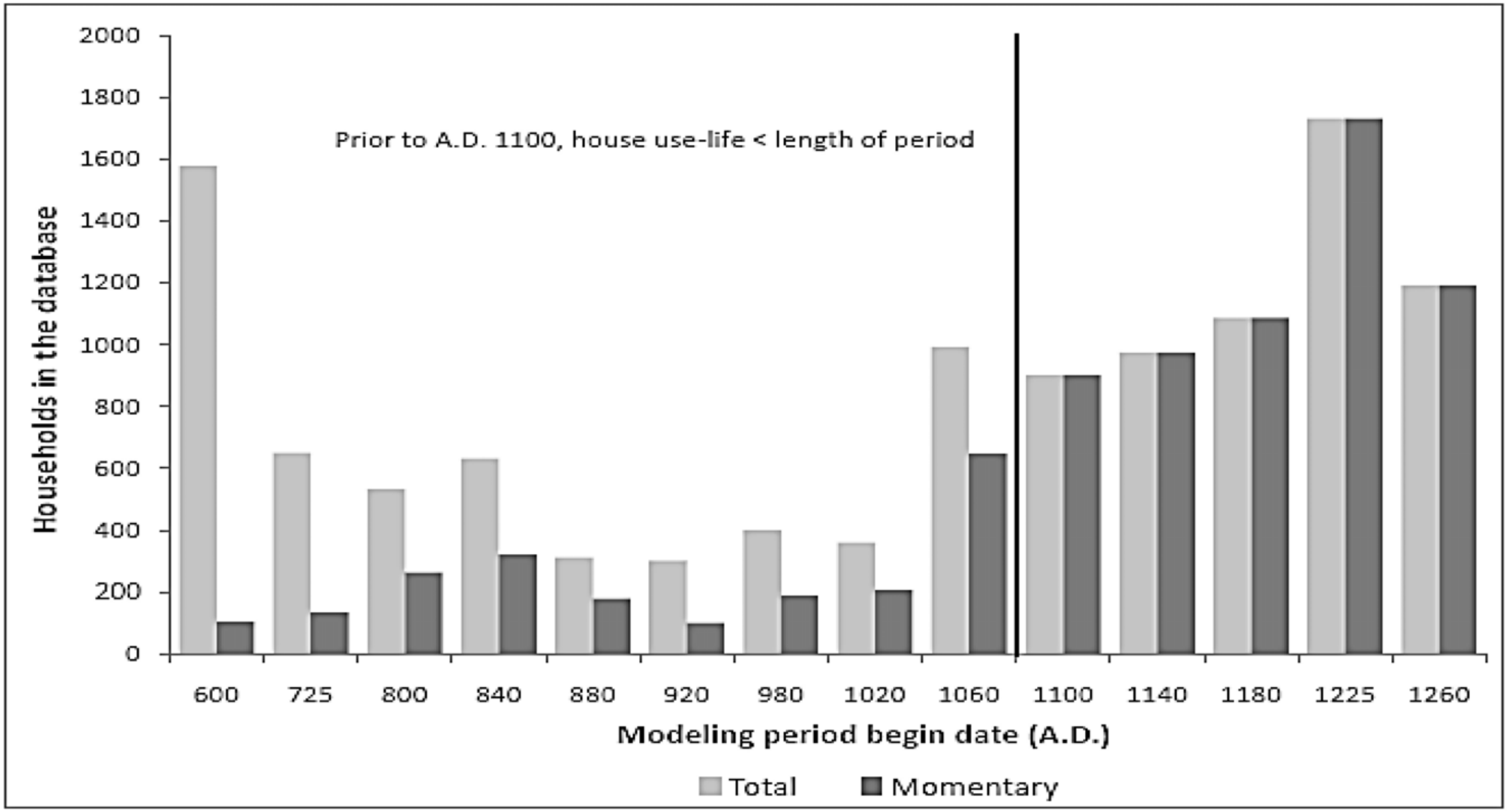

Figure 2.3. Village Ecodynamics Project population estimates for modeling periods between A.D. 600 and 1260.

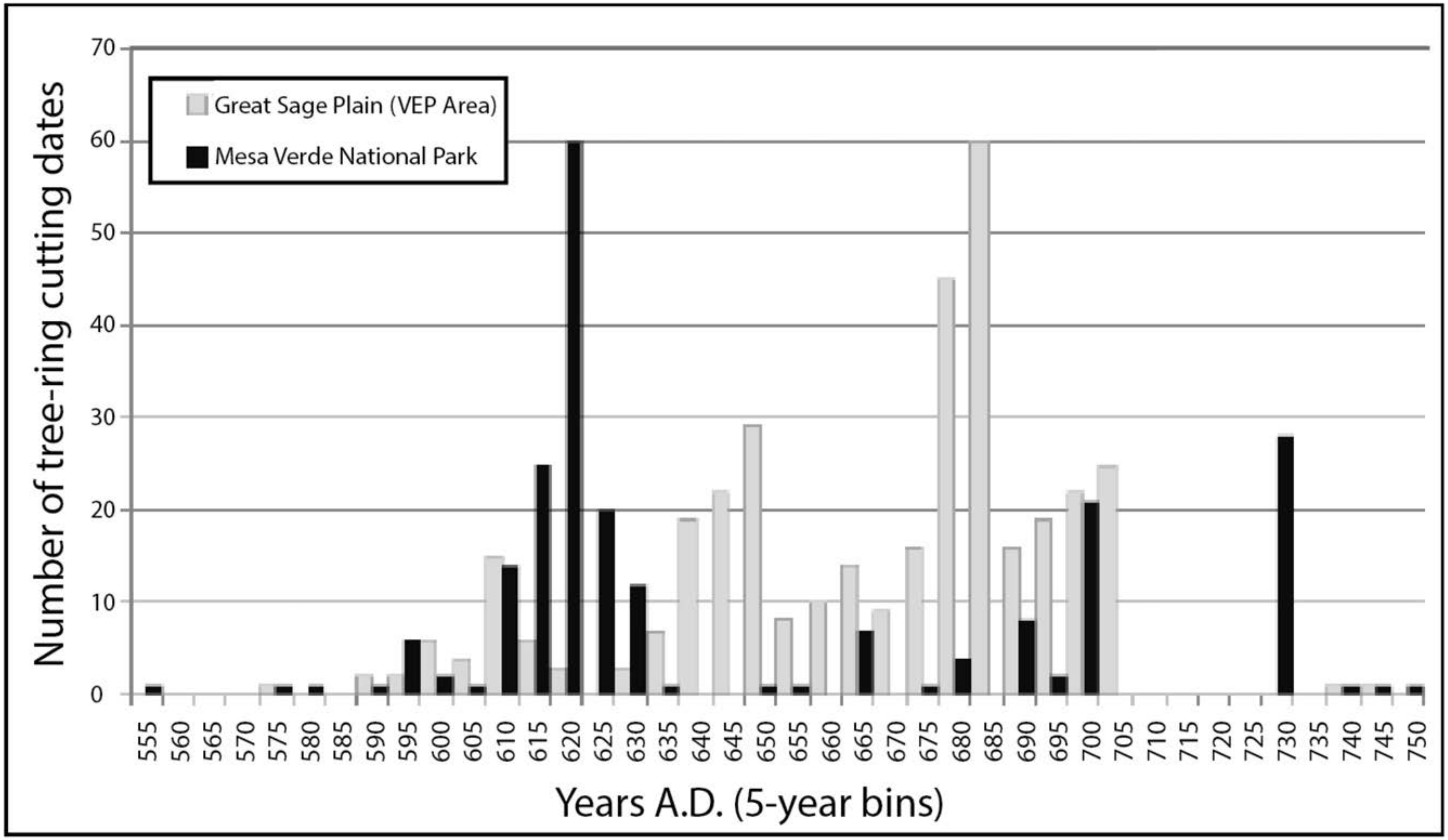

Figure 2.4. A comparison of tree-ring dates from the Village Ecodynamics Project area on the Great Sage Plain and Mesa Verde National Park between A.D. 555 and 750.

Table 2.1. Expected Archaeological Patterns for Various Forms of Community Organization.

Attribute	Big Man Model	Permanent Model	Episodic Model
Location of Great Kiva	Geographically central, good view shed	Geographically central, good view shed, productive land	Geographically central, good view shed
Ritual Elaboration of Pithouses	Correlated with floor areas	Correlated with floor areas	Independent of floor areas
Pithouse Size	Independent of distance from great kiva	Larger near great kiva	Independent of distance from great kiva
Distribution of Pithouse Ritual Features	Independent of distance from great kiva	Concentrated near great kiva	Independent of distance from great kiva
Surplus Storage	Associated with larger pithouses	Associated with great kiva and "core" pithouses	Associated with larger pithouses
Pithouse Occupation Span	Correlated with floor area and agricultural potential	Correlated with proximity to great kiva	Correlated with agricultural potential
Agricultural Potential of Surrounding Land	Correlated with pithouse size and elaboration	Correlated with pithouse size and elaboration	Correlated with pithouse size, independent of ritual elaboration
Serving Vessel Frequency and Size	Associated with larger pithouses	Associated with great kiva	Associated with great kiva
Cooking Pot Size	Correlated with pithouse size	Independent of pithouse size	Independent of pithouse size
Trade Goods	Correlated with pithouse size	Concentrated near great kiva	Correlated with pithouse size
Deer (Feasting) Remains	Associated with larger pithouses	Associated with great kiva	Associated with great kiva
Ritual Fauna	Associated with larger pithouses	Concentrated near great kiva	Associated with ritual elaboration in pithouses

Table 2.2. Basketmaker Communities Project Excavation Sampling Plan.

Site Type	Excavation Strategy	Recovered Data	Behavioral Inferences	Research Domain
Great Kiva	Re-expose 1991 test trench	Stratigraphic section	Decommisioning, use-history	III
		Architectural reconstruction	Size and depth, construction labor estimates	III
		Subfloor tests	Prior use of area, remodeling	I, II, III
	Judgmental units in great kiva	Tree-ring samples, C-14, archaeomagnetic samples	Construction date, lifespan of structure	I, III
		Fill artifacts and ecofacts	Post-collapse ritual, subsequent use of area	I, III
		Surface features, remodeling	Original, revised activities within structure	I, III
		Surface artifacts and ecofacts	Final activities within structure	I, III
		Archaeobotanical samples	Final activities within structure	III
	Stratified random sample of artifact scatter	Estimates of total accumulation of various artifact types	Intensity and nature of use over lifespan of structure	I, II, III
Pithouse Hamlets	North–south trench through pithouses	Architecture	Definition of structure, length, and depth	III
		Stratigraphic section	Decommisioning, subsequent use of area	I, III
Pithouse Hamlets	Excavate 1–2 additional quarters of main chamber and antechamber of select structures	Tree-ring samples, C-14 samples, archaeomagnetic samples	Construction date, occupation span	I
		Fill artifacts and ecofacts	Subsequent use of area	I, III
		Architecture	House size and population	III, IV
			Features, remodeling	I, III, IV
		Archaeobotanical/ pollen/soil samples	Ritual activities, subsistence, occupation span, environmental impacts	III, IV
		Surface artifacts and ecofacts	Final activities within structure	I, III
		Archaeobotanical samples	Final activities within structure	III, IV

Site Type	Excavation Strategy	Recovered Data	Behavioral Inferences	Research Domain
	Stratified random sample of artifact scatter	Estimated total accumulation of various artifact/ ecofact types	Occupation span, resident population, inter-household variation in activities	I, III
		Assemblage composition	Activity mix, chronology	I, II
		Provenance studies	Trade networks, migration	II
	Surface stripping of area northwest of pithouse	Number and size of storage features	Storage capacity, chronology	I, III, IV
		Identify stockade post-holes, if present	Size of enclosure, functional interpretation, chronology	I, III, IV
Unexcavated Pithouse Hamlets	Augering of suspected pithouse locations	Confirm additional pithouses	Chronology	III
			Decommisioning	I, III
	Geophysical imaging	Locate additional pithouses	Location and size of structure	I, IV

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Chapter 3

Remote sensing Methods and Results

by Shanna R. Diederichs

Introduction

The Basketmaker III period (A.D. 500–750) was a time of migration and transformation. Ancestral Pueblo farmers colonized the central Mesa Verde region during this period, experimenting with architectural forms, technological methods, and social organization in the process. Fundamental Pueblo material traits appeared during this time, and the "virile and progressive ensemble" of ancestral Pueblo culture came together (Kohler et al. 2008; Morris 1939:19, 43). The distribution of architecture is an important element of the Basketmaker III ensemble, providing information on the scale and organization of communities. Unfortunately, the remains of pit structure architecture in the Southwest are notoriously difficult to characterize from the surface. The reasons for this are twofold. First, pit structure architecture is inherently perishable. Built from locally available sediment and timber, these shallow earthen structures collapse and refill with erosion-deposited sediments often leaving minimal or no visible evidence of their location on the surface. Second, Basketmaker III settlements were often constructed on prime agricultural land, which was reoccupied and farmed during the following eight hundred years of Pueblo occupation (after A.D. 750) and more recently by modern dryland farmers.

The "invisibility" of pit structures presents unique challenges on several fronts: in discerning the presence of long-term habitation sites from short-term activity areas, in comparing the scale and organization of architecture, in developing reliable population estimates, and in identifying Basketmaker III period components at sites dominated by later ancestral Pueblo occupations. As such, the challenges associated with surface visibility tied to pit structure architecture have significantly impacted our ability to define Basketmaker III settlements and study their organization on a community level.

Modern remote sensing methods offer Southwestern archaeologists a new suite of tools to capture Basketmaker III pit structure distribution on a settlement scale. Remote-sensing surveys measure various types of data at regular intervals across broad areas. Specific methods can produce images of buried architecture, undetectable from a site's surface. Aerial surveys, like LiDAR (light detection and ranging), measure ground surface height to create fine-grained topographic maps. Basketmaker III pithouses can be detected with LiDAR because collapsed prehistoric pit structures are often characterized by slight topographic depressions left behind by a partially refilled structure pit. Terrestrial geophysical imaging methods contrast subsurface sediment properties to identify aberrant "anomalies" that could represent buried pit structures based on their signature. Possible pit structure anomalies and depressions can then be ground-truthed by archaeologists with direct techniques such as soil auguring or excavation.

More importantly, complementary remote sensing methods can be used to efficiently locate, image, and contextualize pit structures, which facilitates both spatial-analysis studies and the implementation of research designs with targeted excavation parameters. Different geophysical methods are sensitive to specific properties, such as magnetic fields or the flow of an electrical current in the earth. Employing a combination of methods over a survey area can help provide information as to the nature or material of an anomaly, thus providing insight for site interpretation. Mapping the distribution of anomalies over a large area can help in the recognition of anomalies generated through cultural activities and reveal the spatial distribution and association with site features (Kvamme 2003). These methods often extend beyond the usual "site boundary" unit of investigation and provide a more cohesive view of prehistoric settlement patterns, a field of study known as landscape archaeology (David and Payne 1997; Kvamme 2003).

The Basketmaker Communities Project is the first study in the Southwest to tackle Basketmaker III settlement studies at a landscape scale using geophysical imaging. Both aerial (LiDAR) and terrestrial (electrical resistivity, electromagnetic conductivity, magnetic gradiometry, magnetic susceptibility, and ground penetrating radar) methods were applied by Crow Canyon and partnering entities. These surveys were conducted at various scales across Indian Camp Ranch, the 1,200-acre Basketmaker Communities Project study area, with the purpose of identifying buried pit structures (Figure 3.1). In all, 300 acres in the southwest portion of the Ranch were intensively imaged with LiDAR. A total of 5,342 m^2 at 27 archaeological sites was surveyed using terrestrial geophysical methods. In total, 47 pit structures were located with geophysical imaging and confirmed with soil auguring and/or excavation.

In this chapter, I discuss the history of archaeological remote sensing on Indian Camp Ranch, introduce the entities and people who conducted geophysical imaging for the Basketmaker Communities Project, and provide a brief overview of the survey methods applied during the project. Geophysical survey results are discussed in detail by site, and in some cases, in groups of sites when surveys overlapped multiple sites. As demonstrated in this chapter, noninvasive remote sensing surveys are a preservation-oriented and economically feasible method to pursue broad-scale exploration of pit structure distribution in a Basketmaker III settlement context.

History of Remote Sensing

Remote sensing techniques have been sporadically applied to archaeological research in the central Mesa Verde region since the 1960s (Mink 2017). One of the first applications was a marginally successful magnetometry survey of buried structures at Mesa Verde National Park (Johnston 1965). During the 1980s, feasibility studies were conducted using ground penetrating radar to detect pit structures (Conyers 2013; Weymouth 1986). In some cases, this method was effective, but ground penetrating radar waves attenuate at shallow depths in the dense eolian silt that covers much of the region (Conyers 2013). Since that time, targeted geophysical imaging has been integrated into research and cultural resource management site mitigation, but while results have been productive these efforts have been small and unsystematic (Barker 1993; Horn et al. 2003).

One of these rare projects was conducted on Indian Camp Ranch in 1993 by Heather Barker for her master's thesis at the University of Texas, Arlington. Working with site maps from the original survey of Indian Camp Ranch (Fetterman and Honeycutt 1994), Barker surveyed 20-x-20-m grids at six sites (5MT10631, 5MT10632, 5MT10730, 5MT3907, 5MT10684, and 5MT3876) with magnetometry and electrical resistivity. The magnetometry survey was conducted with a Williams dual-bottle proton magnetometer, and the electrical resistivity survey was conducted with a Williams resistivity meter (Barker 1993). Data values were mapped and interpolated by hand. Barker identified three possible pit structure anomalies in the data and concluded that "The combined use of resistivity and magnetometer data may prove very useful in combination for evaluation of excavation potential at Anasazi sites, rather than singly as past surveys conducted on these ruins" (1993:56).

Four of these sites (5MT10631, 5MT10632, 5MT3907, and 5MT10684) were re-surveyed with electrical resistivity and magnetometry during the Basketmaker Communities Project. Two of the pit structure anomalies identified by Barker at sites 5MT10631 and 5MT10632 were confirmed to be double-chambered Basketmaker III period pithouses.

Basketmaker Communities Project Remote sensing Partners

Geophysical imaging was not part of the initial Basketmaker Communities Project research design (Ortman et al. 2011). However, once fieldwork commenced in the spring of 2011 it became all too apparent that the goals of the project could not be fulfilled without broad implementation of remote sensing to locate pit structures and provide basic size and morphology information via subsurface imaging. Hence, the Crow Canyon team pursued funding for geophysical surveys and began partnering with remote sensing specialists to develop techniques suited to imaging buried pit structures in the eolian silts of Indian Camp Ranch and implementing those methods at a sample of sites across the study area.

Basketmaker Communities Project remote sensing partners and collaborators include the Natural Resources Conservation Service (NRCS); undergraduate students, graduate students, and professors from Colorado School of Mines, Fort Lewis College, and Southern New Mexico University; the Oregon Public Broadcasting's *Time Team America* geophysical team; Fort Lewis College Center for Southwest Studies; and Powderhorn Research, LLC (Powderhorn). Mona Charles of Powderhorn was the most consistent and productive partner, working with Crow Canyon in a variety of capacities for five consecutive years. The final Basketmaker Communities Project scope and findings would not have been possible without the contributions of these remote sensing partners. Much of the methodological discussions and site-specific analyses and images in this chapter are taken directly from the interim reports they produced for Crow Canyon over the course of the project.

Natural Resources Conservation Service

Archaeologists William Wolf and Wes Tuttle of the NRCS were the first geophysical specialists to contribute to the Basketmaker Communities Project. In 2011 and 2012 they conducted electrical resistivity surveys at five sites (5MT3875, 5MT3907, 5MT10631, 5MT10632, and 5MT10647,) and magnetic gradient and ground penetrating radar at two sites (5MT10647 and

5MT10631) (Wolf 2014). Data collection was split between NRCS and Crow Canyon staff. A total of 10,480 m^2 (2.6 acres) was surveyed, and 11 pit structures were found. The NRCS surveys determined that while data collection for electrical resistivity is much slower than magnetic gradient or ground penetrating radar, resistivity was the superior technique for locating and imaging buried pit structures.

Colorado School of Mines

As partial fulfillment of their senior project in the Department of Geophysics at Colorado School of Mines, Kendra Johnson, Patricia Littman, and Travis Pitcher compared multiple remote sensing methods at two Basketmaker III hamlet sites (5MT10721 and 5MT10730) in Indian Camp Ranch to determine the best methods for imaging buried pit structures (Johnson et al. 2012). The team made two trips to the project area in November 2011 and January 2012. Under the direction of Dr. Richard Krahenbul, the team used magnetometry, electrical resistivity, conductivity, and ground penetrating radar methods to investigate suspected pit structure locations. One double-chambered pithouse was located, and the project determined that magnetometry and electrical resistivity were the most suitable methods for capturing pit structure images because of their sensitivity to shallow deposits.

Time Team America

Time Team America joined Crow Canyon in June 2013 to investigate the Dillard site (5MT10647), a Basketmaker III community center with a great kiva in the southwest portion of Indian Camp Ranch. The *Time Team America* challenge at the Dillard site was to (1) try to determine the site population, (2) better understand why a great kiva was built there, (3) gain insight into the organization of the site, (4) understand its context within the broader landscape, and (5) understand what this meant for the development of community. In the three days of magnetic gradient and conductivity surveys conducted by *Time Team America* an additional eight pit structures and a variety of other pit-like anomalies were identified in the area north of the great kiva. In collaboration with *Time Team America* an airborne LiDAR survey was conducted by Paul Kinder and Adam Riley from the Natural Resource Analysis Center (NRAC), West Virginia University. The goal of the airborne LiDAR survey was to attempt to identify possible site features and to contribute to a broader landscape perspective for interpreting the Dillard site.

This work was undertaken as part of the filming of Season 2 of the PBS prime-time program *Time Team America*. The program was co-produced by Oregon Public Broadcasting and Videotext LLC and funded entirely by a National Science Foundation Informal Science Education grant. Meg Watters was the Remote Sensing and Visualization Coordinator for the television program. Members of the *Time Team America* geophysical survey team include Bryan Haley from Tulane University and Duncan McKinnon from the University of Arkansas. The survey results were later presented in a chapter in *Archaeological Remote Sensing in North America: Innovative Techniques for Anthropological Applications* (Diederichs et al. 2017).

Fort Lewis College Center for Southwest Studies

In 2012 a field crew from Fort Lewis College Center for Southwest Studies was contracted to survey portions of three sites (5MT10647, 5MT10736, and 5MT10711). The team, headed by Mona Charles, surveyed a total of 6,800 m^2 with electrical resistivity (Charles 2012). Portions of this work were done in tandem with the filming of *Time Team America*, and the survey results for 5MT10647 were presented on the show. The electrical resistivity surveys successfully located and imaged 10 pit structures.

An additional site (5MT10637) was surveyed in the fall of 2012 by Fort Lewis College student Jane Cooper for her senior thesis (Charles 2013). A single 20-x-20-m grid was surveyed five times using electrical resistivity and magnetometry at various increments to develop a best practices methodology. One double-chambered pithouse was imaged. The study found that low-resolution magnetometry was suitable for locating Basketmaker III pithouses, and high-resolution electrical resistivity could result in a detailed pit structure image.

Powderhorn Research

Over the course of 2013, 2014, 2015, and 2016 Crow Canyon partnered with Powderhorn to conduct additional geophysical studies across Indian Camp Ranch. Crow Canyon personnel conducted electrical resistivity surveys in the field, and Mona Charles of Powderhorn conducted magnetometry surveys, processed all field data, produced interpretive maps, and wrote annual reports on the geophysical survey results.
Eight sites (5MT3882, 5MT10673, 5MT10651, 5MT3890, 5MT10736, 5MT3875, 5MT10709, and 5MT10627) were surveyed with electrical resistivity in 2013 (Charles 2013). Thirty 20-x-20-m grids were targeted for a total survey area of 12,000 m^2. As previously determined, electrical resistivity was a productive survey method, and 11 buried pit structures were located.

Work in 2014 and 2015 reflected electrical resistance surveys at 5MT10684, 5MT10685, 5MT10686, 5MT10687, and 5MT2037, collectively designated as the Hatch site group (Charles 2014, 2016a). Eight grids east of the Hatch site group, designed as the East Ridge were also surveyed. In total, 23 20-x-20-m grids were surveyed for a total area of 9,200 m^2. The Hatch group is a Pueblo II to Pueblo III complex with at least one possible Chacoan great house. The group was intensively surveyed to locate any earlier Basketmaker III pit structures and relocate and excavate late-Pueblo architecture. Two late Pueblo II/early Pueblo III kivas were found and excavated, but no Basketmaker III pit structures were identified.

In 2016 electrical resistance surveys were conducted at sites 5MT3873, 5MT2032, and 5MT3891. In total, 12 20-x-20-m grids were surveyed to cover a 4,800-m^2 area. The surveys at 5MT3873 and 5MT2032 were small and targeted, and one pit structure was imaged at 5MT2032. The 5MT3891 survey was much broader and located five pit structures and five pit rooms dating to the Pueblo I period based on surface pottery at the site.

Amanda Hernandez

Amanda Hernandez collected electrical resistivity data for the Basketmaker Communities Project as a Crow Canyon Field Intern in 2012 and as a Seasonal Archaeologist in 2013 and 2014. For her master's thesis at New Mexico State University, *Geophysical Surveys for Examining Basketmaker III Subsurface Structures and Features: A Comparative Analysis and Synthesis of Geophysical Survey Projects Conducted at Indian Camp Ranch, Cortez, Colorado*, she compared the electrical resistivity and magnetic gradient survey results from 5MT10647, 5MT10631, and 5MT3890 (Hernandez 2015). She concluded that modern disturbance impacts the geophysical signature of buried structures and that a combination of magnetic gradient and electrical resistivity most effectively images pit structures in loess soils.

Methods

The remote sensing techniques applied during the Basketmaker Communities Project fall into five method categories: (1) LiDAR; (2) electrical resistivity; (3) electrical conductivity; (4) magnetic susceptibility; and (5) ground penetrating radar. Due to the ground cover and inherent data-collection rate for different geophysical survey methods, coverage and rate of collection were different for each remote sensing method. In this section, each method will be discussed in general, and the various equipment applied to each method will be introduced.

Most geophysical survey areas were established by Crow Canyon surveyors and tied into the Basketmaker Communities Project grid. Survey areas not established prior to geophysical work were mapped with a total station and brought into the Basketmaker Communities Project GIS mapping project. This spatial control allowed for the Crow Canyon field crew to accurately relocate geophysical anomalies for confirmation with soil augers and/or excavation.

LiDAR Imaging

Airborne LiDAR measures the height of the ground surface and any features (i.e., trees, buildings) that may be on it and provides high-definition and accurate models of the landscape to a high resolution for use in archaeological applications. LiDAR uses a pulsed laser beam that scans from side to side as a plane flies at a low altitude over the survey area collecting 20,000 to 100,000 points per second to build the ground model. In post-processing the first returns can be removed from the data to create a "bare earth" model (or Digital Terrain Model [DTM]) that accurately represents the ground surface.

The *Time Team America* airborne LiDAR data were acquired by the NRAC, West Virginia University. NRAC operates an OPTECH ALTM-3100C airborne laser (small-footprint) mapping system (Watters 2013). The system integrates a laser altimeter, a high-end Applanix Pos/AV Inertial Measurement Unit (also called an Inertial Navigation System), and a dual-frequency NovAtel GPS receiver. This integrated system is capable of 100 kHz operation at an operating height of 1,100 m (3,609 ft). LiDAR technology offers fast, real-time collection of 3-D points that are employed in the creation of Digital Elevation Models, DTMs, landscape feature extraction, forest-stand structure analysis, and many other research applications.

Data were collected in multiple, low-altitude acquisition passes over the core area of the Dillard site to yield ground LiDAR point densities of 15–20 per m^2. Integrated data have a vertical error of 15 cm or less at the 95 percent confidence level for areas of open terrain and 10 degrees or less for areas with moderate slopes (based off manufacturer's specifications). Data are recorded in the applicable Universal Transverse Mercator zone, NAD83 datum (CORS96); heights are orthometric, referenced to the North American Vertical Datum of 1988 (NAVD88) using GEOID09.

Electrical Resistivity

Resistance survey is designed to measure the electrical resistance of the earth to provide information on the subsurface structure of the sediments and geology. The electrical properties of the earth are recorded as a function of depth and/or horizontal distance. An electrical current is introduced into the earth through electrodes, and the resulting potential distribution is sampled at the ground surface. The measured apparent resistivity provides information on the magnitude and distribution of the electrical resistivities in the volume of the sampled subsurface (Griffiths and King 1981).

An electric current is caused by the flow of charged particles and is measured in amperes (amps). Amperage expresses the amount of charge that passes any point in a circuit in one second. A measurement of the ground resistivity is made by passing an electrical current into the ground through an electrode acting as the current source (Figure 3.2). A second electrode, or current sink, enables the electrical current to exit from the ground, thus completing the circuit. The current flows into the earth in all directions from the source electrode.

If the ground is inhomogeneous and a fixed electrode array is moved or the electrode spacing is varied during survey, the calculated resistivity will vary for each measurement. The resistivity of the earth can vary greatly depending on the composition and structure of the material and groundwater saturation. Not only does resistivity vary with rock formations, it also varies from deposit to deposit and on a macro scale within individual deposits depending upon their structure. Resistivity values can vary greatly due to the unconsolidated nature of near-surface materials. The principles provided for basic rock formations can be followed when considering the structure of the near surface and resistivity mapping for archaeological applications (Griffiths and King 1981).

The nature of the archaeological features, the mineral content and compaction of soils in which they are buried, and the saturation levels of the subsurface all affect earth resistivity. The saturation of the subsurface is dependent on rainfall, soil composition and compaction and subsequent percolation rates, evaporation rates, and water take-up through the roots of vegetation. Weather and geological conditions impact the effectiveness of resistance surveys in archaeological applications and dictate careful consideration of resulting data (Clark 1996).

A number of electrode arrays are used in resistance surveys. The array, or configuration, refers to the arrangement of electrodes. Linear arrays, which are commonly used, consist of two current electrodes (A and B) and two potential electrodes (M and N). The twin-electrode array is the most popular for archaeological surveys (Figure 3.3). Due to the relative speed of data collection, the benefits of the resulting survey include a high lateral resolution and depth of investigation relative to the spacing of the mobile electrodes (Apparao and Roy 1971; Apparao et al. 1969). The basic twin-electrode array used in archaeological applications can be seen in Figure 3.3 where single current (A) and potential (M) electrodes are set with a fixed distance (a) with the second pair of electrodes (B and N) are placed at a distance 30 times the spacing (a) of the primary electrodes (A and M) and fixed separation distance (a) the same as the mobile probe spacing.

The depth of investigation can be defined as the depth at which a thin horizontal layer makes the maximum contribution to the total measured signal at the surface (Barker 1989; Evjen 1938; Roy 1972; Roy and Apparao 1971). The separation distance and positions of the current and potential electrodes fundamentally contribute to calculating the most accurate depth estimation. The depth of investigation of electrode arrays should be the depth with which a measurement of apparent resistivity is best associated. Although there is no single depth of investigation, a single value is more useful to have as a reference. The most practically useful value is the median depth (Barker 1989). The median depth is defined as the depth from below which and from above which 50 percent of the signal originates.

Geoscan RM 15

All NRCS, Fort Lewis College, and Powderhorn electrical resistivity surveys for the Basketmaker Communities Project were conducted with Geoscan Research RM15-D Resistance Meters operated in twin-electrode mode. This setting provides an effective response depth between 10 and 100 cm. The RM15-D was configured to operate at 40 v output and 1 ma current. Data were generally collected every 0.5 m along each traverse, with traverses separated by 1 m, and was done in zig-zag mode. This sampling combination produced a dataset of 800 readings per 20-x-20-m grid.

The recorded values were downloaded to a laptop computer and viewed at the end of each day using Geoscan Research GEOPLOT. Subsequent laboratory processing typically consisted of removal of data spikes and applying a high-pass filter. These processing techniques can enhance the visibility of small, low-contrast features and set the mean of the data set to zero. In doing so, the resulting data image presents areas with greater than or less than the local average resistance of the area.

The resulting composite grids were the principal files manipulated in Geoscan Research GEOPLOT. At the completion of post-processing, the composite data were exported into a Surfer binary file (grd or ascii) extension. These files were brought into Golden Surfer software where the final maps were created. Finally, maps were exported in an image format for final publication.

Magnetic Gradient

Magnetometers are passive instruments that measure the magnetic-field strength of a specific location on the surface of the Earth. The Earth's magnetic field varies depending on location relative to the Earth's equator and can be visualized as a large bar magnet that is tilted 11 degrees from the axis of rotation (Heimmer and Devore 1995). Over a small area and in homogeneous soils, the magnetic field is expected to be uniform (Weymouth 1986). A subsurface target can be detected with magnetic survey as a deviation from this background field reading. The resultant anomaly often has a dipolar form aligned with the dip and direction of the Earth's field (Figure 3.4). The most common unit of measure is the nanoTesla (nT).

The magnetic signal of a target is composed of two parameters: induced and remnant magnetism (Reynolds 1997). A magnetometer measures the remnant magnetism of a target, which is permanent and may be caused by the presence of highly magnetic rock compounds or thermal alterations to soils that have high iron content (Heimmer and Devore 1995). Magnetization caused by thermal alteration is called thermoremanence, and it occurs at maximum expression at temperatures above about 600 degrees Celsius, but there is some effect at any elevated temperature (Aitken and Alldred 1964).

Induced magnetism is only visible in the presence of a magnetizing field. However, the Earth serves as a constant magnetizing agent and, therefore, it can be sensed by a magnetometer. The induced magnetism is generally referred to as magnetic susceptibility. Magnetic susceptibility is greater in the topsoil and soils that are organically rich, but these soils often produce relatively subtle anomalies (Clark 1996). Therefore, excavations that rearrange the topsoil are sometimes evident in magnetic surveys, but these are rather weak in strength.

Thermoluminescence is permanent magnetization and can be caused by firing beyond the Curie point, which effectively demagnetizes the oxides. Upon cooling, the oxides are remagnetized by the Earth's field and aligned with the geomagnetic field at the time of the firing. In cases of pottery kilns, hearths, and roasting pits, the magnetism is relatively strong and can be easily detected (Aitken and Alldred 1964; Hasek 1999). Subtler features such as unfired pits, house fills, unfired pit structures or kivas, and ditches can also be detected with the magnetometer because topsoil is normally more magnetic than underlying subsoil or bedrock. When features are filled, either intentionally or unintentionally with topsoil, they will produce a positive magnetic signal. Less-magnetic material intruding into the topsoil, such as many kinds of masonry, can be detected by a subtractive effect, which gives a negative magnetic reading (Clark 2000). Highly magnetic (ferrous) items can produce dipole readings (high and low).

Interpretation of magnetic imagery begins by identifying anomalies, which may have strong high- and low-amplitude values (Bevan 1998). Next, metal objects can be identified from the shape and amplitude. Anomalies with strong, narrowly spaced dipoles or strong monopoles are usually produced by ferrous metal objects. If targets are relatively large and the amplitude is not extreme, the shape may be approximated in the magnetic imagery (Bevan 1998). Little information about the depth of a target is obtained with magnetic survey. In some cases, the half-width rule can be used to estimate target depth. The half-width rule depends on the amplitude drop-off for readings over a target and assumes a simple and regular target shape (Bevan 1998). However, except for buried iron targets, this technique is often not useful for archaeological targets.

Geoscan Fluxgate Gradiometers

NRCS used a Geoscan Research FM256 Fluxgate Gradiometer (Wolf 2014) to conduct magnetic gradient surveys. Fort Lewis College and Powderhorn employed a similar Geoscan Fluxgate Gradiometer (type unknown) for their Basketmaker Communities Project surveys (Charles 2012; 2013; 2014; 2016a; 2016b). These instruments contain two fluxgate magnetometer sensors that are fixed vertically 50 cm apart. The sensors record the magnetic field at each point along the survey traverse, and the instrument calculates and records the difference (the gradient) in the instrument's memory. The instrument is capable of recording deviations in the magnetic field at a level of 0.1 nT (the magnetic-field intensity of the Earth is approximately 55,000 nT in the Montezuma County area). Recording the gradient of the magnetic field removes the effects of the Earth's natural diurnal "drift" in magnetic values.

The NRCS gradiometer was configured to record eight measurements per meter (1 reading every 0.125 m). Both surveys used traverse intervals of either 0.5 or 1.0 in both north–south and east–west zig-zag patterns. Data were processed using Geoscan Research GEOPLOT, version 3.0 software.

Bartington 601 Fluxgate Gradiometer Time Team America

The *Time Team America* geophysical team surveyed the Dillard site (5MT10647) with a Bartington 601 fluxgate gradiometer. The *Time Team America* gradiometer was also configured to record eight measurements per meter (1 reading every 0.125 m). Transect spacing was set at 0.5 m, and data were collected in an east–west zig-zag pattern starting in the southwest corner of the grid (Figure 3.5).

Electromagnetic Conductivity

Electromagnetic induction instrumentation uses a near-surface transmitter coil to emit radio frequency electromagnetic waves into the subsurface. Objects in the subsurface respond by generating eddy currents, producing a secondary electromagnetic field (Figure 3.6). This secondary electromagnetic field is proportional to conductivity and detected by a receiver coil on the instrument and recorded by an attached data-logger (Bevan 1983; Clay 2006).

Magnetic susceptibility measures "a material's ability to be magnetized" (Dalan 2006:26). It is different from magnetic gradiometry in that susceptibility is an active measurement recorded in the presence of an induced magnetic field. The transmission of the in-phase component of the induced electromagnetic field is based on the presence of a magnetic topsoil matrix that is greater in magnetism than proximate soil matrix or materials. The increase in magnetism in topsoil is the result of pedogenesis enhancement from hematite, magnetite, and maghematite minerals. Additionally, changes to the magnetic composition of the soil can be caused by human activity, such as fire or the movement of magnetically rich topsoil (Dalan 2006).

Geonics Limited EM38B

The *Time Team America* geophysical team employed a Geonics Limited EM38B during the Dillard site (5MT10647) survey that allowed for simultaneous collection of both quadrature-phase (electromagnetic conductivity) and in-phase (magnetic susceptibility) components. Electromagnetic conductivity measures the "ability of the soil to conduct an electric current" (Clay 2006:1) and is recorded in siemens (mS/m). Theoretically, electromagnetic conductivity is the inverse of resistivity, although methods for recording each are completely different (voltage, sample spacing, soil, volume, sensitivity to metals) and results may not match entirely. The transmission of the quadrature-phase component of the induced electromagnetic field signal is related to the mineral and chemical composition of the soil. Soils high in clay and/or saline composition will produce higher conductivity measurements, whereas soils composed of sand and/or silt will produce a lower conductivity measurement. Levels of soil moisture also have a dramatic impact on conductivity measurements—increased moisture will cause higher conductivity readings (Clay 2006).

Both quadrature-phase and in-phase readings were simultaneously collected for each station (two samples per meter), relating to conductivity and magnetic susceptibility properties, respectively (Figure 3.7). This specification resulted in a maximum depth sensitivity of about 1 m for the conductivity. For the magnetic susceptibility, the penetration was significantly shallower. Transect spacing was set at 0.5 m and collected in south to north parallel sweeps.

Geonics Limited EM38B data were processed using GEOPLOT 3.0. Null values were added in a text editor so that grid lengths and widths were in multiples of 10 m, and these were used to create a single composite data set. Data processing methods include a despike operation and a 3-x-3 low pass, as well as the addition of a 10-x-10 high-pass filter to a second version. The magnetic susceptibility data were processed in a similar fashion, without the creation of the second, high-pass, filtered version.

Ground Penetrating Radar

Ground penetrating radar is a technique that uses high frequency radio waves, yielding data with very high resolution in a short amount of time. This technique uses electromagnetic waves that travel at a specific velocity determined by the permittivity of the material. Velocities will differ based on the kind of material due to difference in electrical properties and will thus provide responses at different times (Ducman et al. 2018). Depths of anomalies are measured based on the time lapse between the emission and reception of a wave when reflected back to the instrument (Witten 2006).

Both the NRCS and *Time Team America* teams assessed the viability of ground penetrating radar methods to detect buried pit structures: NRCS at 5MT10631 and *Time Team America* at Site 5MT10647. Both test runs determined that ground penetrating radar was an ineffective technique for detecting Basketmaker III pit structures on the Basketmaker Communities Project. Ground penetrating radar waves became highly attenuated in the dense silt loess of the project area. This was exacerbated by the lack of density contrast between pit structure floors and surrounding sediments.

Remote Sensing Results

Geophysical surveys captured 5,342 m^2 of terrestrial data on 25 sites and 300 acres of LiDAR-derived topography in the southwest corner of Indian Camp Ranch. Electrical resistivity and magnetic susceptibility were the most effective methods (see Method Comparisons section of this chapter), allowing Crow Canyon to locate 55 buried pit structures in various settings across the study area (Table 3.1). About half of these pit structures were confirmed using 3-in soil augers, which can expose pit structure roofing and floor deposits up to 1.75 m deep. The other pit structures were confirmed with partial or complete excavation. The pit structure anomalies identified with electrical resistivity at 5MT3891 were not ground-truthed.

In the following section remote sensing results are summarized by site or groups of sites (in cases where sites were surveyed together).

5MT10631 Mueller Little House Site and 5MT10632

Sites 5MT10631 and 5MT10632 are adjacent Basketmaker III hamlets located on a north–south ridge on the eastern edge of Indian Camp Ranch. Both sites were surveyed with resistivity and conductivity in the 1990s (Barker 1993) with limited results. In 2013 the NRCS, with the help of Crow Canyon field staff, surveyed a combined 7,600 m^2 of the ridgetop, encompassing both sites of the ridge (Figure 3.8). The survey was very effective. A double-chambered pithouse, diagnostic of the Basketmaker III period, was imaged at each site along with a few small anomalies (a pit structure), on 5MT10631. Both pithouses were auger tested, and the pithouse at 5MT10631(Mueller Little House) was excavated in 2015 and 2016 (see Chapter 9).

5MT10637

Site 5MT10637 is a Basketmaker III hamlet located less than 100 m northeast of Mueller Little House (5MT10631). In 2012, Fort Lewis College student Jane Cooper led electrical resistance and gradiometer surveys over a single grid at 5MT10637 for the purpose of determining the efficacy of different geophysical instruments using a variety of survey methods (Figure 3.9).

Data collection for the resistance survey consisted of surveying the same grid three times with the following survey design: (1) intervals of two samples per meter and a transect interval of 1 m for a total of 800 samples per grid, (2) intervals of two samples per meter and a transect interval of 0.5 m for a total of 1,600 samples per grid, and (3) intervals of one sample per meter and a transect interval of 1 m for a total of 400 samples per grid. A double-chambered pithouse was clearly visualized by the higher-intensity sample collection methods that had 800 and 1,600 samples per grid (Figure 3.10), and the 1,600 samples-per-grid method produced the clearest image of the structure.

In the gradiometer survey, two sampling designs were implemented for the same grid: (1) eight samples per meter and a 1-m transect interval for a total of 3,200 samples per grid and (2) eight samples per meter and a 0.5-m transect interval for a total of 6,400 samples per grid. The image output from both gradiometry surveys detected the halo in the shape of the pithouse outline and a small central anomaly, which is likely the main chamber hearth (Figure 3.11). Two other possible burned (or at least highly magnetic) features are visible along the left edge of the grid but are more prominent along the bottom line to the south. The source of these anomalies is not known, but the anomaly at the bottom of the grid could represent an extramural thermal feature.

The double-chambered pithouse was confirmed by Crow Canyon auger testing after it was detected by remote sensing. The structure was nicely detected by both instruments, and the results provide complementary information.

5MT10647 Dillard Site

The Dillard site (5MT10647) is an aggregated Basketmaker III settlement with a great kiva in the southwest portion of Indian Camp Ranch (see Chapter 5). The site was the primary focus of Basketmaker Communities Project investigations and was surveyed with multiple geophysical imaging methods followed by extensive excavation.

The Dillard site encompasses 7 acres of a north to south–trending ridge. Sagebrush interspersed with pinyon and juniper covers the entire site. Historic chaining and recent burning of the downed material across the property have noticeably impacted the surface.

Prior to Basketmaker Communities Project investigations, Woods Canyon tested a large circular depression at the site and confirmed it to be a Basketmaker III great kiva (Fetterman 1991). Based on the lack of surface evidence for additional pit structures at the site, Crow Canyon presumed that few, if any, habitation structures accompanied the great kiva.

2011 Surveys

To test this presumption, NRCS sampled a small area of the site with electrical resistivity and magnetic susceptibility at the outset of the Basketmaker Communities Project. A 40-m-x-20-m block just south of the great kiva was surveyed with both methods (Figure 3.12). Although this survey covered less than five percent of the site's total area, 10 potential pit structure anomalies were identified in the electrical resistivity images. Soil auguring and excavation determined that nine of the 10 anomalies were pit structures.

2012 Surveys

Based on the productive results of the NRCS 2011 survey, Crow Canyon solicited additional remote sensing over the north half of the Dillard site. In June of 2012, several geophysical surveys were undertaken as part of the *Time Team America* television episode focused on determining the number of habitation structures at the site. Magnetic gradient, conductivity, and resistivity surveys were conducted at various scales across the north half of the Dillard site (Figure 3.13) (Charles 2012; Diederichs et al. 2017; Watters 2013). Due to the ground cover and inherent data-collection rate for different geophysical survey methods, coverage was different for each method. Magnetic gradient survey covered the entire research area targeted for survey (north of the great kiva to the north site boundary), while conductivity/magnetic susceptibility and resistance surveys covered smaller areas. A cattle protection fence around the site was removed to enable effective survey with instruments sensitive to iron.

The team from Fort Lewis College surveyed 11 grids (4,400 m^2) in the northern half of the Dillard site with electrical resistivity. Seven possible pit structure anomalies were identified in the data directly north of the great kiva (Figure 3.14). Six other anomalies were suggested as reflecting other types of cultural modification (foot paths, stockade fences, mechanical disturbance), either prehistoric or modern. Excavation and soil auguring confirmed that the southern five electrical resistivity anomalies were indeed pit structures. Soil auguring of the other anomalies found shallow or mixed cultural deposits, uncharacteristic of buried pit structures.

Magnetometry

The *Time Team America* magnetic gradient survey covered 9,600 m^2 of the Dillard site from the great kiva to the northern site boundary (Figure 3.15). Numerous possible pit structure and extramural thermal-feature anomalies were identified in the displayed magnetic data. The modern burned windrows also stood out clearly as strong, linear magnetic anomalies. Iron stakes or nails also stood out as very highly contrasting black and white anomalies, either as monopoles (Figure 3.16a), or as dipoles oriented to magnetic north (Figure 3.16b).

Interpretations of the magnetic gradient survey results were divided into three categories: individual anomalies, general areas of interest, and possible pit structures (Figure 3.17). Individual anomalies were investigated to determine whether they represented modern metal contamination or small-scale prehistoric thermal activities. Areas of interest were identified as a “clustering” of anomalies that could represent activity areas. Of the eight possible pit structure anomalies identified, seven were confirmed as pit structures after soil auguring and/or excavation. As part of the ground-truthing, anomalies that appeared as a double “ring” of magnetic points encircling several pit structures to the north of the great kiva were sampled and revealed as extramural post holes likely associated with a stockade fence encircling one or more pithouses.

The *Time Team America* conductivity survey covered 4,000 m^2, and several possible archaeological anomalies were mapped (Figure 3.18). Conductivity values ranged from 10.2 (white) to 12.33 (black) mS/m, which is a very small range. Because the instrument employed on the survey (EM38B conductivity meter) is sensitive to instrument orientation and height above the ground surface, the sage-covered Dillard site was difficult to survey, and some errors may have been projected into the results. Three of the more obvious anomalies north of the great kiva were confirmed as buried pit structures, and a north–south linear anomaly was found to reflect the modern footpath through the site.

The *Time Team America* magnetic susceptibility survey covered the same 4,000 m^2 of the Dillard site as the conductivity survey. The data values for the magnetic susceptibility survey range from 0.13 (white) to 0.50 SI (black). Several of the confirmed pit structures north of the great kiva appeared as anomalies in the conductivity results (Figure 3.19), but the results were less refined than in the conductivity images.

Ground penetrating radar was tested in a few locations across the Dillard site but was ruled out as an effective technique due to the soil properties and failure of ground penetrating radar to record any useful information. Part of this testing was conducted over the balk of the excavation trench at the great kiva where the stone foundation of the kiva should easily have been recorded if ground conditions had been amenable.

On May 9, 2012, an airborne LiDAR survey was flown by Paul Kinder and Adam Riley from the NRAC, West Virginia University. The goal of the airborne LiDAR survey was to attempt to identify possible site features and to contribute to a broader landscape perspective for interpreting the Dillard site. The resulting "bare earth" model from the LiDAR data provided an excellent DTM of the landscape at less than 5-cm relief accuracy (Figure 3.20). Despite this accuracy, the only surface depression of pit structure size noted on the Dillard site was the great kiva. Nevertheless, this tool was invaluable—viewing the Dillard site draped on LiDAR data shows its location within the broader natural and cultural landscape.

5MT10651 and 5MT3882

Sites 5MT10651 and 5MT3882 are adjacent sites located near the center of the Indian Camp Ranch. Site 5MT10651, to the north, is a 1,480-m² scatter of small pieces of sandstone and artifacts dating to the Basketmaker III or Pueblo I period. Site 5MT3882 is a Pueblo II site with an arching roomblock and central kiva (Hampson and Chuipka 2020). A modern house is directly east of both sites, and there are signs of mechanical disturbance and heavy compaction due to a two-track road at Site 5MT10651. Five nearly adjacent grids between the two sites, covering 2,000 m^2, were surveyed with electrical resistivity by Powderhorn in 2013 (Charles 2013). Three grids were surveyed at Site 5MT10651, and one was surveyed at 5MT3882. Though collected in tandem, the site data for each site were processed separately.

The data from Site 5MT10651 were skewed by a mechanical problem in the central grid. Despite these issues, the data were post-processed, and the resulting map indicates the possibility of buried cultural features (Figure 3.21). The north–south bladed road is visible in the resistance data. The other visible anomalies were not further confirmed.

The single surveyed grid on site 5MT3885 was marginally productive (Figure 3.22). A circular anomaly was detected in the center of the grid. Excavations by the landowner, Ginny Kistler, found that this anomaly corresponds to a partially stone-lined kiva dating to the Pueblo II period (Hampson and Chuipka 2020).

5MT10674

Site 5MT10674 is located in a low-lying plowed field in the south-central portion of Indian Camp Ranch. Prior to heavy farming, the site was recorded as consisting of a Basketmaker III linear rock scatter, possible pit structure depression, and midden (Fetterman and Honeycutt 1994). The pithouse depression was slight and not definitive according to the surveyors. The scatter of flaked lithics, pottery, and rock concentrations cover an area of about 6,274 m^2.

In 2014 Crow Canyon surveyed 1,200 m^2 in the vicinity of the site, and the data were processed and interpreted by Mona Charles of Powderhorn. The site pole marker was missing from the site, so three grids were surveyed to capture the previously identified pit structure location (Figure 3.23). The resistance survey found a low-resistance linear anomaly running from the southwest to the northeast, a pattern that gives the impression that the anomaly is historic in nature and could be a buried utility line. An oblong feature in the southwest grid was identified as a probable pit structure. The size and shape are similar to pit structure anomalies at other Basketmaker Communities Project Basketmaker III sites. This anomaly was not soil augured or tested to confirm whether it represents a buried structure.

5MT10704

Based on surface indications, site 5MT10704 is a Basketmaker III period hamlet. The site is located on a north to south–trending ridge in the eastern portion of Indian Camp Ranch. It is the southernmost Basketmaker III hamlet of the five known hamlets along the same ridge.

In 2011, Crow Canyon and NRCS surveyed 800 m^2 of site 5MT10704 with electrical resistivity (Figure 3.24). One diagnostic Basketmaker III double-chambered pithouse anomaly was identified.

5MT10709 and 5MT10627

Surveyed in 2013, Sites 5MT10709 (north) and 5MT10627 (south) are adjacent Basketmaker III sites on a north–south ridge in a pinyon/juniper woodland near the middle of Indian Camp Ranch. Small bedrock outcrops are exposed on the ridge. The site boundary between the two sites was arbitrarily drawn, and together 5MT10709 and 5MT10627 likely comprise a single Basketmaker III hamlet. A driveway runs along the east edge of the sites, and some bladed materials were deposited in mounds on the sites.

In 2013, Crow Canyon conducted an electrical resistance survey across the site, and Mona Charles of Powderhorn processed and interpreted the data. The survey covered 800 m^2. The electrical resistance results were not entirely definitive and likely reflect near-surface bedrock seams and modern ground disturbance (Figure 3.25). Crow Canyon conducted auger testing and find a double-chambered pithouse that generally coincides with the dark gray negative-ohm anomaly in the southernmost grid.

5MT10711 Ridgeline Site

Site 5MT10711 (the Ridgeline site) is a substantial Basketmaker III habitation located on the crest of the slope of a high north–south ridge on the west edge of Indian Camp Ranch. Directly to the southeast is the site at the center of a Basketmaker III habitation complex on the ridge, Site 5MT2032 (the Switchback site). A driveway runs along the east edge of the site, and there is evidence of chaining and small-scale mechanical disturbance across the site.

In 2012, Fort Lewis College surveyed 1,600 m^2 of the site with electrical resistivity (Figure 3.26). Six anomalies of different sizes and intensities were identified. A linear feature is evident running northeast to southwest and has 4 to 5 small high-resistance readings spaced equidistant along the line. This anomaly is definitely cultural but is likely modern in origin. Two similar anomalies were identified with almost identical electrical resistance signatures in the northwestern portion of the survey. Auger testing proved them to be natural near-surface

B-horizon signatures. The very high readings in the northern portion of the data probably represent the underlying geology.

The double-lobed anomaly in the central-west portion of the survey was auger tested, which confirmed that it was a buried and highly burned pit structure (Figure 3.27). Excavation of the structure in 2016 and 2017 revealed it to be a rare Basketmaker III oversized double-chambered pithouse (see Chapter 8).

5MT10721

5MT10721 is a Basketmaker III hamlet located in a partially cleared pinyon and juniper woodland at the center of Indian Camp Ranch. Undergraduate students from the Colorado School of Mines experimented with various geophysical methods at the site over the course of two trips in the fall of 2011. Data from the first trip were deemed unsuitable for detecting near-surface anomalies. The second survey was more successful and is discussed here.

The crew established a 27-x-23-m grid over the probable pithouse location (Figure 3.28). They surveyed portions or all of this grid with magnetic susceptibility, electrical conductivity, electrical resistivity, and ground penetrating radar methods (Figure 3.29).

Ground penetrating radar was not successful using either antenna at this site. The on-screen data showed that the instrument reacted more to small-scale surface features, such as sagebrush, than to the near-surface features of interest (i.e., the pit structures). Ground penetrating radar data were not processed or interpreted.

The magnetic susceptibility, electrical conductivity, and electrical resistivity surveys were variably successful at imaging a double-chambered pithouse confirmed later with soil auger testing. The location of the pit structure was best captured by the magnetic susceptibility survey, but the electrical conductivity and electrical resistivity images better portray the shape of the building.

5MT10730

5MT10730 is a Basketmaker III hamlet located in a partially cleared pinyon and juniper woodland at the center of Indian Camp Ranch about 200 m north of 5MT10721. Undergraduate students from the Colorado School of Mines experimented with magnetic susceptibility and ground penetrating radar at the site in November 2011.

The crew established a 22-x-22-m grid over the most probable pit structure location at the site. Two magnetometry surveys were conducted, one in the east–west direction and one in the north–south direction. The ground penetrating radar survey was conducted using both 1,000-MHz and 500-MHz antennas. Data collection was incredibly difficult for all surveys because trees and other plants crowded the grid. Lines were not straight, pace was inconsistent, and the forced routes and plant noise contaminated the data. No possible pit structure anomalies were detected by either method (Figure 3.30).

5MT10736 TJ Smith Site

The TJ Smith site (5MT10736) is a Basketmaker III site located in a plowed field in the northeast portion of Indian Camp Ranch. Multiple geophysical surveys were conducted at the site over the course of the Basketmaker Communities Project in an attempt to locate buried structures and features.

In 2011, NRCS surveyed an 800-m^2 area with magnetic susceptibility (Figure 3.31). Numerous dipole anomalies, put off by pieces of modern iron, partially impacted the readings. However, a strong reading from a possible pit structure also produced an anomaly.

Guided by the NRCS magnetometry results, the Fort Lewis College team surveyed 800 m^2 with electrical resistivity in 2012 (Figure 3.32) (Charles 2012). In the spring of 2013, Crow Canyon conducted a second resistance survey with grids to the south and east of the initial two surveys to expand the dataset (Figure 3.33). The combined 2,400 m^2 of resistivity data were then processed and interpreted by Mona Charles of Powderhorn (Charles 2013).

When both sets of data were combined, a very large anomaly was detected running along the western edge of the grids. Due to its size and intensity the anomaly likely represents subsurface geology. A probable pit structure anomaly was detected in the central-west portion of the survey. Auger testing and excavation confirmed that this anomaly represented the main chamber of a Basketmaker III pithouse.

5MT2032 Switchback Site

The Switchback site (5MT2032) is a long-term Basketmaker III habitation on the prominent ridge on the eastern edge of Indian Camp Ranch, overlooking the Dillard site on the next ridge to the east. The Switchback site is on the eastern slope of the ridge in dense pinyon and juniper woodland and is considered to be part of the Basketmaker III aggregated habitation complex around the Ridgeline site (5MT10711), which is 25 m to the northwest. A driveway runs along the crest of the ridge, dividing the Switchback and Ridgeline sites.

In 2014 and 2015, the Crow Canyon field crew found the main chamber of a Basketmaker III pithouse with soil auger tests and excavated a 2-x-2-m unit in the center of the chamber. The excavation unit did not identify any of the pithouse walls and did not clarify the structure's orientation. In 2016 after the excavation unit was backfilled, the Crow Canyon field crew and Mona Charles of Powderhorn surveyed 400 m^2 with electrical resistivity over the pithouse area in an attempt to determine the structure's size and orientation. Data resolution was increased by decreasing the sample interval to 0.5 m rather than the standard 1-m interval. Survey was especially challenging in the thick dendritic branches of the juniper, and a large number of data points had to be dummy logged during the course of the survey.

The results of the survey marginally clarified the size and orientation of the structure (Figure 3.34), though the structure's outline was diffuse. Equally important, the resistivity survey captured anomalies northeast and southeast of the pithouse that could represent adjacent pit structures (Figure 3.35).

5MT3873 Ladle House

Site 5MT3873 is a multicomponent Basketmaker III and Pueblo II habitation site on the ridgetop 40 m southwest of Portulaca Point (5MT10709), which is at the center of Indian Camp Ranch. It was first recorded in 1983 and 1984 by Crow Canyon (Lightfoot 1985) and partially excavated by Woods Canyon (Fetterman and Honeycutt 1994). Excavation focused on the Pueblo II surface rooms and kiva, but portions of a Basketmaker III pithouse were exposed in units under the Pueblo III midden deposits southwest of the kiva.

In 2016, the Crow Canyon field crew surveyed 800 m^2 with electrical resistivity on the east side of the ridge, about 45 m from the excavated kiva. Powderhorn processed and interpreted the data. This area was chosen for remote sensing because many Basketmaker III pottery sherds, an upright slab feature, and deep-level soils were in the vicinity, indicating the potential for a second Basketmaker III pithouse. Unfortunately, the area was heavily impacted by modern construction: a driveway was constructed along the east edge of the site, gravel and fill were spread in some areas, and large boulders had been rolled into the level area.

Disturbance to the site was obvious in the resistivity results and generally visible in the southern half of the two grids as a highly resistive zone (Figure 3.36). Additional linear and circular anomalies in the north half of the survey were also attributed to modern disturbances. No possible pit structure anomalies were identified. The area of upright slabs visible on the surface is also visible as an anomaly in the geophysical map. If there are buried pit structures in this vicinity the electrical resistance survey did not identify them.

5MT3875 Shepherd Site

The Shepherd site (5MT3875) is a multicomponent Basketmaker III and Pueblo II site located along the eastern border of Indian Camp Ranch. The site covers an area of about 2,473 m^2 of the eastern slope of a northwest to southeast–trending ridge that drops away to Crow Canyon. The Pueblo II component is isolated to a small field house and associated artifacts, and the Basketmaker III component has a large footprint including several surface middens, upright slab features, and burned rock features.

In 2013, a crew including both Crow Canyon and Powderhorn personnel surveyed 3,200 m^2 of the site with electrical resistivity (Figure 3.37). The survey focused on a wide sloping field in the center of the site away from the Pueblo II field house. The area has been impacted over the last 40 years: the area has been chained to remove trees, windrows and other vegetation were burned on site, and a two-track road follows the fence line around the edge of the site. Data collection was done in two stages, complicating post-processing. The resistance survey results reflect near-surface bedrock that was exposed in outcrops along the east edge of the survey. Two small circular resistant anomalies along the north edge of the grid were sampled with auger tests and excavation. Both were confirmed to be small shallow circular pit rooms.

5MT3890 Windrow Ruin

Windrow Ruin (5MT3890) is a robust Basketmaker III habitation on a north to south–trending ridge directly east of the Dillard site. This site is very large (20,135 m^2) and characterized on the surface by dense late Basketmaker III period artifacts, a large east–west adobe roomblock, and several smaller burned adobe and rock features. The site earned its name from a series of burned windrows visible as burned linear piles of charcoal running east–west across the ridge.

Due to its size and proximity to the Dillard site, Windrow Ruin is considered important to understanding the relationship of nearby households to the Dillard great kiva and the social complexity of the Indian Camp Ranch Basketmaker III settlement. Because the landowner was reluctant to excavate Windrow Ruin as part of the Basketmaker Communities Project, Crow Canyon put concerted effort into remote sensing, soils auger testing, and accelerator mass spectrometry (AMS) dating to determine the number, morphology, and relationship of pit structures across the site. A total of 4,800 m^2 of the site was surveyed with electrical resistivity by the Crow Canyon field crew in 2013 (Figure 3.38). Mona Charles of Powderhorn processed and interpreted the resistance data.

The electrical resistance survey of Windrow Ruin was highly productive. Eleven pit structure anomalies were identified and confirmed with soil auguring (Figure 3.39). At least four of the pit structures identified with resistivity are diagnostic Basketmaker III double-chambered pithouses (Structures 101, 103, 201, and 202). The other anomalies represent shallow adjacent pit rooms in the large adobe roomblock visible on the site's surface in Block 100. A twelfth possible pit structure was found eroding from a cutbank at the southern end of the site outside of the resistance survey area.

Double-chambered pithouse Structure 101 is notable for its size, which appears to be four to five times the scale of the other pithouses at the site. The structure is 16.5 m long and 1.6 m deep, placing it in the category of oversized pithouse. Only one other oversized pithouse, Pithouse 101–103 at the Ridgeline site, was located during the Basketmaker Communities Project. While oversized pithouses are habitations, rather than communal structures, their presence represents wealthy, imposing households that stand out from the rest of the community.

Based on superposition and absolute dating methods, a settlement history was developed for the site. The resistance survey located a standard-sized double-chambered pithouse (Structure 103) beneath the adobe roomblock (Structure 102), indicating that it predates the roomblock and the associated oversized pithouse. Burned pieces of corn retrieved from several structures with a soil auger were dated with AMS. Based on superimposition of structures and the AMS dates the history of the settlement extended from the seventh to the ninth centuries (Table 3.2). The site was settled in hamlets by at least two households (Pithouse Structures 103 and 201) during the mid–Basketmaker III phase. The oversized pithouse was built several generations later in the late Basketmaker III phase. The occupants continued to use and expand the roomblock associated with the oversized pithouse into the Pueblo I period. This settlement history parallels the occupation sequence of the Dillard site up to the end of the Basketmaker III period when the Dillard great kiva was formally decommissioned.

5MT3891 Wheatfield Island

Wheatfield Island (5MT3891) is located on property owned by Arleen and Richard Blake. It was first recorded by Crow Canyon in 1984 (Lightfoot 1985) and was re-evaluated and mapped in 1991 by Woods Canyon (Fetterman and Honeycutt 1994). This large site consists of a high-density scatter of artifacts with a definable rubble mound, pit structure depressions, burned adobe concentrations, and areas of artifact concentrations (Figure 3.40). The site was selected for remote sensing during the Basketmaker Communities Project because the surface artifacts and architectural remains suggested that a late Basketmaker III/early Pueblo I component was at the site. A later component dating to the early Pueblo II period was evidenced by a low rubble mound and some diagnostic pottery. Today, 5MT3891 is located in a chained and plowed field, and those activities have leveled the rubble mound.

In 2016, the Crow Canyon field crew surveyed 3,600 m^2 with electrical resistivity (see Figure 3.40). Samples were collected every 0.5 m and at 1-m transect intervals for a total of 7,200 data points. The electrical resistance survey was very productive, and five possible pithouse anomalies were identified (Figure 3.41). These resistant anomalies are oblong to round, 5 to 6.5 m in diameter, and clustered south of the rubble mound. Based on their morphology, these anomalies likely represent Pueblo I pithouses or Pueblo II kivas. No possible double-chambered pithouses, diagnostic to the Basketmaker III period, were identified in the resistance survey. Other small resistant anomalies in the data likely reflect surface storage rooms. Though none of the anomalies were auger tested during the Basketmaker Communities Project, this work helped to confirm that Windrow Ruin was likely settled in the Pueblo I period rather than the Basketmaker III period.

5MT3907

Site 5MT3907 is a Basketmaker III period hamlet on a north to south–trending ridge in the eastern portion of Indian Camp Ranch. The site is directly south of 5MT10631 and 5MT10632 and north of 5MT10704 and 5MT10705, making it a central hamlet in a string of five similar Basketmaker III sites on the same ridge.

In 2011, Crow Canyon and NRCS surveyed 2,400 m^2 of Site 5MT3907 with electrical resistivity (Figure 3.42). One diagnostic Basketmaker III double-chambered pithouse anomaly was identified and confirmed with auger testing.

Hatch Group (5MT10684, 5MT10685, 5MT10686, 5MT10687, and 5MT2037) and the East Hatch Group Ridge

The Hatch site group comprises five adjacent sites (5MT10684, 5MT10685, 5MT10686, 5MT10687, and 5MT2037) arranged on a north to south–trending ridgetop in the southeastern portion of Indian Camp Ranch. All five sites are dominated by Pueblo II period pottery and architectural remains. Early recorders of the centrally located Pasquin site (5MT2037) suggest the site is a Chacoan great house. The Hatch site group surface assemblage also includes a few pieces of Basketmaker III pottery. The group was selected for investigation during the

Basketmaker Communities Project because it potentially represented a multicomponent Basketmaker III and Pueblo II complex (Fetterman and Honeycutt 1994).

The Hatch group has been impacted by farming and looting. Prior to 1984, the ridgetop was chained and put under cultivation. A two-track road developed along the west side of the ridge along the edge of the fields. In 1987, “pot hunting” impacted sites 5MT10686, 5MT10687, and 5MT2037 more severely than the previous disturbances and had a detrimental effect on the Basketmaker Communities Project remote sensing efforts. All three sites were looted with heavy machinery by a group of local men. One of the men, Richard McClellan, kept notes on their efforts (Fetterman and Honeycutt 1994; McClellan 1986). The crew “cleared” each site by blading away surface masonry and digging enormous pits to access kiva floors. This method destroyed all upper architecture in the effort to expose any burials and artifacts on structure floors. The Basketmaker Communities Project employed geophysical surveys with the hopes of identifying intact buried features or structures at the looted sites. A second goal of the geophysical work was to search for Basketmaker III pit structures in the vicinity of the Hatch group.

Over the course of the 2014 and 2015 field seasons, a total of 8,800 m^2 of the Hatch group ridge was surveyed by Crow Canyon and Powderhorn personnel with electrical resistivity and/or magnetic susceptibility (Figures 3.43–3.45). The results were minimally successful in identifying buried structures; one intact kiva and one possible kiva were identified as anomalies in the remote sensing and confirmed with auger testing and/or excavation. Instead, the geophysical results reflect many of the modern disturbances across the Hatch group sites including plowing, mechanical looting, and a two-track road.

5MT10684 Dry Ridge Site

The Dry Ridge site (5MT10684) was not looted in 1987. Instead, it appears that McClellan and crew pushed excavated materials onto the site, especially rubble. One possible pit structure anomaly was identified in the resistivity survey (Figure 3.46). This anomaly was later trenched and partially excavated, confirming it as an intact earthen-walled kiva. Two other high-resistance anomalies, one in the far southwest corner of the survey and the other along the northern boundary, correspond with mounds of rubble on the surface.

5MT10685

5MT10685 is the northernmost site in the Hatch group. The site was presumed to have been targeted during the 1987 looting event; however, the electrical resistivity readings were more consistent and conductive than disturbed sites to the south. A large anomaly was detected at the center of the site and appeared to be a possible pit structure based on its shape and clarity (Figure 3.47). Auger testing sampled burned roofing deposits in the anomaly, providing further evidence of a buried structure. The anomaly was not excavated, which would be required to confirm the structure and evaluate its integrity.

5MT10686 Badger Den Site

Badger Den (5MT10686) is located between Dry Ridge and the Pasquin site. The site was looted in 1987, and McClellan noted that two kivas were excavated with bulldozers. The resistance survey reflects the mechanical churning of the deposits at the site. No pit structure anomalies were identified (Figure 3.48).

5MT10687 Sagebrush House

Sagebrush House is the southernmost site in the Hatch group. In 1987 McClellan and others bulldozed the site, excavating a roomblock and a kiva (Figure 3.49) and possibly exposing an earlier pithouse (McClellan 1986). The resistance survey identified a high-resistance linear feature along the west edge of the grids, which likely reflects near-surface bedrock. A high-resistance anomaly in the extreme east-central portion of the survey reflects a push pile from the 1987 excavations. The two low-resistance anomalies suggested reflections of intact deposits. These anomalies were also captured in the gradiometer survey. Crow Canyon excavated several trenches across the site during the Basketmaker Communities Project and found the remnants of a kiva floor 2.1 m below surface. This kiva remnant does not correspond with any of the anomalies identified in the geophysical survey results.

5MT2037 Pasquin Site

The Pasquin site (5MT2037) is the largest site in the Hatch group and is situated between the Dry Ridge and Badger Den sites. In 1969, D. Martin recorded the site as consisting of a large roomblock with standing architecture over a meter in height, two kivas, a midden, and a plaza. The scale, layout, and construction style of the Pasquin site indicates that it was a Chacoan outlier. The Pasquin site was looted in 1987, and two kivas and a roomblock were demolished (McClellan 1986).

Similar to Badger Den, the resistance survey results at the Pasquin site reflect deeply churned deposits (Figure 3.50). A few conductive anomalies were identified as possible locations for the looted kivas. Crow Canyon excavated numerous trenches through the site, specifically targeting anomalies in the resistance readings. No buried structures were found; sediments across the site were disturbed down to the underlying bedrock.

East Hatch Group Ridge

Eight contiguous grids, covering 3,200 m^2, were surveyed with electrical resistance along the eastern side of the Hatch group (Figure 3.51). The purpose of these grids was to check for potential undamaged Basketmaker III pit structures outside of the looted area on the east slope of the ridge. No possible anomalies were identified. The generally uniform readings suggest only natural features, such as undulating bedrock, below the sediment layer.

Methodological Studies

The extensive use of geophysical imaging during the Basketmaker Communities Project offers a unique opportunity to study the effectiveness of various methods in detecting and imaging Basketmaker III pit structures and other features in the central Mesa Verde region. Several of the Basketmaker Communities Project partners conducted method comparison studies, which resulted in proposed best practice models for future Basketmaker III architecture-focused studies (Charles 2013; Diederichs et al. 2017; Hernandez 2015; Watters 2013; Watters and Diederichs 2013; Diederichs et al. 2017).

Factors Affecting Geophysical Methods

The efficacy of any given geophysical method in identifying pit structures depends on a series of interacting factors: type and depth of background sediments, depth of construction, construction materials, prehistoric burning, accumulation of overburden, post-occupation disturbance, and vegetation coverage.

The Basketmaker III sites in this study are situated on uplands covered by continuous and often deep deposits of eolian-derived silty loam soils mostly deposited during the Pleistocene Era. These quartz- and iron oxide–derived sediments are collectively known as the Mesa Verde loess (Arrhenius and Bonatti 1965) and are characterized by their fine-grained consistency. Based on Basketmaker Communities Project excavations and witness accounts of excavated utility trenches, the Mesa Verde loess on the uplands of Indian Camp Ranch ranges in thickness from about 1.25 to 1.8 m. These soils develop thick and highly defined B Horizons, especially when denuded of shade-providing vegetation (see Chapter 4). The loess layer across the study area has deflated, rather than accumulated, since the Basketmaker III period, leaving 1,400 years of human activity exposed on or near the modern ground surface. Because they are so shallowly buried, cultural deposits dating to the Basketmaker III period were particularly susceptible to historic disturbances (chaining, windrow burning, plowing, and looting). Directly below the Mesa Verde loess is a cap of Dakota Sandstone, which fractures naturally into tabular pieces.

Basketmaker III homesteaders in the vicinity appreciated the depth of the Mesa Verde loess in the uplands of Indian Camp Ranch and excavated their year-round pithouses as deep as possible through these sediments (see Chapter 18). The excavated fill was reused to cover pithouse roofs, which were supported by wood and usually covered by small tabular pieces of sandstone. Every habitation and some storage structures included a hearth. Most pit structures were cleaned out and burned with a low- or moderate-intensity fire at the end of their use life. Because many pit structures were only semi-subterranean, their structure pit generally refilled with collapsed roofing to the height of the surrounding ground surface. Any remaining depression was easily filled with windblown loess. The factors cited above either allow geophysical methods applied during the Basketmaker Communities Project to detect pit structures or impede the methods by affecting measurable elements of an archaeological site such as surface topography and the hardness, conductivity, and magnetism of soils.

The last (but most maligned) factor affecting the efficiency of geophysical methods applied on the Basketmaker Communities Project is the amount and type of vegetation covering an archaeological site. Depending on the instrument, even low-lying brush can stop data points from being collected or force surveyors off a linear survey course, introducing error into the data set. Human disturbance across Indian Camp Ranch has differentially impacted vegetation, leaving some sites totally denuded, some chained and covered with sagebrush, and other sites covered with old growth pinyon and juniper.

Method Comparisons

Of the five geophysical methods applied during the Basketmaker Communities Project, two (LiDAR and ground penetrating radar) were found ineffective while the other three methods (electrical resistivity, electrical conductivity, and magnetic susceptibility) were found to be varyingly effective given particular circumstances.

LiDAR mapping did not contribute to finding buried structures. The shallow depth of Basketmaker III pithouses, 1,400 years of windblown erosion and deposition, and modern ground disturbance across Indian Camp Ranch combined to ensure that Basketmaker III pit structures were not identifiable as depressions in fine-grained LiDAR surface topography. Ground penetrating radar was also found ineffective. Radar waves tended to bounce off the fine Mesa Verde loess in the study area or quickly attenuated in the upper layer of sediment.

The *Time Team America* geophysical crew compared the more productive methods (magnetic gradient, conductivity, magnetic gradient/susceptibility, and electrical resistance) using survey results from the Dillard site (Figure 3.52). Of the nine possible pit structure anomalies identified during the *Time Team America* investigation, many were imaged using multiple methods. Excavation and soil auger tests confirmed that all but two (PHF2 and PHF3) were buried Basketmaker III period pit structures.

Magnetic gradient was the fastest survey technique. The gradiometer surveyor was able to cover three times as much area as the electrical resistivity survey team of three over a three-day period. Magnetic gradient was also very effective in consistently locating all possible buried pit structures. However, the gradiometer results were coarse—pit structure anomalies tended to be diffuse round shapes somewhat larger than the actual pit structure. Conductivity and magnetic susceptibility were slightly faster survey methods than electrical resistance but were not consistent at discerning the actual location of pithouse features with a high level of confidence. Resistance was a much slower method, but very effective in mapping pit structure outlines. This information was particularly valuable because it provided a template for the placement of auger testing and excavation units and provided interpretable data such as the shape, size, and orientation of any given pit structure.

Other studies comparing Basketmaker Communities Project geophysical methods (Charles 2013, 2016b; Hernandez 2015) came to the same conclusion as the *Time Team America* study; magnetic gradient survey efficiently locates pit structures while electrical resistivity most effectively images pit structures. The success of the application of these methods during the Basketmaker Communities Project is the result of the characteristics of the Mesa Verde loess. First, the well-sorted fine nature of the loess allows it to retain a relatively consistent level of moisture throughout its sediment profile (Fadem and Diederichs 2019) and, therefore, maintain a consistent level of electrical conductivity. Pit structures interrupt the consistent flow of introduced electricity through sediments and create a highly resistant anomaly during an electrical resistivity survey. Indeed, when looking at all Basketmaker Communities Project electrical resistivity studies, buried structures and features consistently had higher resistivity readings than the surrounding sediments. Second, the Basketmaker III tradition of burning decommissioned structures created a distinct magnetic signature for most pit structures on the Basketmaker Communities Project. Once the Mesa Verde loess used in the construction of the floor, walls, and roof of a pit structure was heated past the Curie point, iron particles in the soil were magnetized to a greater or lesser extent (Johnson et al. 2012). Magnetic susceptibility surveys consistently detected the magnetized sediments in burned Basketmaker III pithouses on the Basketmaker Communities Project.

Recommendations

Based on the comparisons of geophysical methods during the Basketmaker Communities Project, the most efficient way to detect and capture basic architectural information about buried Basketmaker III pit structures on Indian Camp Ranch is to use a combination of electrical resistivity and magnetic susceptibility survey methods. The methods are complementary; magnetic gradient survey is the most efficient tool for detecting pit structures, and electrical resistance survey produces accurate pit structure images. For the most effective process, we recommend first surveying entire Basketmaker III sites with a gradiometer to locate probable structures then surveying smaller sections over and adjacent to the gradiometer anomalies with electrical resistivity to produce refined pit structure images. Finally, all possible structures should be confirmed and samples collected for dating with soil auger testing. This process can likely be applied with similar results in similar upland settings across the Mesa Verde region.

Similar methods have been employed at the Mississippian site of Moundville (Davis et al. 2015). Large swaths of the site were surveyed using a gradiometer, and anomalies were mapped in GIS. This map was used to correlate the size and shape of certain anomalies with particular types of structures and features based on “prior knowledge of Moundville architecture and variation in magnetic signals” from other sites (Davis et al. 2015:164). These anomalies were then selected for ground-truthing via auguring and 1-x-1-m test units. Using this method, anomalies could be interpreted as specific feature or structure types with limited excavation. Over time and with enough ground-truthing, site layout and composition will be confirmed solely based on geophysical survey data.

Discussion and Conclusion

Archaeologists have dealt with issues stemming from the invisibility of pithouse architecture in several ways. Surface studies have depended on the presence of fire-hardened jacal or charcoal surface staining to locate possible pit structures (Morris 1939). Another common but aggressive technique involves stripping overburden deposits or trenching sites with mechanized equipment to expose the outline or stratigraphic profile of a pit structure (Chuipka 2008). These methods locate large structures across a site but unduly impact the architecture and disproportionally damage extramural surfaces and associated features. In cases like the Basketmaker Communities

Project, where sites are not threatened by development and are instead targeted for conservation, investigations with heavy equipment are antithetical to the goals and values of the project.

Crow Canyon's success in locating and studying Basketmaker III pit structures using geophysical methods provides a new model for the investigation of early ancestral Pueblo architecture in the central Mesa Verde area, one that can be applied at a settlement scale. This approach provides accurate information on the number, size, shape, orientation, organization, and even contemporaneity of structures in pithouse settlements, which enables us to test many structures over a large area rather than intensively excavating fewer structures identifiable from the surface. For the Basketmaker Communities Project these data have likely helped reduce sampling bias. Previously, investigations focused on site areas with surface indications of subsurface structures. With geophysical imaging, Crow Canyon was able to investigate for pit structures in areas that might not have merited augering or excavation based simply on the surface expression. This reduced sampling bias likely produced a more accurate pit structure count and, in conjunction, more accurate population estimates and historical reconstruction of the Indian Camp Ranch community. The Basketmaker Communities Project would have been more destructive, less informative, and smaller in scale without the application of these geophysical methods. The geophysical investigative model presented here has been proven to be a cost-effective and conservation-oriented method to study Basketmaker III populations in the central Mesa Verde region.

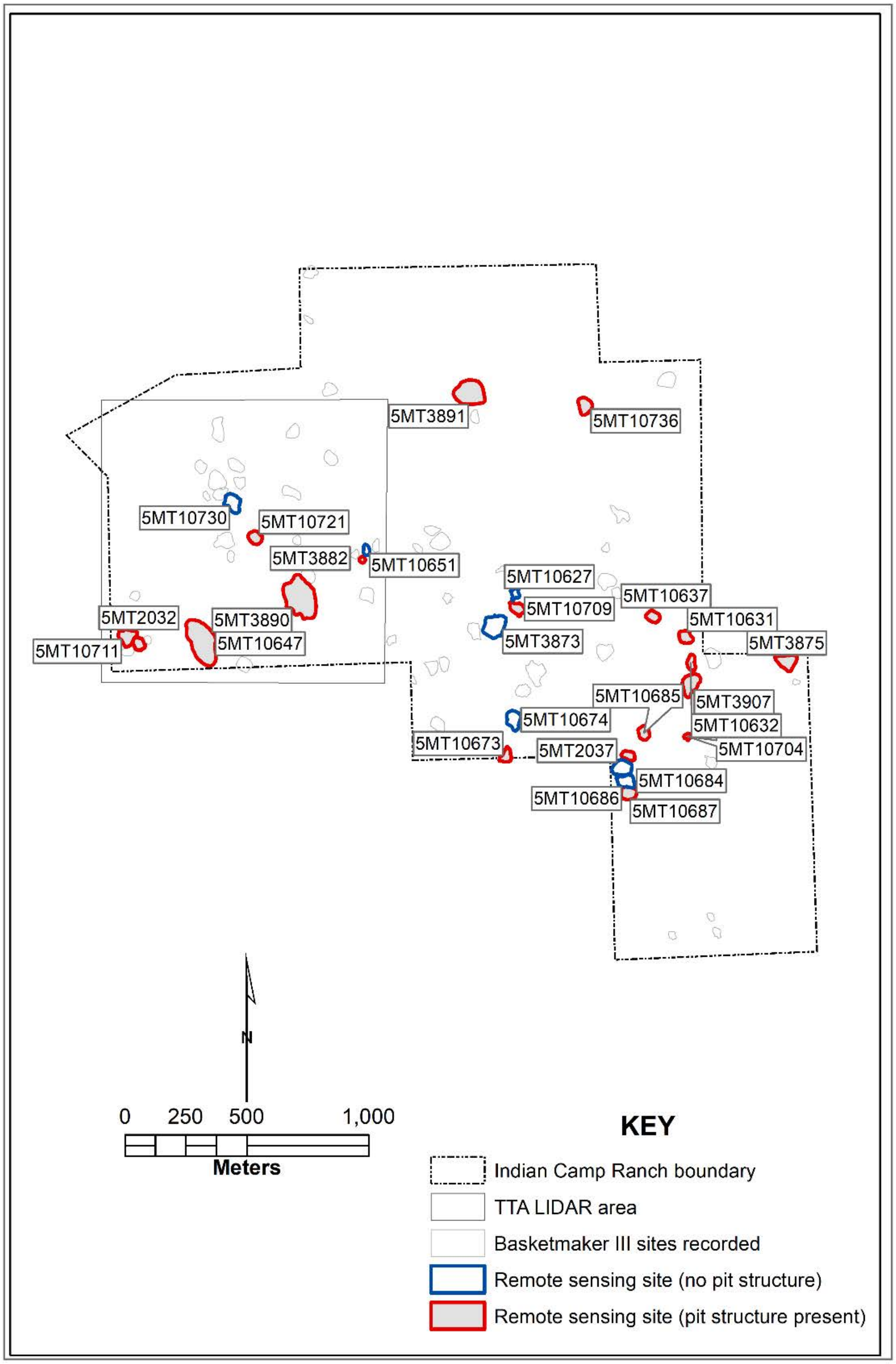


Figure 3.1. Map of archaeological sites on Indian Camp Ranch with remote sensing survey locations highlighted.

Note: TTA = *Time Team America*.

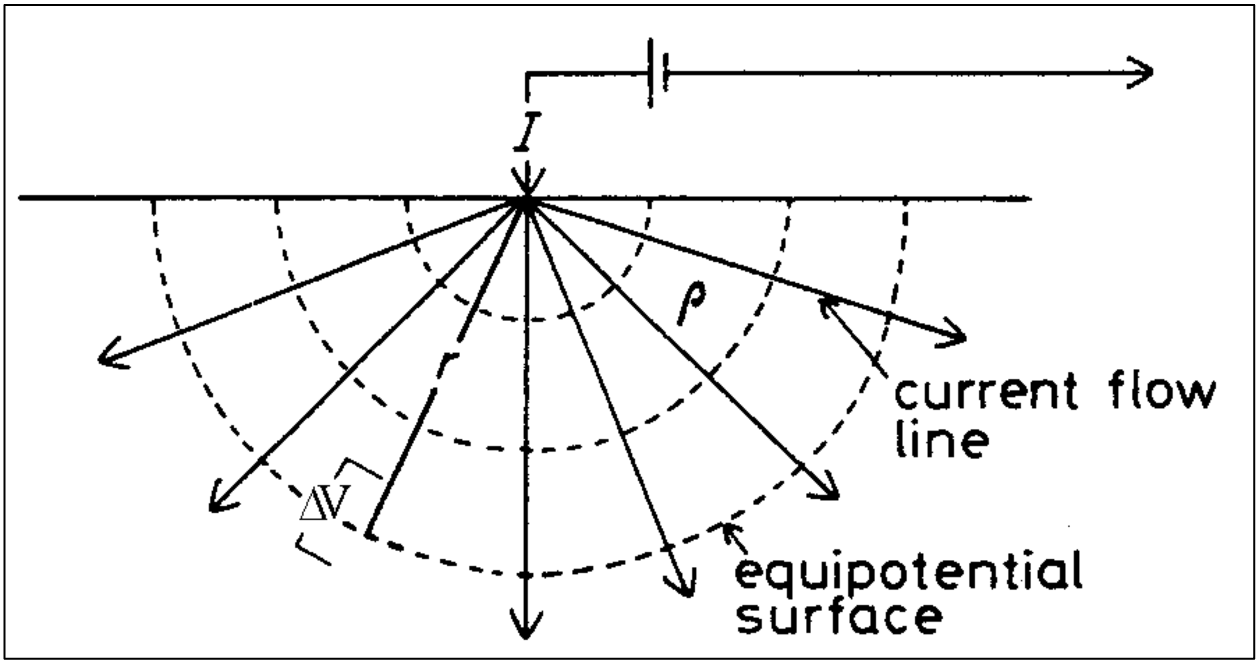


Figure 3.2. The flow of current from a single current source and resulting potential distribution.

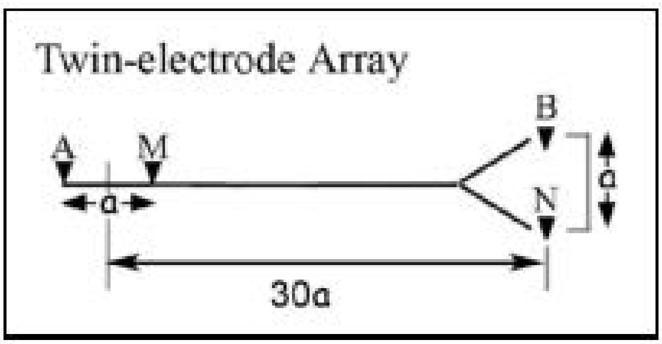


Figure 3.3. The twin-electrode array commonly used in archaeology.

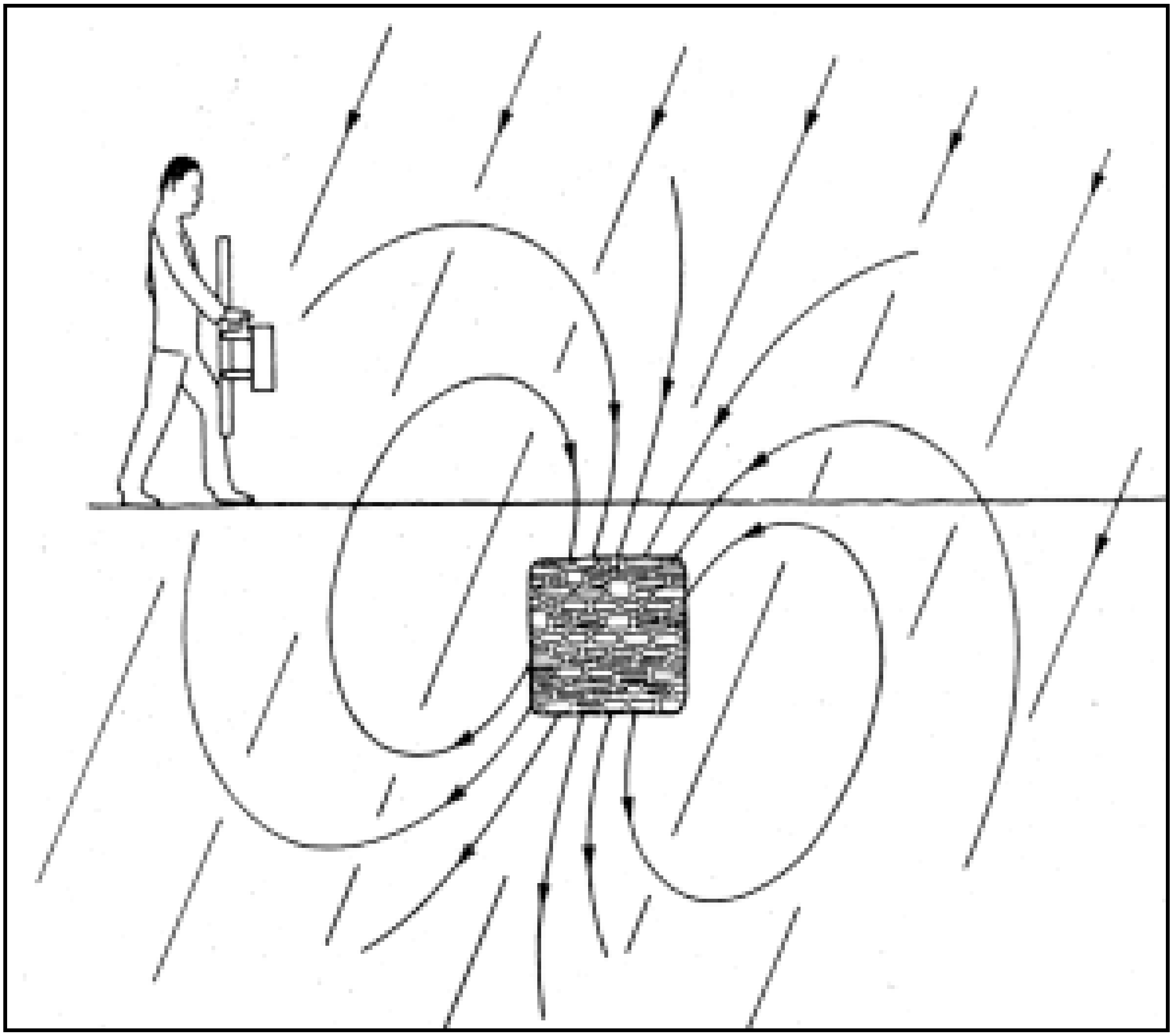


Figure 3.4. The magnetic anomaly produced by a burned feature is aligned to the dip and direction of the earth's magnetic field. (From Clark 1996.)

Figure 3.5. Duncan McKinnon with the Bartington 601 dual array fluxgate gradiometer.

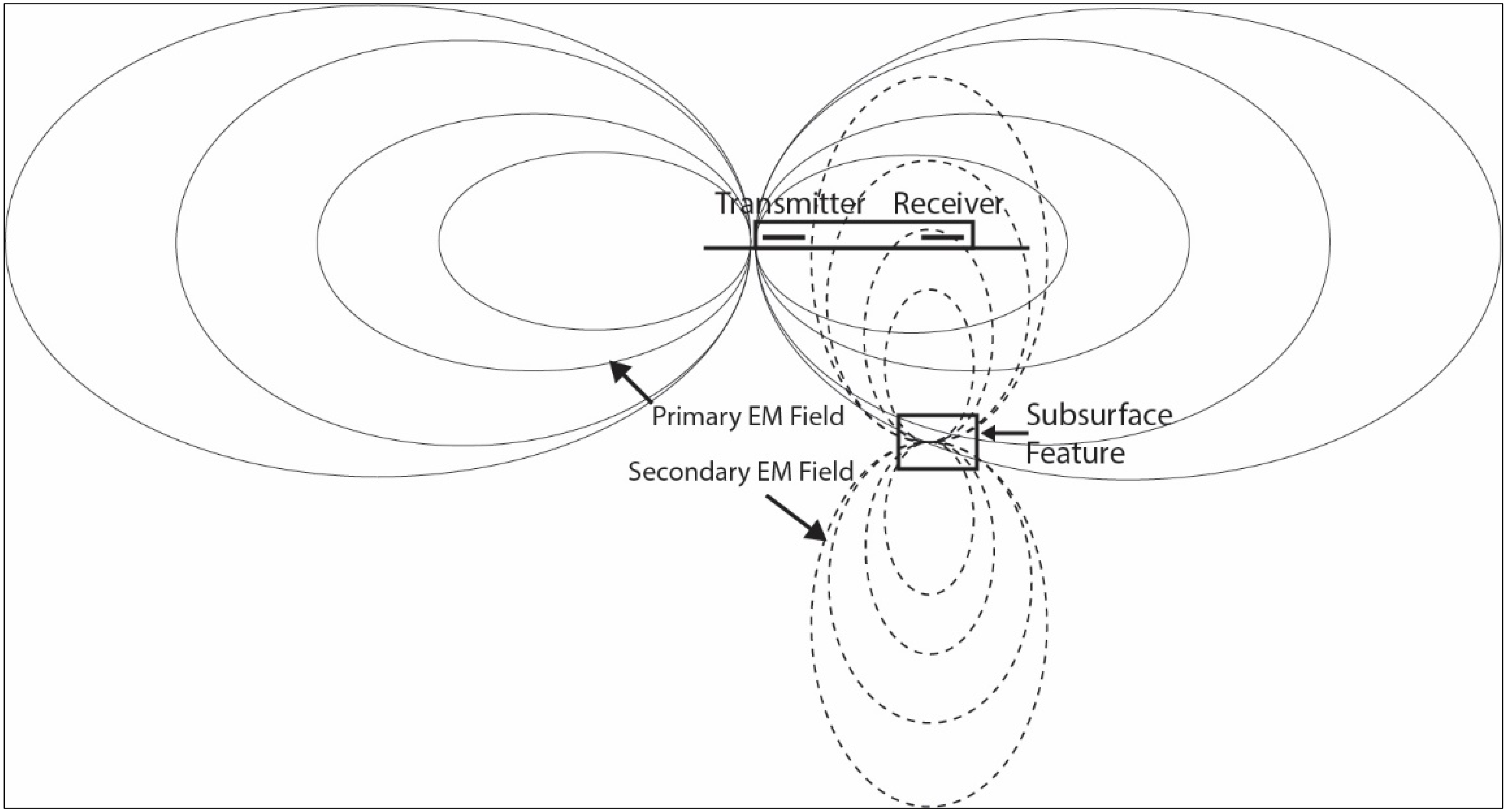


Figure 3.6. Electromagnetic induction diagram.

Figure 3.7. Bryan Haley with the EM38 conductivity meter.

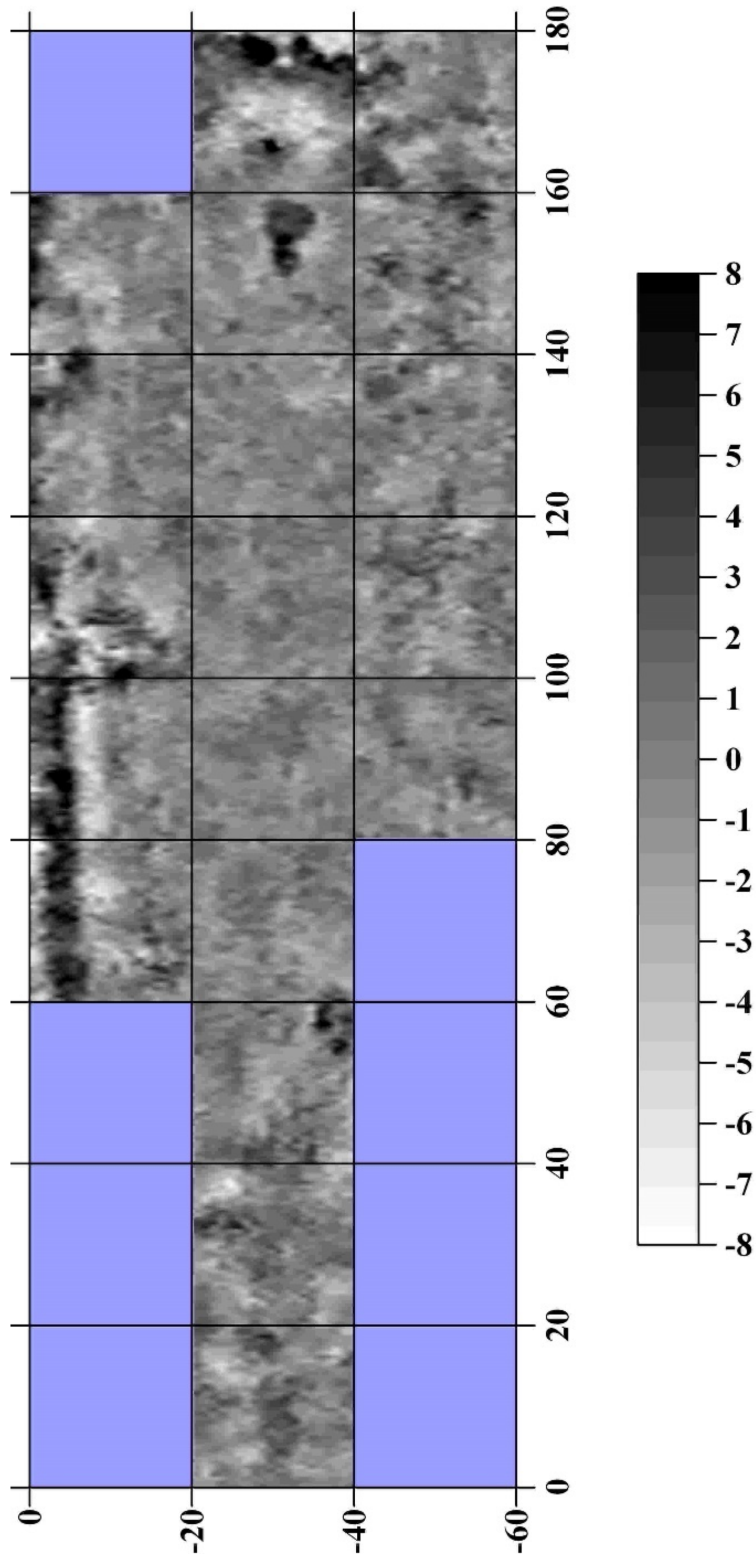


Figure 3.8. Image of the Natural Resource Conservation Service electrical resistivity survey results for 5MT10631 and 5MT10632. Note the double-chambered pithouse anomaly at 5MT10631 in the upper third of the image and a second double-chambered pithouse at 5MT10362 in the lower third of the image.

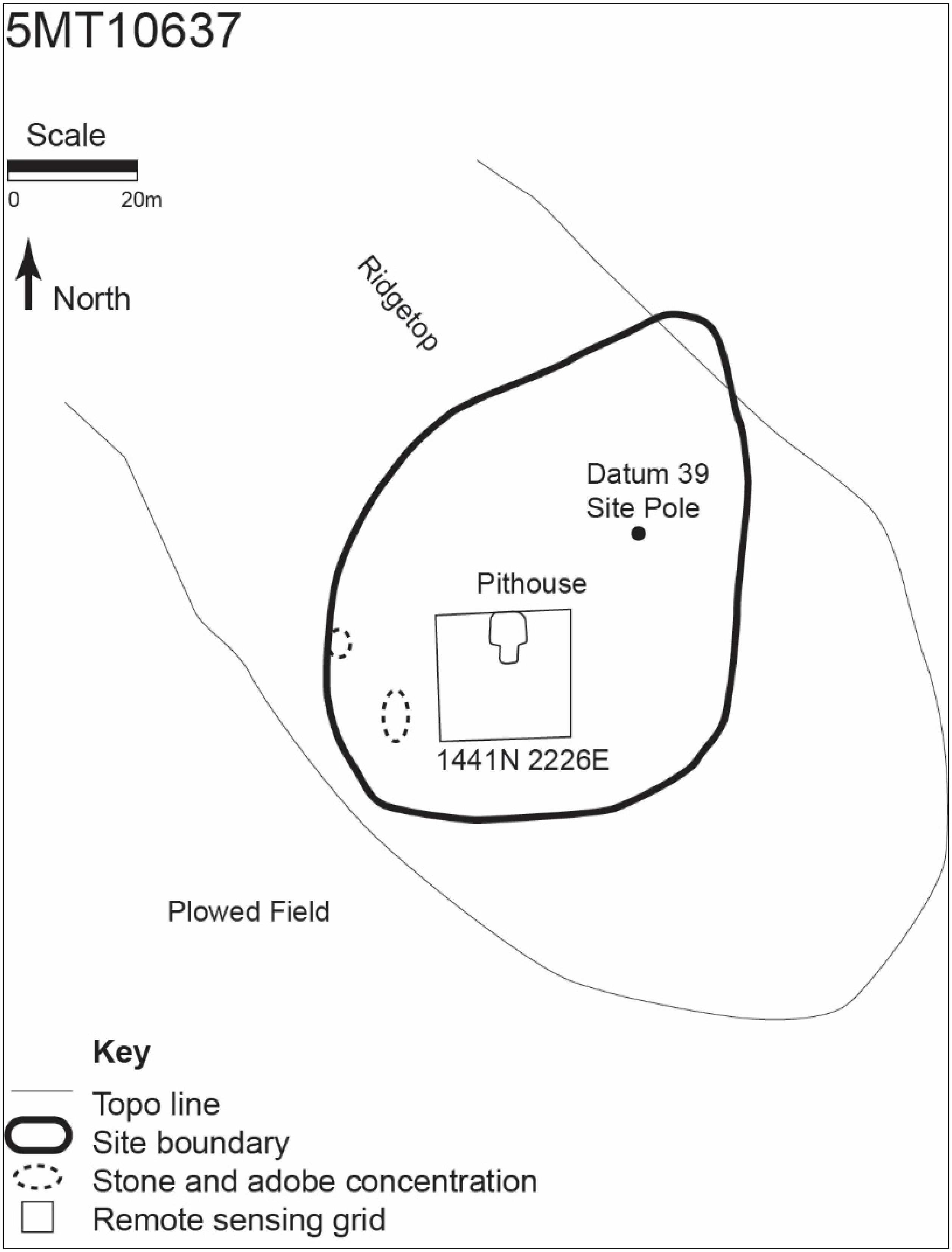


Figure 3.9. Sketch map of site 5MT10637 with remote sensing grid and proposed pithouse location.

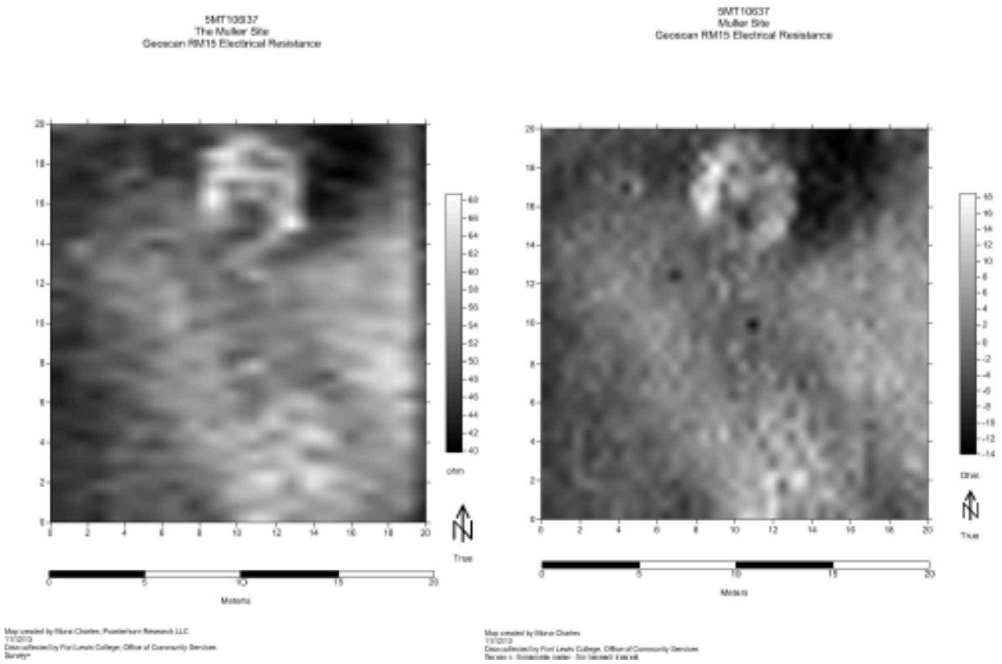


Figure 3.10. Electrical resistance survey at 800 samples per grid (left) versus 1,600 samples per grid (right).

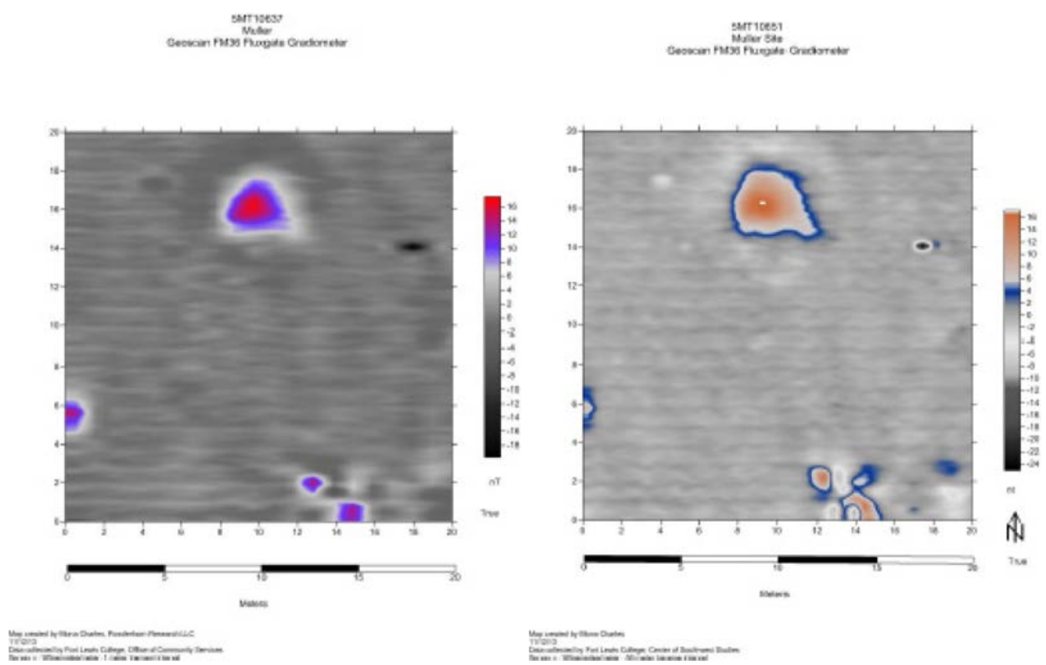
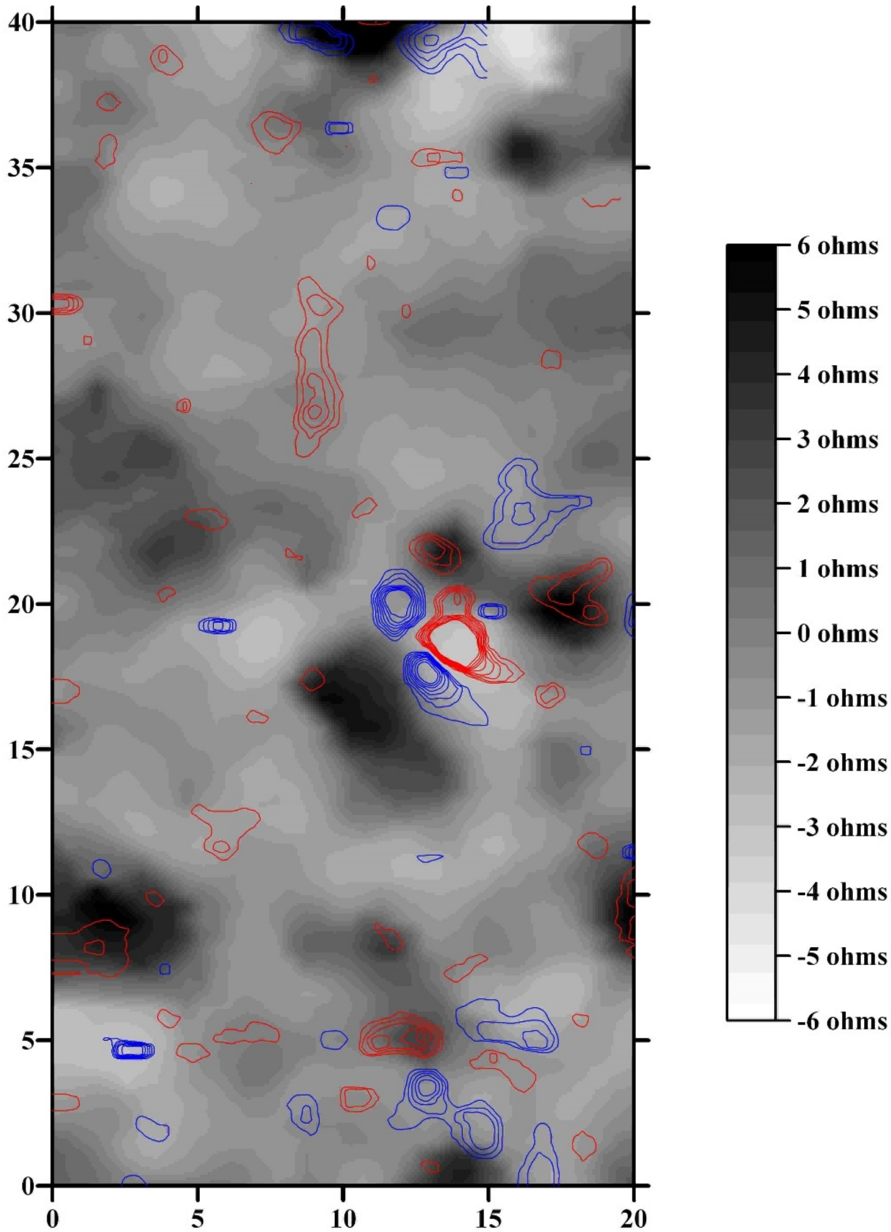


Figure 3.11. Gradiometer survey at 3,200 samples per grid (left) and 6,400 samples per grid (right).



5MT.10647
Image Map= RM-15 Soil Resistance
Contour Map= FM-256 Fluxgate Gradiometer
Red= Positive; Blue= Negative

Figure 3.12. Electrical resistivity image and magnetic susceptibility contour map captured in 2011 by the National Resource Conservation Service in the south half of 5MT10647. Note the northernmost anomaly at the top of the image reflects the southern edge of the Dillard site great kiva (Structure 102).

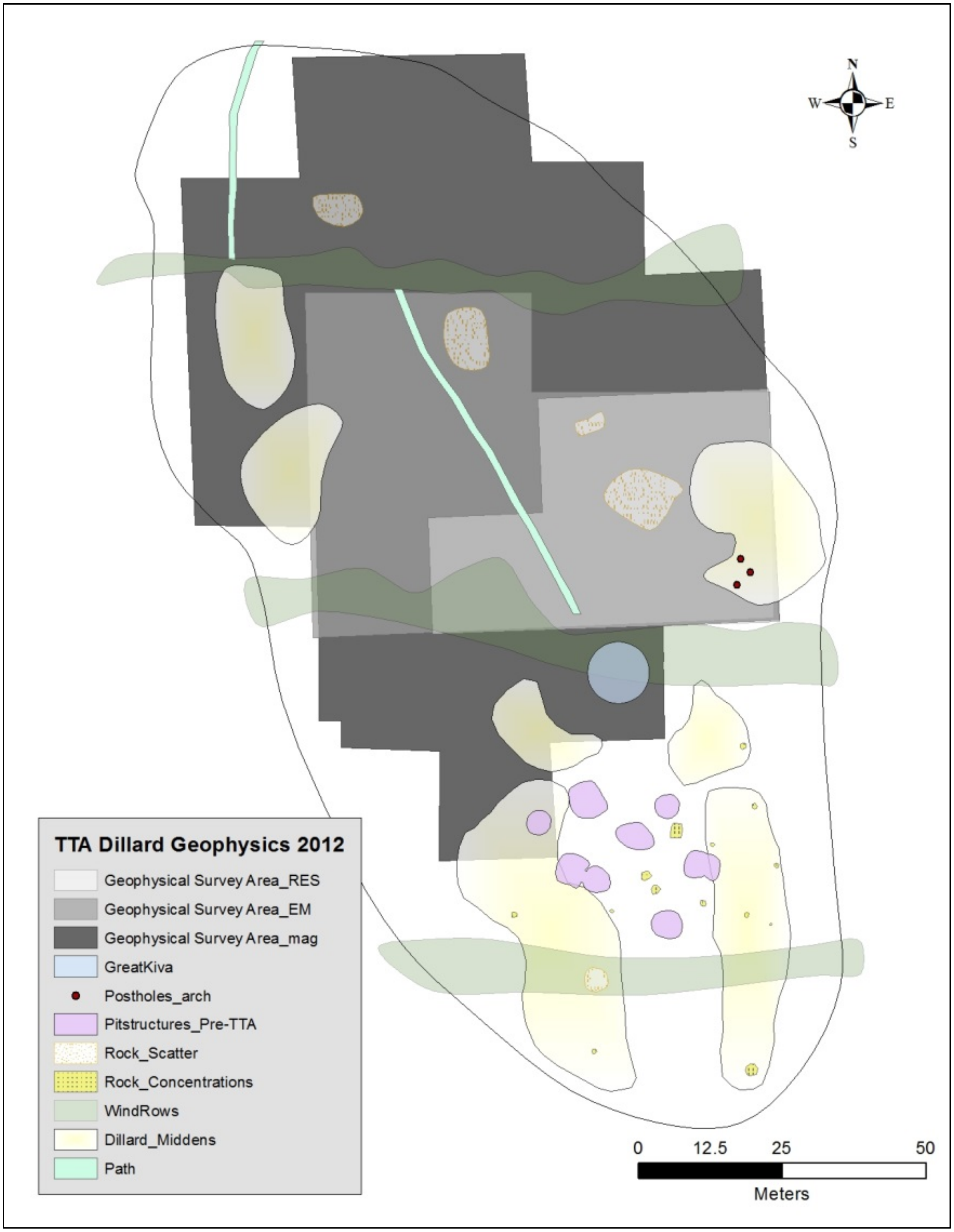


Figure 3.13. Geophysical surveys associated with the June 2012 episode filming of *Time Team America* (TTA) at the Dillard site (5MT10647).

Note: EM = electromagnetic induction survey, mag = magnetic gradient, and RES = resistance.

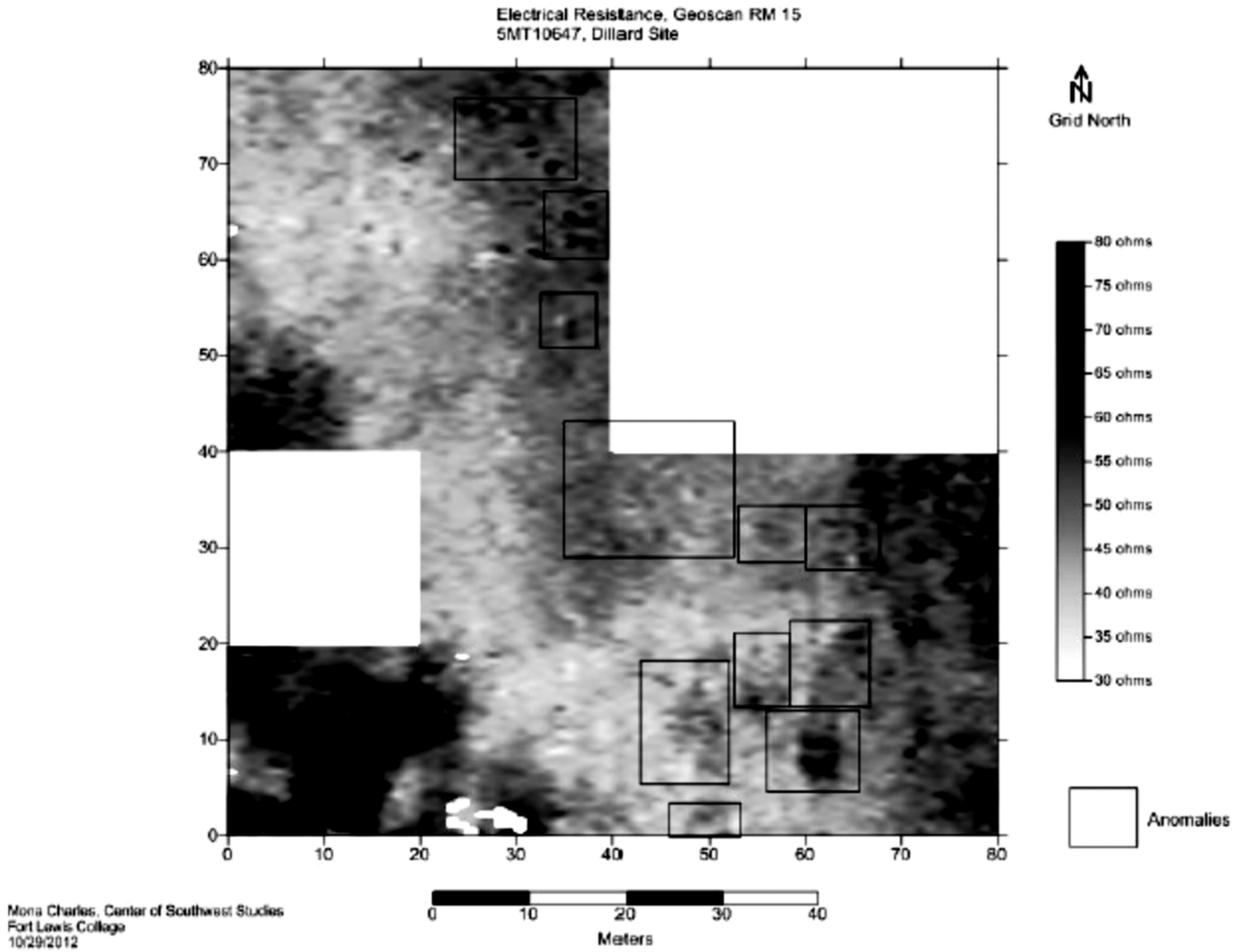


Figure 3.14. The 2012 electrical resistance map of the north half of Site 5MT10647. The Dillard site great kiva is located 6 m south of the southernmost anomaly.

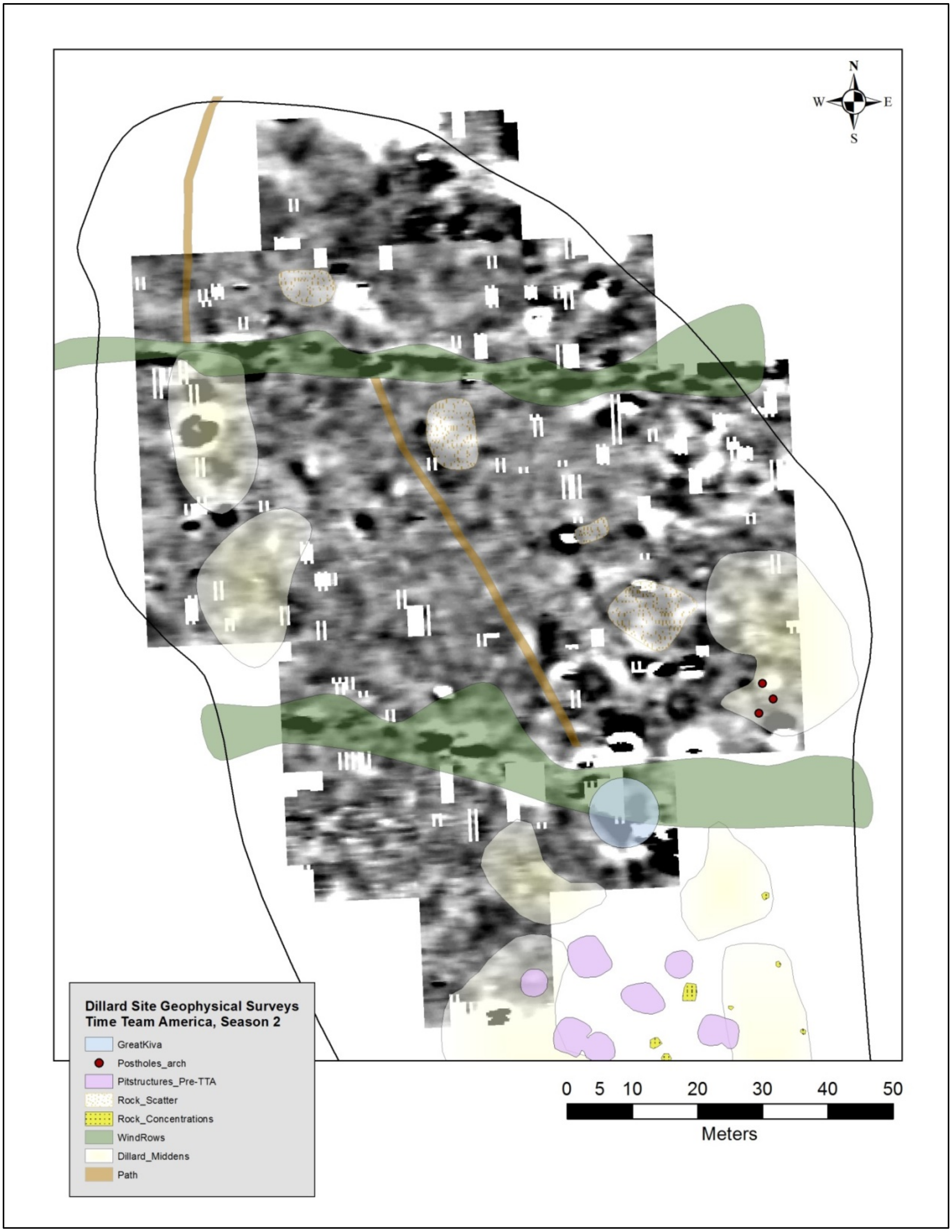


Figure 3.15. Results of the 2012 magnetic gradient survey at the Dillard site overlain with confirmed Basketmaker III structures and features and modern surface disturbances. (Magnetic gradient values range from −3.56 [white] to 3.39 [black] nT.)

Note: TTA = *Time Team America.*

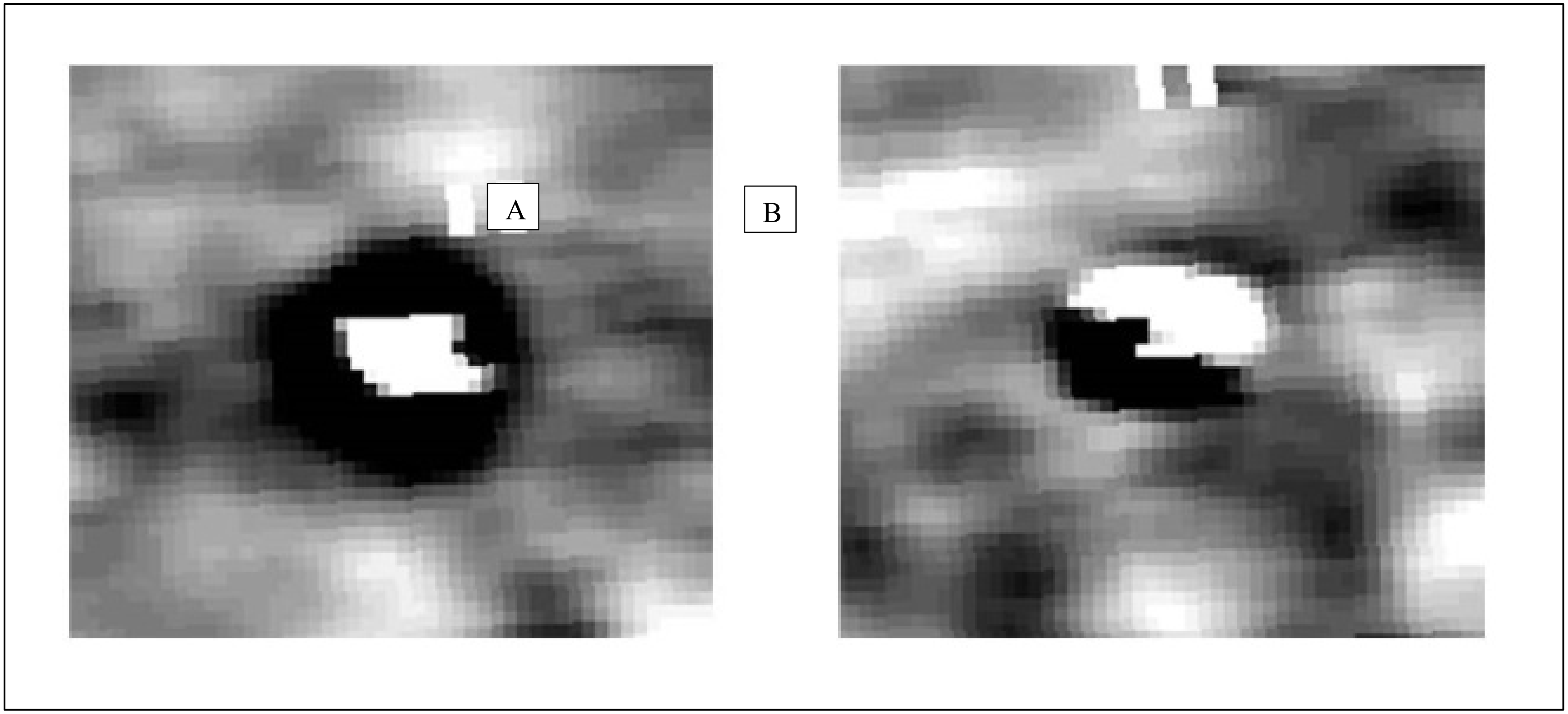


Figure 3.16. Magnetic anomalies at the Dillard site caused by iron stakes and/or nails displayed as monopoles (A) or dipoles (B) with an orientation to magnetic north.

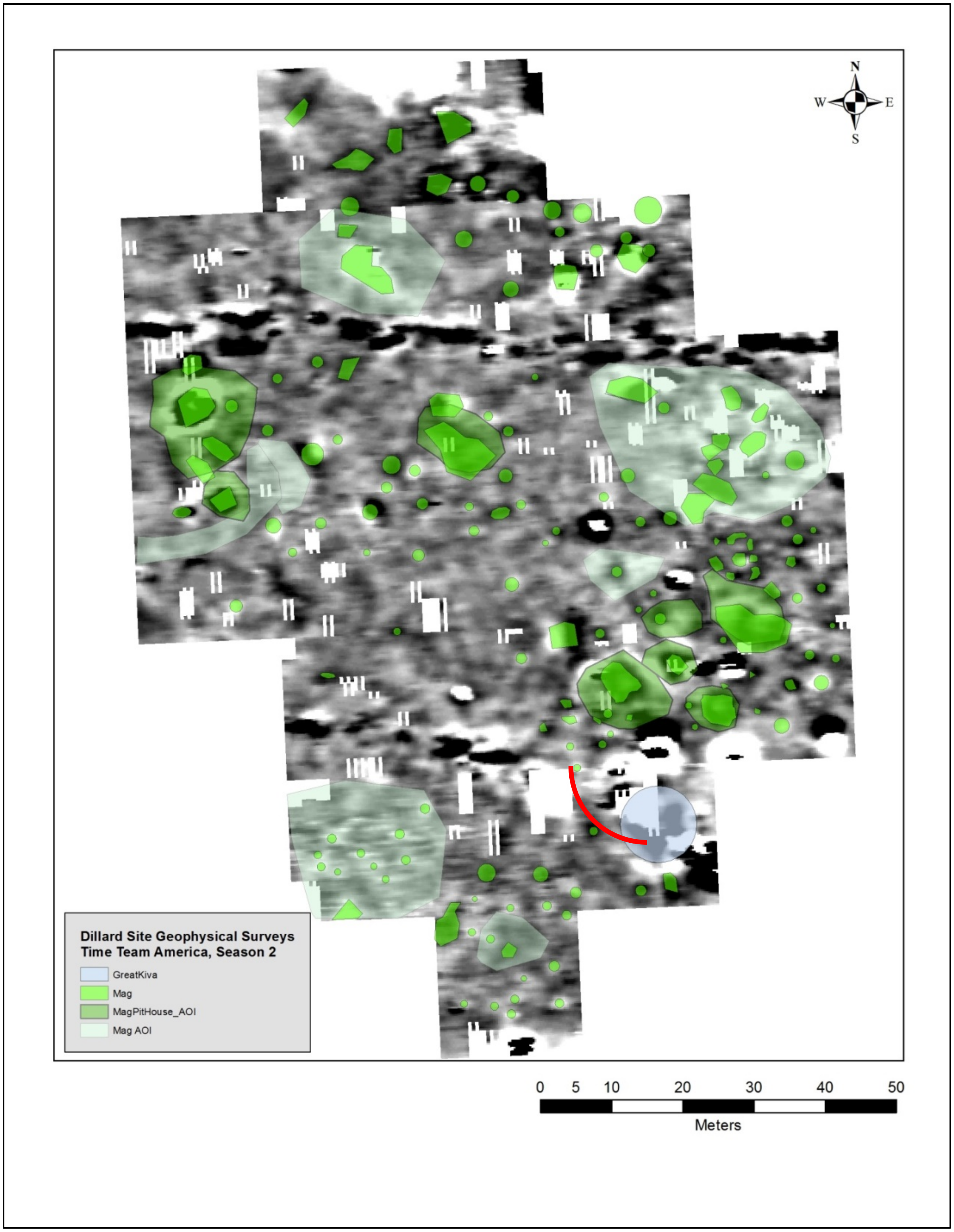


Figure 3.17. Results of the 2012 magnetic gradient survey at the Dillard site. Anomalies possibly related to prehistoric activity are highlighted in green. The great kiva (blue) and great kiva berm (red line) are plotted for reference.

Note: Mag = individual anomaly, MagPitHouse_AOI = possible pit structure anomaly, and Mag AOI = possible activity area.

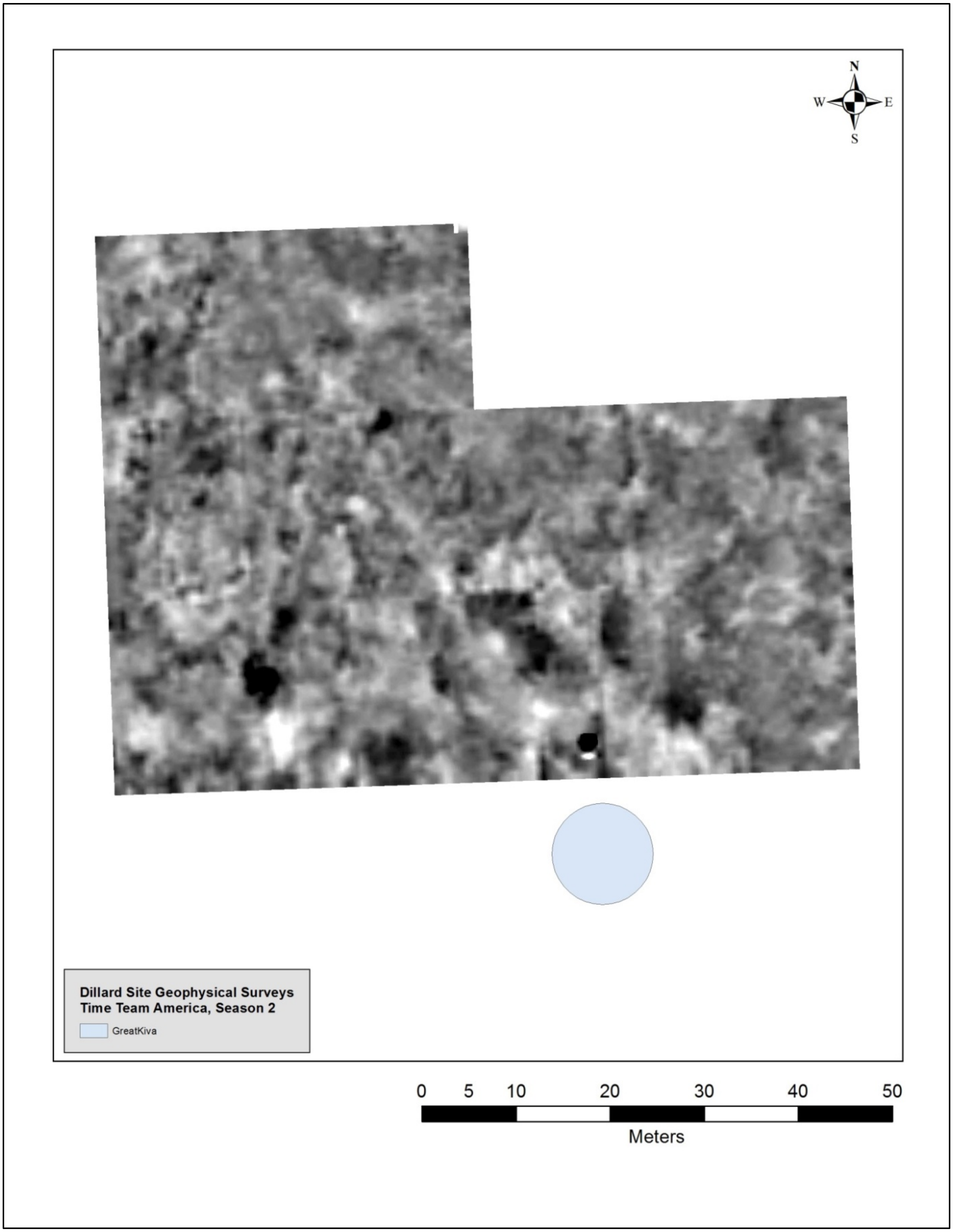


Figure 3.18. Electrical conductivity survey results from the north half of the Dillard site.

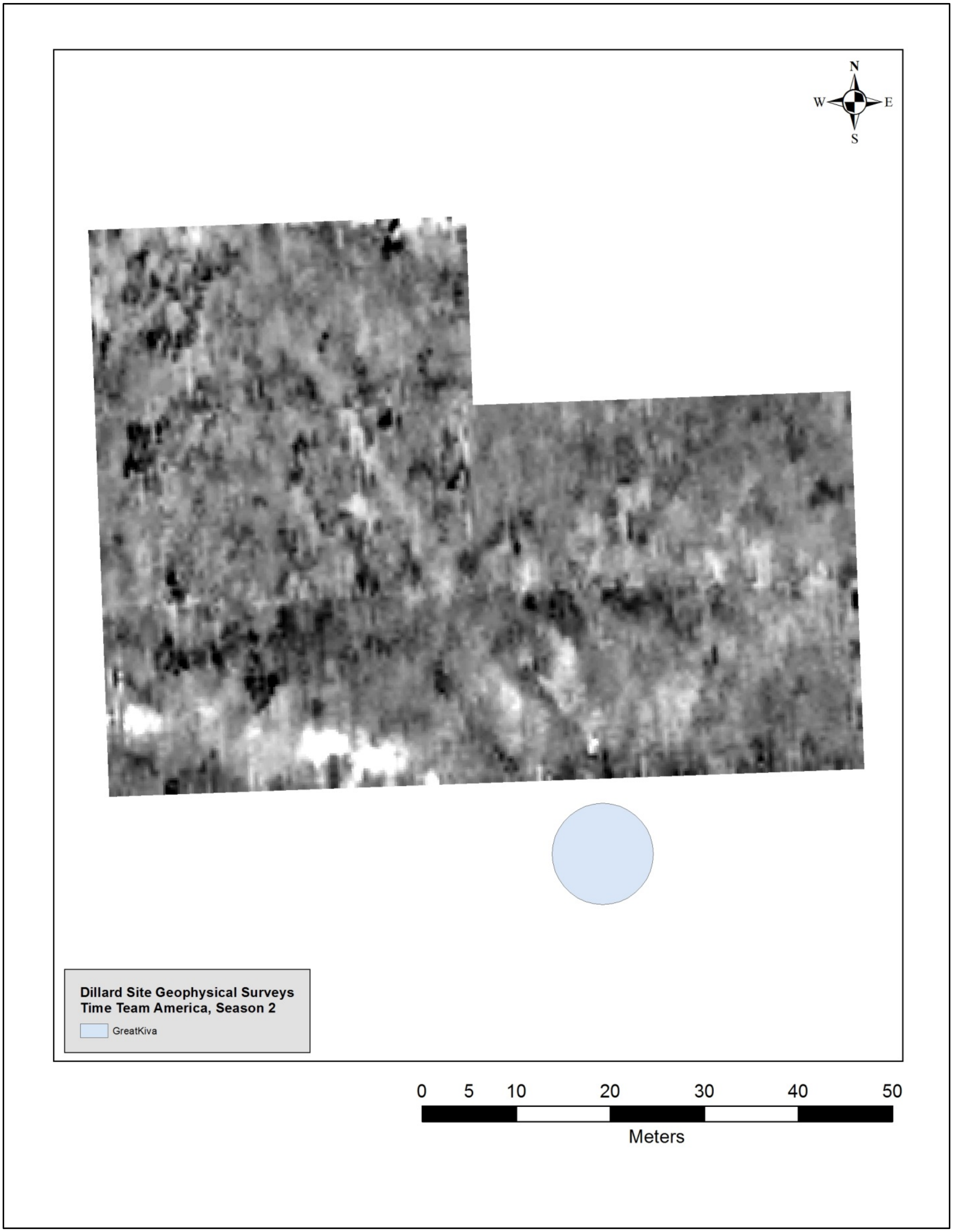


Figure 3.19. Magnetic susceptibility survey results from the north half of the Dillard site.

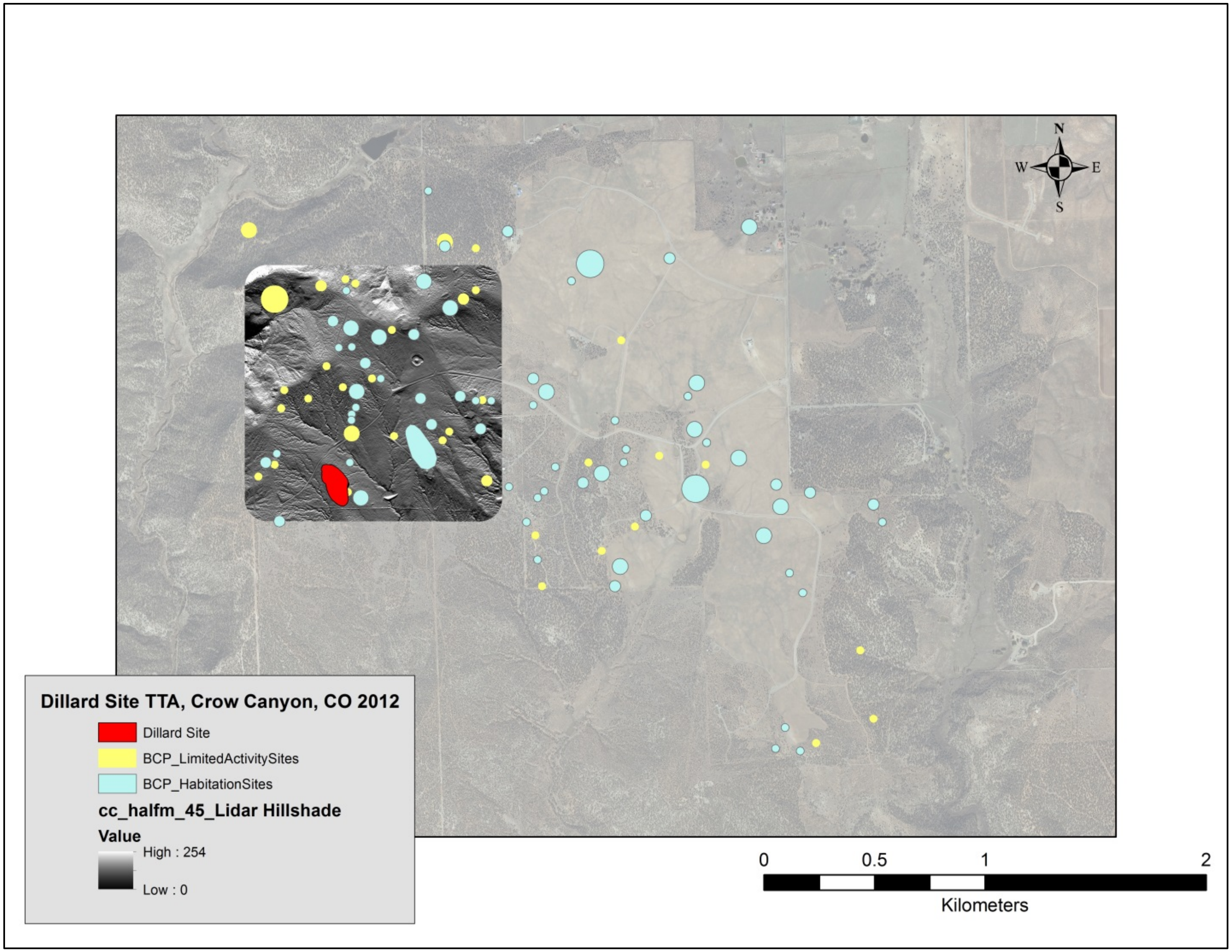


Figure 3.20. LiDAR digital terrain model and the broader landscape with Basketmaker III site distribution in reference to the Dillard site (red).

Note: TTA = *Time Team America* and BCP = Basketmaker Communities Project.

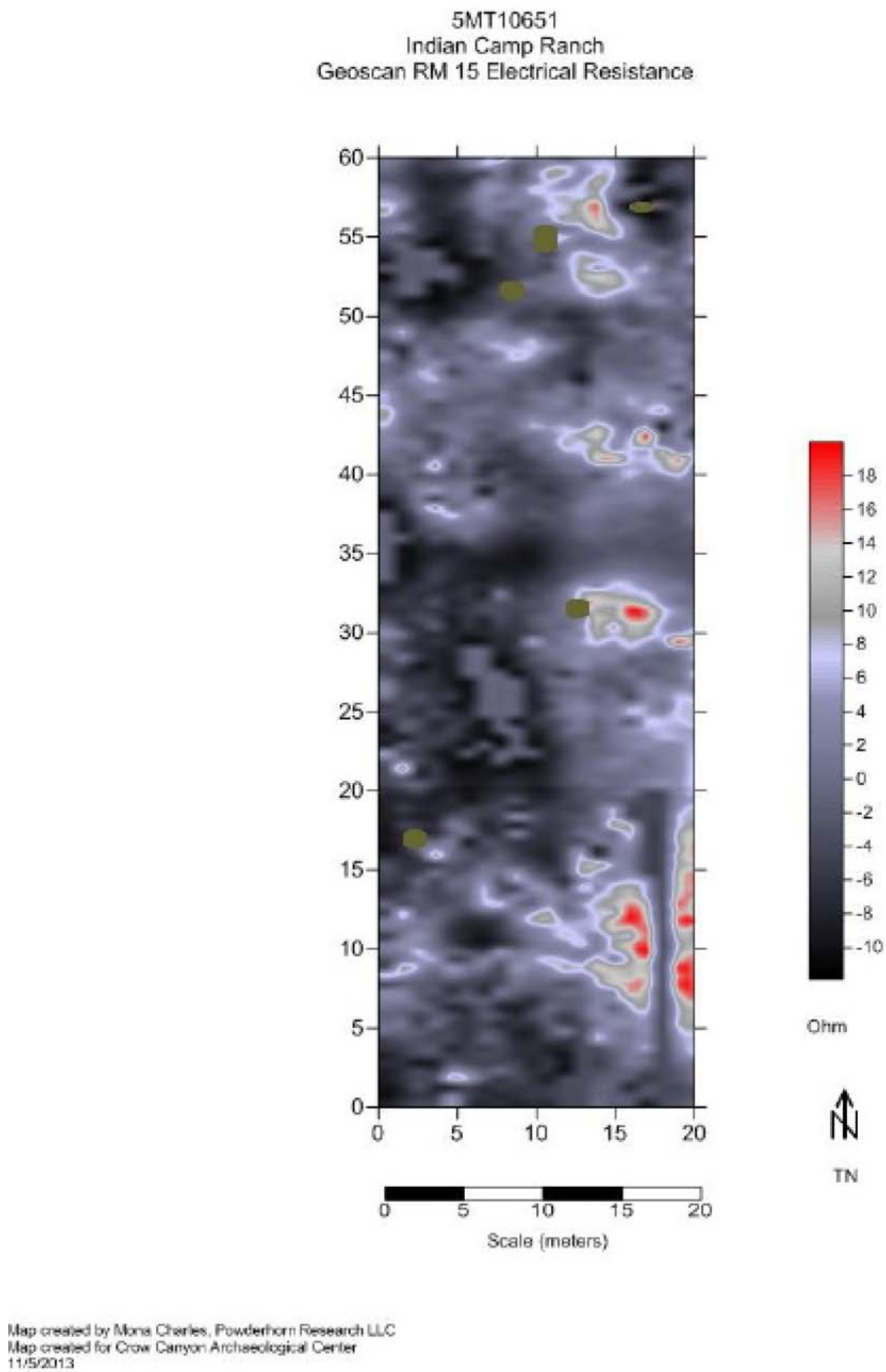


Figure 3.21. Electrical resistance survey of Site 5MT10651.

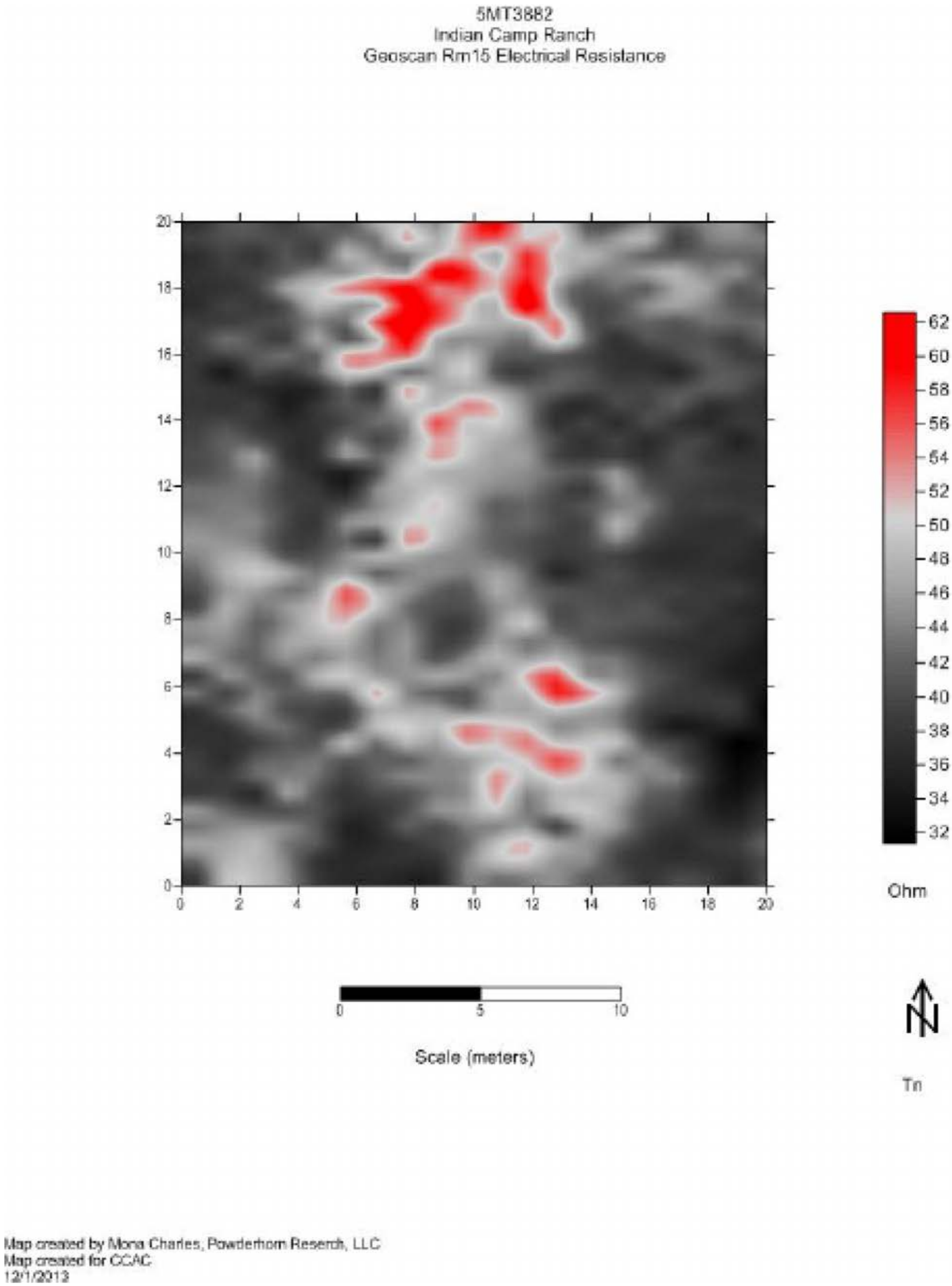


Figure 3.22. Electrical resistance grid for Site 5MT3882.

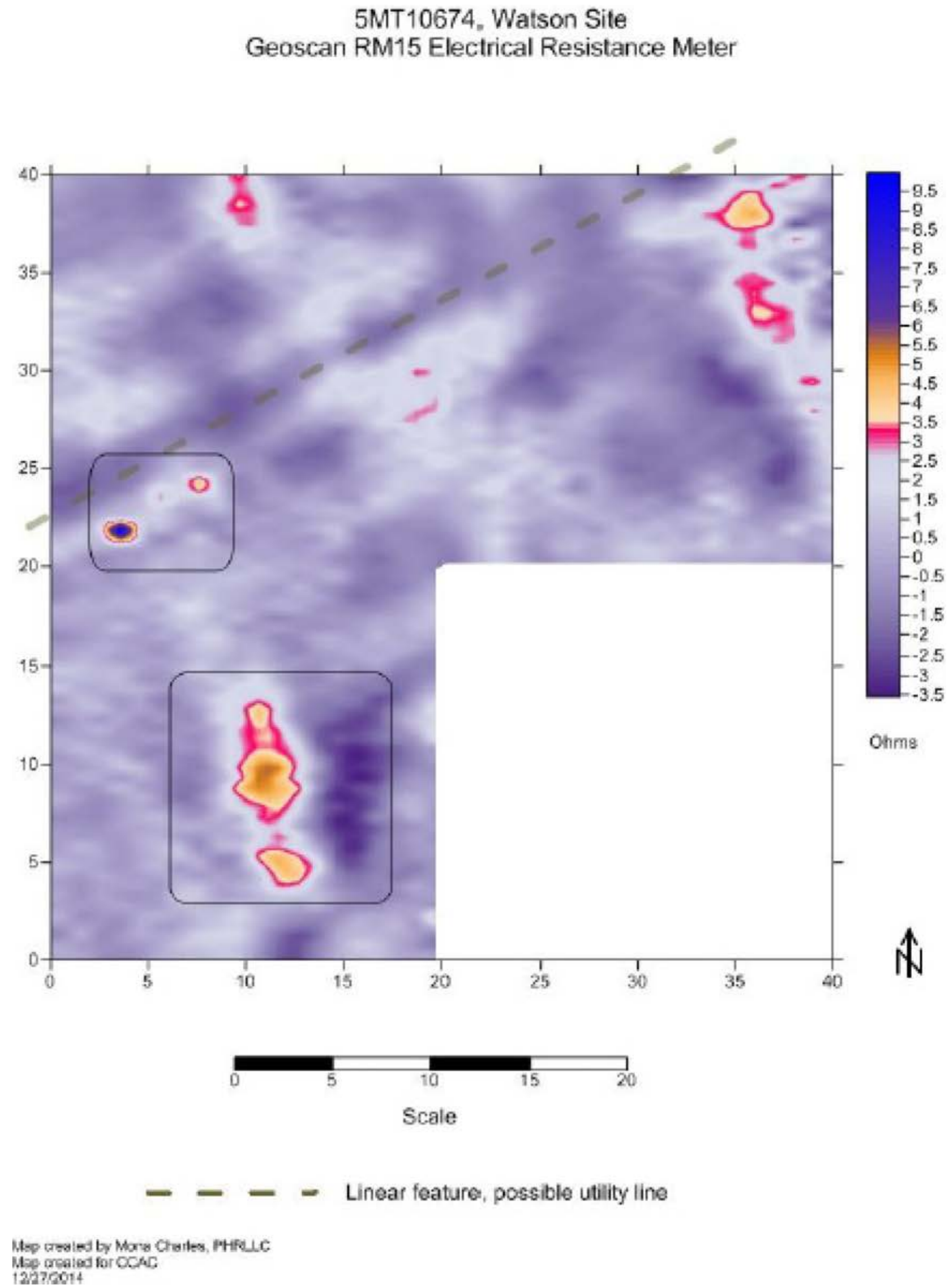


Figure 3.23. Post-processed electrical resistance map of Site 5MT10674. The two outlined areas are the most likely areas for buried archaeological features. The anomaly outlined in the southwest grid is similar in size and shape to known Basketmaker III pit structures from other sites.

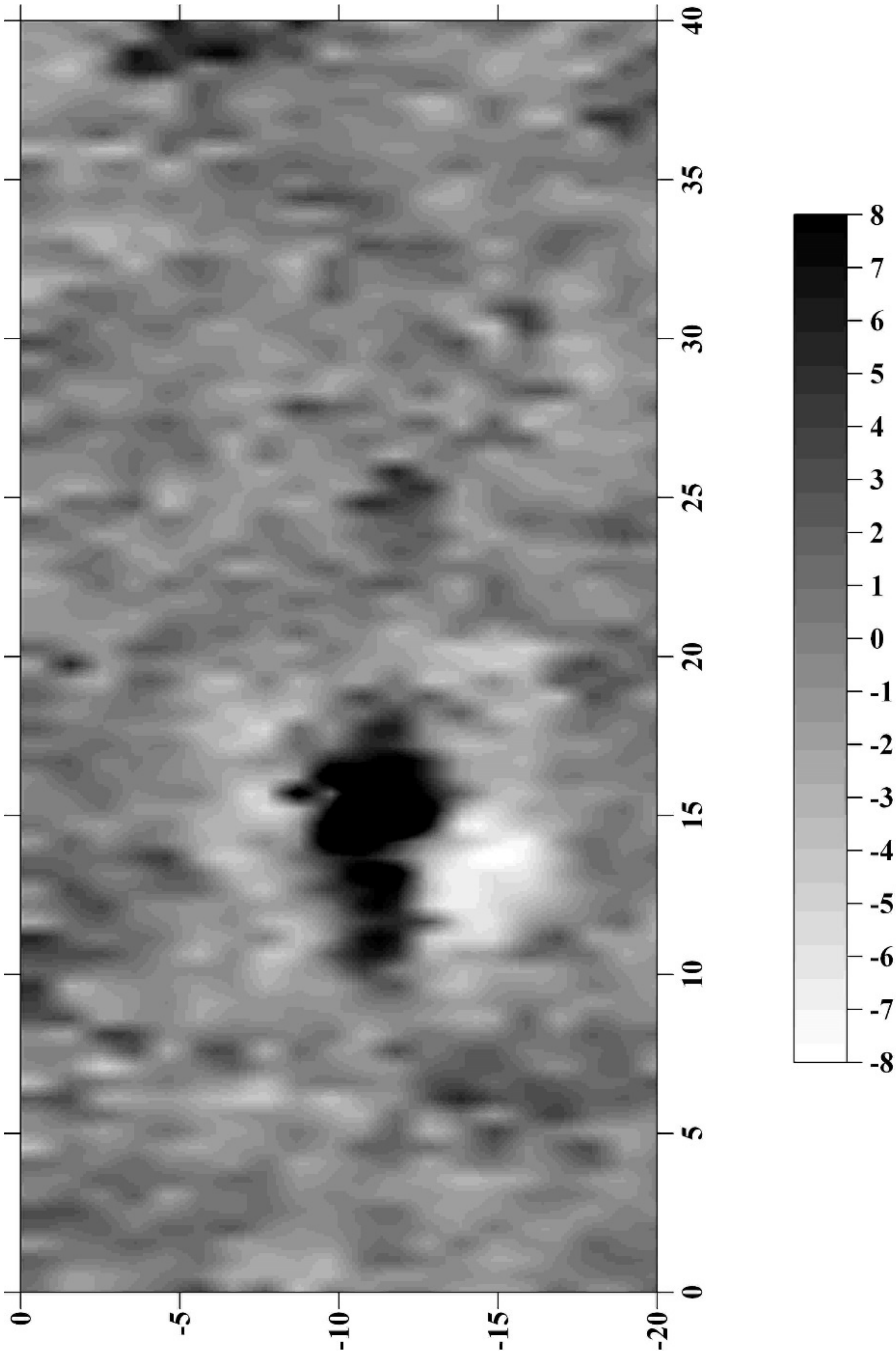


Figure 3.24. Electrical resistivity survey of Site 5MT10704.

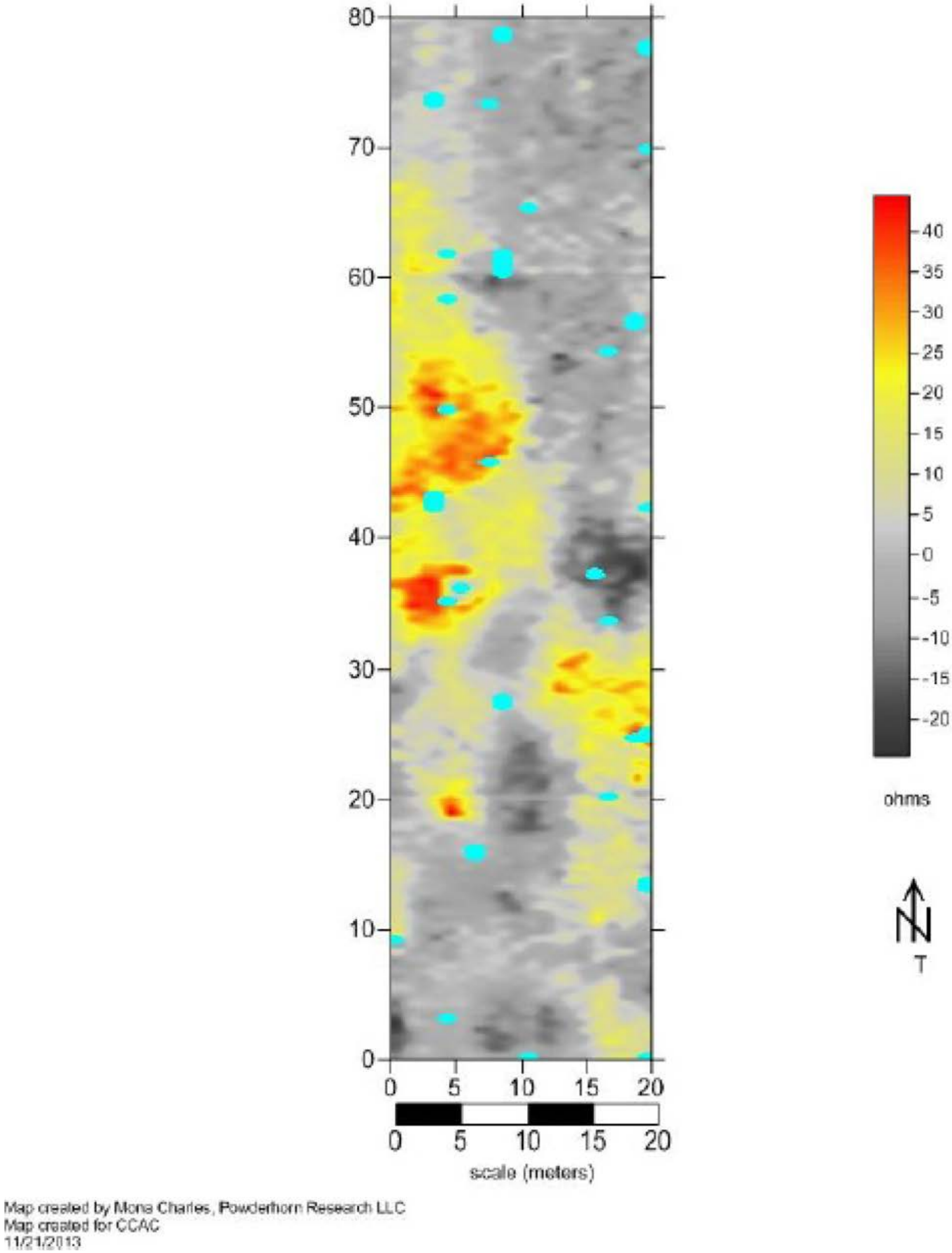


Figure 3.25. Electrical resistance map for Sites 5MT10627 (north) and 5MT10709 (south).

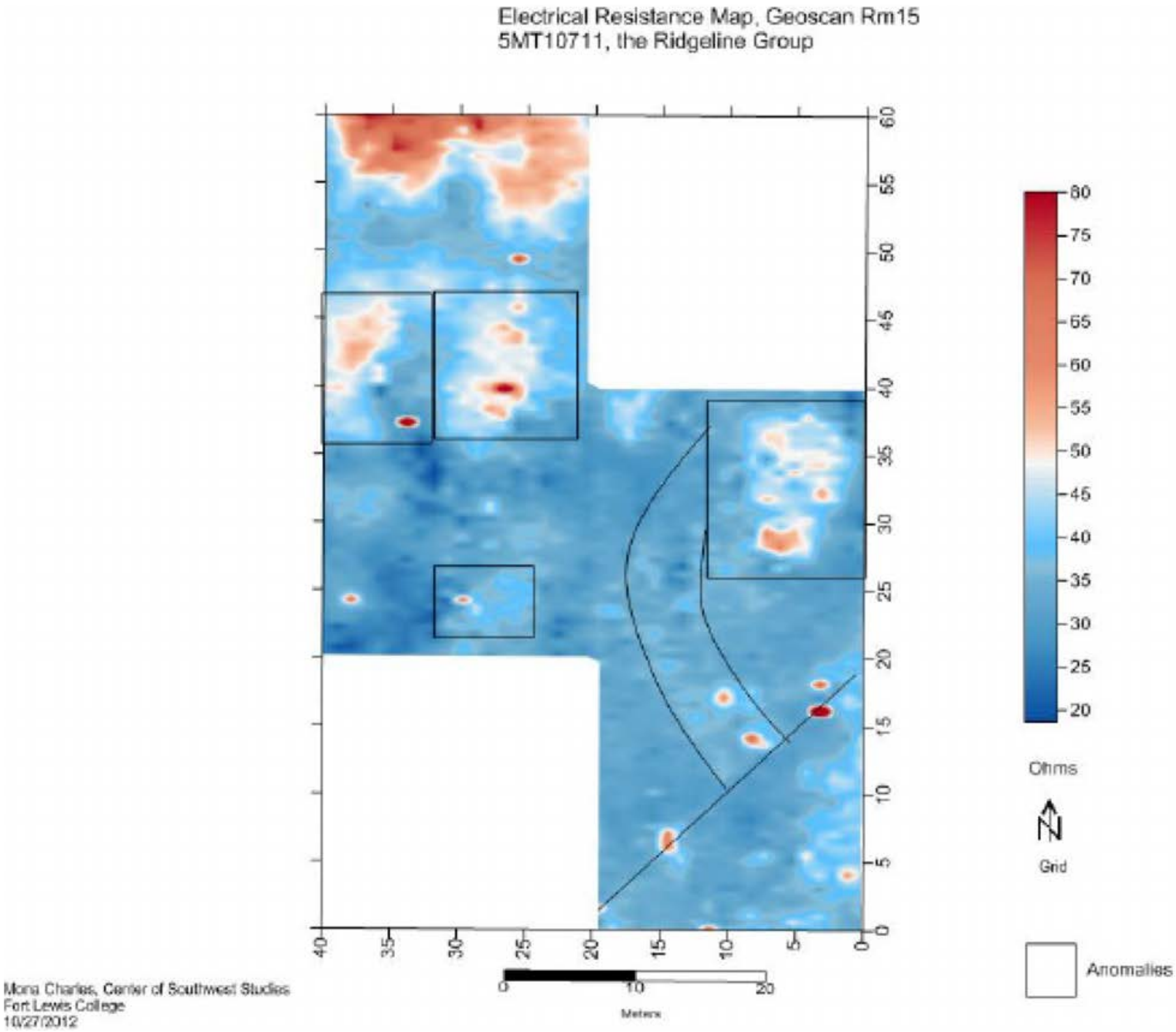


Figure 3.26. Electrical resistance map of Site 5MT10711.

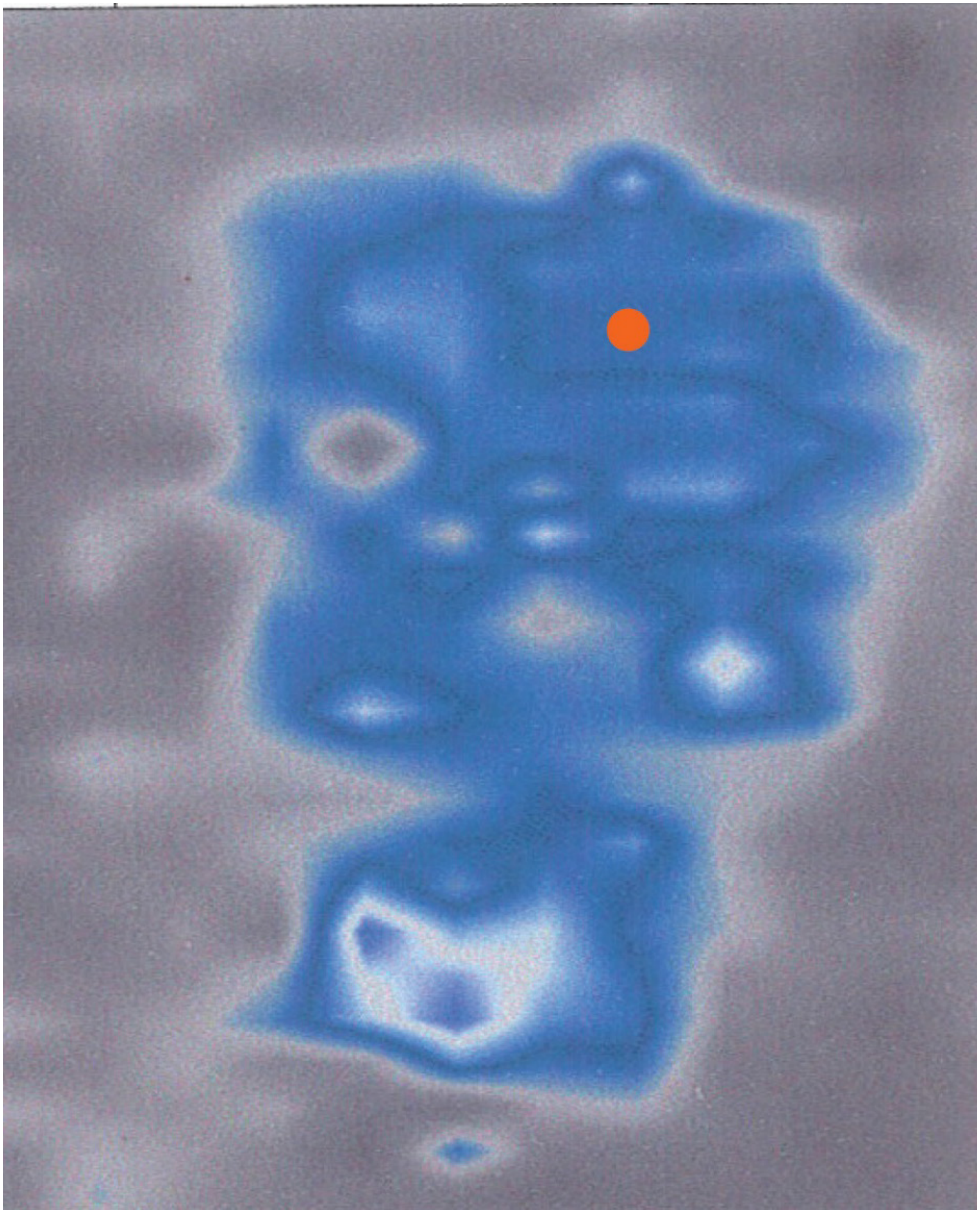


Figure 3.27. Detail of the interpolated resistivity image of Oversized Pithouse 101–103 at Site 5MT10711. Red dot is the location of the original soil auger test.

Figure 3.28. Aerial view of the remote sensing grid at Site 5MT10721.

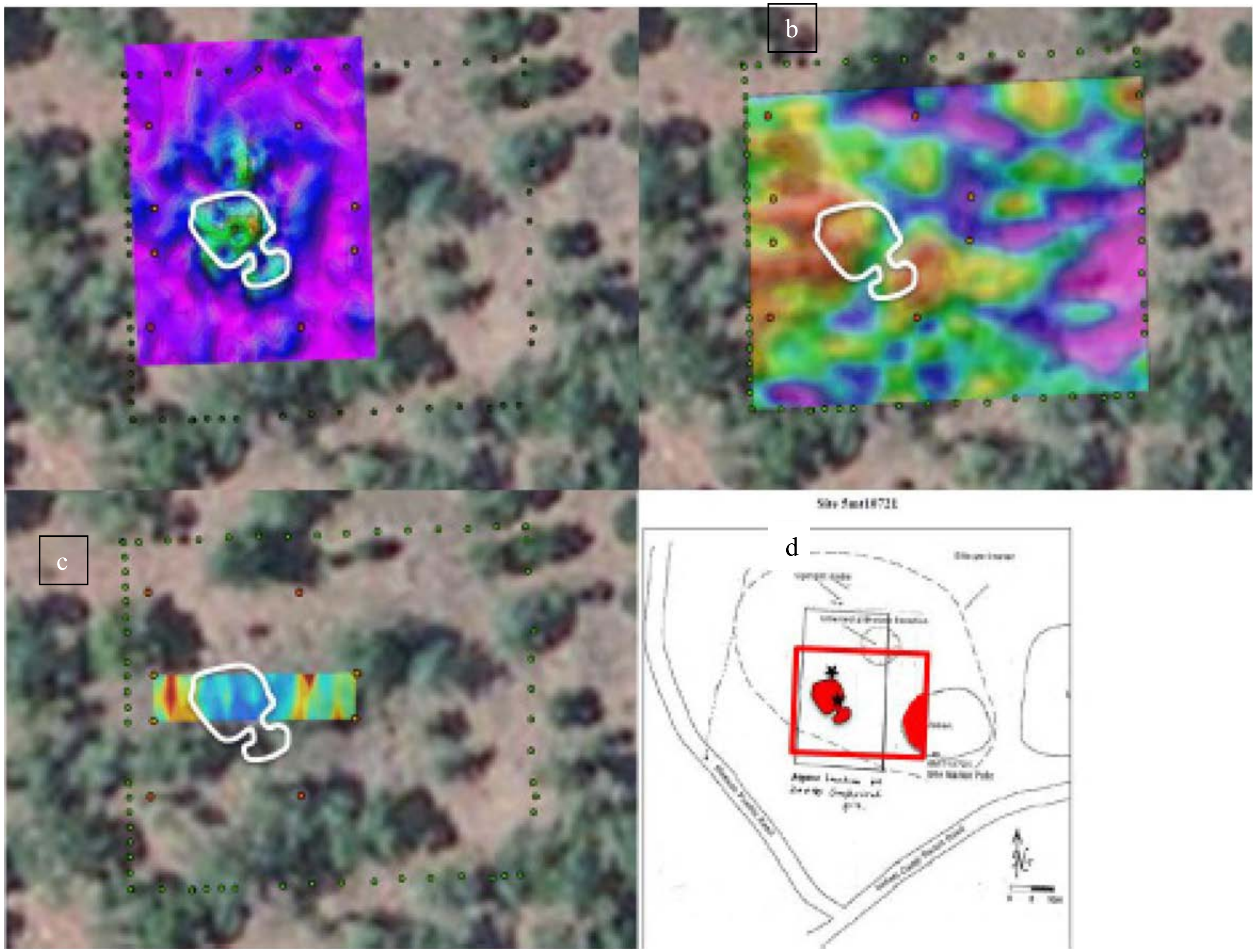


Figure 3.29. Comparison of geophysical imaging techniques at Site 5MT10721. From top-left clockwise: (a) magnetic susceptibility, (b) electrical conductivity, (c) electrical resistivity, and (d) site sketch with remote sensing grid and probable pithouse orientation.

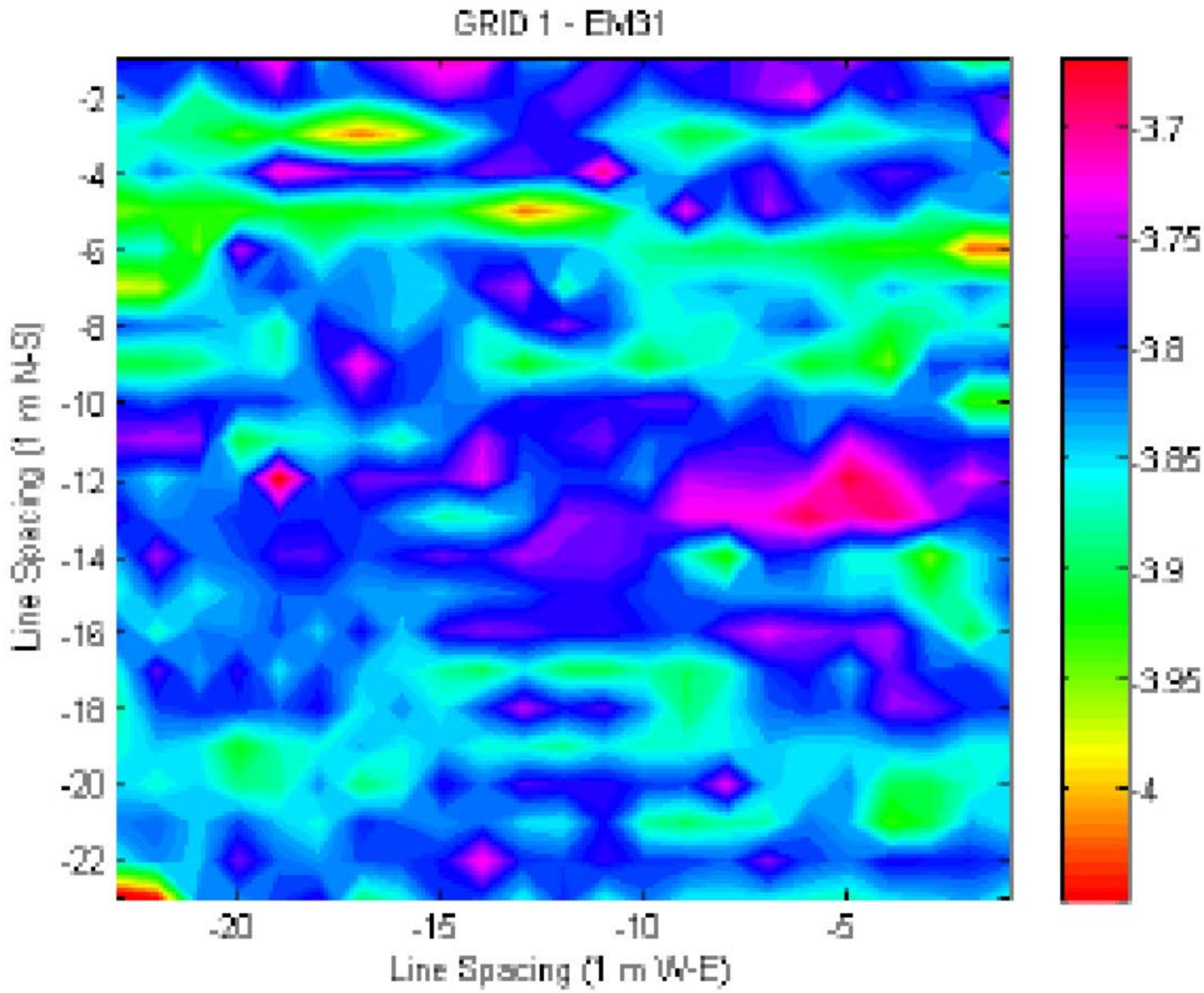


Figure 3.30. Magnetic susceptibility survey output from Site 5MT10730.

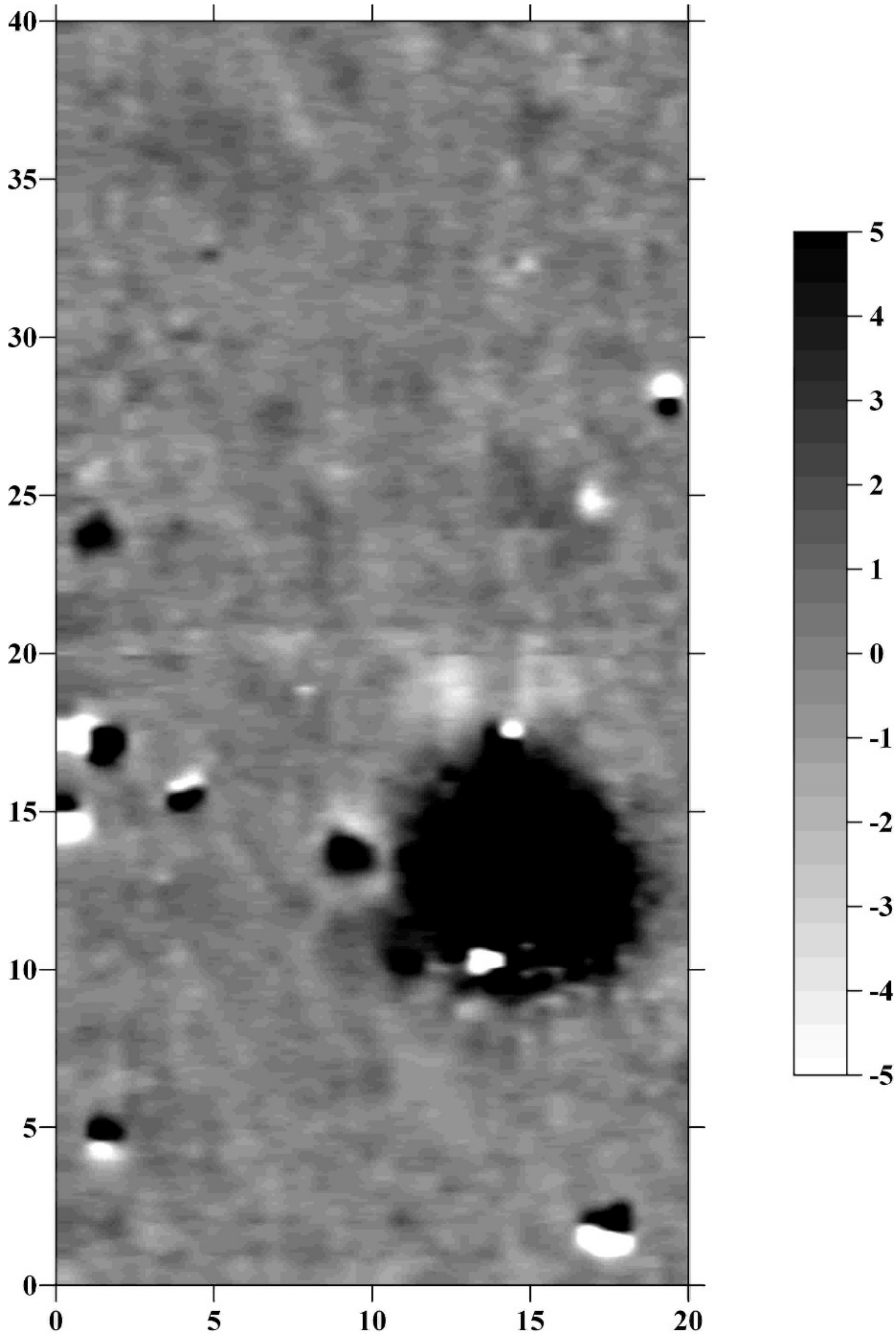


Figure 3.31. Natural Resources Conservation Service 2011 magnetic susceptibility survey from Site 5MT10736.

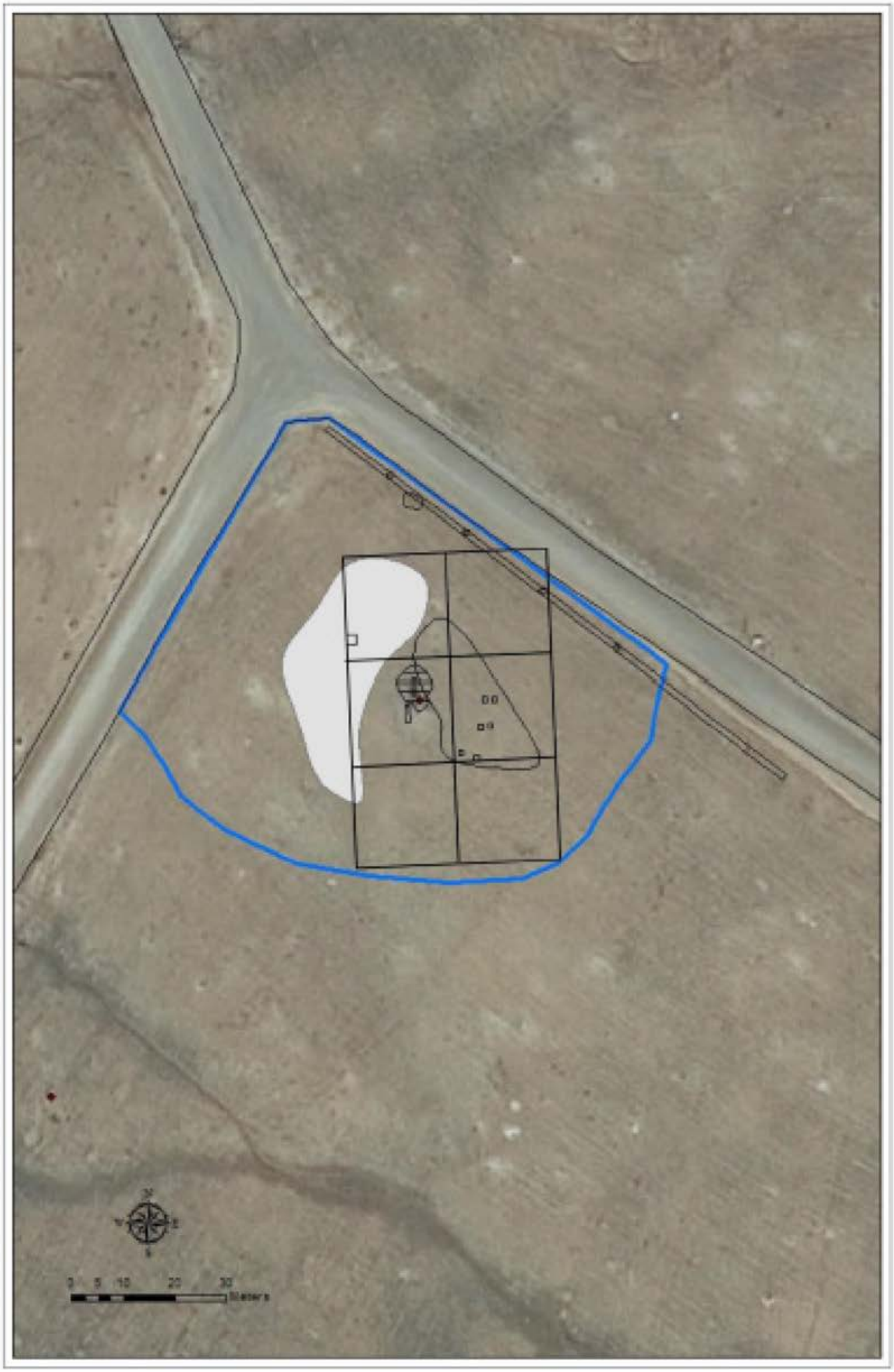


Figure 3.32. Aerial photograph of Site 5MT10736 overlain with pit structure location, resistance survey grids, and the site boundary (blue).

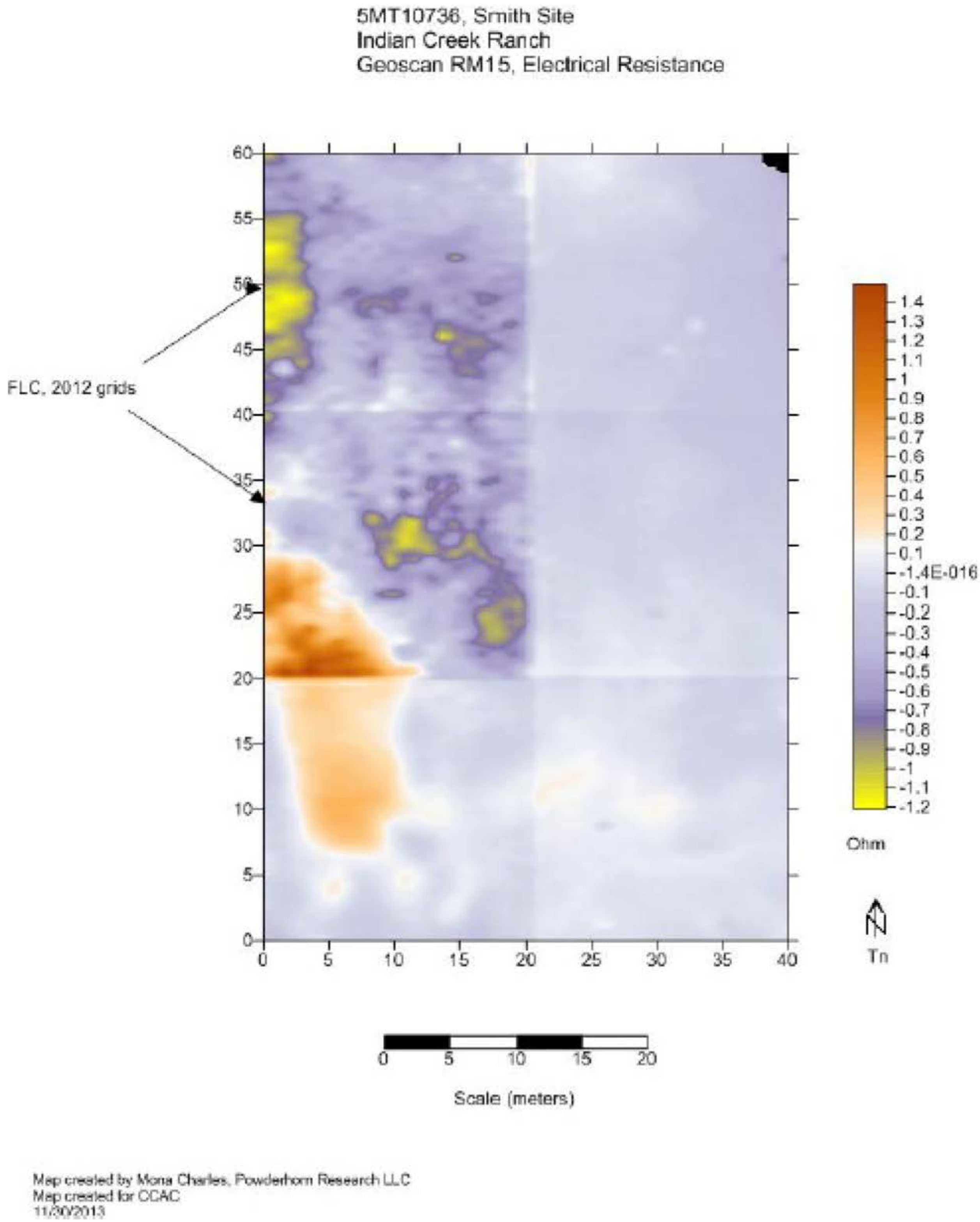


Figure 3.33. Combined 2012 and 2013 electrical resistance grids from Site 5MT10736.

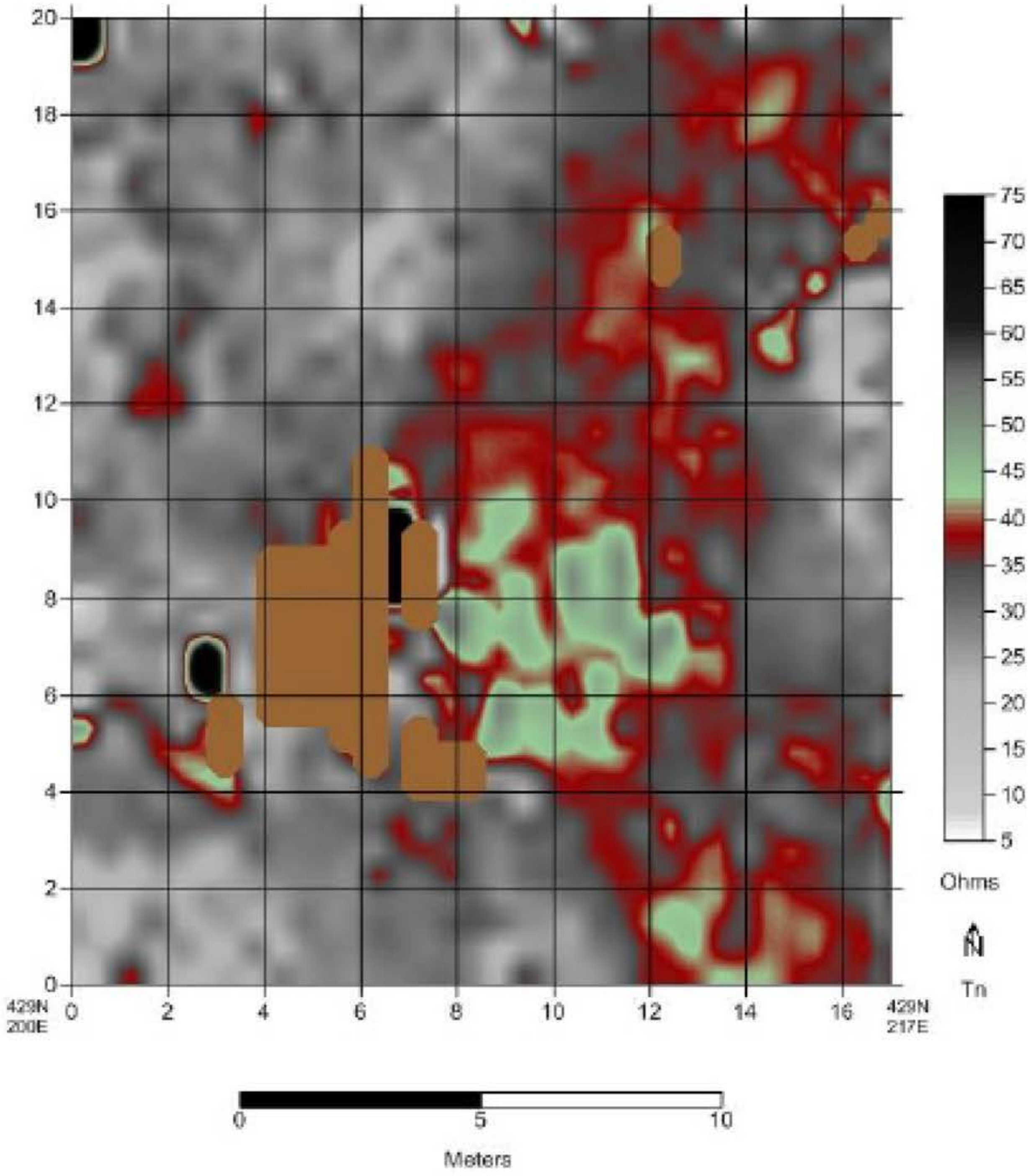


Figure 3.34. Electrical resistance map of the 20-x-20-m grid at Site 5MT2032.

Figure 3.35. Aerial photograph of Site 5MT2032 overlain with electrical resistivity results, pithouse orientation (red), roomblock outline (dashed line), excavation units (black), and site boundary (blue).

Figure 3.36. Aerial photograph of Site 5MT3873 overlain with the electrical resistance results and the site boundary (blue).

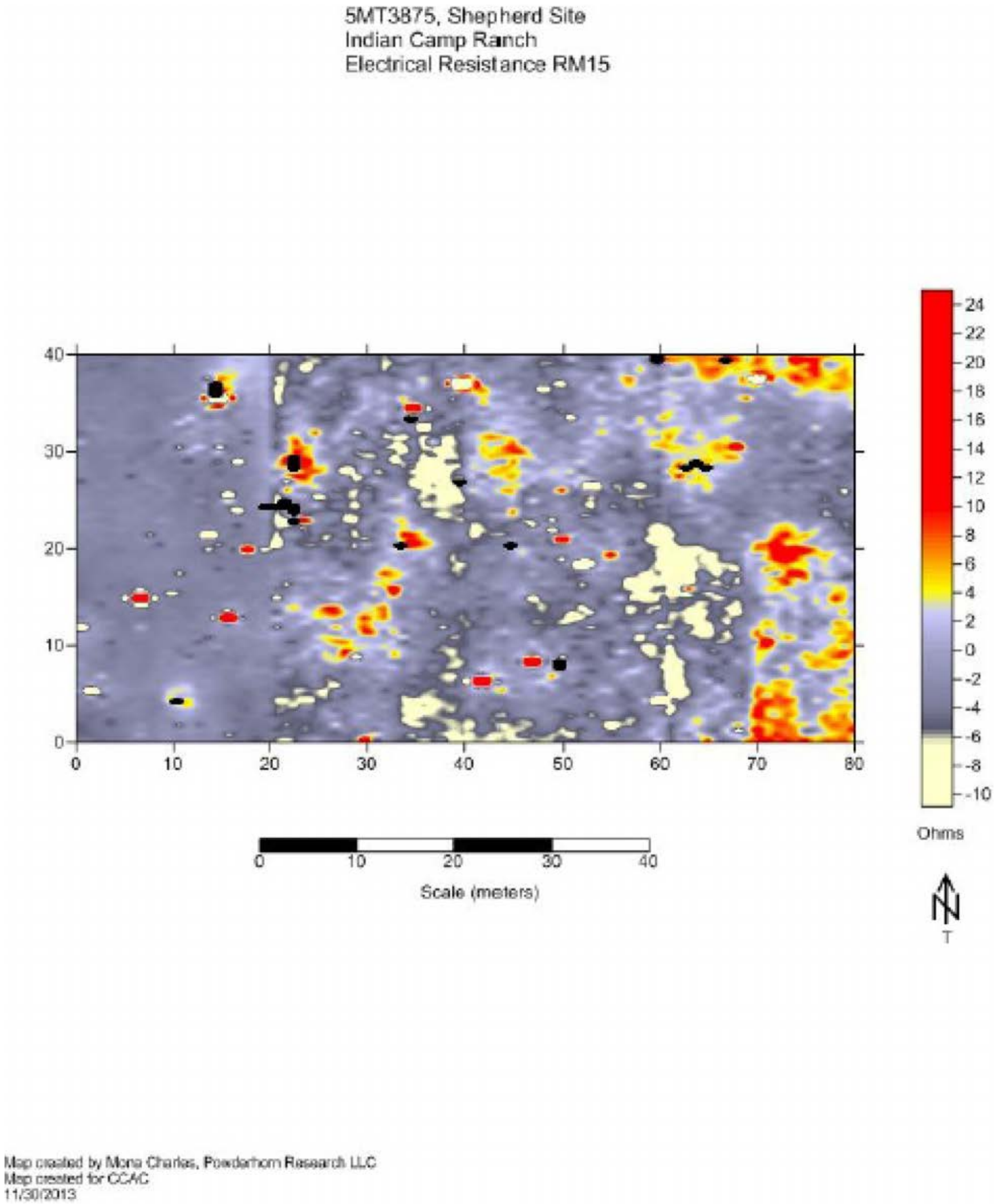


Figure 3.37. Post-processed electrical resistance at Site 5MT3875.

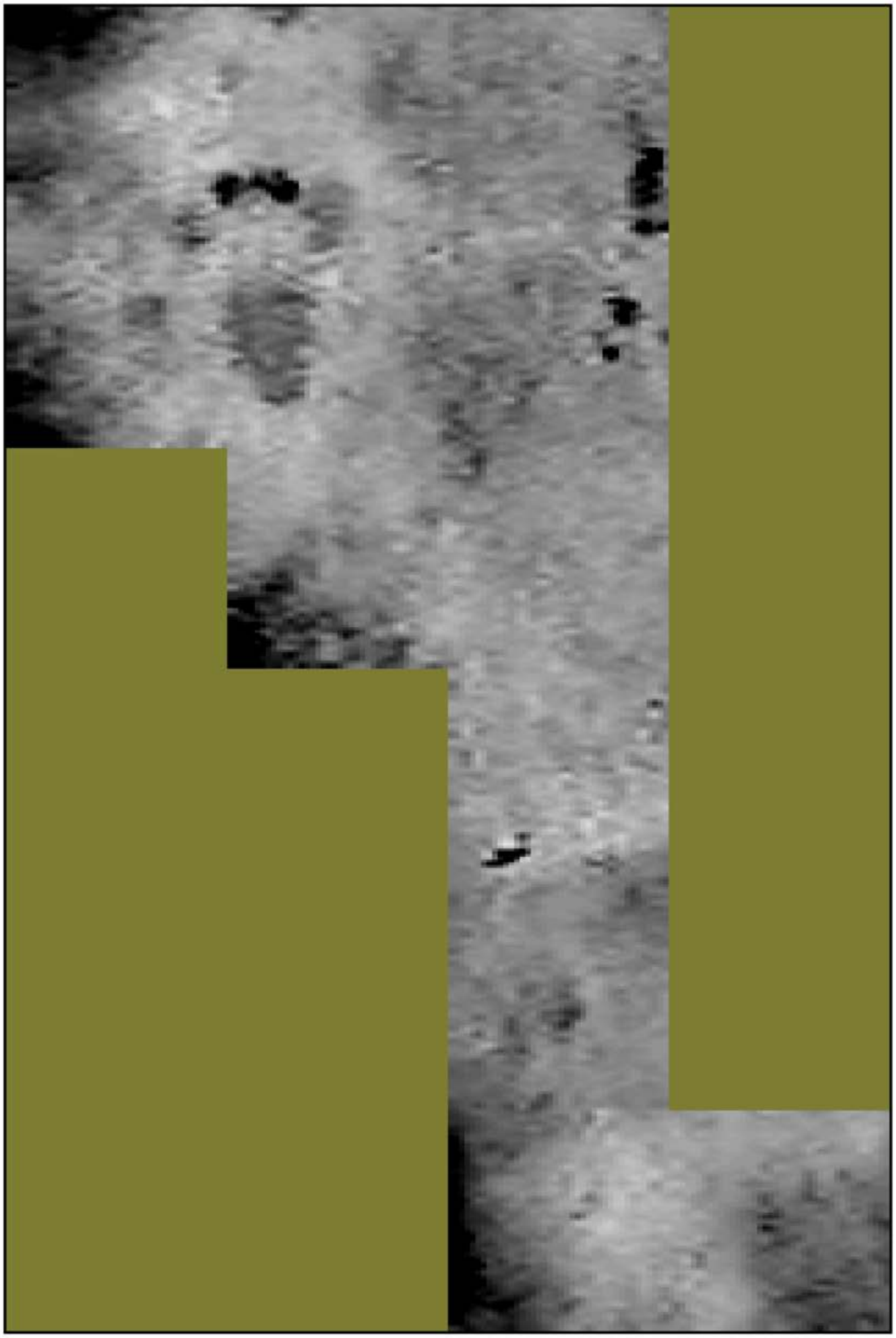


Figure 3.38. Electrical resistance map of Site 5MT3890 showing several high-resistance gray anomalies. Each survey grid is 20-x-20 m in size.

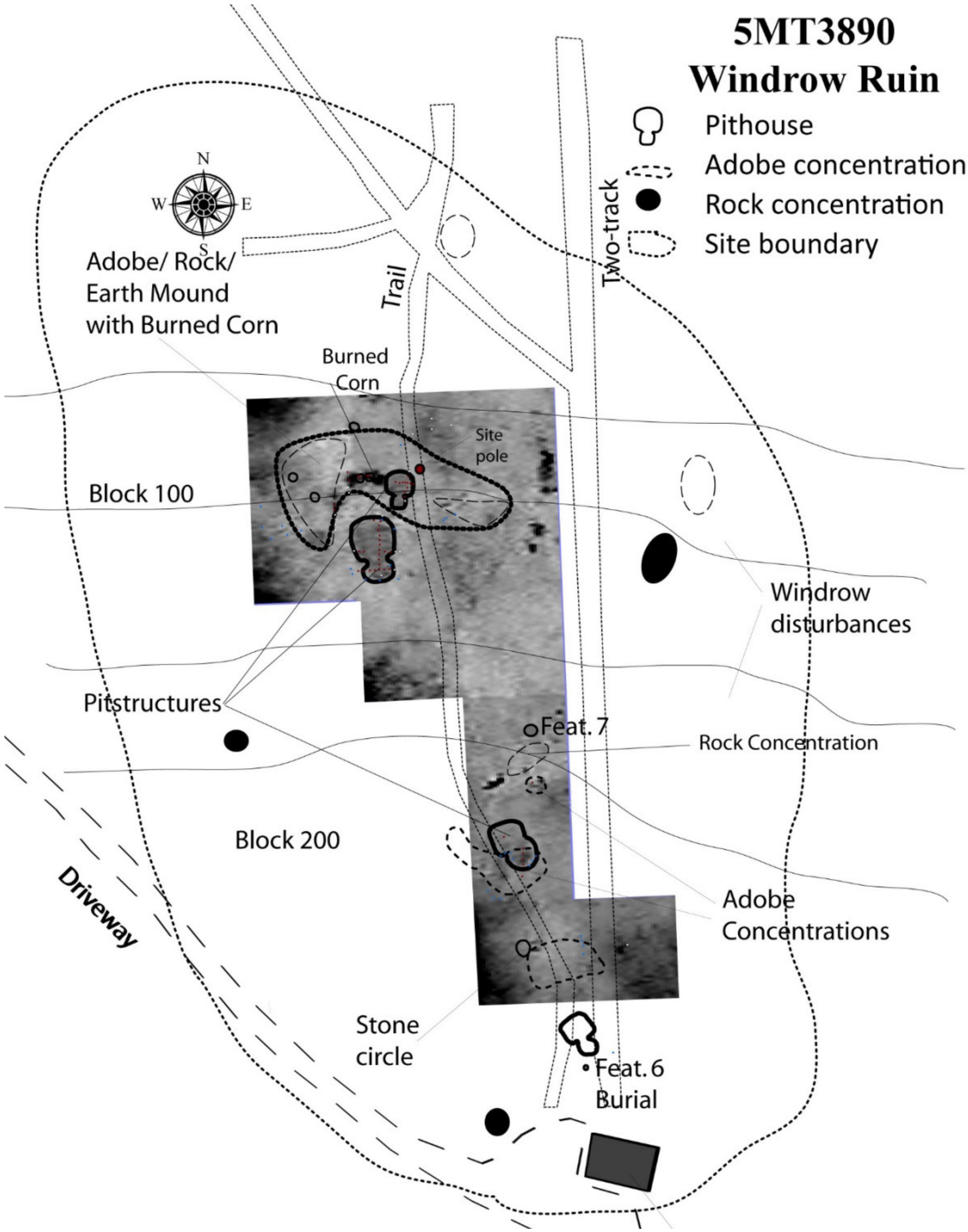


Figure 3.39. Map of Windrow Ruin (Site 5MT3890) overlain with resistivity survey results, auger tests, confirmed pit structures, surface features, and modern impacts.

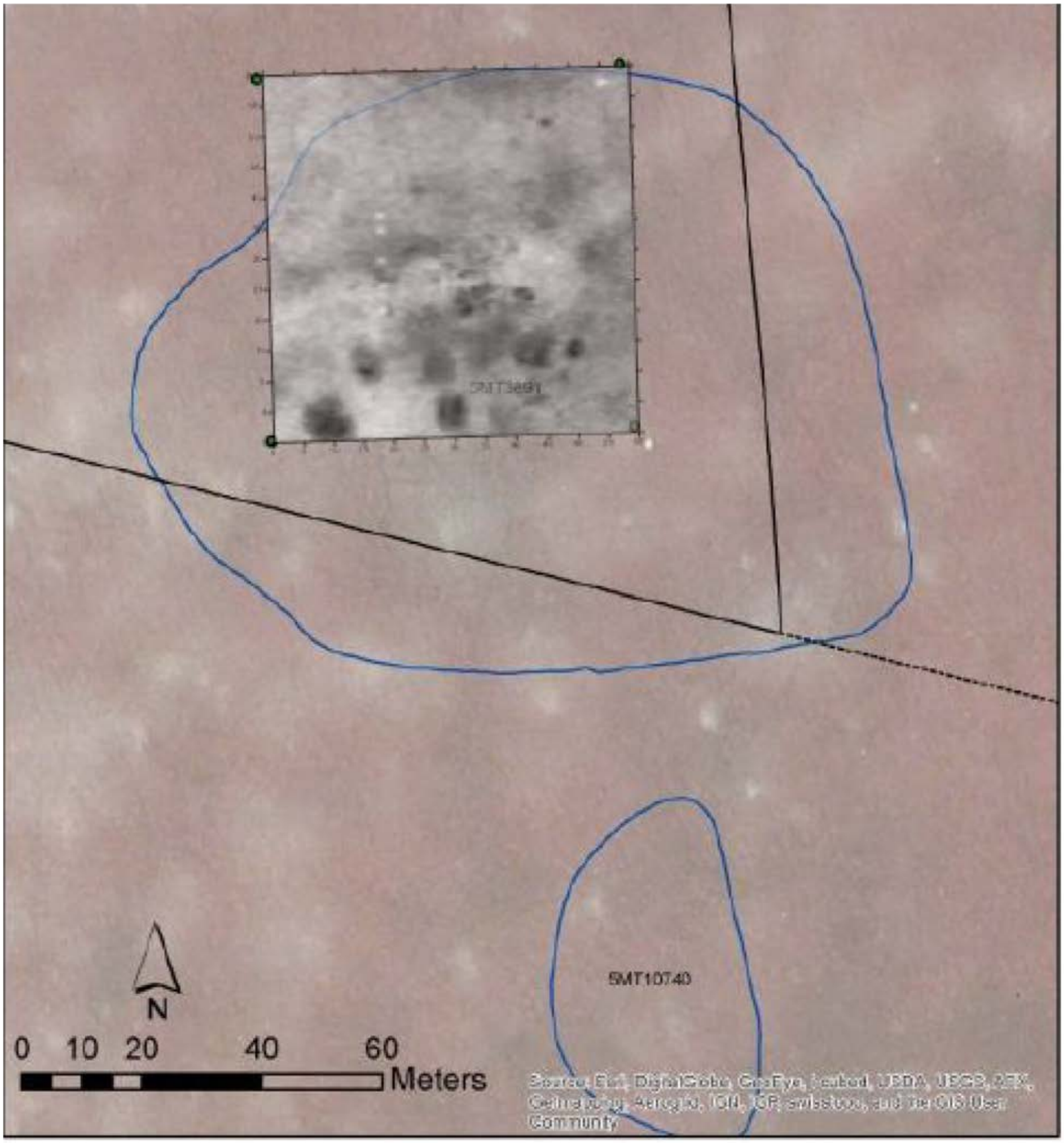


Figure 3.40. Aerial photograph of Site 5MT3891 overlain with the Basketmaker Communities Project resistance survey results and the site boundary (blue).

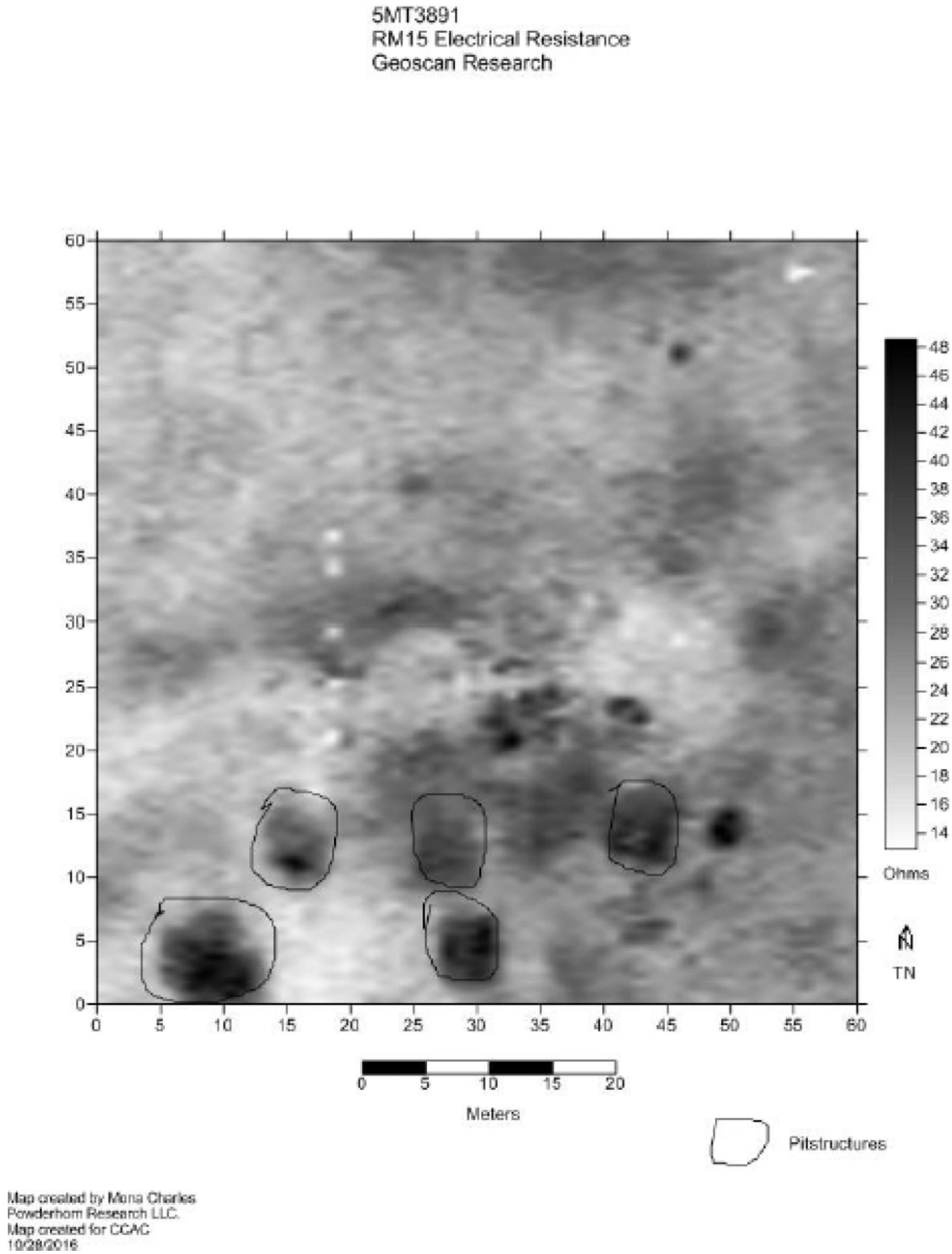


Figure 3.41. Electrical resistance map and probable pit structure anomalies at Site 5MT3891.

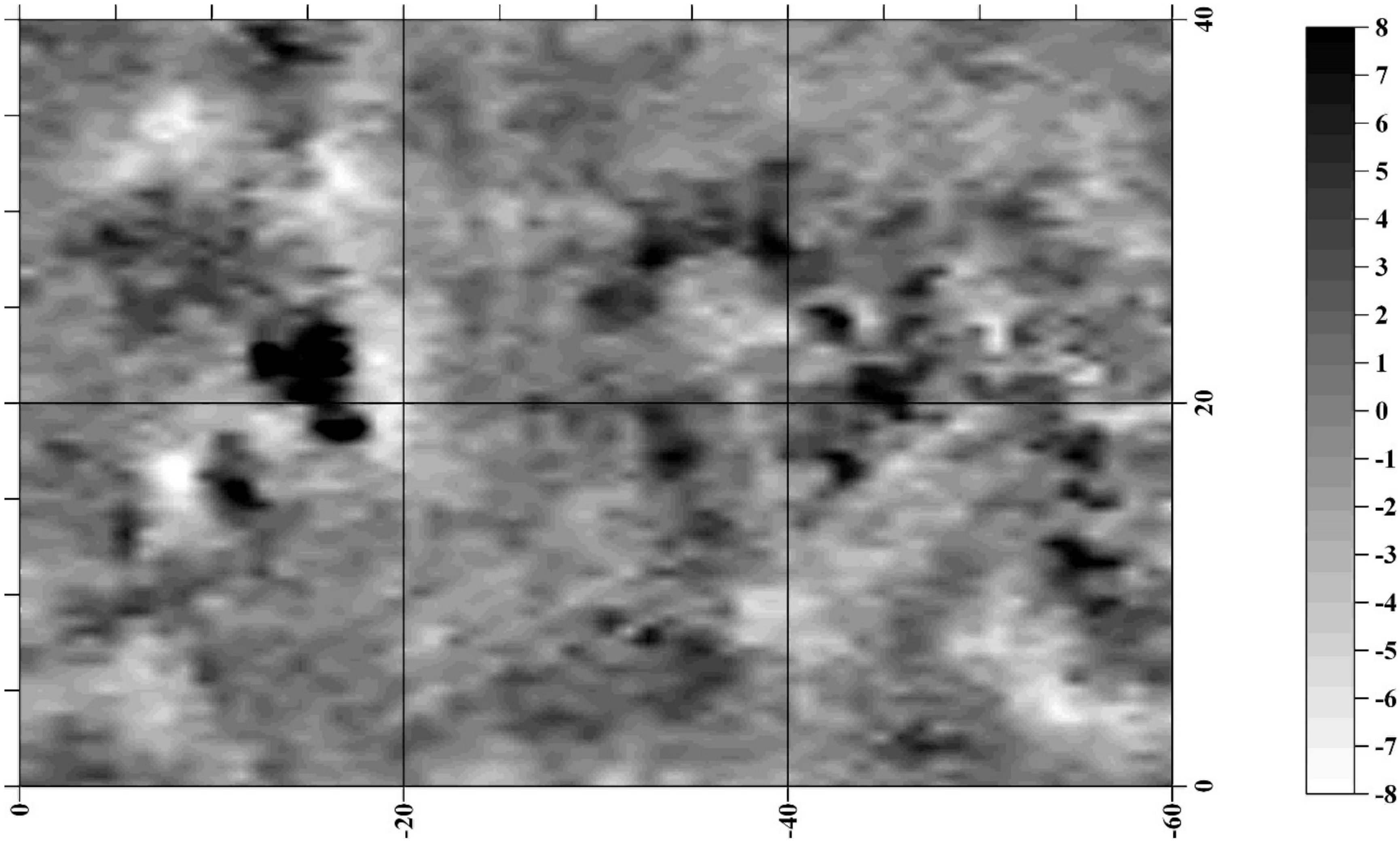


Figure 3.42. Electrical resistance map of Site 5MT3907.

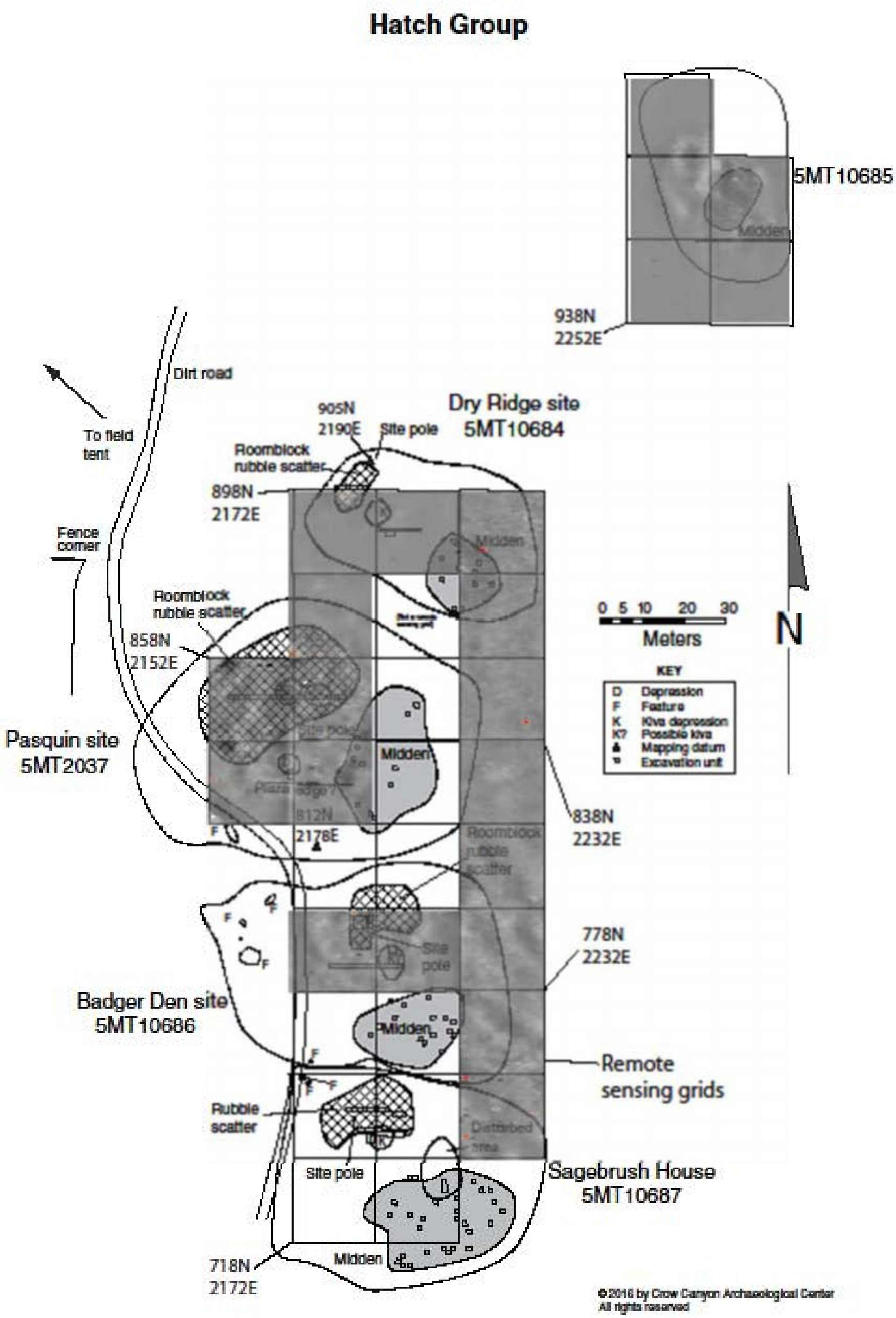


Figure 3.43. Map of the Hatch group sites overlain with Basketmaker Communities Project remote sensing grids and 2015 electrical resistivity results.

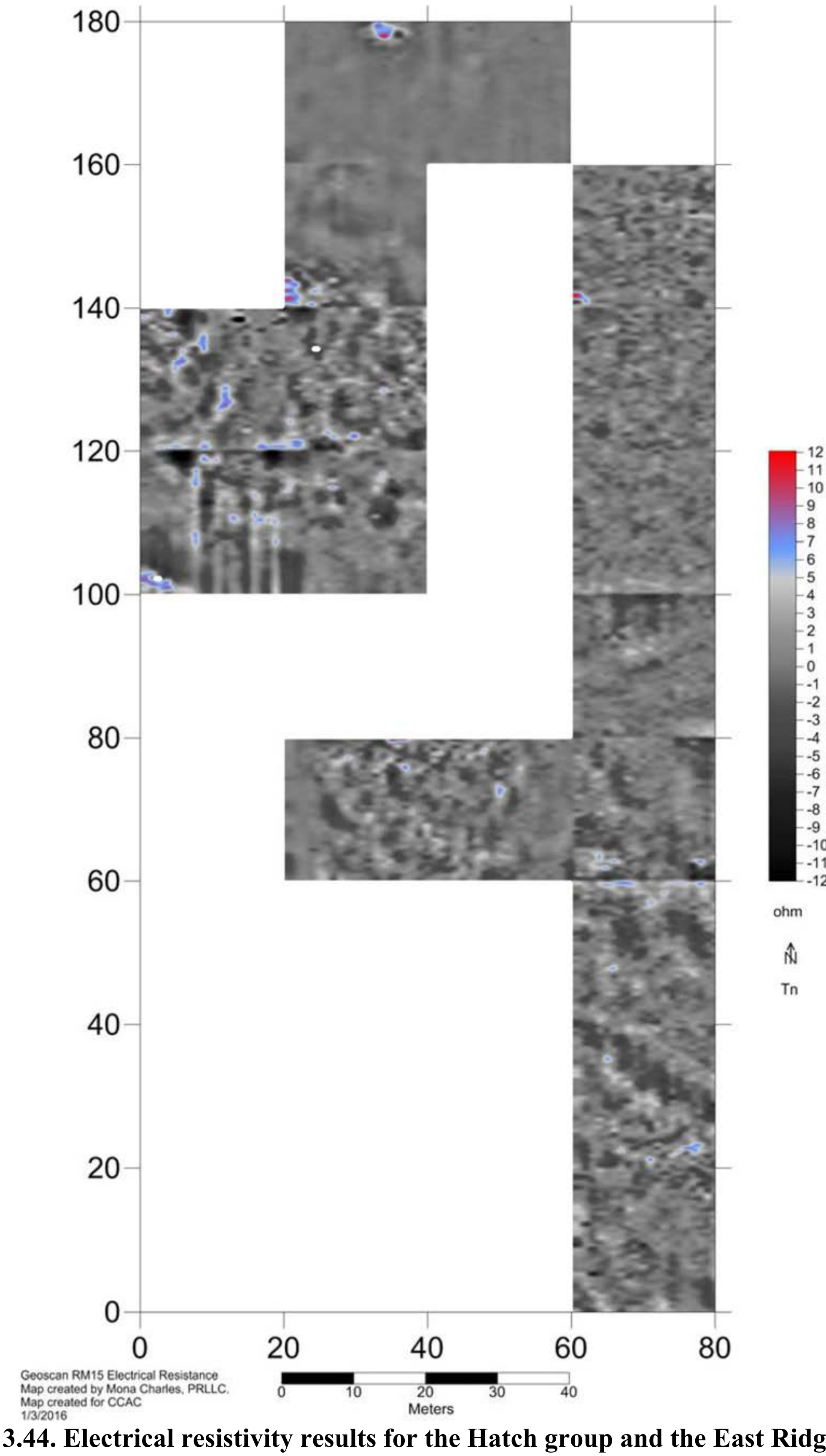


Figure 3.44. Electrical resistivity results for the Hatch group and the East Ridge survey.

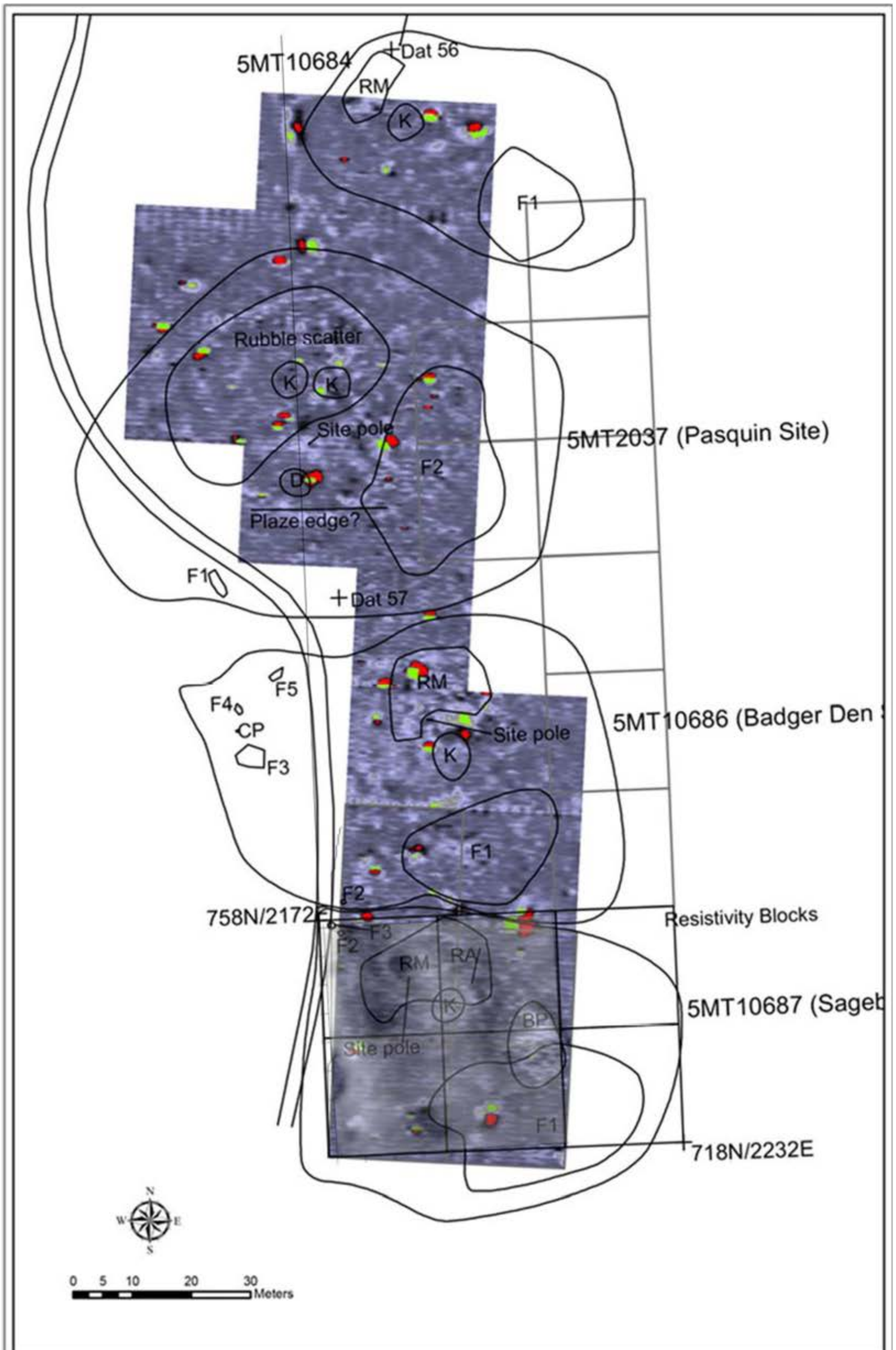


Figure 3.45. Map of the Hatch group sites overlain with magnetic gradiometer results and electrical resistivity grid outlines.

Note: BP = bermed sediment pile, CP = artifact collection pile, D = depression, F = feature, K = reported kiva location, RA = rubble and artifacts RB = roomblock, RM = rubble mound.

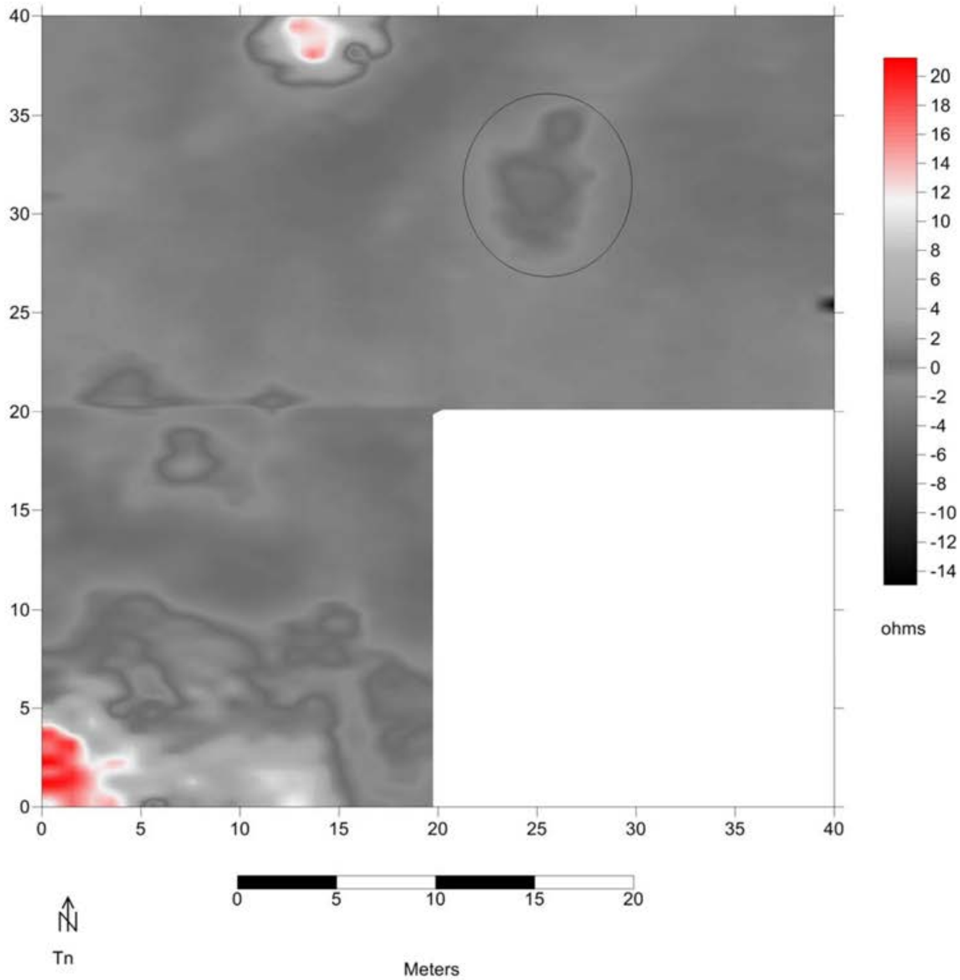


Figure 3.46. Electrical resistance map of Site 5MT10684 with an earthen-walled kiva anomaly circled.

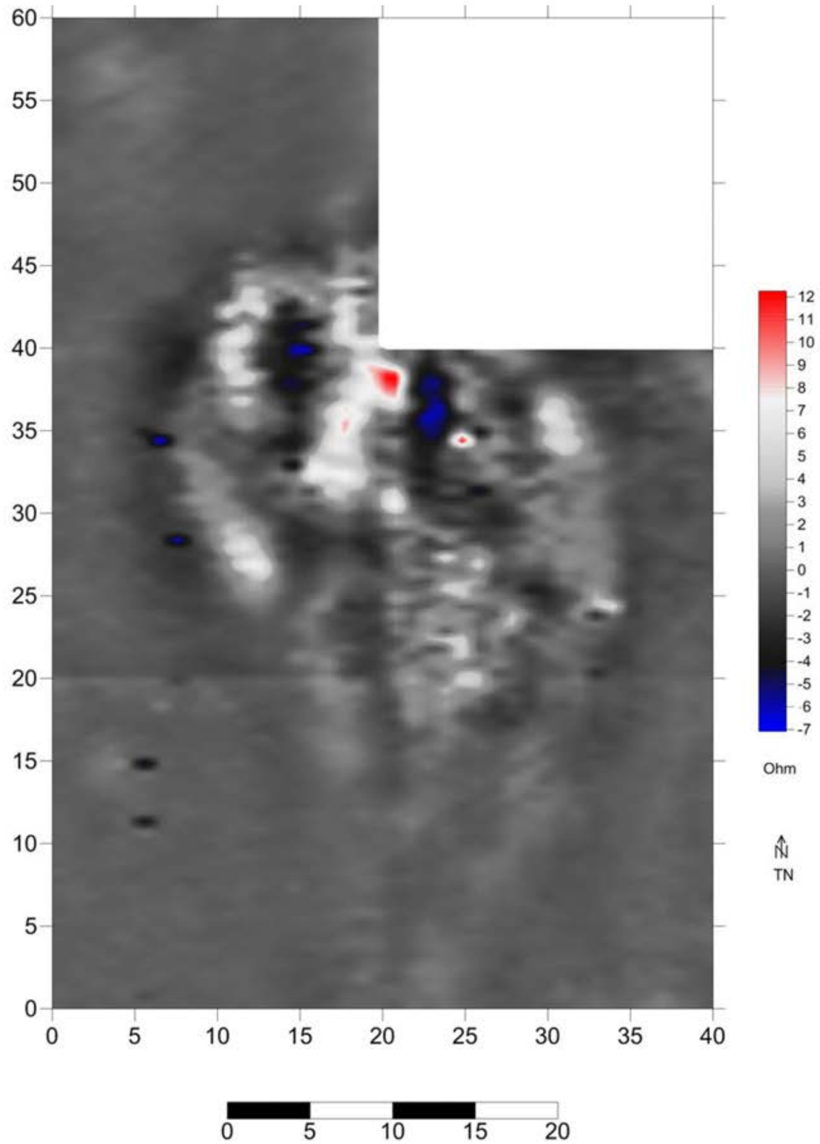


Figure 3.47. Post-processed electrical resistance map of Site 5MT10685.

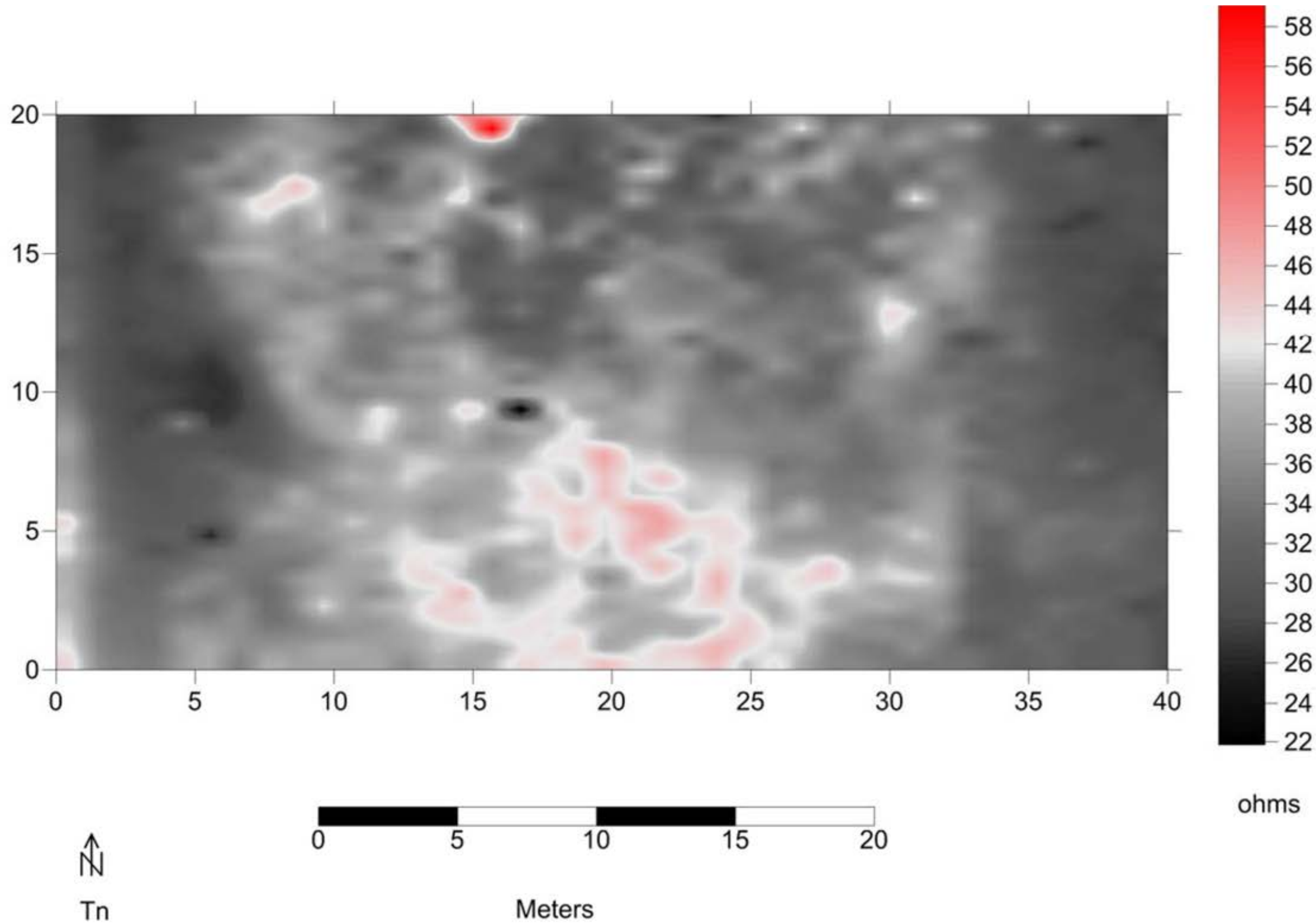


Figure 3.48. Post-processed electrical resistance map of Site 5MT10686.

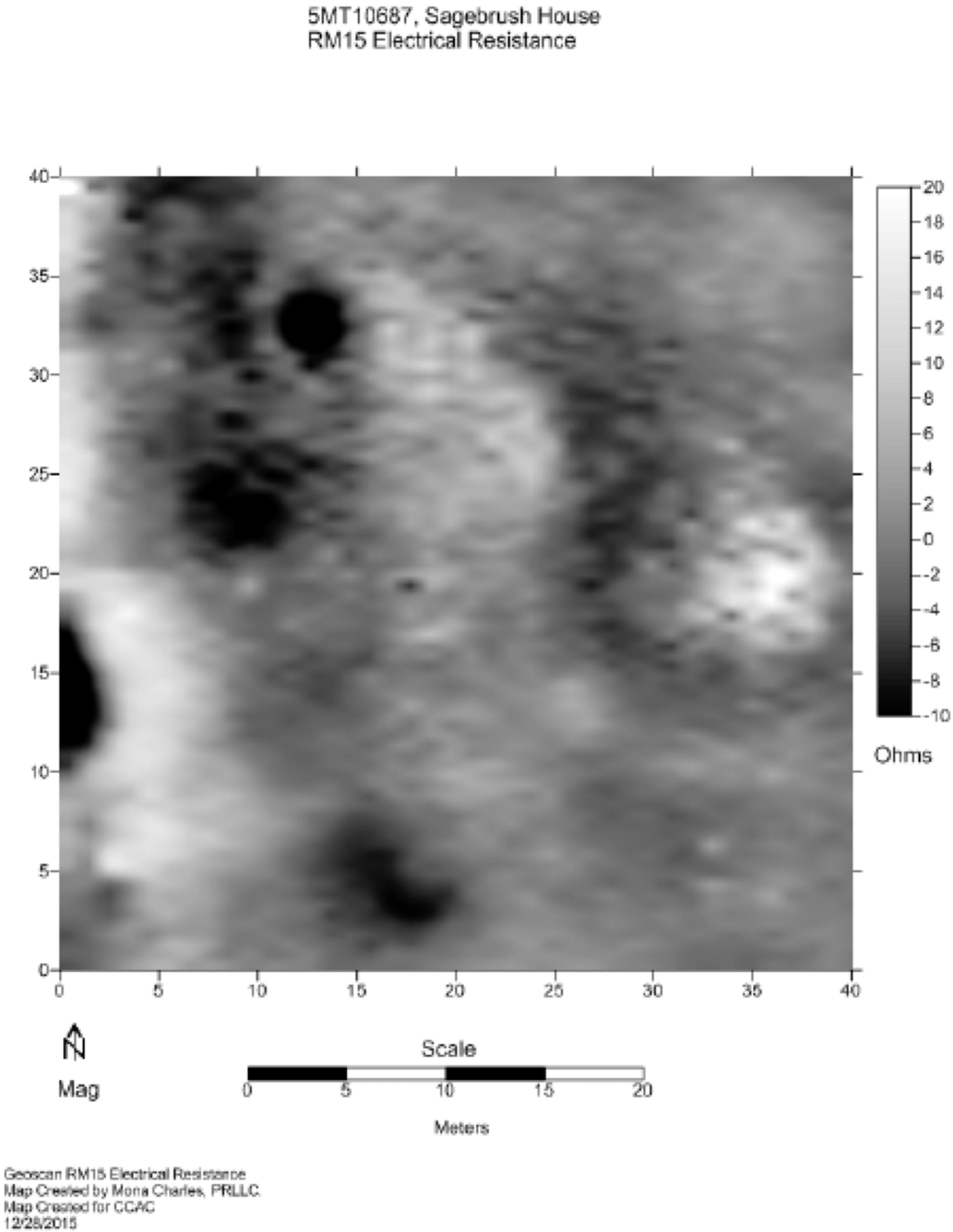


Figure 3.49. Post-processed electrical resistance map of Site 5MT10687.

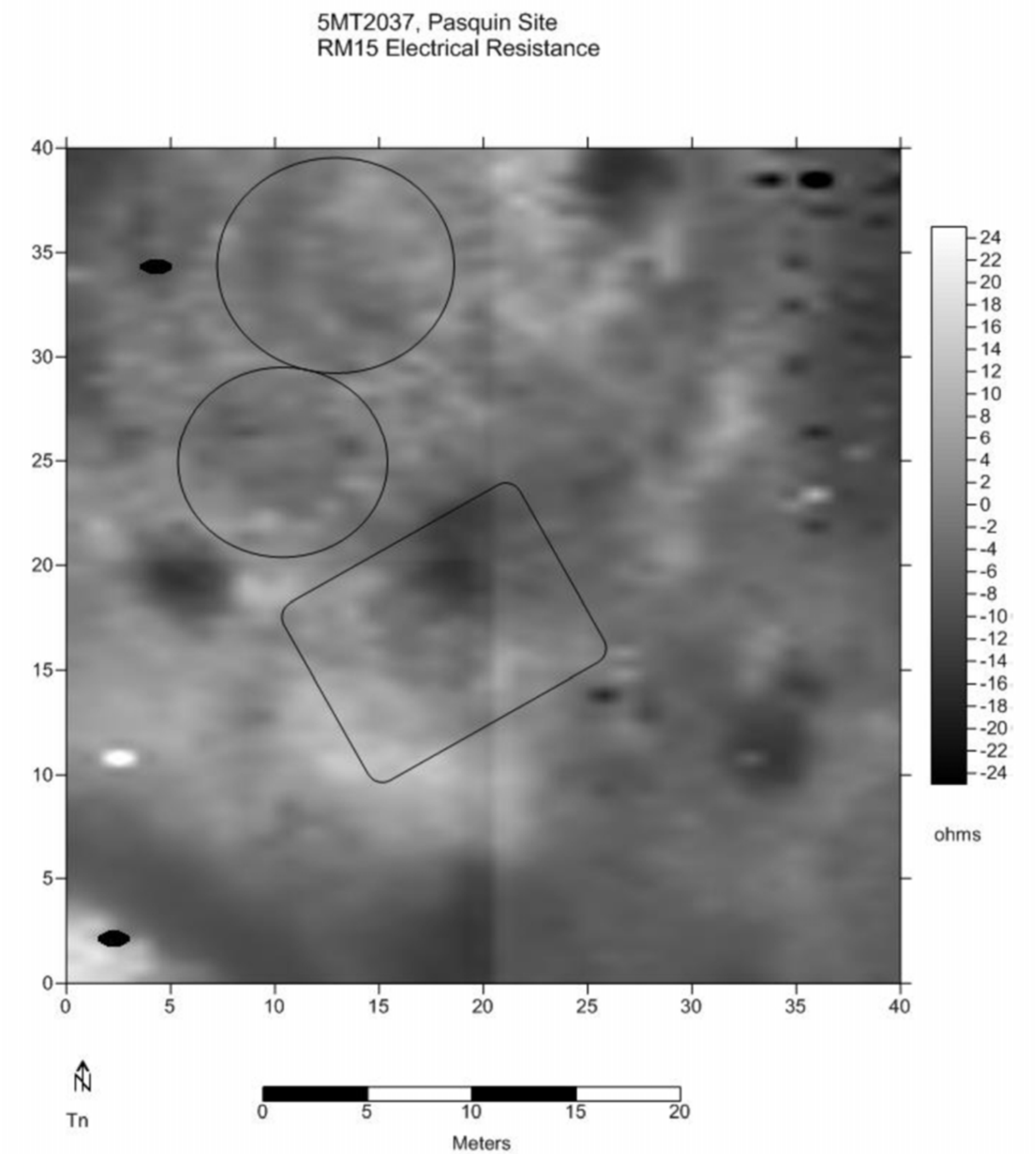


Figure 3.50. Post-processed electrical resistance map of Site 5MT2037 with proposed looter/kiva anomalies outlined in black.

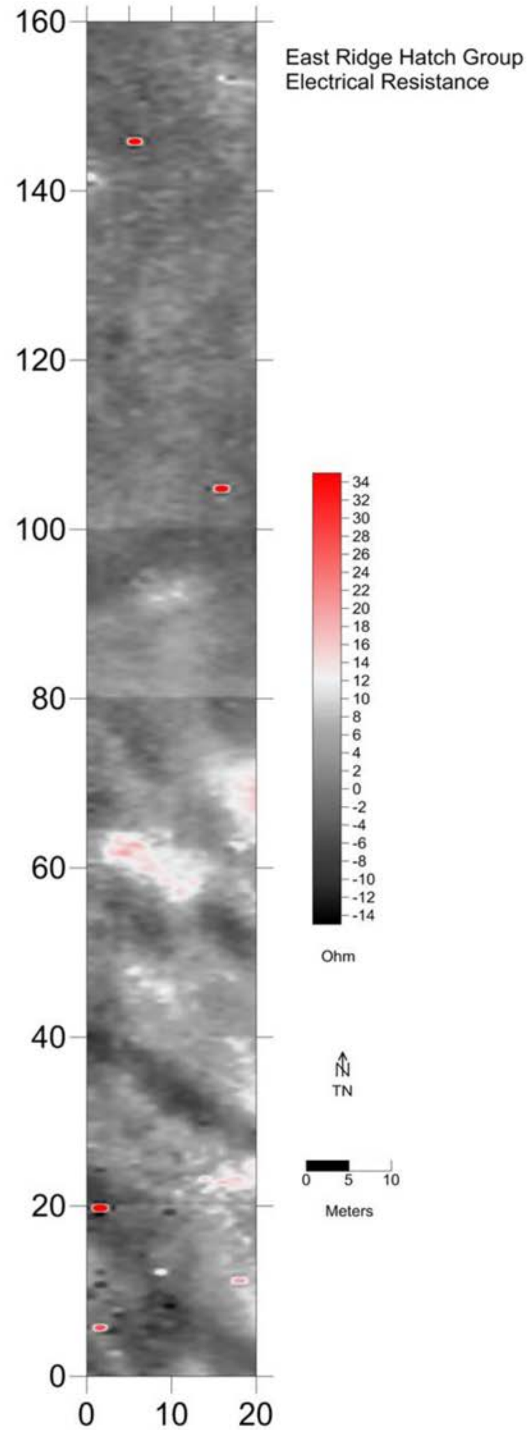


Figure 3.51. Electrical resistance map for the east side of the Hatch group ridge.

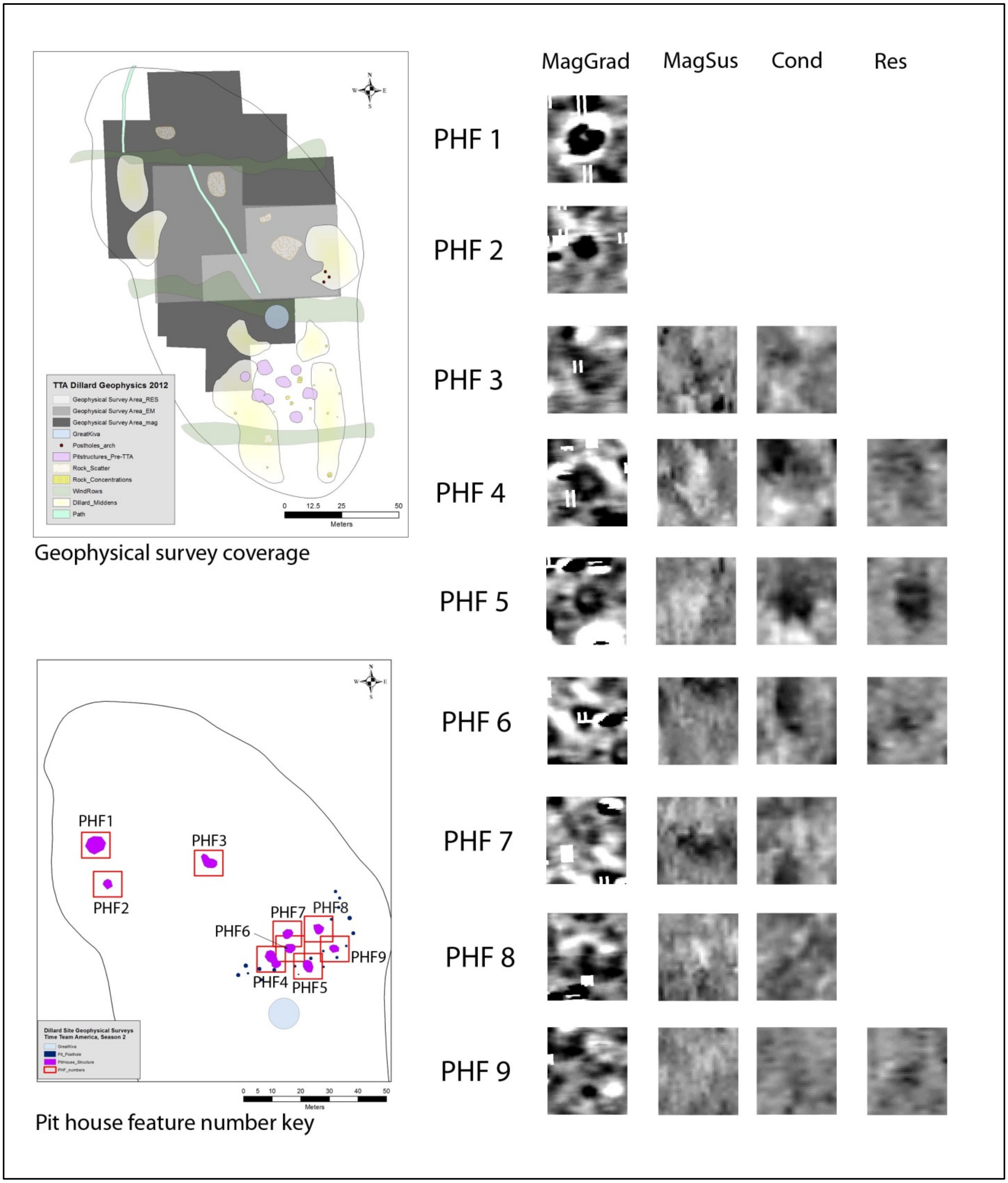


Figure 3.52. Comparison of possible pit structure (PHF) anomalies from the Dillard site (5MT10647) using multiple geophysical survey methods.

Note: MagGrad = magnetic gradient, MagSus = magnetic susceptibility, Cond = electrical conductivity, and Res = electrical resistivity.

Table 3.1. Basketmaker Communities Project Sites Imaged with Remote Sensing.

Site Number	Site Name	Survey Area m^2	Method(s)	Entity	Year	Auger Tested	No. of Pit Structures Found
5MT10627		800	ER	Powderhorn	2013		0
5MT10631	**Mueller Little House**	4,400	ER GPR	Powderhorn	2013	Yes	1
5MT10632	Agatha	3,200	ER	NRCS Powderhorn	2011 2016	Yes	1
5MT10637		400	ER MAG	Fort Lewis College Powderhorn	2012 2013	Yes	1
5MT10647	**Dillard**	10,400	CON ER GPR LiDAR MAG	NRCS Fort Lewis College Powderhorn TTA	2011–2013	Yes	11
5MT10651		1,200	ER	Powderhorn	2013		0
5MT10674		1,200	ER	Powderhorn	2014		0
5MT10684	**Dry Ridge**	1,200	ER	Powderhorn	2015		1
5MT10685		2,000	ER	Powderhorn	2015	Yes	1
5MT10686	**Badger Den**	800	ER	Powderhorn	2015	Yes	0
5MT10687	**Sagebrush House**	3,200	ER MAG	Powderhorn	2014 2015	Yes	1
5MT10704		800	ER	NRCS	2011		1
5MT10709	**Portulaca Point**	800	ER	Powderhorn	2013	Yes	1
5MT10711	**Ridgeline**	1,600	ER LiDAR	Fort Lewis College	2012	Yes	3
5MT10721		821	CON ER MAG	Colorado School of Mines	2011	Yes	1
5MT10730		621	CON ER MAG	Colorado School of Mines	2011	Yes	0
5MT10736	**TJ Smith**	2,400	ER	Powderhorn	2013	Yes	4
5MT2032	**Switchback**	400	ER LiDAR	Powderhorn	2016	Yes	1
5MT2037	**Pasquin**	1,600	ER	Powderhorn	2015		0
5MT3873		800	ER	Powderhorn	2016		0
5MT3875	**Shepherd**	3,200	ER	Powderhorn	2013	Yes	3
5MT3882		400	ER MAG	Powderhorn	2013		1
5MT3890	Windrow Ruin	4,800	ER LiDAR	Powderhorn	2013	Yes	12
5MT3891	Wheatfield Island	3,600	ER	Powderhorn	2016		10
5MT3907		2,400	ER	Fort Lewis College	2011	Yes	1

Notes: Excavated sites in bold. CON= electrical conductivity, ER = electrical resistivity, GPR = ground penetrating radar, LiDAR = light detection and ranging with laser, MAG = magnetic susceptibility, NRCS = Natural Resources Conservation Service, and TTA = *Time Team America*.

Table 3.2. Accelerator Mass Spectrometry Results from Maize Kernels Collected during Soil Auguring at Site 5MT3890.

Study Unit #	d13 C	Conventional 14C Age BP	CalPal Online Radiocarbon Calibration (A.D.) (68% probability—2 sigma)	Beta Analytic Radiocarbon Calibration (A.D.) (95% probability—2 sigma)	CCAC Sample #	Beta Analytic Sample #
STR 101		1310 ± 30	707 ± 40	655–725 and 740–770	5MT3890-03-1	383547
STR 101		1320 ± 30	703 ± 40	655–720 and 740–765	5MT3890-16-1	383548
STR 102	−9.3	1180 ± 30	836 ± 43	770–900 and 920–940	5MT3890-102-42-4	365059
STR 103		1400 ± 30	632 ± 18	605–665	5MT3890-19-1	383549
STR 201		1360 ± 30	657 ± 12	640–680	5MT3890-22-2	383550

Note: BP is an abbreviation for "Before Present" or 1950, and CCAC = Crow Canyon Archaeological Center.

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Chapter 4

Geomorphology

By Cynthia M. Fadem and Shanna R. Diederichs

Introduction

Dryland agriculture has been an important component of crop production and settlement in the semi-arid Mesa Verde region of southwest Colorado for centuries. Analyzing the effects of dryland agriculture on available soil resources is vital to understanding the longevity of successful subsistence at ancestral Pueblo archaeological sites, as well as mitigating current and future desertification in the arid Southwest. This study aimed to determine the primary limitations for dryland maize agriculture in Mesa Verde loess soils and to characterize the evolution of soils under short- and long-term site-use.

To that end, a team from the Department of Geology at Earlham College examined soils on and near four sites in the Basketmaker Communities Project study area. These data were added to data from a parallel study, the Pueblo Farming Project, which generated soil assessments of four experimental gardens on the adjacent Crow Canyon Archaeological Center campus (Ermigiotti et al. 2018). Pedologic data from these samples and a mature pinyon-juniper forest reveal patterns of soil development. The Mesa Verde loess-based soils show signs of mineral induration with use (Fadem and Diederichs 2019). Induration and crop productivity appear to vary inversely over time, with impacts due to management, vegetation, exposure, use life, and settlement choices. Understanding the interplay of climate, cultural practice, and pedogenesis is, therefore, key to agricultural sustainability in the region.

Environmental Setting

The Basketmaker Communities Project study area and the adjacent Crow Canyon campus are currently characterized by a mix of cultivated fields, sage shrubland, and patches of mature pinyon-juniper forest. However, pollen and plant results from the Basketmaker Communities Project indicate that the study area was a dispersed old-growth pinyon and juniper woodland when the first Basketmaker III settlers arrived in the sixth century A.D.

On top of the weathered basal sandstone of the region lies the Mesa Verde loess (Arrhenius and Bonatti 1965). The loess, transported by wind from the southwest, is a fine-grained, permeable, well-drained sediment composed primarily of quartz and iron oxide (Arrhenius and Bonatti 1965; Reeves 1970). These deposits are thick and currently dry, lacking clays to store water (Benson 2011); however, as a loose, nutrient-rich material, the loess is conducive to agriculture when precipitation is adequate (Wilshusen 2006).

Many farmers in the Southwest still practice non-irrigation dryland farming (e.g., Wall and Masayesva 2004). While water stress is a clear issue for dryland farming, some researchers have postulated that nutrient depletion could be the limiting factor for agricultural longevity (Benson 2011; El-Fouly et al. 1991). While nitrogen is a typical limiting nutrient for maize, depletion in any vital nutrient (phosphorous, sulfur, or potassium) or water could result in a decline in crop productivity.

Archaeological Background

Early farming populations homesteaded the Mesa Verde region over the course of the Basketmaker III period (A.D. 500–750) (Diederichs 2016; Wilshusen 1999). They migrated into this region over the course of the sixth and seventh centuries, and the population had increased to one person every 1.36 acres by the end of the Basketmaker III period (Kohler et al. 2007; Varien et al. 2007). Initially, the colonizers may not have been familiar with Mesa Verde loess soil behavior. We know that in the case of the Basketmaker Communities Project population, a group of approximately eight households initially settled in a cluster at the Dillard site (5MT10647). After three generations, this community dispersed into small, short-lived hamlets within 1 km of the original site. A nearest-neighbor analysis of this settlement determined that there is a <1 percent chance these hamlets were randomly situated (see Chapter 3); instead, hamlets were regularly spaced with 10-acre buffers between them. This distribution parallels patterns found in larger studies across the region in which Basketmaker III households are more evenly dispersed than randomly simulated households (Kohler 2012).

Basketmaker III hamlets were generally short lived with an estimated occupation length of just eight years (Varien 1999; Varien and Ortman 2005), making it extremely unlikely that neighboring hamlets in this 125-year settlement would have been occupied at the same time. The pivotal shift in Basketmaker III settlement—from clustered to systematically dispersed—compels us to consider the possibility that the earliest settlers adapted to factors limiting agricultural productivity within three generations of their immigration to the study area. Based on the productivity of Mesa Verde loess soils and Hopi plant-spacing practices, the Pueblo Farming Project estimates that ancestral Pueblo occupants of the Mesa Verde region would have needed 4.7 acres of maize per adult or a total of about 7.7 acres to meet the annual needs of a household for one year, and much more to create a several-year stockpile against future yield instability (Ermigiotti et al. 2018). Basketmaker III populations likely farmed areas adjacent to their homes because habitations are almost always situated on deep, productive soils (Lipe et al. 1999; Sommer et al. 2014). Based on this model, the 10-acre dispersed settlement pattern would have allowed each household enough farmable acreage for an adequate maize supply, as long as the farm-plot soils were productive.

Landscape, climate, and cultural patterns co-evolved over 800 years of ancestral Pueblo occupation in the Mesa Verde region. The combination of adequate rainfall and nutrient-rich soils encouraged the formation of agricultural communities during the initial Basketmaker III colonization (Wilshusen 2006). Basketmaker III settlements were located near mesa tops and ridgelines, presumably close to agricultural fields (Stiger 1979). Such sites contained the deepest soils, making them the most agriculturally viable. Maize was the primary crop, although squash and beans were also important to the diet (Stiger 1979). As settlement and population density increased, maize became an increasingly important crop because of its high rate of carbohydrate production per acre. There is evidence that corn was stored in quantities large enough to last a year, which indicates that these settlements were relatively permanent but not so settled that households could not move in response to unpredictability in this system of interwoven climate, soil, and culture (Wilshusen 2006).

Methods

This study was a collaboration between the Earlham College Department of Geology and Crow Canyon Archaeological Center. In 2014 and 2015, Dr. Cynthia M. Fadem led a team of four Earlham College geology students in recording and analyzing the pedology of 17 soil profiles in the field and analyzing samples from each profile in the laboratory. Shanna Diederichs, the Crow Canyon Project Director for the Basketmaker Communities Project, guided sampling of archaeological sites. Pueblo Farming Project garden sampling was guided by Paul Ermigiotti of the Crow Canyon Archaeological Center Education Department. The Earlham College Geology Department Ansel Gooding Endowment, the Earlham College Dean's Summer Research Fund, the Earlham College Burgess Fund, and a Colorado State Historical Fund grant funded this work.

The sites in the study, 5MT10647 (Dillard site), 5MT10709 (Portulaca Point), 5MT10736 (TJ Smith site), and 5MT2032 (Switchback site), are Basketmaker III habitations tested during the Basketmaker Communities Project. At each site we analyzed profiles and soil samples from both inside the site boundary and off-site. The off-site profile (within 2 m of a site's boundary and in the same geomorphic condition) was tested as an example of soil not impacted by daily use during the Basketmaker III occupation. The on-site profile was tested as an example of the anthropogenic impacts of daily use over the use life of the Basketmaker III settlement. In addition, we analyzed an off-site soil profile under the canopy of a patch of mature pinyon-juniper forest along the west edge of the Basketmaker Communities Project study area as a correlate for the pre-colonized paleoecology of the region.

Under the Pueblo Farming Project, members of the Hopi tribe and researchers from Crow Canyon planted experimental gardens of Hopi maize (*Zea mays*) on Crow Canyon's campus using traditional methods. They recorded growth, yields, and characteristics of the crops for seven seasons (Ermigiotti et al. 2018). Pueblo Farming Project experiments demonstrate that Hopi varieties of maize can flourish in the Hopi ancestral homeland of southwest Colorado when traditional cultivation methods are used; many of these methods are analogous to dryland farming practices still in use in the region today. Comparative profiles and soil samples from both inside and adjacent to Pueblo Farming Project gardens (Check Dam Garden, Karen's Upper Garden, Pithouse Garden, Pueblo Learning Center Garden, and Paul's Old Garden) were also analyzed. The Pueblo Farming Project gardens are situated in various micro-environments across the Crow Canyon campus. The gardens were assessed to identify contemporary changes due to cultivation.

For each soil profile, we performed qualitative analyses evaluating soil horizonation, color, texture, aggregate size and structure, root density, and precipitate density (Table 4.1). We determined horizonation by delineating boundaries based on soil color, bulk structure, and precipitate density. We then recorded the depth and location of each soil horizon. To assign soil color we used the Munsell Soil Color Chart to evaluate a fresh aggregate surface. We performed soil texture hand tests to access bulk soil texture and determined aggregate size and structure using a photo scale and a soil structure key. Lastly, we evaluated root density and precipitate density using a percent-density scale. We performed all analyses for each horizon in each profile and recorded results on-site. Finally, we took bulk samples from each soil profile in each horizon for later lab analysis, as well as micromorphological samples at both the on- and off-site profiles for Site 5MT10647.

The soil chemistry and mineralogy of each sample was analyzed in Earlham College's Geoarchaeology and Geochemistry lab to assist in understanding soil behavior. Variables analyzed include pH for alkalinity; electrical conductivity for salt content; nitrate, phosphate, sulfate, potassium, and magnesium content for available nutrients; soil organic matter content for productivity and water storage capacity; and carbonate content and bulk mineral identification for character of parent materials and pedogenic precipitates (Table 4.2). We measured pH, electrical conductivity, and nitrate content using an Oakton PC2700 pH/mV/conductivity/temperature meter for all soil samples (Figure 4.1). We report pH measurements as modified direct soil pH (1:10 water) (Oman et al. 2007). This particular ratio became necessary due to the fine grain size and high pH of the soils, which encouraged both deflocculation (high suspension) and direct contact with the electrode. Based on the low salinity and alkaline nature of the soils, we regard these values as being within 0.5 pH units of measurements using the more standard 1:5 water (e.g., Afzal and Yasin 2002), but we performed all tests the same way to maintain comparability within the study. We added 1.5 ml of a 2M $(NH_4)_2SO_4$ solution to each sample before measuring its nitrate content. To measure phosphate, sulfate, potassium, magnesium, and carbonate content, we extracted nutrient ions from the soil samples by mixing soil in a 1:10 ratio with 0.01M $CaCl_2$ and centrifuging. We used a YSI 9500 EcoSense photometer to measure the ion content of the aliquot. For organic matter, we conducted loss-on-ignition analysis by measuring each sample after 24 hours at 105°C, 550°C, and 950°C. Finally, we analyzed the mineralogy of the Pueblo Learning Center Garden soil and bedrock samples with powder X-ray diffraction using a Rigaku MiniFlex X-ray diffractometer and MDI Jade software.

Results

Field characteristics of all analyzed soils fit with both the Mesa Verde loess parent material and sedimentary setting described above (Table 4.3). Results confirm the area continues to receive eolian input from the surface, creating a 1–4 cm slightly hydrophobic loess deposit over all soil profiles. Over time the surface deposit becomes part of the soil, functioning as a secondary parent material.

Though there are differences in nutrient content between sampled locales, with nitrate generally higher in on-site/cultivated contexts, these differences are within the error range of the Oakton benchtop meter (0.5–1 percent). Instead, soil analysis demonstrated that the most prominent difference is that farmed soils have greater precipitate density than unfarmed soils. On-site and in-garden soils had more pedogenic mineral accumulation than off-site and out-of-garden soils, particularly in the lower B horizons, in some cases forming a caliche or hardpan (Figure 4.2). Caliche forms in lower B and upper C horizons when evapotranspiration follows illuviation of dissolved ions into lower soil horizons (Reeves 1970). The strongest pattern we found through the course of this study is the differential accumulation of pedogenic carbonate between soils on- versus off- sites and gardens.

One explanation for larger caliche deposits on-site and in-gardens may be agricultural land use, which tends to increase soil evapotranspiration rates. The increased downward flux of dissolved ions followed by greater water use by maize plants would have increased the rate of precipitate formation. Caliche formation may also result from relatively humid paleoclimates in the central Mesa Verde region. Transport of calcium ions can only occur with sufficient water in the soil profile, so caliche formation would occur more readily given greater soil moisture than is found in these soils today (Reeves 1970). Archaeological records date many of these occupations to a period known as the Little Climatic Optimum (A.D. 900–1300), when the climate was both warmer and more humid than today. This warm period would have increased the agricultural potential of a greater proportion of the landscape (Peterson 1994).

Evidence for this phenomenon's enhancement at site and garden locales is different from the conductivity pattern in the pinyon-juniper forest (Figure 4.3). If the pinyon-juniper soil surface were more exposed to direct precipitation, the salts in the O horizon would dissolve and redistribute through the profile at various depths depending on evaporation and infiltration rates. In that case, the pinyon-juniper chemical profile would look more like those from the site locales. While this difference would exist between the pinyon-juniper forest soil and any more-exposed locale, if the hypothesis of a pinyon-juniper paleolandscape cleared for cultivation holds true, this difference would also point to the difference in apparent viability of the soils.

The pinyon-juniper forest soil is looser, darker, and moister than the soils on- and off-site at the Basketmaker Communities Project archaeological locales at the same time of year; its precipitate density is lower as well. Overall, both soils from site locales were quite different from pinyon-juniper forest soils with respect to pH and conductivity. In general conductivity was much lower and pH was higher in the pinyon-juniper forest. The buried burned O horizon and subsequent horizons in the 5MT10736 profile, however, had similar pH and conductivity to the pinyon-juniper soils. The similarity of these two profiles may suggest that the paleosol in 5MT10736 represents the pinyon-juniper paleoecology.

In all off-site soils, electrical conductivity followed the pattern of being high in the dust layer, decreasing in the A horizon, and remaining relatively constant until dramatically increasing in the mid–B horizon. Soil electrical conductivity is a function of soil salinity, clay content, and moisture, so the observed conductivity differences between horizons are related to variations in these soil properties. The surface dust layer contains more organic matter and fine particles, so it has a relatively high electrical conductivity. In comparison, clays and salt ions leach out of the more mineral-rich A horizon, so its electrical conductivity is lower. In some of our on-site samples, conductivity was highest just above the most precipitate-rich horizon, consistent with the presence of restrictive layers (hardpans) that limit downward leaching of soil water, thus accumulating salts just above the caliche (Natural Resources Conservation Service 2011). In both on-site and off-site soils, the pH settled around 8.5 at depth. This is a typical pH for alkaline, carbonate-buffered soils (Brady and Weil 2010). In on-site soils, however, the pH reached 8.5 much sooner—generally in the A horizon—while off-site soils maintained a slightly lower pH until settling at 8.5 in the B horizon.

Sodic soils are unique in having high pH and low conductivity, meaning that sodium content is high while the soil lacks the chlorine to form salts (Brady and Weil 2010). Several of the soils in this study, particularly on-site, qualify as sodic. Samples from 5MT10647 on-site, 5MT10709 on-site, 5MT10736 on-site A horizon, 5MT10736 off-site paleosols, and 5MT2032 on-site could all be considered sodic. Most crops cannot grow in sodic soils because the excess sodium deflocculates the soil structure, dispersing nutrients and inhibiting healthy aggregation and water flow. The abundance of sodic soils on former agricultural sites points to sodium build-up as a possible reason for loss of agricultural viability. Further tests for soil sodium concentration in these soils would be beneficial for furthering our investigation of soil productivity.

Soil analysis from inside and outside the Pueblo Farming Project gardens follow the same trends as the on-site and off-site samples with a few differences. X-ray diffraction analysis reveals that both the bedrock and soils from the Pueblo Learning Center Garden are uniformly quartz. Shared mineralogy does not indicate a shared source—both the sandstone and the loess are primarily crystalline quartz, but the loess is much finer and contains more accessory materials, like iron oxide and carbonate. These soils characterize loess redeposited in drainages.

Additionally, both the Check Dam and Pueblo Learning Center Gardens show evidence of continual aggradation. Along with physical characteristics, variability in pH and nutrient content in the Check Dam Garden internal profile (below approximately 10 cm) indicates pulses of deposition from eroding soils uphill. The Pueblo Learning Center Garden shows more-recent depositional activity and thin deposits near the surface of eroded soil material from uphill. Akin to Hopi runoff fields, the Check Dam and the Pueblo Learning Center Gardens are in local low areas that receive water, organic material, and sediment during precipitation events that replenish resources. This mechanism indicates the potential for fertility buffering in this region on a fine (100–10,000 m^2) topographic scale. The variable geomorphology of the Mesa Verde loess depositional region (hilly and cut by small drainages) provides many local sinks for sediment and organic matter that would provide for crop plants. In this case, field size and distribution would be limited by geomorphology, but fertility and sustainability would be much greater in locally aggrading runoff areas, leading to crop yields relatively insulated against climate variability on the same spatial scale.

Discussion

In summary, soils from archaeological site and tested garden locales are similarly patterned but quite different from the pinyon-juniper forest profile. We find no significant nutrient or other chemical difference in farmed vs. unfarmed or on-site vs. off-site soils. These data indicate that all study areas host neutral–alkaline soils low in salinity and available nutrients. All non-forest soils are low in organic matter; in contrast, the pinyon-juniper soil has higher organic matter, hosts an O horizon, and is much softer than the rest of the soils in our study. The pinyon-juniper soil also has low visible carbonate accumulation relative to its measured carbonate content, though it is quantitatively similar to some of the other profiles.

Differential soil hardening is the most salient difference across the experimental gardens and archaeological sites sampled for this project, leading us to conclude that anthropogenic soil use causes enhanced precipitation of minerals within the B horizon of Mesa Verde loess soils. Further evidence for agricultural induration is the difference between the conductivity pattern of the pinyon-juniper forest soils and all non-forest soils. If the pinyon-juniper soil surface were more exposed to direct meteoric precipitation, minerals would dissolve and redistribute through the profile at various depths, depending on evaporation and infiltration rates. In that case, the pinyon-juniper chemical profile would look more like those from the site and garden locales. In contrast, the pinyon-juniper forest soil is looser, darker, and moister than all Pueblo Farming Project and Basketmaker Communities Project soils at the same time of year.

The Basketmaker III site-use pattern of farming directly adjacent to homes appears to have led to long-term anthropogenic impacts to the soil of those farming plots. Initiation of cultivation in the Mesa Verde region during the Basketmaker III period would have exacerbated mineral induration in two ways: (1) planting on recently cleared soils increases soil permeability and dissolved ions' subsequent translocation and precipitation as new minerals, and (2) increased plant density and cycling (compared to native vegetation) increases evapotranspiration rates, contributing to further mineral precipitation (Soil Conservation Service 1991). Cultivation in previously unfarmed Mesa Verde loess soil—especially with sufficient water supply—is successful initially. Over time cultivation exacerbates mineral precipitation, growing and hardening the B horizon, sometimes forming a Bk horizon. In both Pueblo Farming Project gardens and within Basketmaker Communities Project sites, we see thicker, better developed mineral accumulations in internal garden and on-site profiles than in external and off-site profiles. This type of soil induration limits water and root movement through the soil profile, inducing water stress in crop plants and making continued cultivation less successful.

Conclusions

Overall, we find no pattern of nutrient depletion either in modern or anciently farmed contexts. Even in cases where total nutrient content is lower than ideal for corn, large plant-spacing techniques traditionally used in the region make direct comparisons of nutrient and water content with other U.S. regions impractical. Instead, this study of Mesa Verde loess–derived soils indicates that pedogenic mineral accumulation and water stress are the limiting factors for agriculture in this region. Dryland farming likely induces soil hardening in this environment, physically limiting agricultural sustainability over time, especially in the case of forest canopy removal. As such, the Mesa Verde loess is both beneficial and detrimental to agricultural sustainability in this region. Its fine grain size helps retain moisture but makes the rate of both grain weathering and pore-space induration faster than in the coarser sandstone-derived soils in the region's canyon settings.

The limiting factors of B-horizon mineral accumulation on agricultural productivity and sustainability would have been identifiable and very tangible to Basketmaker III period farmers. Settlement strategy and farming technology would have evolved in response to soil induration, and would, in turn, have required several scales of social adaptation that may have influenced social mores and organization during the Mesa Verde region Basketmaker III period. One such adaptation appears to be the adherence to dispersed farming during the late Basketmaker III period. In contrast, agroforestry (agriculture incorporating the moisture conservation of trees) may have played a role in sustaining the longest-lived sites (~100 years) in the Basketmaker Communities Project study area. This practice would have avoided soil induration, keeping small farm plots in established woodlands productive indefinitely.

Understanding soil behavior opens new avenues of inquiry for the sustainable use of Mesa Verde loess soils. Based on Pueblo Farming Project interviews with Hopi subsistence farmers in Arizona and commercial farmers producing dryland beans on Mesa Verde loess soils, soil induration is a primary concern. Traditional Hopi farmers mitigate induration by spacing plants widely, limiting surface evaporation, and when productivity drops, leaving fields fallow for several years (Fadem and Diederichs 2019). In contrast, commercial farmers of Mesa Verde loess soils till to break up indurated soils, but still have to fallow fields when induration is excessive. The innovations of both subsistence and commercial non-irrigation farmers provide models for sustainability of food production in water-limited environments such as the central Mesa Verde region.

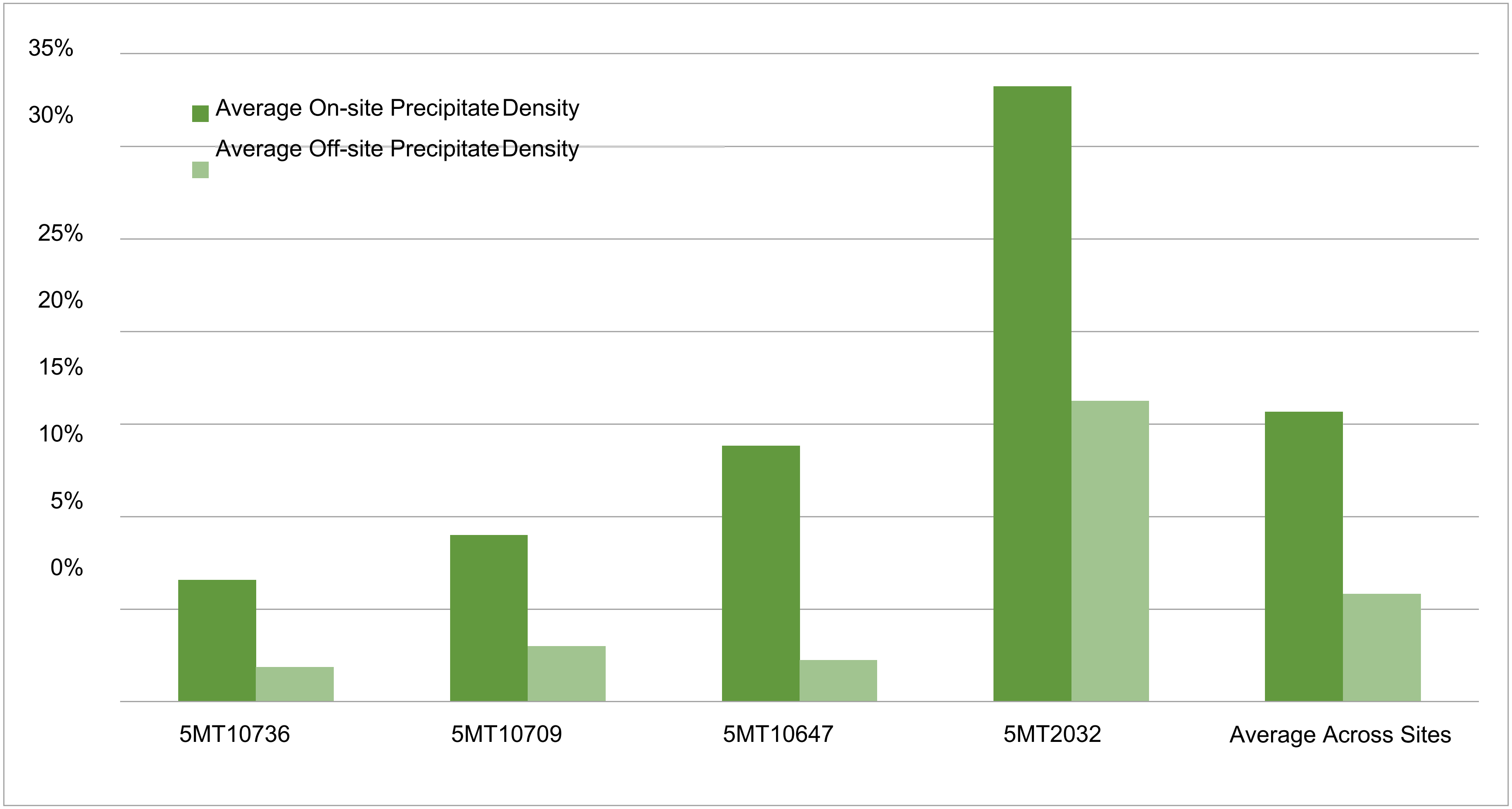

Figure 4.1. Average soil precipitate density on-site and off-site for Basketmaker Communities Project sites.

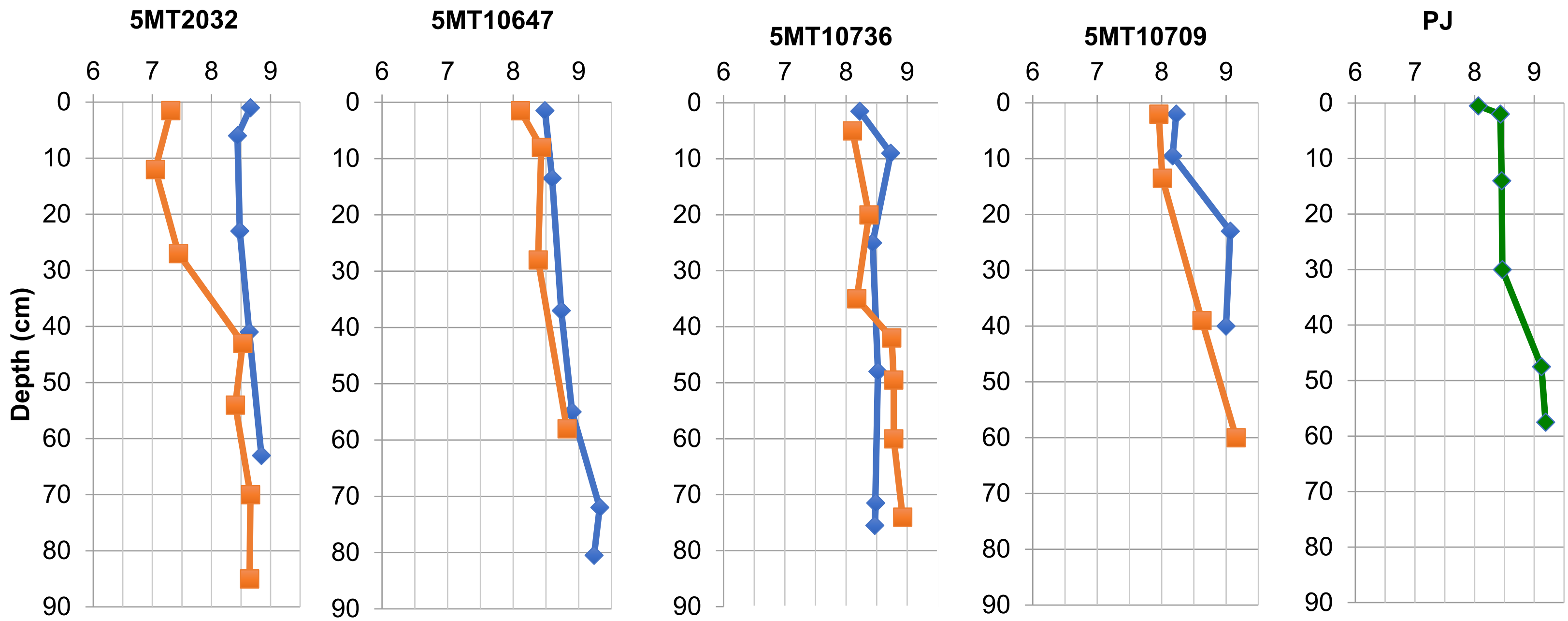

Figure 4.2. Soil pH versus depth (cm) for Basketmaker Communities Project sites and mature pinyon-juniper forest sample. Blue lines indicate on-site soils, red lines indicate off-site soils, and green line indicates pinyon-juniper soils.

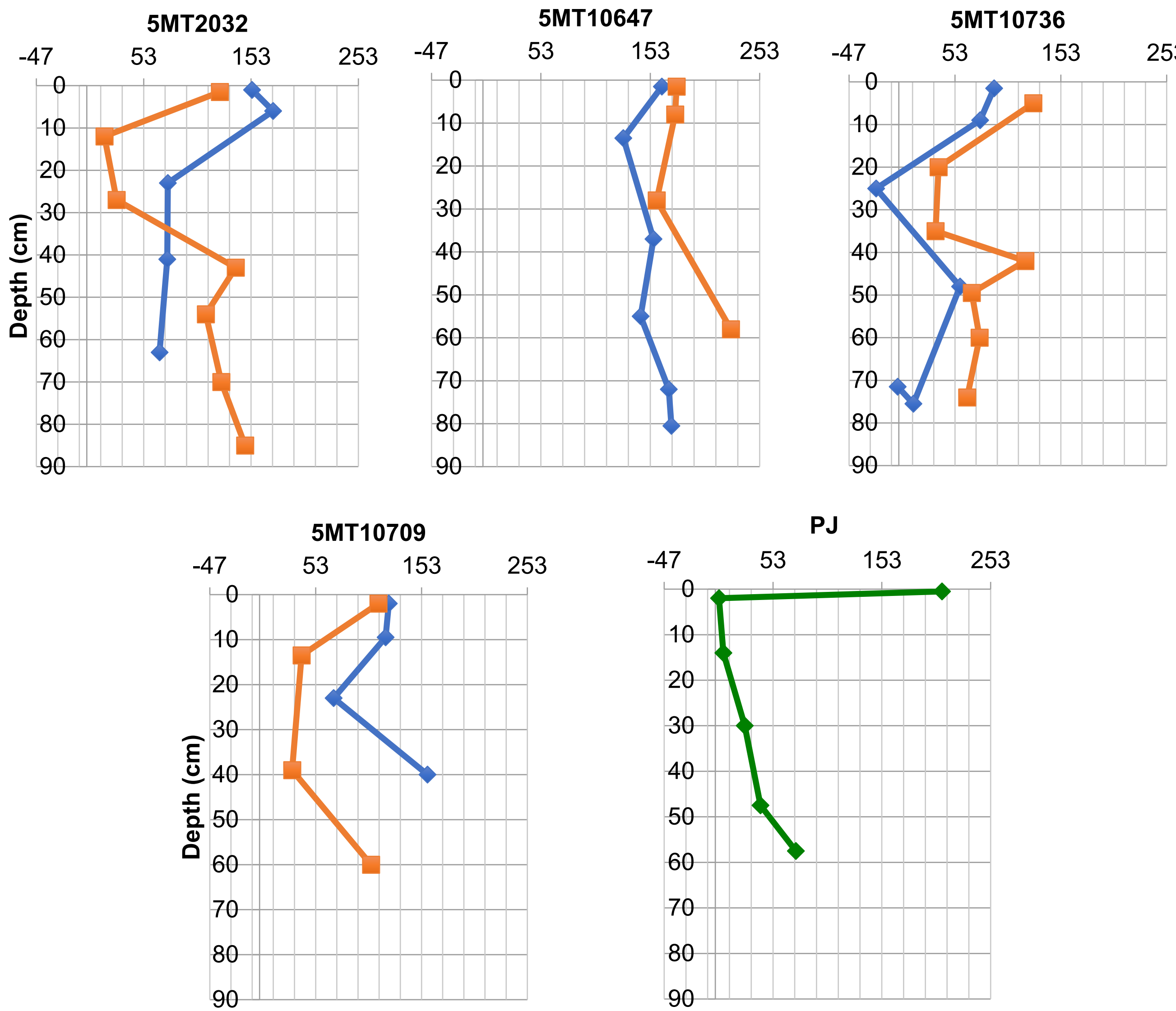

Figure 4.3. Soil electrical conductivity (µS) versus depth (cm) for Basketmaker Communities Project sites and mature pinyon-juniper forest. Blue lines indicate on-site soils, red lines indicate off-site soils, and green line indicates pinyon-juniper soils.

Table 4.1. Summary of Soil Survey Data for Pueblo Farming Project Gardens, Basketmaker Communities Project Sites, and the Pinyon-Juniper Forest Soil Profile (NRCS 2013).

Garden/Site	Soil Type	Key Features
All		• Mean annual precipitation: 13–16" • Mean annual air temperature: 46–50°F • Drainage class: well drained
Check Dam Garden, Pueblo Learning Center Garden, 5MT2032, 5MT10647, and 5MT10736	Wetherill loam, 3–6% slopes	• Depth to restrictive feature: >80" • Landform: hills, mesas • Parent material: eolian deposits • Farmland classification: prime farmland if irrigated
Paul's Old Garden	Ackmen loam, 1–3% slopes	• Depth to restrictive feature: >80" • Landform: draws, floodplains, drainageways • Parent material: alluvium • Farmland classification: prime farmland if irrigated
Pithouse Garden*	Ackmen loam, 3–6% slopes	• Depth to restrictive feature: >80" • Landform: draws, floodplains, drainageways • Parent material: alluvium • Farmland classification: prime farmland if irrigated
Karen's Upper Garden and 5MT10709	Sharps-Cahona complex, 6–12% slopes	• Depth to restrictive feature: 20–40" to paralithic bedrock • Landform: hills, mesas • Parent material: eolian deposits • Farmland classification: not prime farmland
Pinyon-Juniper Forest	Gladel-Pulpit complex, 3–9% slopes	• Depth to restrictive feature: 12–20" to lithic bedrock • Landform: hills, mesas • Parent material: eolian deposits • Farmland classification: not prime farmland

* The Pithouse Garden soil is a mixture of native soil, imported material, and construction debris. See Table 2 for full description.

Table 4.2. Field Soil Data by Locale for the Pueblo Farming Project, Basketmaker Communities Project, and Pinyon-Juniper Forest Profiles.

Horizon/ Deposit	Top Depth	Bottom Depth	Munsell Color	Structure	Aggregate Size (cm)	Root Coverage	Precipitate Coverage	Apparent Texture
Paul's Old Garden—External								
A	0	17	5YR 4/5	g, abk	0.2–0.5	10	0	Silt l
Bk	17	31	5YR 4/6	abk	0.2–0.5	3	3	Silty clay l
Bk	31	42	5YR 3/4	abk	0.5–1	3	5	Silt l
B/C	42	59	5YR 4/4	abk	>1	1	1	Silty clay l
C	59	80	5YR 4/3	m, wet-to-touch level w/wastewater ditch		1	0	Silty clay l
Paul's Old Garden—Internal								
Dust	0	5	7.5YR 5/4	m		5		Silt
A	5	20	7.5YR 2.5/3	g		5		Silt l
Bk	20	40	7.5YR aggregate exterior: 3/3, interior: 2.5/3	sbk				Silty clay l
C	40	60	7.5YR 3/3	m				Silt l
Karen's Upper Garden—External								
Dust	0	5	7.5YR 4/4	m		2	0	
A	5	20	7.5YR 4/6	sbk	0.5–1	3	3	Silty clay l
A/B	20	48	7.5YR 5/8	abk, rhizoliths	0.5–1	<1	7	Clay l
Bkm	48	65	7.5YR 6/8	abk		0	100: completely coats aggregates and present throughout	Silty clay l
Karen's Upper Garden—Internal								
Dust	0	5	7.5YR 4/4	m				Silt l
A	5	20	7.5YR 3/4	m				Silty clay l
Bk	20	32	7.5YR 3/4	sbk		Two 10-cm roots at 28–32 cm depth		Silty clay l

Horizon/ Deposit	Top Depth	Bottom Depth	Munsell Color	Structure	Aggregate Size (cm)	Root Coverage	Precipitate Coverage	Apparent Texture
C	32	48	7.5YR 4/4	m		5-cm root at 32–37 cm depth		Silt l
Check Dam Garden—External								
Dust	0	5	7.5YR 4/4	m		<1	0	Silty clay l
A	5	20	7.5YR g: 6/4; abk: 4/4	g, abk	Granular: 0.2–0.5; abk: >10	<1	<1	Silty clay l
A/B	20	40	7.5YR 4/6	abk, very moist	>10	1	1	Silty clay l
Bk	40	80	7.5YR 5/4	abk	>10	<1	6	Silty clay
C	80	90	7.5YR 4/4	abk	>10	0	<1	Silty clay l
Check Dam Garden—Internal								
Dust	0	3	7.5YR 4/4, plus black flecks	m				Silt l
A	3	20	7.5YR 2.5/2, 3/3	sbk				Silty clay
Bk	20	30	7.5YR aggregate exterior: 3/3, interior: 2.5/2	sbk				Silt l
C	30	36	7.5YR 3/4	m				Clayey sand
2A	36	48	7.5YR 3/3	m				L
2Bk	48	58	7.5YR 4/4, 3/3, plus black flecks	m				Sandy clay l, gravel below
Pithouse Garden—External								
Dust	0	5	7.5YR 4/4	m		<1	0	Sandy clay l
A	5	27	7.5YR 4/6	abk	>10	4	0	Silty clay
B–Artificial Fill Matrix	27	53	7.5YR 4/6, plus multicolor glass sand	abk	>10	1	4: carbonate nodules	Sandy clay l, 5-cm pebbles at 30–35 cm depth
Pithouse Garden—Internal								
Dust	0	3	7.5YR 3/4	m		Small plant debris 10%		Sandy l

Horizon/ Deposit	Top Depth	Bottom Depth	Munsell Color	Structure	Aggregate Size (cm)	Root Coverage	Precipitate Coverage	Apparent Texture
A	3	10	7.5YR 3/2	m				Sandy l
Bk–Artificial Fill Matrix	10	32	7.5YR 3/4, plus multicolor glass sand	abk				Silt l, plus gravel and 2% coarse sand
C–Construction Debris/Fill	32	46	7.5YR 4/6	m		0.3-cm plant debris		Silty clay, plus 5–10 cm concrete pieces and nail
2C–Intact Subsoil	46	50	7.5YR 4/4, plus 2/2 black flecks	m				Silt l
Pueblo Learning Center—External								
Dust	0	5		m				
A	5	10	7.5YR 4/6	sbk	0.5–1	3	0	Sandy clay
Bk	10	34	7.5YR 5/6	abk	>1	3	<1: coats bedrock pebbles	Sandy clay l
R–Sandstone	34			m				
Pueblo Learning Center—Internal								
Dust	0	5	7.5YR 4/4, plus 2/2 black flecks	m				L
A	5	20	7.5YR 3/3, plus 2/2 black flecks	m				Sandy clay l
C–Topsoil Redeposit	20	53	7.5YR 3/3	m				Sandy l
5MT10736—on-site								
Dust	0	3	5YR 5/6	g, sbk	1	2	0	Silty clay l
A	3	15	5YR 5/4	sbk	2–6	5	<1	Silty clay l
Bk	15	35	5YR 4/4	sbk	2	3	3	Silty clay l
2A	35	65 (left side), 57 (right side)	5YR 4/6	abk	2–3	3	1: veins in and around aggregates	Silty clay l

Horizon/ Deposit	Top Depth	Bottom Depth	Munsell Color	Structure	Aggregate Size (cm)	Root Coverage	Precipitate Coverage	Apparent Texture
2Bk	65 (left), 57 (right)	86	5YR matrix: 4/6 (left), 5/6 (right); precipitate: 8/2	abk	2	<1	5 (left): veins, patchy aggregate coating; 30 (right): aggregate and sandstone pebble coating	Sandy clay l
5MT10736—off-site								
Dust	0	10	5YR 5/6	g, sbk	1	2	0	Silty clay
A	10	30	5YR 4/4	abk	2–4	5	0	Silty clay
Bk	30	40	5YR 4/4	abk	1–2	4	<1	Silty clay
2O–Burned Wood	40	44	5YR 5/6	abk	2–3	3	0	Silty clay
2A	44	54	5YR 4/4	abk, columnar	1–3	3	1	Silty clay
2A/B	54	65	5YR 5/6	abk	2–3	1	5: veins around aggregates	Silty clay
2Bk	65	83	5YR 5/6	abk	2	<1	7: veins around aggregates	Silty clay l
5MT10709—on-site								
Dust	0	4	5YR 4/6	g, sbk	1	3	0	Silty clay l
A	4	15	5YR 5/4	sbk	1–2	3	1	Silty clay l
A/B	15	31	5YR 6/4	sbk	1.5–2	3	10: veins around aggregates	Silty clay l
Bk	31	49	5YR matrix: 6/4; precipitate: 8/3	sbk	2	<1	25: coats aggregates, veins inside	Silty clay l
5MT10709—off-site								
Dust	0	4	5YR 4/6	g		3	0	Silty clay l
A	4	23	5YR 4/4	sbk	2–3	5	0	Silty clay l
Bk	23	70	5YR 5/4	sbk	1–2	3	3: veins around aggregates	Silty clay l

Horizon/ Deposit	Top Depth	Bottom Depth	Munsell Color	Structure	Aggregate Size (cm)	Root Coverage	Precipitate Coverage	Apparent Texture
5MT10647—on-site								
Dust	0	3	5YR 4/3	g, sbk	1	2	0	Silty clay l
A	3	24	5YR 5/4	sbk	2–6	7	4	Silty clay l
Bk	24	68	5YR 5/4	sbk	2–3	2	3: partial aggregate coatings	Silty clay l
Bkm	68	76	5YR matrix: 5/6; precipitate: 8/3	abk	1	0	60: coats aggregates; veins inside	Silty clay l
C	76	85	5YR 6/4	abk	1	0	2	Silty clay l
5MT10647—off-site								
Dust	0	3	5YR 4/4	sbk	<1–1	3	0	Silty clay l
A	3	13	5YR 4/4	sbk	2–6	5	1: faint patches in aggregates	Silty clay l
Bk	13	41	5YR 4/4	sbk	2	3	5: veins on aggregates, some inside	Silty clay l
Bk	41	73	5YR 4/4	sbk	1.5–2	<1	3: faint veins	Silty clay l
5MT2032—on-site								
Dust	0	2	5YR 4/6	g		<1	0	Silty clay l
A	2	10	5YR 4/6	sbk	1–2	5	3	Silty clay
Bk	10	55	5YR matrix: 4/6; precipitate: 8/2	abk	1–2	10	30: coats aggregates, veins inside	Clay l
Bkm	55	71	5YR matrix: 5/3; precipitate: 8/2	abk	1–2	0	100: completely coats aggregates and present throughout	Sandy clay
5MT2032—off-site								
Dust	0	3	5YR 4/6	g		3	0	Silty clay l
A	3	37	5YR 4/4	abk	2–3	5	0	Silty clay l
Bk	37	60	5YR 4/6	abk	2–3	1	5: veins around aggregates	Silty clay l

Horizon/ Deposit	Top Depth	Bottom Depth	Munsell Color	Structure	Aggregate Size (cm)	Root Coverage	Precipitate Coverage	Apparent Texture
Bkm	60	95	5YR matrix: 4/6; precipitate: 8/1	abk	2	0	60: coats aggregates, some inside	Silty clay l
Pinyon-Juniper Forest								
O–Leaf Litter	0	1		m				
Dust	1	3	5YR 4/4	g		3	0	Silty clay l
A	3	44	5YR 4/3	sbk	2–3	4	0	Silty clay l
A/B	44	50	5YR 4/3	abk	2	<1	<1	Silty clay l
Bk	50	65	5YR 4/4	abk	2	<1	2: veins around aggregates	Silty clay l

Note: Bk horizons exhibit accumulation of pedogenic carbonates, and Bkm horizons exhibit nearly continuous to continuous cementation or induration of the soil matrix by carbonates (Soil Science Society of America 2018). Abbreviations: abk = angular blocky, g = granular, m = massive/none, and sbk = sub-angular blocky. Coverage values are comparative visual percentages; for carbonate these are for coverage by white veins and nodules. Apparent textural class is via hand test with abbreviation l = loam. Shading indicates data attributes not collected for a given profile due to time constraints.

Table 4.3. Summary of Sediment Analysis at Basketmaker III Habitations in the Basketmaker Communities Project Study Area.

Site	Sediment Analysis
5MT2032	On-site soil had a higher pH and precipitate density than off-site soil (see Figures 4.2 and 4.3). On-site soil had a higher conductivity than off-site soils up to ~35 cm, where off-site soil conductivity dramatically increased as on-site conductivity continued to decline (see Figure 4.4).
5MT10647	Off-site pH was quite alkaline, ranging from about 8 to a little over 8.5. The off-site pH was lowest in surface soils and increased with depth, decreasing only slightly around 30 cm. On-site soils, however, were extremely alkaline. Surface soils were again more acidic, with a pH below 8, but quickly increased and remained above 9 in subsequent horizons (see Figure 4.3). Conductivity was lower on-site than off-site; however, soils had higher conductivity in the B horizon than the A horizon (see Figure 4.4). Conductivity on-site greatly increased with depth, and off-site conductivity was less variable.
5MT10736	On-site soil had higher pH in topsoil than off-site soil. The pH in on-site soil changed little with depth, and pH off-site increased dramatically with depth. Below about 40 cm, off-site soil had higher pH values than on-site (see Figure 4.3). Off-site soil had consistently higher conductivity than on-site soil, and both followed a similar trend with depth. Conductivity was highest at the surface, decreased to a minimum around 25–30 cm, and spiked again around 45–50 cm (see Figure 4.4). Neither profile displayed extremely high precipitate density when compared to other profiles (see Figure 4.2). Precipitate density was highest on-site at a depth of 71.5 cm.
5MT10709	On-site soil had higher pH than off-site soil at all depths in the profile. The pH off-site consistently increased with depth and pH on-site decreased in the first 10 cm, increased dramatically to 23 cm, and then decreased slightly (see Figure 4.3). Conductivity was also consistently higher on-site than off-site. Both soils decreased in conductivity from the surface to the B horizon and then increased in the lowest horizon (see Figure 4.4). Precipitate density was considerably higher in the on-site than off-site soil (see Figure 4.2).
Pinyon-Juniper Forest	The pH under the forest canopy was consistent with the pH from archaeological locales on- and off-site. The surface conductivity was much higher than the site locales, but dramatically decreased below the O horizon to well below that of the other surface horizons (see Figure 4.4). Conductivity then rose slightly through the rest of the profile, remaining much more consistent throughout the profile than most of the site locales.

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Chapter 5

The Dillard Site (5MT10647)

by Shanna R. Diederichs

Introduction

The Dillard site is an aggregated Basketmaker III settlement centered on an early great kiva. The site is in the southeast portion of the Indian Camp Ranch Archaeological District (see Figure 1.4) and was first recorded in 1991 by Woods Canyon as part of the Indian Camp Ranch Archaeological Survey (Fetterman and Honeycutt 1994). A crew from Woods Canyon tested the site later the same year, excavating trenches across a large depression to confirm the presence of a great kiva and locating a second pit structure with soil auger probes (Fetterman 1991). The Dillard Site runs the length of a north to south–trending ridgetop that was chained to remove old growth pinyon and juniper prior to the 1990s (Figure 5.1). Indian Camp Ranch developer, Archie Hanson, burned the windrows and used heavy equipment to manage vegetation on the site, disturbing surface deposits.

Numerous other sites dating to the Basketmaker III period are documented in the vicinity of the Dillard site (Fetterman and Honeycutt 1994, 2004; Shanks 2014). Four small sites (5MT10640, 5MT10643, 5MT10641, and 5MT10642) are found on the east slope of the same ridge occupied by the Dillard site and are likely part of the same aggregated settlement. On the elevated ridges to the west and east of the Dillard site are clusters of Basketmaker III habitations (5MT10646, 5MT10711, 5MT10713, 5MT10714, and 5MT2032 to the west and 5MT3890, 5MT10639, and 5MT10656 to the east) centered on oversized pithouses. Together, these sites constitute the densest area of Basketmaker III occupation in the study area and the focal point for the surrounding community.

The Dillard site was selected for investigation because of its inferred role in community integration through group gatherings at the great kiva and additional goals set forth for the project in the first research design (Ortman et al. 2011). The surface signature of the site is fairly unassuming with the great kiva depression surrounded by 6 acres of light midden and sporadic pockets of burned rock (Figure 5.2). Eleven of these rock concentrations were recorded as surface features during the 1991 documentation of the site. Remote sensing, soil auguring, and excavation associated with the Basketmaker Communities Project confirmed the presence of the great kiva, 11 pithouses, seven pit rooms, two fences, three ramadas, several extramural features, and two formal burials (Figure 5.3).

Approximately three percent (513 m^2) of the total site area was excavated during the Basketmaker Communities Project using 197 excavation units (Figure 5.4). Most excavation was limited to rectangular testing units (1-x-1 m, 2-x-2 m, 1-x-3 m, etc.). However, the architectural focus of the research design (see Chapter 2) required that other methods be applied to the investigation of structures, such as the excavation of full halves of unique structure types. What follows is a summary of excavation results.

Site Chronology

Data from excavations at the Dillard site suggest it was built and used during the mid-to-late Basketmaker III phase and that the earlier architecture at the site was domestic while the later architecture was civic-ceremonial and used for extra-domestic purposes. Only 19 percent of the tree-ring samples collected and submitted to the University of Arizona tree-ring lab could be dated. The datable tree-ring samples; AMS dates; archaeomagnetic dates; the presence of pottery dating to Basketmaker III, Pueblo I, and Pueblo II; and the architecture exposed all support sporadic use of the site prior to A.D. 600, at least a century of occupation between A.D. 600 and 725, and continued visitation during the following Pueblo I and Pueblo II periods (A.D. 800–1000). Prior to about A.D. 600, the Dillard site was used as a temporary activity area. During the early A.D. 600s, domestic and civic architecture was built, and the site became an aggregated habitation for numerous households. During its late occupation, between A.D. 660 and 725, only civic-ceremonial architecture continued to be built and revitalized.

Architecture

The following discussion of architecture at the site is structured by analytical units defined as "architectural blocks." Following Crow Canyon guidelines, I define an architectural block as a "functional space" delineated by evidence of architecture and associated artifact concentrations.

Block 100

On the surface, Architectural Block 100 is composed of an 11-m -diameter great kiva depression, a low berm around the western half of the depression, two definable artifact concentrations south of the depression, and a small storage structure identified with electrical resistivity imaging north of the great kiva depression (Figure 5.5).

Thirty of the Block 100 units were used to test a 60 percent portion of Structure 102 (the great kiva). The excavation units included five linear trench segments, five 1-x-3-m units, five 1-x-2-m units, nine 2-x-2-m units, and a mechanical scrape area along the southeast edge of the structure. Twelve 1-x-1-m units and two 1-x-3-m units were used to test the berm on the west side of the great kiva and two associated artifact concentrations to the southeast and southwest of the structure. Two other 2-x-2-m units were used to test a small storage structure (Pit Room 124) north of the great kiva.

Evidence for Early Temporary Storage

The earliest evidence of ancestral Pueblo occupation in the Basketmaker Communities Project study area was found in Block 100. Maize from the floor of the small pit room (Pit Room 124) north of the great kiva produced a calibrated AMS date of A.D. 420–575. Pit Room 124 was a round, shallow pit room roofed with vegetation, adobe, and sandstone (Figure 5.6). A 3.5-cm-long piece of turquoise was left in a floor pit of Pit Room 124 when the building was burned and decommissioned. The pit room likely served as storage for a nearby habitation. In the Mesa Verde region, storage structures are usually built north or northeast of an associated pithouse during the Basketmaker III period (Reed 2000). In the case of Pit Room 124, the associated pithouse would likely have been located to the south of the storage room where the great kiva was eventually constructed. Pit Room 124 predates the great kiva by at least half a century, but its location just north of the great kiva and the absence of a habitation structure nearby dating to the same period suggests that any pithouse in the vicinity was later obliterated by the construction of the great kiva. Only the very south end of a pithouse may have been preserved. A 50-cm-deep disturbed deposit on the southeast side of the great kiva (Nonstructures 118 and 119) could represent the refilled southern extent of a shallow structure.

Evidence for Long-Term Communal Use of the Great Kiva

The Dillard site great kiva (Structure 102) was a focal point for both the Dillard site occupants and the surrounding community during the latter half of the Basketmaker III period. Tree-ring dates, AMS dates, archaeomagnetic dates, and the structure's pottery assemblage indicate that the great kiva was initially constructed around A.D. 620 in conjunction with many of the domestic pithouses at the site. The structure was remodeled into its final configuration between A.D. 670 and 690 just as the household occupants moved away, likely to adjacent or nearby locales. Though they did not live at the Dillard site, community members continued to intensively use the structure for several decades.

Excavations of the northwest third and the southeastern quarter of the structure revealed the great kiva to be 11.5 m in diameter, 1.3 m deep, symmetrically round, and semi-subterranean (Figure 5.7). The kiva walls are vertical except for an intermittent shallow ledge running along the upper 0.3 m of the wall. The building was covered with a robust roof, and occupants would have accessed the structure through a large opening in the center of the roof. A 0.3-m-high and 0.8-m-deep bench encircled the interior perimeter of the building and provided seating for approximately 75 individuals (Figure 5.8). Though floor features in the great kiva changed over the structure's use life, they generally appear to function symbolically rather than serving domestic purposes.

The great kiva roof was supported by four deeply seated upright beams tied together in a 4-x-4-m-square frame centered on the middle of the structure. This frame is oriented to magnetic north–south and east–west. The height of this framework is unknown but likely exceeded 2 m to provide standing room in the central portion of the structure and to transfer the weight of the roof to the perimeter of the building. Leaner beams, running from the frame to the perimeter of the building, were likely seated on either the shallow shelf in the upper lining wall or on the ground surface around the perimeter of the structure. It is estimated that over four tons of sediment and large tabular sandstone were layered on top of the superstructure. As many as seven courses of stone were layered along the roof's edge and shingled in shorter courses toward the center of the roof (Figures 5.9 and 5.10). This suggests that the perimeter of the roof was built up with masonry to meet the height of the central roof frame, giving the kiva the appearance of a massive masonry cylinder or dome from the exterior.

The original floor of the great kiva (Surface 2) was formed by smoothing the underlying calcium carbonate–rich silt deposit and adding redeposited native sediment to cover pockets of decomposing bedrock. Ten features were documented on the original floor, including evidence for two auxiliary post supports (Figure 5.11). The center of the floor was dominated by two southwest–northeast oriented, subrectangular (and possibly roofed) floor vaults. The floor vaults were likely used consecutively; the first vault collapsed and was filled and capped over with plaster, while the second was left open and remodeled during later use. Other floor features included a small ovoid burned spot in the south-central portion of the floor, two rock-lined pits (one ovoid and the other hook shaped) coated with colorful clays (Figure 5.12), and three additional small pits of unknown function in the east-central portion of the floor. Artifacts and samples recovered from Surface 2 are presented in Tables 5.1 and 5.2.

During remodeling of the great kiva, a new surface (Surface 1) was created with the application of a thick layer of reddish-brown plaster to the floor and bench. Plaster was not applied to the upper lining wall of the great kiva, suggesting that this area may have already been covered, possibly by a jacal facing like Pithouse 205-226 to the south. As the great kiva was remodeled, large shallow basins were excavated around each primary support post and plastered (Figure 5.13). Upright slabs were sporadically added to the bench face as reinforcement. In addition, a meter-long section of the northwest portion of the bench was heavily remodeled and covered with rock to create a formalized stone-paved feature. This feature seems to be symbolic and may have been used as an altar. Most of the features associated with the original floor were capped with plaster, but the two rock-and-clay-lined features in the east-central portion of the floor were left partially exposed and/or open. The center of the remodeled floor was again dominated by a subrectangular, roofed floor vault, but unlike earlier vaults, it was oriented directly east–west and associated with a pair of sipapus to the north. Artifacts and samples recovered from Surface 1 are presented in Tables 5.3, 5.4, and 5.5.

The plastered floor was eventually covered by a 4-to-15-cm-thick layer of multi-colored sand, deepest in the northern third of the structure and along the bench faces, to create a new use surface (Figure 5.14). All floor features associated with the plastered floor surface were also filled and covered with sand. Sand deposits ranged in color from tan to golden to green and sporadically reddish brown and were laminated and mixed with ash and charcoal. Pollen analysis of the sand (Chapter 22) identified an inflated presence of maize, Cheno-am, beeweed, cattail, and large grasses suggesting that these plants were brought into the great kiva while in bloom. The use surface also shows signs of intensive lithic activity. Systematic sampling of the sand deposit (see Chapter 1) demonstrated that an estimated twenty thousand micro-lithics were in and on top of the sand (Wurster et al. 2017). The proportional lack of larger lithic material associated with the sand layer likely indicates cleanup behavior after repeated lithic reduction events. Artifacts and samples associated with this sand deposit layer (Stratum 8) are presented in Tables 5.6, 5.7, and 5.8.

The great kiva was decommissioned in several stages. In the first stage, hundreds of pottery and lithic artifacts were scattered across the sand-layer use surface (Figures 5.15 through 5.17). Vessel reconstruction has demonstrated that hundreds of the pottery fragments recovered represent at least two Chapin Black-on-white bowls, multiple seed jars, and several wide-mouth jars (see Figure 5.18; also see Chapter 24, Figures 24.7 and 24.8). These vessels were all coated with fugitive red pigment, smashed into small fragments, and scattered across the sand use surface. Other artifacts, including lithic debris, informal lithic tools, stone beads, and four projectile points, were also scattered across the sand surface. Occupants then burned small fires, composed mostly of sagebrush, directly on the sand, which became fire-reddened in patches. The fires left behind concentrations of fine ash. Artifacts and samples associated with these layers (Strata 6/7) are presented in Tables 5.9, 5.10, and 5.11.

The occupants then began to dismantle the great kiva, possibly by peeling away adobe attached to the structure's ceiling, which left a 10-to-15-cm-thick layer of construction material on top of the sand. A de facto assemblage of informal lithic tools, a slab of basalt, two projectile points, and a few pieces of pottery was left on top of the construction deposit (Figure 5.19). The structure was then filled with small-diameter saltbrush branches and wood and set on fire. This blaze burned hot enough to fire-redden most of the exposed construction sediments and char the lower portions of the main support posts and several roof beams, destabilizing the superstructure. The great kiva roof, with its four tons of rock, mortar, and beams, leaned southwest and then collapsed directly onto the construction deposit, likely smothering the fire before the remainder of the wooden roof elements could burn (Figure 5.20). Based on archaeomagnetic and calibrated AMS dating of the burned layer, the great kiva was decommissioned between A.D. 690 and 725. Artifacts associated with this layer (Stratum 5) are presented in Tables 5.12, 5.13, and 5.14.

Evidence for Social Memory of the Great Kiva

There is evidence that ancestral Pueblo people continued to visit the great kiva long after the structure was decommissioned (see Nonstructure 125 and Arbitrary Unit 126). During excavation, artifacts dating to the late Pueblo I and early Pueblo II period (A.D. 800–1000) were collected from the naturally accumulating loess in the depression left by the collapsed great kiva. This concentration of material includes diagnostic pottery such as Obelisk and Twin Trees Utility brown ware, Chapin and Mancos Black-on-white, Chapin and Mancos gray ware, and corrugated pottery, along with a chalcedony projectile point and a bone awl. A small informal feature appears to have been built inside the great kiva depression sometime during the Pueblo II period (Nonstructure 125 Feature 1). The feature is a rectangular cluster of 13 small but heavily ground slabs, possibly serving as a small shrine. The concentration of Pueblo I and II artifacts and the construction of the informal feature in the depression of the collapsed great kiva suggests that the great kiva was part of the ancestral Pueblo social memory of the area long after it was decommissioned.

Block 200

Architectural Block 200 encompasses the southern third of the Dillard site and includes the ridgetop and east and west slopes of the ridge. The block comprises six pithouses, a pit room, a surface ramada, evidence of a fence or stockade, two definable middens, two burials, and seven extramural features (Figure 5.21). Excavation results indicate temporary and permanent habitation of Block 200 in the early seventh century from approximately A.D. 620 to 660.

Block 200 was tested with 93 excavation units. Most of the pithouses and the pit room were tested with rectangular test pits including one 1-x-1-m unit, two 1-x-2-m units, five 1-x-3-m units, and one 3-x-3-m unit. Thirty-three 2-x-2-m units and one 1-x-2-m unit were stripped of 5 to 20 cm of post-occupation overburden to expose the pit outline of two double-chambered pithouses (Pithouses 205-226 and 220–234) identified with electrical resistivity imaging. The north or south halves of each structure were then excavated in quadrants or halves, as appropriate. Nine 2-x-2-m units were excavated outside of structures to test for possible features identified during surface documentation or through electrical resistivity imaging. A tenth 2-x-2-m unit in the center of the block was surface collected but not excavated. The west midden was tested with 21 1-x-1-m probability units, and the east midden was tested with 20 1-x-1-m probability units.

Evidence for Permanent Habitation

Permanent habitation refers to structures large enough to live in and robustly built to protect inhabitants during the winter months. The most conclusive evidence of permanent habitation of Block 200 are the robust single-chambered pithouse (Pithouse 231) and double-chambered pithouses (Pithouses 205-226, 202–234, and 236). These structures are all oriented northwest to southeast and were excavated deeply enough that the lower half of the domestic chamber was built below the surrounding ground level. The three double-chambered pithouses have central hearths in the main chamber and were likely entered from the outside through an opening in the antechamber wall. Beyond these few factors, results from excavation, electrical resistivity imaging, and soil augering indicate that the Bock 200 permanent habitation pithouses vary widely in size, construction details, and function, which was interpreted based on their internal features and floor assemblages.

The north half of Pithouse 205-226 was entirely excavated and provides an example of Block 200 pithouse architectural details (Figure 5.22). Pithouse 205-226 is the largest structure in Block 200; it has a D-shaped main chamber measuring 4.8 m long and 5.2 m wide and a nearly equally large oval antechamber measuring 4.7 m long and 4.2 m wide. The antechamber was entered from the exterior by a set of rough steps cut into a sloping ramp at the southeast end of the chamber. The antechamber is 10 cm shallower than the main chamber, and the two are connected by a narrow step-through entryway cut into the undisturbed sediment bulk between them. Four vertical posts supported the roof framework in both the main chamber and antechamber. The walls of both chambers are vertical, and a series of postholes along the wall base of the main chamber indicate the walls were lined with upright-beam-supported jacal. This type of construction was not identified during testing of any other pit structures either at the Dillard site or at other sites in the larger study area. However, vertical interior jacal walls have been documented at other Basketmaker III sites (Yellow Jacket Ruin, Shabik'eshchee Village, Melloy Ruin) in the Southwest, suggesting that it may be a distinct construction tradition (Neily 1982; Roberts 1929; Wheat 1955).

Pithouse 205-226 is unique within the Basketmaker Communities Project in that the large antechamber mirrors the main chamber with a full suite of domestic features including a hearth, small capacity storage bins/pits, and a sipapu complex. This duplication suggests that the structure was built to support two households. Despite its capacity, little was invested into making Pithouse 205-226 a robust or long-lasting structure. The floors and features were never plastered, the storage bins were lightly built, and the presumed secondary leaner beams in the roof were not seated in sockets but simply rested on the surrounding surface.

Pithouse 220-234, on the east side of the ridgetop, is a striking contrast to Pithouse 205-226 (Figure 5.23). The entire south half of Pithouse 220-234 was excavated, which enables a point by point comparison with Pithouse 205-226. The antechamber (Structure 234) of Pithouse 220-234 is simply a protected entryway rather than an interior household space. Antechamber 234 consists of a slightly depressed area with a few postholes around its perimeter. There is no evidence that the wooden walls and ceiling of Antechamber 234 were mudded. A raised ramp led from Antechamber 234 down into the main chamber of Pithouse 220-234.

Main Chamber 220 of Pithouse 220-234 is comparatively small; the interior measures 4.00 m long and about 3.50 m wide. Slab-lined corner bins and pit features take up 8 m^2 of the 14 m^2 of floor area leaving very little room for sleeping inside the structure. However, the features reflect the usual domestic activity suite and include a large hearth, possible ashpit, sipapu complex, and storage pits. Despite its small size, a fair amount of time and energy were invested into Main Chamber 220. The roof was constructed of robust four-post supports with leaner posts socketed into a high perimeter bench. The bench, walls, bins, and possibly floor were plastered multiple times. All artifacts and samples recovered from the surface of Pithouse 220-234 are presented in Tables 5.15, 5.16, and 5.17.

Testing of Pithouses 231 and 236 in Block 200 suggest that their construction is similar to Pithouse 205-226. Testing and soil augering indicate that Pithouse 236 is a standard double-chambered pithouse and Pithouse 231 is a single-chambered pithouse; the main chambers of both pithouses are similar in size. Both structures are 1 m deep with vertical walls and built with secondary leaner roof beams or cribbing resting on the surrounding ground surface. Like Pithouse 205-226, the floors of Pithouse 231 and 236 were not plastered. A large hearth was exposed in the center of Pithouse 236, and four indeterminate round pits were exposed on the floor of Pithouse 231.

Occupants decommissioned the Block 200 permanent-occupation pithouses in different ways. In Pithouse 205-226, slab-lined features were dismantled, some of the features were filled with sand, and the domestic assemblage was removed (Figure 5.24). Only a light scatter of pottery sherds, lithic fragments and tools, one projectile point, minerals, raw clay, and bone tools was left behind. Pithouse 231 was decommissioned in a similar manner with pockets of sand on the floor and a few scattered artifacts. No artifacts or sand were found on the floor of Pithouse 236. The interiors of these structures were lightly burned, reddening patches on the floor and scorching exposed roof beams, and then they were left to collapse in place.

The decommissioning of Pithouse 220-234 was much more formal. An entire domestic assemblage was left inside, including a slab-metate sitting on three support stones; several manos; a cache of corn on the bench; lithic hammering, pecking, and scraping tools; projectile points; beads; clay spheres; possible human hair cordage; and at least three crushed vessels including one unfired platter. Finally, the main chamber was intensively burned, vitrifying chunks of the adobe roof and the wall plaster and carbonizing hundreds of roof beams (Figure 5.25).

The morphology, features, assemblage, and decommissioning treatment of the permanent-occupation pithouses in Block 200 indicate that Pithouse 220-234 likely served a slightly different function than Pithouses 205-226, 231, and 236. Regardless of their size, less investment was made in the construction and decommissioning of Pithouses 205-226, 231, and 236. They also have far less storage capacity than Pithouse 220-234. The larger floor space, salvaged assemblages, and leisurely decommisioning suggest these spaces were used for more private and personal activities. In contrast, there is not enough floor space for an extended family to live inside Pithouse 220-234. Instead, the large food storage capacity inside the structure and the emphasis on food processing and cooking suggests that the users focused on large-scale food production rather than personal activities. The fine plaster work, full de facto cooking assemblage left in the structure, and the intense burning of the pithouse all suggest that Pithouse 220-234 was a more formal space than other pithouses in Block 200.

Evidence for Temporary Habitation

Two pithouses in Block 200 (Pithouses 239 and 232) appear to be seasonal habitations for the simple reason that their construction was not robust enough to provide protection for the inhabitants during the winter months. Pithouses 232 and 239 are round, single-chambered pithouses built along the ridgetop in Block 200. AMS and archaeomagnetic dating indicate these temporary habitations were in use sometime between A.D. 570 and 661 and, given their spatial relationships to surrounding structures, were likely contemporaneous with the permanent habitations in Block 200 (A.D. 620–660). Pithouse 239 was sampled with a 3-x-1-m unit, and the entire northwest quarter of Pithouse 232 was excavated (Figure 5.26), providing much of the architectural details described below.

Pithouses 232 and 239 are approximately the same size as the main chamber of Pithouse 205-226; their interiors measure between 5 and 6 m in diameter. Despite their large size, each pithouse was excavated less than 0.4 m deep, requiring the upper three-quarters (approximately 1.5 m) of the structures to be built aboveground. The superstructure of Pithouse 232 was supported by an unusual configuration of nine vertical interior posts that must have been tied together and enclosed to form the roof. Nearly vertical posts were socketed in a 40-cm-wide bench around the perimeter of the pithouse and leaned inward to the roof line. The framework was covered with vegetal closing material and a layer of adobe. Both pithouses have substantial central hearths but few other features, leaving most of the floor area open to the inhabitants. Only a light scatter of domestic artifacts was found on either floor, including two projectile points on the floor of Pithouse 232. Neither structure was burned when decommissioned, but the roofs were collapsed directly on the floor indicating that they did not stand unoccupied for very long.

In summary, Pithouses 232 and 239 were large, lightly built, shallow pithouses with open floor spaces and central hearths. They show no signs of domestic activity beyond warming and cooking. In fact, pollen analysis of Pithouse 239 demonstrated that the structure has a very weak plant signature and no domesticated plant pollens (Chapter 22). These findings suggest that Pithouses 232 and 239 were used primarily for basic human habitation (sleeping, heating, and possibly cooking) rather than as locales of production or intense activity. As such, they may have been occupied solely during functions at the great kiva or other communal activities at the Dillard site.

Evidence for Extramural Activities

Several architectural elements and extramural features were discovered during Block 200 testing. The architectural elements include an enclosing fence, a pit room, and a ramada. Evidence for purely extramural activity in Block 200 comprise a thermal pit, two large shallow pits, and two burials.

A pit room (Study Unit 228) is 6 m northwest of Pithouse 205-226 and served as a storage and cooking facility. This 2.4-m-diameter pit room was built 0.50 m deep below the prehistoric ground surface (Figure 5.27). The roof was supported by a series of upright posts built into the vertical walls and covered by vegetation and adobe. Upright slabs were integrated into both the roof and the exterior base of the wall, effectively armoring the pit room. A small bell-shaped pit in the upper wall served as a storage area for edible plants. Pollen analysis from the fill of the pit found a high density of both wild and domesticated edible plant pollen (see Chapter 22), and the adjacent hearth was used intensively and remodeled several times suggesting that cooking was a common activity in the room. The few items on the floor of Pit Room 228 were dominated by ground stone and large sandstone slabs likely used as work platforms.

A 6-m-long section of upright post fence arcing northwest–southeast (Nonstructure 248) is 8 m west of Pithouse 205-226 (Figures 5.28 and 5.29). This fence line is composed of 24 robust postholes spaced less than 10 cm apart. The area was targeted for excavation because a linear feature of scattered stone was recorded in the location during surface survey (Fetterman 1991). This rock was concentrated on the interior of the fence line and may represent an attempt to stabilize the fence or seal gaps along its base. Often referred to as stockades, perimeter fences are commonly found at small Basketmaker III hamlets (Lipe et al. 1999; Wilshusen 1999) but have not been previously documented at aggregated settlements. The arc of the fence suggests that it may have enclosed the entire Block 200 pithouse complex, but with such a small section exposed, this cannot be confirmed.

Another set of surface posts was located 10 m north of Pithouse 205-226 (Nonstructure 241). In this case the five posts aligned in a tight arc north to south and were set much further apart than the fence line to the southeast. Inside the arc of posts are two pits, one of which was used for thermal activities. This complex of posts and pit features likely represents a small surface structure or open-air ramada. Based on an AMS date of corn from one of the pits, this activity area was in use between A.D. 547 and 655 and was contemporaneous with the rest of the occupation in Block 200.

In the center of Block 200, a 12-m-square area of ridgetop was left open as something of a courtyard between the encircling pithouses (see Figure 5.21). On the southwestern edge of this open space is a large slab-lined pit (Nonstructure 216 Feature 1) used alternately for thermal activities and trash deposit. A similar but smaller thermal feature was excavated east of the open area just north of Pithouse 220-234 (Nonstructure 227 Feature 2). Four large, shallow depressions filled with refuse were found in the open area between the pithouses (Nonstructure 225, Nonstructure 208 Features 1, 2, and 3). The function of these basins is unclear. They may be evidence of ephemeral surface rooms or extramural ground-disturbing activities. An intrusive burial pit was later dug into one of these basins in the center of the courtyard (Nonstructure 208

Feature 4) where the remains of a middle-aged woman with a severe bone infection (Nonstructure 208 Feature 4) were interred (see Chapter 23). A second adult female (Nonstructure 227 Feature 4) was interred in a similar pit on the northeast edge of the open area. Two additional deep pits, morphologically similar to the tested burial pits, were detected with electrical resistivity (see Chapter 3) in the southern half of the open area between Pithouses 205-226 and 220-234, indicating that there may be additional burials in the courtyard.

Block 300

Architectural Block 300 is a cluster of pithouses and associated activity areas comparable to Block 200. It is located directly north of the great kiva near the center of the site on the top and eastern slope of the ridge. Block 300 comprises four pithouses, five pit rooms, a thermal activity area, evidence of a perimeter fence, a buried midden, and a definable exposed midden (Figure 5.30). Excavation results indicate Block 300 was permanently occupied during the early half of the seventh century and reoccupied with a temporary habitation between A.D. 670 and 690.

Block 300 was excavated with 39 excavation units. The pithouses and pit rooms, identified as rock-cluster features on the surface or as anomalies with electrical resistivity imaging, were tested with rectangular test pits including three 1-x-2-m units, four 1-x-3-m units, and 14 2-x-2-m units. The 12 2-x-2-m units over Pithouse 312-324 were intended to simply strip off the post-occupation overburden to expose the pithouse outline, but the structure was so shallow that the structure was not divided into quadrants; instead, the rectangular units were excavated to the floor. The midden was tested with 12 1-x-1-m probability units, and extramural activity areas below the midden were tested with six 2-x-2-m units.

Evidence for Permanent Habitation

Most of the pithouses in Block 300 qualify as permanent habitations in that they are large enough to live in and built robustly enough to protect inhabitants during the winter months. Like the permanent pithouses in Block 200, these structures (Pithouses 309, 311, and 313) vary widely in their morphology but were likely contemporaneous. Based on AMS, archaeomagnetic, and seriation dating, all three structures were in use sometime in the early seventh century, likely around A.D. 610. Though overlapping with habitation dates from Block 200, the earlier date ranges from Block 300 permanent pithouses suggest that Block 300 may have been occupied before Block 200.

Study Units 309 and 311 are double-chambered pithouses, and Study Unit 313 is a single-chambered pithouse. The single chamber of Pithouse 313 measures 5.50 m in diameter and 0.90 m deep, making it the deepest pithouse in Block 300. Pithouse 313 is the larger of the two double-chambered pithouses, with the main chamber measuring approximately 4.30-x-4.30 m and the antechamber 3.24-x-3.25 m. The 0.85-m-deeep main chamber of Pithouse 309 appears to have been accessed from the 0.50-m-deep antechamber by an earthen ramp. Pithouse 311 is quite a bit smaller; the main chamber measures approximately 3-x-4 m, and the antechamber measures 2.5-x-3.5 m. Both chambers are just over 0.5 m deep. Little is known about the superstructure over the Block 300 permanent pithouses except that Pithouse 313 was built with a vertical north wall and the roofs over all three pithouses were composed of wood, adobe, and moderate amounts of sandstone.

The floors of Pithouses 309, 311, and 313 were not plastered. The usual suite of floor features (hearth, sipapu complex, and storage pits) was found in the main chamber of all three structures (Figure 5.31). In addition, an ashpit was identified south of the hearth in Pithouse 309. The sipapu in Pithouse 309 is considered complex and has a false-bottomed basin capping an underlying cylindrical pit filled with alternating colors of reddish-brown and greenish-tan sand (Figure 5.32). All artifacts and samples recovered from Surface 1 in Pithouse 309 are presented in Tables 5.18, 5.19, and 5.20. Pithouse 311 has a single sand-filled sipapu, and Pithouse 313 has double sipapu pits filled with clean red silt.

The Block 300 permanent habitations were decommissioned in similar ways. Sand was spread across the floors of Pithouses 309 and 311.The domestic assemblage was removed from all three pithouses, leaving light scatters of ground stone, pottery sherds, animal bone, bone tools, and chipped stone behind. The roofs of the pithouses were collapsed directly onto the floors after either intense burning of the roof, as was the case in Pithouse 309 (Figure 5.33), or light to moderate burning, as was identified for Pithouses 311 and 313.

Evidence for Extramural Activities

Several non-habitation architectural elements and extramural features were exposed in Block 300. The architectural elements include five storage-pit rooms and a possible enclosing fence. The extramural features, two thermal pits, and one pit of unknown function are concentrated in the eastern portion of the block.

Five postholes and a series of possible postholes are evidence of a perimeter fence in Block 300 (see Figure 5.30). The posthole alignment arcs north to south under the western edge of a dense midden (Nonstructure 304). Magnetometry images show additional posthole-diameter anomalies arcing around the pithouse cluster in Block 300, suggesting that the fence may have enclosed all habitation structures. Unlike the fence in Block 200, the excavated postholes in the Block 300 alignment are spaced 0.5 to 1 m apart. This suggests that the fence was not robustly built and was likely tied together horizontally with vegetation. Midden deposits in excavation units inside (west) of the alignment averaged 14 cm thicker than outside (east) of the alignment, indicating that refuse was deposited inside rather than outside of the fence line.

Just northeast and outside of the possible fence alignment is a 6-x-6-m area of burned rock, charcoal, and burned soil. Two thermal features were excavated in this area. The largest feature was slab lined and rock filled, suggesting it was a roasting pit or a possible pottery kiln. The other feature was a large shallow pit of unknown function. This feature is similar to other shallow depressions found in Block 200 (Nonstructure 225, Nonstructure 208 Features 1, 2, and 3) and could be evidence of an ephemeral surface room or extramural ground-disturbing activity.

Small, isolated pit rooms were found in Block 300 both in the vicinity of the pithouses and downslope to the east in Midden 304. Pit Room 333 is just west of Pithouse 309, and Pit Room 317 is directly north of Pithouse 311. Pit Rooms 330, 331, and 332 are east of the pithouse cluster but inside the trajectory of a possible enclosing fence. Half of Pit Room 330 was excavated, and Pit Room 333 was excavated in full, providing many of the construction details discussed below (Figures 5.34–5.35). The single AMS date on maize from Pit Room 330 (A.D. 550–650) suggests that the pit rooms are contemporaneous with the permanent habitations in Block 300.

Based on excavation, auger tests, and electrical resistivity imaging, all five pit rooms in Block 300 are sub-circular and measure approximately 1.5 m in diameter. They range in depth from 0.15 to 0.40 m deep and have unprepared earthen floors. Pit Rooms 330 and 332 were lined with large sandstone slabs. The walls of the other three pit rooms are earthen, but it is possible that any stone in the lining of these rooms was scavenged for other construction purposes. All five pit rooms were lightly roofed with wood, adobe, and small sandstone pieces. Postholes were found 30 to 40 cm outside of Pit Rooms 333 and 317. These postholes may have supported roof frames over the buildings or anchored the base of cribbed roofing beams as has been documented at other Basketmaker III habitations in the central Mesa Verde region (Ives 1999; Rohman 2003; Wheat 1955).

Evidence for Late Temporary Habitation

Pithouse 312-324 is a rare, large double-chambered pithouse occupied seasonally rather than permanently, based on its very shallow profile. Pithouse 312-324 is also the only structure at the Dillard site contemporaneous with the late seventh and early eighth century use of the great kiva, indicating that it may be related to periodic communal gathering at the site during this time period. Three-quarters of Pithouse 312-324 were excavated in 12 contiguous 2-x-2-m units and provided a substantial amount of data about the pithouse's construction, use, and decommisioning. AMS dates of maize on the floor of the structure and an archaeomagnetic date of the hearth indicate that the pithouse was in use between A.D. 670 and 690.

Pithouse 312-324 has the largest footprint of any pithouse at the Dillard site (Figure 5.36). The main chamber is ovoid, measuring 6.60 m long and 6.00 m wide, and the antechamber is 3.10 m long and 3.30 m wide. Despite its size, Pithouse 312-324 is just slightly subterranean; the main chamber was excavated less than 0.35 m below surface, and the antechamber was excavated 0.26 m below surface (Figure 5.37). This shallow profile would have required 80 percent of the structure to have been built aboveground making it not only the largest, but likely the tallest pithouse on the site.

Both the main chamber and the antechamber roofs of Pithouse 312-324 were supported by four-post superstructures. Approximately 55 nearly vertical secondary posts were leaned against the main chamber superstructure from a 0.36-m-wide perimeter bench. These secondary beams were deeply seated in the bench, creating strong upright walls that were covered with vegetation and a layer of adobe at least 20 cm thick. The antechamber roof was less substantial with leaner posts barely, if at all, socketed into the ground surface around the exterior of the building. The main chamber and antechamber were connected through an extremely large, 3-m-wide step-down entryway.

The floor features and artifact assemblage associated with Pithouse 312-324 point to domestic activities inside the structure. All artifacts and samples from the surface of Pithouse312/324 are presented in Tables 5.21, 5.22, and 5.23. Floor features were isolated to the main chamber and include a jacal deflector, a hearth, the remains of an upright-slab bin feature, and six pit features. Three of the pit features (PNS32, 34, and 35) are a potential sipapu complex that was cleaned out and packed with consistently reddish-brown silt prior to the structure's decommissioning. A scatter of domestic items was found across the main and antechamber floors including pottery sherds, chipped-stone debris, a few expedient tools, a projectile point, and a concentration of ground stone in the antechamber.

Though the internal features and floor assemblage of Pithouse 312-324 point to a domestic function, the nature of this temporary habitation was far from ordinary. Pithouse 312-324 was built 9 m directly north of the Dillard site great kiva (Study Unit 102), which had already been in use for a half century. The great kiva was remodeled and likely reroofed during the same era in which Pithouse 312-324 was built, between A.D. 670 and 690. The two structures are notably oriented in different directions: the great kiva north–south and Pithouse 312-324 northwest–southeast. Interestingly, the two floor vaults associated with the great kiva's remodeling (Surface 1) are oriented at the same northwest–southeast orientation as Pithouse 312-324. The prominence of this large temporary structure suggests that it was periodically inhabited and/or used by a group of people intent on its visual importance and proximity to the great kiva.

The only sign of special activity associated with Pithouse 312-324 is the comparatively high number of faunal remains in the artifact assemblage. Over 150 pieces of fauna were recovered from the floor or in floor features of Pithouse 312-324, which is several times the average density of faunal remains found in any other structure at the site. This assemblage is even more surprising because bone in shallow deposits such as Pithouse 312-324 appears to have deteriorated at much higher rates than in deeper deposits at the Dillard site, suggesting that the Pithouse 312-324 faunal assemblage may have been much larger than what survived. The high density of faunal remains in Pithouse 312-324 suggests that people engaged in feasting or feast preparation inside the structure (Potter and Chuipka 2007).

Block 400

Architectural Block 400 encompasses the area between Blocks 300 and 500 in the mid-northern portion of the Dillard site (Figure 5.38). The block extends from a rock concentration on the top of the ridge to a light artifact scatter off the western slope. The ridgetop that runs north–south through the Dillard site is widest in Block 400 and, therefore, was presumed to be a preferred location for pithouse construction. The area was extensively imaged with electrical resistivity and magnetometry remote sensing to identify buried pithouses. Just one pithouse-sized anomaly was identified, and soil auger tests determined that it was a natural deposit. As such, Block 400 is not considered a habitation block; instead, it is interpreted as an area of extramural activity composed of a possible ramada and a light artifact scatter. Block 400 was tested with seven excavation units. The artifact scatter on the slope was tested with six 1-x-1-m units, and a 2-x-2-m unit was excavated in the center of the rock concentration on the ridgetop. Pottery collected from the block confirms that it dates to the Basketmaker III period.

Evidence for Extramural Activities

Test excavations in the artifact scatter (Nonstructure 401) demonstrated that the cultural deposits were surficial and low density. The density of the artifacts resembles the density of cultural deposits across the site surface suggesting that the artifact scatter is simply a result of general occupation and slopewash rather than evidence for in situ activity.

The rock concentration on the ridgetop consists of a 12-x-10-m scatter of burned and unburned small sandstone pieces. An occupation surface (Nonstructure 407) and two pit features were exposed during the testing of the concentration. One of the pits is a potential posthole suggesting that a lightly built surface structure, such as a ramada, stood in the vicinity. The surrounding rock concentration may be the remains of a rock and mud coating of the surface structure.

Block 500

Architectural Block 500 is a habitation complex at the north end of the Dillard site (see Figure 5.38). The block comprises a rock concentration with an upright slab on the top of the ridge and a double-chambered pithouse surrounded by a light midden scatter off the western slope of the ridge. As in Block 400, the top of the ridge in Block 500 was extensively imaged with electrical resistivity and magnetometry remote sensing to identify buried pithouses. No possible pithouse anomalies were identified, and the area was not further tested. The midden was sampled with six 1-x-1-m units. One of the midden test units revealed the main chamber of a double-chambered pithouse, and a 3-x-1-m unit was excavated off the south side of this unit to test the pithouse antechamber.

Evidence for Permanent Habitation

The Basketmaker III occupation of Block 500 may represent an independent single-family hamlet rather than an extension of the aggregated occupation clustered around the great kiva. Pithouse 505-508 in Block 500 is over 70 m away from the nearest pithouse at the Dillard site and the intervening area is nearly devoid of activity, creating a perceivable buffer between the Block 500 hamlet and the community center. Despite its apparent detachment, AMS dating of maize from Pithouse 505-508 confirmed that the structure was contemporaneous with the main occupation of the Dillard site between A.D. 620 and 670.

Pithouse 505-508 is a permanent double-chambered pithouse. Based on the excavation of 4 square m of the structure and a series of soil auger tests the structure was determined to be moderately large and robust. The main chamber measures approximately 4.80-x-5 m and 1.10 m deep. Secondary posts were deeply seated in an 0.80-m-wide perimeter bench and then leaned into an internally supported superstructure. The roof was covered by a 0.45-m-thick layer of vegetation and adobe. The antechamber is round, measuring 2.5 m in diameter, but very shallow at just 0.3 m deep. The interior walls of the antechamber were lined with upright stone mortared in place. A wooden superstructure was built over the antechamber, and the exterior was enclosed with a light layer of vegetation and adobe. The two chambers were connected by a step-through entryway cut into the undisturbed native sediment bulk that divided them.

Little is known about the floor of the main chamber of Pithouse 505-508, but a 2-m-long section of the antechamber floor was sampled (Figure 5.39). Like most pithouses at the site, the floor of the antechamber was not plastered. A raised platform was detected in the east-central portion of the structure with the remains of a slab-and-plaster-lined bin constructed on top of it. A light midden surrounds Pithouse 505-508 suggesting that refuse was not carried away from the structure but was deposited just outside the building.

A light scatter of chipped stone, ground stone, and pottery sherds were left on the floor of the antechamber when Pithouse 505-508 was decommissioned. Both the antechamber and main chamber were intensively burned, which charred many of the roof beams, fire-reddened exposed surfaces, and collapsed the roof directly onto the floor of the antechamber.

Demography

The Dillard site experienced dramatic demographic shifts throughout the Basketmaker III period; it transformed from a small habitation to an aggregated settlement and finally ended as a gathering site for the larger community (Figure 5.40). Though the site was never reoccupied after the Basketmaker III period, there are indications that ancestral Pueblo occupants remembered its history for several centuries.

The Dillard site may have been inhabited by a single household early in the sixth century A.D. based on dates from a Pit Room 124. The pithouse associated with this storage room would have been obliterated by the later construction of the great kiva. The choice to build the great kiva in the location of a century-old pithouse would indicate that the builders chose to superimpose the structures on purpose for either logistical or symbolic reasons.

A group of homesteaders moved to the Dillard site at or just prior to A.D. 600. Within a generation, up to seven year-round pithouses were contemporaneously occupied, creating a peak population of approximately 30 to 40 people (Ortman et al. 2016). Though archaeomagnetic and AMS dating produced wide overlapping date ranges for these pithouses, general trends in date ranges differ among occupation blocks. Based on these trends, Block 300, in the center of the site, was likely founded before Block 200 at the south end of the site. The pithouses in Block 300 are tightly clustered with storage structures interspersed between and east of the cluster. In Block 200, the pithouses are slightly more dispersed but encircle a common courtyard area. Again, storage and ramada buildings were interspersed among the pit structures. Fence segments found during testing suggest that the pithouses and associated structures in both Block 200 and in Block 300 may have been encircled by one or more perimeter fences.

The first iteration of the great kiva was built in conjunction with the early seventh-century population boom at the Dillard site. In fact, given its location in the center of the site between the Block 200 and 300 pithouses, the great kiva was likely in place when these organized habitation clusters were built. Even in its early configuration, the great kiva could have accommodated twice as many occupants than were living at the Dillard site. When gathered together in the great kiva, these participants would have witnessed one, or possibly two, large floor vaults in the center of the building and colorfully clay-lined pits in the western floor, perhaps illuminated by a raised fire at the south end of the building.

During the occupation peak of the site in the early seventh century, there is evidence that people from the surrounding community temporarily gathered at the Dillard site. Two large, shallow pithouses (Pithouses 232 and 239) were incorporated into the Block 200 pithouse complex. These structures show little sign of domestic use other than a warming hearth and excessive floor space, making them suitable for short-term occupation. Periodic gathering for observances in the great kiva would have certainly been a draw for the larger community.

In the latter half of the seventh century, the Dillard site population stopped investing in permanent habitation at the site, likely moving their homesteads into the surrounding settlement. Pithouse 505-508, built between A.D. 620 and 670, is the last permanent pithouse built at the Dillard site and was part of this trend toward occupation dispersion. Pithouse 505-508 is 70 m away from the aggregated core of the site and likely represents an independent household hamlet.

Just as the permanent households moved away from the Dillard site, the larger community reinvested in the great kiva as a communal structure. The great kiva was heavily remodeled between A.D. 670 and 690. It appears that the original support beams were retained, but the rest of the roof was likely replaced. The new roof was massive and supported four tons of raw sandstone slabs, material that was hauled to the site from half a mile away. Inside the structure, the floor and bench were plastered and a rock-lined feature added to the northwestern portion of the bench. Many of the earlier floor features were capped over, but a new vault and double sipapu complex were constructed in the north-central portion of the floor.

Community members continued to periodically gather at the Dillard site for at least another 35 years. Just north of the great kiva, a large, seasonal, double-chambered pithouse (Pithouse 312-324) was constructed for temporary use and occupation. Large amounts of faunal bone found on the floor suggest feasting, or at least feasting preparation took place in the building. Two burials were likely interred in Block 200 during this period. The burials, both adult women, were interred in pits excavated through midden deposits and features dating to early seventh-century occupation of the site. This suggests that these women were buried at the Dillard site during the period it was used solely for community gatherings.

Late in the use life of the great kiva, activities in the building shifted. The plastered features were filled, and the floor was covered with a layer of multi-colored sand. The structure then became a focal point for repeated lithic reduction activities. At the end of its use life, sagebrush was burned in piles across the sand floor and pottery vessels were broken and scattered. The great kiva was finally decommissioned around A.D. 725 when the structure was partially dismantled, lithic tools and projectile points were deposited on the construction debris, and the roof was burned and collapsed.

After the great kiva was decommissioned, the Dillard site was never again reoccupied. This is surprising given the fact that over one hundred later ancestral Pueblo components have been recorded in the surrounding project area and the Dillard site ridge is an enticing location for habitation. In fact, several Pueblo II period habitations were built off the eastern slope of the Dillard ridge in far less favorable locations. This avoidance of the Dillard site may indicate that the ancestral Pueblo community had a social memory of the great kiva and considered the area off-limits for regular habitation. Later ancestral Pueblo people spent time at the Dillard site given the smattering of later pottery types across the site surface, and they may have intentionally visited the great kiva during the Pueblo I and II periods based on a possible shrine feature and bone, pottery, and stone tools deposited in the fill of the structure.

Sitewide Artifact and Sample Interpretations

Of all the material recovered as part of the Basketmaker Communities Project, the vast majority dating to the Basketmaker III temporal components was recovered from the Dillard site. A detailed discussion of artifacts by time and by structure-function type is included in Chapter 24. All unmodified sherds recovered from 5MT10647 are presented in Table 5.24. All bulk chipped-stone artifacts are presented in Table 5.25 by raw material type. Nearly nineteen thousand sherds were collected from the Dillard site, and the vast majority of these date to the Basketmaker III period. Almost all of the brown ware sherds (N = 168, 90 percent) from the Basketmaker Communities Project pottery assemblages (see Chapter 24, Table 24.1) were recovered from the Dillard site. A few more recent sherds were recovered and point to the continued use of the Indian Camp Ranch community into the Pueblo II and Pueblo III periods.

Subsistence

Most of the subsistence data from the Dillard site comes from the mid-Basketmaker III phase during its primary occupation. Based on macrobotanical, pollen, and faunal analysis, wild and domesticate resources were available and abundant during this phase. Resources become scarcer and the resources more specialized during the late Basketmaker III phase.

Plant Resources

Based on macrobotanical and pollen data, the Dillard site occupants were reliant on maize, which was grown in abundance. The presence of seeds from goosefoot and pigweed plants supports this interpretation. These plants, along with purslane, are weeds of agricultural fields and other disturbed locations. Families also had access to domesticated squash (*Cucurbita*). Cholla and prickly pear cactus were favorite foods. On occasion occupants harvested wild ground cherry seeds and cattail and bulrush achenes from resource-rich mesic (damp) habitats. Spring-ready tansy mustard seeds, late summer–ripening sunflower achenes, fall-ripening sagebrush, and stickleaf seeds indicate collecting in different seasons. Grass caryopses (grains) and embryo evidence suggest occasional use of wild grasses, like ricegrass grains. Seeds of spiderling (*Boerhavia* aka *Boerhaavia*) plants that have not been documented in the area today may be evidence that plants were imported from southern regions off the Colorado Plateau.

The recovery of juniper wood and other non-reproductive parts in nearly every macrobotanical sample reveals the importance of juniper trees as a fuel source and for other daily needs. People also frequently used pinyon pine wood and, less often, sagebrush wood and cottonwood/willow trees. Grass stems and sagebrush wood were carried in on occasion as were, to a lesser extent, rabbitbrush and wood/twigs from shrubs in the rose family. A rare construction material, the water birch (*Betula occidentalis*) or the shrub called bog birch (*Betula glandulosa*), was likely used to construct a bin in Pithouse 220-226.

The recovery of wild tobacco seeds in several pit structures and the great kiva may well reflect ceremonial activity at the site. Occupants may have also used the great kiva for pottery production or to prepare specialty foods based on a high level of beeweed and cattail pollens in its interior.

Animal Resources

Dillard site occupants had access to a wide variety of animal resources; amphibians, snakes, lizards, birds, and small, medium, and large mammals are all represented in the faunal assemblage.

The occupants had medium-sized dogs for companions but, unlike other Basketmaker III households in the study area, there is no evidence that they kept turkeys at the Dillard site. A dog was buried on the floor of Pithouse 309, and other dog, gray fox, and dog/coyote skeletal elements were found across the site. Though no turkey bone was found, a handful of gizzard stones suggest the inhabitants at least hunted wild turkey.

Dillard site occupants hunted nearby; element frequencies show that complete, rather than butchered, animal carcasses were deposited at the site. For large game, occupants hunted deer, pronghorn, and elk. Small game, including lagomorphs and small birds, were also hunted on a regular basis. Based on the frequency of remains, Block 300 occupants seemed to prefer jackrabbits, while Block 200 occupants preferred cottontail rabbits.

Bones from jackrabbits and other medium-sized mammals were shaped into tools, gaming pieces, and ornaments, most of which were found inside pit structures at the site. A bone needle was recovered from the great kiva, and 16 awls and spatula-shaped tools found in pithouses were used for weaving and sewing. Bone beads and tubes served as ornaments. Hawks, snakes, amphibians, lizards, and box turtle remains suggest ceremonial activities at the Dillard site.

Pottery and Stone Tools

Materials for making pottery and chipped-stone tools are locally available near the Dillard site. The adjacent Dakota and Morrison geologic formations provided both clay and chipped-stone materials that were used by the residents of the Dillard site. A pottery resource survey, conducted on an area adjacent to the Indian Camp Ranch community and discussed in more detail in Chapter 24, identified many available outcrops of clay from the Dakota geologic formation, which appear compositionally similar to the archaeological pottery sherds recovered at the Dillard site. One nonlocal and a number of semi-local red ware sherds indicate connections to the south and west of the project area.

Chipped-stone materials utilized by Dillard site residents are primarily local, and the Morrison Formation is the most-utilized source location (see Table 5.25). Morrison Formation outcrops are accessible in Alkali Canyon, just to the northwest of the Dillard site. Nonlocal stone materials, including red jasper, obsidian, and Narbona Pass chert, suggest connections to the west and south. The sourced obsidian from the Dillard site mostly originated from the Jemez Mountains and Mount Taylor sources, and one piece originated from the Government Mountain source near Flagstaff, Arizona (Shackley 2013, 2015, 2017).

Site Summary and Conclusions

The Dillard site represents a Basketmaker III homesteading colony in the central Mesa Verde region that transformed over several generations into a civic-ceremonial center for an expanding community.

Nonlocal artifacts may suggest areas of origin of the residents of the Dillard site, either because residents brought those nonlocal items with them when they migrated or because the continued presence of nonlocal materials suggests ongoing connections to those source areas. Very few nonlocal artifacts were identified at the Dillard site, but those that were recovered (one nonlocal and a number of semi-local red ware sherds) suggest the Dillard site residents had connections with areas to the south and west. Nonlocal stone materials, including red jasper, obsidian, and Narbona Pass chert, suggest connections to the south and west.

The earliest occupation of the project area is what appears to be a single household at the Dillard site in the latter half of the A.D 500s. The site was settled in earnest at or just prior to A.D. 600 when at least seven permanent households were established within a generation. These households likely represent settlement and expansion of a single group of immigrants. The architectural details from the pithouses of this phase vary widely indicating the settlement was established by several different source populations and that the population felt no pressure to conform at the household level. However, the households at the Dillard site were grouped into clusters, one north and one south of a great kiva, each likely enclosed by a perimeter fence.

A great kiva was built in the center of the Dillard site in conjunction with the household florescence in the early seventh century. Though adjacent households were most definitely involved in the construction of the great kiva, the amount of labor required to build the structure suggests that other families from the surrounding community might have contributed to the kiva's construction. These or other families could have been housed in the two seasonal pithouses when visiting the Dillard site.

In the latter half of the seventh century, the Dillard site population stopped investing in permanent habitation and likely moved out into the surrounding community. However, community members continued to revitalize and gather at the Dillard site great kiva for at least another 35 years. The great kiva eventually became a focal point for recurrent lithic reduction activities, possibly by select groups from the surrounding community.

After a ceremony involving breaking and scattering pottery vessels across the floor, the Dillard great kiva was partially dismantled and burned around A.D. 725. Though the site was never reinhabited, the Dillard site great kiva continued to live on in the social memory of the community and was visited for centuries by ancestral Pueblo people who left items and a possible shrine in the collapsed depression of the structure.

Figure 5.1 Photograph of Woods Canyon Archaeological Consultants' test excavations of the Dillard site great kiva in 1991.

Figure 5.2. Aerial photograph of the Dillard site during Crow Canyon Archaeological Center's Basketmaker Communities Project excavation, facing north. The great kiva (Structure 102) is in the background covered by a white tarp, and Pithouses 205-226, 232, and 220-234 are in the foreground covered by black tarps.

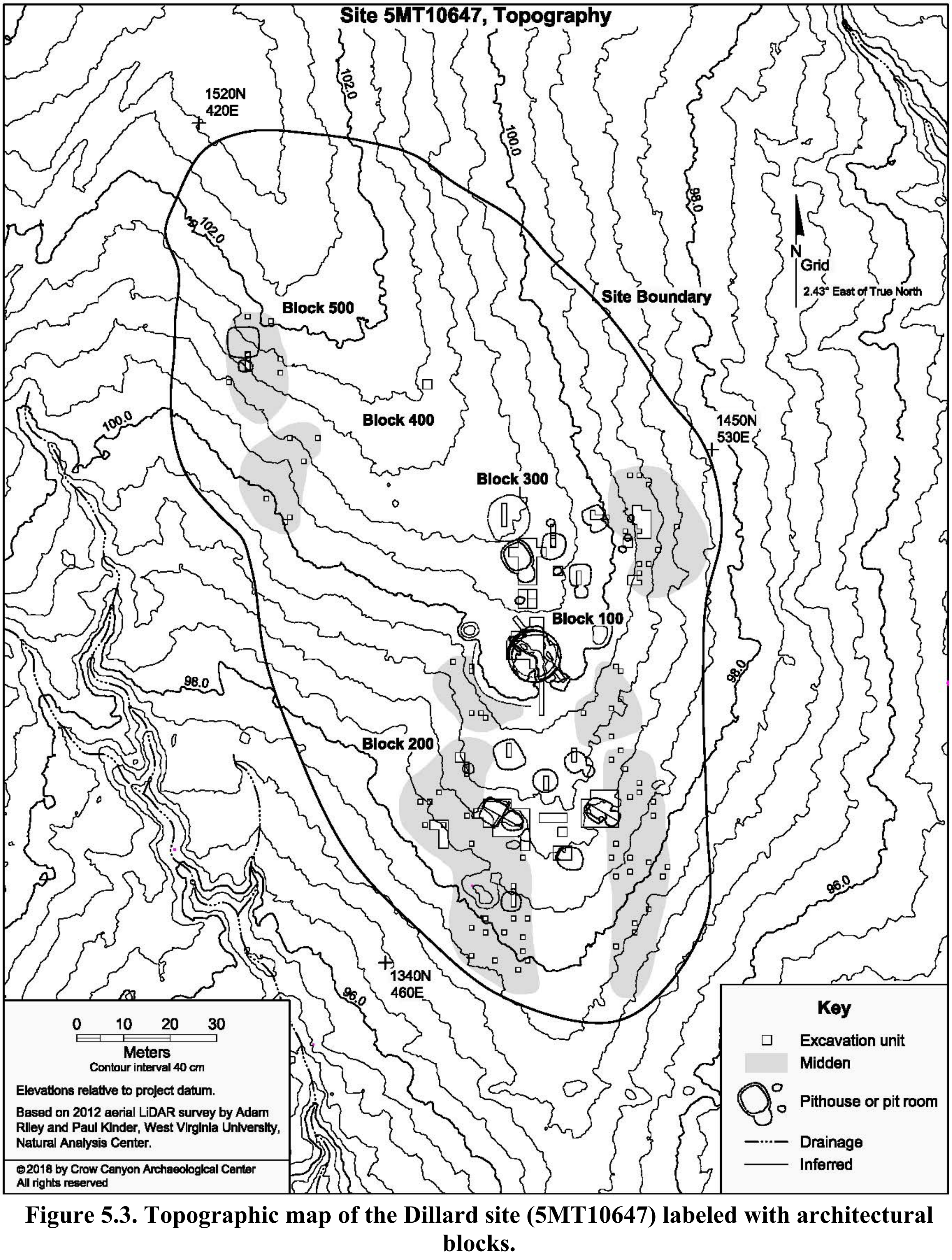

Figure 5.3. Topographic map of the Dillard site (5MT10647) labeled with architectural blocks.

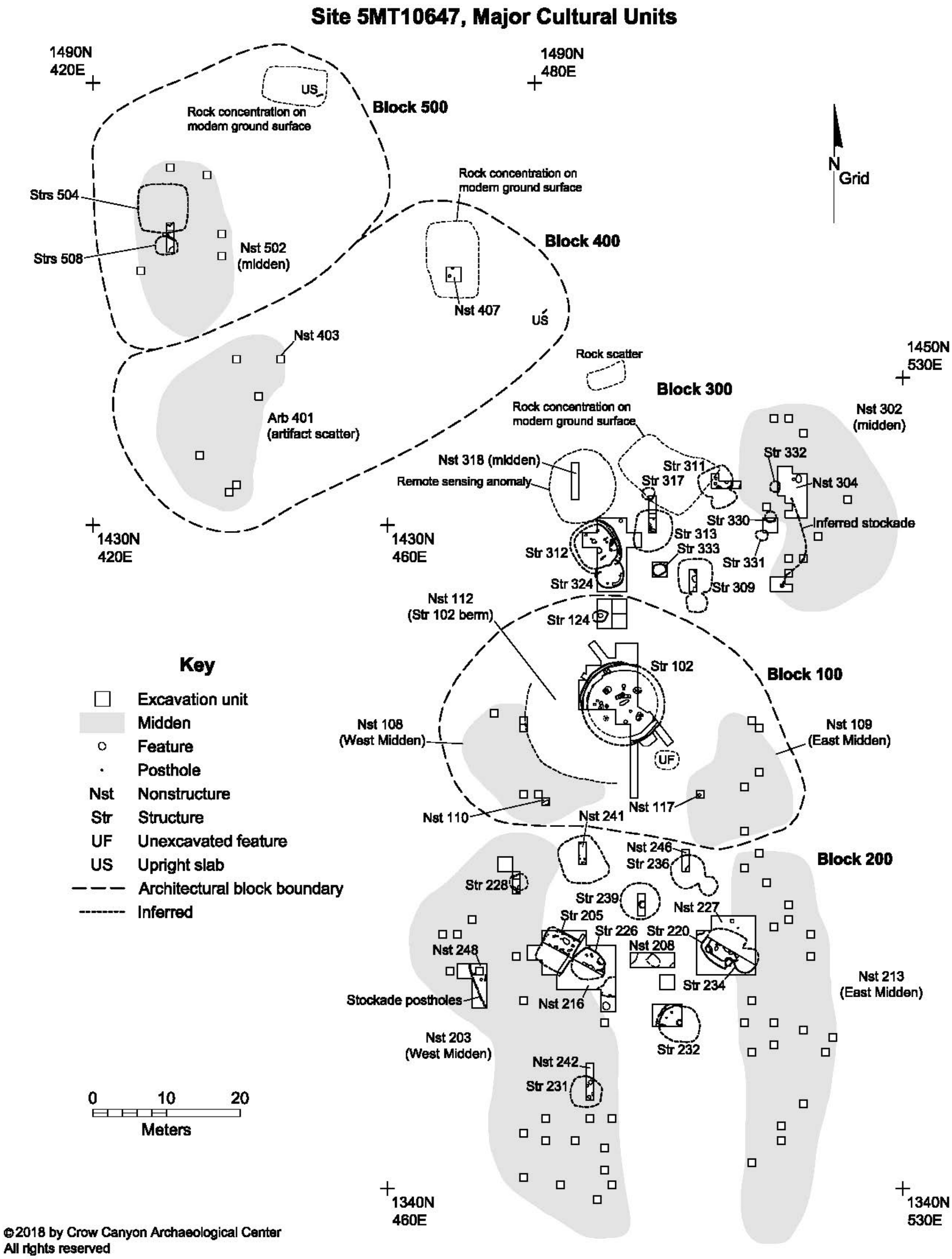

Figure 5.4. Dillard site map with all major cultural units and excavation units.

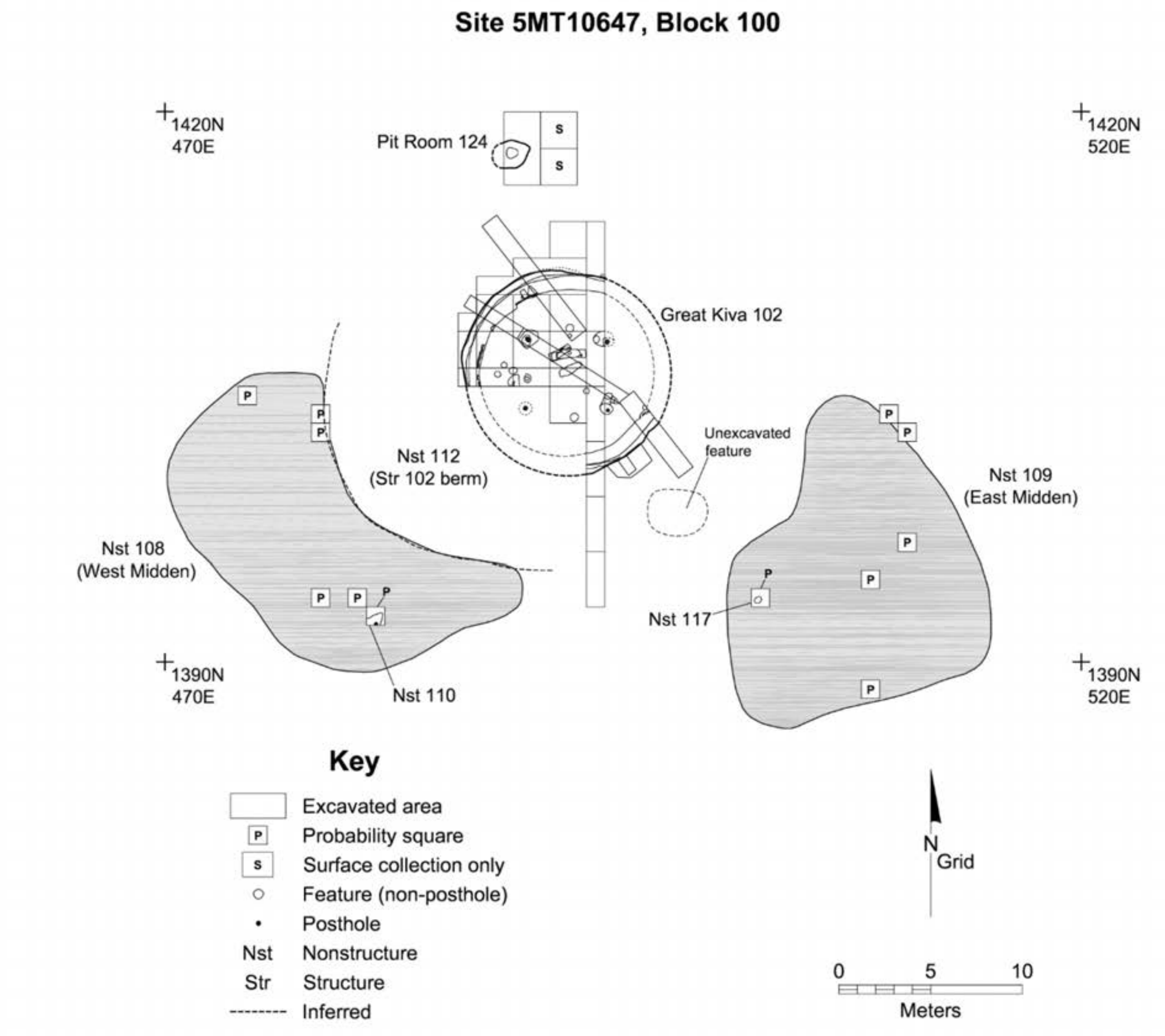

Figure 5.5. Map of architectural Block 100 at the Dillard site.

Figure 5.6. Photograph of Pit Room 124 at the Dillard site, the earliest dated feature on the Basketmaker Communities Project.

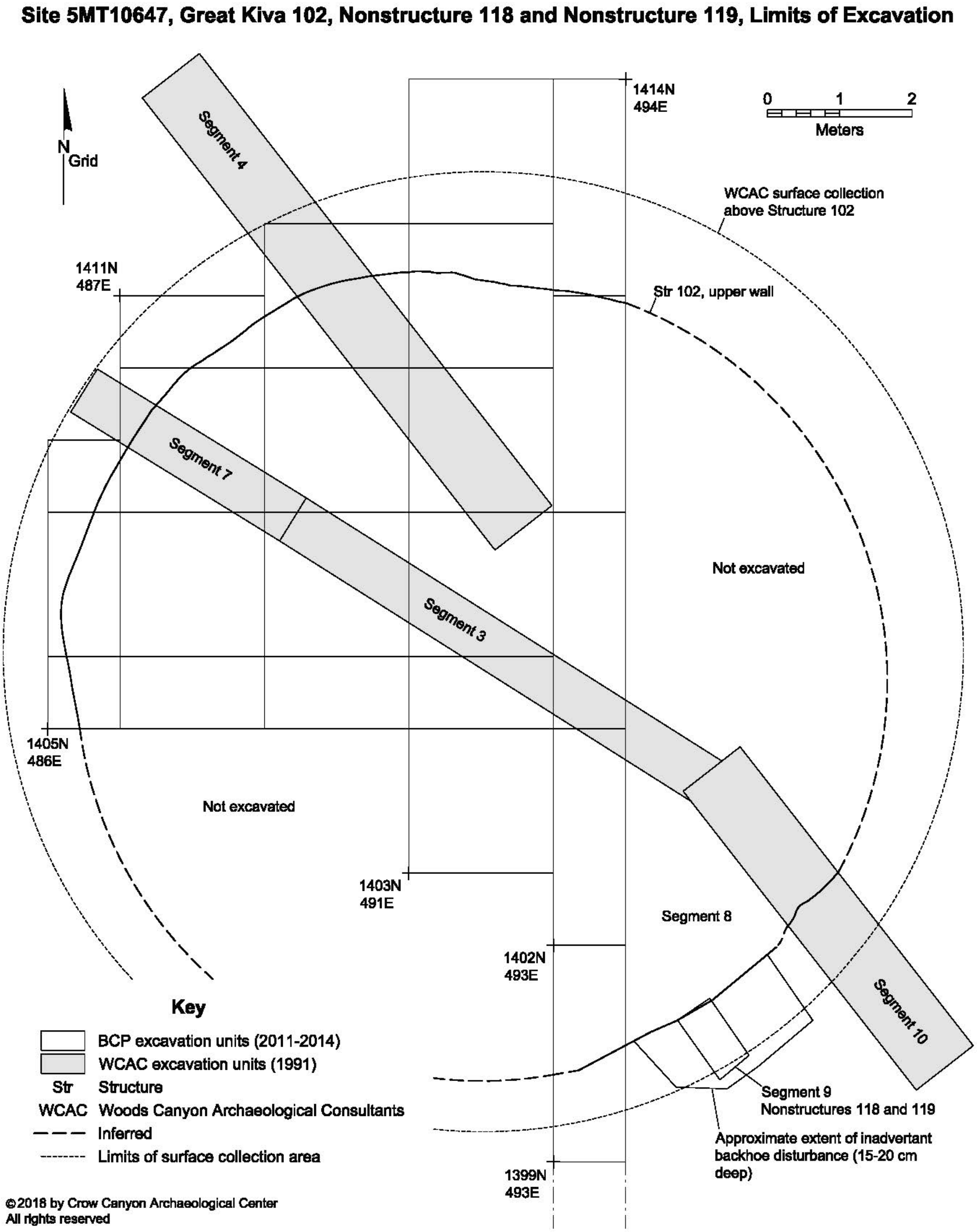

Figure 5.7. Excavation units associated with the Dillard great kiva (Structure 102).

Figure 5.8 Photograph of the Dillard great kiva (Structure 102) during excavation.

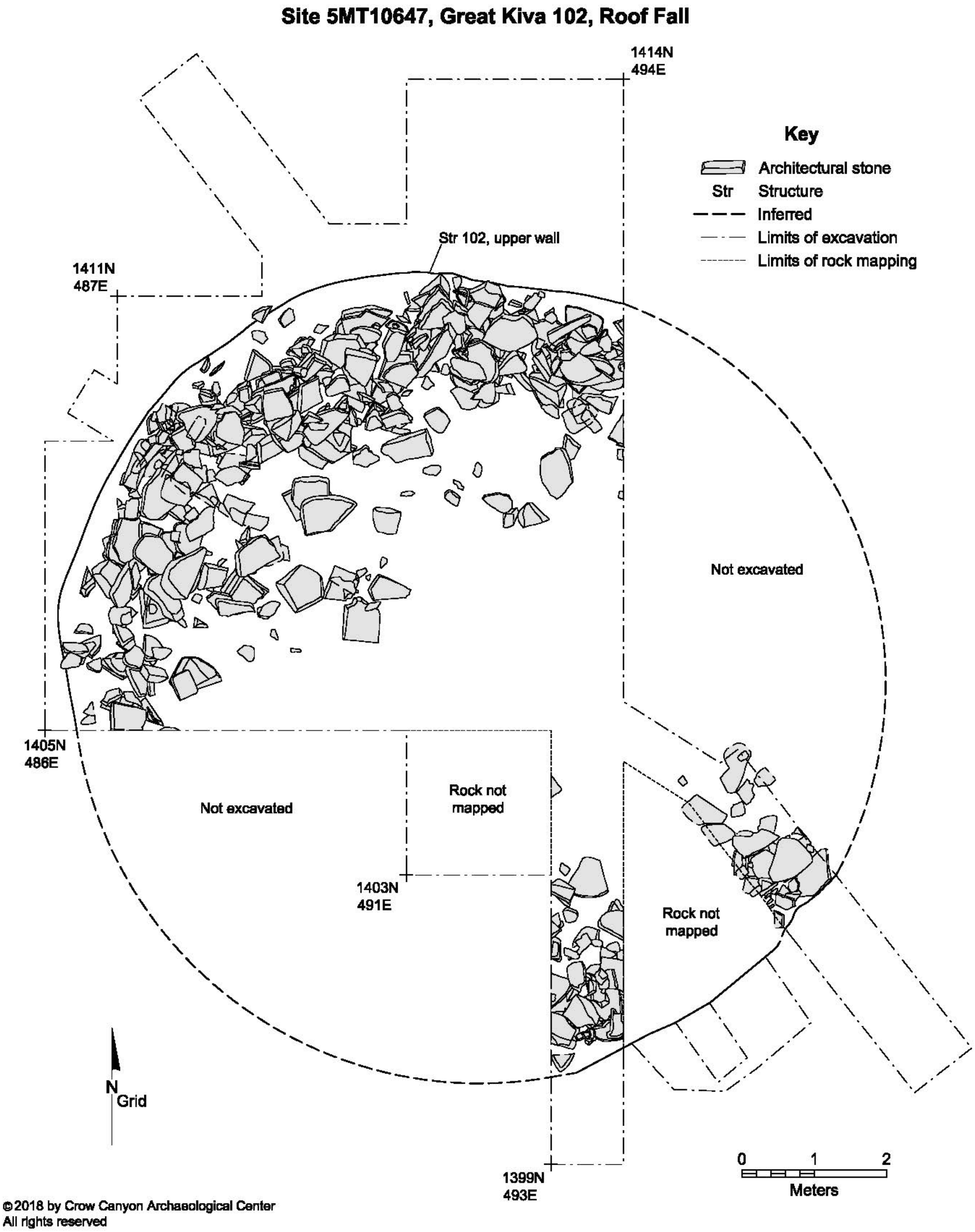

Figure 5.9. Map of collapsed roofing elements associated with the Dillard site great kiva (Structure 102).

Figure 5.10. Photograph of stone in the collapsed roof of the Dillard site great kiva (Structure 102).

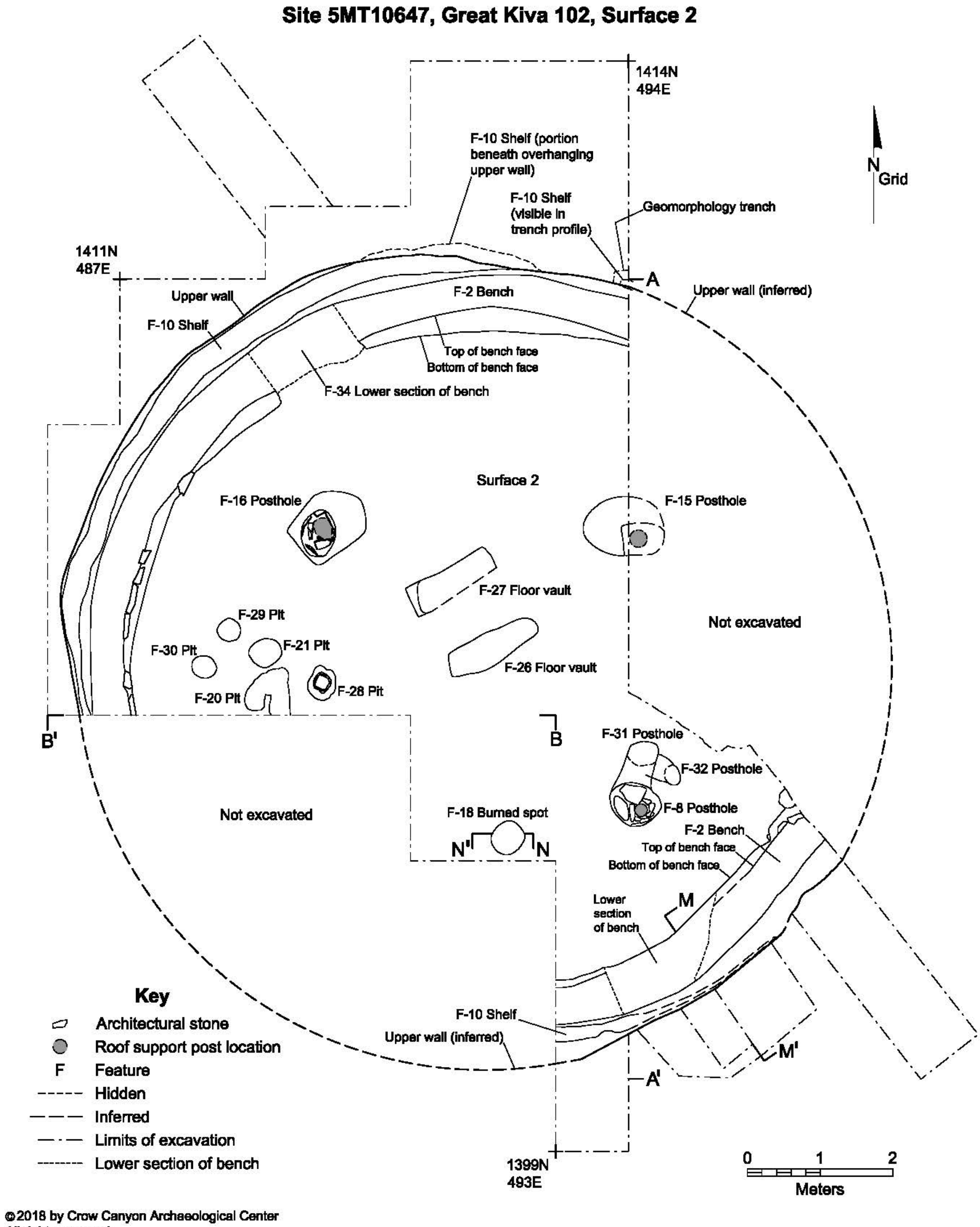

Figure 5.11. Map of Surface 2 of the Dillard site great kiva (Structure 102).

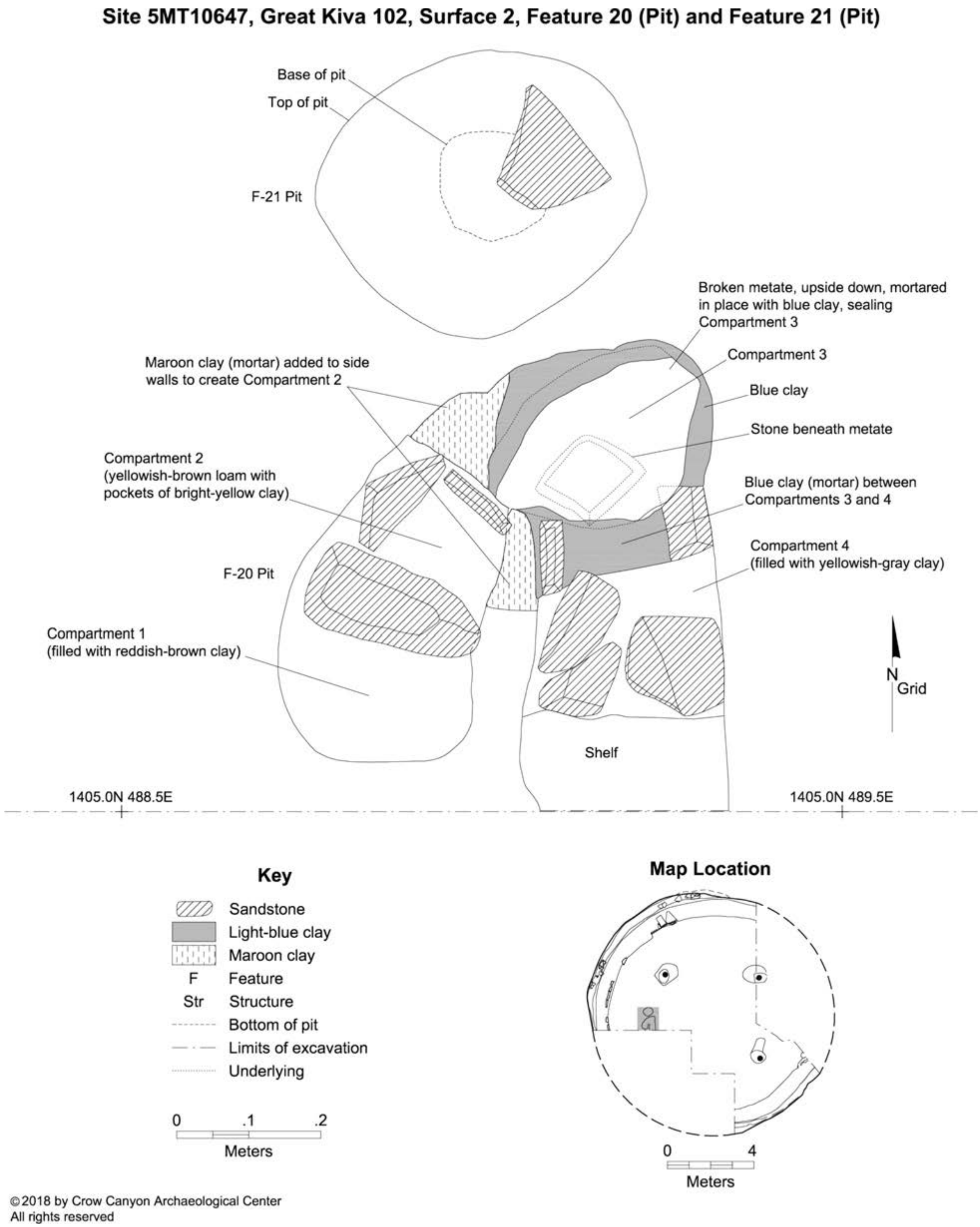

Figure 5.12. Map of one of the rock-lined pits filled with colorful clays on Surface 2 of the Dillard site great kiva (Structure 102).

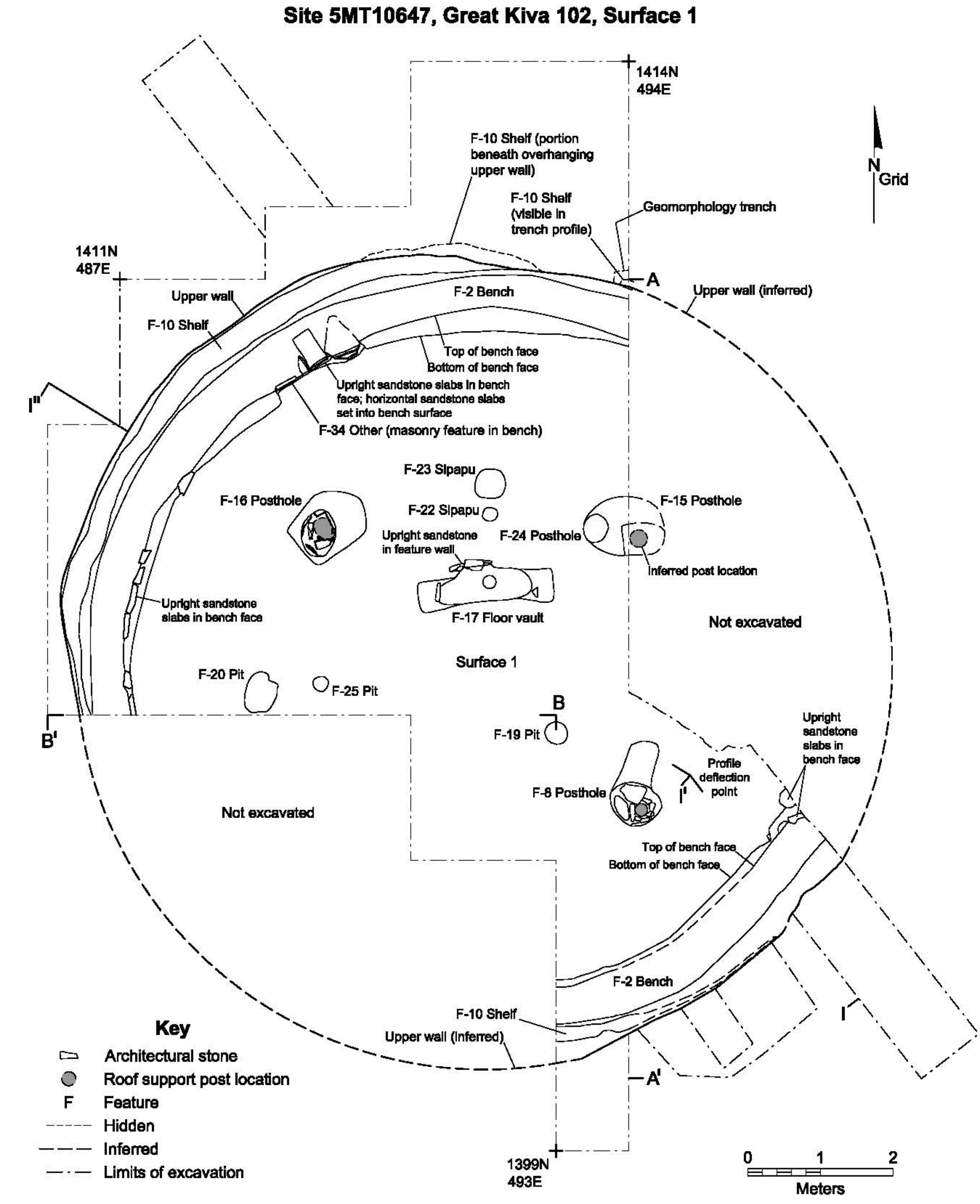

Figure 5.13. Map of Surface 1, the remodeled floor, of the Dillard site great kiva (Structure 102).

Figure 5.14. Photograph of crew member mapping artifacts on and just above the late sand surface (Stratum 8) in the Dillard great kiva (Structure 102).

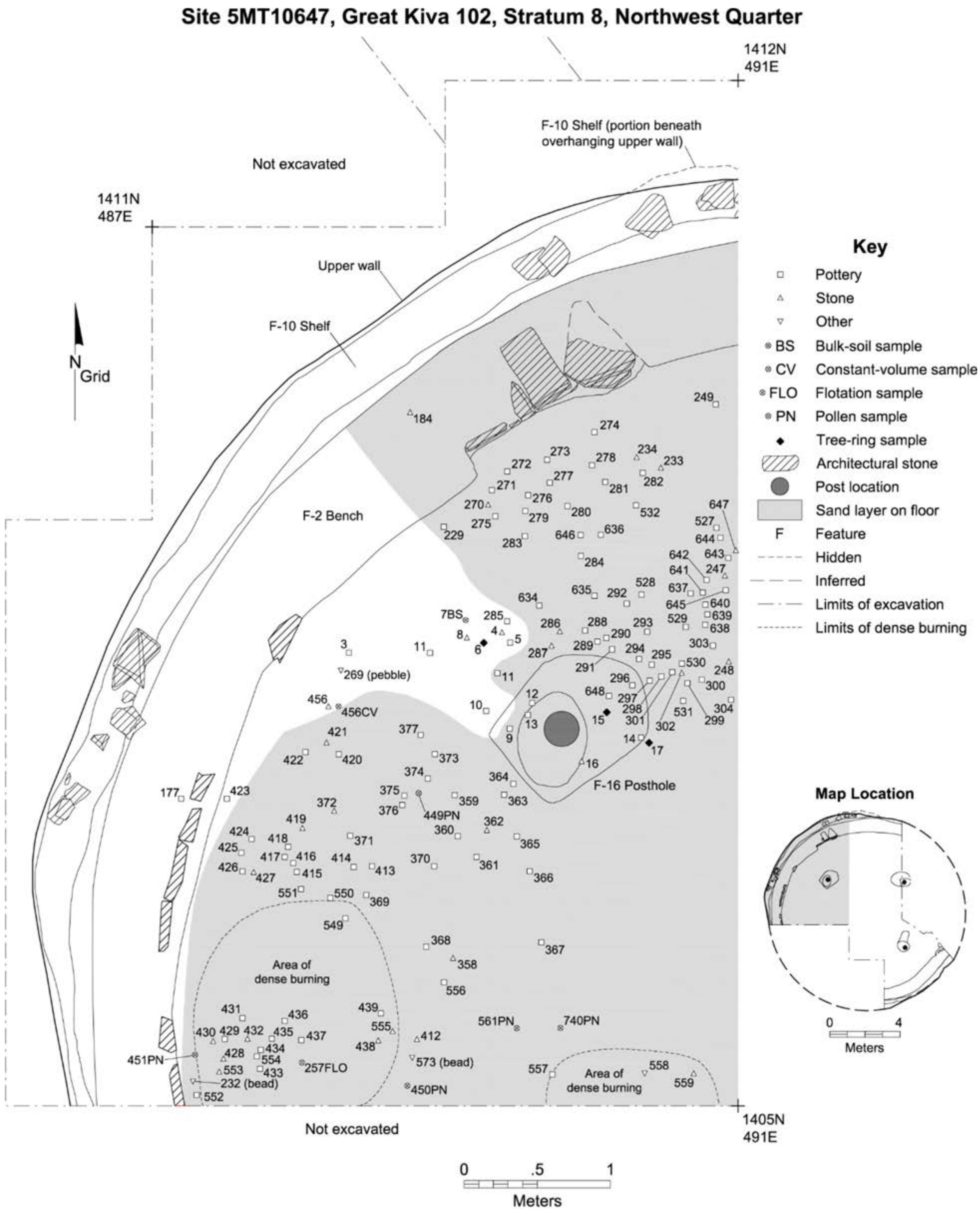

Figure 5.15. Map of point-located artifacts and samples on the sand surface in the northwest quarter of the Dillard great kiva (Structure 102).

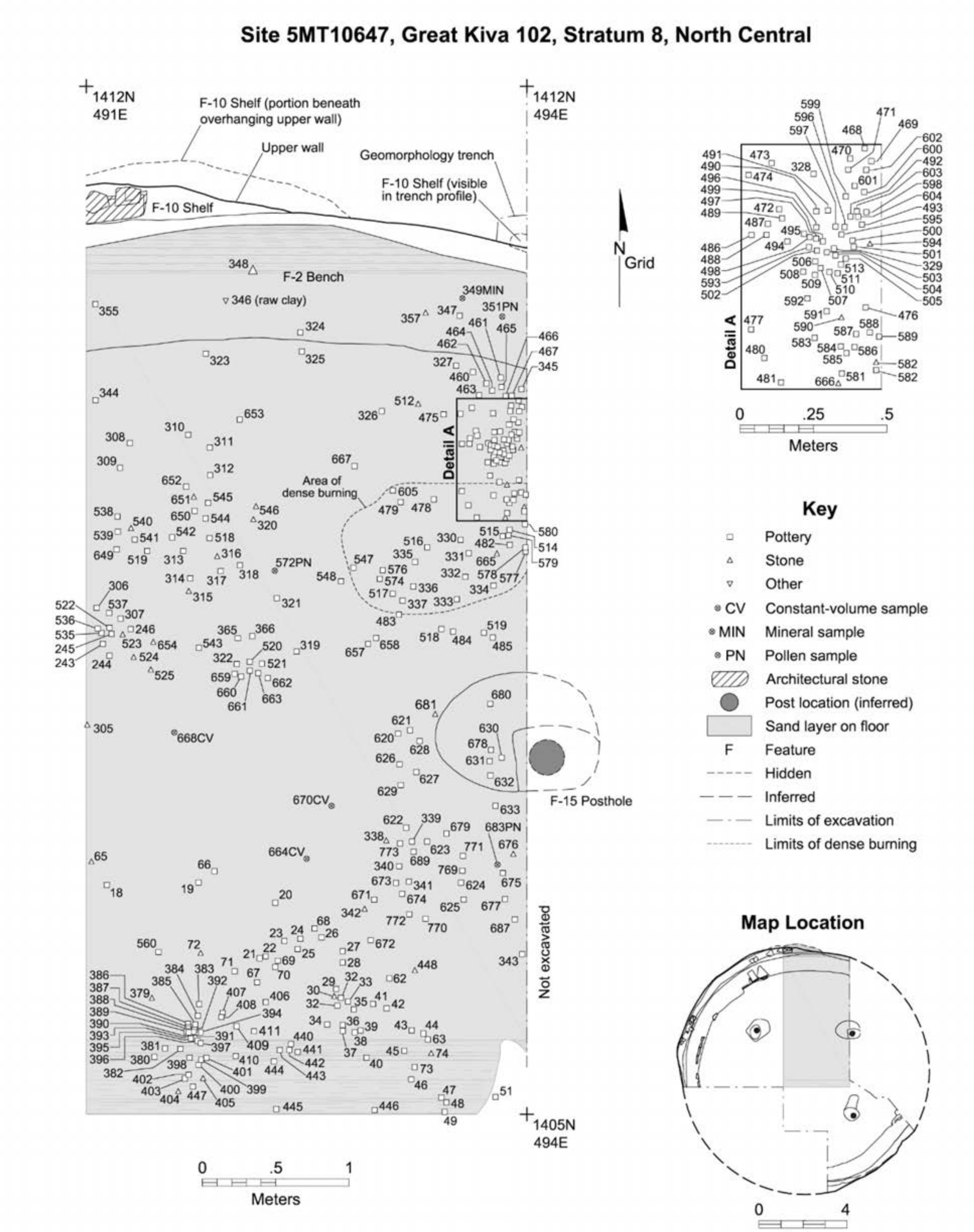

Figure 5.16. Map of point-located artifacts and samples on the sand surface in the north-central portion of the Dillard site great kiva (Structure 102).

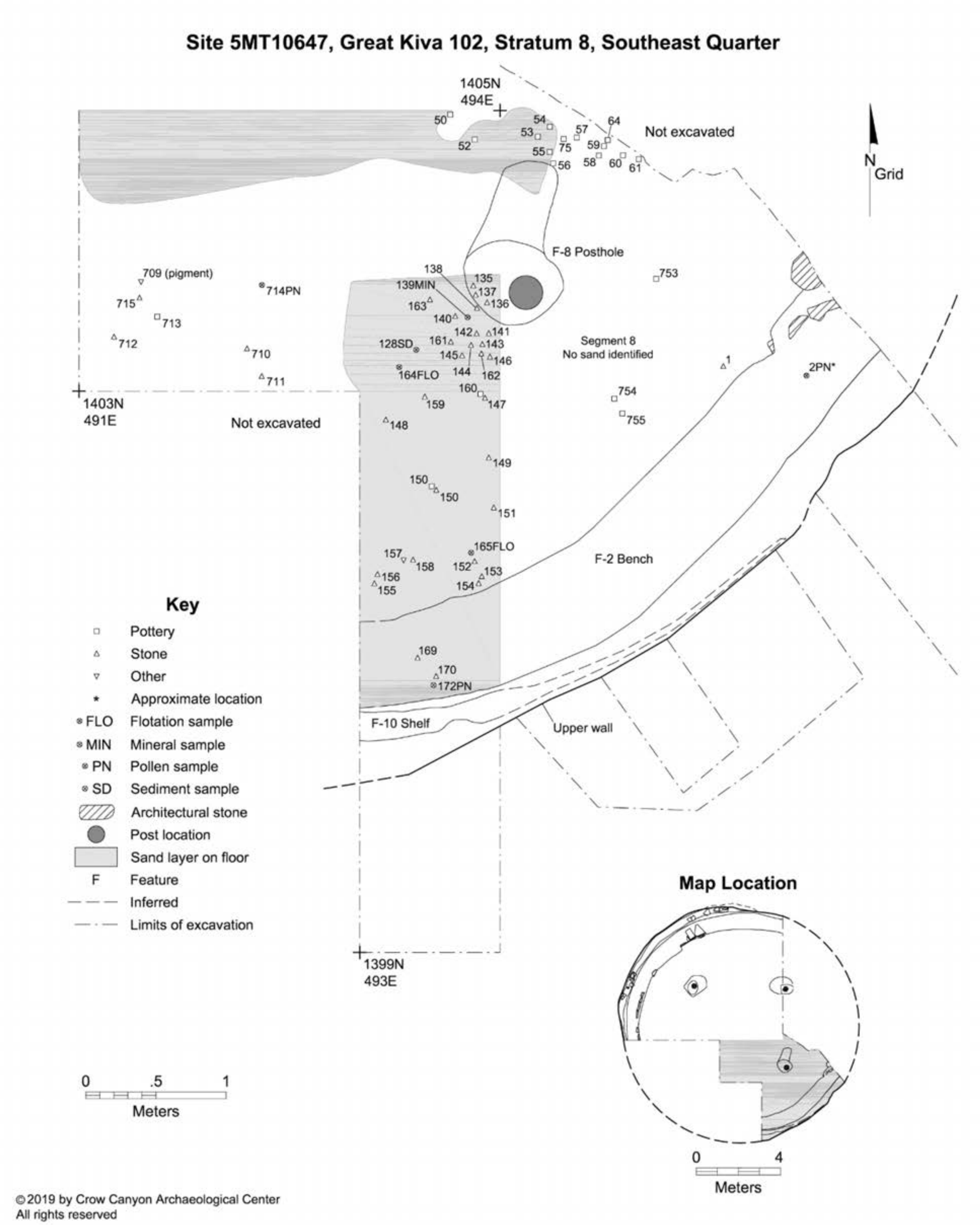

Figure 5.17. Map of point-located artifacts and samples on the sand surface in the southeast quarter of the Dillard site great kiva (Structure 102).

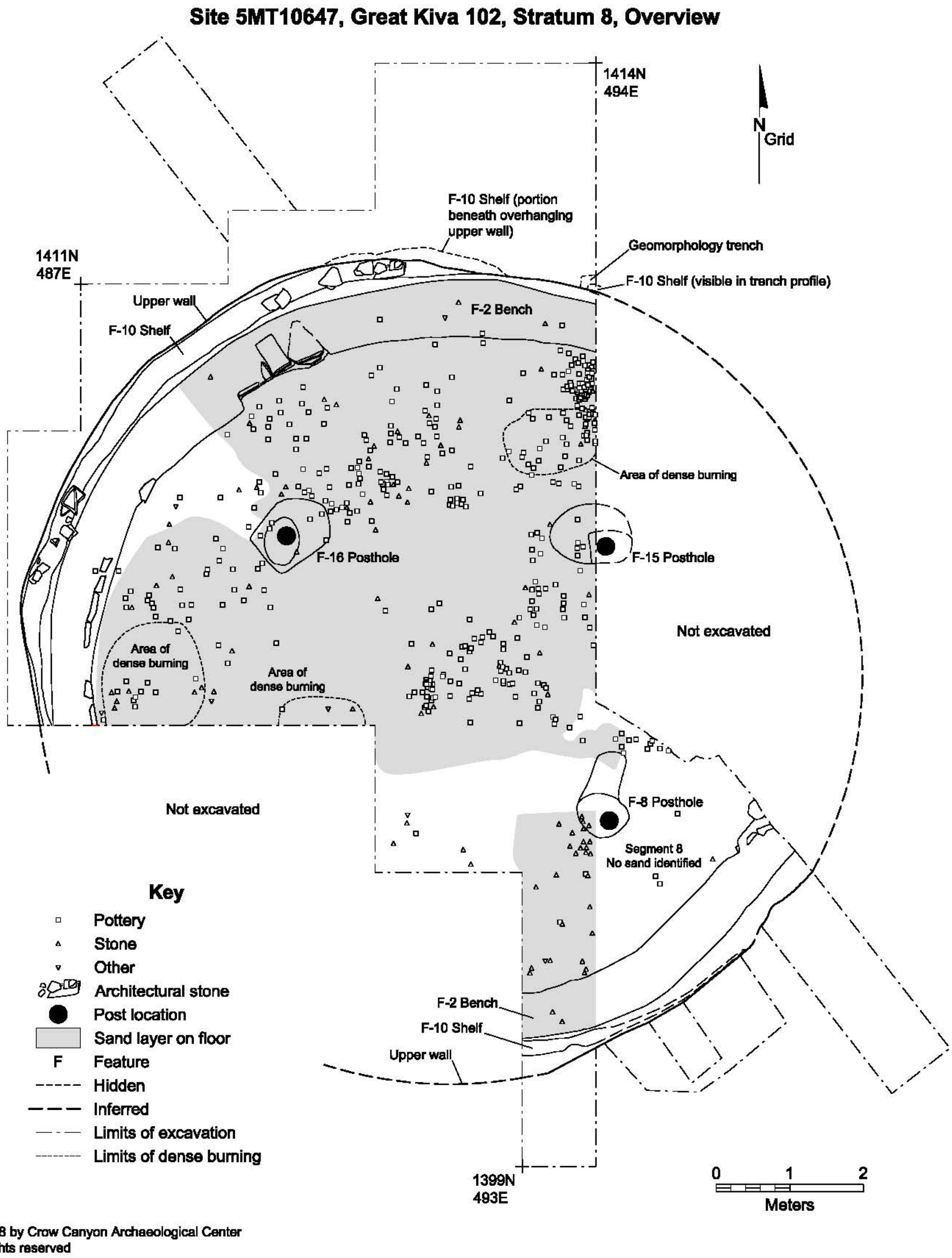

Figure 5.18. Map of Stratum 8, the assemblage associated with the sand layer surface, of the Dillard site great kiva (Structure 102).

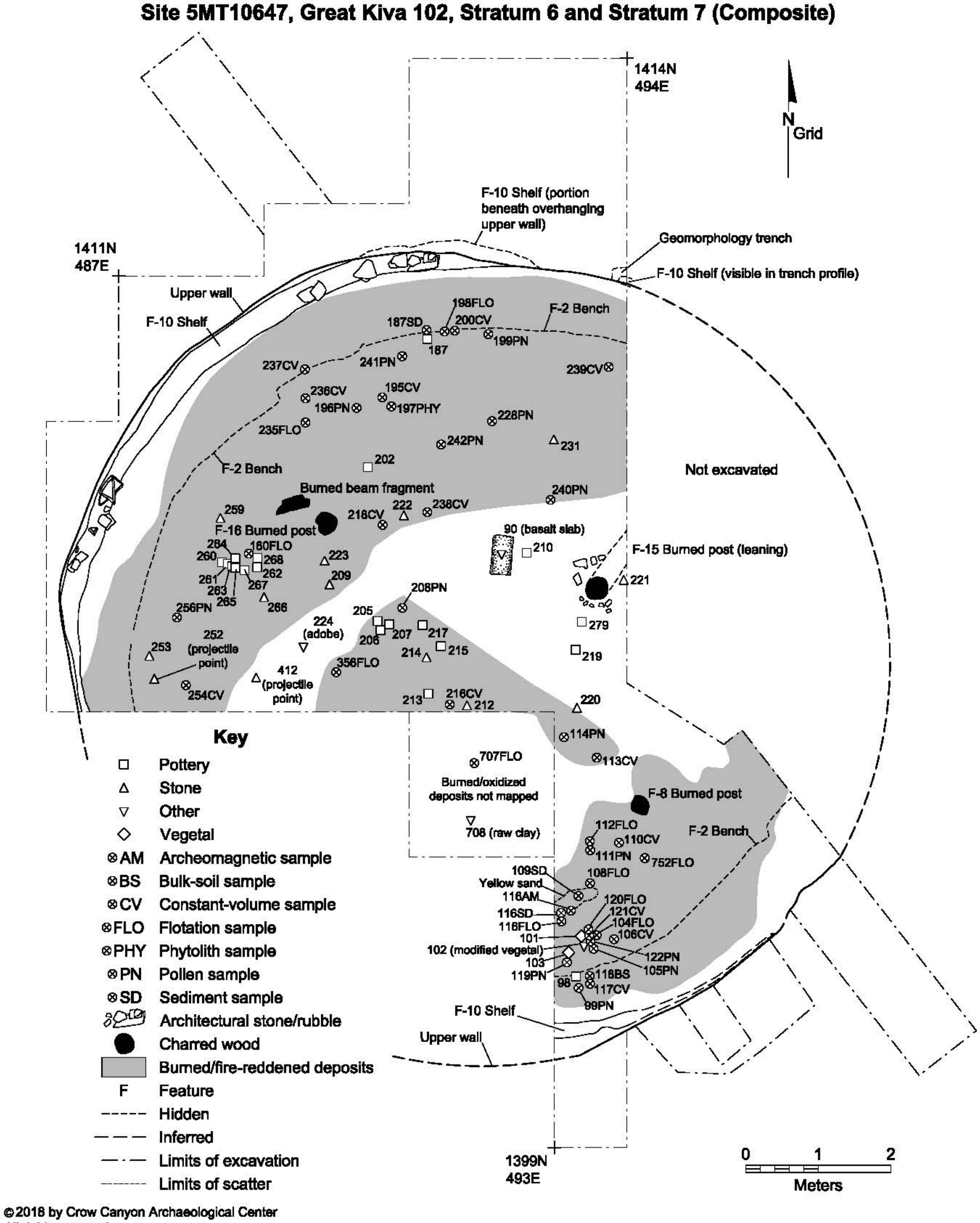

Figure 5.19. Map of the de facto artifact assemblage left on top of the dismantled construction debris during the decommissioning of the Dillard site great kiva (Structure 102).

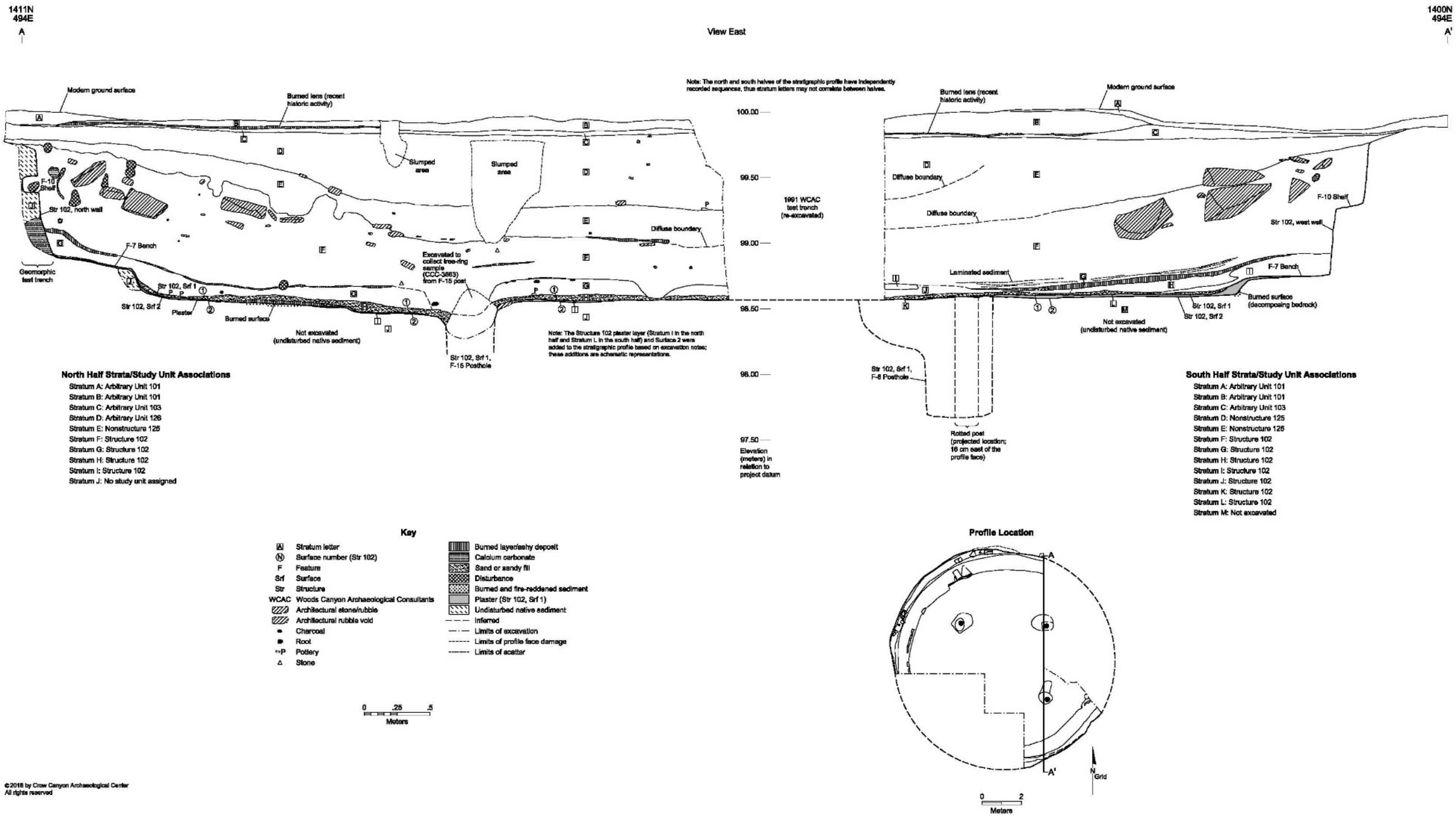

Figure 5.20. Stratigraphic profile of deposits in the Dillard site great kiva (Structure 102).

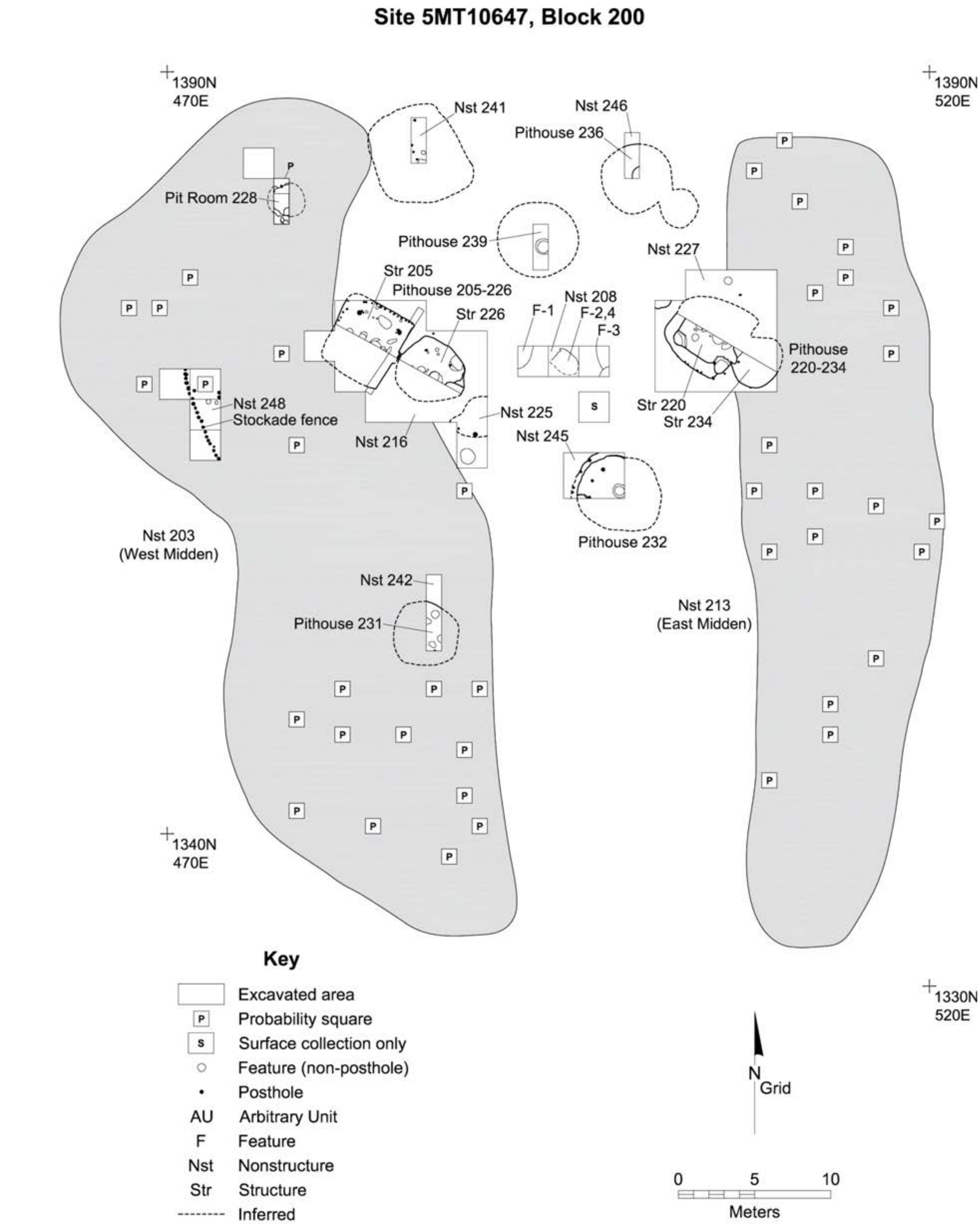

Figure 5.21. Map of Architectural Block 200 at the Dillard site.

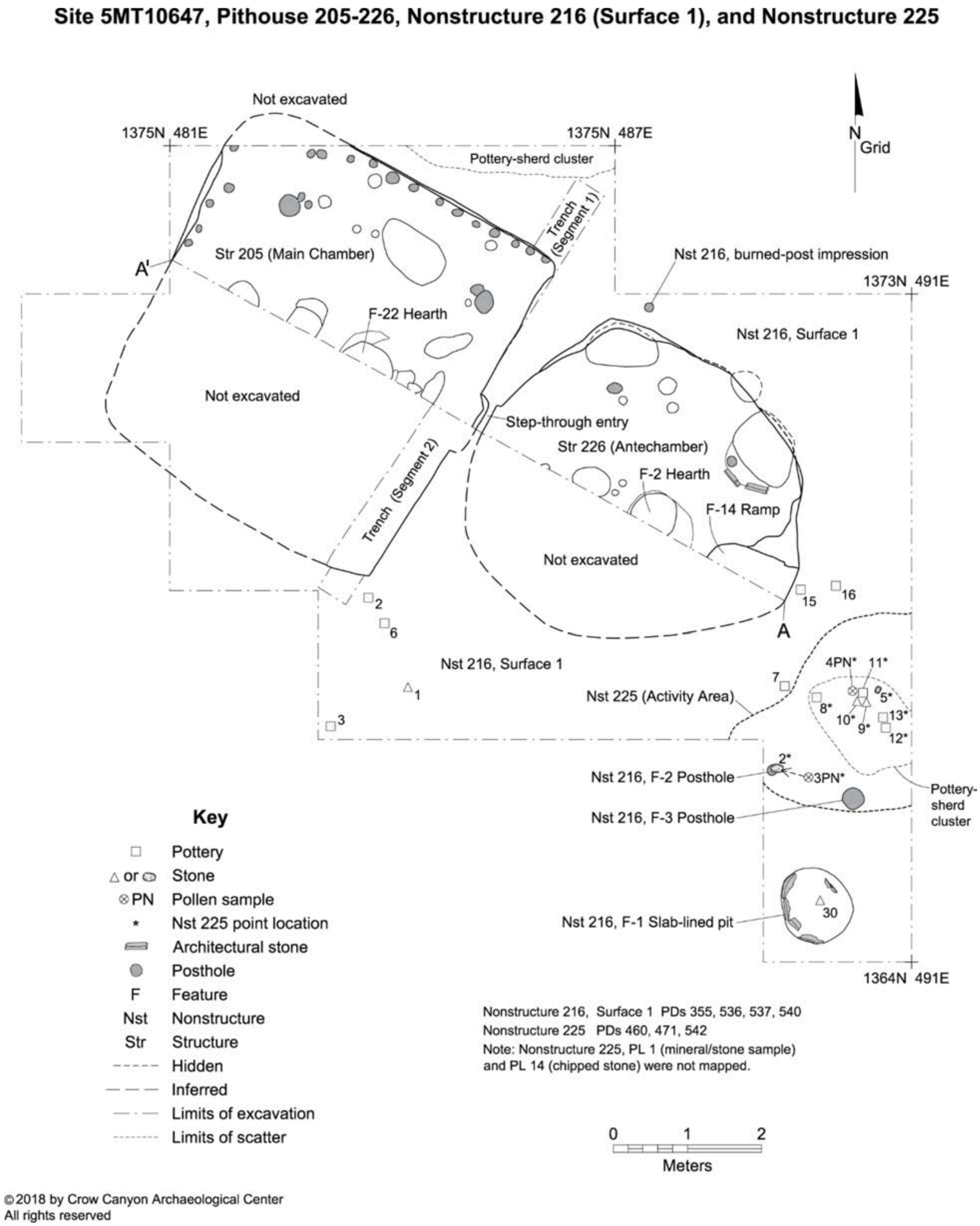

Figure 5.22. Plan map of Pithouse 205-226, Surface 1 at the Dillard site.

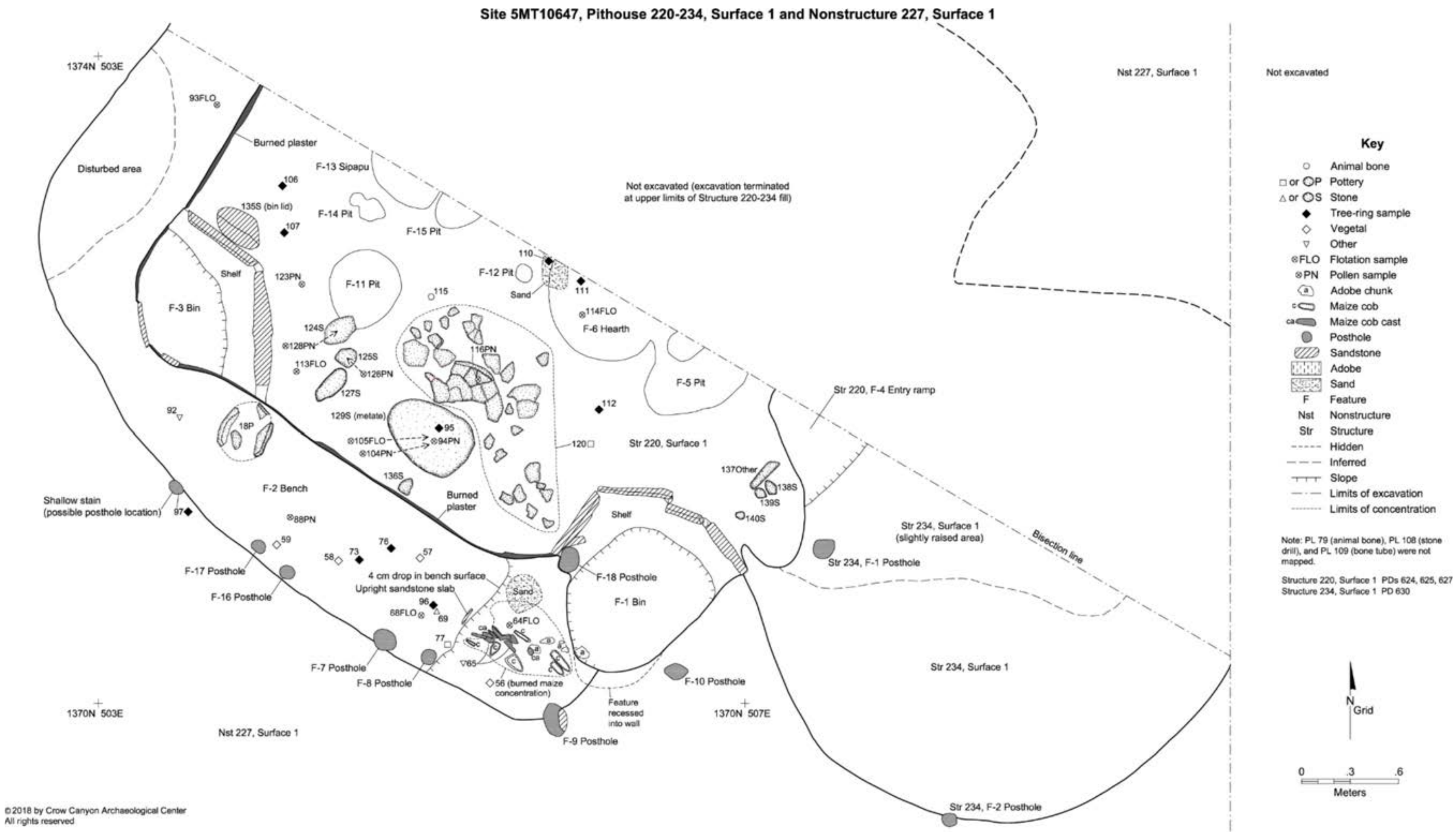

Figure 5.23. Plan map of Pithouse 220-234 at the Dillard site.

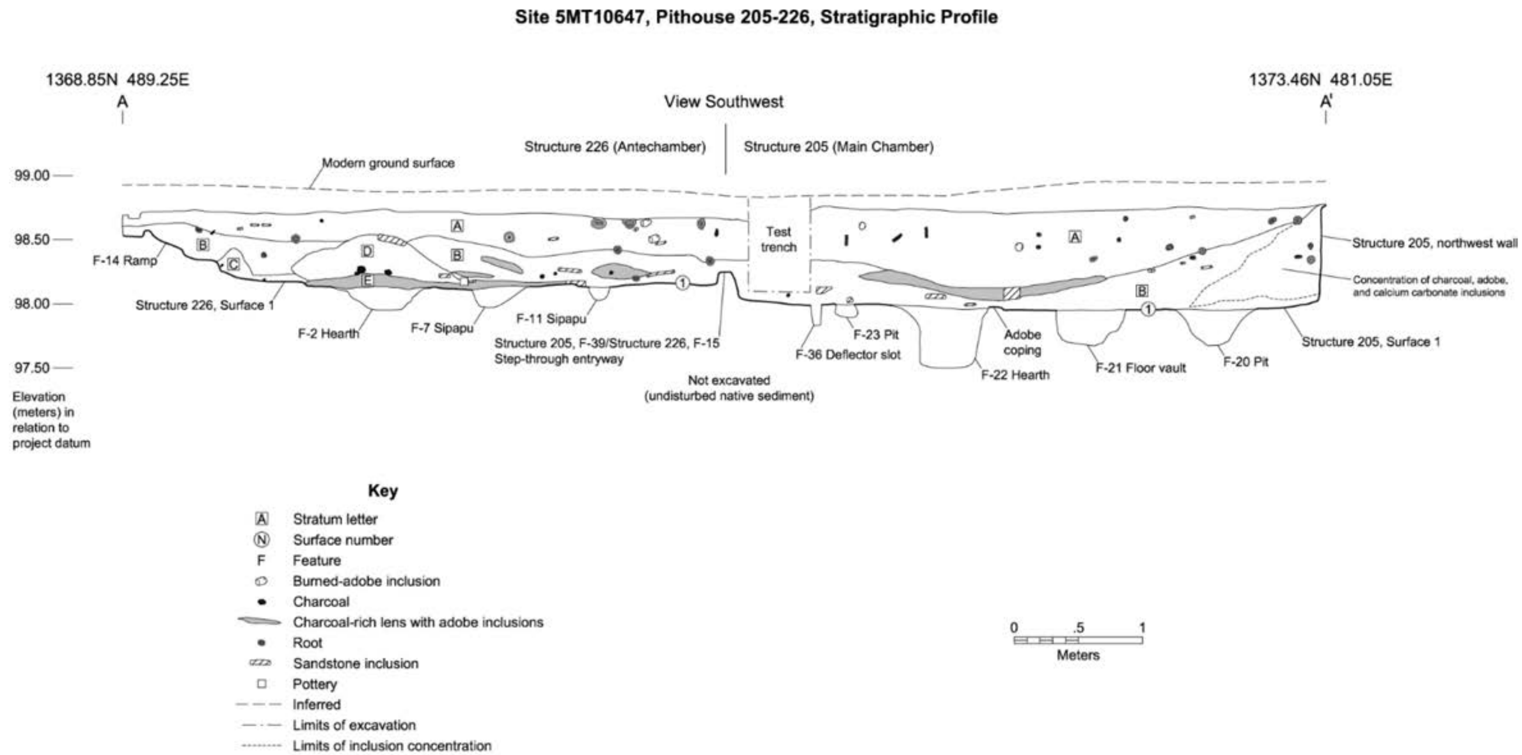

Figure 5.24. Stratigraphic profile of collapsed roofing and post-occupation deposits in Pithouse 205-226 at the Dillard site.

Figure 5.25. Photograph of burned plastered walls, floor, and artifacts in Pithouse 220-234 at the Dillard site.

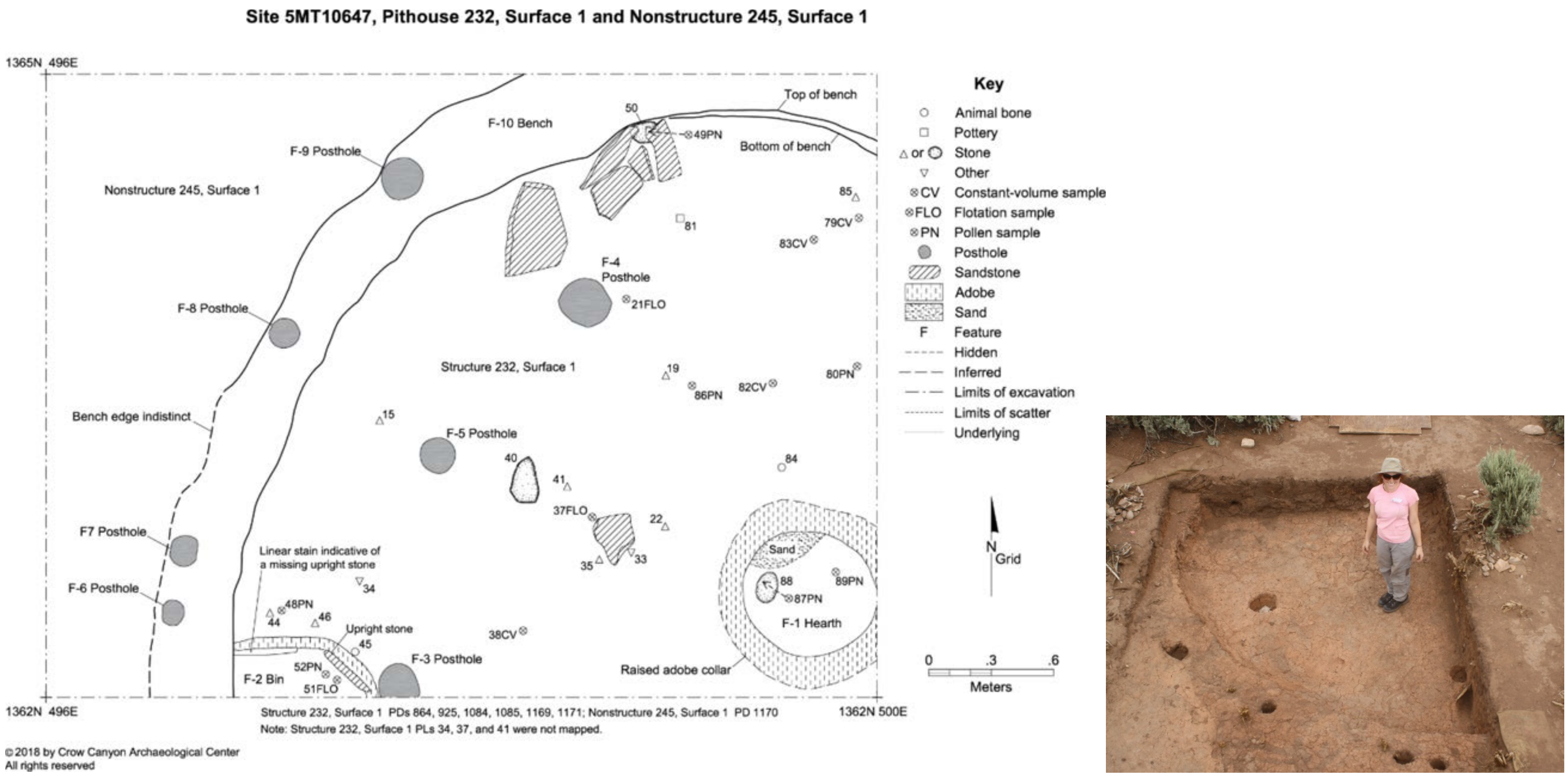

Figure 5.26. Map and photograph of Pithouse 232, Surface 1 at the Dillard site. Photograph view is facing east.

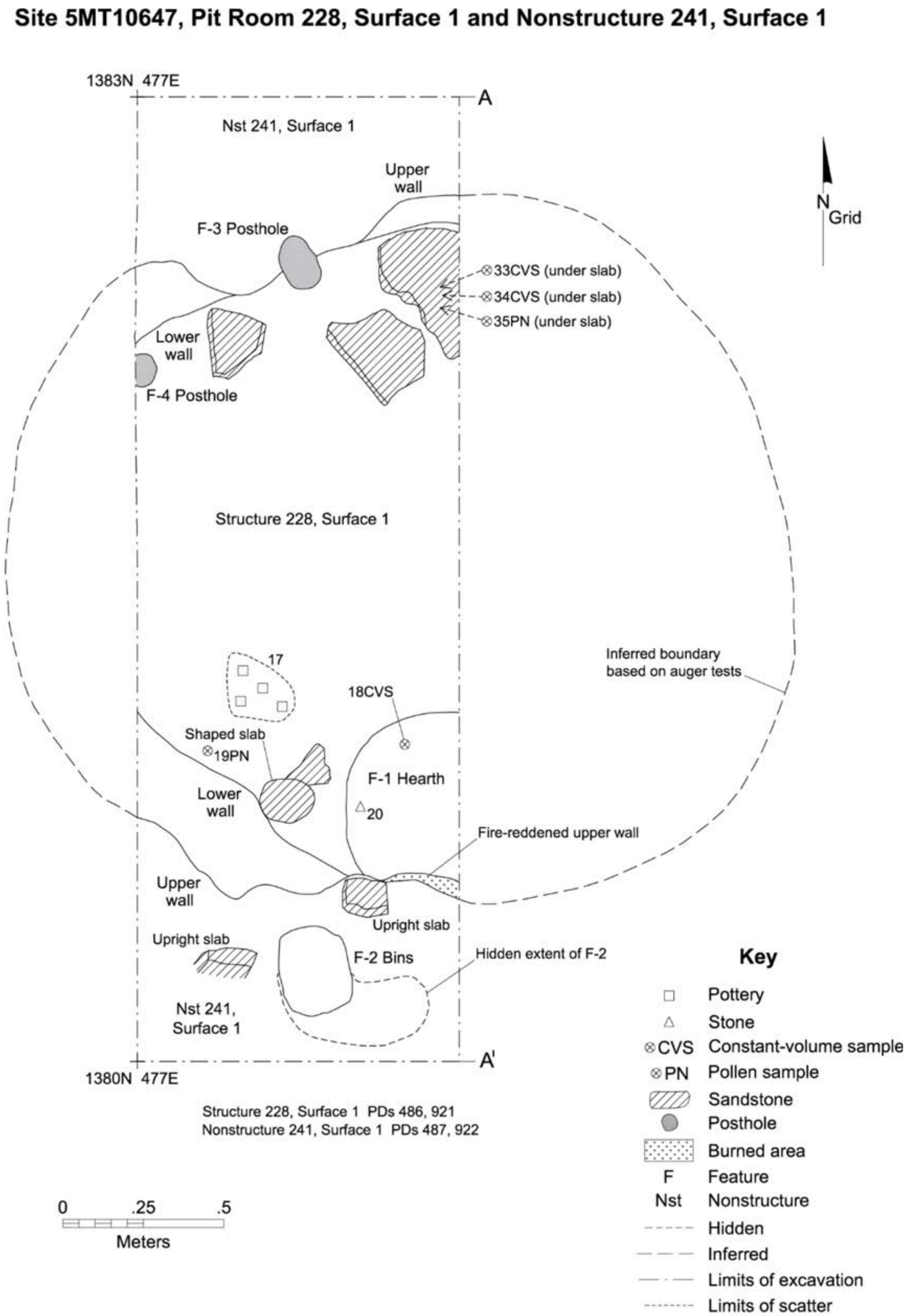

Figure 5.27. Map of Pit Room 228, Surface 1 at the Dillard site.

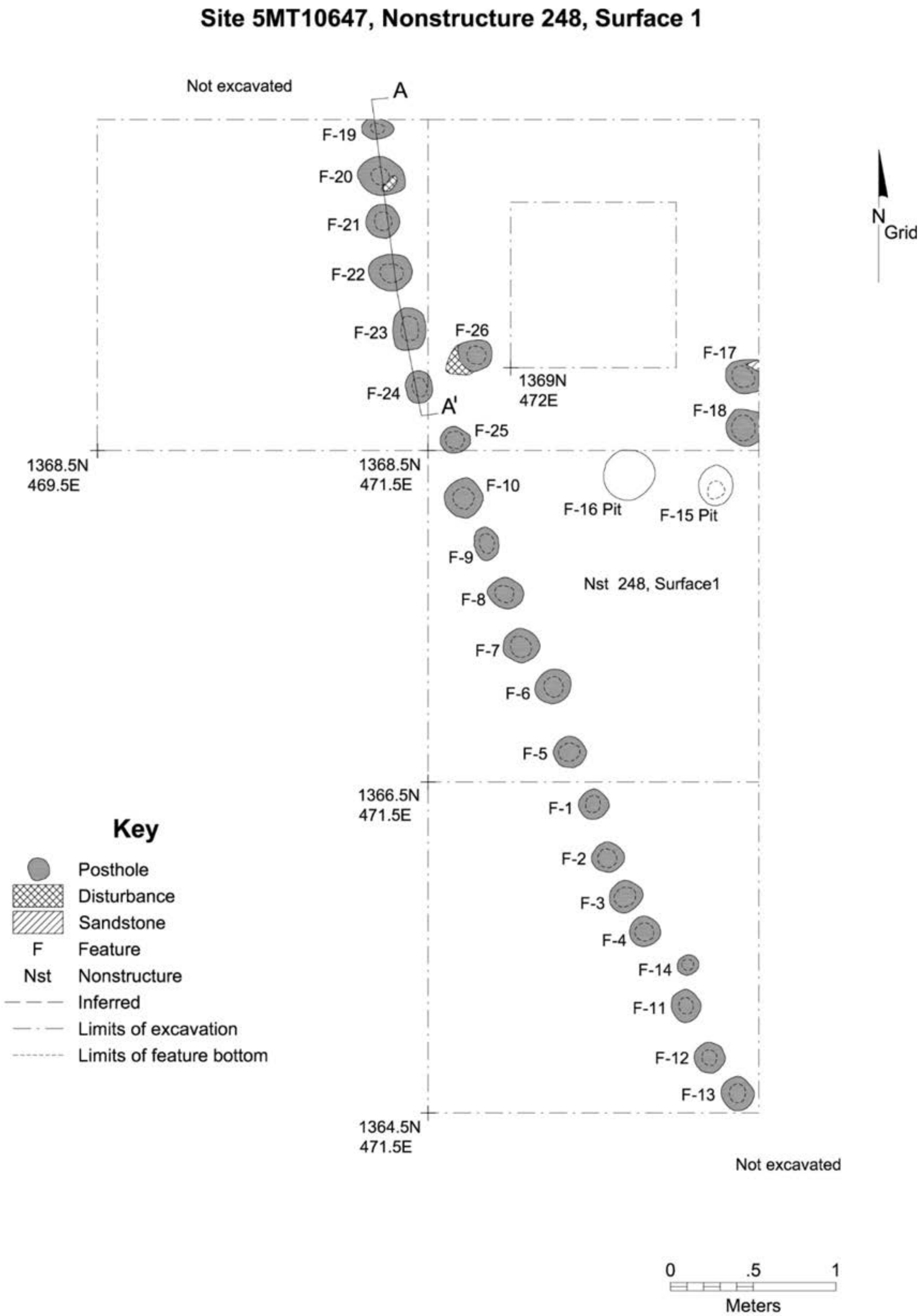

Figure 5.28. Map of a series of extramural postholes on Nonstructure 248, Surface 1 at the Dillard site that may be part of a perimeter fence around Block 200.

Figure 5.29. Photograph of extramural postholes on Nonstructure 248, Surface 1 at the Dillard site.

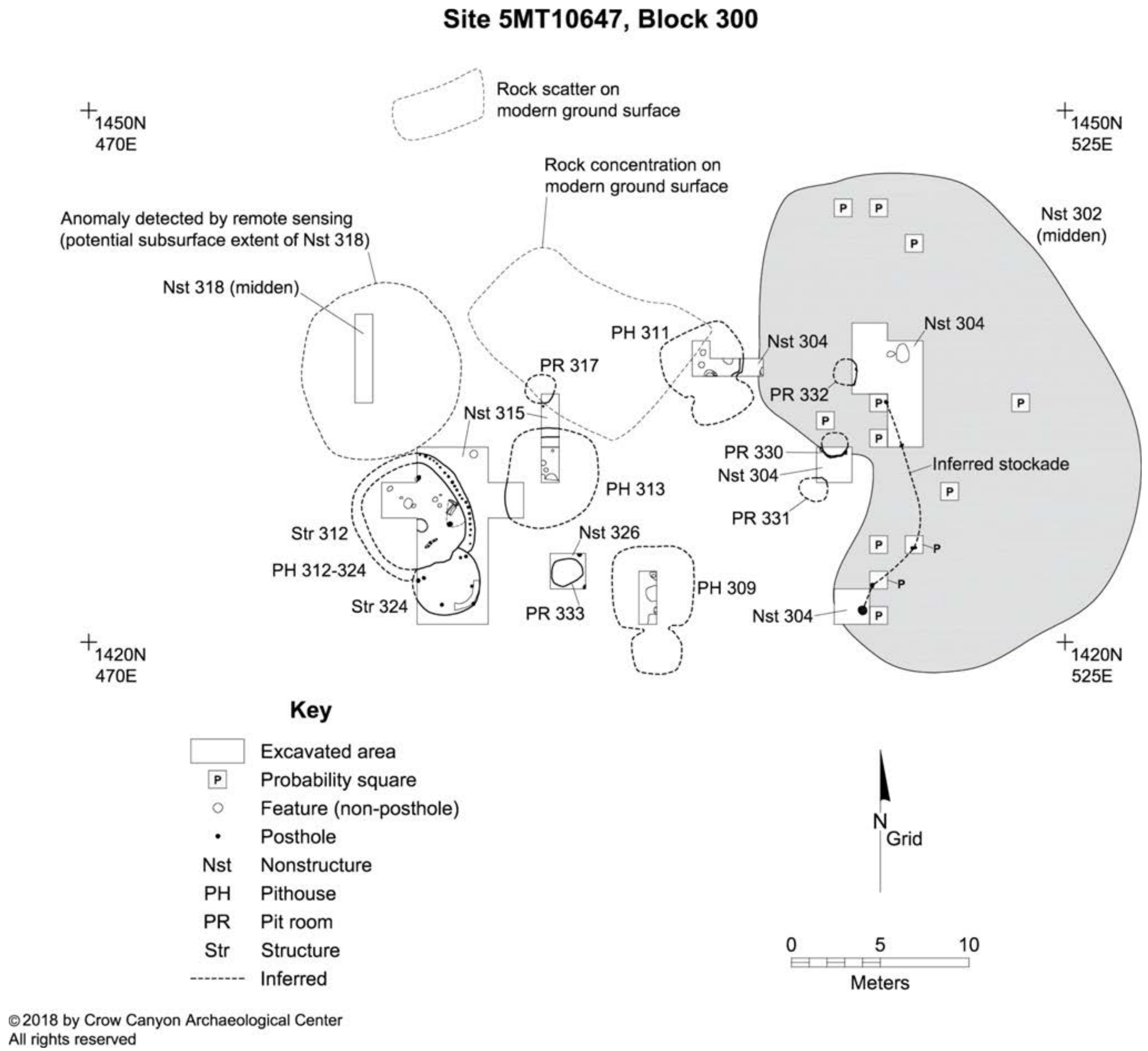

Figure 5.30. Map of Architectural Block 300 at the Dillard site.

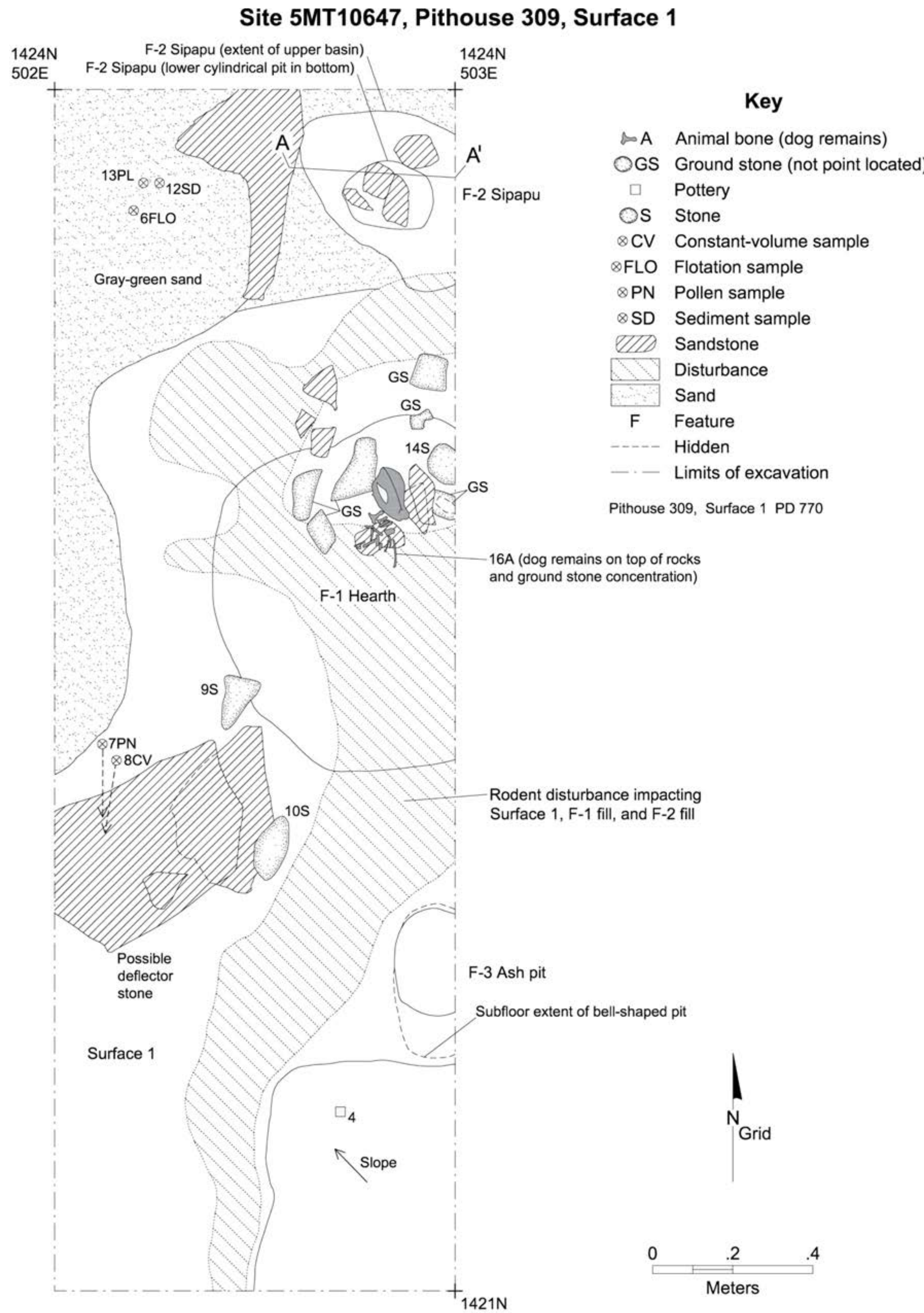

Figure 5.31. Map of Pithouse Main Chamber 309, Surface 1 at the Dillard site.

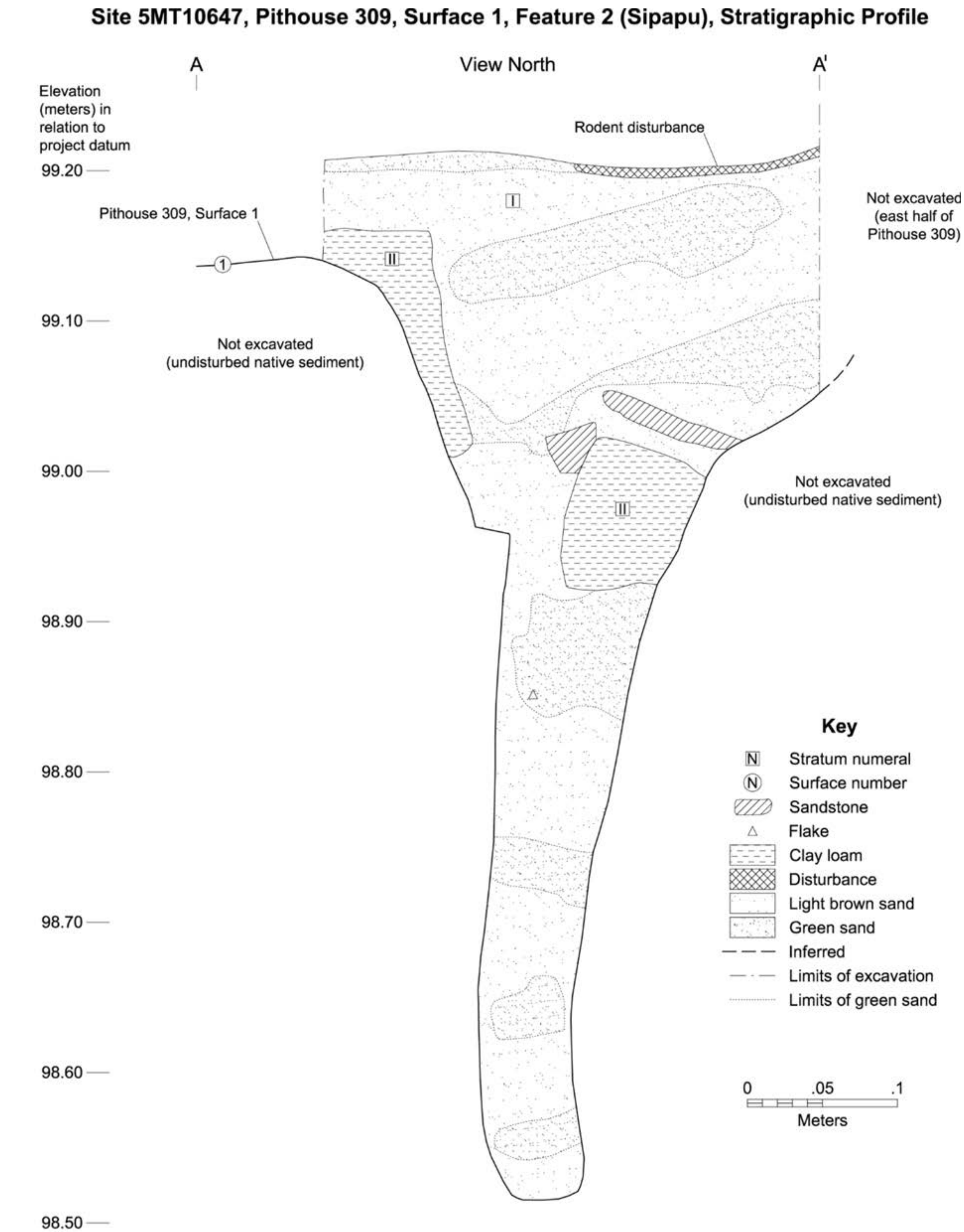

Figure 5.32. Stratigraphic profile of the sipapu (Feature 2) on Surface 1 of Pithouse309 at the Dillard site.

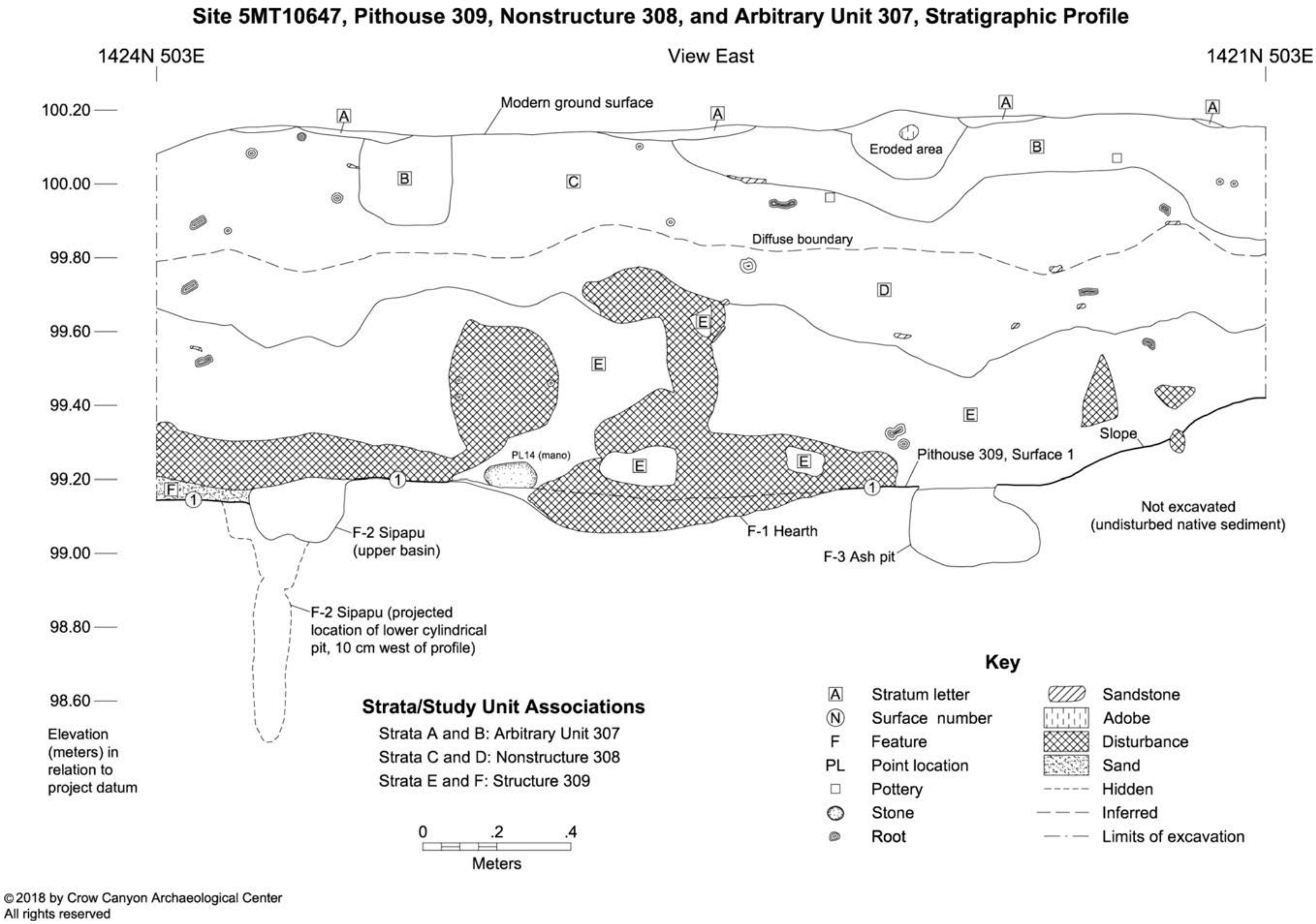

Figure 5.33. Stratigraphic profile of Pithouse 309 at the Dillard site.

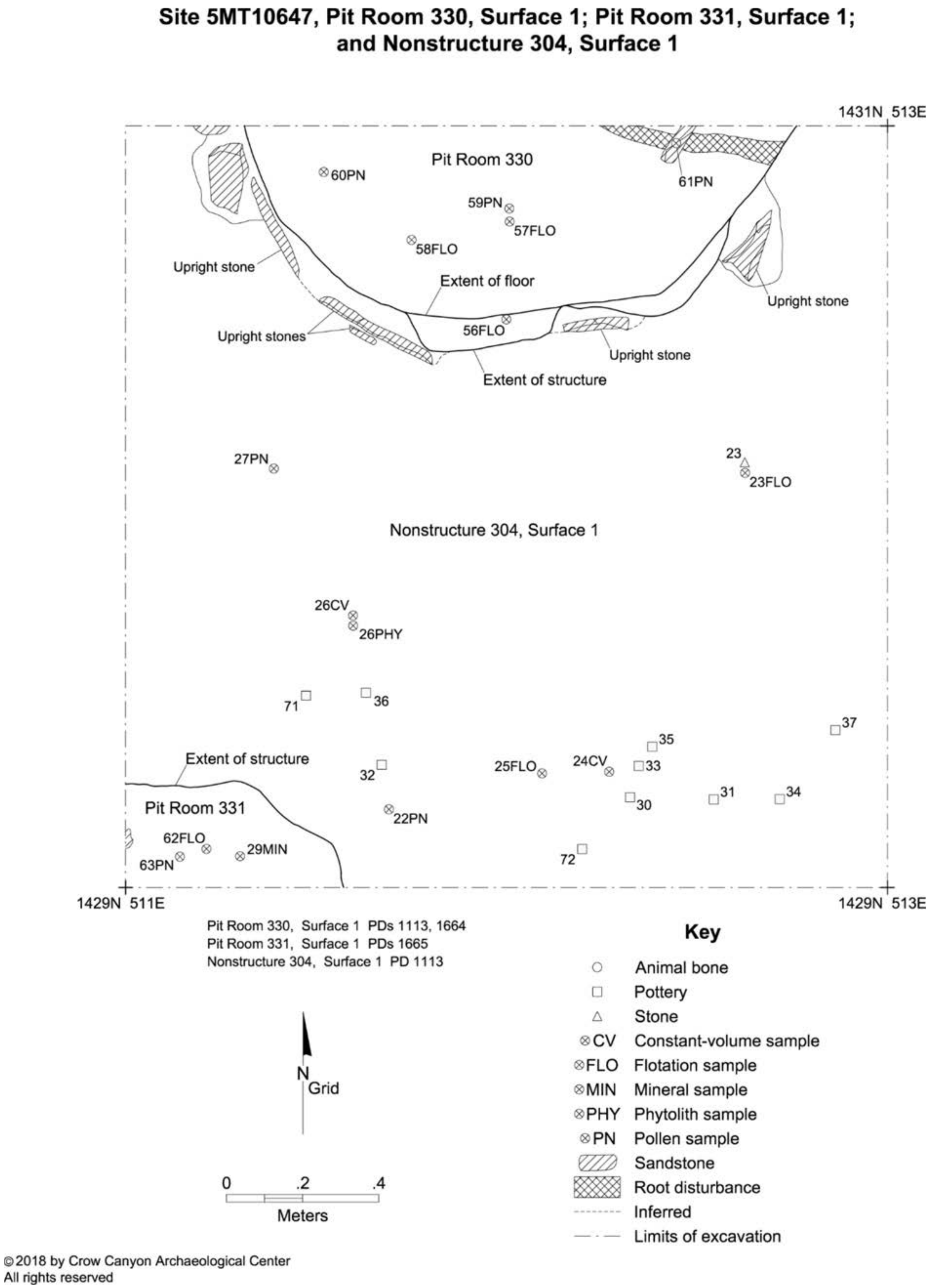

Figure 5.34. Plan map of Pit Room 330, Surface 1 at the Dillard site.

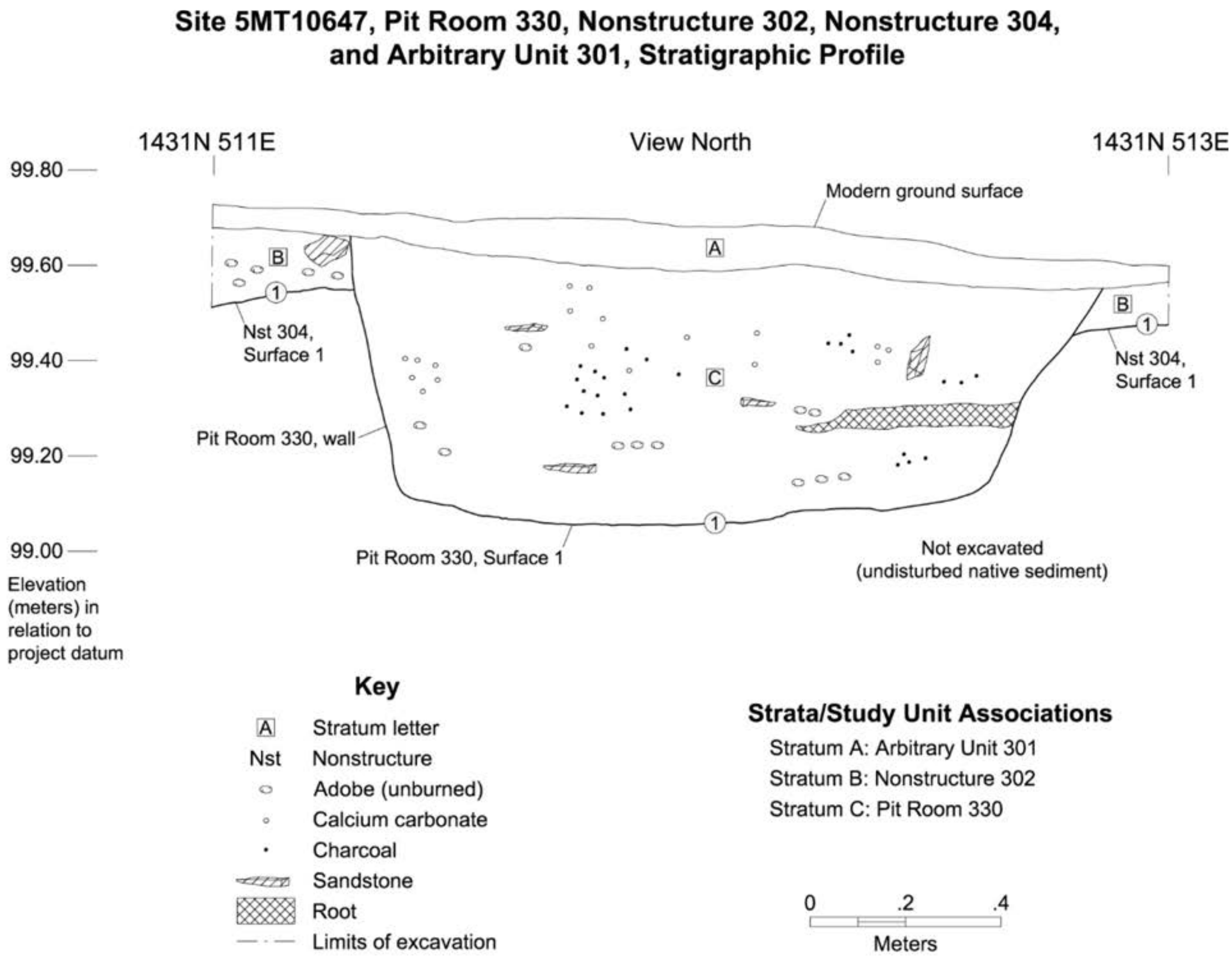

Figure 5.35. Stratigraphic profile of deposits in Pit Room 330 at the Dillard site.

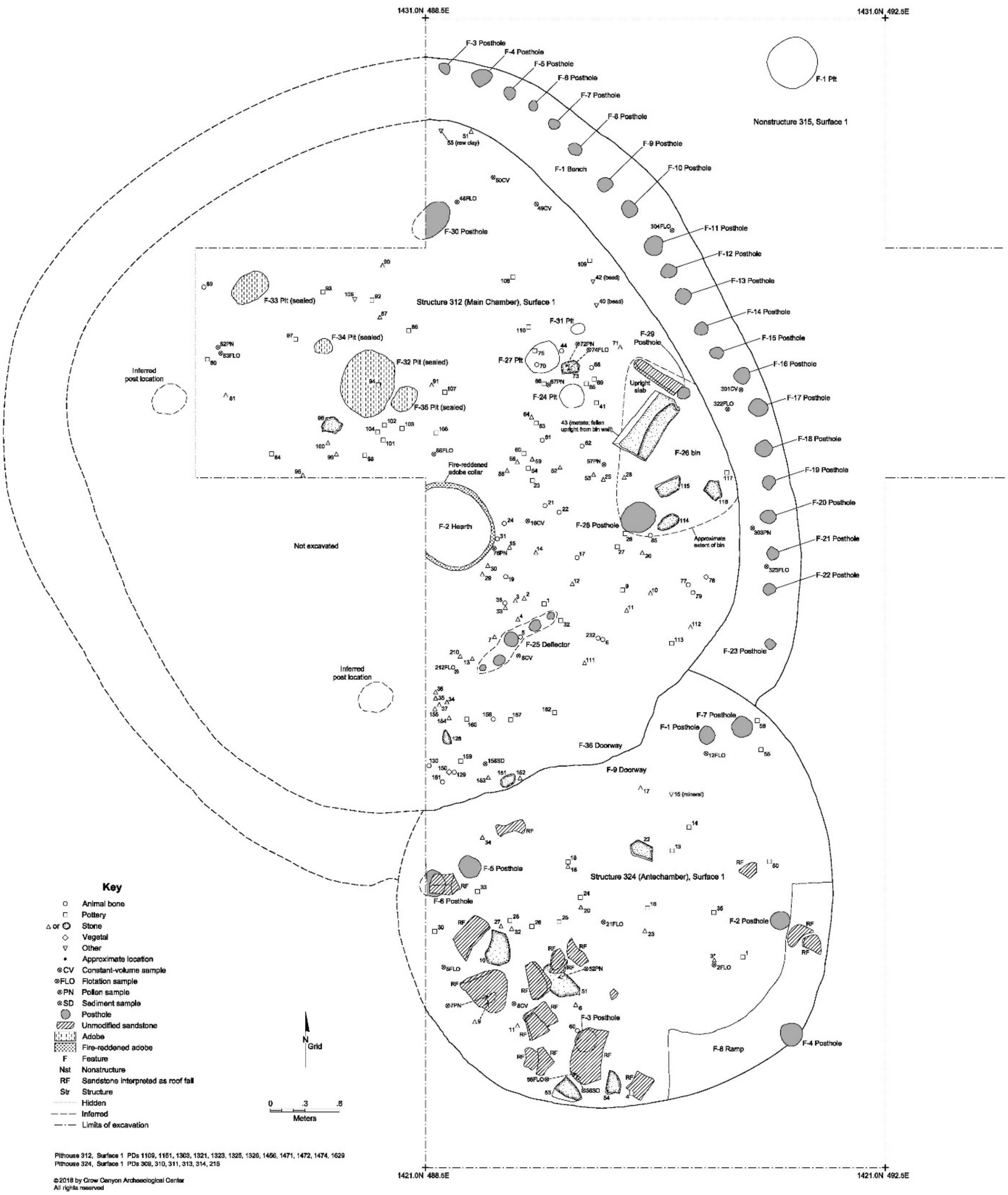

Figure 5.36. Map of Pithouse 312-324, Surface 1 at the Dillard site.

Figure 5.37. Photograph of Pithouse 312-324, Surface 1 at the Dillard site.

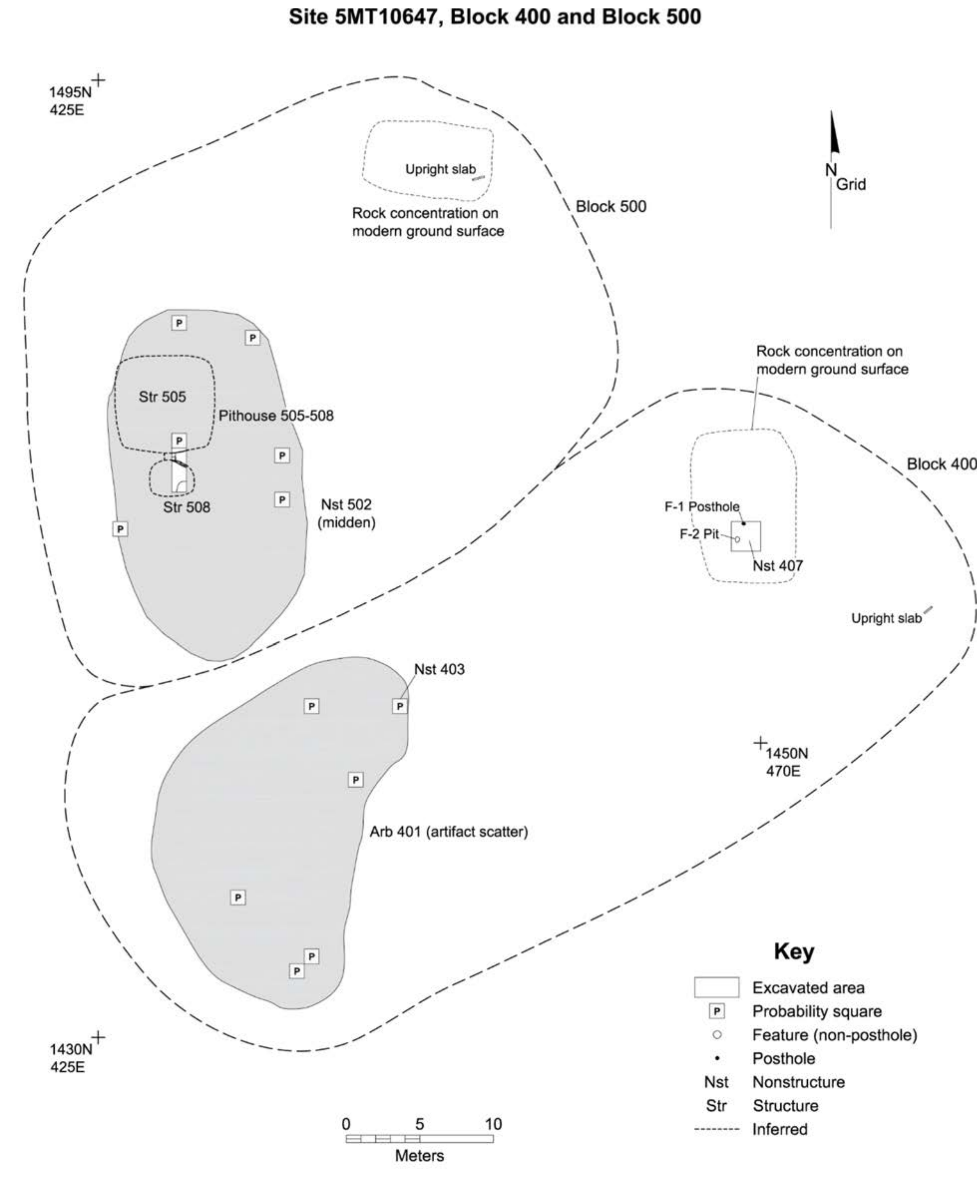

Figure 5.38. Map of Architectural Blocks 400 and 500 at the Dillard site.

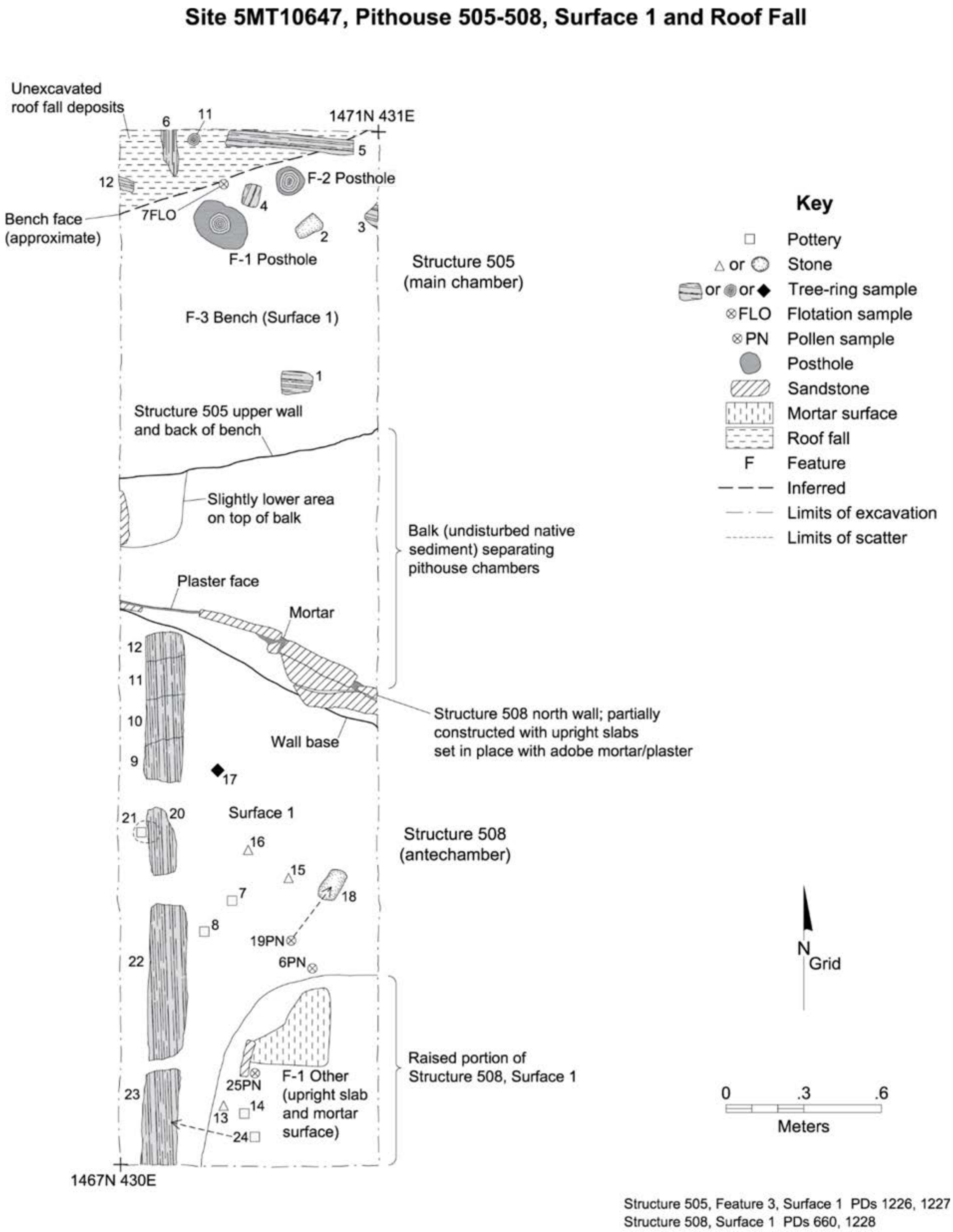

Figure 5.39. Map of Pithouse 505-508, Surface 1 at the Dillard site.

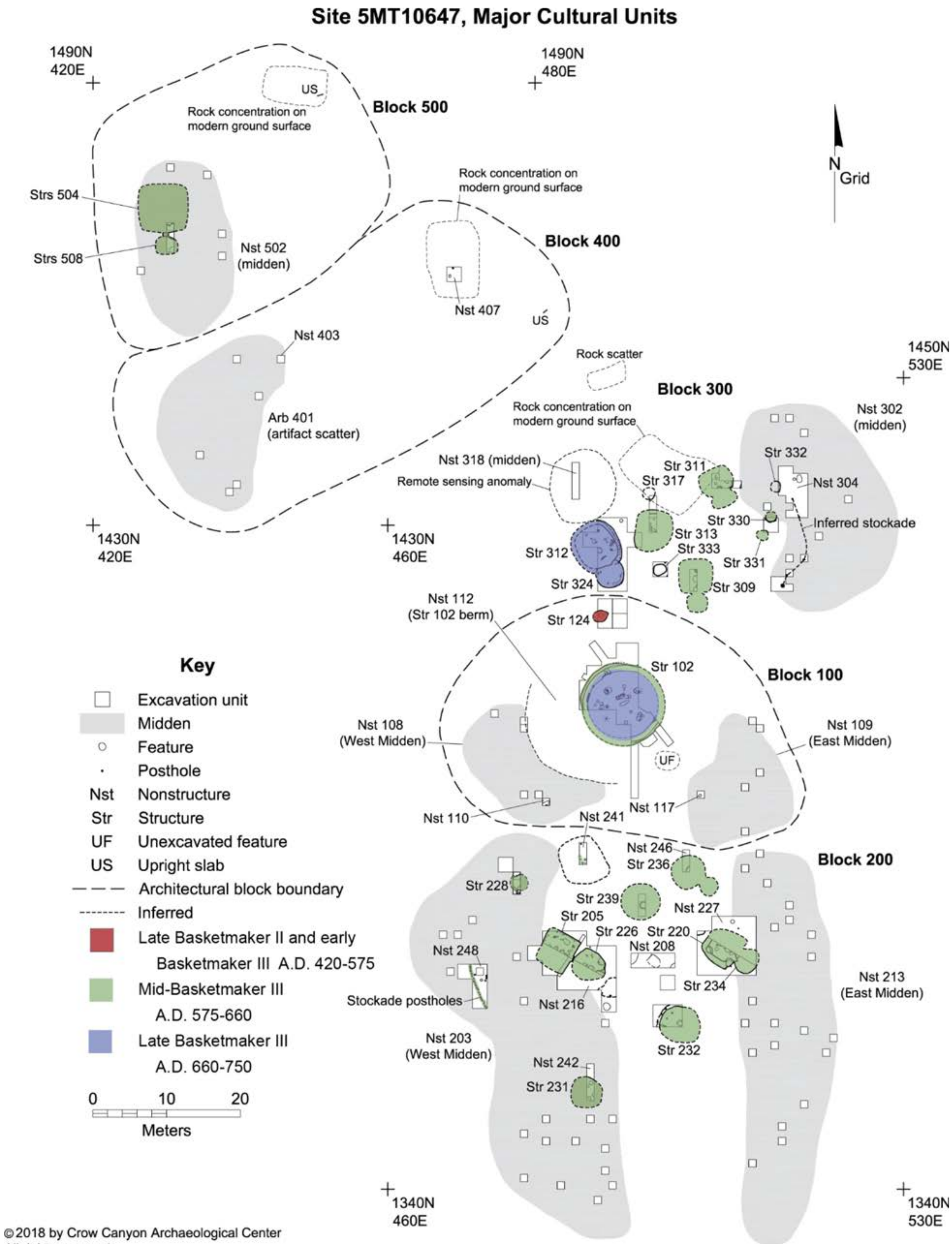

Figure 5.40. Map of major cultural units at the Dillard site with structures highlighted by occupation phase.

Table 5.1. Bulk Chipped Stone Recovered from Surface 2 of Great Kiva 102, 5MT10647.

Feature Number (Type)	Material Type	Category	N (<1/4 in)	Weight (g) (<1/4 in)	N (>1/4 in)	Weight (g) (>1/4 in)
	Agate/chalcedony	Debitage	2	0.00		
	Burro Canyon chert	Debitage	1	0.00		
	Dakota/Burro Canyon silicified sandstone	Debitage	3	0.00		
	Morrison silicified sandstone	Debitage	3	0.00		
	Morrison mudstone	Debitage			1	0.20
8 (Posthole)	Dakota/Burro Canyon silicified sandstone	Debitage	2	0.03		
	Morrison mudstone	Debitage	6	0.08		
	Morrison silicified sandstone	Debitage	4	0.00		
	Unknown chert/siltstone	Debitage	1	0.00		
18 (Firepit)	Morrison silicified sandstone	Debitage	1	0.00		
20 (Pit: Not Further Specified)	Morrison silicified sandstone	Debitage	1	0.00		
	Unknown chert/siltstone	Debitage	1	0.00		
21 (Pit: Not Further Specified)	Agate/chalcedony	Debitage	2	0.00		
	Burro Canyon chert	Debitage	4	0.00		
	Dakota/Burro Canyon silicified sandstone	Debitage	1	0.00		
	Morrison mudstone	Debitage	5	0.00		
	Morrison silicified sandstone	Debitage	6	0.00		
24 (Posthole)	Burro Canyon chert	Debitage	2	0.00		
	Dakota/Burro Canyon silicified sandstone	Debitage	1	0.00		
	Morrison chert	Debitage	1	0.10		
	Morrison silicified sandstone	Debitage	1	0.00	2	0.90
28 (Posthole)	Morrison mudstone	Debitage	1	0.00		
	Morrison silicified sandstone	Debitage	15	0.10		
29 (Pit: Not Further Specified)	Dakota/Burro Canyon silicified sandstone	Debitage	1	0.00		
	Morrison mudstone	Debitage	3	0.00		
32 (Posthole)	Morrison silicified sandstone	Debitage			1	30.70
Total			66	0.31	4	31.80

Table 5.2. Other Artifacts and Samples from Surface 2 of Great Kiva 102, 5MT10647.

Grouped Artifact Category	Artifact Type	Condition	Material Type	N of Samples	N of Items	Weight (g)
Animal Bone	Nonhuman bone			5		1.20
Non-flaked Lithic Tool	One-hand mano	Fragment	Igneous	1	1	805.00
Other Inorganic	Bead	Complete	Shell	1	1	0.10
	Bead	Fragment	Shell	1	1	0.00
	Gizzard stones			1	1	0.00
	Mineral/stone sample		Clay	7	7	449.90
	Mineral/stone sample		Iron oxide	1	2	0.00
	Mineral/stone sample		Pigment (yellow)	1	2	0.00
Sample	Constant volume sample			1		
	Flotation sample			22		
Total				41	15	1,256.20

Table 5.3. Unmodified Sherds Recovered from Surface 1 of Great Kiva 102, 5MT10647.

Feature Number	Pottery Type	Pottery Form	Vessel Number	Count	Weight (g)
17 (Floor Vault)	Chapin Black-on-white	Bowl	3	1	19.90
	Indeterminate Local Gray	Bowl		1	4.20
	Indeterminate Local Gray	Jar		9	100.40
8 (Posthole)	Indeterminate Local Gray	Jar		1	6.50
	Indeterminate Local Gray	Jar		7	70.71
Total				19	201.71

*In the Crow Canyon system, sherds that refit without fresh breaks are classified as their individual attributes suggest. Vessels 2 and 3 are Chapin Black-on-white vessels, but individual sherds were classified as Chapin Black-on-white, Chapin Gray, Early White Painted, and Indeterminate Local Gray. All of these types have been grouped under the overall vessel type of Chapin Black-on-white for this discussion.

Table 5.4. Bulk Chipped Stone Recovered from Surface 1 of Great Kiva 102, 5MT10647.

Feature Number (Type)	Material Type	Category	N (<1/4 in)	Weight (g) (<1/4 in)	N (>1/4 in)	Weight (g) (>1/4 in)
13 (Burned Spot, Surface Feature)	Dakota/Burro Canyon silicified sandstone	Debitage	1	0.00		
	Morrison chert	Debitage	1	0.00		
	Morrison silicified sandstone	Debitage	10	0.00		
	Unknown chert/siltstone	Debitage	2	0.00		
15 (Posthole)	Dakota/Burro Canyon silicified sandstone	Debitage	1	0.00		
	Morrison mudstone	Debitage	1	0.00		
	Morrison silicified sandstone	Debitage	3	0.00		
16 (Posthole)	Morrison silicified sandstone	Debitage			2	4.60
17 (Floor Vault)	Agate/chalcedony	Debitage	11	0.00		
	Burro Canyon chert	Debitage	4	0.00		
	Dakota/Burro Canyon silicified sandstone	Debitage	5	0.10		
	Morrison chert	Debitage	3	0.00		
	Morrison mudstone	Debitage	42	0.10	1	0.50
	Morrison silicified sandstone	Debitage	62	0.10		
	Unknown chert/siltstone	Debitage	7	0.00		
22 (Sipapu)	Agate/chalcedony	Debitage	1	0.00		
	Dakota/Burro Canyon silicified sandstone	Debitage	1	0.00		
	Morrison mudstone	Debitage	1	0.00		
	Morrison silicified sandstone	Utilized flake			1	32.90
	Unknown chert/siltstone	Debitage	4	0.00		
23 (Sipapu)	Agate/chalcedony	Debitage	2	0.00		
	Morrison mudstone	Debitage	3	0.00		
	Morrison silicified sandstone	Debitage	4	0.20		
8 (Posthole)	Morrison mudstone	Debitage			1	10.80
	Morrison mudstone	Utilized flake			1	12.80
	Morrison silicified sandstone	Debitage			2	5.70
	Burro Canyon chert	Debitage	1	0.00		
	Dakota/Burro Canyon silicified sandstone	Debitage	30	0.32	6	16.38
	Morrison chert	Debitage	17	0.10	2	0.80
	Morrison mudstone	Debitage	113	0.56	3	2.70
	Morrison silicified sandstone	Debitage	48	0.39	9	51.06
	Morrison silicified sandstone	Modified flake			1	78.90
	Unknown chert/siltstone	Debitage	8	0.00		
Total			386	1.87	29	217.14

Table 5.5. Other Artifacts and Samples from Surface 1 of Great Kiva 102, 5MT10647.

Grouped Artifact Category	Artifact Type	Condition	Material Type	N of Samples	N of Items	Weight (g)
Animal Bone	Nonhuman bone			15		1.20
Other Inorganic	Bead	Incomplete	Shell	1	1	0.00
	Gizzard stones			5	41	0.20
	Mineral/stone sample		Sandstone	1	2	0.00
	Mineral/stone sample		Quartz	1	2	0.00
	Mineral/stone sample		Igneous	2	3	0.30
	Mineral/stone sample		Clay	1	1	82.60
	Other	Complete	Feathers, likely modern	3	3	0.00
	Pebbles			3	8	8.80
	Shell		Terrestrial snail shell	4	4	0.00
Sample	Constant volume sample			8		
	Flotation sample			25		
Total				69	65	93.10

Table 5.6. Unmodified Sherds Recovered from Stratum 8 of Great Kiva 102, 5MT10647.

Pottery Type	Pottery Form	Vessel Number	N	Weight (g)
Chapin Black-on-white*	Bowl	2	28	243.20
Chapin Black-on-white*	Bowl	3	33	222.60
Chapin Black-on-white	Bowl		1	7.10
Early White Painted	Bowl		3	9.20
Early White Unpainted	Bowl		1	9.10
Indeterminate Local Gray	Bowl		13	65.80
Chapin Gray	Jar		7	69.20
Indeterminate Local Gray	Jar		254	2,654.00
Indeterminate Local Gray, Polished	Jar		4	51.70
Chapin Gray	Seed jar		9	147.30
Indeterminate Local Gray	Unknown		2	7.20
Total			355	3,486.40

*In the Crow Canyon system, sherds that refit without fresh breaks are classified as their individual attributes suggest. Vessels 2 and 3 are Chapin Black-on-white vessels, but individual sherds were classified as Chapin Black-on-white, Chapin Gray, Early White Painted, and Indeterminate Local Gray. All of these types have been grouped under the overall vessel type of Chapin Black-on-white for this discussion.

Table 5.7. Bulk Chipped Stone Recovered from Stratum 8 of Great Kiva 102, 5MT10647.

Material Type	Chipped Stone Category	N (<1/4 in)	Weight (g) (<1/4 in)	N (>1/4 in)	Weight (g) (>1/4 in)
Agate/Chalcedony	Debitage	12	0.01	1	6.90
Brushy Basin Chert	Debitage	2	0.00		
Burro Canyon Chert	Debitage	1	0.00	1	1.80
Dakota/Burro Canyon Silicified Sandstone	Debitage	21	0.22	5	57.90
Igneous	Debitage			1	0.30
Morrison Chert	Debitage	12	0.03	5	6.40
Morrison Mudstone	Utilized flake			2	14.30
Morrison Mudstone	Modified flake			1	86.50
Morrison Mudstone	Debitage	217	2.79	33	164.44
Morrison Silicified Sandstone	Utilized flake			6	224.10
Morrison Silicified Sandstone	Debitage	127	0.85	58	443.60
Red Jasper	Debitage	1	0.00		
Sandstone	Debitage			2	13.20
Unknown Chert/Siltstone	Debitage	23	0.05	1	0.30
Unknown Silicified Sandstone	Debitage			1	3.60
Unknown Stone	Debitage	1	0.00		
Washington Pass Chert	Debitage	3	0.00		
Total		420	3.95	117	1,023.34

Table 5.8. Other Artifacts and Samples from Stratum 8 of Great Kiva 102, 5MT10647.

Grouped Artifact Category	Artifact Type	Condition	Material Type	N of Samples	N of Items	Weight (g)
Animal Bone	Eggshell			1	1	0.00
	Nonhuman bone			14		1.20
Flaked Lithic Tool	Biface	Fragment	Dakota/Burro Canyon silicified sandstone	1	1	0.90
	Peckingstone	Complete	Morrison silicified sandstone	1	1	448.40
	Peckingstone	Complete	Morrison mudstone	2	2	323.70
	Projectile point	Fragment	Obsidian sourced to Grants Ridge (Mt. Taylor); likely a corner-notched, expanding stem with straight base but too incomplete to be sure	1	1	0.30
Non-flaked Lithic Tool	Bulk indeterminate ground stone		Sandstone	1	1	101.40
	Stone disk	Complete	Sandstone	1	1	36.40
	Two-hand mano	Fragment	Sandstone	1	1	715.70
Other Inorganic	Adobe			1	1	5.80
	Bead	Complete	Shell	4	4	0.10
	Gizzard stones			9	17	3.80
	Mineral/ stone sample		Fossil	1	1	0.00
	Mineral/ stone sample		Morrison silicified sandstone	1	1	0.90
	Pebbles			1	1	0.20
	Shell			1	1	0.00
Sample	Constant volume sample			13		
	Flotation sample			18		
Total				72	35	1,638.80

Table 5.9. Unmodified Sherds Recovered from Strata 6/7 of Great Kiva 102, 5MT10647.

Pottery Type	Pottery Form	Vessel Number	Count	Weight (g)
Chapin Black-on-white	Bowl		2	29.80
Chapin Black-on-white*	Bowl	2	3	25.40
Chapin Black-on-white*	Bowl	3	6	21.20
Chapin Gray	Jar		1	18.20
Chapin Gray	Seed jar		2	18.60
Early White Painted	Bowl		5	27.80
Early White Unpainted	Bowl		1	12.80
Early White Unpainted	Jar		1	17.40
Indeterminate Local Gray	Bowl		11	68.40
Indeterminate Local Gray	Jar		112	803.10
Indeterminate Local Gray	Unknown		8	11.50
Indeterminate Local Gray, Polished	Jar		1	0.90
Total			153	1,055.10

*In the Crow Canyon system, sherds that refit without fresh breaks are classified as their individual attributes suggest. Vessels 2 and 3 are Chapin Black-on-white vessels, but individual sherds were classified as Chapin Black-on-white, Chapin Gray, Early White Painted, and Indeterminate Local Gray. All of these types have been grouped under the overall vessel type of Chapin Black-on-white for this discussion.

Table 5.10. Bulk Chipped Stone Recovered from Strata 6/7 of Great Kiva 102, 5MT10647.

Material Type	Chipped Stone Category	N (<1/4 in)	Weight (g) (<1/4 in)	N (>1/4 in)	Weight (g) (>1/4 in)
Agate/Chalcedony	Debitage	1	0	2	1
Burro Canyon Chert	Debitage			1	0.3
Dakota/Burro Canyon Silicified Sandstone	Debitage	7	0.11	20	31.6
Igneous	Debitage			4	36
Morrison Chert	Debitage	11	0.14	3	1.6
Morrison Mudstone	Utilized flake			3	36.4
Morrison Mudstone	Debitage	26	1.08	38	60.36
Morrison Silicified Sandstone	Utilized flake			2	130.1
Morrison Silicified Sandstone	Modified flake			2	124.8
Morrison Silicified Sandstone	Debitage	37	1.48	91	331.6
Petrified Wood	Debitage	1	0		
Sandstone	Debitage			3	87.6
Unknown Chert/Siltstone	Debitage	9	0.05	2	7.4
Unknown Stone	Debitage			1	2.8
Washington Pass Chert	Debitage	2	0		
Total		94	2.86	172	851.56

Table 5.11. Other Artifacts and Samples from Strata 6/7 of Great Kiva 102, 5MT10647.

Grouped Artifact Category	Artifact Type	Condition	Material Type	N of Samples	N of Items	Weight (g)
Animal Bone	Nonhuman bone			30		12.60
Flaked Lithic Tool	Biface	Complete	Dakota/Burro Canyon silicified sandstone	1	1	10.40
	Core	Complete	Morrison silicified sandstone	1	1	130.40
	Drill	Fragment	Nonlocal chert/siltstone	1	1	3.40
	Peckingstone	Complete	Morrison mudstone	1	1	124.60
	Peckingstone	Incomplete	Morrison silicified sandstone	1	1	529.20
	Projectile point	Complete	Dakota/Burro Canyon silicified sandstone; type Bajada	1	1	3.60
	Projectile point	Incomplete	Dakota/Burro Canyon silicified sandstone; type: Dolores Expanding Stem	1	1	0.70
Non-flaked Lithic Tool	Bulk indeterminate ground stone		Sandstone	2	2	155.30
	Hammerstone	Complete	Morrison silicified sandstone	1	1	904.40
	Other modified stone/mineral	Fragment	Morrison mudstone	1	1	0.20
	Stone disk	Complete	Sandstone	1	1	69.00
Organic	Other modified vegetal	Fragment		1	1	
Other Inorganic	Adobe			7		445.10
	Bead	Complete	Shell	3	3	0.00
	Bead	Incomplete	Shell	2	2	0.00
	Gizzard stones			6	7	0.67
	Mineral/ stone sample		Clay	1	1	92.80
	Mineral/ stone sample		Igneous	1	1	48.30
	Other pottery artifact	Fragment	Shaped clay disc/pinched	1	1	1.30
	Pebbles			3	4	1.91
Sample	Constant volume sample			15		
	Flotation sample			21		
Total				103	32	2,533.88

Table 5.12. Unmodified Sherds Recovered from Stratum 5 of Great Kiva 102, 5MT10647.

Pottery Type	Pottery Form	N	Weight (g)
Sambrito Utility	Bowl	1	15.70
Basketmaker Mud Ware	Jar	1	6.10
Basketmaker Mud Ware	Unknown	1	13.40
Chapin Black-on-white	Bowl	10	161.40
Chapin Gray	Bowl	9	76.60
Chapin Gray	Jar	11	80.40
Chapin Gray	Seed jar	18	174.90
Chapin Gray	Unknown	2	3.10
Early White Painted	Bowl	14	76.90
Early White Painted	Jar	1	14.20
Early White Painted	Unknown	1	4.00
Early White Unpainted	Bowl	4	20.70
Early White Unpainted	Jar	7	58.40
Indeterminate Local Corrugated Gray	Jar	2	4.70
Indeterminate Local Gray	Bowl	30	166.40
Indeterminate Local Gray	Jar	382	3,097.90
Indeterminate Local Gray	Unknown	14	19.20
Indeterminate Local Gray, Polished	Bowl	7	94.50
Indeterminate Local Gray, Polished	Jar	13	79.20
Indeterminate Local Gray, Polished	Seed jar	1	3.30
Late White Unpainted	Unknown	1	18.40
Piedra Black-on-white	Bowl	1	12.20
Twin Trees Utility	Jar	2	11.80
Twin Trees Utility	Unknown	1	1.80
Unknown Pottery	Unknown	1	2.30
Total		535	4,217.50

Table 5.13. Bulk Chipped Stone Recovered from Stratum 5 of Great Kiva 102, 5MT10647.

Material Type	Chipped Stone Category	N (<1/4 in)	Weight (g) (<1/4 in)	N (>1/4 in)	Weight (g) (>1/4 in)
Agate/Chalcedony	Debitage	2	0	15	14.8
Brushy Basin Chert	Debitage			5	14.3
Burro Canyon Chert	Debitage	2	0.1	5	7
Dakota/Burro Canyon Silicified Sandstone	Debitage	4	0	32	167
Dakota/Burro Canyon Silicified Sandstone	Utilized flake			1	53.2
Igneous	Debitage	2	0	15	49.6
Morrison Chert	Debitage	6	0.14	6	18.5
Morrison Mudstone	Utilized flake			1	5.4
Morrison Mudstone	Debitage	27	0.67	96	367.2
Morrison Mudstone	Modified flake			1	15.2
Morrison Silicified Sandstone	Modified flake			1	59.9
Morrison Silicified Sandstone	Utilized flake			4	109.8
Morrison Silicified Sandstone	Debitage	48	1.26	241	2,069.3
Obsidian	Debitage			1	0.6
Red Jasper	Debitage			1	1.4
Sandstone	Debitage			2	42.6
Slate/Shale	Debitage			1	0.2
Unknown Chert/Siltstone	Debitage	3	0	1	0.5
Unknown Stone	Debitage			1	1
Washington Pass Chert	Debitage	2	0	3	17
Total		96	2.17	433	3,014.5

Table 5.14. Other Artifacts and Samples from Stratum 5 of Great Kiva 102, 5MT10647.

Grouped Artifact Category	Artifact Type	Condition	Material Type	N of Samples	N of Items	Weight (G)
Ceramics	Shaped sherd	Complete		1	1	21.00
Animal Bone	Eggshell			1	1	0.00
	Nonhuman bone			23		4.10
	Other modified bone	Fragment		1	1	0.00
Flaked Lithic Tool	Biface	Fragment	Agate/chalcedony	1	1	4.90
	Biface	Fragment	Dakota/Burro Canyon silicified sandstone	1	1	2.30
	Core	Complete	Morrison mudstone	3	3	258.00
	Core	Complete	Morrison silicified sandstone	5	5	1,688.00
	Peckingstone	Complete	Morrison silicified sandstone	1	1	276.90
	Projectile point	Incomplete	Petrified wood; type: Dolores Expanding Stem	1	1	0.30
Non-Flaked Lithic Tool	Bulk indeterminate ground stone		Sandstone	4	4	625.30
	Bulk indeterminate ground stone	Fragment	Sandstone	1	1	84.80
	Mano	Fragment	Quartzite	1	1	348.50
	One-hand mano	Complete	Sandstone	1	1	646.10
	Slab metate	Fragment	Sandstone	1	1	1,122.30
	Stone disk	Incomplete	Sandstone	1	1	61.20
	Stone disk	Complete	Sandstone	1	1	27.80
Other Inorganic	Adobe			20	6	417.70
	Bead	Incomplete	Shell	1	1	0.00
	Effigy	Complete		1	1	1.10
	Gizzard stones			4	7	0.20
	Mineral/stone sample		Morrison silicified sandstone	2	2	149.80
	Mineral/stone sample		Sandstone	3	7	101.10
	Mineral/stone sample		Quartz	1	1	1.20
	Mineral/stone sample		Pigment	2	2	27.90
	Mineral/stone sample		Other mineral (unknown crystalline mineral)	3	4	437.80
	Mineral/stone sample		Gypsum/calcite/barite	1	1	0.20
	Mineral/stone sample		Clay	2	2	44.80
	Mineral/stone sample		Igneous	7	99	798.80
	Other pottery artifact	Complete	Possible effigy leg	2	2	3.40
	Pebbles			2	2	12.50
Sample	Constant volume sample			5		
	Flotation sample			34		
Total				138	162	7,168.00

Table 5.15. Unmodified Sherds Recovered from the Surface of Pithouse 220/234, 5MT10647.

Feature Number (Type)	Pottery Type	Pottery Form	Vessel Number	N	Weight (g)
	Indeterminate Local Gray	Jar		26	147.80
	Indeterminate Local Gray	Jar	1	87	1,893.10
1 (Corner Bin)	Chapin Black-on-white	Bowl		3	41.80
	Chapin Gray	Jar		3	92.94
	Chapin Gray	Seed jar		6	25.50
	Early White Painted	Bowl		8	62.20
	Early White Unpainted	Bowl		1	5.67
	Early White Unpainted	Jar		1	1.50
	Early White Unpainted	Unknown		1	1.90
	Indeterminate Local Gray	Bowl		6	33.40
	Indeterminate Local Gray	Jar		81	797.77
	Indeterminate Local Gray	Unknown		1	2.10
	Indeterminate Local Gray, polished	Bowl		2	11.40
	Indeterminate Local Gray, polished	Jar		6	42.50
3 (Corner Bin)	Chapin Black-on-white	Bowl		4	33.10
	Chapin Gray	Bowl		1	4.20
	Chapin Gray	Seed jar		1	1.60
	Early White Painted	Bowl		1	2.40
	Early White Painted	Jar		1	4.90
	Early White Unpainted	Bowl		3	14.00
	Indeterminate Local Gray	Jar		33	191.80
	Indeterminate Local Gray	Unknown		4	8.40
	Indeterminate Local Gray, polished	Bowl		2	9.60
	Indeterminate Local Gray, polished	Jar		4	34.20
6 (Hearth)	Indeterminate Local Gray	Jar		1	1.00
	Indeterminate Local Gray, polished	Jar		2	8.00
Total				289	3,472.78

Table 5.16. Bulk Chipped Stone Recovered from the Surface of Pithouse 220/234, 5MT10647.

Feature Number (Type)	Material Type	Chipped Stone Category	N (<1/4 in)	Weight (g) (<1/4 in)	N (>1/4 in)	Weight (g) (>1/4 in)
	Dakota/Burro Canyon silicified sandstone	Utilized flake			1	7.50
1 (Corner Bin)	Agate/chalcedony	Debitage	3	0.00		
	Burro Canyon chert	Debitage	2	0.00		
	Dakota/Burro Canyon silicified sandstone	Debitage	6	0.00	6	83.30
	Morrison mudstone	Debitage	13	0.24	15	60.32
	Morrison silicified sandstone	Debitage	22	0.07	28	213.20
	Morrison silicified sandstone	Modified flake			1	20.20
	Red jasper	Debitage	1	0.00		
	Unknown chert/siltstone	Debitage	1	0.00		
3 (Corner Bin)	Burro Canyon chert	Debitage			1	0.00
	Dakota/Burro Canyon silicified sandstone	Debitage	6	0.10	5	27.70
	Igneous	Debitage			2	4.40
	Morrison mudstone	Debitage	7	0.30	28	40.20
	Morrison silicified sandstone	Debitage	13	0.70	39	86.30
	Unknown chert/siltstone	Debitage	1	0.00		
	Quartz	Debitage			1	7.20
5 (Pit: Not Further Specified)	Agate/chalcedony	Debitage	1	0.00		
	Dakota/Burro Canyon silicified sandstone	Debitage	5	0.00		
	Igneous	Debitage	1	0.00		
	Morrison mudstone	Debitage	1	0.00		
	Morrison silicified sandstone	Debitage	1	0.00	2	0.70
	Unknown chert/siltstone	Debitage	1	0.00		
6 (Hearth)	Agate/chalcedony	Debitage	1	0.00		
	Dakota/Burro Canyon silicified sandstone	Debitage	1	0.00		
	Morrison mudstone	Debitage	4	0.00		
	Morrison silicified sandstone	Debitage	15	0.00		
	Unknown chert/siltstone	Debitage	2	0.00		
11 (Pit: Not Further Specified)	Agate/chalcedony	Debitage	1	0.00		
	Morrison silicified sandstone	Debitage	1	0.00		
13 (Sipapu)	Agate/chalcedony	Debitage	3	0.00		
	Burro Canyon chert	Debitage	1	0.00		
	Igneous	Debitage	1	0.00		
	Morrison chert	Debitage	6	0.00		
	Morrison mudstone	Debitage	9	0.00		
	Morrison silicified sandstone	Debitage	38	0.00		
15 (Pit: Not Further Specified)	Agate/chalcedony	Debitage	1	0.00		
	Dakota/Burro Canyon silicified sandstone	Debitage	2	0.00		
	Morrison mudstone	Debitage	2	0.00		
	Morrison silicified sandstone	Debitage	7	0.00		
Total			180	1.41	129	551.02

Table 5.17. Other Artifacts and Samples from the Surface of Pithouse 220/234, 5MT10647.

Grouped Artifact Category	Artifact Type	Condition	Material Type	N of Samples	N of Items	Weight (G)
Animal Bone	Nonhuman bone			44		10.90
	Other modified bone	Complete	Unknown bone	1	1	0.20
	Other modified bone	Fragment		1	1	0.40
	Bone tube	Incomplete		1	1	0.20
Flaked Lithic Tool	Core	Complete	Morrison silicified sandstone	1	1	73.00
	Peckingstone	Complete	Morrison mudstone	1	1	283.50
	Peckingstone	Complete	Morrison silicified sandstone	2	2	302.50
	Projectile point	Incomplete	Small corner-notched (BMIII–early PII); Dakota/Burro Canyon silicified sandstone	1	1	0.20
Non-Flaked Lithic Tool	Bulk indeterminate ground stone		Morrison silicified sandstone	1	1	446.00
	Bulk indeterminate ground stone		Sandstone	1	2	333.00
	Mano	Complete	Sandstone	1	1	1,093.30
	Pestle	Complete	Sandstone	1	1	1,720.90
	Slab metate	Complete	Sandstone	2	2	30,980.00
	Stone disk	Fragment	Sandstone	1	1	587.00
	Stone disk	Complete	Sandstone	2	2	4,521.40
	Two-hand mano	Complete	Dakota/Burro Canyon silicified sandstone	1	1	1,699.20
Organic	Textile	Fragment	Possible human hair cordage	1	1	0.00
Other Inorganic	Adobe			10		440.60
	Gizzard stones			9	10	0.00
	Mineral/ stone sample		Fossil	3	3	11.60
	Mineral/ stone sample		Gypsum/calcite/barite	1	1	0.10
	Mineral/ stone sample		Igneous	1	1	4.10
	Other pottery artifact	Complete		1	2	1.50
Sample	Constant volume sample			2		
	Flotation sample			42		
Total				132	37	42,509.60

Table 5.18. Unmodified Sherds Recovered from the Surface of Pithouse 309, 5MT10647.

Feature Number (Type)	Pottery Type	Pottery Form	Vessel Number	N	Weight (g)
	Indeterminate Local Gray	Jar		1	3.90
1 (Hearth)	Indeterminate Local Gray	Jar		1	25.50
3 (Ashpit)	Indeterminate Local Gray	Jar		2	6.60
Total				2	6.60

Table 5.19. Bulk Chipped Stone Recovered from the Surface of Pithouse 309, 5MT10647.

Feature Number (Type)	Material Type	Chipped Stone Category	N (<1/4 in)	Weight (g) (<1/4 in)	N (>1/4 in)	Weight (g) (>1/4 in)
1 (Hearth)	Dakota/Burro Canyon silicified sandstone	Debitage			1	6.10
	Morrison mudstone	Debitage	2	0.00		
	Unknown stone	Debitage	1	0.00		
2 (Sipapu)	Agate/chalcedony	Debitage	7	0.00		
	Dakota/Burro Canyon silicified sandstone	Debitage	12	0.00		
	Morrison chert	Debitage	13	0.00		
	Morrison mudstone	Debitage	11	0.90	3	2.20
	Morrison silicified sandstone	Debitage	44	0.94	2	0.80
	Unknown chert/siltstone	Debitage	4	0.20		
3 (Ashpit)	Agate/chalcedony	Debitage	1	0.00		
	Dakota/Burro Canyon silicified sandstone	Debitage	9	0.10	3	1.90
	Morrison chert	Debitage	4	0.00		
	Morrison mudstone	Debitage	4	0.00	2	0.30
	Morrison silicified sandstone	Debitage	20	0.10		
	Unknown stone	Debitage	1	0.00		
Total			133	2.24	11	11.30

Table 5.20. Other Artifacts and Samples from the Surface of Pithouse 309, 5MT10647.

Grouped Artifact Category	Artifact Type	Condition	Material Type	N of Samples	N of Items	Weight (g)
Animal Bone	Eggshell			1	1	0.00
	Nonhuman bone			13		152.60
Flaked Lithic Tool	Core	Complete	Morrison mudstone	1	1	36.60
Non-flaked Lithic Tool	Bulk indeterminate ground stone		Sandstone	3	3	530.30
Other Inorganic	Gizzard stones			3	4	0.10
	Mineral/stone sample		Turquoise	1	1	0.00
	Mineral/stone sample		Pigment (red pigment, likely iron oxide)	1	2	0.00
Sample	Constant volume sample			11		
	Flotation sample			19		
Total				53	12	719.60

Table 5.21. Unmodified Sherds Recovered from the Surface of Pithouse 312/324, 5MT10647.

Feature Number (Type)	Pottery Type	Pottery Form	N	Weight (g)
1 (Posthole)	Indeterminate Local Gray	Jar	1	5.20
2 (Hearth)	Indeterminate Local Gray	Jar	1	12.40
2 (Posthole)	Indeterminate Local Gray	Jar	1	9.80
26 (Bin: Not Further Specified)	Indeterminate Local Gray	Jar	1	5.30
26 (Bin: Not Further Specified)	Indeterminate Local Gray, polished	Jar	1	9.50
27 (Pit: Not Further Specified)	Indeterminate Local Gray	Jar	2	13.40
7 (Posthole)	Indeterminate Local Gray	Jar	1	1.60
	Chapin Black-on-white	Bowl	1	32.50
	Indeterminate Local Gray	Bowl	1	2.80
	Indeterminate Local Gray	Jar	8	99.60
	Indeterminate Local Gray, polished	Bowl	1	15.70
Total			19	207.80

Table 5.22. Bulk Chipped Stone Recovered from the Surface of Pithouse 312/324, 5MT10647.

Feature Number (Type)	Material Type	Chipped Stone Category	N (<1/4 in)	Weight (g) (<1/4 in)	N (>1/4 in)	Weight (g) (>1/4 in)
	Dakota/Burro Canyon silicified sandstone	Debitage			2	10.12
	Morrison chert	Modified flake			1	32.00
	Morrison mudstone	Modified flake			1	3.90
	Morrison mudstone	Debitage	1	0.00	4	26.80
	Morrison silicified sandstone	Debitage	2	0.00		
	Unknown chert/siltstone	Debitage	1	0.04		
1 (Posthole)	Agate/chalcedony	Debitage	2	0.00		
	Morrison mudstone	Debitage	1	0.00		
2 (Hearth)	Agate/chalcedony	Debitage	1	0.00		
	Brushy Basin chert	Debitage	2	0.20	4	3.00
	Burro Canyon chert	Debitage	1	0.00		
	Dakota/Burro Canyon silicified sandstone	Debitage	7	0.00	1	0.20
	Morrison chert	Debitage	10	0.00		
	Morrison mudstone	Debitage	1	0.00	2	0.50
	Morrison silicified sandstone	Debitage	7	0.00		
3 (Posthole)	Morrison mudstone	Debitage	5	0.00	1	1.30
	Morrison silicified sandstone	Debitage	6	0.00		
4 (Posthole)	Agate/chalcedony	Debitage	5	0.00		
	Burro Canyon chert	Debitage	5	0.00		
	Morrison mudstone	Debitage	1	0.00		
	Morrison silicified sandstone	Debitage	10	0.00		
5 (Posthole)	Agate/chalcedony	Debitage	1	0.00		
	Dakota/Burro Canyon silicified sandstone	Debitage	1	0.00		
	Morrison mudstone	Debitage	3	0.00		
	Morrison silicified sandstone	Debitage	4	0.00		
	Unknown chert/siltstone	Debitage	1	0.00		
6 (Posthole)	Agate/chalcedony	Debitage	2	0.00		
	Nonlocal chert/siltstone	Debitage	1	0.00		
7 (Posthole)	Agate/chalcedony	Debitage	1	0.00		
	Morrison silicified sandstone	Debitage	3	0.00		
11 (Posthole)	Morrison mudstone	Debitage			1	0.30
25 (Deflector)	Agate/chalcedony	Debitage	2	0.00		
	Dakota/Burro Canyon silicified sandstone	Debitage	1	0.00		
	Morrison mudstone	Debitage	1	0.00		
	Morrison silicified sandstone	Debitage	3	0.00		

Feature Number (Type)	Material Type	Chipped Stone Category	N (<1/4 in)	Weight (g) (<1/4 in)	N (>1/4 in)	Weight (g) (>1/4 in)
26 (Bin: Not Further Specified)	Agate/chalcedony	Debitage	1	0.00		
	Morrison mudstone	Debitage	1	0.00		
	Morrison silicified sandstone	Debitage	1	0.00		
27 (Pit: Not Further Specified)	Agate/chalcedony	Debitage	1	0.00		
	Morrison chert	Debitage	1	0.00		
	Morrison mudstone	Debitage	1	0.00		
	Morrison silicified sandstone	Debitage	2	0.00		
28 (Posthole)	Morrison chert	Debitage	1	0.00		
	Morrison mudstone	Debitage	1	0.00		
	Morrison silicified sandstone	Debitage	3	0.00		
29 (Posthole)	Agate/chalcedony	Debitage	1	0.00		
	Dakota/Burro Canyon silicified sandstone	Debitage	1	0.00		
	Morrison mudstone	Debitage	2	0.00		
	Morrison silicified sandstone	Debitage	1	0.00		
30 (Posthole)	Agate/chalcedony	Debitage	2	0.00		
	Burro Canyon chert	Debitage	1	0.00		
	Dakota/Burro Canyon silicified sandstone	Debitage	1	0.00		
	Morrison chert	Debitage	2	0.00		
	Morrison mudstone	Debitage	4	0.00		
	Morrison silicified sandstone	Debitage	3	0.00		
32 (Pit: Not Further Specified)	Morrison mudstone	Debitage	1	0.00		
	Morrison silicified sandstone	Debitage	3	0.00		
33 (Pit: Not Further Specified)	Agate/chalcedony	Debitage	1	0.00		
	Morrison silicified sandstone	Debitage	1	0.00		
	Unknown chert/siltstone	Debitage	1	0.00		
35 (Pit: Not Further Specified)	Morrison chert	Debitage	1	0.00		
	Morrison mudstone	Debitage	2	0.00		
	Morrison silicified sandstone	Debitage	3	0.00		
	Unknown chert/siltstone	Debitage	1	0.00		
Total			137	0.24	17	78.12

Table 5.23. Other Artifacts and Samples from the Surface of Pithouse 312/324, 5MT10647.

Grouped Artifact Category	Artifact Type	Condition	Material Type	N of Samples	N of Items	Weight (g)
Animal Bone	Nonhuman bone			37		21.00
Flaked Lithic Tool	Core	Complete	Morrison mudstone	1	1	53.90
	Chipped-stone tool	Complete	Dakota/Burro Canyon silicified sandstone	1	1	249.10
	Projectile point	Incomplete	Dolores Expanding Stem; Dakota/Burro Canyon silicified sandstone	1	1	1.00
Non-flaked Lithic Tool	Abrader	Complete	Sandstone	1	1	521.10
	Bulk indeterminate ground stone		Sandstone	1	1	309.70
	Metate	Fragment	Sandstone	1	1	19,400.00
	Slab metate	Incomplete	Sandstone	1	1	8,920.00
	Slab metate	Fragment	Sandstone	2	2	9,240.00
	Stone disk	Fragment	Sandstone	1	1	2,720.00
Other Inorganic	Adobe			8		11.60
	Gizzard stones			2	2	0.00
	Mineral/stone sample		Clay	1	1	72.00
	Mineral/stone sample		Igneous	1	3	4.90
	Shell		Terrestrial snail shell	1	2	0.00
Sample	Constant volume sample			2		
	Flotation sample			36		
Total				98	18	41,524.30

Table 5.24. Summary of Unmodified Sherds by Ware and Type for 5MT10647.

Ware and Type	Count	% by Count	Weight (g)	% by Weight (g)
Brown Ware				
Basketmaker Mud Ware	17	0.09	79.50	0.09
Obelisk Utility	5	0.03	15.00	0.02
Sambrito Utility	45	0.24	232.70	0.25
Twin Trees Utility	101	0.54	400.00	0.43
Plain Gray Ware				
Chapin Gray	953	5.06	6,036.24	6.52
Indeterminate Local Gray	15,493	82.24	72,507.72	78.31
Indeterminate Local Gray, Polished	784	4.16	4,854.00	5.24
Indeterminate Neckbanded Gray	6	0.03	21.50	0.02
Moccasin Gray	5	0.03	57.20	0.06
Corrugated Gray Ware				
Indeterminate Local Corrugated Gray	130	0.69	622.30	0.67
Mancos Corrugated Gray	1	0.01	15.50	0.02
White Ware				
Chapin Black-on-white	252	1.34	2,094.00	2.26
Early White Painted	553	2.94	2,823.00	3.05
Early White Unpainted	377	2.00	1,990.77	2.15
Indeterminate Local White Painted	2	0.01	12.40	0.01
Indeterminate Local White Unpainted	1	0.01	8.90	0.01
Late White Painted	31	0.16	199.90	0.22
Late White Unpainted	30	0.16	298.40	0.32
Mancos Black-on-white	10	0.05	112.70	0.12
McElmo Black-on-white	1	0.01	8.30	0.01
Mesa Verde Black-on-white	1	0.01	14.00	0.02
Piedra Black-on-white	6	0.03	63.30	0.07
Pueblo II White Painted	1	0.01	6.00	0.01
Red Ware				
Abajo Red-on-orange	2	0.01	7.40	0.01
Bluff Black-on-red	1	0.01	10.60	0.01
Indeterminate Local Red Painted	6	0.03	18.30	0.02
Indeterminate Local Red Unpainted	21	0.11	71.00	0.08
Nonlocal				
Lino Gray	1	0.01	7.50	0.01
Unknown				
Unknown Pottery	3	0.02	4.90	0.01
Total	18,839	100.00	92,593.03	100.00

Table 5.25. Counts of Chipped-Stone Artifacts by Raw Material Type for 5MT10647.

Material Category	Raw Material	Count	% by Count	Weight (g)	% by Weight (g)
Local	Concretion	2	0.01	0.30	0.00
	Conglomerate	1	0.00	7.60	0.01
	Dakota/Burro Canyon silicified sandstone	2,256	10.06	6,813.32	10.88
	Gypsum/calcite/barite	2	0.01	0.20	0.00
	Igneous	297	1.32	1,095.80	1.75
	Morrison chert	678	3.02	771.25	1.23
	Morrison mudstone	6,739	30.05	17,280.98	27.60
	Morrison silicified sandstone	10,590	47.23	34,040.47	54.37
	Quartz	5	0.02	13.10	0.02
	Sandstone	23	0.10	280.58	0.45
	Slate/shale	49	0.22	146.00	0.23
Nonlocal	Nonlocal chert/siltstone	4	0.02	3.90	0.01
	Obsidian	11	0.05	14.70	0.02
	Red jasper	29	0.13	26.09	0.04
	Washington Pass chert	65	0.29	96.10	0.15
Semi-local	Agate/chalcedony	777	3.47	512.11	0.82
	Brushy Basin chert	207	0.92	559.80	0.89
	Burro Canyon chert	372	1.66	614.60	0.98
	Petrified wood	18	0.08	42.80	0.07
Unknown	Other mineral	3	0.01	9.00	0.01
	Unknown chert/siltstone	224	1.00	65.04	0.10
	Unknown silicified sandstone	32	0.14	163.40	0.26
	Unknown stone	39	0.17	49.60	0.08
Total		22,423	100.00	62,606.74	100.00

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Chapter 6

TJ Smith (5MT10736)

by Shanna R. Diederichs

Introduction

The TJ Smith site (5MT10736) is a repeatedly occupied Basketmaker III hamlet site in the northwest portion of Indian Camp Ranch (see Figure 1.4). Two single-family hamlets were consecutively built on the location between A.D. 535 and 720. Today, the TJ Smith site is on Indian Camp Ranch Lot 23 and named for the owners Tammy and Jerry Smith (Figure 6.1).

Compared to other portions of the Indian Camp Archaeological District, there are relatively few Basketmaker III habitations in the vicinity of the TJ Smith site (Fetterman et al. 2014). The most substantial site in the area is Wheatfield Island (5MT3891), a multicomponent Basketmaker III to Pueblo II habitation several hundred meters to the west with six pit structures found with resistivity imaging. Five other small Basketmaker III hamlets (5MT10740, 5MT10739, 5MT10734, 5MT10622, and 5MT10623) are within a quarter kilometer of the site to the south and west. The TJ Smith site was the only site in the northeastern portion of the study area to be tested during the Basketmaker Communities Project.

The TJ Smith site is situated on the crest of a low ridge above a gentle south- and southwest-facing slope overlooking Crow Canyon and Montezuma Valley to the east and southeast (Figure 6.2). The landscape around the site consists of rolling uplands formed by 1.25-m-thick eolian silt loam deposited on top of Dakota Formation sandstone. These eolian soils were heavily farmed by early ancestral Pueblo people and continue to be farmed commercially today. The TJ Smith site has been under cultivation for at least 25 years. The plow zone is 15–20 cm thick across the site.

The site was first recorded as 5MT10736 in 1995 by Woods Canyon who described it as a 3,002-m^2 chipped stone and pottery scatter in a plowed field south of a gravel road (Fetterman and Honeycutt1994). Within the scatter the crew noted concentrations of artifacts, rock, and adobe. Four thermal features were visible in the road north of the site (Figure 6.3).

In the mid-1990s, Indian Camp Ranch was parceled into lots. A second gravel road (County Road 22.6) was built along the northeast edge of Lot 26 to intersect with the previous road (County Road K.3) just north of the TJ Smith site. Over the next 20 years, the Indian Camp Ranch developer continued to widen and improve County Road K.3 through the northeast side of the site impacting the four previously documented thermal features. The Ranch also installed an irrigation pipe and planted yucca along the southwest side of County Road K.3 exposing at least one additional slab-lined feature.

In preparation for Basketmaker Communities Project testing, the surface signature of the site was rerecorded (Shanks 2014). This work confirmed that the surface signature of the TJ Smith site includes a sitewide scatter of gray ware ceramics and chipped stone, a rock and burned adobe concentration in the plowed field, and several rock and/or ash stains along the irrigation ditch in County Road K.3 to the northeast. The most distinct feature is half of a 1.2-m-diameter slab-lined pit room exposed along the irrigation ditch, which is 12 m north of the central rock concentration at the site. Despite the site's moderately large size, the artifact density was comparatively low with just 476 pottery sherds, 103 pieces of debitage, and a few manos, cores, and bifaces exposed. Most of the pottery consisted of plain gray body sherds, but a few Chapin Gray and Chapin Black-on-white were also noted. Most of the lithics are local Morrison Formation siltstones and cherts, but there is a small amount of obsidian, red chert, and igneous lithic materials on the site surface.

To locate buried architecture, 2,400 m^2 of the site was imaged with electrical resistivity in 2012 and 2013 (see Chapter 3), and all resistance anomalies were tested with soil augers. This technique was only marginally successful at the site due to near-surface bedrock. One late Basketmaker III pit structure was found, but there is likely another early Basketmaker III pit structure that was not located.

The TJ Smith site was selected for Basketmaker Communities Project investigations because it represents a consecutively occupied Basketmaker III hamlet with a roomblock(s), pit structure(s), and midden deposits in a low occupation density area far (1 km) from the Dillard site. Sampling of the site was expected to contribute to our understanding of (1) the development of the Indian Camp Ranch community, (2) the occupants' relationship to the great kiva at the Dillard site, and (3) the relative wealth and length of occupation at farming hamlets (Ortman et al. 2011).

Remote sensing, soil augering, and testing of the site determined that it includes two early Basketmaker III phase surface rooms (Pit Rooms 108 and 109), a late Basketmaker III pithouse (Pithouse 111), and a low-density midden (Arbitrary Unit 101). Neither the rock concentration along the west edge of the site nor the slab-lined thermal features along the road were investigated (Figure 6.4).

Approximately 1 percent (18 m^2) of the total 0.6-acre site area was excavated during the 2012 and 2013 Basketmaker Communities Project field seasons using eight excavation units (Figure 6.5). Most excavation was limited to random testing units (1-x-1-m). However, the architectural focus of the research design (see Chapter 2) required that larger targeted sampling (two 1-x-3-m units) be applied to structure and feature investigation. What follows is a summary of excavation results.

Chronology

The TJ Smith site was occupied at least twice between the early and late Basketmaker III phases (A.D. 535–720). Absolute dating of the site was only partially successful: four tree-ring samples and an archaeomagnetic sample were analyzed but could not be dated. However, AMS of four corn cupules from structures revealed two distinct Basketmaker III occupations. The first occupation, between A.D. 535 and 650, included surface storage rooms and extramural activities in the south-central portion of the site (Pit Rooms 108 and 109). This occupation is rare evidence of early Basketmaker III habitation in the Indian Camp Ranch community; only a single storage pit room at the Dillard site is contemporaneous with this early occupation. In the late Basketmaker III phase (A.D. 655 to 720) the TJ Smith site was again occupied, and a substantial pithouse (Pithouse 111) was constructed just north of the previous pit rooms.

Architecture

All architectural elements at the TJ Smith site were considered part of a single architectural block (Block 100). The early and late Basketmaker III occupations overlay one another on the site, making them difficult to separate spatially. Block 100 includes the early Basketmaker III phase east–west oriented roomblock, a late Basketmaker III phase pithouse, and a midden south of both.

There was little evidence of the east–west roomblock on the surface of the site other than a light scatter of small rocks in a 5-x-5-m area. The center of the rock scatter was sampled with a north–south 3-x-1-m unit that captured portions of Pit Rooms 108 and 109 (Figures 6.6 and 6.7). Though built adjacent to one another, the construction of the rooms differed slightly. Pit Room 108 to the west is round, earthen walled, and 0.14 m deeper than the plow zone. Pit Room 109 to the east is subrectangular, slightly larger, slab-lined, and 0.2 m deeper than the plow zone. Collapsed wood, adobe, and caliche roof material filled Pit Room 109, but there was no roofing material in Pit Room 108 suggesting that it was dismantled during occupation. Both pit rooms were cleaned out at the end of their use lives. The remains of this early Basketmaker III roomblock were just south of Pithouse 111, which was occupied anywhere from 20 to 180 years later. Any standing elements of the pit rooms were likely salvaged for the later construction.

Pithouse 111 is either a large single-chambered or double-chambered pithouse. The following structure description is based on the excavation of a 3-x-1-m unit in the center of the main chamber and fairly inconclusive soil auger probes in the vicinity of the unit. The main chamber of the pithouse was substantial and measured 4.5-x-4.5 m and 1.24 m deep. The bottom of the main chamber pit was excavated through the hard pan caliche layer and into decomposing bedrock (Figure 6.8). A cribbed roof was constructed of 5-to-15-cm-diameter beams and four layers of alternating adobe and caliche. A 70-cm-square access and smoke roof opening above the hearth was evident in the nearly intact roof fall inside the structure. The floor of the pithouse was leveled with adobe and plaster, and a deflector, ashpit, hearth, sipapu, and one additional pit were built into the floor (Figures 6.9 and 6.10). Based on the orientation of the features, the pithouse was oriented almost directly north–south.

Very few artifacts were left on the floor of Pithouse 111. Most were common items such as gray ware pottery sherds, chipped stone of local material, and mano fragments. Other items include two biface fragments, burned yucca twine, and a cylindrical piece of sandstone. All artifacts and samples collected from the floor surface of Pithouse 111 are presented in Tables 6.1, 6.2, and 6.3.

Demography

The TJ Smith site was occupied twice during the Basketmaker III period by single extended families. These occupations may have been consecutive or spaced up to 180 years apart. Though full architectural suites were not identified for either occupation, they each likely comprised a habitation pithouse, a surface storage roomblock, and a midden. The paucity of refuse at the site suggests that both occupations lasted no more than a couple generations. Two fragments of adult human bone in the upper fill of Pithouse 111 attest to families in the area returning to the site after it was decommissioned to bury their dead in the pithouse fill, a common practice across the community (see Chapter 23).

Artifacts

The artifacts recovered from the TJ Smith site indicate occupation during the Basketmaker III period, with pottery primarily consisting of Chapin Gray and Indeterminate Local Gray (Table 6.4). A few brown ware and red ware sherds were recovered. Chipped-stone debitage and flakes from the TJ Smith site primarily originate from local geologic formations, including the Morrison and Dakota formations. Two pieces of nonlocal red jasper were recovered that, along with the red ware sherds, suggest some connections with southeast Utah (Table 6.5).

Subsistence

The Basketmaker III occupants of the TJ Smith site were farmers with access to wild plants, a pinyon and juniper forest, and basketry and pottery resources. Water was not readily available. With no dependable intermittent streams or springs in the area, the occupants of the TJ Smith site likely walked about 0.6 km east to Crow Canyon for domestic water when it was available. This inconvenience highlights their commitment to living on highly productive farming soils on the ridgetop rather than near accessible water and riparian areas.

Based on archaeobotanical and pollen studies (see Chapters 21 and 22), the TJ Smith site occupants were farmers who ate maize and the weeds of maize fields (pigweed and goosefoot). Tansy mustard seeds and grass grains, including ricegrass, were also important. Prickly pear cactus fruit and lemonadeberry seeds were harvested on occasion. Beeweed and wild carrot were available as culinary spices. Small amounts of mistletoe and wild tobacco were collected for medicinal or ceremonial purposes.

A number of nonfood wood, twigs, stems, bark, and pollen are indicative of fuels and other daily needs. These resources included juniper, sagebrush, mountain mahogany, cottonwood/willow, pine, saltbush, and grass stems. Douglas fir wood within the pithouse hearth was carried some distance from a higher elevation. Yucca fibrovascular bundles from the pithouse floor may have been left over from processing yucca leaves for basketry or some other fiber use.

Very little animal bone was recovered from the TJ Smith site. The 29 analyzed fragments all represent rodents and lagomorphs (ground squirrel, cottontail, and jackrabbit). Though poor bone preservation in the plow zone may account for a paucity of bone in the midden and pit room deposits, the protected deposits in Pithouse 111 also lacked the species diversity and bone tools found in other pithouses across the community. This pattern suggests that, during the late Basketmaker III occupation of the site, large game and diverse species were less available than during earlier-Basketmaker III phases.

Depopulation

The early Basketmaker III inhabitants of the TJ Smith site untenanted the locale after cleaning out at least some of the surface pit rooms. In contrast, the late Basketmaker III occupants formally decommissioned their pithouse and likely the associated roomblock when they moved away from the site at the end of the seventh century. Prior to leaving they filled the interior of Pithouse 111 with small-diameter twigs to ignite the structure, which burned so hot that both the roof adobe and sections of the floor vitrified. Burned adobe fragments in the roomblock remains along the west edge of the site suggest that they also burned the associated surface roomblock. Two fragments of adult human bone in the upper fill of Pithouse 111 attests to families in the area returning to the site after it was decommissioned to bury their dead in the pithouse fill.

Site Summary and Conclusions

Basketmaker Communities Project investigations demonstrated that both an early and a late Basketmaker III hamlet were built at the TJ Smith site between A.D. 535 and 720. The earlier occupation was evidenced by an east–west roomblock, and the later occupation was evidenced by a substantial pithouse. Both households likely consisted of an extended family unit who occupied the site for a single generation. These families farmed maize in a low-density portion of the larger settlement. They had access to wild plants, a pinyon and juniper forest, and basketry and pottery resources but may have found wild game difficult to procure.

Though evidence for basic subsistence is the same at the TJ Smith site as at other sites across the community, the lack of specialty plant and animal resources and the paltry accumulation of pottery and lithics at the TJ Smith site suggest that the inhabitants were poorer than other members of the community, especially those living adjacent to the Dillard site in the late Basketmaker III phase. Despite this wealth disparity, the TJ Smith site is the only Basketmaker Communities Project hamlet occupied twice during the extended use of the Dillard site as a community center. The reoccupation of the site and the possible burial of an individual in the upper fill of the pithouse after it was decommisioned suggest that a portion of the community had a long-term connection to the site but felt little pressure to continuously occupy the locale.

Figure 6.1. Aerial photograph of the TJ Smith site during Basketmaker Communities Project excavations.

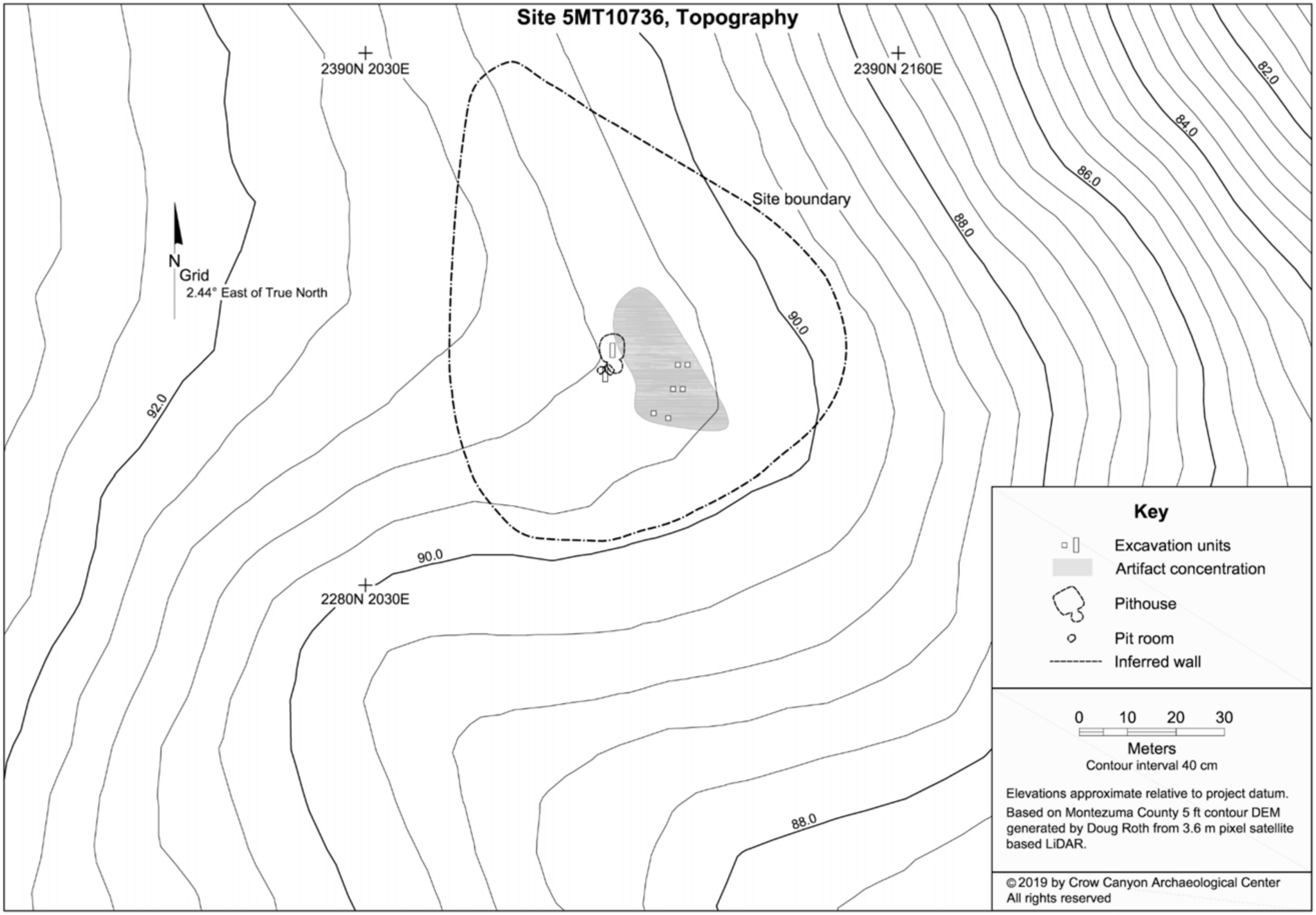

Figure 6.2. Topographic map of the TJ Smith site vicinity.

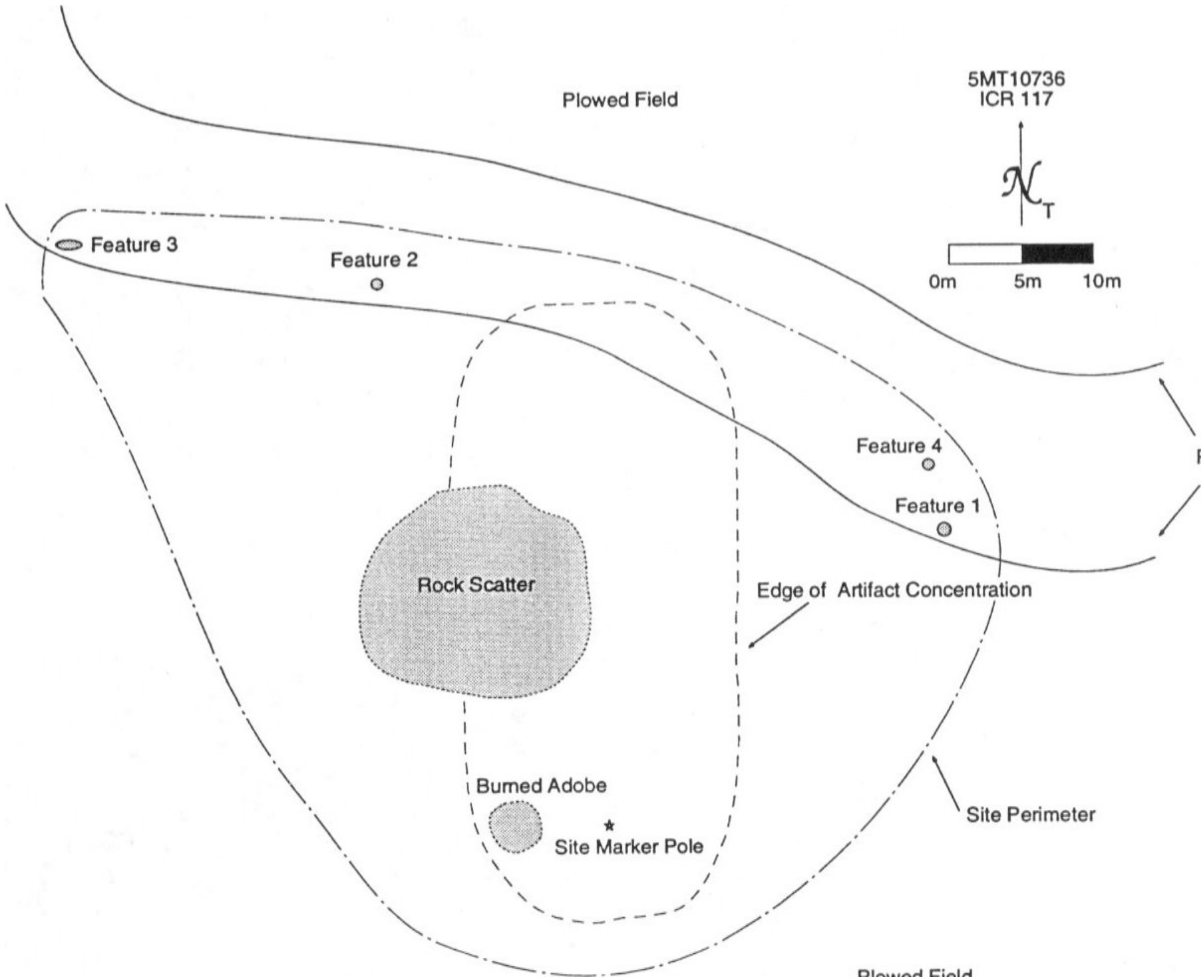

Figure 6.3. Survey sketch of the TJ Smith site from the 1995 Colorado Cultural Resource Management Form (Fetterman et al. 1995:7).

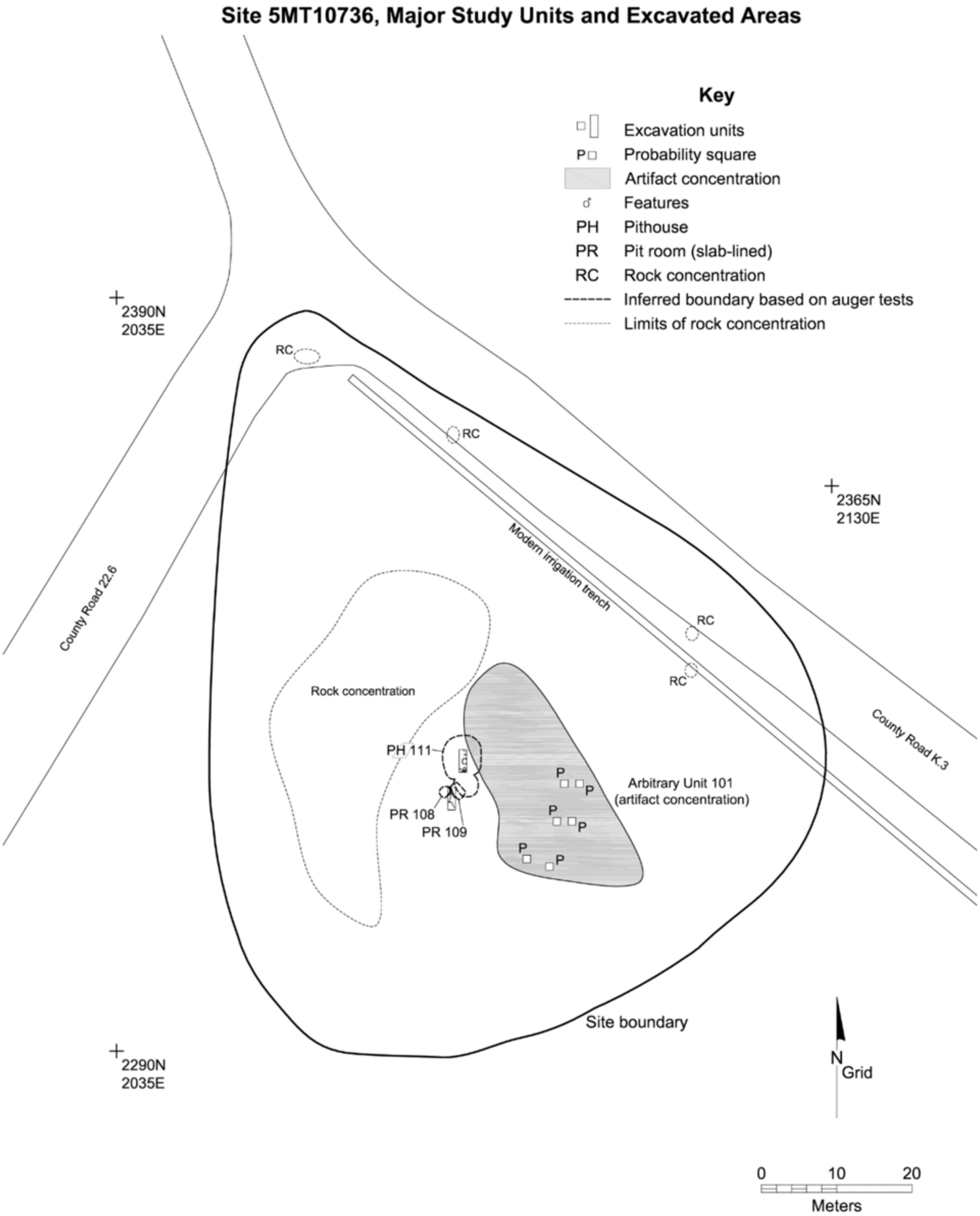

Figure 6.4. Map of the TJ Smith site (5MT10736) showing all major cultural units and excavation units.

Figure 6.5. Photograph of a Crow Canyon crew member excavating at the TJ Smith site during the Basketmaker Communities Project.

Figure 6.6. Photograph of Pit Rooms 108 and 109 at the TJ Smith site.

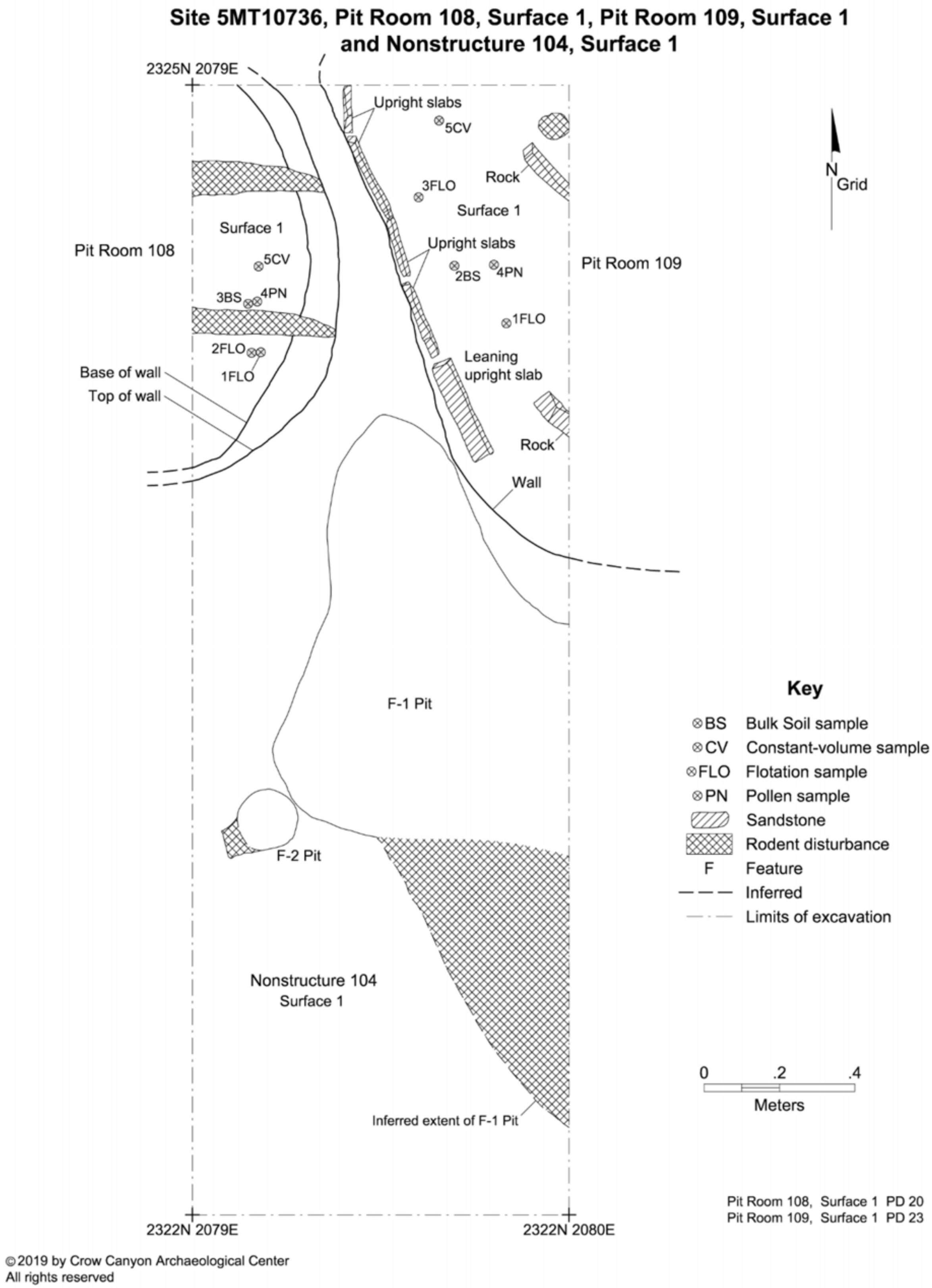

Figure 6.7. Plan map of Pit Rooms 108 and 109 at the TJ Smith site.

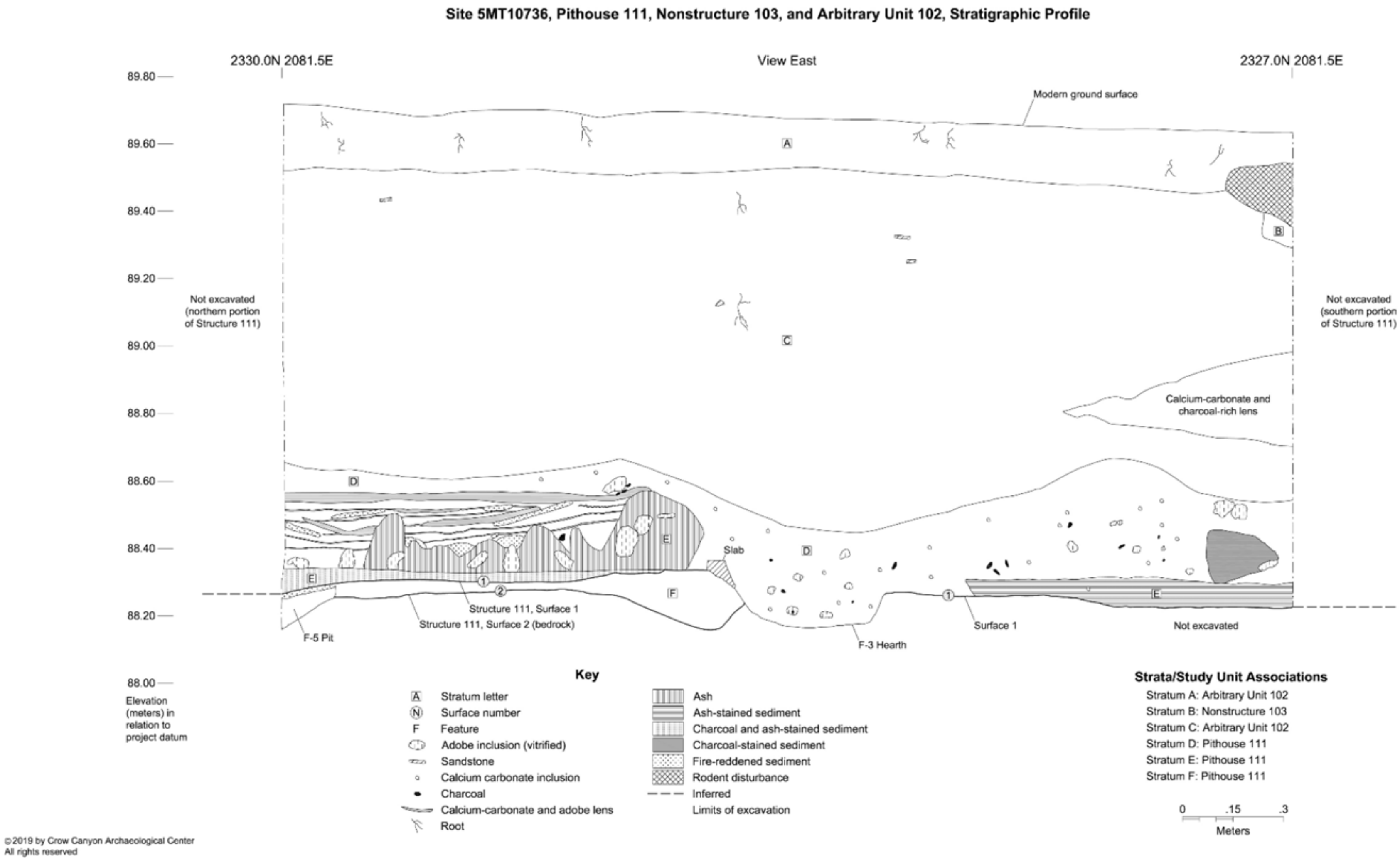

Figure 6.8. Stratigraphic profile of Pithouse 111 at the TJ Smith site.

Figure 6.9. Photograph of Pithouse 111 at the TJ Smith site, facing south. Note: sipapu not yet excavated.

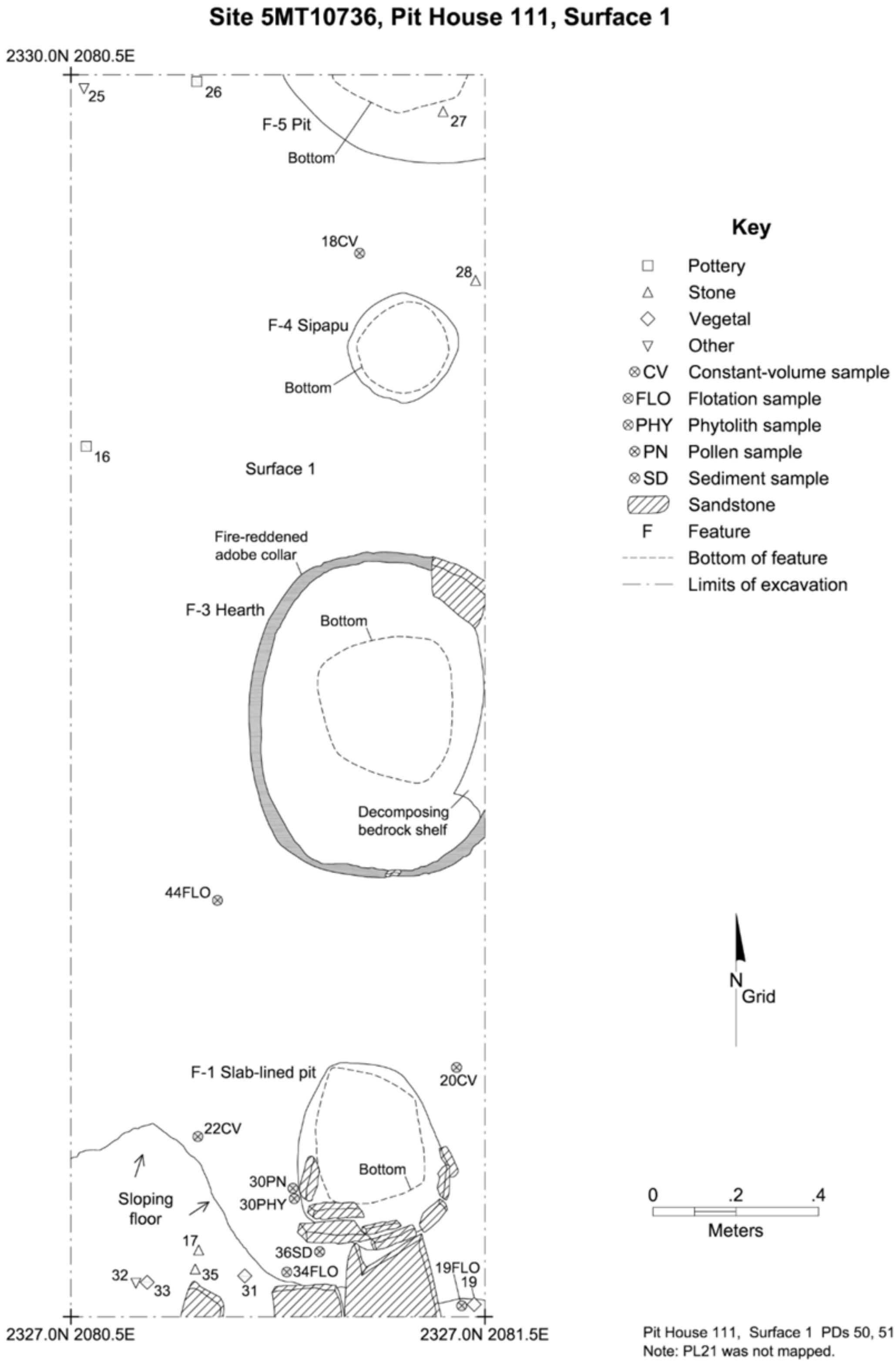

Figure 6.10. Plan map of Pithouse 111, Surface 1 at the TJ Smith site.

Table 6.1. Unmodified Sherds Recovered from the Surface of Pithouse 111, 5MT10736.

Feature Number (Type)	Pottery Type	Pottery Form	N	Weight (g)
	Indeterminate Local Gray	Jar	1	302.00
3 (Hearth)	Indeterminate Local Gray	Jar	3	34.40
5 (Pit: Not Further Specified)	Indeterminate Local Gray	Jar	1	124.00
	Indeterminate Local Gray	Unknown	1	1.10
Total			6	461.50

Table 6.2. Bulk Chipped Stone Recovered from the Surface of Pithouse 111, 5MT10736.

Feature Number (Type)	Material Type	Chipped Stone Category	N (<1/4 in)	Weight (g) (<1/4 in)	N (>1/4 in)	Weight (g) (>1/4 in)
	Morrison mudstone	Utilized flake			1	8.70
1 (Pit: Slab-Lined)	Dakota/Burro Canyon silicified sandstone	Debitage	2	0.00		
	Morrison chert	Debitage	1	0.00		
	Morrison mudstone	Debitage	1	0.00		
4 (Pit: Not Further Specified)	Agate/chalcedony	Debitage	12	0.00		
	Burro Canyon chert	Debitage	4	0.00		
	Dakota/Burro Canyon silicified sandstone	Debitage	3	0.00		
	Morrison chert	Debitage	1	0.00		
	Morrison mudstone	Debitage	15	0.00		
	Morrison silicified sandstone	Debitage	10	0.00		
	Red jasper	Debitage	1	0.00		
	Slate/shale	Debitage	1	0.00		
5 (Pit: Not Further Specified)	Agate/chalcedony	Debitage	3	0.00		
	Agate/chalcedony	Debitage			1	4.30
	Burro Canyon chert	Debitage	7	0.00	2	10.10
	Dakota/Burro Canyon silicified sandstone	Debitage	1	0.00		
	Morrison silicified sandstone	Debitage	1	0.00		
	Morrison chert	Utilized flake			3	32.20
Total			63	0.00	7	55.30

Table 6.3. Other Artifacts and Samples from the Surface of Pithouse 111, 5MT10736.

Grouped Artifact Category	Artifact Type	Condition	Material Type	N of Samples	N of Items	Weight (g)
Animal Bone	Nonhuman bone			6		0.50
Flaked Lithic Tool	Biface	Incomplete	Dakota/Burro Canyon silicified sandstone	1	1	12.20
	Biface	Fragment	Burro Canyon chert	1	1	1.90
Non-flaked Lithic Tool	Bulk indeterminate ground stone	Fragment	Sandstone	2	12	1,966.70
	Other modified stone/mineral	Fragment	Sandstone	1	1	60.10
Organic	Textile	Fragment	Fragments of twine	1	3	0.40
Other Inorganic	Adobe			1		371.40
Sample	Constant volume sample			2		
	Flotation sample			18		
Total				33	18	2,413.20

Table 6.4. Summary of Unmodified Sherds by Ware and Type for 5MT10736.

Ware and Type	Count	% by Count	Weight (g)	% by Weight (g)
Brown Ware				
Basketmaker Mud Ware	1	0.34	3.20	0.10
Sambrito Utility	1	0.34	8.40	0.27
Plain Gray Ware				
Chapin Gray	3	1.01	9.40	0.30
Indeterminate Local Gray	240	80.81	2,698.80	87.04
Indeterminate Local Gray, Polished	35	11.78	291.30	9.39
White Ware				
Chapin Black-on-white	2	0.67	22.00	0.71
Early White Painted	8	2.69	43.40	1.40
Early White Unpainted	3	1.01	18.30	0.59
Red Ware				
Bluff Black-on-red	4	1.35	5.90	0.19
Total	297	100.00	3,100.70	100.00

Table 6.5. Count of Chipped-Stone Artifacts by Raw Material Type for 5MT10736.

Material Category	Raw Material	Count	% by Count	Weight (g)	% by Weight (g)
Local	Dakota/Burro Canyon silicified sandstone	35	12.41	155.50	22.83
	Igneous	9	3.19	21.80	3.20
	Morrison chert	9	3.19	39.60	5.81
	Morrison mudstone	117	41.49	310.30	45.57
	Morrison silicified sandstone	57	20.21	112.20	16.48
	Sandstone	6	2.13	18.40	2.70
	Slate/shale	1	0.35	0.00	0.00
Nonlocal	Red jasper	2	0.71	0.50	0.07
Semi-local	Agate/chalcedony	28	9.93	7.70	1.13
	Brushy Basin chert	3	1.06	0.60	0.09
	Burro Canyon chert	14	4.96	13.20	1.94
Unknown	Unknown silicified sandstone	1	0.35	1.20	0.18
Total		282	100.00	681.00	100.00

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2014 Intensive Surface Documentation of Basketmaker III Sites on Indian Camp Ranch, Colorado. Woods Canyon Archaeological Consultants, Cortez, Colorado.

Chapter 7

The Switchback Site (5MT2032)

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Introduction

The Switchback site (5MT2032) is located in the southeast portion of the Indian Camp Ranch Archaeological District. The site runs down the southeast slope of a north to south–trending ridge. This ridge is one of the tallest landforms in Indian Camp Ranch, and it overlooks Alkali Canyon to the west and the low-lying Dillard site ridge to the southeast. The site was named by landowner Jane Dillard for its location along the north and east side of the switchback turn in the access road to her house.

The Switchback site was first recorded in 1969 by Dale Hayhurst of the University of Colorado (Hayhurst 1969). The site was on Bureau of Land Management lands at the time, and the site was likely recorded as part of chaining activities in the Dolores Grazing District Colorado # 4. The site was rerecorded in 1993 by Woods Canyon as part of the Indian Camp Ranch Archaeological Survey (Fetterman and Honeycutt 1994). Prior to documentation, the ridge was chained to remove old growth pinyon and juniper (Figure 7.1). Indian Camp Ranch developer, Archie Hanson, used heavy equipment to manage vegetation on the site and burned the windrows, disturbing some surface deposits and leaving several piles and patches of ash. After the site was recorded, Indian Camp Ranch was parceled into lots. Lot 6, which includes the Switchback site, was sold to Jane Dillard who installed a driveway along the top of the ridge, further impacting the cultural deposits along the upper west edge of the site. A Pueblo I site 80 m south of the Switchback site was mistakenly rerecorded with the same site number in 2003, again by Woods Canyon, as part of the Cultural Resource Survey of Indian Camp Hazardous Fuels Reduction Project (Shanks 2014).

Numerous other sites dating to the Basketmaker III period are documented in the vicinity of the Switchback site (Fetterman 2004; Fetterman and Honeycutt 1994; Shanks 2014). Adjacent to the Switchback site on the ridgetop are 5MT10646, 5MT10711, 5MT10713, and 5MT10714 (see Figure 1.4). These five sites are likely part of the same multi-household site. Site 5MT10711 (the Ridgeline site) is 40 m north and on the west (opposite) side of the driveway from the Switchback site and was also investigated during the Basketmaker Communities Project. Excavations confirmed the presence of a central long-lived oversized pithouse. The pattern of an oversized pithouse and a few standard-sized households is repeated in a set of adjacent sites (5MT3890, 5MT10639, and 5MT10656) centered on an oversized pithouse on the Windrow site (5MT3890) on a prominent ridge a quarter mile to the east of the Switchback site. Between the Switchback and Ridgeline site complex on the western ridge and the Windrow site complex on the eastern ridge is the Dillard site complex (5MT10640, 5MT10641, 5MT10642, 5MT10643, and 5MT10647), which includes at least 10 households centered on an early great kiva (see

Chapter 5). Together, these sites constitute the densest Basketmaker III occupation in the study area and served as the focal point for the surrounding community.

The Switchback site was selected for investigation because it represented a well-preserved Basketmaker III habitation with a roomblock, pit structure, and midden deposits (Figure 7.2) in the vicinity of the Dillard site great kiva. Sampling of these proveniences was expected to contribute to our understanding of (1) the development of the Indian Camp Ranch community, (2) the occupants' relationship to the great kiva at the Dillard site, and (3) the relative wealth and length of occupation at farming hamlets (Ortman et al. 2011).

The surface signature of the Switchback site is typical for a late Basketmaker III hamlet in the Mesa Verde region (Wilshusen 1999). An L-shaped 25-m-long roomblock of adjacent circular rooms, evidenced by upright and fallen wall slabs, runs along the ridgetop above a moderately steep southeast-trending slope (Figure 7.3). Covering 0.4 acres of the slope are Basketmaker III period artifacts. The pithouse location is not evident from the surface but was assumed to be located near redeposited fill on the slope between the roomblock and midden. Charcoal and ash remnants from burning of chained windrows in the early 2000s are visible in patches across the midden deposits.

Geophysical imaging, mapping, auger testing, and excavation associated with the Basketmaker Communities Project confirmed the presence of an extensive roomblock, a double-chambered Basketmaker III pithouse, and an associated midden at the Switchback site (Figure 7.4). The Basketmaker III roomblock is L-shaped with one wing of the block arcing north–south across the slope and a shorter wing running down the slope on the north end of the block. Eight to 10 circular slab-lined rooms are in the block, built with adjacent, but not shared, slab-lined walls. The double-chambered pithouse is situated downhill to the east of the roomblock and is unusually oriented north–south across the slope with the antechamber cutting back slightly into the slope. A masonry checkdam built across a low drainage at the north edge of the site was also investigated and determined to be associated with a Pueblo II habitation (5MT2031) on the ridge 40 m north of the Switchback site.

Approximately three percent (46 m^2) of the total site area was excavated during the Basketmaker Communities Project using 33 excavation units. Most excavation was limited to random testing units (1-x-1-m). However, the architectural focus of the research design (see Chapter 2) required that larger targeted sampling be applied to structure and feature investigations (1-x-3-m and 2-x-2-m units). What follows is a summary of excavation results.

Chronology

Investigations at the Switchback site suggest it was occupied during the late Basketmaker III phase and into the early Pueblo I period. Diagnostic pottery on the surface of the site includes Chapin Black-on-white and Chapin Gray Ware. The large north to south–oriented double-chambered pithouse and associated roomblock built of circular slab-lined rooms indicate a late Basketmaker III to early Pueblo I construction. The University of Arizona tree-ring lab was unable to date any of the 59 burned beam samples submitted for dendrochronology. However, excavation samples from Pithouse 110 and Pit Room 113 produced other absolute dates. Three

AMS dates and an archaeomagnetic sample support a late seventh-century to early eighth-century occupation between A.D. 675 and 740 (see Chapter 19).

Architecture

The Basketmaker III elements at the Switchback site are considered to be part of a single architectural block (Block 100) comprising the L-shaped roomblock and the double-chambered pithouse. The settlement layout is generally consistent with other late Basketmaker III hamlet sites in the Mesa Verde region (Wilshusen 1999) with a linear upright slab roomblock running across a southeast-trending slope and a double-chambered pithouse built into the slope just below the roomblock. The site layout differs in that the pithouse is not oriented down the slope but across it, paralleling the roomblock. This orientation may be an adaptation to the steep pitch of the slope, but it also reflects compliance with direct north–south orientation trends at the end of the Basketmaker III period (see Chapter 29).

The arcing roomblock at the site is substantial for the Basketmaker III period. It measures 25 m north–south with an 8-m-long added east–west wing. The roomblock is one to two rooms wide and constructed of nine to 11 adjacent circular pit rooms, evidenced by upright and fallen wall slabs. A 2-x-2-m test unit excavated into Pit Room 113, the pit room at the juncture of the two roomblock wings, provides an example of the roomblock construction (Figure 7.5). The test of Pit Room 113 revealed that though the rooms are built next to one another, they are isolated entities that do not share walls. Pit Room 113 is an irregular ovoid measuring 2.10 m long and 2.05 m wide, is shallowly excavated (just 0.18 m deep), and is lined with medium-to-large upright slabs socketed into customized footer trenches around the edge of the pit room. A second row of upright slabs were leaned against the interior of the socketed upright slabs and mortared into place likely sandwiching and supporting small-diameter upright beams used to frame the walls and roof of the structure. This framework was supported by one additional post seated in the floor and covered with approximately 0.4 m of adobe and sporadic sandstone pieces to seal the roof and walls. In the case of Pit Room 113, a 0.80-m-wide gap was left in the east wall of the room, possibly as an access point from the adjacent room. A 0.35-m-deep storage pit along the east wall was the only floor feature in the room. Thus configured, the room provided a marginally accessible sitting space with enough floor area for work projects. In the case of Pit Room 113, this activity appears to have been pottery production. The floor assemblage includes two balls of high-quality raw clay and three pieces of ground stone fragments coated with clay. The clay-coated ground stone may be pottery clay mixing and coiling stations or even pukis on which to form pots. Pottery production in the room is also supported by the fact that Pit Room 113 has the highest levels of beeweed pollen of any pit room tested during the Basketmaker Communities Project (see Chapter 22). Beeweed is a known plant source of black pottery paint used by the ancestral Pueblo people. Artifacts recovered from the surface of this room are listed in Tables 7.1, 7.2, and 7.3. Items stored in the room included one bone awl manufactured from a right dog/wolf/coyote ulna and a polished rib fragment that may be a portion of a bracelet or other type of adornment (see Chapter 20).

The pithouse orientation, shape, and size were delineated based on electrical resistivity imaging and auger probe tests (see Chapter 3). Based on this information the main chamber (Pithouse 110) measures 6.0-x-5.25 m, and the antechamber to the south measures about 2.5 m in diameter and 0.45 cm deep. The two chambers were likely connected by a short access tunnel. A 2-x-2-m test unit into the center of Pithouse 110 confirmed that the main chamber is 1.15 m deep and was formally constructed and decomissioned. The test unit captured the deflector, wing wall, one main support post, ashpit, hearth, and a 0.8-m-tall storage bin in the southeast corner (Figure 7.6 and Figure 7.7). The floor likely includes a sipapu, but the test unit was placed too far south to locate such a feature. The floor, wing wall, deflector, and bin of the main chamber were plastered with an orange-buff silt that naturally occurs on site. A slightly browner material was used to remodel the structure at a later date: resurfacing the floor, coping the hearth, capping the ashpit, and creating a single low wall across the southern third of the main chamber by attaching the wing walls to the deflector. The standing corner bin in Pithouse 110 is one of the most unusual features excavated during the project because it is standing at nearly its full height. The east edge of the test unit exposed the west wall face and the round access port in its center sealed with a shaped slab and adobe. The port was opened, but the interior of the bin was filled with windblown sediment and no contents could be collected. All artifacts and samples recovered from the surface of this pithouse are presented in Tables 7.4, 7.5, and 7.6. Domestic artifacts, including sherds from Chapin Gray bowls and jars and Chapin Black-on-white bowls and ground stone fragments were left in place on the structure's floor.

Demography

The Switchback site likely housed a single extended family for one or two generations. This is based on the lone double-chambered pithouse on the site and the extensive remodeling of that structure. The occupants appear to have been materially wealthy compared with other Basketmaker III habitations. This is evidenced by the large storage capacity and high artifact density at the site. The Switchback roomblock is one of the largest Basketmaker III surface structures on Indian Camp Ranch, and the site is in the top 10 percent for Basketmaker III site artifact density (Shanks 2014). This wealth could be the legacy of hereditary wealth accumulated over a century by the population occupying the adjacent ridgetop.

The Switchback extended family may have been related to the occupants of the Ridgeline site (5MT10711) who homesteaded the ridge 50 years earlier in the mid-seventh century. By the time the structures at the Switchback site were built at the end of the seventh century, the standard-sized double-chambered pithouse at the Ridgeline site had been converted into a massive oversized pit structure (see Chapter 8). This oversized pit structure was certainly the focal point for the cluster of late Basketmaker III households on the ridge (5MT2032, 5MT10646, 5MT10713, and 5MT10714), including the Switchback household. The fact that the Switchback site was built on a fairly steep slope off the east side of the ridge could reflect the desire by the inhabitants to build as closely to the Ridgeline site as possible despite the less desirable location.

Artifacts

Artifacts recovered from the Switchback site consist of domestic refuse, with a few specialty items that suggest long-distance trade and exchange. All unmodified sherds found at the site are presented in Table 7.7. Most of the pottery sherds come from gray ware vessels, including Chapin Gray and Indeterminate Local Gray, with white wares making up about 8 percent of the pottery assemblage. One brown ware and one red ware sherd were also recovered. Chipped-stone artifacts by raw material type are presented in Table 7.8. Most of the chipped-stone flakes and debitage are made of local raw materials, primarily from the Morrison geologic location. Nonlocal chipped stone consists of one piece of obsidian and one of red jasper. The obsidian was sourced using X-ray fluorescence (XRF) analysis to the El Rechuelos formation in the Jemez Mountains of north-central New Mexico (Shackley 2015).

Artifacts assist with identifying the use of particular rooms at the Switchback site. The clay-coated ground stone and raw clay found in Pit Room 113 suggest that pottery production occurred in this location. The bone awl found in Pit Room 113 indicates sewing, weaving, or basketry construction, and the unique polished bone fragment may be an object of personal adornment (see Chapter 20).

Artifacts from Pit Room110, a pithouse, compose a typical domestic habitation artifact assemblage, with pottery, ground stone tools, chipped stone, an awl, a projectile point, and pigment. This pithouse assemblage also includes some less utilitarian and unique items, including a stone cylinder, a blue azurite ball, and a pendant.

Subsistence

The high preservation of burned plant remains (see Chapter 21), pollen (see Chapter 22), and bone (see Chapter 20) at the Switchback site resulted in one of the most complete pictures of Basketmaker III subsistence practices in the Basketmaker Communities Project study area. The site occupants relied on wild, cultivated, and domesticated food sources and appear to have brought with them certain food and cuisine preferences.

Domesticated and cultivated plants included maize and seeds of weeds that thrive in maize fields, such as pigweed, goosefoot, and purslane. A wide range of wild plants representing additional foods were also recovered: sagebrush, sunflower, and bulrush achenes; grasses including domesticated little barley grains and wild ricegrass grains; and wild tansy mustard seeds, globemallow seeds, groundcherry seeds, saltbush fruit, bugseed seeds, dropseed grass grains, and juniper seeds. The domesticated little barley grains, a first for the southwestern Colorado region, have been fully reported elsewhere (Graham et al. 2017). According to ethnobotanist Karen Adams, little barley grass is a Hohokam domesticate that must have been redomesticated in the Mesa Verde region, traded up north onto the Colorado Plateau, or traveled with migrants hundreds of miles from central Arizona to be incorporated into the cuisine at the Switchback site.

A few plants were harvested as spices or for smoking. Pollen analysis found ubiquitous evidence of a member of the wild carrot family; its roots were eaten raw or baked, and the aromatic leaves and flowers were widely used as a spice (Dunmire and Tierney 1995; Moerman 1998). Colorado beeweed, which is known for spicy leaves, flowers, and fruits, was found across the site (Adams and Bowyer 2002). Seeds of wild tobacco, likely smoked in a pipe, were found in the hearth of Main Chamber 110.

Faunal food sources were dominated by small wild game—cottontail and ground squirrel in particular. The medium-sized mammal remains at the site are long bones or cancellous bone fragments, suggesting that these animals were hunted away from the site and only the fore and hind quarters were brought back to the site.

Materials for making pottery and chipped-stone tools are locally available near the Switchback site. The adjacent Dakota and Morrison geologic formations provided both clay and chipped-stone materials that were used by the residents of the Switchback site. A pottery resource survey, conducted on an area adjacent to the Indian Camp Ranch community and discussed in more detail in Chapter 24, identified many available outcrops of clay from the Dakota geologic formation, which appear compositionally similar to the archaeological pottery sherds recovered at the Switchback site. Rock from nearby Dakota and Morrison geologic formations were the preferred raw materials for making chipped-stone tools at the Switchback site. Morrison formation outcrops are accessible in Alkali Canyon, just to the northwest of the Switchback site.

Depopulation

Both the roomblock and the pithouse at the Switchback site were burned when they were decomissioned between A.D. 725 and 740. In both cases the level of burning was intense enough to carbonize roof beams and vitrify construction adobe, indicating that this was a deliberate and calculated decommissioning process. The decommissioning of the site coincides or slightly postdates the burning of the oversized pithouse at the adjacent Ridgeline site, suggesting that the entire habitation cluster on the ridge may have been decomissioned at the same time.

Site Summary and Conclusions

Investigations of the Switchback site confirmed that the site is a late Basketmaker III hamlet occupied between A.D. 675 and 740. The Switchback site is just one of several late Basketmaker III habitations in a cluster surrounding the oversized pithouse at the Ridgeline site, 25 m to the northwest. The Switchback inhabitants may have been related to the occupants of the Ridgeline site (5MT10711) who homesteaded the ridge 50 years earlier in the mid-seventh century. The large storage capacity and high artifact density at the Switchback site certainly reflect the material wealth found at sites along the same ridge. This wealth may be the legacy of a hundred years of occupation and accumulation by a hereditary group. Importantly, the occupants of this ridge overlooked and had direct access to the Dillard site great kiva on the next ridge to the southeast.

Sampling of the L-shaped roomblock and the heavily remodeled double-chambered pithouse found a wide array of domestic activities including pottery production, corn mealing, long-term storage, and cooking. There is also evidence that inhabitants were engaged in jewelry production, mineral collection, smoking tobacco, weaving, and hunting. The site occupants relied on wild, cultivated, and domesticated food sources and had very specific cuisine preferences including little barley, from the Hohokam region, and wild carrot as a seasoning.

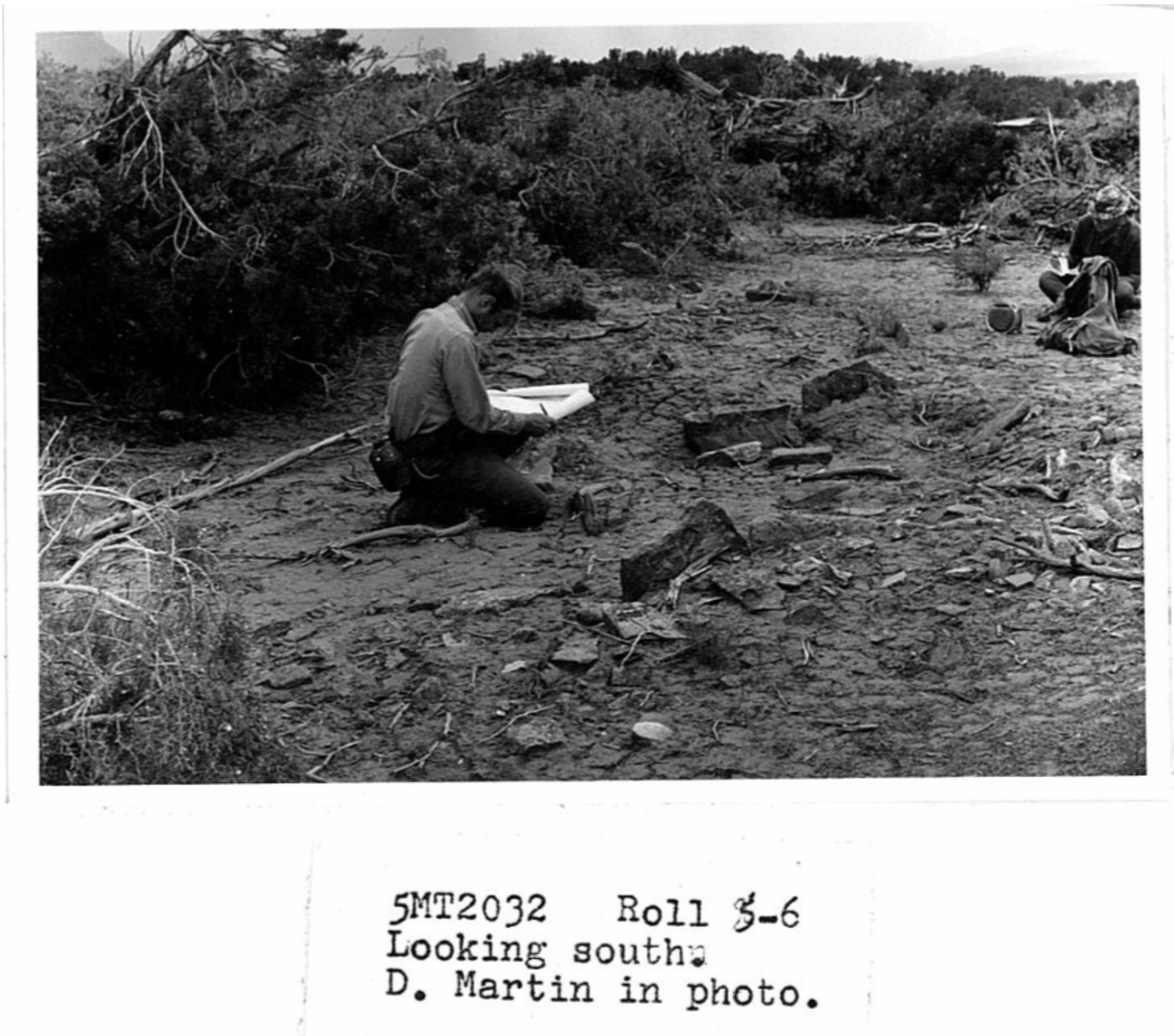

Figure 7.1. Photo of the Switchback site taken during its recording by Dale Hayhurst of the University of Colorado in 1969. Note the chained and windrowed trees piled around the remnants of the roomblock. (Fetterman et al. 2003:17)

Figure 7.2. Photograph of the Switchback site with Jane Dillard's house in the background.

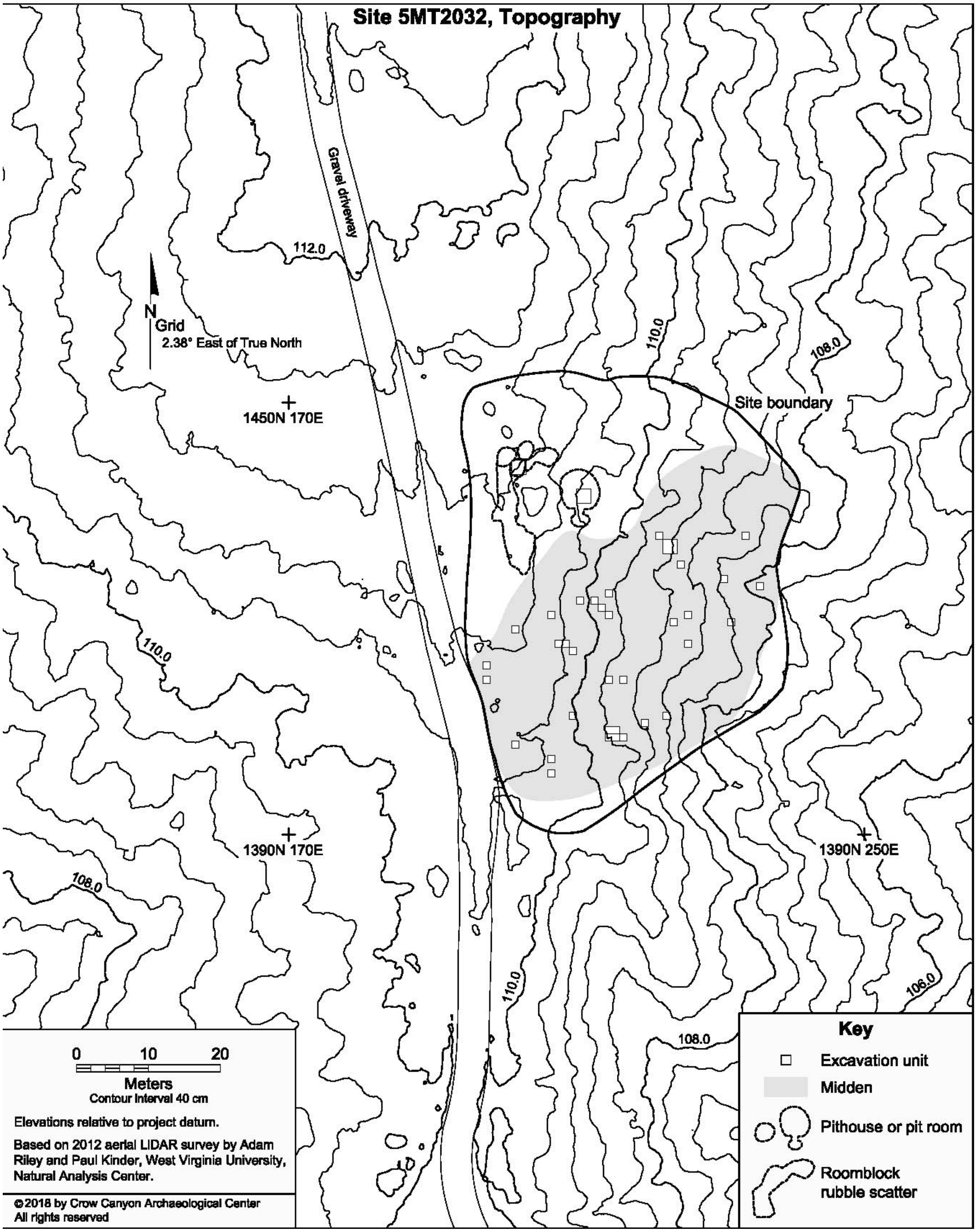

Figure 7.3. Topographic map of the Switchback site.

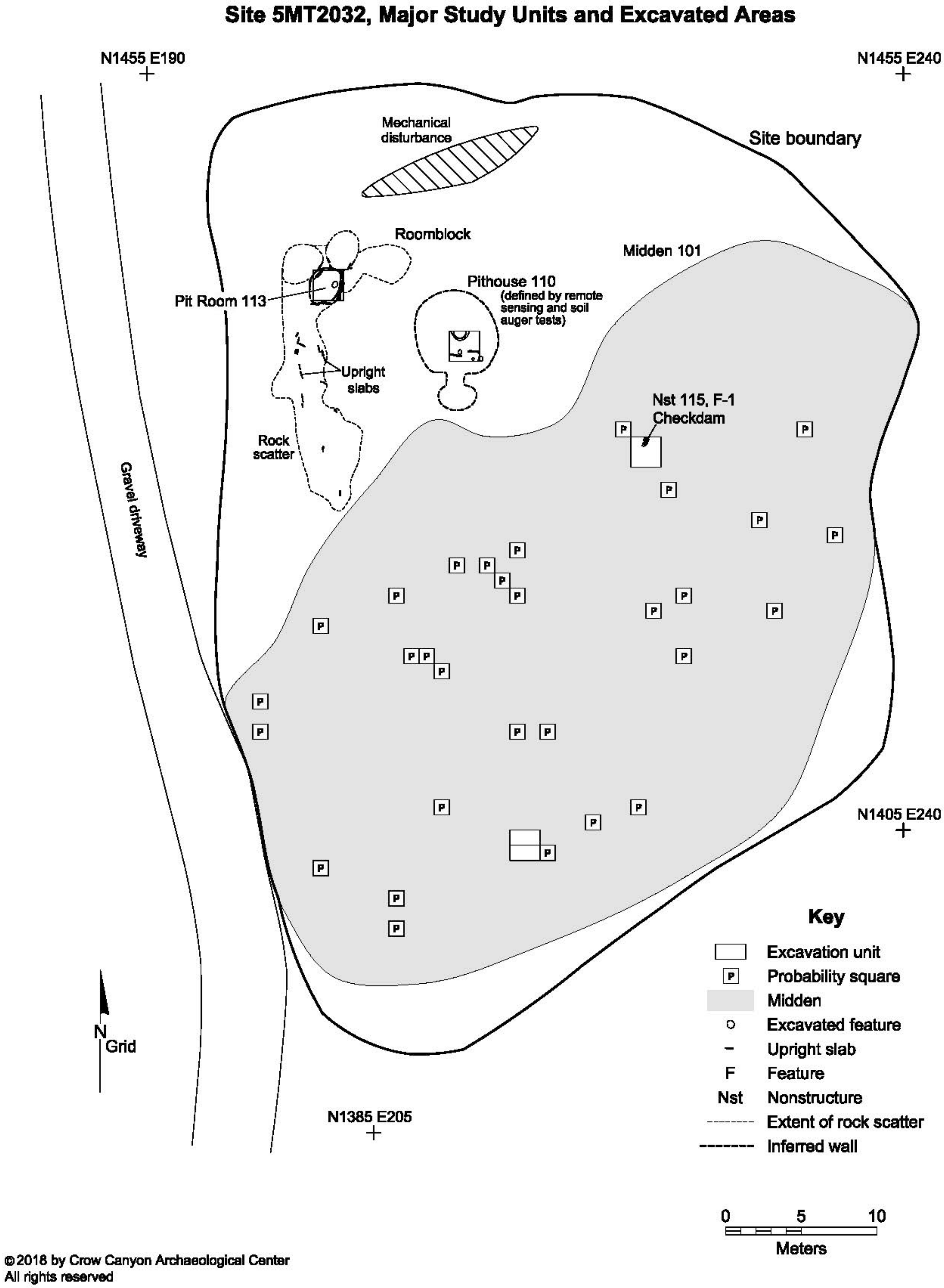

Figure 7.4. Map of the Switchback site showing all major cultural units and excavation units.

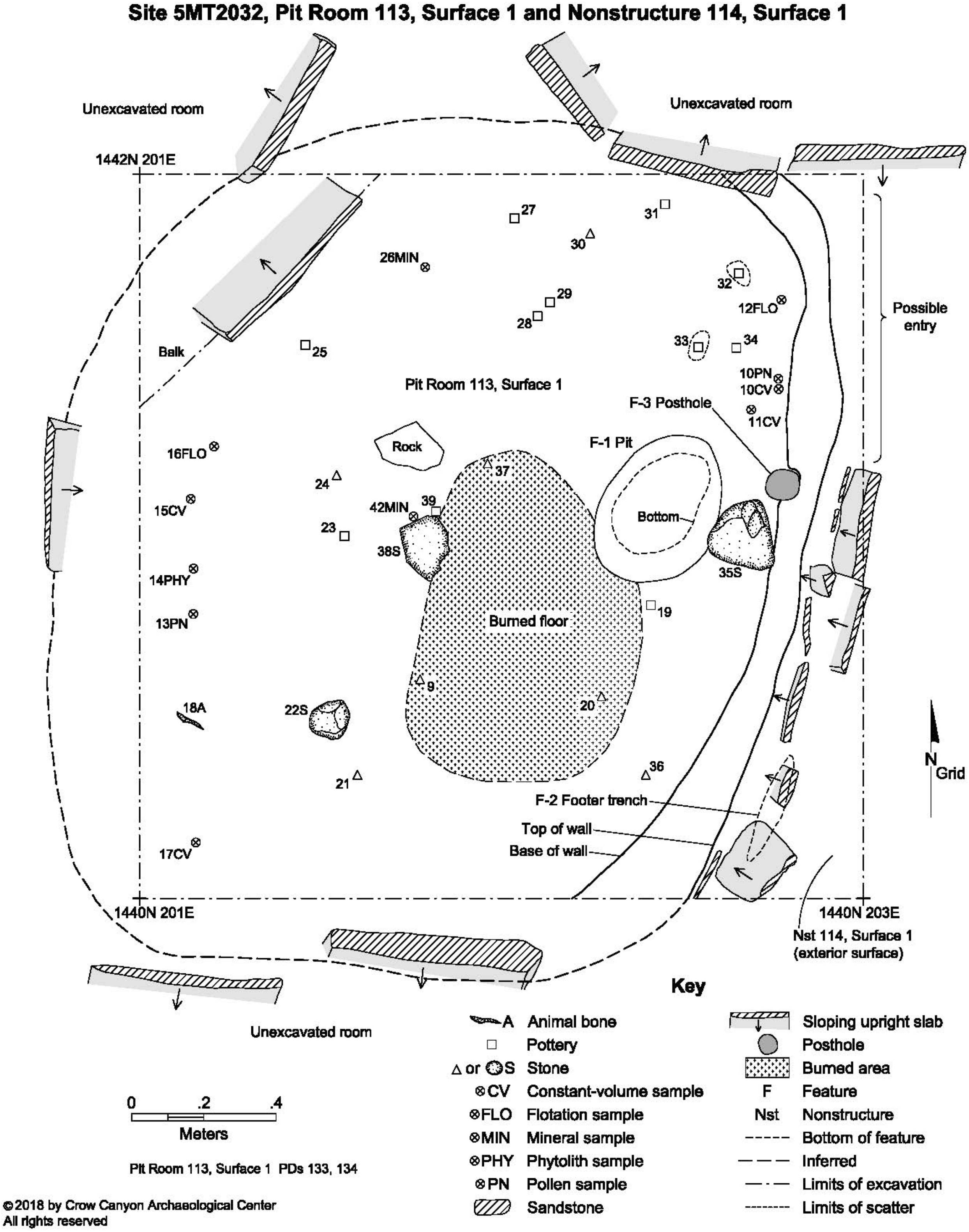

Figure 7.5. Map of Pit Room 113 at the Switchback site.

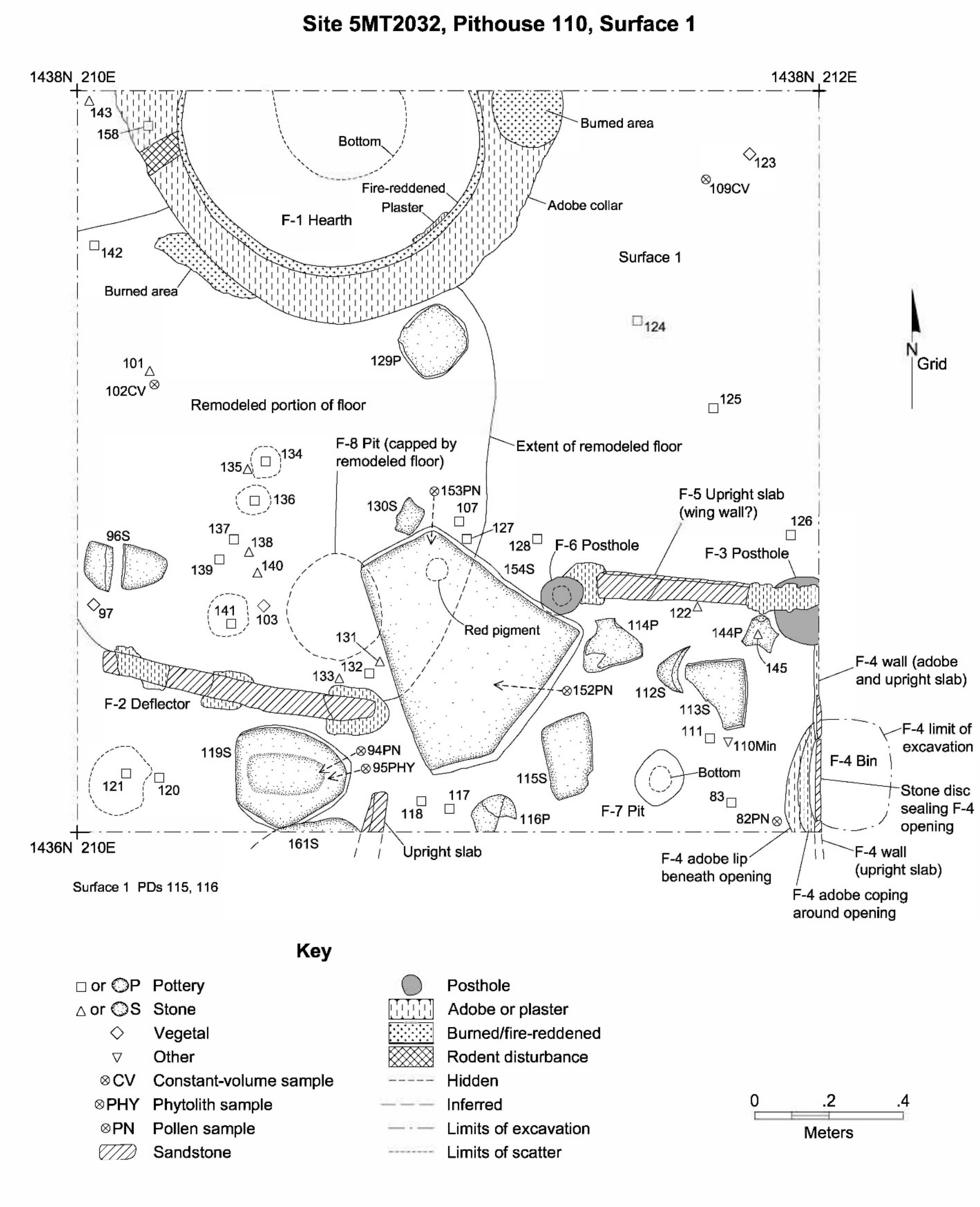

Figure 7.6. Floor map of Pithouse Main Chamber 110, Surface 1 at the Switchback site.

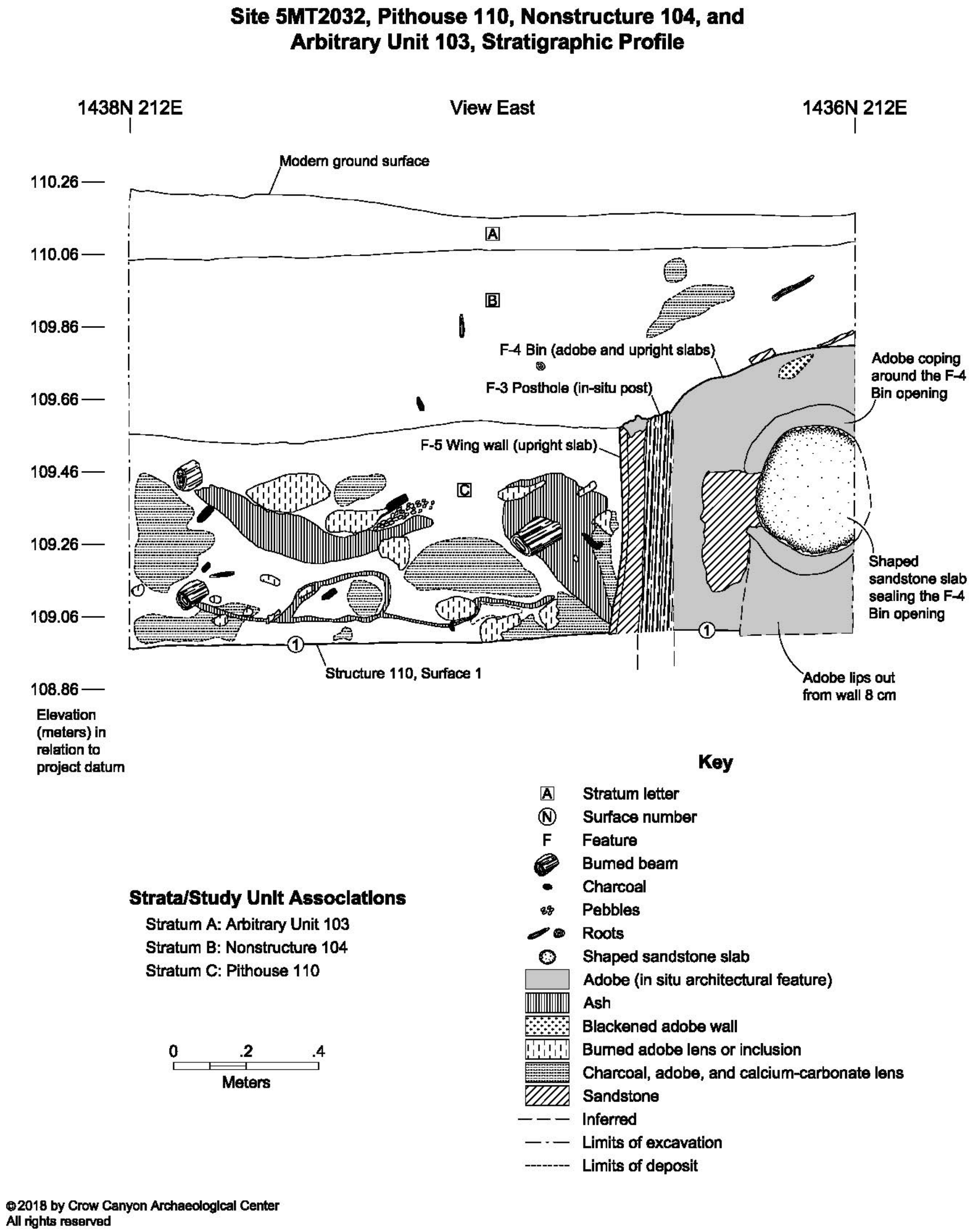

Figure 7.7. Stratigraphic profile of the east wall of the test unit into Pithouse Main Chamber 110 at the Switchback site illustrating the west face of a standing storage bin (Feature 4).

Table 7.1. Unmodified Sherds Recovered from the Surface of Pit Room 113, 5MT2032.

Feature Number (Type)	Pottery Type	Pottery Form	N	Weight (g)
	Indeterminate Local Gray	Jar	7	115.40
	Indeterminate Local Gray	Unknown	1	8.20
1 (Pit: Not Further Specified)	Indeterminate Local Gray	Jar	2	25.40
Total			10	149.00

Table 7.2. Bulk Chipped Stone Recovered from the Surface of Pit Room 113, 5MT2032.

Feature Number (Type)	Material Type	Chipped Stone Category	N (>1/4 in)	Weight (g) (>1/4 in)	N (<1/4 in)	Weight (g) (<1/4 in)
	Morrison mudstone	Debitage	1	1.20		
	Morrison silicified sandstone	Debitage	3	16.50		
1 (Pit: Not Further Specified)	Morrison silicified sandstone	Debitage	1	1.90		
3 (Posthole)	Morrison mudstone	Debitage			1	0.00
	Morrison silicified sandstone	Debitage			1	0.00
Total			5	19.60	2	0.00

Table 7.3. Other Artifacts and Samples from the Surface of Pit Room 113, 5MT2032.

Grouped Artifact Category	Artifact Type	Condition	Material Type	N of Samples	N of Items	Weight (g)
Flaked Lithic Tool	Core	Complete	Morrison silicified sandstone	1	1	329.30
Non-flaked Lithic Tool	Bulk indeterminate ground stone		Sandstone	1	1	531.40
Other Inorganic	Mineral/stone sample		Clay	2	5	33.10
Sample	Constant volume sample			3		
	Flotation sample			1		
Total				8	7	893.80

Table 7.4. Unmodified Sherds Recovered from the Surface of Pithouse 110, 5MT2032.

Feature Number (Type)	Pottery Type	Pottery Form	N	Weight (g)
	Chapin Gray	Bowl	2	9.10
	Chapin Gray	Jar	1	271.10
	Chapin Gray	Seed jar	1	68.30
	Indeterminate Local Gray	Bowl	10	49.70
	Indeterminate Local Gray	Jar	38	604.70
	Indeterminate Local Gray, polished	Jar	2	20.80
1 (Hearth)	Chapin Black-on-white	Bowl	1	59.70
	Indeterminate Local Gray	Jar	2	41.90
4 (Bin: Not Further Specified)	Indeterminate Local Gray	Jar	1	1.40
Total			58	1,126.70

Table 7.5. Bulk Chipped Stone Recovered from the Surface of Pithouse 110, 5MT2032.

Feature Number (Type)	Material Type	Chipped Stone Category	N (<1/4 in)	Weight (g) (<1/4 in)	N (>1/4 in)	Weight (g) (>1/4 in)
	Dakota/Burro Canyon silicified sandstone	Debitage			1	19.50
	Morrison mudstone	Debitage	3	0.10	1	4.80
	Morrison silicified sandstone	Debitage	2	0.10	3	16.50
1 (Hearth)	Morrison silicified sandstone	Debitage	1	0.00	2	0.80
4 (Bin: Not Further Specified)	Morrison chert	Debitage	1	0.00		
	Morrison silicified sandstone	Debitage	1	0.00		
8 (Pit: Not Further Specified)	Agate/chalcedony	Debitage	1	0.10		
	Dakota/Burro Canyon silicified sandstone	Debitage	3	0.00		
	Morrison mudstone	Debitage	2	0.00	1	0.00
	Morrison silicified sandstone	Debitage	2	0.00	1	0.30
Total			16	0.30	9	41.90

Table 7.6. Other Artifacts and Samples from the Surface of Pithouse 110, 5MT2032.

Grouped Artifact Category	Artifact Type	Condition	Material Type	N of Samples	N of Items	Weight (g)
Animal Bone	Nonhuman bone			6		0.30
Flaked Lithic Tool	Core	Complete	Morrison silicified sandstone	1	1	533.80
Non-flaked Lithic Tool	Bulk indeterminate ground stone		Sandstone	1	1	2,437.20
	Metate	Fragment	Sandstone	1	1	
	Other modified stone/mineral	Fragment	Morrison silicified sandstone	1	1	359.60
	Other modified stone/mineral	Complete	Pigment	1	1	2.20
	Slab metate	Complete	Sandstone	1	1	15,350.00
	Trough metate	Incomplete	Sandstone	1	1	53,000.00
Other Inorganic	Adobe			1		46.20
	Mineral/stone sample		Pigment (iron oxide)	1	1	0.70
	Mineral/stone sample		Other mineral (iron oxide)	2	2	1.40
	Unfired sherds			1	1	1.00
Sample	Constant volume sample			3		
	Flotation sample			14		
Total				35	11	71,732.40

Table 7.7. Summary of Unmodified Sherds by Ware and Type for 5MT2032.

Ware and Type	Count	% by Count	Weight (g)	% by Weight (g)
Brown Ware				
Sambrito Utility	1	0.10	3.10	0.05
Plain Gray Ware				
Chapin Gray	57	5.76	633.10	9.85
Indeterminate Local Gray	833	84.23	5,214.90	81.11
Indeterminate Local Gray, Polished	15	1.52	139.20	2.16
Corrugated Gray Ware				
Indeterminate Local Corrugated Gray	5	0.51	20.60	0.32
White Ware				
Chapin Black-on-white	20	2.02	175.70	2.73
Early White Painted	30	3.03	111.30	1.73
Early White Unpainted	27	2.73	128.20	1.99
Red Ware				
Indeterminate Local Red Unpainted	1	0.10	3.70	0.06
Total	989	100.00	6,429.80	100.00

Table 7.8. Count of Chipped-Stone Artifacts by Raw Material Type for 5MT2032.

Material Category	Raw Material	Count	% by Count	Weight (g)	% by Weight (g)
Local	Dakota/Burro Canyon silicified sandstone	120	11.39	744.70	13.55
	Igneous	47	4.46	129.70	2.36
	Morrison chert	23	2.18	105.00	1.91
	Morrison mudstone	222	21.06	839.90	15.28
	Morrison silicified sandstone	573	54.36	3,393.80	61.75
	Quartz	1	0.09	0.60	0.01
	Sandstone	5	0.47	124.20	2.26
	Slate/shale	6	0.57	89.60	1.63
Nonlocal	Obsidian	1	0.09	0.40	0.01
	Red jasper	1	0.09	0.60	0.01
Semi-local	Agate/chalcedony	11	1.04	9.40	0.17
	Brushy Basin chert	9	0.85	10.30	0.19
	Burro Canyon chert	29	2.75	42.70	0.78
	Petrified wood	1	0.09	2.30	0.04
Unknown	Unknown chert/siltstone	3	0.28	0.80	0.01
	Unknown silicified sandstone	2	0.19	1.60	0.03
Total		1,054	100.00	5,495.60	100.00

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1999 Basketmaker III (A.D. 500–750). In *Colorado Prehistory: A Context for the Southern Colorado River Basin*, edited by W. D. Lipe, M. D. Varien, and R. H. Wilshusen, pp. 166–195. Colorado Council of Professional Archaeologists, Denver.

Chapter 8

The Ridgeline Site (5MT10711)

by Shanna R. Diederichs

Introduction

The Ridgeline site (5MT10711) is in the southeast portion of the Indian Camp Ranch Archaeological District (see Figure 1.4). The site runs down the crest of a north to south–trending ridge with 1.2-m-deep eolian soils. This ridge is one of the tallest landforms in Indian Camp Ranch, and it overlooks Alkali Canyon to the west and the low-lying Dillard site ridge to the southeast. The site was named by the landowner, Jane Dillard, for its location along the ridgetop south of her guest house and west of the driveway.

Prior to its documentation, likely in the1960s, the ridge was chained to remove the old-growth pinyon and juniper forest. In the early 1990s, Indian Camp Ranch developer, Archie Hanson, used heavy equipment to consolidate the windrows and then burned them, which disturbed some of the surface deposits and left several patches of ash across the site. During this cleanup effort, Hanson clipped the cranium of a burial 15 cm below the ground surface, which Archie and Mary Hanson then excavated (Archie Hanson personal communication May 2012). The burial was reportedly in the prone position with a cluster of azurite nodules and awls on the chest. The Hansons brought the remains to an osteologist at the University of Northern Arizona (name unknown) who told them that the remains were of a young adult male. The Hansons reburied the remains off-site and stored the burial goods with the Hanson site collection at their Indian Camp Ranch property.

The Ridgeline site was recorded in 1993 by Woods Canyon as part of the Indian Camp Ranch Archaeological Survey (Fetterman and Honeycutt 1994). Woods Canyon reported the site as a Basketmaker III habitation consisting of one long roomblock of six non-contiguous rooms (Roomblock 1), a concentrated 10-x-25-m midden south of Roomblock 1 (Midden 1), a 5-x-5-m concentration of sandstone slabs (Roomblock 2) east of Roomblock 1, a 7-x-7-m midden underlying Roomblock 2 (Midden 2), and a small 3-x-3-m midden between Roomblocks 1 and 2 (Figure 8.1).

After the site was recorded, Indian Camp Ranch was parceled into lots. Lot 6, which includes the Ridgeline site, was sold to Jane Dillard who installed a driveway down the length of the ridgetop obliterating Midden 3, Roomblock 2, and most of Midden 2.

In preparation for the Basketmaker Communities Project sampling, the surface signature of the site was rerecorded (Shanks 2014), and 1,600 m^2 across the center of the site was imaged with electrical resistivity (see Chapter 3). The surface recording documented a high density of pottery at the site (1,641 pottery sherds), and the electrical resistivity imaging revealed a single pit structure anomaly south of the main roomblock. The size and shape of the pit structure indicated that it was an oversized double-chambered Basketmaker III pithouse.

The Ridgeline site was selected for investigation because it represented a well-preserved Basketmaker III habitation with at least one roomblock, an oversized pithouse, and extensive midden deposits (Figure 8.2) in the vicinity of the Dillard site great kiva. Sampling of these areas was expected to contribute to our understanding of (1) the development of the Indian Camp Ranch community, (2) the occupants' relationship to the great kiva at the Dillard site, (3) the relative wealth and length of occupation at farming hamlets, and (4) the presence or absence of community architecture beyond the great kiva (Ortman et al. 2011).

The surface signature of the Ridgeline site is typical for a large Basketmaker III hamlet in the Mesa Verde region (Wilshusen 1999). A 20-m-long roomblock runs east–west perpendicular across the west side of the ridgetop and is now truncated on the west end by the driveway. This roomblock consists of an east–west arch of circular rooms, evidenced by upright and fallen wall slabs. The pithouse location, which is 5 m south of the roomblock, is only evident as a slight discoloration of the soils in this area and small flecks of burned adobe. The entire 0.9 acres of the site is covered by a moderately dense and heavily deflated artifact scatter. Charcoal and ash remnants from burning of chained windrows in the early 2000s are visible in patches at the south end of the site.

Geophysical imaging, mapping, auger testing, and excavation associated with the Basketmaker Communities Project confirmed the presence of an extensively remodeled roomblock, a double-chambered Basketmaker III oversized pithouse, and an associated midden at the Ridgeline site. The roomblock consists of approximately 10 circular slab-lined rooms built with adjacent, but not shared, slab-lined walls. Some of the rooms were built directly on the ground surface, and others were partially subterranean and up to 0.75 m deep. The oversized pithouse is oriented north–south down the ridgeline, was extensively remodeled, and was built on the location of an earlier standard-sized pithouse. Midden deposits across the south half of the site are shallow but extensive and likely cover an additional untested roomblock and pithouse suite.

Approximately two percent (87 m^2) of the total site area was excavated during the Basketmaker Communities Project using 14 excavation units. Most excavation was limited to random testing units (1-x-1-m). However, the architectural focus of the research design (see Chapter 2) required that larger targeted sampling be applied to structure and feature investigations (halves and quarters of structures, 1-x-2-m units, and 2-x-2-m units). What follows is a summary of excavation results.

Architecture

Only one architectural block was defined at the site. From north to south, this architectural unit includes a roomblock, an oversized pithouse, and an extensive midden area.

Oversized Pithouse 101-103

The main habitation (Oversized Pithouse101103) is oriented north–south and dominates the center of the site. There is evidence that the original structure was a standard-sized double-chambered pithouse. The original main chamber measured 5-x-4.2 m (Figure 8.3) and the antechamber 3.75-x-5.4 m. Both chamber roofs were supported by square vertical-post support systems measuring 2-x-2 m in the main chamber and 2.55-x-2.65 m in the antechamber. The original carbonate-rich floors were smoothed but unplastered, and the walls were smoke blackened from use during this initial occupation. A hearth and a sipapu were built into the main chamber and reconfigured at least once during the original pithouse occupation.

The building was converted to an oversized pithouse (Oversized Pithouse 101-103) after A.D. 660 (Figure 8.4). The main chamber (Structure 101) was expanded north, east, and west to 8.07-x-7.80 m including a 0.7–1.0-m-wide native sediment bench that seated approximately 50 leaner posts. Large sandstone slabs were set in adobe along the vertical face of the bench. The support-post system was enlarged to 3.4-x-3.4 m by moving the main vertical support postholes outward. The native sediment bulk between the main chamber and antechambers was bolstered and heightened with construction mortar, and the door entry between the chambers was formalized. A new floor was created in the main chamber by adding a layer of construction fill. Most of the new floor features had domestic functions (hearth, deflector, pot rests) indicating the structure continued as a habitation, but several symbolic features (a floor vault, a paho depression, and a complex of small sand-filled pits) indicate an increase in ritualized activities inside the main chamber.

The antechamber (Structure 103) was also remodeled when the structure was converted to an oversized pithouse. A shallow 30–40-cm-wide bench was excavated into the ground surface around the east, south, and likely west sides of the chamber, and a 10–20-cm rind of mortar was added to the interior walls to expand the bench width to 60 cm wide. Approximately 34 near-vertical leaner posts were mounted into the bench. This reduced the interior size of the building slightly but raised the height of the ceiling. Five pits were excavated into the antechamber floor and filled with layers of reddish brown silt and/or sand. A distinct stick or paho impression was visible in the fill of one of the pits (Figure 8.5).

The oversized pithouse was remodeled and reroofed a second time between A.D. 660 and 725 (Figures 8.6 and 8.7). In both chambers Douglas fir and juniper were used as main support beams. Horizontal juniper and pinyon pine beams were stacked up behind the bench-seated leaner posts and across the flat central portion of the roof to sheath the structure. The stacked beams in the upper walls of the pithouse were covered with woven reedgrass and mountain mahogany twig matting and then insulated with tied sagebrush bundles (see Figure 8.7), which were then covered by a layer of rock and adobe.

The interior of the oversized pithouse was also remodeled between A.D. 660 and 725. In both chambers, the previous floor, features, and walls were covered over with construction material and a thick layer of plaster. The main chamber hearth and floor vault were remodeled, and an ashpit, wing wall, and a few small pits were added to the floor. The pass-through entryway between the chambers was remodeled and reduced several times with additional coping and an entryway step (Figure 8.8).

The floor assemblage of Oversized Pithouse 101-103 is a mix of primary in-use objects, de facto refuse, and secondary refuse (Figures 8.9 and 8.10). An especially large pile of secondary refuse was found just south of the hearth in the main chamber suggesting refuse was deposited through the roof hatch. The artifacts recovered from the final occupation (Surface 1) of both chambers are shown in Tables 8.1, 8.2, and 8.3. Table 8.1 lists the unmodified sherds recovered; all of the formal pottery types date to the Basketmaker III period. One reconstructible Indeterminate Local Gray jar was found on the floor. This vessel was likely a Chapin Gray jar, but no rim sherds were present. Table 8.2 presents the bulk chipped-stone artifacts found on Surface 1. Numerous small and microscopic pieces of debitage and the presence of cores (see Table 8.3) on the surface suggest stone-tool production in the oversized pithouse. The variety of ground stone (see Table 8.3) items in the assemblage suggests food processing and possibly pottery making, especially given the additional pigment minerals that were also recovered.

A carbonized plaited sandal was found in the antechamber approximately 5 cm above the floor. It was analyzed in-situ by textile specialist, Laurie Webster (2016). The sandal's location at the contact of the floor and roof-fall deposits suggests that it may have been tucked into the thatching or suspended from the ceiling when the roof collapsed (Figure 8.11). The poorly preserved sandal survived as a dark charcoal stain 25 cm long and 10 cm wide with a 15-cm-long by 8-cm-wide section of intact yucca-leaf plaiting. The original thickness of the sandal could not be determined. The toe and heel finishes are missing. Because these are the most diagnostic parts of a sandal, the toe end could not be distinguished from the heel end. Based on the shape of the stain, one end appears to have been relatively square. No loops or ties were observed, so it is unknown whether the sandal was equipped with a toe loop or side loops.

Importantly, the twill-plaited sandal from the Ridgeline site is the earliest reported example from the Montezuma Valley or central Mesa Verde areas (Webster 2016). Basketmaker III sandals from this area are usually twined, not plaited (e.g., Nordenskiöld 1893:Pl. XLVI, no. 6; Webster 2004a, 2004b, 2004c; see also Webster 2012:169–173). Webster recently AMS dated a twill-plaited sandal from the South Shelter at Falls Creek Rock Shelters in the eastern Mesa Verde area to the late Basketmaker III phase (1310 +/-20 B.P., 660–767 cal A.D., median 688 cal A.D.). Farther south, a carbonized 2/2 twill-plaited object, probably a sandal, was recovered from a pit structure with an A.D. 640–710 date at LA 61956 near Mexican Springs, New Mexico, at the south end of the Chuska Mountains (Webster 1999:200). Given that most twill-plaited sandals from the northern Southwest date to the Pueblo I period or later, the sandal from the Ridgeline site is a significant find that demonstrates the inhabitants had textile knowledge or trade connections far to the east or south.

Actual textile production is evident in the oversized pithouse based on pollen samples from the upper two floors (See Chapter 22), which had the largest number of rare pollen taxa of any structure tested during the Basketmaker Communities Project. Eleven rare types were identified, and two of these (buckthorn and walnut), occur only in the Oversized Pithouse 101-103 samples. The composition of the rare types is unique because of the number of woody shrubs represented that grow in canyons and riparian environments (walnut, willow, lemonadeberry, buckthorn, and

chokecherry). This variety suggests specialty materials used by artisans making wood implements, baskets, weapons, or other products, including medicine.
As in the great kiva (Structure 101) at the Dillard site (5MT10647), there is a near absence of any maize pollen signature in Oversized Pithouse 101-103 (see Chapter 22). Instead, both structures preserved high values of beeweed compared to other structures sampled during the Basketmaker Communities Project. The correspondence between large/public architecture and enriched beeweed suggests artisans working inside these buildings with beeweed paint or possibly preparation of special foods spiced with beeweed.

Roomblock Pit Rooms 110, 116, and 117

From surface evidence, the roomblock at the Ridgeline site is 20 to 30 m long, oriented east–west, and composed of at least six non-contiguous pit rooms. Three of these rooms (Pit Rooms 110, 116, and 117) were sampled during the Basketmaker Communities Project. Pit Rooms 110 and 116 are adjacent rooms in the west-central portion of the roomblock, and Pit Room 117 is in the south-central portion of the roomblock. The rooms were all earthen floored, partially slab lined, roofed with wattle-and-daub superstructures, subrectangular, and sized between 2.5-x-3 m and 3-x-3 m. Despite their general conformity, the rooms appear to have been used at different times, served different functions, and ranged in depth from 0.07–0.42 m.

Pit Room 116 is likely the earliest of the three rooms based on the fact that it was partially salvaged, unburned, backfilled with mixed refuse, and superimposed by later extramural features (Figure 8.12). Based on the presence of several shaped flat stones of fine-grained material, the room was likely used for ornament production as well as general storage. Pit Room 110, the slab-lined room on the east side of Pit Room 116, was left more intact than Pit Room 116 but was cleaned out when it was decommissioned. Pit Room 117 was a very late addition based on the fact that it was dug into earlier fill and added to the south side of other rooms in the central portion of the roomblock (Figure 8.13). The floor assemblage of Pit Room 117 is fairly rich and includes portions of a miniature seed jar, a large seed jar, a black-on-white bowl, a mano, and several expedient tools. All artifacts and samples recovered from Surface 1 in Pit Room117 are shown in Tables 8.4, 8.5, and 8.6. Several lumps of white, blue, and yellow raw clay stored on the floor suggest the room was used for pottery production.

Chronology

Investigations at the Ridgeline site suggest it was occupied for an extended period starting in the mid-Basketmaker III phase and into the early Pueblo I period. Diagnostic pottery on the surface of the site includes Chapin Black-on-white and Chapin Gray Ware, consistent with a Basketmaker III occupation. The large north–south oriented double-chambered oversized pithouse and associated roomblock built of circular slab-lined rooms indicates a late Basketmaker III to early Pueblo I construction. Out of 174 dendrochronology samples submitted to the University of Arizona Tree-ring Laboratory, 15 could be dated (see Chapter 19). These samples produced cutting or near death/cutting dates of A.D. 418, 494, 510, 610, 667, 722, 763, and 788. Noncutting samples produced dates of A.D. 541, 561, 580, 623, 686, 693, and 759. These dendrochronology dates span 350 years and likely reflect the use of downed old wood in construction, salvaged beams from decommissioned structures, remodeling, and repair of the pithouse roof. Seven AMS dates and an archaeomagnetic sample support a seventh-century to early eighth-century occupation between A.D. 561 and 725 (see Chapter 19).

One archaeomagnetic date from the hearth generated three post-A.D. 1535 erroneous date ranges. The misorientation of the sample was likely due to the fact that the floor was dug into caliche, rather than iron-rich loess, which produced a weak magnetic response to heat.

The only evidence of occupation at the site prior to A.D. 660 is the footprint of the standard-sized pithouse in the location of the later Oversized Pithouse 101-103. The standard-sized pithouse was likely constructed in the first quarter of the seventh century.

Between A.D. 660 and 750 the oversized Pithouse 101-103 and the roomblock (Pit Rooms 110, 116, and 117) were constructed and remodeled multiple times. Oversized Pithouse 101-103 shows stratigraphic signs of a long, continuous occupation and heavy remodeling (Figure 8.14). Three stratified floor surfaces were exposed in the main chamber. A smaller roof-support configuration on the deepest floor suggests that the structure was once an average-sized pithouse. Two later floors, one built of mottled construction fill and the other of fill and thick plaster, represent sequential occupations of the oversized pithouse between A.D. 660 and A.D. 788 making it the longest in-use habitation in the project area.

Demography

Based on Basketmaker Communities Project findings, the Ridgeline site was occupied continuously for at least 85 years and for up to 150 years. This occupation likely started in the mid-seventh century just as the adjacent Dillard site settlement dispersed, suggesting that the Ridgeline site occupants may have moved there directly from the Dillard site. Throughout its occupation, the configuration of the Ridgeline site was extremely stable, and the roomblock, pithouse, and midden locations were consistent through time. Despite this continuity, there is evidence that the household grew in size and possibly status. The remodel of the pithouse into an oversized pithouse in the late seventh century nearly doubled the interior habitation space at the site, and the evidence of pottery and ornament production in the pit rooms and bone tools, gaming pieces, and textiles in the oversized pithouse suggest a level of wealth and production specialization.

Numerous other sites dating to the Basketmaker III period are documented in the direct vicinity (Fetterman and Honeycutt 1994; Shanks 2014). Adjacent to the Ridgeline site on the ridgetop are 5MT2032, 5MT10646, 5MT10713, and 5MT10714 (Figure 8.15). These five sites are likely part of the same multi-household Basketmaker III complex. Site 5MT2032 (the Switchback site) is 40 m south and on the east (opposite) side of the driveway from the Ridgeline site and was also tested during the Basketmaker Communities Project. Excavations confirmed the presence of a standard-sized double-chambered pithouse with a large slab-lined roomblock representing a well-established household occupied contemporaneously with the Ridgeline site between A.D. 675 and 740.

The pattern of an oversized pithouse and a few standard-sized households is repeated in a set of nearby sites (5MT3890, 5MT10639, and 5MT10656) centered on an oversized pithouse at the

Windrow site (5MT3890) on a prominent ridge a quarter mile to the east of the Ridgeline site. The Ridgeline and Windrow habitation clusters flank the Dillard site ridgetop, which includes at least 10 households centered on an early great kiva (see Chapter 5). Together, the site clusters on these three adjacent ridgetops constitute the densest Basketmaker III occupation in the study area and served as the focal point for the surrounding community.

Artifacts

The artifacts recovered from the Ridgeline site are a typical, if enriched, Basketmaker III period assemblage. Unmodified pottery sherds are presented in Table 8.7, and bulk chipped-stone artifacts are shown in Table 8.8. Chapin Gray and Chapin Black-on-white are the most prevalent formal pottery types, indicating use of the site in the Basketmaker III period, though the trace presence of red wares indicates the site was occupied into the Pueblo I period. Chipped-stone materials used in stone tools are almost entirely locally available, with less than 1 percent nonlocal chipped stone in the assemblage. Morrison Formation rocks make up approximately 85 percent of the assemblage. Only two types of nonlocal lithic types are present, consisting of obsidian and red jasper. Only one of the two pieces of obsidian from Ridgeline was sourced using XRF analysis. The sourced piece of obsidian came from the El Rechuelos source in the Jemez Mountains (Shackley 2017). This piece of obsidian and the jasper, plus one sherd of Abajo Red-on-orange, suggest the Ridgeline residents had connections to the west and to the south-southeast.

Subsistence

Subsistence evidence at the Ridgeline site reflects its geographical location on a ridge above Alkali Canyon and the Basketmaker III history of this geography. The evidence indicates that the occupants relied heavily on maize farming, wild food gathering, and small game. The site occupants took full advantage of nearby riparian areas for water, textile resources, and bird hunting. Construction and pottery production materials were easily obtained.

The faunal assemblage at the Ridgeline site is larger than many of the other Basketmaker Communities Project sites (see Chapter 20) and is dominated by lagomorphs and rodents. This site differs from other Basketmaker III habitations tested as part of the Basketmaker Communities Project in that there is a near absence of artiodactyl bone; just one large fragment of antler (deer or elk) was found in the oversized pithouse. Instead, the faunal assemblage includes a large number of birds (large and small birds, perching birds, hawks, turkeys, and great blue herons).

Macrobotanical and pollen analysis revealed a mixed diet of domesticated and wild plant foods (see Chapters 21 and 22). Both domesticated squash and maize were prolific. Wild plants varied in their ubiquity and context across the site. They included spring-ripening ricegrass (*Stipa*), weedy chenopodium/amaranth and purslane plants, saltbush and grass fruit, prickly pear, groundcherry and globemallow seeds, a species of the wild carrot family, cone scale remains suggesting pinyon nut harvest, and pollen from a distinctive, but unknown, pea family (Fabaceae) plant known as hog potato.

Construction materials at the site were varied and appear generally accessible. Materials found in roofing contexts include juniper, pinyon pine, sagebrush, and mountain mahogany. The use of Douglas fir wood for roofing reveals long-distant transport of a high mountain tree into the Ridgeline site.

Of all the Basketmaker III habitations in the Basketmaker Communities Project, the Ridgeline site is closest to a perennial water source. Alkali Creek runs in the canyon bottom just west of the site. The site inhabitants took full advantage of access to riparian areas in the canyon to collect construction materials (reedgrass), textile materials (walnut, willow, lemonadeberry, and buckthorn), medicine (rose and chokecherry), and water birds.

Depopulation

All structures still in use at the end of the site's occupation (Oversized Pithouse 101-103 and Pit Rooms 110 and 117) were decommissioned by burning around A.D. 788. Grass and twigs were piled inside the structures and lit on fire. Leading up to this event, the oversized pithouse was ceremoniously decomissioned. A 2–8-cm-thick layer of light brown sand was deposited along the north and east walls of the main chamber. Hundreds of items were left on the structure's floor. Most were scattered and broken de facto refuse, but a 20-cm-thick mound of artifacts and organically stained sediment over the hearth points to intentional dumping of secondary refuse through the roof vent. Though broken and dispersed, the assemblage represents a full suite of domestic artifacts.

Site Summary and Conclusions

Investigations of the Ridgeline site confirmed that the site was occupied by a single household whose wealth increased over several generations between A.D. 610 and 788. By the early eighth century, the inhabitants had remodeled their standard-sized pithouse into an oversized pithouse and expanded the number of pit rooms in the adjacent roomblock. This occupation became the focal point site for a cluster of late Basketmaker III habitations along the same ridge including the Switchback site, 25 m to the southeast. The oversized pithouse, large storage capacity, the large number of birds, and evidence of pottery, ornament, and textile specialization at the Ridgeline site certainly reflect a level of material wealth and status not found at other late Basketmaker III sites in the larger community. This wealth may be the legacy of a hundred years of occupation and accumulation by a single hereditary group. Importantly, the occupants of this ridge overlooked and had direct access to the Dillard site great kiva on the next ridge, 100 m to the southeast.

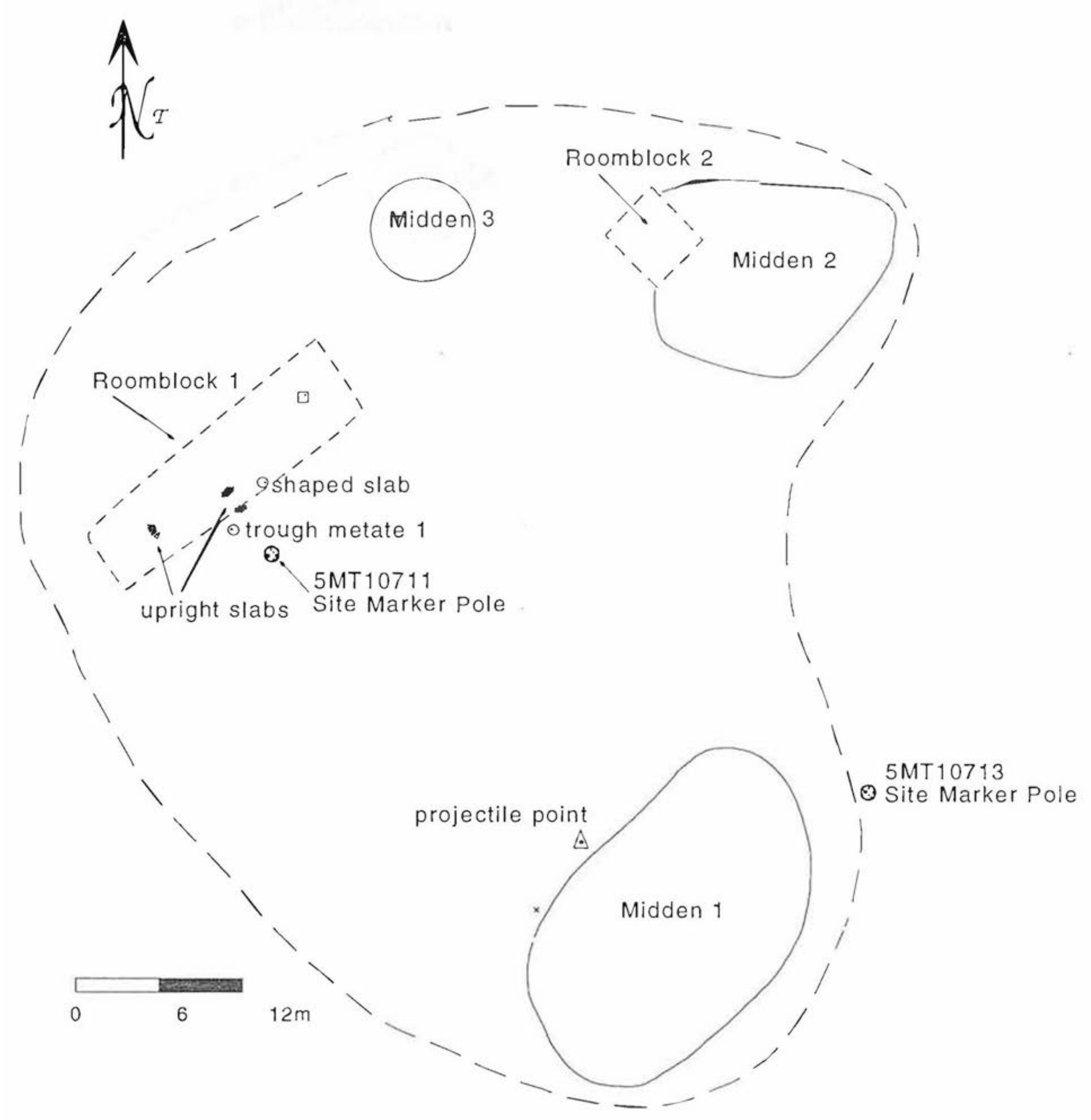

Figure 8.1. Survey sketch of the Ridgeline site from the 1993 Woods Canyon Archaeological Consultants site form (Fetterman 1993:7).

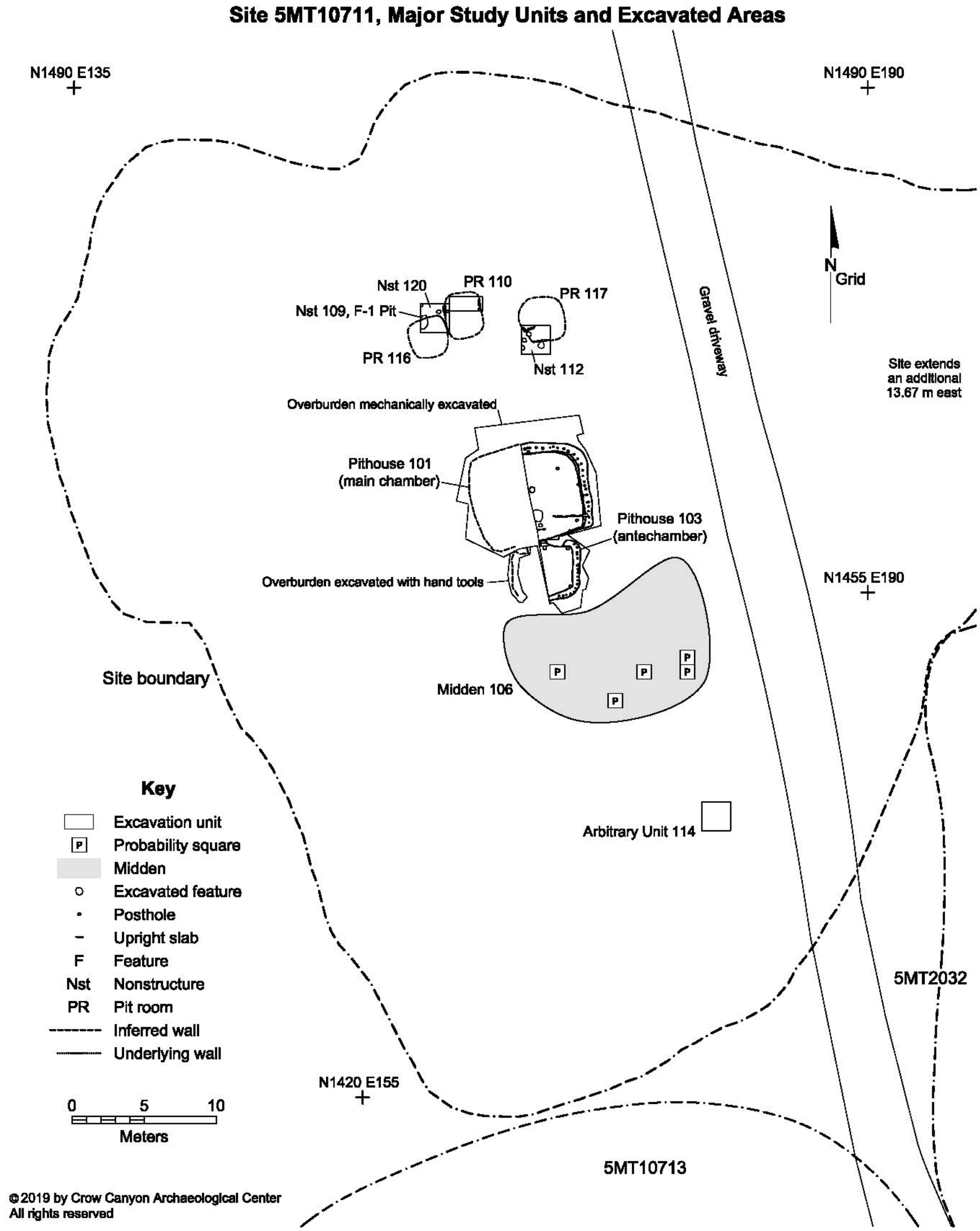

Figure 8.2. Map of the Ridgeline site with all major cultural units and excavation units.

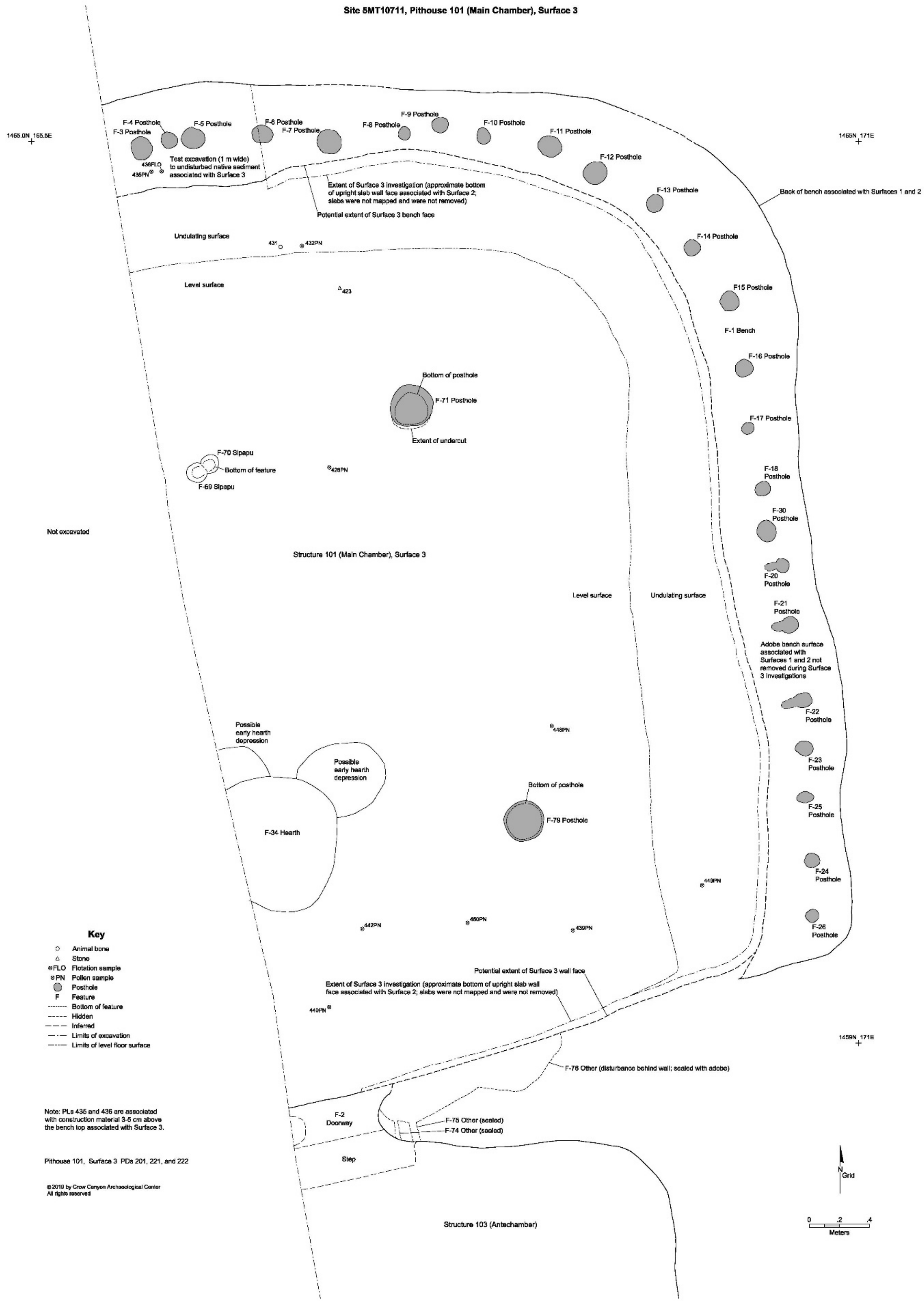

Figure 8.3. Plan map of Pithouse Main Chamber 101, Surface 3.

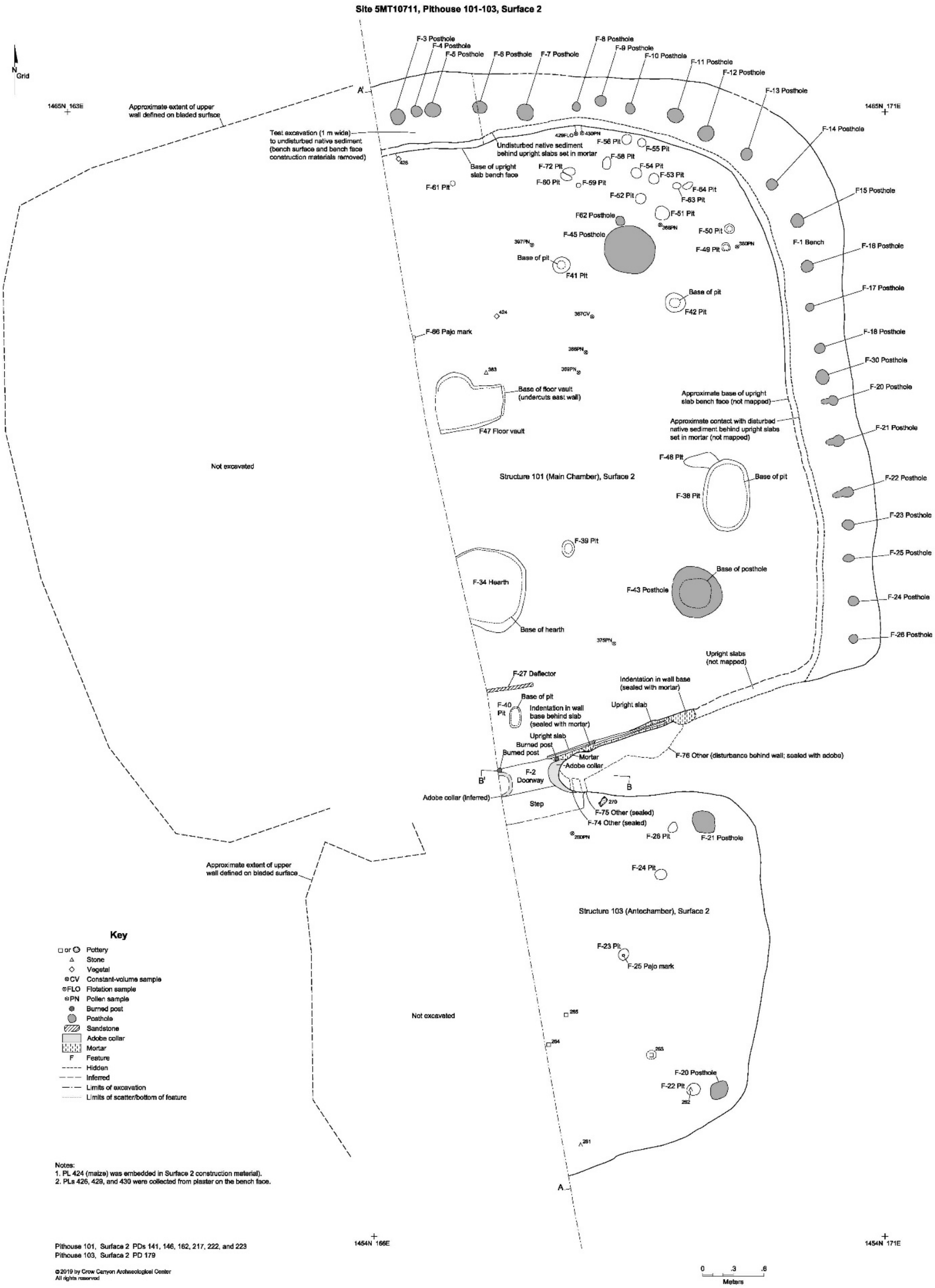

Figure 8.4. Plan map of Oversized Pithouse 101-103, Surface 2.

Figure 8.5. Photograph of paho impression in the fill of a pit feature on the floor of the antechamber of oversized pithouse 101-103.

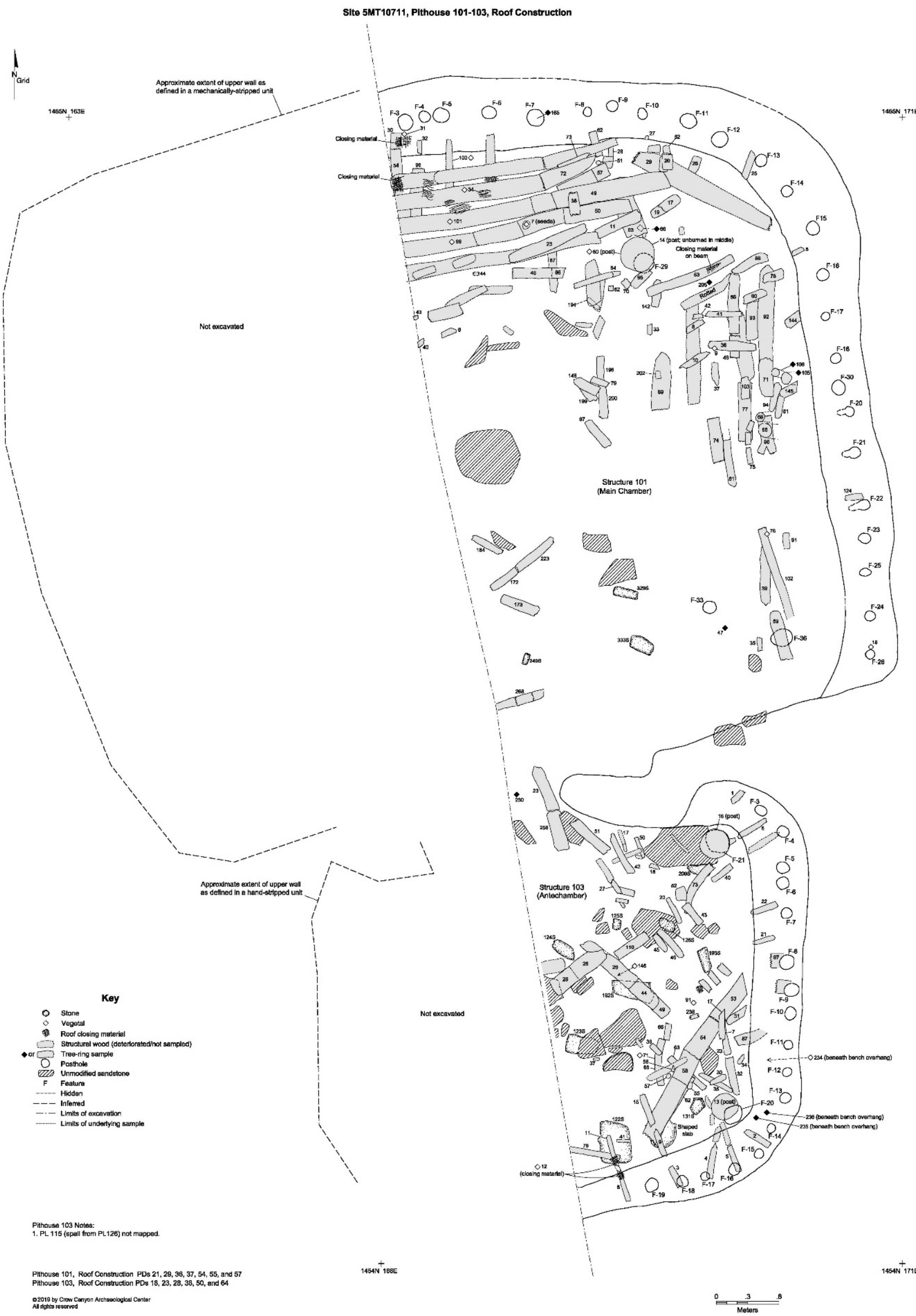

Figure 8.6. Plan map of Oversized Pithouse 101-103 roofing elements.

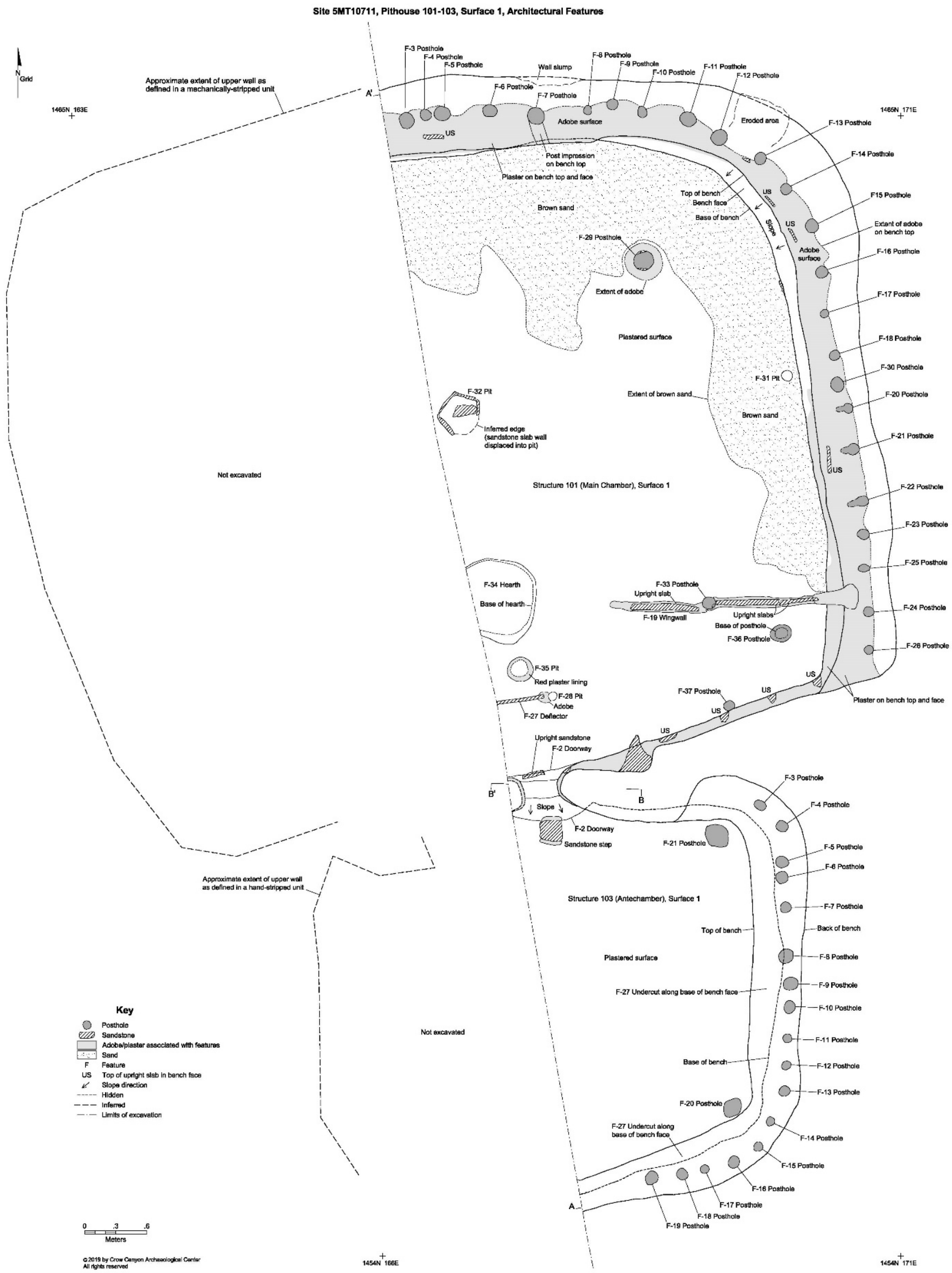

Figure 8.7. Plan map of Oversized Pithouse 101-103, Surface 1.

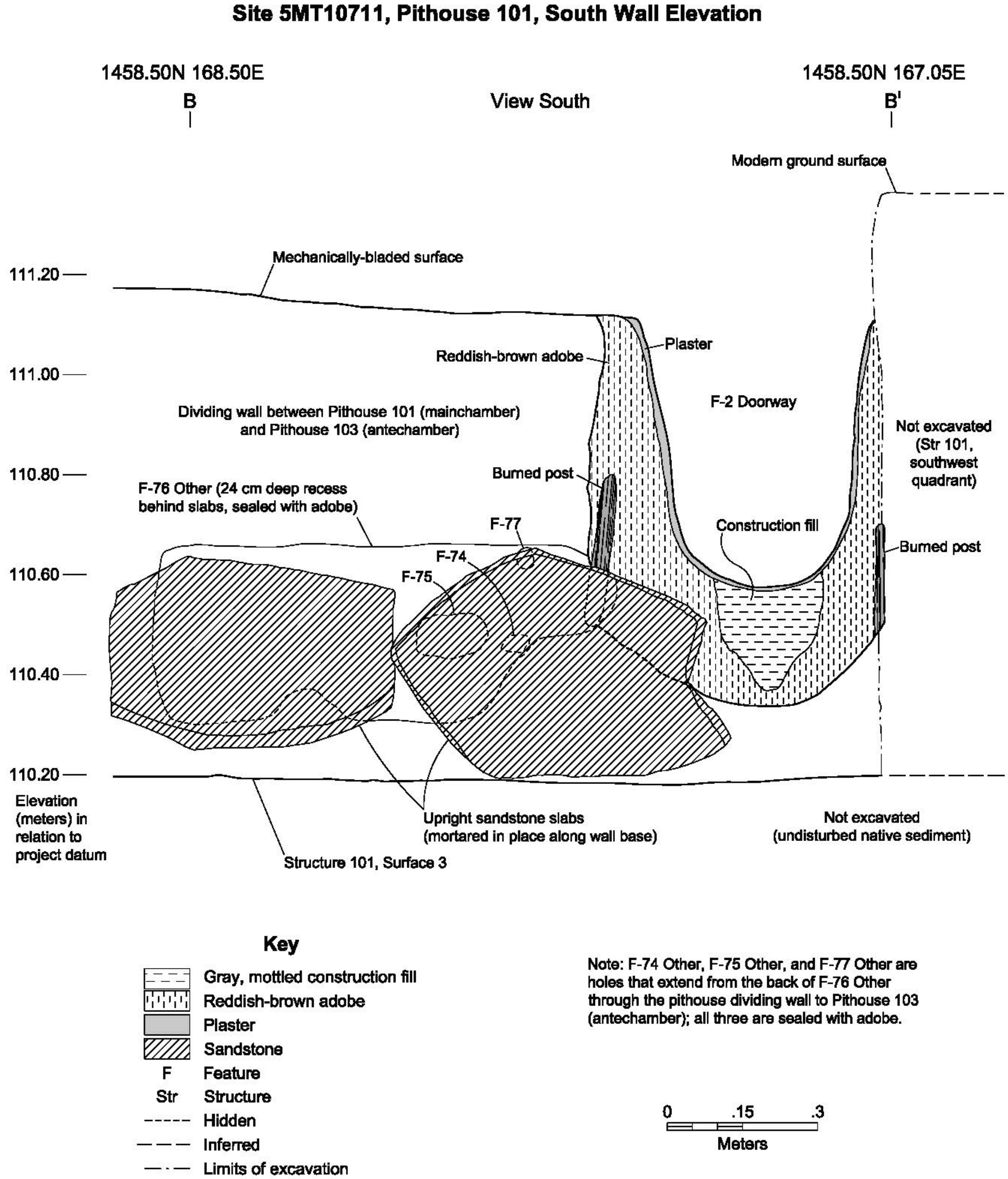

Figure 8.8. Illustration of the south wall elevation of main chamber of Pithouse 101-103 showing entryway Feature 2 remodeling.

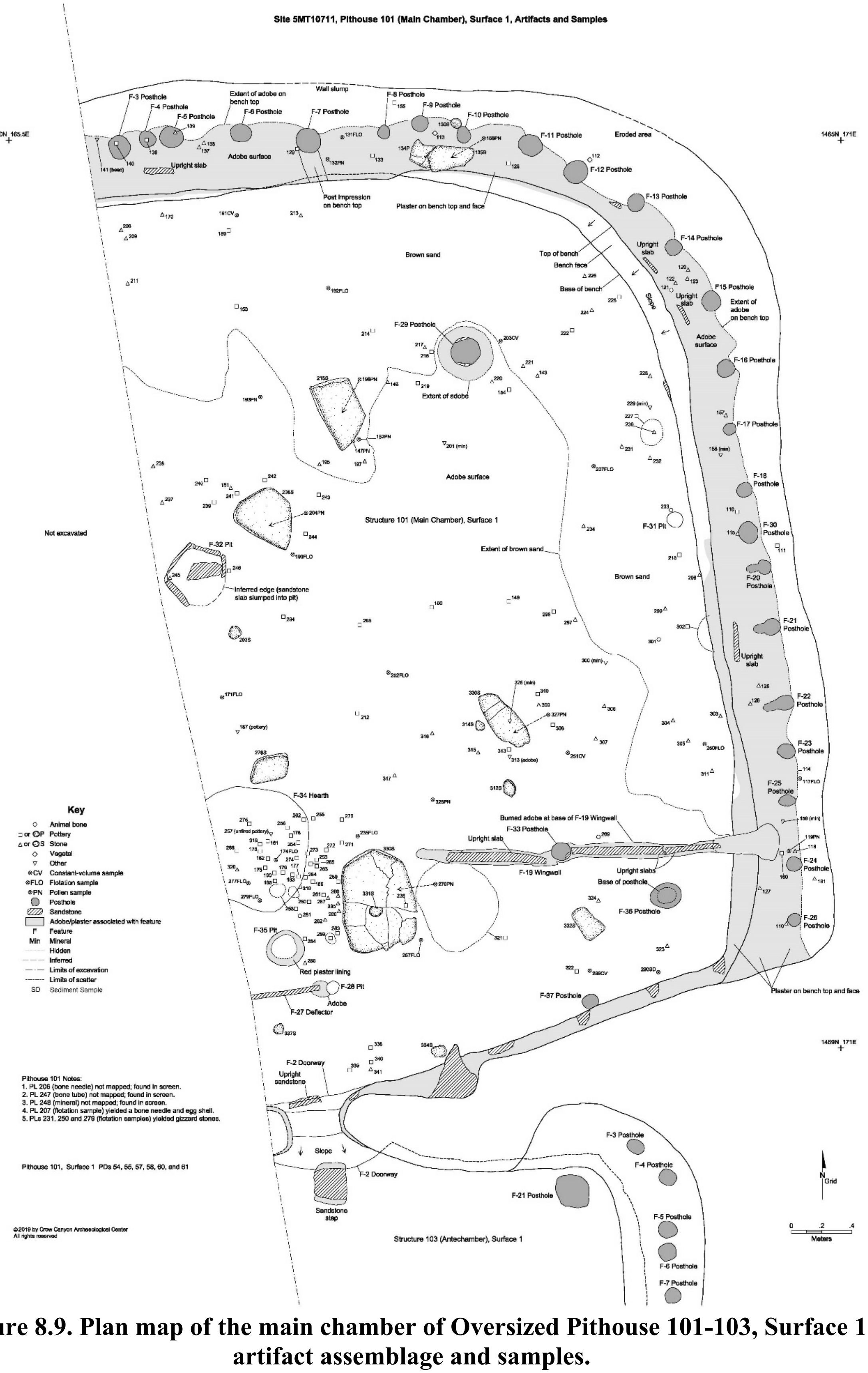

Figure 8.9. Plan map of the main chamber of Oversized Pithouse 101-103, Surface 1 artifact assemblage and samples.

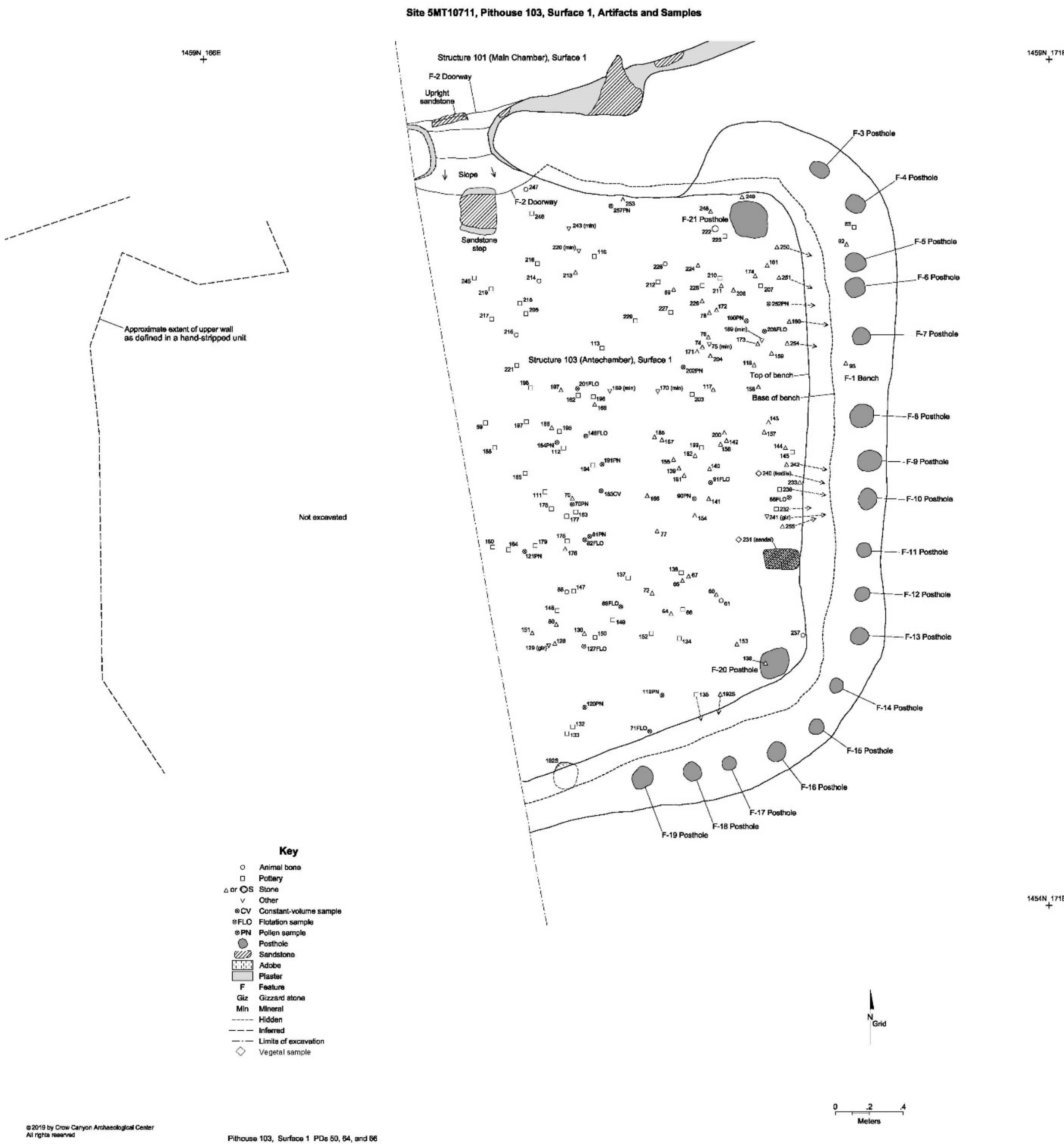

Figure 8.10. Plan map of the antechamber of Oversized Pit House 101-103, Surface 1 artifact assemblage and samples.

Figure 8.11. Photograph of the twill plaited sandal recovered from antechamber of Oversized Pithouse 101-103, Surface 1.

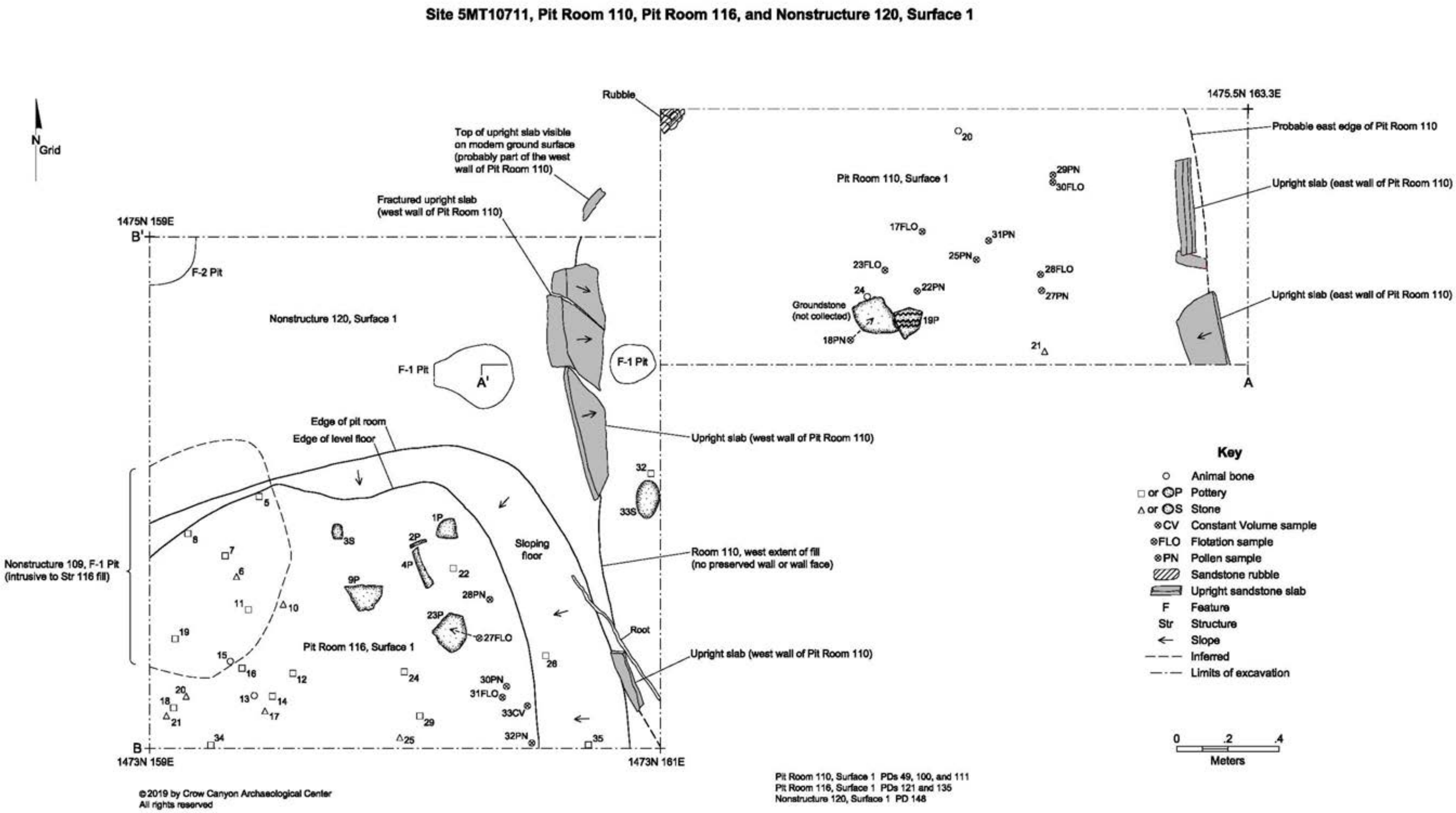

Figure 8.12. Plan map of Pit Rooms 110 and 116.

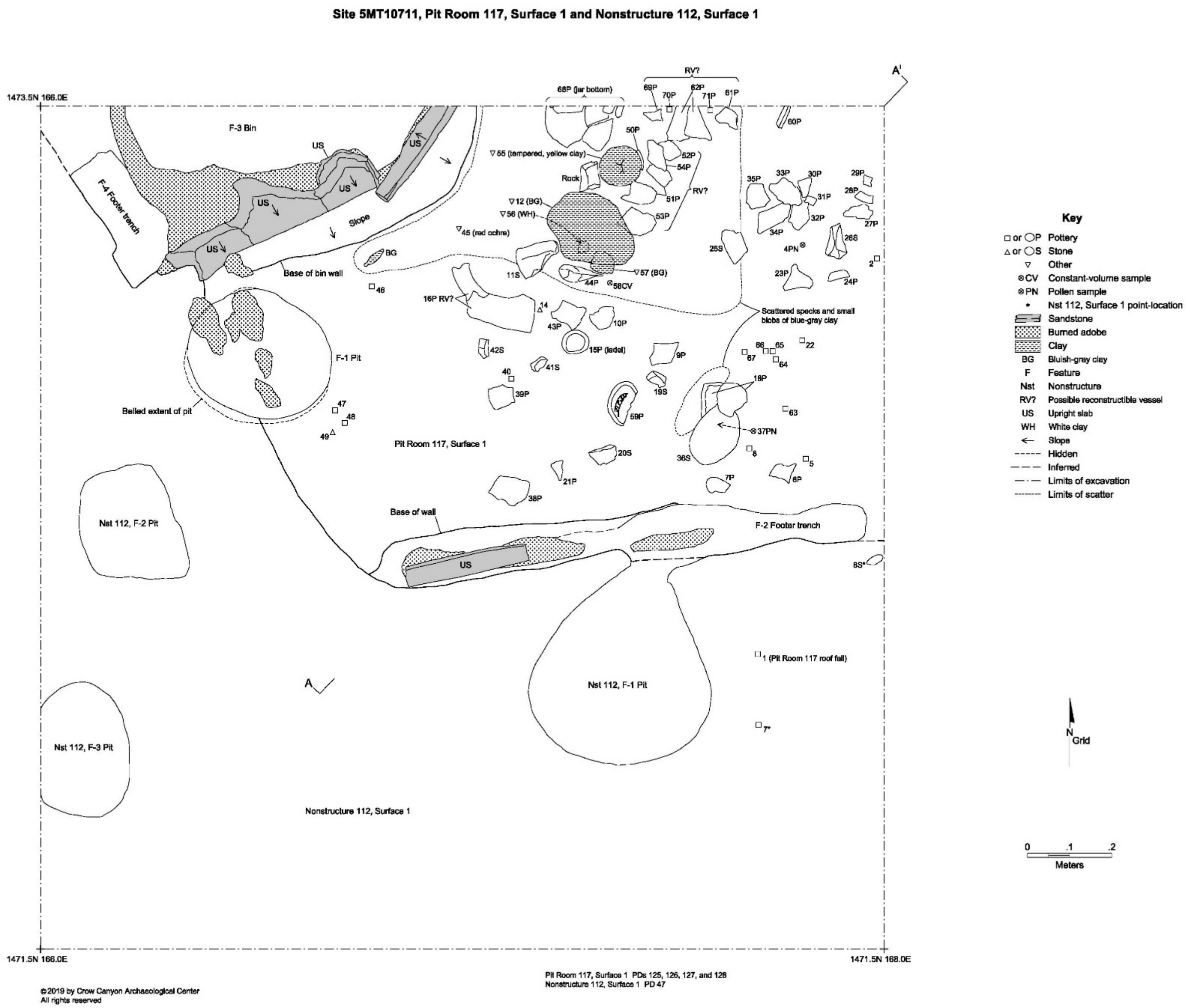

Figure 8.13. Plan map of Pit Room 117.

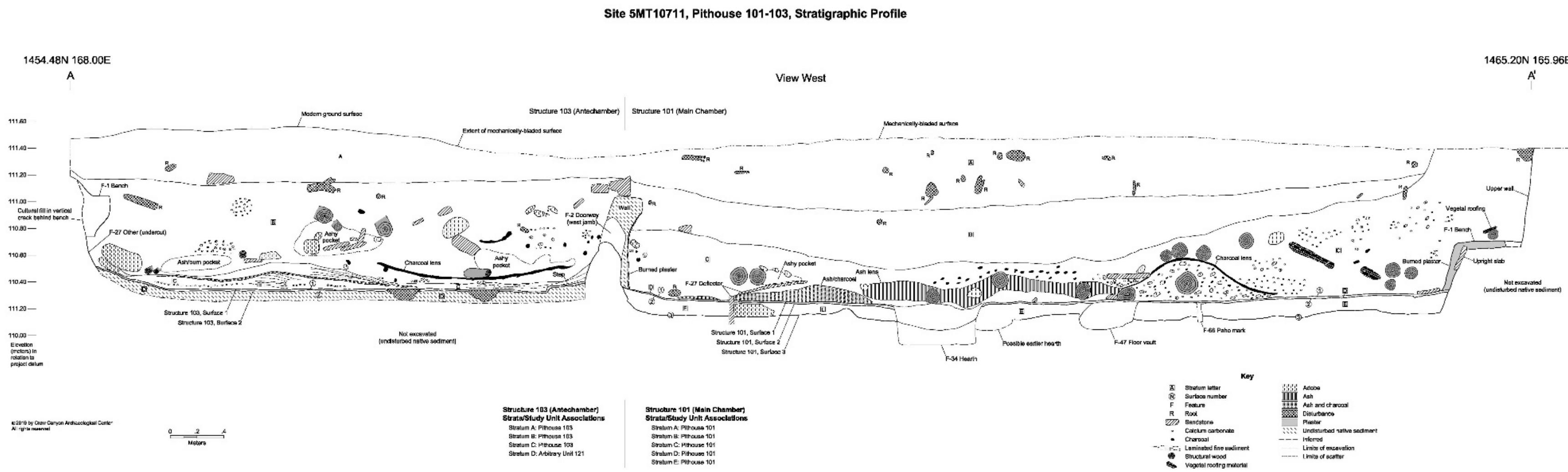

Figure 8.14. Stratigraphic profile of Oversized Pithouse 101-103.

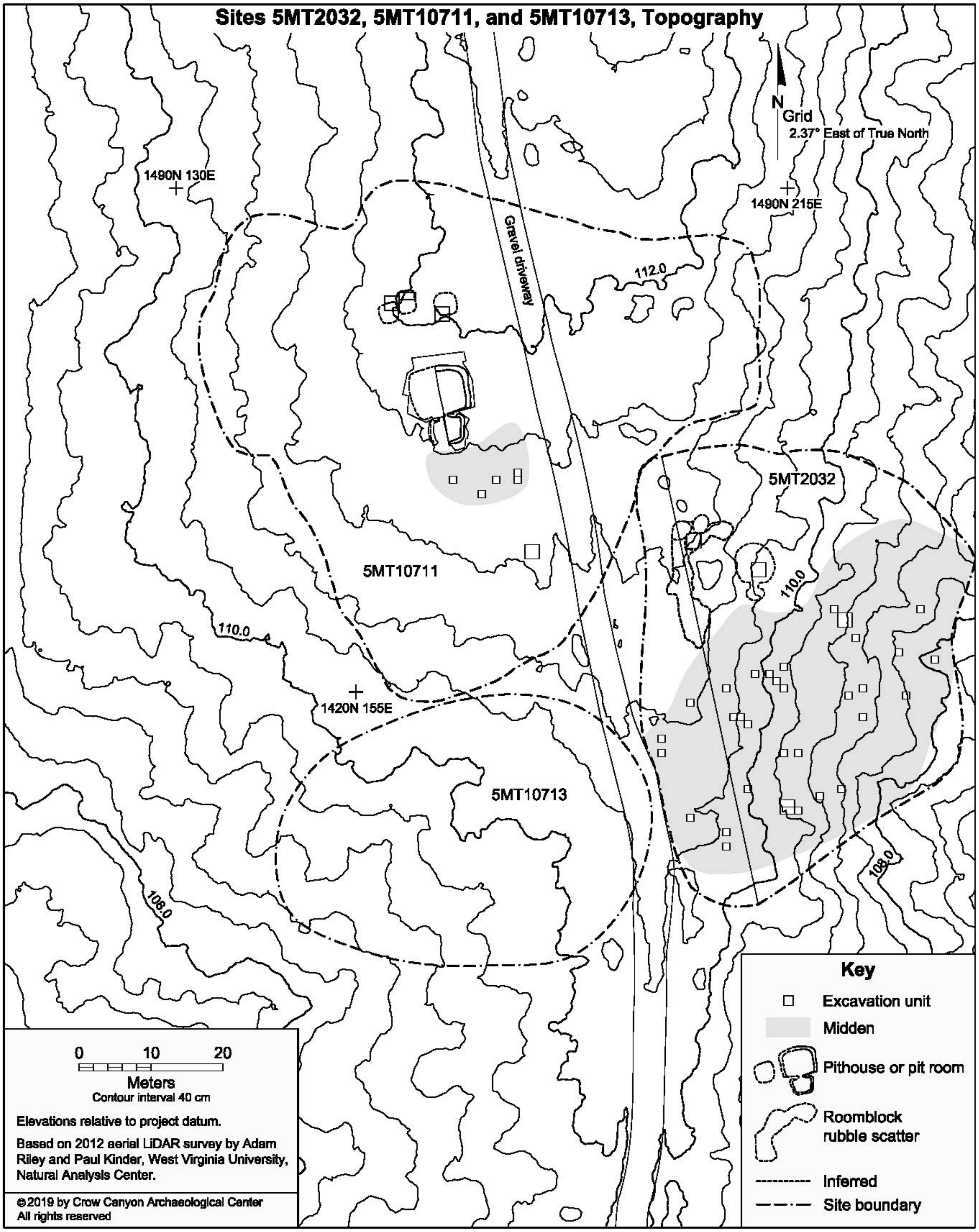

Figure 8.15. Topographic map of the Ridgeline site (5MT10711) and adjacent Basketmaker III period sites.

Table 8.1. Unmodified Sherds Recovered from the Surface of Oversized Pithouse 101-103, 5MT10711.

Feature Number (Type)	Pottery Type	Pottery Form	Vessel Number	N	Weight (g)
	Indeterminate Local Gray	Jar		26	147.80
	Indeterminate Local Gray	Jar	1	87	1,893.10
1 (Corner Bin)	Chapin Black-on-white	Bowl		3	41.80
	Chapin Gray	Jar		3	92.94
	Chapin Gray	Seed jar		6	25.50
	Early White Painted	Bowl		8	62.20
	Early White Unpainted	Bowl		1	5.67
	Early White Unpainted	Jar		1	1.50
	Early White Unpainted	Unknown		1	1.90
	Indeterminate Local Gray	Bowl		6	33.40
	Indeterminate Local Gray	Jar		81	797.77
	Indeterminate Local Gray	Unknown		1	2.10
	Indeterminate Local Gray, polished	Bowl		2	11.40
	Indeterminate Local Gray, polished	Jar		6	42.50
3 (Corner Bin)	Chapin Black-on-white	Bowl		4	33.10
	Chapin Gray	Bowl		1	4.20
	Chapin Gray	Seed jar		1	1.60
	Early White Painted	Bowl		1	2.40
	Early White Painted	Jar		1	4.90
	Early White Unpainted	Bowl		3	14.00
	Indeterminate Local Gray	Jar		33	191.80
	Indeterminate Local Gray	Unknown		4	8.40
	Indeterminate Local Gray, polished	Bowl		2	9.60
	Indeterminate Local Gray, polished	Jar		4	34.20
6 (Hearth)	Indeterminate Local Gray	Jar		1	1.00
	Indeterminate Local Gray, polished	Jar		2	8.00
Total				289	3,472.78

Table 8.2. Bulk Chipped Stone Recovered from the Surface of Oversized Pithouse 101-103, 5MT10711.

Feature Number (Type)	Material Type	Chipped Stone Category	N (<1/4 in)	Weight (g) (<1/4 in)	N (>1/4 in)	Weight (g) (>1/4 in)
	Agate/chalcedony	Debitage	2	0.00	1	1.70
	Dakota/Burro Canyon silicified sandstone	Debitage	2	0.00	1	4.20
	Morrison mudstone	Debitage	4	0.00	3	26.60
	Morrison mudstone	Modified flake			1	28.10
	Morrison mudstone	Utilized flake			1	7.40
	Morrison silicified sandstone	Debitage	28	0.40	26	317.40
	Morrison silicified sandstone	Modified flake			1	9.90
	Morrison silicified sandstone	Utilized flake			2	35.90
2 (Doorway)	Morrison silicified sandstone	Debitage			2	3.10
20 (Posthole)	Morrison silicified sandstone	Debitage	1	0.00		
21 (Posthole)	Burro Canyon chert	Debitage			1	1.40
	Morrison silicified sandstone	Debitage	6	0.00		
24 (Pit: Not Further Specified)	Morrison silicified sandstone	Modified flake			1	5.00
32 (Sipapu)	Agate/chalcedony	Debitage	1	0.00		
	Dakota/Burro Canyon silicified sandstone	Debitage	2	0.00		
	Gypsum/calcite/barite	Debitage	1	0.00		
	Morrison chert	Debitage	1	0.00		
	Morrison mudstone	Debitage	2	0.00		
	Morrison silicified sandstone	Debitage	6	0.00		
34 (Hearth)	Agate/chalcedony	Debitage	1	0.00		
	Burro Canyon chert	Debitage	3	0.00	1	0.00
	Dakota/Burro Canyon silicified sandstone	Debitage	7	0.00		
	Morrison mudstone	Debitage	4	0.00	1	0.00
	Morrison silicified sandstone	Debitage	29	0.00	2	2.50
35 (Pit: Not Further Specified)	Dakota/Burro Canyon silicified sandstone	Debitage	4	0.00	1	0.40
	Morrison chert	Debitage	10	0.00		
	Morrison mudstone	Debitage	2	0.00		
	Morrison silicified sandstone	Debitage	23	0.00		
	Unknown chert/ siltstone	Debitage	1	0.00		
36 (Posthole)	Morrison silicified sandstone	Debitage			1	0.40

Feature Number (Type)	Material Type	Chipped Stone Category	N (<1/4 in)	Weight (g) (<1/4 in)	N (>1/4 in)	Weight (g) (>1/4 in)
37 (Posthole)	Morrison silicified sandstone	Debitage	1	0.00		
38 (Pit: Not Further Specified)	Agate/chalcedony	Debitage	3	0.00		
	Burro Canyon chert	Debitage			1	10.80
	Dakota/Burro Canyon silicified sandstone	Debitage	1	0.00	1	0.10
	Morrison mudstone	Debitage	1	0.00		
	Morrison silicified sandstone	Debitage	12	0.10	6	22.10
42 (Pit: Not Further Specified)	Agate/chalcedony	Debitage	2	0.00		
	Dakota/Burro Canyon silicified sandstone	Debitage	2	0.00		
	Morrison silicified sandstone	Debitage	20	0.10		
43 (Posthole)	Dakota/Burro Canyon silicified sandstone	Debitage	1	0.00		
	Morrison mudstone	Debitage	1	0.00		
45 (Posthole)	Morrison silicified sandstone	Debitage	1	0.00		
47 (Floor Vault)	Burro Canyon chert	Debitage	2	0.00		
	Dakota/Burro Canyon silicified sandstone	Debitage	6	0.00		
	Morrison silicified sandstone	Debitage	3	0.00	1	1.10
48 (Pit: Not Further Specified)	Agate/chalcedony	Debitage	2	0.00		
	Burro Canyon chert	Debitage	2	0.00		
	Dakota/Burro Canyon silicified sandstone	Debitage	3	0.00		
	Morrison mudstone	Debitage	1	0.00		
	Morrison silicified sandstone	Debitage	9	0.00		
	Unknown chert/ siltstone	Debitage	2	0.00		
49 (Floor Vault)	Burro Canyon chert	Utilized flake			1	24.00
54 (Pit: Not Further Specified)	Morrison silicified sandstone	Debitage	1	0.00		
62 (Posthole)	Dakota/Burro Canyon silicified sandstone	Debitage	5	0.10	3	3.50
	Morrison silicified sandstone	Debitage	7	0.00	2	3.70
69 (Sipapu)	Morrison silicified sandstone	Debitage	1	0.00		
71 (Posthole)	Morrison silicified sandstone	Debitage	1	0.00		
79 (Posthole)	Agate/chalcedony	Debitage	1	0.00		
	Morrison silicified sandstone	Debitage	1	0.00		
Total			232	0.70	61	509.30

Table 8.3. Other Artifacts and Samples from the Surface of Oversized Pithouse 101-103, 5MT10711.

Grouped Artifact Category	Artifact Type	Condition	Material Type	N of Samples	N of Items	Weight (g)
Animal Bone	Eggshell			4	5	0.00
	Nonhuman bone			46		98.40
	Other modified bone	Fragment		3	3	3.20
Flaked Lithic Tool	Core	Complete	Burro Canyon chert	1	1	29.40
	Core	Complete	Dakota/Burro Canyon silicified sandstone	2	2	852.10
	Core	Complete	Morrison silicified sandstone	2	2	324.70
	Drill	Complete	Morrison mudstone	1	1	0.40
	Peckingstone	Complete	Morrison mudstone	1	1	256.40
	Peckingstone	Complete	Morrison silicified sandstone	1	1	56.40
	Peckingstone	Complete	Unknown quartzite	1	1	79.90
Non-flaked Lithic Tool	Metate	Fragment	Sandstone	1	1	575.60
	One-hand mano	Complete	Sandstone	1	1	804.40
	One-hand mano	Incomplete	Quartzite	1	1	504.40
	Other modified stone/mineral	Complete	Dakota/Burro Canyon silicified sandstone	1	1	3,976.80
	Other modified stone/mineral	Fragment	Igneous	1	1	1,833.80
	Other modified stone/mineral	Fragment	Sandstone	1	1	5,500.00
	Polishing stone	Complete	Unknown quartzite	1	1	48.70
	Slab metate	Incomplete	Sandstone	2	2	25,925.80
	Slab metate	Fragment	Sandstone	1	1	4,004.00
	Stone disk	Complete	Sandstone	1	1	197.00
	Two-hand mano	Complete	Sandstone	2	2	2,994.50
	Trough metate	Incomplete	Sandstone	1	1	17,179.10
Other Inorganic	Adobe			1		6.40
	Gizzard stones			18	32	0.80
	Mineral/ stone sample		Other mineral (mica and azurite)	2	2	0.30
	Mineral/ stone sample		Unknown stone	1	1	0.40
	Mineral/ stone sample		Quartz	1	1	0.00
	Mineral/ stone sample		Pigment (yellow pigment, possibly sulfur)	1	1	0.00
	Mineral/ stone sample		Gypsum/calcite/barite	1	1	0.00
	Mineral/ stone sample		Pigment (red ochre)	4	15	27.20
	Other pottery artifact	Incomplete	Twisted coil of clay	1	1	0.10
	Other	Fragment	Possible twist of hair or unidentified organic material	1	1	0.00

Grouped Artifact Category	Artifact Type	Condition	Material Type	N of Samples	N of Items	Weight (g)
	Shell		2 samples burned; 1 is a fossilized shell	3	3	0.00
Sample	Constant volume sample			5		
	Flotation sample			55		
Total				170	89	65,280.20

Table 8.4. Unmodified Sherds Recovered from the Surface of Pit Room 117, 5MT10711.

Feature Number (Type)	Pottery Type	Pottery Form	N	Weight (g)
	Chapin Black-on-white	Bowl	1	167.80
	Chapin Gray	Seed jar	2	56.10
	Indeterminate Local Gray	Jar	43	816.70
1 (Pit: Not Further Specified)	Indeterminate Local Gray	Jar	1	5.70
	Indeterminate Local Gray, polished	Bowl	1	3.40
2 (Other)	Indeterminate Local Gray	Jar	4	30.30
3 (Bin: Not Further Specified)	Indeterminate Local Gray	Jar	1	30.20
Total			53	1,110.20

Table 8.5. Bulk Chipped Stone Recovered from the Surface of Pit Room 117, 5MT10711.

Feature Number (Type)	Material Type	Chipped Stone Category	N (<1/4 in)	Weight (g) (<1/4 in)	N (>1/4 in)	Weight (g) (>1/4 in)
	Dakota/Burro Canyon silicified sandstone	Utilized flake			1	34.30
	Morrison mudstone	Modified flake			1	34.80
	Morrison mudstone	Debitage			1	11.60
	Morrison silicified sandstone	Modified flake			1	34.40
	Morrison silicified sandstone	Debitage			2	44.40
1 (Pit: Not Further Specified)	Morrison silicified sandstone	Debitage	2	0.00		
2 (Other)	Morrison silicified sandstone	Debitage	3	0.00		
3 (Bin: Not Further Specified)	Morrison silicified sandstone	Debitage	2	0.00		
Total			7	0.00	6	159.50

Table 8.6. Other Artifacts and Samples from the Surface of Pit Room 117, 5MT10711.

Grouped Artifact Category	Artifact Type	Condition	Material Type	N of Samples	N of Items	Weight (g)
Animal Bone	Nonhuman bone			4		0.00
	Other modified bone	Fragment		1	1	0.40
Flaked Lithic Tool	Modified core	Complete	Morrison mudstone	1	1	11.20
Non-flaked Lithic Tool	One-hand mano	Complete	Igneous	1	1	1,360.60
Other Inorganic	Gizzard stones			3	5	0.10
	Mineral/stone sample		Pigment	1	1	1.40
	Mineral/stone sample		Clay	3	3	315.20
Sample	Constant volume sample			1		
	Flotation sample			5		
Total				20	12	1,688.90

Table 8.7. Summary of Unmodified Sherds by Ware and Type for 5MT10711.

Ware and Type	Count	% by Count	Weight (g)	% by Weight (g)
Brown Ware				
Sambrito Utility	1	0.05	1.80	0.01
Twin Trees Utility	5	0.26	48.56	0.26
Plain Gray Ware				
Chapin Gray	97	5.04	1,397.70	7.43
Indeterminate Local Gray	1,643	85.40	15,916.32	84.64
Indeterminate Local Gray, Polished	8	0.42	50.06	0.27
Corrugated Gray Ware				
Indeterminate Local Corrugated Gray	4	0.21	11.90	0.06
White Ware				
Chapin Black-on-white	41	2.13	642.80	3.42
Early White Painted	87	4.52	491.80	2.62
Early White Unpainted	29	1.51	175.70	0.93
Late White Painted	2	0.10	23.90	0.13
Late White Unpainted	2	0.10	7.90	0.04
Piedra Black-on-white	3	0.16	31.00	0.16
Rosa Black-on-white	1	0.05	3.80	0.02
Red Ware				
Abajo Red-on-orange	1	0.05	1.30	0.01
Total	1,924	100.00	18,804.54	100.00

Table 8.8. Count of Chipped-Stone Artifacts by Raw Material Type for 5MT10711.

Material Category	Raw Material	Count	% by Count	Weight (g)	% by Weight (g)
Local	Dakota/Burro Canyon silicified sandstone	141	8.13	542.34	6.71
	Gypsum/calcite/barite	1	0.06	0.00	0.00
	Igneous	19	1.10	153.50	1.90
	Morrison chert	28	1.61	30.90	0.38
	Morrison mudstone	357	20.58	1,487.92	18.41
	Morrison silicified sandstone	1,056	60.86	5,572.14	68.94
	Sandstone	1	0.06	19.40	0.24
	Slate/shale	7	0.40	15.70	0.19
Nonlocal	Obsidian	2	0.12	0.90	0.01
	Red jasper	5	0.29	2.70	0.03
Semi-local	Agate/chalcedony	33	1.90	46.50	0.58
	Brushy Basin chert	9	0.52	19.40	0.24
	Burro Canyon chert	62	3.57	171.71	2.12
	Petrified wood	2	0.12	1.10	0.01
Unknown	Unknown chert/siltstone	12	0.69	18.80	0.23
Total		1,735	100.00	8,083.01	100.00

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Chapter 9

Mueller Little House (5MT10631)

by Shanna R. Diederichs

Introduction

Mueller Little House (5MT10631) is a late-Basketmaker III phase hamlet site near the west central edge of the Indian Camp Ranch Archaeological District (see Figure 1.4). The site is situated on the crest of a low northwest to southeast–trending ridge overlooking Crow Canyon and the Montezuma Valley to the east and southeast. (Figure 9.1). The vicinity consists of rolling uplands formed on the top of Dakota Sandstone (Figure 9.2). These uplands are covered by eolian silt loam approximately 1 m thick. The site locale was chained to remove trees sometime prior to 1970 and has been under cultivation since that time. A moderately dense pinyon and juniper forest 40 m east of the site reflects the pre-farming setting of the site. Mueller Little House is on Indian Camp Ranch Lot 20 and was named by the landowners Jerry and Lisa Mueller.

The site was first recorded in 1991 by R. Walkenhorst and G. Ives of Woods Canyon as a Basketmaker III habitation for the original Indian Camp Ranch Survey (Fetterman and Honeycutt 1994). They recorded a dense lithic and pottery scatter with sparse quantities of sandstone (Figure 9.3). Evidence for surface architecture in the form of an alignment and concentration of sandstone were recorded as Features 1 and 2 at the site. A dispersed midden (Feature 3) was delineated to the southeast of the surface architecture remains. In 1993, Heather Barker imaged two 20-x-20-m grids between the rock concentration features and the midden with a proton magnetometer in an attempt to locate associated pit structures (Barker 1993). She identified a 4-m-diameter anomaly in the northern grid, which was later confirmed to be the main chamber of a double-chambered pithouse.

Mueller Little House is part of a moderately dense concentration of Basketmaker III hamlets. Along the same ridgetop are 5MT10624, 5MT10626, 5MT10637, and 5MT10751 to the north and 5MT3907, 5MT10632, 5MT10702, 5MT10703, and 5MT10704 to the south. 5MT3875, 5MT10706, and 5MT10707 are on lower benches off the east side of the ridgetop, and 5MT10633 is on the next ridge to the west. Electrical resistivity imaging and auger testing at five of these sites revealed that each was a hamlet comprising a single family pithouse with adjacent surface storage. A nearest neighbor analysis of the cluster demonstrated that the sites were evenly spaced with 10-acre buffers between adjacent hamlets (see Chapter 4). At least some of these hamlets were contemporaneous with the Mueller Little House occupation; a pit room at the Shepherd Site (5MT3875) was also in use during the late Basketmaker III phase.

Mueller Little House was selected for Basketmaker Communities Project investigations because it represents a moderately well-preserved Basketmaker III hamlet surrounded by similar period habitations on the opposite side of the Indian Camp Ranch Archaeological district from the

Dillard site. Sampling of the site was expected to contribute to our understanding of (1) the development of the Indian Camp Ranch community, (2) the occupants' relationship to the great kiva at the Dillard site, (3) the relative wealth and length of occupation at farming hamlets, and (4) the impact of Basketmaker III farming techniques (Ortman et al 2011; Ryan and Diederichs 2014).

The surface signature of Mueller Little House is typical for a Basketmaker III hamlet currently under cultivation in the Mesa Verde region (Wilshusen 1999). Pottery and lithic artifacts cover a 0.57-acre area in a disked field. Rocks associated with the surface architecture have been broken into small pieces and scattered by heavy equipment. The pithouse depression has been refilled to the level of the surrounding landscape leaving no depression, but burned adobe from the roof appears on the surface in nearby rodent holes. The 2010 recording of the site (Shanks 2014) found a high proportion of chipped stone and flaked lithic tools including cores, peckingstones, choppers, and scrapers. Most of the pottery on the surface is diagnostic to the Basketmaker III period, but a few Pueblo I and II sherds on the surface reflect Mueller Little House's proximity to later Pueblo sites such as the Pueblo II field house 100 m to the southeast at the Shepherd site (5MT3875).

Geophysical imaging, auger testing, mechanical stripping, and excavation associated with the Basketmaker Communities Project confirmed the presence of a triple-chambered habitation pithouse (Pithouse 101-102-114), a probable stockade fence (Nonstructure 110), a low-density midden (Midden 104), and a large subsurface disturbance (Arbitrary Unit 107) at Mueller Little House. Electrical resistivity imaging of 5,600 square m of the site by Bill Wolf of the NRCS located the pithouse (see Chapter 4). Approximately 15 percent (49.5 m^2) of the total site area was excavated (330 m^2) with heavy equipment and the other 85 percent (280.5 m^2) excavated by hand during the Basketmaker Communities Project. The plow zone was bladed away in the central-north portion of the site to expose the full outline of the pithouse. The pithouse was bisected north–south, and the entire east half was excavated by hand: the main chamber (Structure 101) in quadrants, the antechamber (Structure 102) as a full half, and the side chamber (Structure 114) in its entirety. Beyond the pithouse, excavation was limited to random testing units (1-x-1-m) and targeted anomaly and feature testing (2-x-2-m units). What follows is a summary of excavation results.

Chronology

Mueller Little House was occupied for a long duration during the late Basketmaker III period. All of the pottery below the plow zone on the site is diagnostic to the general Basketmaker III period. A few Pueblo I and Pueblo II sherds on the site's surface are attributed to activities at later Pueblo period sites nearby. The north–south orientation and multi-chamber layout of Pithouse 101-102-114 is indicative of a late Basketmaker III occupation.

Only 17 of 184 tree-ring samples from Pithouse 101-102-114 could be dated by the University of Arizona Tree-ring Laboratory in Tucson. These samples produced cutting or near-cutting dates of A.D. 575, 625, 663, 724, and 761. Three AMS dates taken from burned corn and a turkey burial indicate occupation between. A.D. 660 and 725. These dates confirm that Pithouse 101-102-114 was likely built in the mid-seventh century using some old wood beams and was remodeled at least once or twice in the eighth century A.D. giving it a use life of close to 100 years.

A fourth AMS date on burned corn from the fill of the main chamber of the pithouse returned a date of A.D. 1150–1256. This date is assumed to be intrusive material from the later ancestral Pueblo occupations in the area. An archaeomagnetic sample from the pithouse hearth did not produce a date.

Architecture

All elements at Mueller Little House are considered to be part of a single block (Block 100). The settlement layout is generally consistent with other Basketmaker III hamlet sites in the Mesa Verde region (Wilshusen 1999) with evidence for slab-lined surface rooms to the north, a midden to the southeast, a north–south oriented pithouse between the surface rooms and midden, and a possible stockade encircling the site (Figure 9.4). The stockade fence is evidenced by just two postholes 10 m southeast of the pithouse, at the north end of the midden. The posts are 1 m apart, and their alignment suggests a fence encircling the pithouse. Three 2-x-2-m units north of the pithouse were placed over a suspected pit room anomaly. No pit room was revealed in these test units, but the sediments were deeply and erratically disturbed. This disturbance appears to date to the Basketmaker II period and could reflect sediment collection from a deep borrow pit.

The entire east half of Pithouse 101-102-114 was investigated and serves as the Basketmaker Communities Project type example of a hamlet pithouse (Figure 9.5). Pithouse 101-102-114 measures 9.0 m long north to south and consists of a round main chamber (Structure 101), a connected sub-round antechamber (Structure 102), and a small additional chamber (Structure 114) off the northeast side of the main chamber. The round main chamber measures 5.25 m in diameter. The antechamber is smaller at 3.9-x-4.10 m, and the side chamber measures just 1.8-x-1.05 m, an area large enough for an adult to lie down in. Pithouse 101-102-114 was semi-subterranean with the 0.80-cm-deep main chamber slightly deeper than the antechamber and side chamber floors.

The chamber roofs were supported by four-post support systems with leaner posts anchored into the surrounding ground surface or the high bench at the rear of the main chamber (Figure 9.6). The roof of the main chamber was cribbed, coated with a 0.5-m-thick layer of adobe, and armored with large tabular stone (Figure 9.7). All of the support posts show signs of remodeling indicating that the pithouse roof was replaced at least once during the structure’s use life. Two conical-shaped sandstone objects appear to have been stored in the roofs, one in the main chamber and one in the antechamber, and a small cache of raw bluish-gray clay was collected from the main chamber roof. The pithouse was likely entered through a roof hatch in the main chamber and/or antechamber. Occupants accessed the main chamber from the antechamber through a 0.6-m-long raised and partially paved entryway cut through the native sediment bulk between the chambers. In contrast, an ephemeral jacal wall appears to have partially divided off the side chamber from the main chamber.

Floor features were not built into the antechamber or the side chamber, but the main chamber was riddled with in-use, remodeled, and capped features (Figures 9.8 and 9.9). Abandoned and sealed floor features include a corner bin, an ashpit, a large roofed vault north of the hearth, three small pit features, a bell-shaped pit, and two postholes. Some of these features were disturbed by later features; part of the corner bin was retained as a wing wall, and a sipapu was excavated into the fill of the sealed vault. Other features still in use at the end of the structure's use life include a hearth, a large conical pit, and 10 smaller pits.

All artifacts and samples that were recovered from the surfaces in the main chamber, the antechamber, and side chamber are presented in Tables 9.1, 9.2, and 9.3. The assemblage on the floor of the pithouse reflects a partial domestic assemblage (Figure 9.10), but Tables 9.1 through 9.3 give a more detailed picture of that assemblage. Relatively few sherds were recovered, likely only representing a few vessels, including a Chapin Gray seed jar and an early white unpainted bowl (see Table 9.1). Chipped-stone debitage and flakes were more numerous, with over 200 pieces collected (see Table 9.2). The vast majority of these consist of small flakes or debitage, suggesting stone-tool production occurred in the pithouse. A core was also present, of local Morrison silicified sandstone, again indicating stone-tool production (see Table 9.3). Other tools include a bone awl and both one-hand and two-hand manos, suggesting other domestic activities, such as food preparation and weaving.

There is evidence of turkey at the site in the eggshell and gizzard stones, as well as a turkey burial. The inhabitants left a healthy female adult turkey on the floor of the antechamber when the pithouse was burned; the turkey was dead but not butchered when it was left on the floor, suggesting that it was intentionally deposited as part of the structure's decommissioning. Fragments of eggshell were left in the antechamber near the turkey remains.

Demography

Mueller Little House was occupied by a single extended family for at least one if not two generations. Though the accepted use life of earthen pithouses is considered to be about 15 years, Pithouse 101-102-114 was likely occupied twice as long (Simon and Diederichs 2019). This is based on the fact that the pithouse roof was completely replaced and the interior floor reconfigured at least once during the structure's occupation. Given the close proximity of at least 10 similarly sized Basketmaker III hamlets, there is a strong possibility that the occupants of Mueller Little House moved from or to nearby locations.

Artifacts

Artifacts from the Mueller Little House indicate use during the Basketmaker III period and into the early Pueblo I period as a habitation site. Unmodified pottery sherds recovered from 5MT10631 are presented in Table 9.4. Most of the pottery assemblage consists of Chapin Gray, Indeterminate Local Gray, and early white ware sherds, with a handful of brown ware and red ware sherds also present. One Mancos Black-on-white sherd likely indicates later use of the broader Indian Camp Ranch community during the Pueblo II period and does not reflect reoccupation of the Mueller Little House.

Chipped-stone artifacts are presented in Table 9.5. Most of the chipped-stone assemblage is made of locally available materials, with Morrison Formation rocks dominating the assemblage.

Three nonlocal pieces were recovered from the Mueller Little House: one of Cheese and Raisins chert and two of obsidian. One piece of obsidian was sourced using XRF analysis by Steve Shackley (2017) and originated from the Grants Ridge, New Mexico, source, in the Mt. Tayler Volcanic field. The piece of Cheese and Raisins chert along with the red ware sherds suggest some connections with southeast Utah.

Subsistence

The Basketmaker III occupants of Mueller Little House were farmers with access to wild plants, a pinyon and juniper forest, and pottery resources. Water was not readily available. With no dependable intermittent streams or springs in the vicinity, the occupants of Mueller Little House likely walked 0.5–1 km east into Crow Canyon for domestic water. This inconvenience highlights their commitment to living on highly productive farming soils on the ridgetop rather than near accessible water and riparian areas.

Based on archaeobotanical and pollen studies (see Chapters 21 and 22), the Mueller Little House occupants ate maize and the weeds of maize fields (pigweed, goosefoot, portulaca). These farmers also harvested wild ricegrass grains and used plants from the wild carrot family as cooking spices. Varieties of cacti were prized food resources for their sweet flowers, flower buds, and fruit. Cholla, prickly pear, and other types of cacti were collected, stored, and cooked in Pithouse 101-102-114.

More than any other hamlet tested as part of the Basketmaker Communities Project, the Mueller Little House inhabitants utilized the rose family. They incorporated the woody branches into roof construction and ate the rosebud fruits. They also commonly carried in juniper wood and, less often, saltbush, sagebrush, and pine wood for construction; all would have been directly available resources.

Mueller Little House occupants had access to a wide variety of fauna. They kept dogs, probably for protection and hunting. Small animal resources were abundant and included lizards, non-venomous snakes, squirrels, rodents, cottontail, and jackrabbits. They also hunted deer and elk. Feathers, pelts, and bone were procured from less-accessible animals including medium and large birds and bobcat. Tools and ornaments, such as awls and bone tubes, were made from some of the mammal and bird bone. The inhabitants kept turkeys and likely sacrificed one on the floor of the pithouse when they decommissioned and burned the structure. The keeping of turkeys was a new trend at small hamlet sites in the community starting in the late Basketmaker III period.

Depopulation

The site was formally decommissioned in the early eighth century A.D. The occupants cleaned out the pit features, including the hearth, and covered the north end of the main chamber floor with a layer of light brown sand. Important items, such as whole vessels, seem to have been removed from Pithouse 101-102-114, and the rest of the domestic assemblage was scattered across the main chamber floor. A dead female turkey and her eggs or eggshells were laid out on the floor of the antechamber. Finally, they intentionally burned the pithouse, which carbonized many of the roof beams and vitrified the adobe roof.

Site Summary and Conclusions

Basketmaker Communities Project investigations demonstrated that Mueller Little House comprises a standard-sized triple-chamber pithouse surrounded by a possible stockade occupied during the late Basketmaker III and early Pueblo I period between A.D. 660 and 761. The site was visited, and possibly farmed, by later ancestral Pueblo peoples but never reoccupied. The household likely consisted of an extended family unit who reroofed their pithouse at least once and occupied the site for several generations. The occupants were maize farmers with access to wild plants and cacti, a pinyon and juniper forest, lithic materials, and pottery resources. This hamlet was surrounded by similar farmsteads, many of which may have been occupied at the same time. The Mueller Little House family lived over a kilometer away from the great kiva at the Dillard site and built their pithouse late in the communities' development. Though the occupants did not accumulate the level of wealth found at households near the great kiva, they did not lack resources and reinvested in their home to extend its use.

Figure 9.1. Photograph of Mueller Little House and the pinyon and juniper forest on the property east of the site prior to excavation.

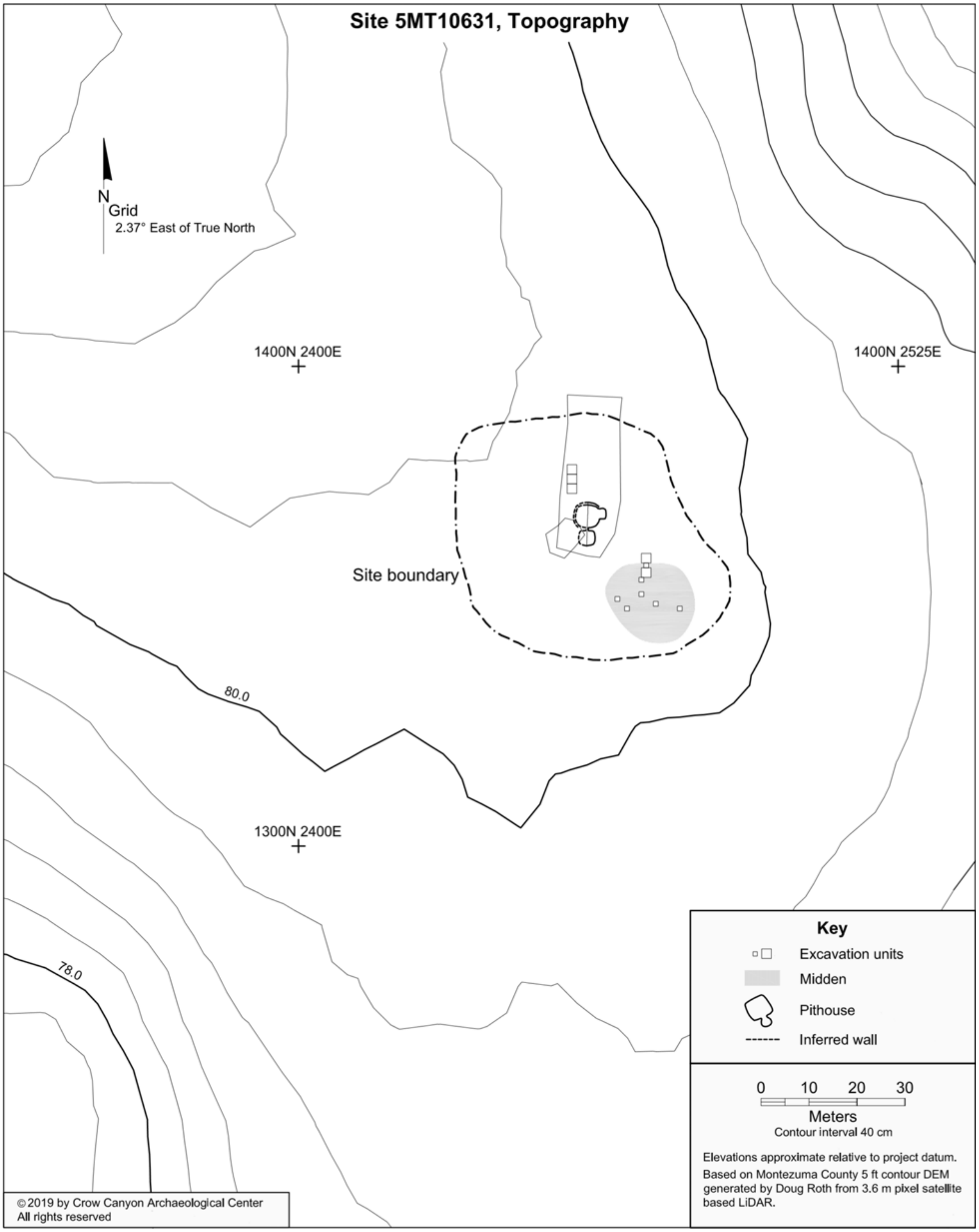

Figure 9.2. Topographic map of Mueller Little House (5MT10631).

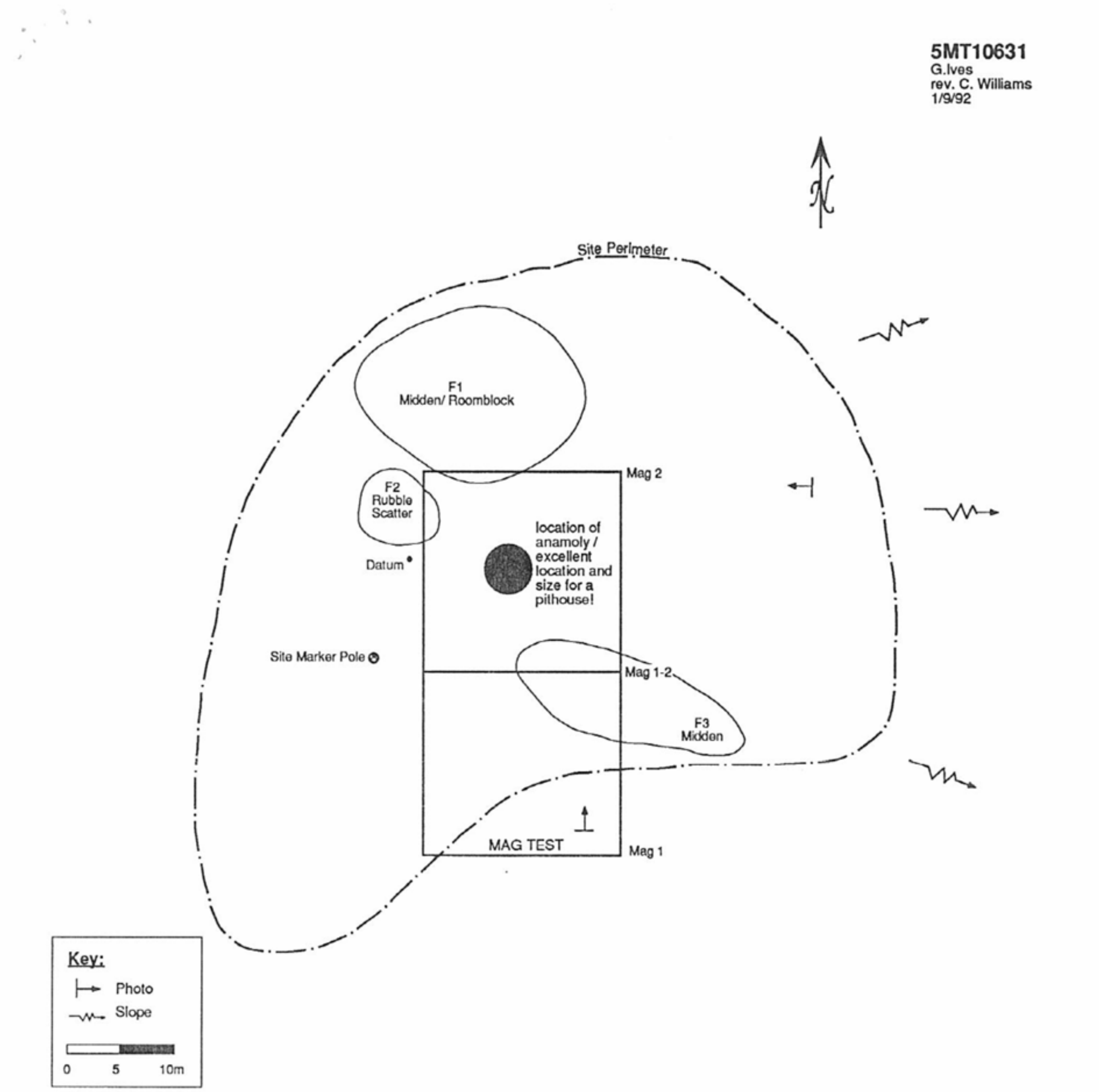

Figure 9.3. Survey sketch of Mueller Little House from the 1993 Woods Canyon Archaeological Consultants site form (Fetterman and Honeycutt 1994). Note the proton magnetometer grid and anomaly identified by Heather Barker (1993).

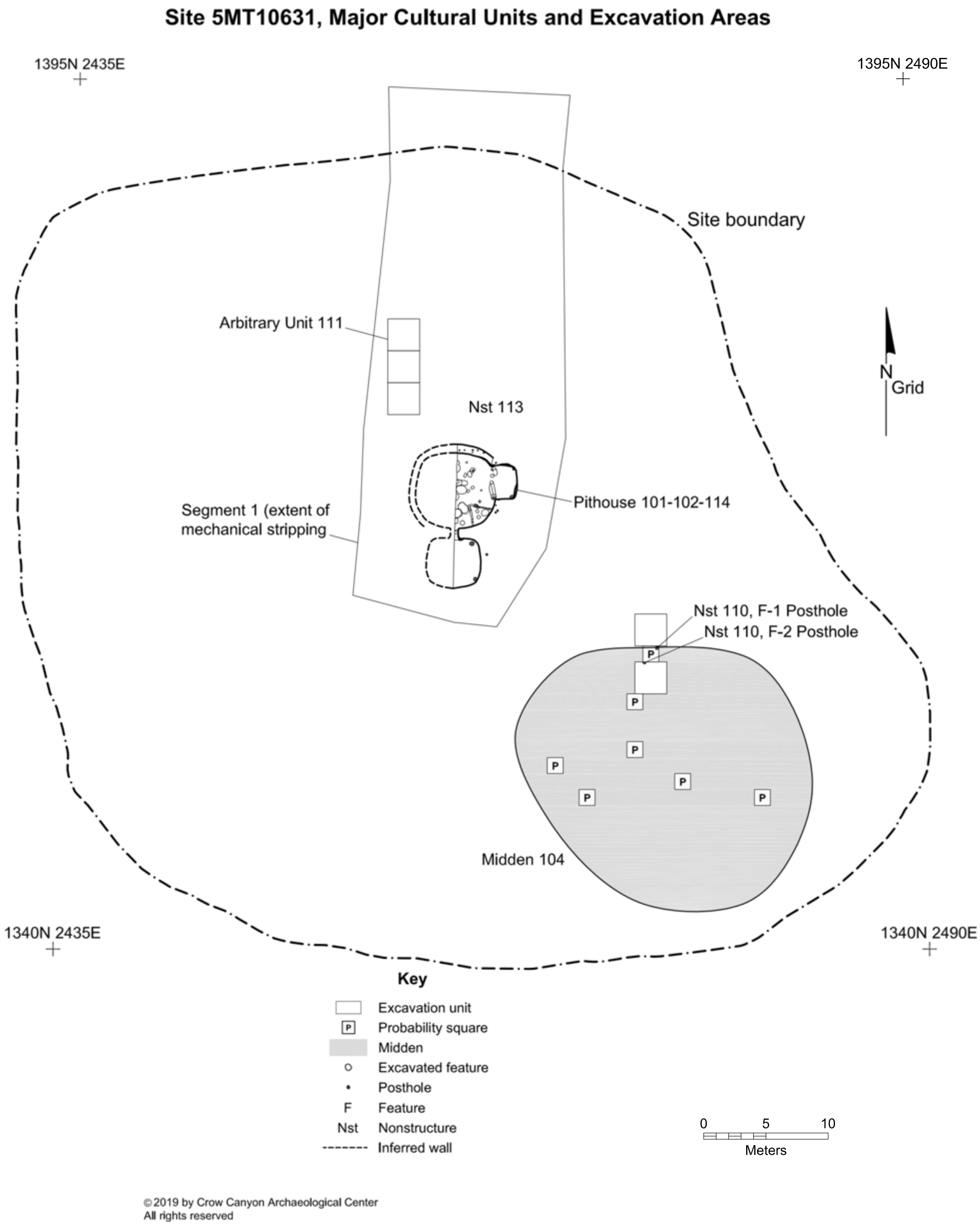

Figure 9.4. Map of Mueller Little House (5MT10631) with all major cultural units and excavation units.

Figure 9.5. Photograph of Pithouse 101-102-114, Surface 1 during excavation.

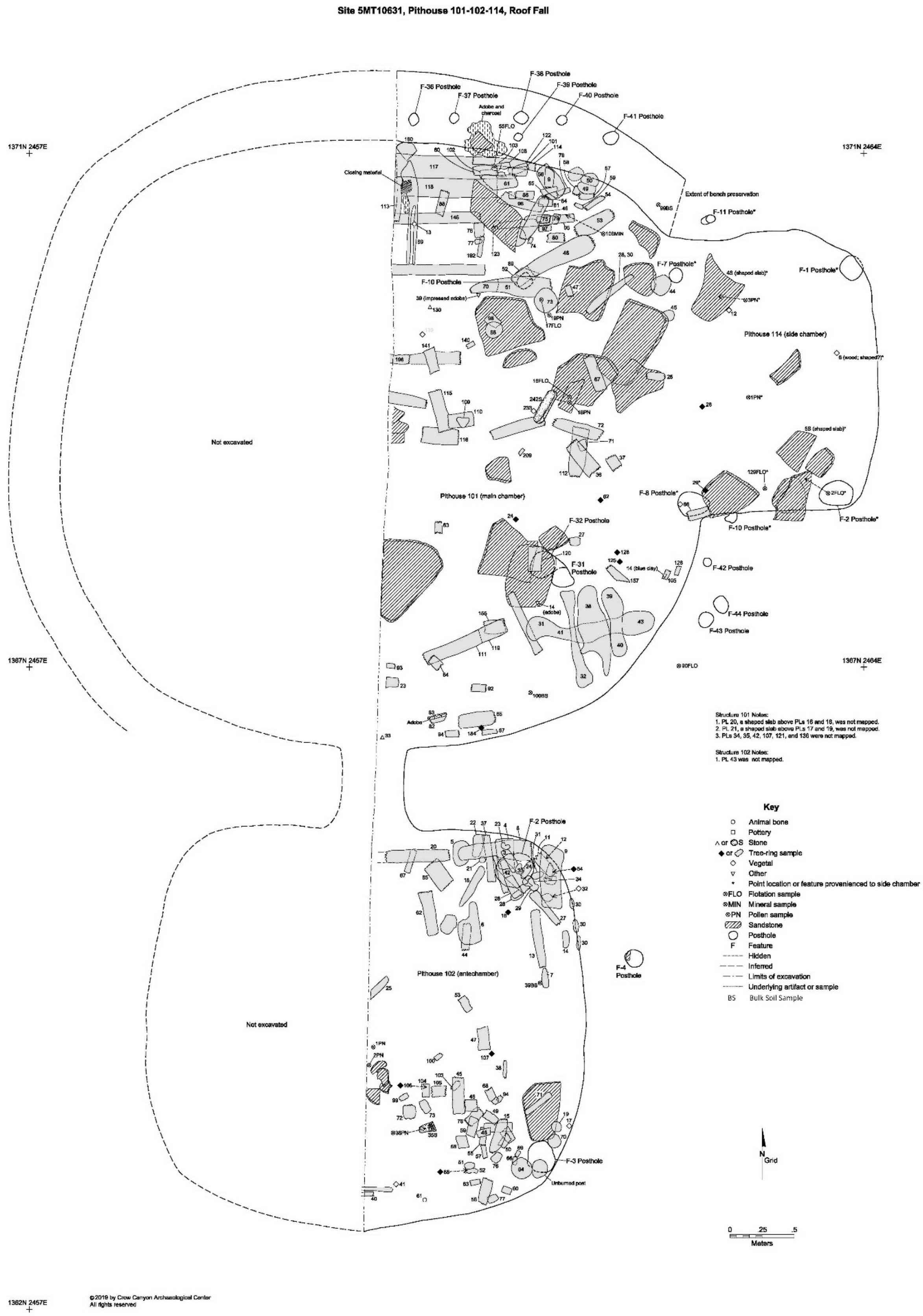

Figure 9.6. Plan map of Pithouse 101-102-114 roof fall and roof features.

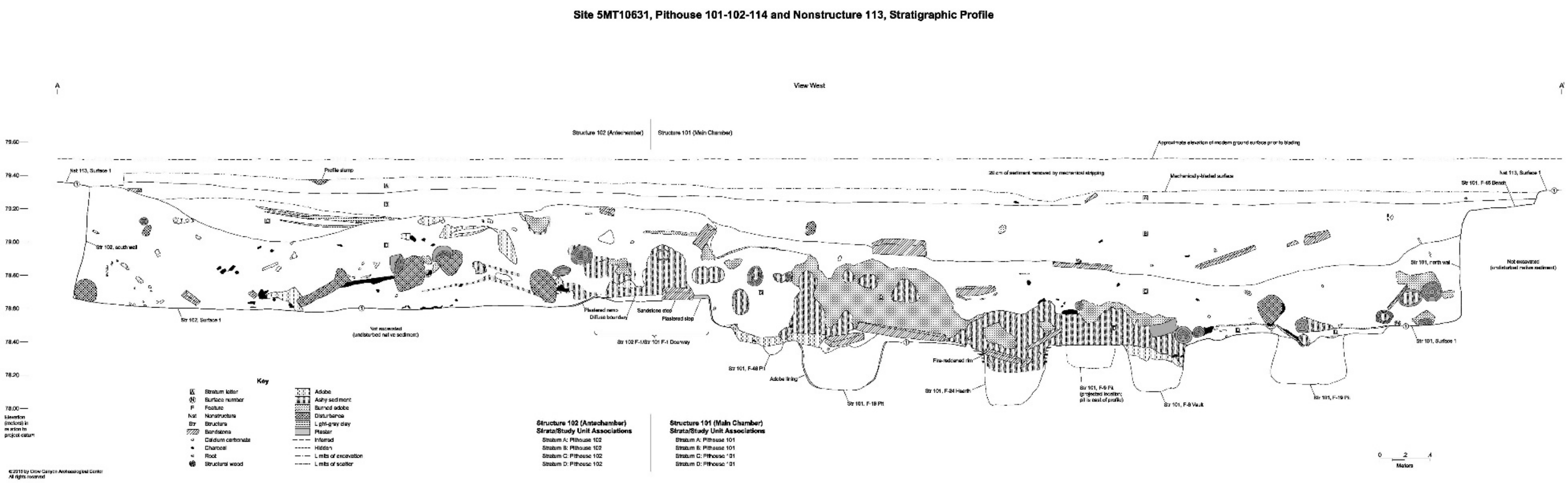

Figure 9.7. Stratigraphic profile map of Pithouse 101-102-114.

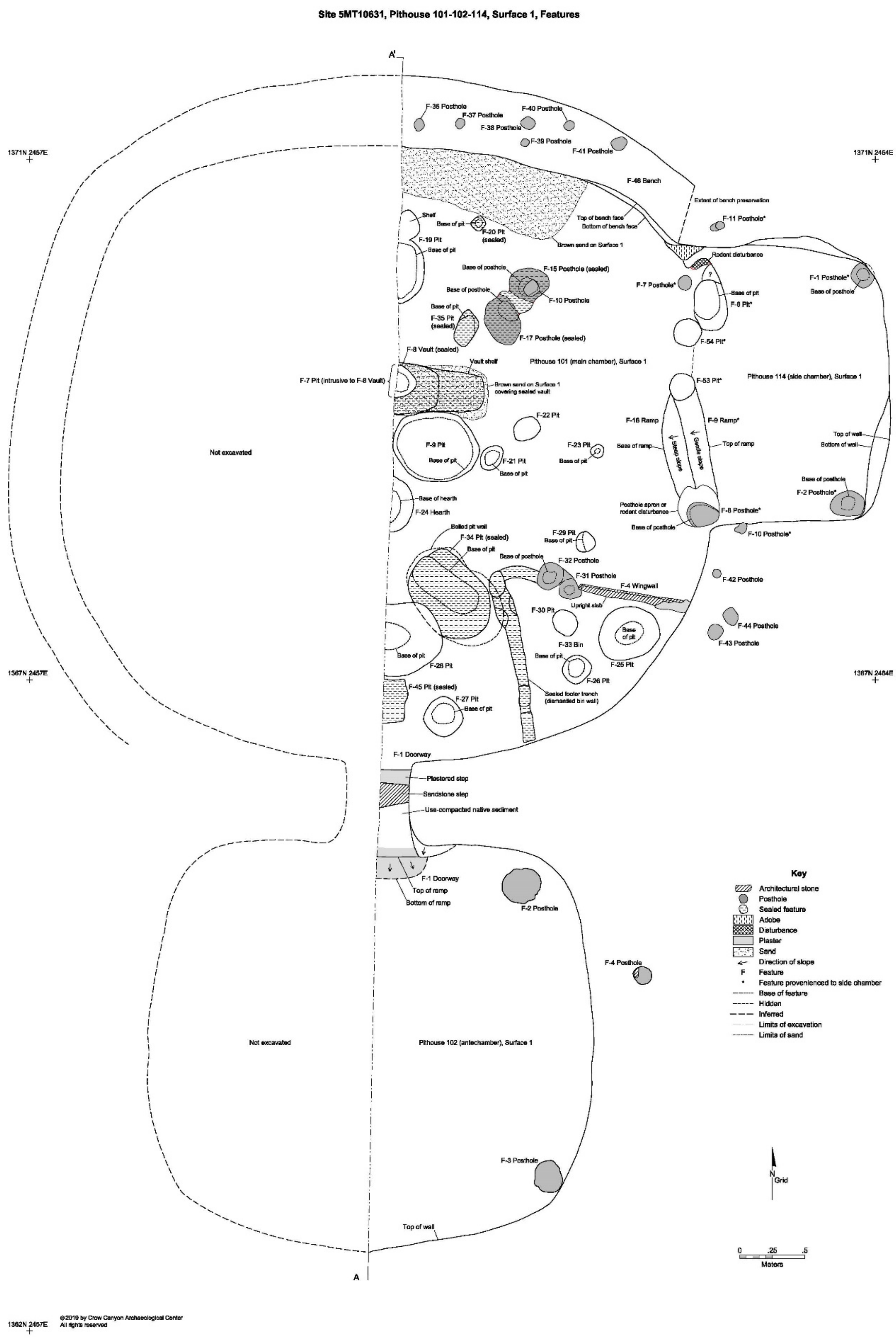

Figure 9.8. Plan map of Pithouse 101-102-114, Surface 1 features.

Figure 9.9. Photoscan 3-D photogrammetry image of Pithouse 101-102-114, Surface 1.

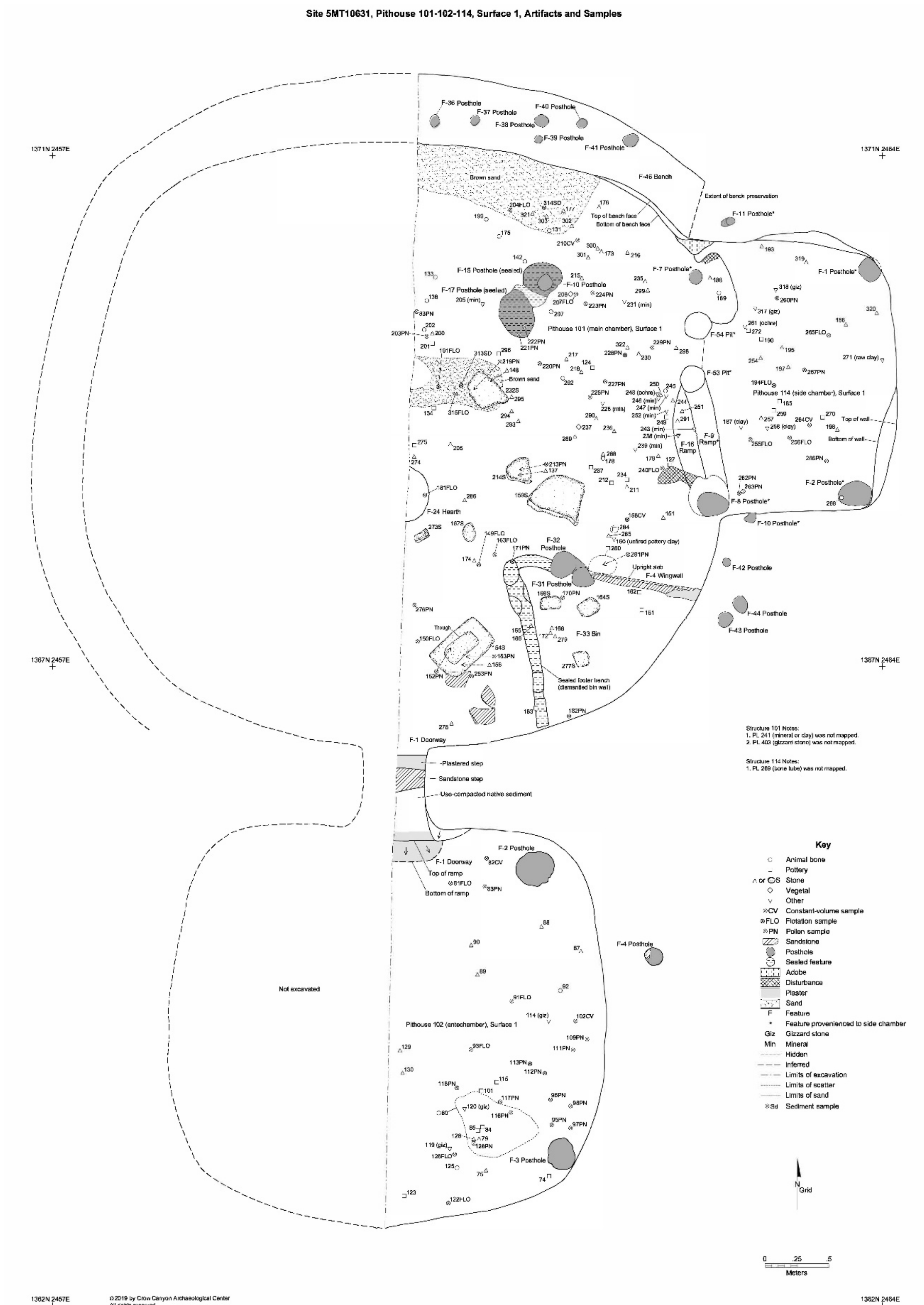

Figure 9.10. Plan map of Pithouse 101-102-114, Surface 1 point-located artifacts and samples.

Table 9.1. Unmodified Sherds Recovered from the Surface of Pithouse 101/102/114, 5MT10631.

Feature Number (Type)	Pottery Type	Pottery Form	N	Weight (g)
	Chapin Gray	Seed jar	2	72.50
19 (Pit: Not Further Specified)	Chapin Gray	Seed jar	1	23.10
32 (Posthole)	Early White Unpainted	Bowl	1	13.40
	Indeterminate Local Gray	Jar	9	567.70
8 (Posthole)	Indeterminate Local Gray	Jar	2	19.70
22 (Pit: Not Further Specified)	Indeterminate Local Gray	Jar	2	12.40
28 (Pit: Not Further Specified)	Indeterminate Local Gray	Jar	4	16.10
Total			21	724.90

Table 9.2. Bulk Chipped Stone Recovered from the Surface of Pithouse 101/102/114, 5MT10631.

Feature Number (Type)	Material Type	Chipped Stone Category	N (<1/4 in)	Weight (g) (<1/4 in)	N (<1/4 in)	Weight (g) (<1/4 in)
	Agate/chalcedony	Debitage	1	0.00		
	Burro Canyon chert	Debitage			2	24.30
	Dakota/Burro Canyon silicified sandstone	Debitage	4	0.10	6	101.43
	Morrison chert	Debitage	1	0.00		
	Morrison mudstone	Debitage	1	0.20	4	8.14
	Morrison silicified sandstone	Debitage	10	0.00	8	41.66
	Morrison silicified sandstone	Modified flake			1	18.85
1 (Posthole)	Dakota/Burro Canyon silicified sandstone	Debitage			1	0.20
	Unknown chert/siltstone	Debitage			1	0.20
	Morrison silicified sandstone	Debitage	2	0.00		
2 (Posthole)	Agate/chalcedony	Debitage	1	0.00		
	Morrison mudstone	Debitage	1	0.00		
	Dakota/Burro Canyon silicified sandstone	Debitage			1	0.60
	Morrison silicified sandstone	Debitage			1	0.60
3 (Posthole)	Morrison chert	Debitage	1	0.09		
	Morrison mudstone	Debitage	1	0.04		
	Morrison silicified sandstone	Debitage	1	0.00		
4 (Pit: Not Further Specified)	Burro Canyon chert	Debitage	1	0.00		
	Dakota/Burro Canyon silicified sandstone	Debitage	1	0.00		
	Morrison silicified sandstone	Debitage	4	0.00		

Feature Number (Type)	Material Type	Chipped Stone Category	N (<1/4 in)	Weight (g) (<1/4 in)	N (<1/4 in)	Weight (g) (<1/4 in)
6 (Pit: Not Further Specified)	Dakota/Burro Canyon silicified sandstone	Debitage	2	0.00		
7 (Pit: Not Further Specified)	Dakota/Burro Canyon silicified sandstone	Debitage	3	0.00		
	Morrison silicified sandstone	Debitage	2	0.00		
7 (Posthole)	Dakota/Burro Canyon silicified sandstone	Debitage			1	5.00
	Morrison silicified sandstone	Debitage	2	0.00		
	Sandstone	Debitage	1	0.00		
8 (Floor Vault)	Agate/chalcedony	Debitage	2	0.00		
	Dakota/Burro Canyon silicified sandstone	Debitage	7	0.10		
	Morrison chert	Debitage	2	0.00		
	Morrison mudstone	Debitage	2	0.00		
	Morrison silicified sandstone	Debitage	14	0.00	1	0.20
8 (Posthole)	Morrison silicified sandstone	Debitage	4	0.00		
	Obsidian	Debitage	1	0.00		
	Unknown chert/siltstone	Debitage	2	0.00		
9 (Pit: Not Further Specified)	Dakota/Burro Canyon silicified sandstone	Debitage	3	0.00		
	Morrison silicified sandstone	Debitage	8	0.00	1	0.90
10 (Posthole)	Morrison silicified sandstone	Debitage	1	0.00		
15 (Posthole)	Morrison silicified sandstone	Debitage	2	0.00		
17 (Posthole)	Agate/chalcedony	Debitage	1	0.00		
	Dakota/Burro Canyon silicified sandstone	Debitage	1	0.00		
	Morrison silicified sandstone	Debitage	2	0.00		
19 (Pit: Not Further Specified)	Agate/chalcedony	Debitage	1	0.00		
	Dakota/Burro Canyon silicified sandstone	Debitage	4	0.00	1	12.80
	Morrison mudstone	Debitage	3	0.00		
	Morrison silicified sandstone	Debitage	14	0.00	2	5.30
22 (Pit: Not Further Specified)	Dakota/Burro Canyon silicified sandstone	Debitage	1	0.00		

Feature Number (Type)	Material Type	Chipped Stone Category	N (<1/4 in)	Weight (g) (<1/4 in)	N (<1/4 in)	Weight (g) (<1/4 in)
	Morrison silicified sandstone	Debitage	4	0.00		
23 (Pit: Not Further Specified)	Morrison silicified sandstone	Debitage			1	33.80
25 (Pit: Not Further Specified)	Dakota/Burro Canyon silicified sandstone	Debitage	1	0.00		
	Morrison silicified sandstone	Debitage	1	0.00		
27 (Pit: Not Further Specified)	Morrison silicified sandstone	Debitage	1	0.00		
28 (Pit: Not Further Specified)	Agate/chalcedony	Debitage	1	0.00		
	Dakota/Burro Canyon silicified sandstone	Debitage	6	0.00	2	1.30
	Morrison mudstone	Debitage			1	0.40
	Morrison silicified sandstone	Debitage	14	0.20	1	2.40
32 (Posthole)	Dakota/Burro Canyon silicified sandstone	Debitage	1	0.00	1	0.60
	Morrison silicified sandstone	Debitage	4	0.00		
33 (Bench: Not Further Specified)	Dakota/Burro Canyon silicified sandstone	Debitage	1	0.00		
	Morrison silicified sandstone	Debitage	18	0.26	2	5.42
34 (Pit: Not Further Specified)	Agate/chalcedony	Debitage	1	0.00		
	Dakota/Burro Canyon silicified sandstone	Debitage	4	0.00		
	Morrison mudstone	Debitage	3	0.00	2	1.64
	Morrison silicified sandstone	Debitage	10	0.20	1	0.40
	Sandstone	Debitage			1	0.30
35 (Pit: Not Further Specified)	Burro Canyon chert	Debitage			1	0.20
	Dakota/Burro Canyon silicified sandstone	Debitage	2	0.00	1	0.90
	Morrison mudstone	Debitage			1	0.40
	Morrison silicified sandstone	Debitage	8	0.00	2	0.10
Total			195	1.19	48	268.04

Table 9.3. Other Artifacts and Samples from the Surface of Pithouse 101/102/114, 5MT10631.

Grouped Artifact Category	Artifact Type	Condition	Material Type	N of Samples	N of Items	Weight (g)
Ceramics	Modified sherd	Fragment		1	1	148.00
Animal Bone	Bone awl	Incomplete		1	1	0.60
	Eggshell			3	3	0.00
	Nonhuman bone			65		149.50
Flaked Lithic Tool	Biface	Fragment	Agate/chalcedony	2	2	1.20
	Core	Complete	Morrison silicified sandstone	1	1	31.00
	Chipped-stone tool	Complete	Morrison silicified sandstone	1	1	695.70
Non-flaked Lithic Tool	Bulk indeterminate ground stone		Sandstone	2	2	2,855.80
	One-hand mano	Complete	Sandstone	1	1	1,971.50
	Other modified stone/mineral	Fragment	Sandstone	2	2	4,320.00
	Two-hand mano	Fragment	Sandstone	1	1	539.00
Other Inorganic	Adobe			2		1.90
	Gizzard stones			24	28	0.50
	Mineral/stone sample		Calcite	1	1	0.40
	Mineral/stone sample		Igneous	1	1	0.00
	Mineral/stone sample		Other mineral (azurite)	1	1	0.00
	Mineral/stone sample		Pigment (iron oxide)	1	2	0.00
	Mineral/stone sample		Sandstone (green colored sandstone)	2	1	1.20
	Mineral/stone sample		Unknown stone (possible green clay or malachite)	1	2	0.00
Sample	Constant volume sample			5		
	Flotation sample			94		
Total				212	51	10,716.30

Table 9.4. Summary of Unmodified Sherds by Ware and Type for 5MT10631.

Ware and Type	Count	% by Count	Weight (g)	% by Weight (g)
Brown Ware				
Sambrito Utility	1	0.10	1.50	0.02
Twin Trees Utility	3	0.29	7.80	0.10
Plain Gray Ware				
Chapin Gray	51	4.86	681.60	8.92
Indeterminate Local Gray	875	83.33	6,330.60	82.83
Corrugated Gray Ware				
Indeterminate Local Corrugated Gray	17	1.62	36.30	0.47
White Ware				
Chapin Black-On-White	25	2.38	167.40	2.19
Early White Painted	40	3.81	227.90	2.98
Early White Unpainted	13	1.24	68.10	0.89
Late White Painted	15	1.43	42.10	0.55
Late White Unpainted	6	0.57	20.20	0.26
Mancos Black-On-White	1	0.10	54.50	0.71
Red Ware				
Abajo Red-On-Orange	1	0.10	2.30	0.03
Indeterminate Local Red Unpainted	2	0.19	2.40	0.03
Total	1,050	100.00	7,642.70	100.00

Table 9.5. Count of Chipped-Stone Artifacts by Raw Material Type for 5MT10631.

Material Culture	Raw Material	Count	% by Count	Weight (g)	% by Weight (g)
Local	Dakota/Burro Canyon silicified sandstone	476	23.07	2,490.01	36.58
	Igneous	2	0.10	10.00	0.15
	Morrison chert	40	1.94	52.44	0.77
	Morrison mudstone	362	17.55	915.34	13.45
	Morrison silicified sandstone	1,058	51.28	2,989.35	43.92
	Quartz	1	0.05	4.70	0.07
	Sandstone	8	0.39	21.50	0.32
Nonlocal	Nonlocal chert/siltstone	1	0.05	0.10	0.00
	Obsidian	2	0.10	0.00	0.00
Semi-local	Agate/chalcedony	30	1.45	39.50	0.58
	Brushy Basin chert	9	0.44	30.00	0.44
	Burro Canyon chert	69	3.34	252.70	3.71
	Petrified wood	2	0.10	0.70	0.01
Unknown	Unknown chert/siltstone	3	0.15	0.20	0.00
Total		2,063	100.00	6,806.54	63.42

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Chapter 10

Portulaca Point (5MT10709)

by Shanna R. Diederichs

Introduction

Portulaca Point (5MT10709) is a mid-Basketmaker III phase hamlet site near the center of the Indian Camp Ranch Archaeological District on the northwestern face of a north to south–trending ridge. This ridge drops away gently to the east but rises to several points and then drops more dramatically to the west, overlooking a wide, shallow drainage with a large surface-water catchment. Portulaca Point is on Indian Camp Ranch Lot 11 and was named by the owners, Bob and Diane Greenlee, for a cache of portulaca seeds found in a vessel at the site.

The site was originally recorded as a Basketmaker III habitation in 1991 by G. Ives, A. Gass, and C. Williams of Woods Canyon during the original Indian Camp Ranch Survey (Fetterman and Honeycutt 1994). They recorded a scatter of gray ware pottery and evidence of at least one upright-slab roomblock (Figure 10.1). They arbitrarily divided Portulaca Point from 5MT10627 to the north because the two sites appeared to represent separate household units. Later that year, Woods Canyon verified the presence of a burned pit structure near the center of the site with auger probes. Prior to documentation, the ridge was partially chained to remove old-growth pinyon and juniper. Indian Camp Ranch developer, Archie Hanson, used heavy equipment to manage vegetation on the site and burned the windrows, disturbing surface deposits in the northwest and south portions of the site and leaving piles of charcoal and ash across the surface. When the Greenlees purchased the site and developed a home on the property, they constructed a driveway along the west edge of the site, and construction debris was deposited and leveled in a berm 20 m to the south.

Several other Basketmaker III period hamlets are on the same ridge as Portulaca Point: 5MT10627 and 5MT10629 directly north, 5MT3873 to the southwest, and 5MT10678 and 5MT10679 to the south. 5MT3873 (the Greenlee site) was partially excavated in 1995 by Woods Canyon. The Pueblo II roomblock and kiva were the primary targets of the excavation, but a standard-sized Basketmaker III pithouse under the Pueblo II period midden was also sampled. During the field seasons of 2018 and 2019, 5MT10678, a Basketmaker III habitation on Lot 12, was excavated by owner Laura Watson under the supervision of Woods Canyon (Hampson and Chuipka 2020). Several slab-lined rooms of the roomblock were excavated along with a substantial standard-sized pithouse with a floor assemblage of over 20 whole vessels. Crow Canyon analyzed these vessels, and the assemblage is summarized in Chapter 24. Both the 5MT3873 and the 5MT10678 pithouses date to the late seventh century, post-dating the habitation at Portulaca Point by several generations.

Portulaca Point was selected for Basketmaker Communities Project investigations because it represents a well-preserved Basketmaker III habitation with a roomblock, pit structure, and midden deposits surrounded by similar period habitations, near but not adjacent to the Dillard site. Sampling of the site was expected to contribute to our understanding of (1) the development of the Indian Camp Ranch community, 2) the occupants' relationship to the great kiva at the Dillard site, and (3) the relative wealth and length of occupation at farming hamlets (Ortman et al. 2011).

The surface signature of Portulaca Point is typical for a partially disturbed Basketmaker III hamlet in the Mesa Verde region (Wilshusen 1999). Construction remnants of an east–west roomblock runs down the slope at the north end of the site (Figures 10.2). There is a concentration of artifacts 20 m to the south. Today, there is no indication of the southern rock scatter recorded in 1991 as Feature 2 suggesting that it has been removed or covered by additional construction activities. There is also no surface evidence of a pithouse at the site because the structure refilled to the level of the surrounding landscape.

Geophysical imaging, mapping, auger testing, and excavation associated with the Basketmaker Communities Project confirmed the presence of a deteriorated roomblock with at least one intact room (Pit Room 115), a standard-sized double-chambered Basketmaker III pithouse (Pithouse 106-111), and two concentrated associated middens at Portulaca Point (Figure 10.3). A light scatter of pottery and lithics covers 0.56 acres. During the 2010 Basketmaker Communities Project surface survey (Shanks 2014), 149 plain gray or Chapin Gray Basketmaker III pottery sherds were documented along with 18 pottery sherds dating to the Pueblo II period. The Pueblo II pottery at the site is likely associated with the Pueblo II unit (5MT3873) on the knoll 50 m to the southwest of Portulaca Point.

Approximately 1 percent (21 m^2) of the total site area was excavated during the Basketmaker Communities Project using 16 excavation units. Most excavation was limited to random testing units (1-x-1 m). However, the architectural focus of the research design (see Chapter 2) required that larger targeted sampling be applied to structure and feature investigations (1-x-3-m and 2-x-2-m units). What follows is a summary of excavation results.

Chronology

Investigations at Portulaca Point suggest it was occupied during the mid-Basketmaker III phase. Early Pueblo diagnostic pottery on the surface of the site was exclusively Chapin Gray Ware. The northwest–southeast oriented double-chambered pithouse and associated roomblock built of disarticulated circular slab-lined rooms also indicates a mid-Basketmaker III occupation.

Three of 16 beam samples submitted to the University of Arizona Tree-Ring Laboratory were dated. All three are noncutting samples dating to A.D. 521, 541, and 594. Four AMS dates, two from each structure, support a late sixth- to early seventh-century occupation likely between A.D. 570 and 670 (see Chapter 19).

Architecture

All architectural elements at Portulaca Point are considered to be part of a single block (Block 100) comprising the east–west roomblock and the double-chambered pithouse. The settlement layout is generally consistent with other Basketmaker III hamlet sites in the Mesa Verde region (Wilshusen 1999) with a linear upright-slab roomblock running generally east–west and a double-chambered pithouse built south of the roomblock and oriented northwest to southeast.

The east–west roomblock appears to be linear rather than arced. Most of the roomblock has deteriorated and fallen to grade making it difficult to determine its exact length. Based on collapsed construction material in the area, the roomblock measures about 12 m long and one room wide, with an estimate of five or six rooms. A 2-x-2-m test unit into Pit Room 115, a fairly intact pit room at the east end of the roomblock, provides an example of individual room construction.

Pit Room 115 is a 1.70-x-1.65-x-0.44-m slab-lined subrectangular surface room built partially below ground and partially aboveground (Figures 10.4 and 10.5). The north, east, west, and likely south walls were slab-lined with large upright stones supported on 10 cm of construction material and mortared into place with adobe. Sporadic interior and exterior posts helped support the roof. No other features were built inside the pit room, and only a few artifacts were left on the floor of the structure. The artifacts recovered from the surface of Pit Room 115 are presented in Tables 10.1, 10.2, and 10.3. Pottery sherds are the most common artifact recovered, with 57 sherds. Chipped-stone debitage was recovered, although only three of the 29 pieces recovered were greater than ¼ inch in size. Other artifacts recovered, including a polishing stone and a mineral sample of iron oxide, may suggest pottery production occurred in this pit room.

Both the main chamber and antechamber of Pithouse 106-111 were investigated. Based on electrical resistivity imaging and auger tests, the main chamber measures about 5.50-x-5.50 m and the antechamber 2-x-3 m. At 1.25 m deep, the main structure was constructed 0.4 m deeper than the antechamber (Figure 10.6) No roofing features were identified during Basketmaker Communities Project testing, but burned roofing beams, adobe, and small rock in both chambers indicate that the roofs were constructed of wooden superstructures covered with 0.4 m of earth and stone that largely collapsed around the main chamber hearth indicating there was a vent and possible roof entry in the center of the main chamber roof. The antechamber floor was not exposed. The main chamber floor was coated with a thick reddish-brown plaster (Figures 10.7 and 10.8). A large 1-m-diameter slab-lined hearth was built into the center of the main chamber floor and coped with similar plaster.

Items from a household assemblage, including a whole plain gray seed jar filled with portulaca seeds, a basket, two awls, two ground stone fragments, and a shaped piece of yellow pigment, were left on the main chamber floor of Pithouse 106-111. All artifacts recovered from the surface in Pithouse 106-111 are presented in Tables 10.4, 10.5, and 10.6. A photo of Vessel 1 is presented in Chapter 24 (Figure 24.9). The basket fragment (Figure 10.9) represents a close-coiled bowl-shaped vessel with non-interlocking stitches and two-rod-and-bundle bunched foundation, a common basketry style for the Basketmaker III period (Webster 2015).

Demography

Portulaca Point was likely occupied by a single extended family for one generation. This is based on the lone standard-sized double-chambered pithouse, the relatively small amount of roomblock storage, and the moderate amount of midden deposits at the site. Given the close proximity of at least five other similarly sized Basketmaker III hamlets, there is a strong possibility that the occupants of Portulaca Point moved from or to nearby locations on the same ridgetop.

Artifacts

The artifacts recovered from Portulaca Point suggest a short-term occupation during the Basketmaker III period. Unmodified sherds recovered from the site are presented in Table 10.7. Almost all of the pottery recovered indicates use in the Basketmaker III period, with the exception of six corrugated sherds and two late white painted sherds. These likely do not indicate more recent reoccupation at Portulaca Point, but rather indicate the later occupation and use of the broader Indian Camp Ranch community in the more recent Pueblo II and Pueblo III periods.

Bulk chipped-stone artifacts recovered from Portulaca Point are shown in Table 10.8. The vast majority of the chipped-stone artifacts are made of locally available raw materials, most notably Morrison silicified sandstone. Only two nonlocal chipped-stone artifacts were recovered, and both were made of obsidian. Both of these obsidian artifacts were identified to their source location using XRF analysis (Shackley 2017). One of the obsidian artifacts, a piece of debitage, was sourced to Grants Ridge, New Mexico, which is part of the Mt. Taylor Volcanic Field near Grants, New Mexico. Approximately one-third of the sourced obsidian artifacts from the Basketmaker Communities Project came from Mt. Taylor sources. This suggests the residents of the Basketmaker III period Indian Camp Ranch community had close connections with areas to the south, into New Mexico. The other obsidian artifact from Portulaca Point was sourced to Wild Horse Canyon, which is in the Mineral Mountain area of western Utah. This was the only piece of obsidian from Utah recovered during the Basketmaker Communities Project, suggesting the residents of Portulaca Point had connections that stretched farther to the west than other Indian Camp Ranch community residents.

Subsistence

The Basketmaker III occupants of Portulaca Point were farmers with access to wild plants, a pinyon and juniper forest, and basketry and pottery resources. Water was not readily available. With no dependable intermittent streams or springs in the area, the occupants of Portulaca Point likely walked about 1 km east, west, or south for domestic water. This inconvenience highlights the commitment to living on highly productive farming soils on the ridgetop rather than near accessible water and riparian areas.

Based on archaeobotanical and pollen studies (see Chapters 21 and 22), the Portulaca Point occupants ate maize and the weeds of maize fields (pigweed, goosefoot, portulaca). These farmers also had access to domesticated common beans (*Phaseolus vulgaris*), based on cotyledon (seed half) remains, and they harvested wild tansy mustard seeds and ricegrass grains. Portulaca Point is the only Basketmaker III site tested during the Basketmaker Communities Project that lacks carrot family pollen. Carrot family plants were likely used as cooking spices, and their absence at Portulaca Point could point to variations in culinary tastes or practices.

Dedication to weedy plant resources at Portulaca Point is evidenced by the thousands of charred portulaca or purslane (*Portulaca retusa*) seeds recovered from a seed jar vessel on the floor of the main chamber of Pithouse 106-111. Portulaca is a wild annual succulent herb with tiny yellow blossoms that produce capsules filled with shiny black seeds. It is high in vitamins A, B, and C; calcium; iron; and protein (Dunmire and Tierney 1997). When dried the seeds are high in albuminoids (30.25 percent) and carbohydrates (34.73 percent) (Harrington 1967). Frank Cushing reported preparation of portulaca by the Zuni tribe by harvesting its "very starchy and white-kerneled seed" (1920:562) by pulling the plant prior to its ripening and then drying and threshing with the use of mats or screens.

Construction wood preferences at the site included juniper, sagebrush, and serviceberry/ *peraphyllum*, which would have all been directly available. The basket fragment on the floor of the pithouse was made of sumac (*Rhus trilobata*) and yucca (*Yucca* sp.), which may have been procured further afield.

Very little animal bone was recovered from Portulaca Point. In addition to rodent remains, three awls shaped from large-mammal long bones were the only bones found at the site. Lack of faunal material may be the result of poor preservation. Numerous gizzard stones were collected from Pit Room 115 pointing to the presence of turkeys at the site.

Materials for making pottery and chipped-stone tools are locally available near Portulaca Point. The adjacent Dakota and Morrison geologic formations provided both clay and chipped-stone materials that were used by the residents of Portulaca Point. A pottery resource survey, conducted on an area adjacent to the Indian Camp Ranch community and discussed in more detail in Chapter 24, identified many available outcrops of clay from the Dakota geologic formation, and they appear compositionally similar to the archaeological pottery sherds recovered at Portulaca Point. Rock from the nearby Dakota and Morrison geologic formations were the preferred raw materials for making chipped-stone tools at Portulaca Point. Morrison Formation outcrops are accessible in Alkali Canyon, just to the northwest of Portulaca Point.

Depopulation

The site was formally decommissioned before the occupants moved away. Pit Room 115 was cleaned out, and only a few secondary deposit refuse sherds were left on the floor. Pithouse 106-111 was also cleaned prior to decommissioning, and all ash was removed from the hearth. On the floor a de facto assemblage was left in place including the seed jar filled with portulaca seeds, a basket, bone awls, a flake, and pigment. After preparation, the pit room and pit structure were thoroughly burned and collapsed. Based on AMS dating and pottery seriation, the Basketmaker III occupants moved away from Portulaca Point by the late seventh century.

Site Summary and Conclusions

Basketmaker Communities Project investigations demonstrated that Portulaca Point comprises a standard-sized double-chambered pithouse and a small roomblock occupied early in the mid-Basketmaker III period between A.D. 570 and 670. The Basketmaker III household likely consisted of an extended family unit who occupied the site for one to two generations. The occupants of Portulaca Point were maize and bean farmers with access to wild plants, a pinyon and juniper forest, and basketry and pottery resources. This hamlet was surrounded by similar farmsteads, many of which may have been occupied at the same time. A quarter mile west of Portulaca Point a larger population was living at the Dillard site around a great kiva. Despite their proximity to the Dillard site and its great kiva, there is no evidence that the Portulaca Point occupants accumulated more wealth or specialty practices than other hamlet households in the community.

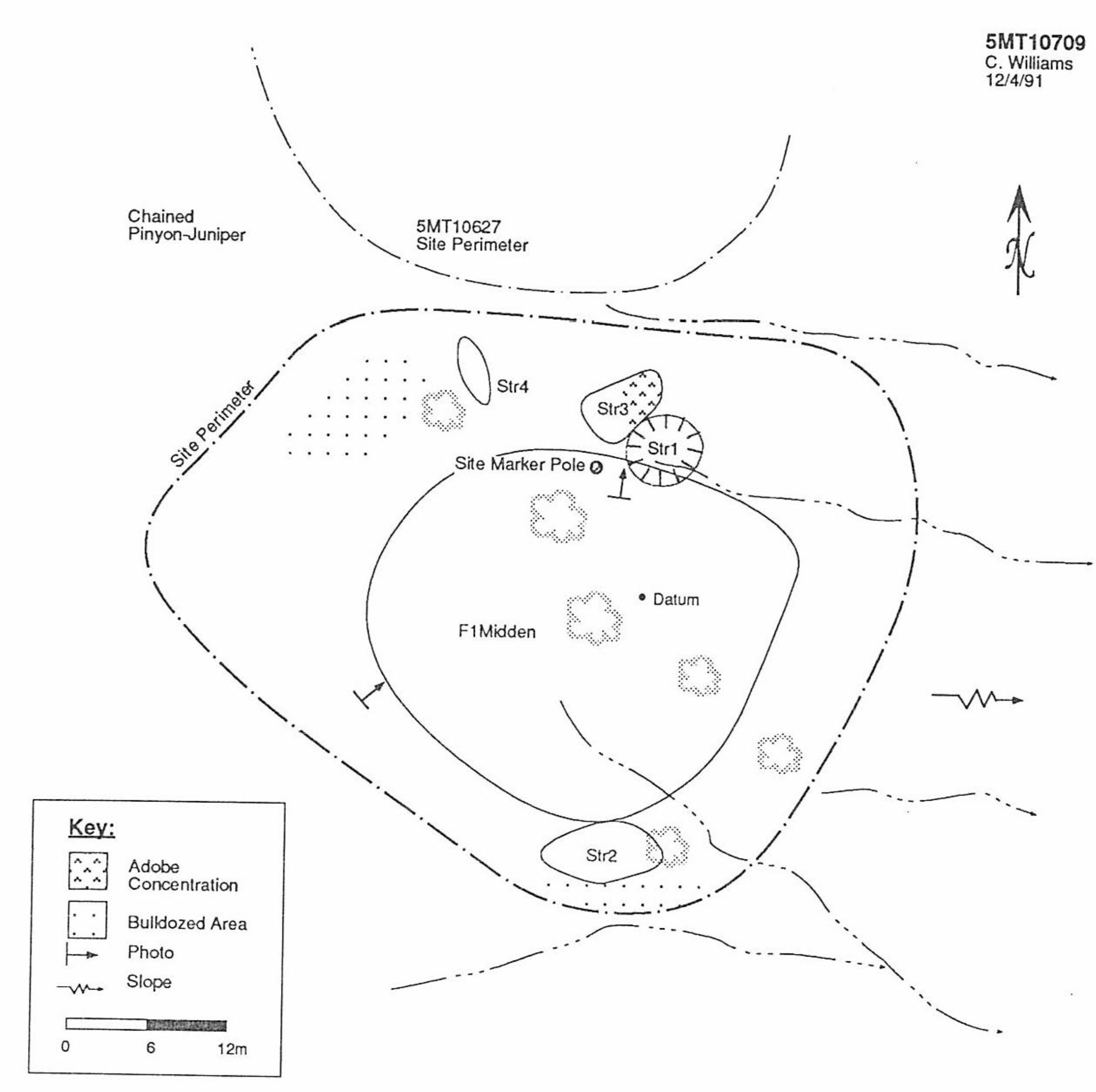

Figure 10.1. Survey sketch of the Ridgeline site from the 1993 Woods Canyon Archaeological Consultants site form (Ives and Williams 1993:8).

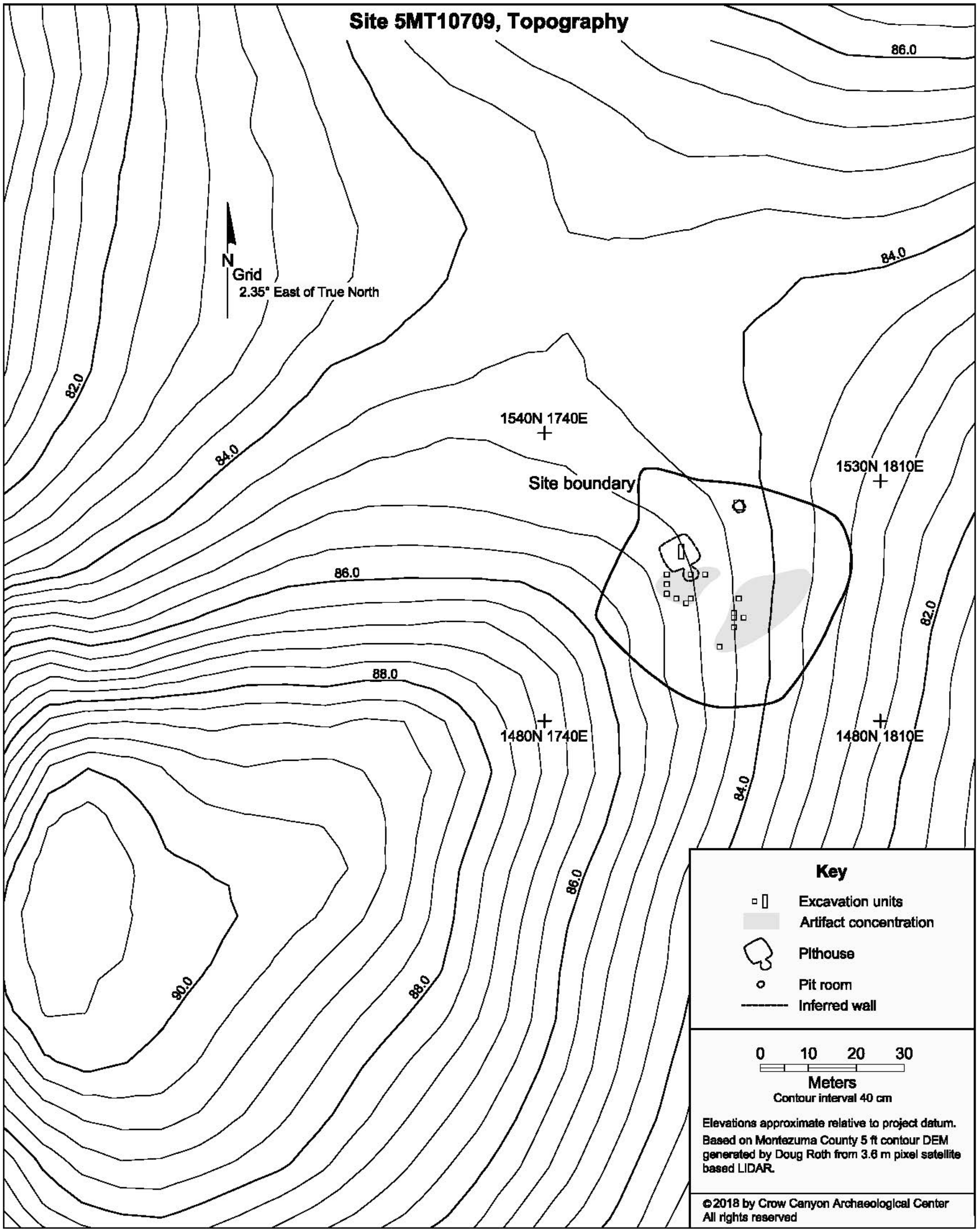

Figure 10.2. Topographic map of Portulaca Point (5MT10709).

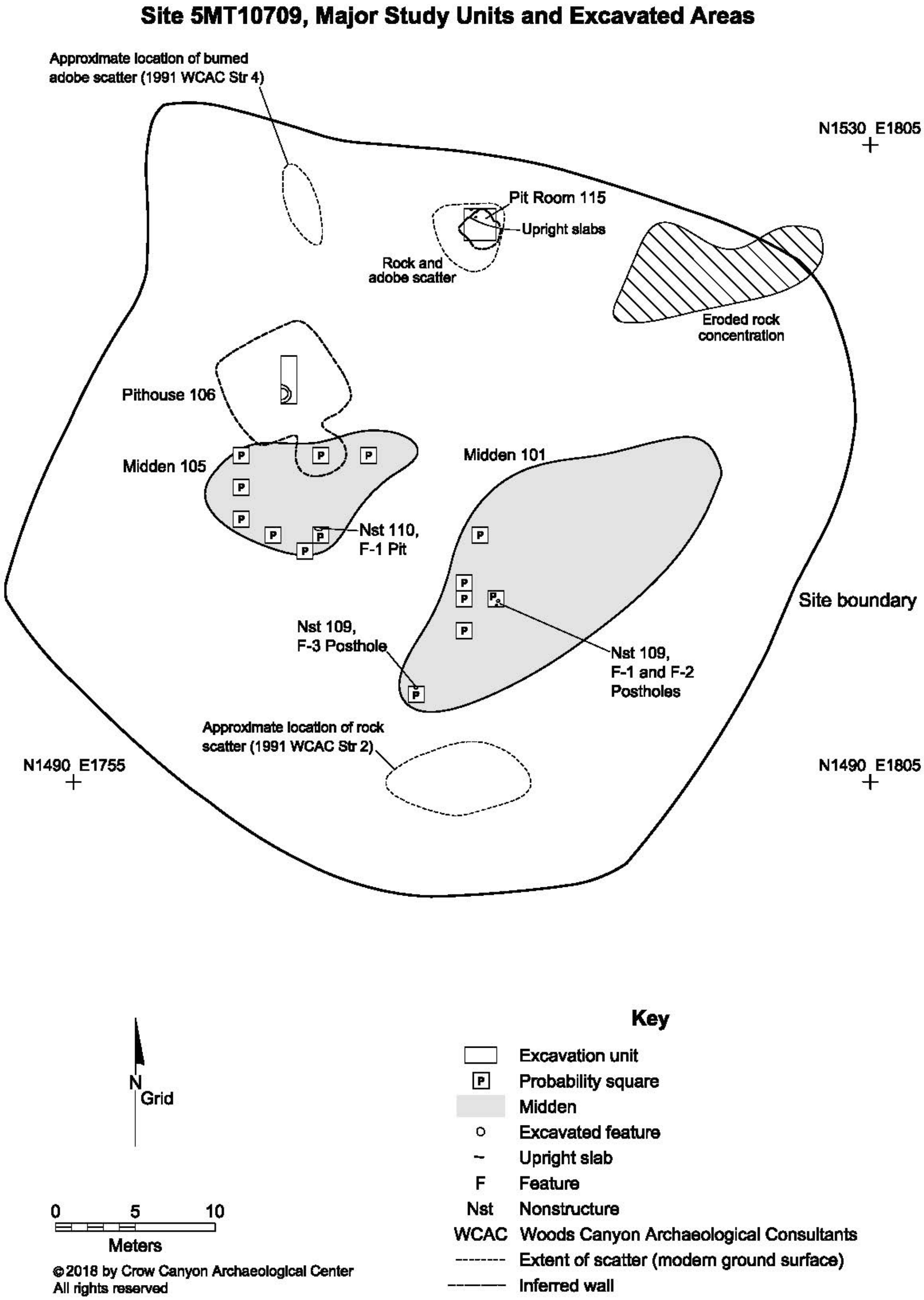

Figure 10.3. Map of Portulaca Point (5MT10709) showing all major cultural units and excavation units.

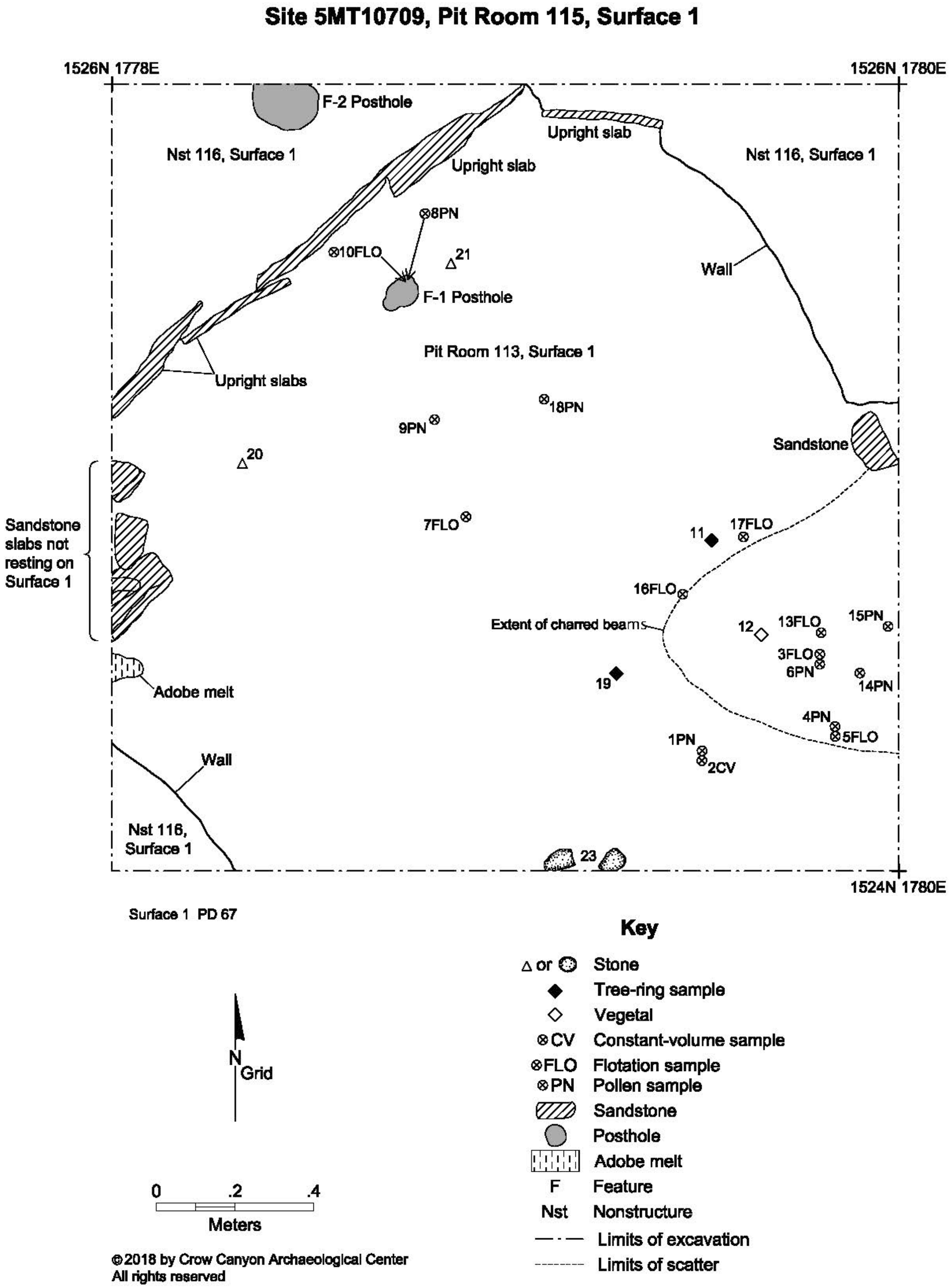

Figure 10.4. Plan map of Pit Room 115, Surface 1, at Portulaca Point.

Figure 10.5. Photograph of Pit Room 115, Surface 1, at Portulaca Point.

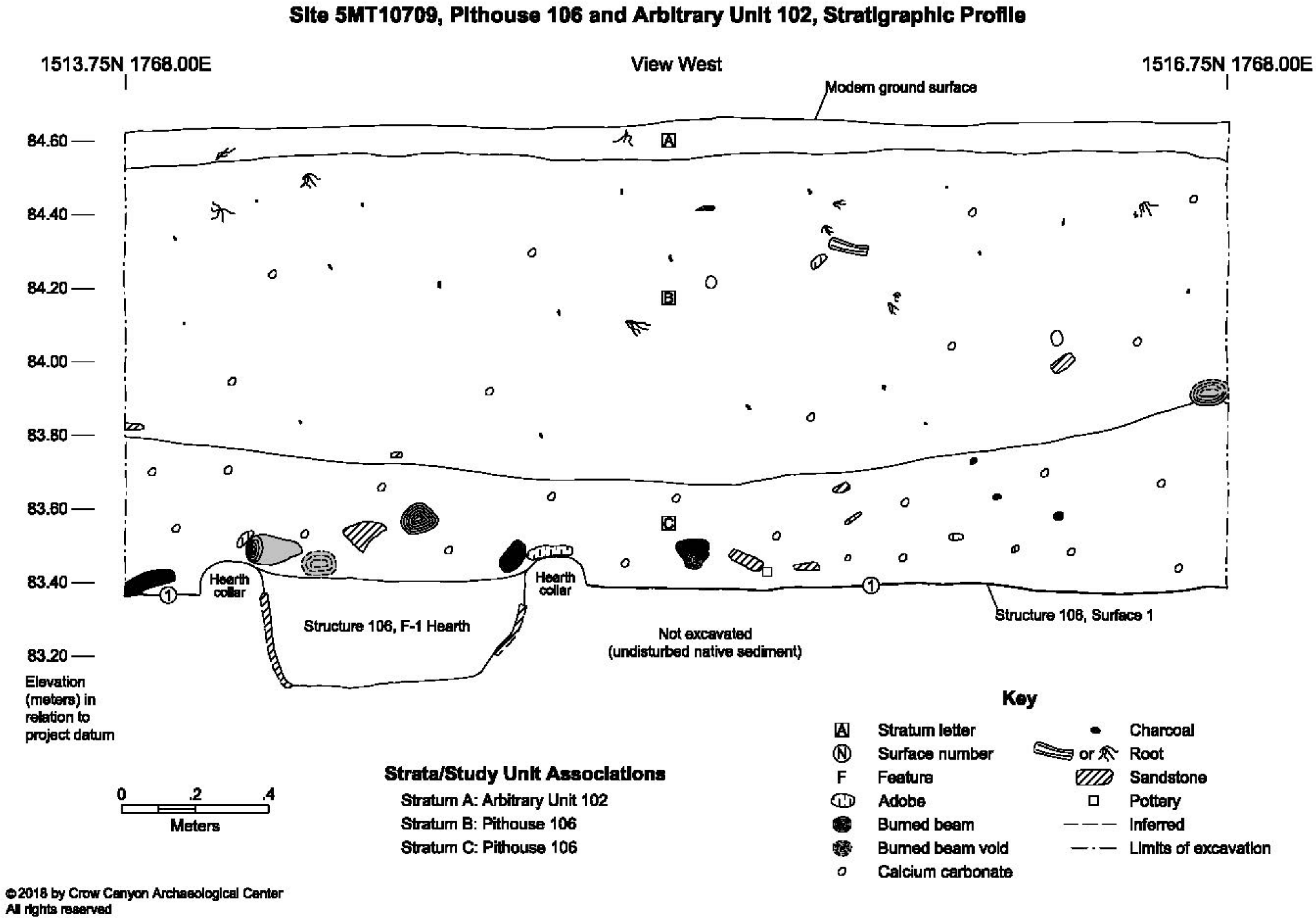

Figure 10.6. Stratigraphic profile map of Pithouse 106-111 main chamber.

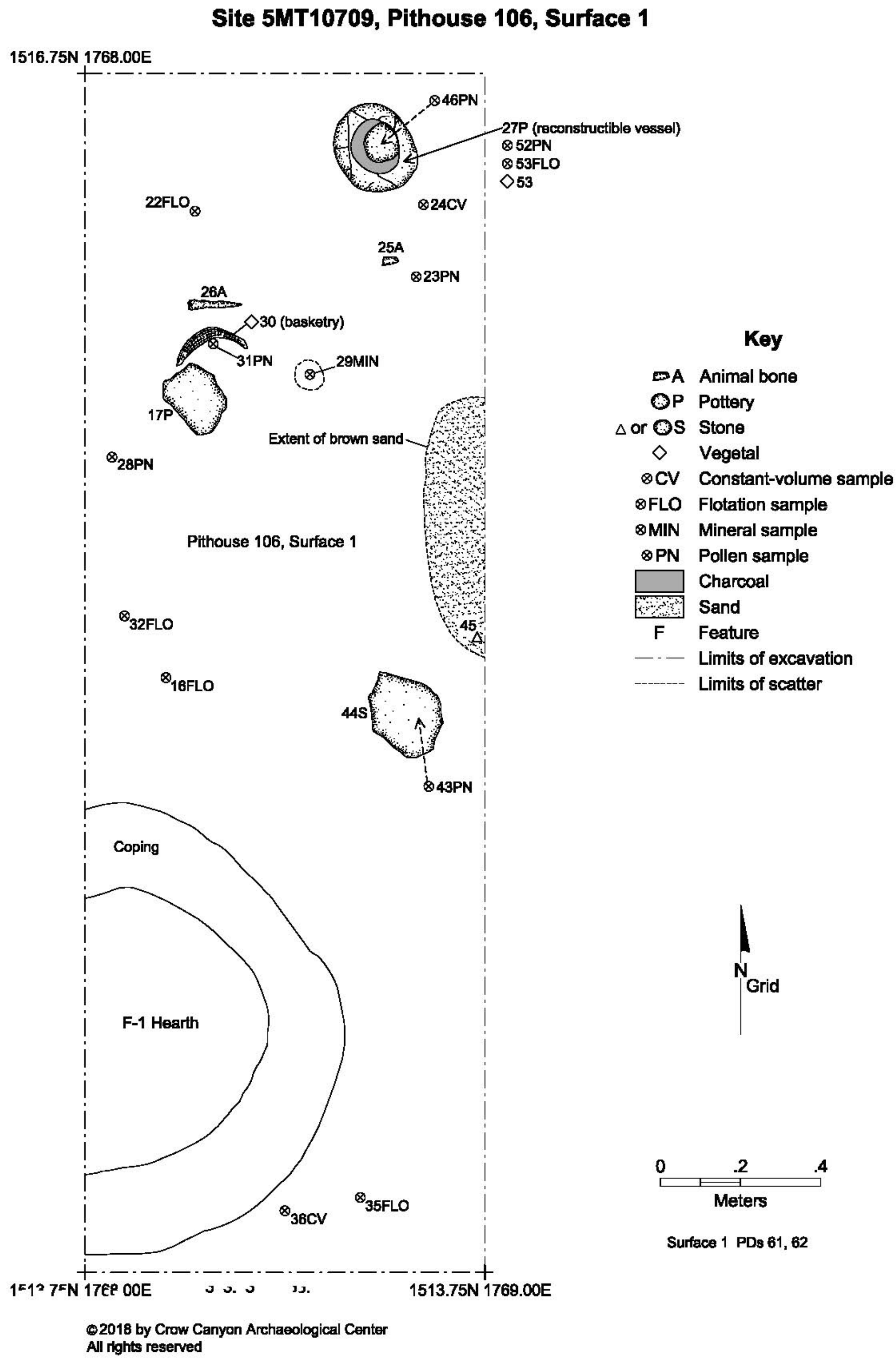

Figure 10.7. Plan map of Pithouse 106-111 main chamber, Surface 1.

Figure 10.8. Photograph of Pithouse 106-111 main chamber, Surface 1.

Figure 10.9. Photograph of a two-rod-and-bundle basketry fragment on the floor of Pithouse 106-111 main chamber, Surface 1 at Portulaca Point.

Figure 10.10. Photograph of the reconstructed gray ware jar that was filled with Portulaca seeds on the floor of Pithouse 106-111.

Table 10.1. Unmodified Sherds Recovered from the Surface of Pit Room 115, 5MT10709.

Pottery Type	Pottery Form	N	Weight (g)
Chapin Black-on-white	Bowl	2	21.90
Indeterminate Local Gray	Jar	52	542.20
Indeterminate Local Gray, Polished	Bowl	3	40.10
Total		57	604.20

Table 10.2. Bulk Chipped Stone Recovered from the Surface of Pit Room 115, 5MT10709.

Feature Number (Type)	Material Type	Chipped Stone Category	N (<1/4 in)	Weight (g) (<1/4 in)	N (>1/4 in)	Weight (g) (>1/4 in)
	Burro Canyon chert	Debitage	1	0.00		
	Dakota/Burro Canyon silicified sandstone	Modified flake			1	3.40
	Morrison chert	Debitage	1	0.00		
	Morrison mudstone	Debitage			1	17.00
	Morrison silicified sandstone	Debitage	23	0.20	1	0.40
	Obsidian	Debitage	1	0.10		
1 (Posthole)	Morrison silicified sandstone	Debitage	1	0.00		
Total			27	0.30	3	20.80

Table 10.3. Other Artifacts and Samples from the Surface of Pit Room 115, 5MT10709.

Grouped Artifact Category	Artifact Type	Condition	Material Type	N of Samples	N of Items	Weight (g)
Animal Bone	Nonhuman bone			9		0.00
Non-flaked Lithic Tool	Polishing stone	Complete	Quartzite	1	1	596.30
Other Inorganic	Adobe			4		4.40
	Gizzard stones			2	2	0.10
	Mineral/stone sample		Iron oxide	1	1	0.10
Sample	Constant volume sample			1		
	Flotation sample			16		
Total				34	4	600.90

Table 10.4. Unmodified Sherds Recovered from the Surface of Pithouse 106-111, 5MT10709.

Feature Number (Type)	Pottery Type	Pottery Form	Vessel Number	N	Weight (g)
	Chapin Gray*	Jar	1	72	1,019.20
	Sambrito Utility	Jar		1	6.10
	Chapin Gray	Bowl		1	13.00
	Early White Unpainted	Bowl		1	2.40
	Indeterminate Local Gray	Jar		13	409.60
	Indeterminate Local Gray, polished	Jar		1	1.40
	Indeterminate Local Gray, polished	Seed jar		1	10.80
1 (Hearth)	Indeterminate Local Gray, polished	Jar		1	2.30
Total				91	1,464.80

*In the Crow Canyon system, sherds that refit without fresh breaks are classified as their individual attributes suggest. Vessel 1 is a Chapin Gray vessel, but individual sherds were classified as Chapin Gray and Indeterminate Local Gray. These types have been grouped under the overall vessel type of Chapin Gray here.

Table 10.5. Bulk Chipped Stone Recovered from the Surface of Pithouse 106-111, 5MT10709.

Feature Number (Type)	Material Type	Chipped Stone Category	N (<1/4 in)	Weight (g) (<1/4 in)	N (>1/4 in)	Weight (g) (>1/4 in)
	Agate/chalcedony	Debitage	1	0.10		
	Burro Canyon chert	Debitage	1	0.00		
	Morrison silicified sandstone	Debitage	12	0.20	1	12.10
	Unknown chert/siltstone	Debitage	1	0.00		
1 (Hearth)	Dakota/Burro Canyon silicified sandstone	Debitage	9	0.00	3	13.10
	Morrison mudstone	Debitage			2	2.20
	Morrison silicified sandstone	Debitage	3	0.00	1	13.80
Total			27	0.30	7	41.20

Table 10.6. Other Artifacts and Samples from the Surface of Pithouse 106-111, 5MT10709.

Grouped Artifact Category	Artifact Type	Condition	Material Type	N of Samples	N of Items	Weight (g)
Animal Bone	Bone awl	Fragment		2	2	11.70
	Bone awl	Complete		1	1	15.80
	Nonhuman bone			3		0.40
Organic	Basketry	Fragment		1	1	
Other Inorganic	Adobe			7		43.70
	Mineral/stone sample		Pigment (iron oxide)	1	6	7.80
	Mineral/stone sample		Other mineral (yellow pigment)	1	1	0.00
	Mineral/stone sample		Igneous	1	1	0.60
Sample	Constant volume sample			2		
	Flotation sample			19		
Total				38	12	80.00

Table 10.7. Summary of Unmodified Sherds by Ware and Type for 5MT10709.

Ware and Type	Count	% by Count	Weight (g)	% by Weight (g)
Brown Ware				
Sambrito Utility	2	0.61	518.20	12.83
Plain Gray Ware				
Chapin Gray	15	4.59	203.70	5.04
Indeterminate Local Gray	276	84.40	3,063.20	75.85
Indeterminate Local Gray, Polished	18	5.50	145.20	3.60
Corrugated Gray Ware				
Indeterminate Local Corrugated Gray	6	1.83	31.00	0.77
White Ware				
Chapin Black-on-white	3	0.92	26.90	0.67
Early White Painted	3	0.92	18.30	0.45
Early White Unpainted	2	0.61	19.80	0.49
Late White Painted	2	0.61	12.20	0.30
Total	327	100.00	4,038.50	100.00

Table 10.8. Count of Chipped-Stone Artifacts by Raw Material Type for 5MT10709.

Material Category	Raw Material	Count	% by Count	Weight (g)	% by Weight (g)
Local	Dakota/Burro Canyon silicified sandstone	29	12.45	66.20	8.43
	Morrison chert	1	0.43	0.00	0.00
	Morrison mudstone	36	15.45	199.20	25.35
	Morrison silicified sandstone	149	63.95	493.00	62.75
	Sandstone	2	0.86	2.10	0.27
	Slate/shale	1	0.43	7.40	0.94
Nonlocal	Obsidian	2	0.86	2.00	0.25
Semi-local	Agate/chalcedony	5	2.15	11.40	1.45
	Burro Canyon chert	6	2.58	3.50	0.45
Unknown	Unknown chert/siltstone	2	0.86	0.90	0.11
Total		233	100.00	785.70	100.00

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Chapter 11

The Shepherd Site (5MT3875)

by Grant D. Coffey

Introduction

The Shepherd site is located in the eastern part of the Indian Camp Ranch Archaeological District along the western margin of the Crow Canyon drainage. The site was originally recorded by Joe Berger in 1983 and was revaluated and recorded by Woods Canyon in 1991 as part of the Indian Camp Ranch Archaeological Survey (Fetterman and Honeycutt 1994). The site was later reassessed in 2013 by Woods Canyon, and pottery tallies were completed at the site (Shanks 2014). It is situated on an east-trending slope near lands currently used for agriculture. The surface of the site has been impacted by historic agricultural activity and land clearing.

Crow Canyon tested other sites in the immediate area including Mueller Little House (5MT10631), which lies about 575 m to the northwest. Numerous other sites dating to the Basketmaker III period are also present in the general vicinity (Fetterman 2004; Fetterman and Honeycutt 1994; Shanks 2014).

The Shepherd site was selected for testing due to its inferred status as a Basketmaker III habitation and the research goals set forth in the research design (Ortman et al. 2011). The surface signature of the site is expansive, and at least 17 rock concentrations are present (Figure 11.1). Many of these have likely been altered by historic land-clearing activity. Remote sensing, soil augers, and excavation failed to reveal the presence of a pit structure at the site. The overall amount of refuse present and the other structures recorded suggest the site likely served as some type of habitation in the Basketmaker III period.

Twenty-four excavation units were dug to test subsurface deposits at the site. All but three of these excavation units were 1-x-1-m units placed to test midden deposits. The other three units were used to test potential architectural areas and other features. Combined, this excavated area accounts for slightly less than 1 percent of the total site area. What follows is a summary of these excavations.

Chronology

Pottery data, AMS carbon dates, and architectural evidence suggest the site was used primarily in the Basketmaker III (A.D. 500 to 750) and Pueblo II (A.D. 900 to 1150) periods. In terms of diagnostic pottery, 393 plain gray sherds were recovered from all contexts at the site, but only 24 corrugated gray ware sherds were recovered (Table 11.1). Plain gray pottery was primarily used in the Basketmaker III and Pueblo I periods, and corrugated pottery was used in the Pueblo II and Pueblo III periods (Ortman et al. 2005). All corrugated sherds were found in fill overlying or within Structure 106 (see the Architecture section below), which suggests the Pueblo II use of the site was far more spatially restricted than the Basketmaker III use. Though few diagnostic white ware pottery sherds were recovered overall, the vast majority reflect use in the Basketmaker III period (i.e., Chapin Black-on-white).

Dates produced through AMS carbon dating also support two distinct periods of use. Burned *Zea mays* from a pit room (Structure 132) submitted for AMS carbon dating suggests that structure was in use sometime from A.D. 644 to 714 (two-sigma calibrated dates [Beta 479184]). This span is relatively late in the Basketmaker III period. A two-sigma calibrated AMS carbon date produced from a charred *Zea mays* cupule recovered from the fill of a masonry surface structure (Structure 106), suggests that structure was used sometime in the A.D. 1045 to 1095 period—roughly the middle of the broader Pueblo II period (Beta 416911). The earthen construction of Structures 131 and 132 would also be consistent with Basketmaker III construction, and the single-stone masonry of the walls framing Structure 106 is consistent with an early-to-middle Pueblo II construction (Lipe and Varien 1999). Though artifacts suggestive of Pueblo I use are present (e.g., Bluff Black-on-red sherds), they are very limited in number and may be associated with the later use of the site.

Architecture

Only one architectural block was defined at the site. All midden areas and the three defined structures are assigned to this block. The identified structures are spatially distinct, as are the four separate midden areas. This suggests more than one architectural or feature complex is likely represented by surface remains.

Structures 131 and 132 are both pit rooms located in the central portion of the site. Both are shallow pits dug into the ancient ground surface, and both were likely used for storage in the Basketmaker III period. Structure 131 was lightly burned when decomissioned, and some burned roof fall was present on the floor surface. Structure 132 was also lightly burned when it was decommissioned and was built in a fashion very similar to Structure 131. Both rooms were covered or filled with light cultural fill or midden material suggesting continued use of the site after the structures were decomissioned.

Structure 106 is located in the northwestern part of the site and is a masonry surface structure dating to the Pueblo II period. The observed walls of the structure are built of single-stone masonry and are seated on a thin layer of mixed cultural fill overlying undisturbed native sediment (Figure 11.2). At least one posthole is present on the interior of structure (Feature 3) in the northwest corner of the room. This posthole likely seated a roof-support post. The central part of the floor of the structure is fire reddened and was covered with a thin layer of ash. This suggests limited burning in this location during use of the structure (burned spot, Feature 2). A partially stone-lined pit feature is present near the center of the structure just to the southeast of the burned spot (Feature 1). This pit was likely a storage feature of some type. Given the lack of an associated pit structure or a more extensive roomblock, this structure likely served some type of periodic storage or processing use in the Pueblo II period.

Midden areas at the site produced artifacts that reflect two major periods of use and a diversity of processing activities. Most of the diagnostic pottery recovered from the site is consistent with an extensive Basketmaker III use of the site. A smaller number of diagnostic sherds dating to the Pueblo II period was also recovered (see Chronology section). The artifact assemblage includes diverse artifact types, such as ground-stone, eggshell, and faunal remains. The amount of cultural material corresponding to the Basketmaker III period, and the presence of at least two pit rooms that were likely used for storage at this time, indicate at least episodic or temporary habitation during this time. Despite remote sensing and soil augering, however, no pithouses could be identified.

Demography

The lack of identified pithouses or kivas makes estimating population difficult. The overall amount of cultural material recovered, the diversity of the artifact assemblage, and the presence of at least two pit rooms suggest at least one household occupied the site in the Basketmaker III period. Based on ethnographic reports, this suggests that five to seven people lived at the farmstead, at least episodically, sometime between A.D. 633 and 714 (Kuckelman 2003; Lightfoot 1994:148). Architectural and artifact evidence suggest the site did not serve as a permanent residence in the Pueblo II period. Rather, the single structure recorded for this time period (Structure 106) and the sparse Pueblo II artifact assemblage suggest some type of storage or processing use.

Artifact Interpretations

Chipped stone was the most numerous type of artifact recovered: 782 lithic flakes and other pieces of chipped-stone debitage were collected (Table 11.2). Lithic materials available locally in bedrock formations dominated this assemblage. Stones from the Morrison Formation were the most common followed by types of stone found in the Dakota and Burro Canyon Formation sandstones. Other types of chipped-stone materials found at the site include agate/chalcedony, red jasper, and slate/shale.

Pottery sherds were the second most abundant type of artifact recovered: 479 sherds are large enough to be captured by 1/2-in mesh (bulk sherds, large [see Table 11.1]). Smaller sherds were not counted or analyzed but were recorded by weight (bulk sherds, small). Indeterminate Local Gray was the most common pottery type in the analyzed assemblage (see Table 11.1). Among decorated white ware sherds, Early White Painted sherds are most numerous (N = 21), followed by Chapin Black-on-white (N = 12). Late White Painted sherds are also present in small numbers (N = 4).

Other types of artifacts found during excavation include fragments of ground-stone tools, gizzard stones, nonhuman bone, and fragments of projectile points. One partial Sudden Side-Notched projectile point indicates use of the general area in the middle Archaic time frame (from about 3,500 to 1,500 B.C.), although this artifact could have been curated or brought to the site by later inhabitants. Tested deposits were generally shallow or contained a low density of artifacts, but the diversity of the assemblage suggests various domestic and/or processing activities took place at the site.

Subsistence

This section details how the inhabitants of the Shepherd site obtained materials and resources needed for daily survival. This section includes data presented in other chapters of this report, including Chapter 20 (Faunal Remains) and Chapter 21 (Archaeobotanical Remains).

The land around the Shepherd site would have provided wild plant resources to the residents of the farmstead. Today the surrounding vegetation consists of pinyon and juniper woodland containing stands of sagebrush and grasses. Other vegetation nearby includes Gambel oak, serviceberry, rabbitbrush, ricegrass, lupine, yucca, yarrow, and a variety of cacti.

Five flotation samples were assessed for macrobotanical remains from the Shepherd site. Structure 106 samples preserved maize, and an additional sample from a Basketmaker III pit room (Structure 132) preserved maize and weedy species associated with maize cultivation (see Chapter 21). Pollen samples from Structure 132 revealed the presence of squash pollen and purslane pollen indicating both domesticates and wild plants were used at the site. Much of the burned macrobotanical material that was collected during excavation appears to be fuelwood, including juniper and saltbrush.

Faunal remains collected from the site indicate that occupants of the Shepherd site used wild-animal resources as well. Bones of cottontail rabbits and jackrabbits were found at the site, and these animals were likely used for food, clothing, bone tools, and other purposes. This assemblage does not contain bones of larger wild game such as mule deer or elk; perhaps these protein-rich resources are absent due to the brief use life of the farmstead.

Pottery and tools would have been used by people at the Shepherd site in a variety of ways including material processing and the storage of food. Data regarding pottery production and exchange for this site can provide evidence of trade relations and the potential for craft specialization during the Basketmaker III and Pueblo II periods in this region. Lithic and bone tools can provide information about the variety of acquisition activities and possible special uses of artifacts.

Though somewhat modest, the pottery sample from the Shepherd site suggests that most vessels at the farmstead were produced locally from local materials. No sherds from nonlocal vessels were documented, although two recovered Bluff Black-on-red sherds could be considered evidence of semi-local pottery production and exchange (Ortman et al. 2005). These sherds likely date to the Pueblo I period and were likely made in southeast Utah. Given the lack of a well-defined Pueblo I component at the site, these sherds might have been brought to the site after the more intensive Basketmaker III use.

The assemblage of lithic artifacts is also dominated by types of stone found locally and available in bedrock outcrops in nearby canyons. This is true for both chipped-stone debris and chipped-stone tools found at the site. Morrison silicified sandstone is the most abundant type of lithic material in the assemblage, but other local or semi-local stones such as Dakota/Burro chert and Brushy Basin chert are also present.

The data for the Shepherd site suggest that both pottery and lithic tools were produced from locally available materials. This assemblage suggests that the residents of this farmstead were familiar with local technologies and material sources.

Depopulation

As stated previously, the lack of definitive domestic architecture at the site makes inferences about depopulation tentative. The pottery, AMS dates, and architectural data at hand suggest the Shepherd site was depopulated late in the Basketmaker III period (by the early A.D. 700s), and that it ceased to be used again later in the late Pueblo II period (likely around A.D. 1100) after an apparent hiatus in use. There is little artifactual or architectural evidence for a robust Pueblo I use of the site suggesting it was not used continuously from the A.D. 600s through A.D. 1100 but rather saw intensive use in two intervals over that span.

Site Summary and Conclusions

The Shepherd site was sampled with 24 excavation units in the single architectural block defined at the site. The resulting data help address questions posed in the research design for this project (Ortman et al. 2011), including better defining the chronology and occupational history of the site, creating a detailed map of the site, and achieving a better understanding of how ancestral Pueblo people made a living on this landscape during the Basketmaker III and Pueblo II periods.

Data suggest that five to seven people occupied the site late in the Basketmaker III period, probably in the mid-to-late A.D. 600s, and the light artifact density of the midden areas suggests that this occupation was brief or perhaps episodic. Later, from about A.D. 1045 to 1095, the site was again used by ancestral Pueblo people in a much more restricted manner, perhaps as a storage and processing area.

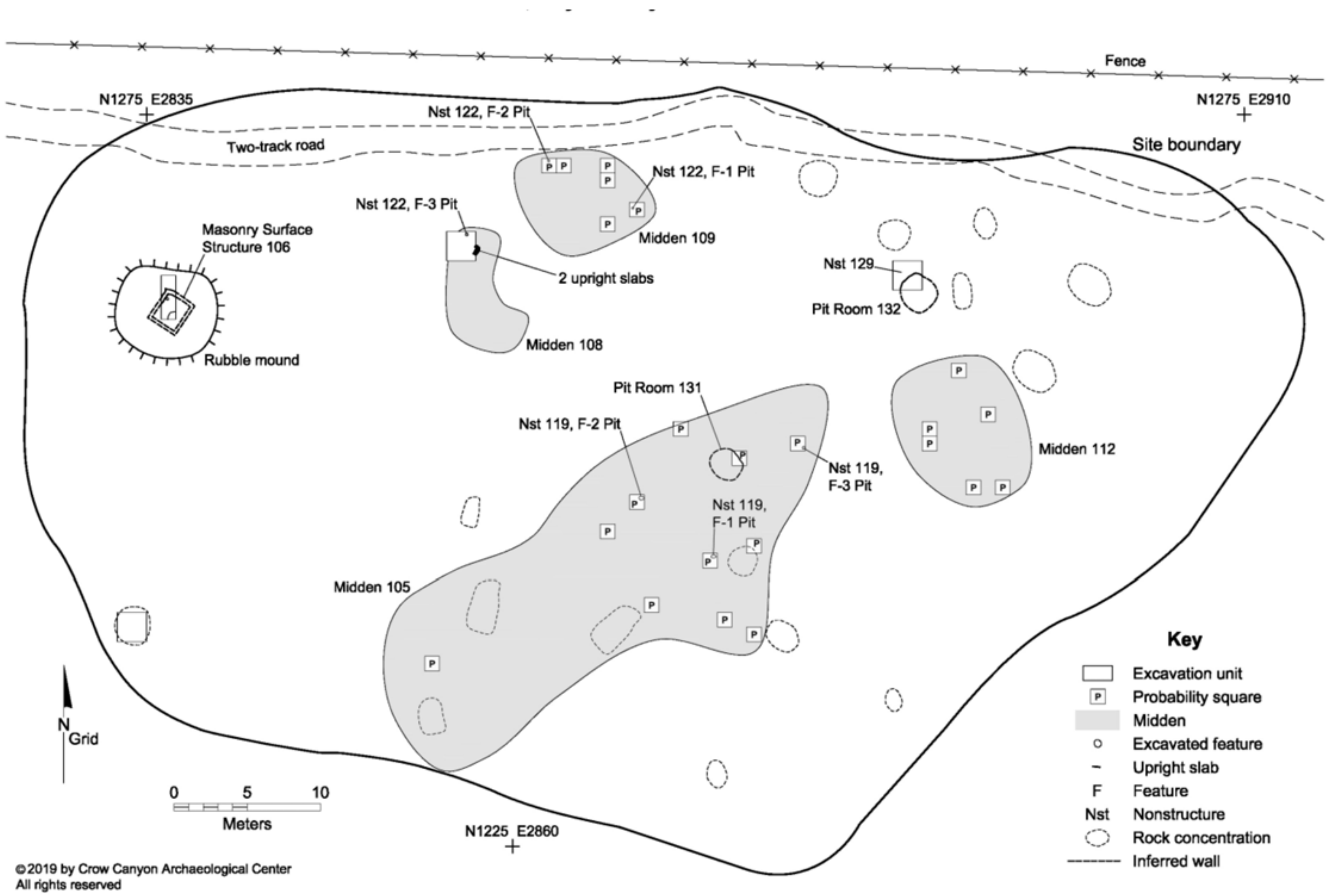

Figure 11.1. Site plan showing cultural features and excavation units, the Shepherd site.

Figure 11.2. Planview of Structure 106, the Shepherd site, showing subsurface excavation in the northwest corner.

Table 11.1. Typed Pottery Sherds by Study Unit, the Shepherd Site.

Ware and Type	Study Unit																	Count	% by Count
	101	102	104	105	106	107	108	109	110	112	113	114	115	118	119	131	132		
Plain Gray Ware																			
Chapin Gray				9			2	1			1	6	1					20	4.18
Indeterminate Local Gray	7	3	2	120	6	13	14	41	3	43	19	65	14	1	1	12	29	393	82.05
Indeterminate Local Gray, Polished				1							1							2	0.42
Corrugated Gray Ware																			
Indeterminate Local Corrugated Gray	20				3													23	4.8
Mancos Corrugated Gray	1																	1	0.21
White Ware																			
Chapin Black-on-white				1		1	2			3	1	2				2		12	2.51
Early White Painted				5			4	2		1	2	4	2				1	21	4.38
Early White Unpainted				1														1	0.21
Late White Unpainted				1	1		1						1					4	0.84
Red Ware																			
Bluff Black-on-red				2														2	0.42
Total	28	3	2	140	10	14	23	44	3	47	24	77	18	1	1	14	30	479	100

Table 11.2. Lithic Materials in the Assemblage of Bulk Chipped Stone, the Shepherd Site.

Material Category	Raw Material	Count	% by Count	Weight (g)	% by Weight
Local	Dakota/Burro Canyon silicified sandstone	198	25.32	634.70	21.20
	Igneous	2	0.26	8.90	0.30
	Morrison chert	15	1.92	24.60	0.82
	Morrison mudstone	153	19.57	423.60	14.15
	Morrison silicified sandstone	366	46.80	1,791.30	59.83
	Sandstone	6	0.77	23.70	0.79
	Slate/shale	1	0.13	9.60	0.32
Nonlocal	Red jasper	1	0.13	0.40	0.01
Semi-local	Agate/chalcedony	7	0.90	7.50	0.25
	Brushy Basin chert	4	0.51	2.90	0.10
	Burro Canyon chert	21	2.69	38.30	1.28
	Petrified wood	1	0.13	9.40	0.31
Unknown	Unknown chert/siltstone	4	0.51	13.40	0.45
	Unknown silicified sandstone	3	0.38	5.90	0.20
Total		782	100.00	2,994.20	100.00

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Chapter 12

5MT10718 and 5MT10719

by Shanna R. Diederichs

Introduction

Sites 5MT10718 and 5MT10719 represent an early Pueblo I hamlet located on a south-facing slope in the southeastern portion of Indian Camp Ranch (Figure 12.1). Earlier Basketmaker III period sites (A.D. 500–750) are found in every direction from the sites within a 100-m radius. A possibly contemporaneous Pueblo I village (5MT3895) is a quarter kilometer north of the sites. The sites share a site boundary, 5MT10719 on the north and 5MT10718 on the south, as recorded in 1991 by Woods Canyon as part of the Indian Camp Ranch Archaeological Survey (Fetterman and Honeycutt 1994). Woods Canyon divided the sites along a dissected sandstone outcrop in the slope, but additional surface analysis (Shanks 2014) determined that the density of surface features and artifacts were continuous between the two sites. Therefore, 5MT10718 and 5MT10719 were sampled and analyzed and are reported on as a single site for the Basketmaker Communities Project.

Sites 5MT10718 and 5MT10719 are situated on a 4-percent south to southeast–trending slope and, together, encompass 0.42 acres. North of the sites the topography continues to rise in dissected benches and slopes. To the south the landscape falls away to long north–south ridges divided by increasingly entrenched drainages. The dissected sandstone outcropping across the slope between the sites represents the intersection of the north and south landforms (Figure 12.2).

The sites were likely once covered by old growth pinyon and juniper woodland, which is found upslope of the sites to the north, but the surface of sites 5MT10718 and 5MT10719 have been moderately to heavily disturbed over the last 50 years. The sites were chained historically. Young 3-to-4-in-tall juniper trees now grow sporadically across the site. County Road K once ran east–west across the northern edge of 5MT10719. Architectural rocks and artifacts appear to have been mechanically pushed into piles when the road was dismantled. The county road was rerouted across the south end of 5MT10718 during the development of Indian Camp Ranch in the 1990s. Though the site does not continue south of the road, the road development likely disturbed and capped with gravel the midden and any features along the southern edge of 5MT10718. A northwest–southeast windrow of chained trees across the southern half of Site 5MT10718 was burned as part of a clean-up effort across Indian Camp Ranch. As a result, charcoal and ash are scattered across the surface of both sites and are very concentrated in the southern half of 5MT10718.

Sites 5MT10718 and 5MT10719 were selected for sampling based on their surface signature and location (Figure 12.3). The small pottery assemblage on the surface of 5MT10718 and 5MT10719 indicated that the sites dated to the Basketmaker III period (A.D. 500–750) based on the presence of plain gray ware pottery and the lack of later banded or corrugated wares (Shanks

2014). This was supported by evidence for upright-slab roomblocks and possible pithouse depressions at each site, likely representing a two-family homestead of the type commonly found at Basketmaker III sites. Because the two sites appeared to be a Basketmaker III hamlet, they had the potential to address Basketmaker Communities Project research goals regarding the role of small hamlets within the larger community. Sites 5MT10718 and 5MT10719 were additionally prioritized for excavation because they are located just 50 m northeast of the Dillard site (5MT10647), an aggregated settlement of 11 pithouses and a great kiva, potentially highlighting the relationship between the aggregated community core and nearby hamlets.

The surface signature of Site 5MT10718 clearly reflects an early agricultural habitation. An 11-m-long roomblock is evidenced by upright slabs lining a series of east to west–oriented adjacent rooms downslope from the exposed bedrock (Figure 12.4). Midden deposits are clustered in four 6-to-10-m-diameter artifact concentrations in the south half of the site. There is no evidence of a pithouse on the surface of the site; however, a 5-m-diameter pithouse was identified between the roomblock and artifact concentrations based on the results of soil augering.

The surface signature of 5MT10719 is less substantial. The soil deposition on site is shallow with bedrock outcrops exposed along the southern slope. Five in situ concentrations of rock are visible; one measures 8 m long and could represent the remains of an eroded roomblock. A fairly substantial 25-m-diameter midden covers the southeast portion of the site. A smaller artifact concentration is located below the bedrock outcrop in the southwest corner of the site.

Just 1 percent of Sites 5MT10718 and 5MT10719 were sampled during the Basketmaker Communities Project. At Site 5MT10718, a 2-x-1-m unit was placed over the buried pit structure (Pithouse 107) found with the soil auger, and a 1-x-2-m unit was placed over the easternmost room (Pit Room 108) in the upright-slab roomblock. Seven 1-x-1-m units were placed to test the various artifact concentrations across the site. Only the southeast midden deposits at Site 5MT10719 were explored; six 1-x-1-m units were placed in the midden area.

Architecture

Only two structures were sampled (Pithouse 107 and Pit Room 108), both at Site 5MT10718. Pithouse 107 was found in a level meadow at the center of the site. The soils are deeper in this area, which may have made it attractive for pithouse construction. Pit Room 108 is 11 m upslope to the northeast of Pithouse 107. It appears to be the easternmost room in a three-to-four-room slab-lined roomblock.

Based on soil auger tests and a 1-x-2-m excavation unit Pithouse 107 is a 5-m-diameter single-chambered pit structure. The structure was semi-subterranean, was 1 m deep, and had a floor constructed of compact native sediment. No other construction information was captured because the excavation unit did not expose the walls of the building and the roof was unburned. An upright-slab bin with a possible metate depression (Feature 1) was recorded in the center of the room (Figures 12.5 and 12.6). Pithouse 107 is small and shallow for a classic Pueblo I pithouse (see Chapter 18) suggesting that (1) it probably dates early in the Pueblo I period and (2) it likely functioned as a short-term field house rather than a permanent habitation. This is supported by the paucity of artifacts found in small concentrations south of the pithouse.

Pit Room 108 appears to be the most intact of the four slab-lined rooms in the roomblock at 5MT10718. From the exposed portion (Figure 12.7) the room is semi-subterranean with a foundation of upright-slab walls anchored in adobe. Large bird, turkey, cottontail rabbit, and ground squirrel remains were found among a scatter of pottery on the floor suggesting that small animals may have been processed in the room. Pit Room 108 is the easternmost room in an 11-m-long east–west roomblock with three to four rooms total.

Chronology

The occupation dates for sites 5MT10718 and 5MT10719 were derived from both absolute dating and pottery seriation. A single AMS date on maize from the floor surface of Pithouse 108 resulted in a date of A.D. 765–890. Chapin Gray and Chapin Black-on-white were the only diagnostic pottery types collected from the sites. The lack of late Pueblo I diagnostic pottery, such as Neckbanded Moccasin Gray suggests that the occupation predates A.D. 775. Based on the AMS and pottery seriation dates, Sites 5MT10718 and 5MT10719 date to the early Pueblo I period (A.D. 750–775).

Demography

Sites 5MT10718 and 5MT10719 were likely in use simultaneously during the early Pueblo I period. The shallow construction of Pithouse 107 and the paucity of artifacts at 5MT10718 indicate that the site was not a permanent home but functioned as a short-term habitation. Though there is little remaining evidence of a similar pithouse and roomblock suite of architecture on 5MT10719, the presence of a second household is likely. Midden 102 on 5MT10719 is the most substantial cultural deposit on either 5MT10718 or 5MT10719. Based on its location on the slope above 5MT10718, it is likely the refuse from a now-obscured pithouse on the terrace above it. Together, these sites represent seasonal homes for two extended families.

A quarter kilometer north of Sites 5MT10718 and 5MT10719 is a possibly contemporaneous Pueblo I village (5MT3895). Sites 5MT10718 and 5MT10719 could have functioned as a short-term habitation and farming locale where crops were grown, processed, and stored for this larger population.

Artifacts

Artifacts, in both the surface and subsurface deposits at Sites 5MT10718 and 5MT10719, are diffuse and scattered. Table 12.1 presents all unmodified pottery sherds, and Table 12.2 shows the counts of chipped-stone artifacts from 5MT10718 and 5MT10719. Only one metate fragment was found at the sites, indicating that although inhabitants may have stored corn and other grains there was no extensive processing of grains at these sites.

Based on the floor assemblage, the remains of small mammals and birds were disposed of in Pit Room 108 after they were eaten. Jackrabbit, cottontail, and large bird remains were found in the room, and several of the elements were obviously burned. The room appears to have been otherwise cleaned out with just a few gray ware and early painted ware sherds scattered on the floor. Pithouse 107 was also cleaned out; just one gray ware sherd was left on the floor surface.

Outside the structures, the artifact assemblage of both sites is dominated by pottery sherds and chipped stone. Ninety-five percent of the nearly 200 pottery sherds are characterized as Indeterminate Local Gray or Chapin Gray indicating a focus on storage and/or cooking at the site. The 19 early white painted and Chapin Black-on-white sherds make up the rest of the pottery assemblage. Three indeterminate corrugated gray sherds were also recovered, but likely reflect the continued use of the Indian Camp Ranch community throughout the Pueblo II and III periods and not reoccupation of these sites. The chipped stone is dominated by locally sourced materials from the Morrison and Dakota formations. Only one biface was identified indicating that though chipped-stone tools were likely produced or sharpened, they were not extensively stored or used at this location.

The diffuse and scattered assemblages at Sites 5MT10718 and 5MT10719 support the interpretation that the sites functioned as a field house rather than a habitation. Evidence for cooking, food preparation, and domestic habitation were not found at the site. Instead the site appears to have served as a short-term occupation site.

Subsistence

Pollen, macrobotanical, and faunal analysis results suggest that the inhabitants of Sites 5MT10718 and 5MT10719 used this locale in the summertime and for short periods. Faunal remains at the site include only small, easily procured animals such as jackrabbit, cottontail, and turkey. Analysts identified several seasonally edible plants including portulaca, tansy mustard, carrot family plants, and cheno-ams. Interestingly, only one maize cupule was recovered during botanical flotation, and no pollen grains were observed in the five analyzed samples, which rules out the use of the sites as a maize storage and processing locale. This is supported by the general absence of ground stone at the site.

Depopulation

Sites 5MT10718 and 5MT10719 were not formally decomissioned but were simply left behind by their occupants at the end of their use lives. Any formal tools were certainly collected from the site, but neither of the tested structures (Pithouse 107 and Pit Room 108) show signs of formal closure such as feature capping or burning. A few corrugated body sherds on the site illustrate that later ancestral Pueblo occupants passed through the locale, but it was never reinhabited.

Site Summary and Conclusions

Together, Sites 5MT10718 and 5MT10719 represent a seasonally occupied locale for two residential groups during the early Pueblo I period (A.D. 750–775). Tested cultural units include one pithouse, one pit room in a four-room roomblock, and two middens. Artifacts at the sites are dominated by gray ware pottery indicating an emphasis on storage. No ground stone items were recovered, and little evidence for maize appears in the pollen and botanical record indicating that these short-term habitations did not function as maize farming and preparation locales. A quarter kilometer north of Sites 5MT10718 and 5MT10719 is a large and possibly contemporaneous Pueblo I village (5MT3895). Based on the architecture, artifact assemblage, and pollen and botanical analyses, Sites 5MT10718 and 5MT10719 may have functioned as summertime residences for two families associated with the village.

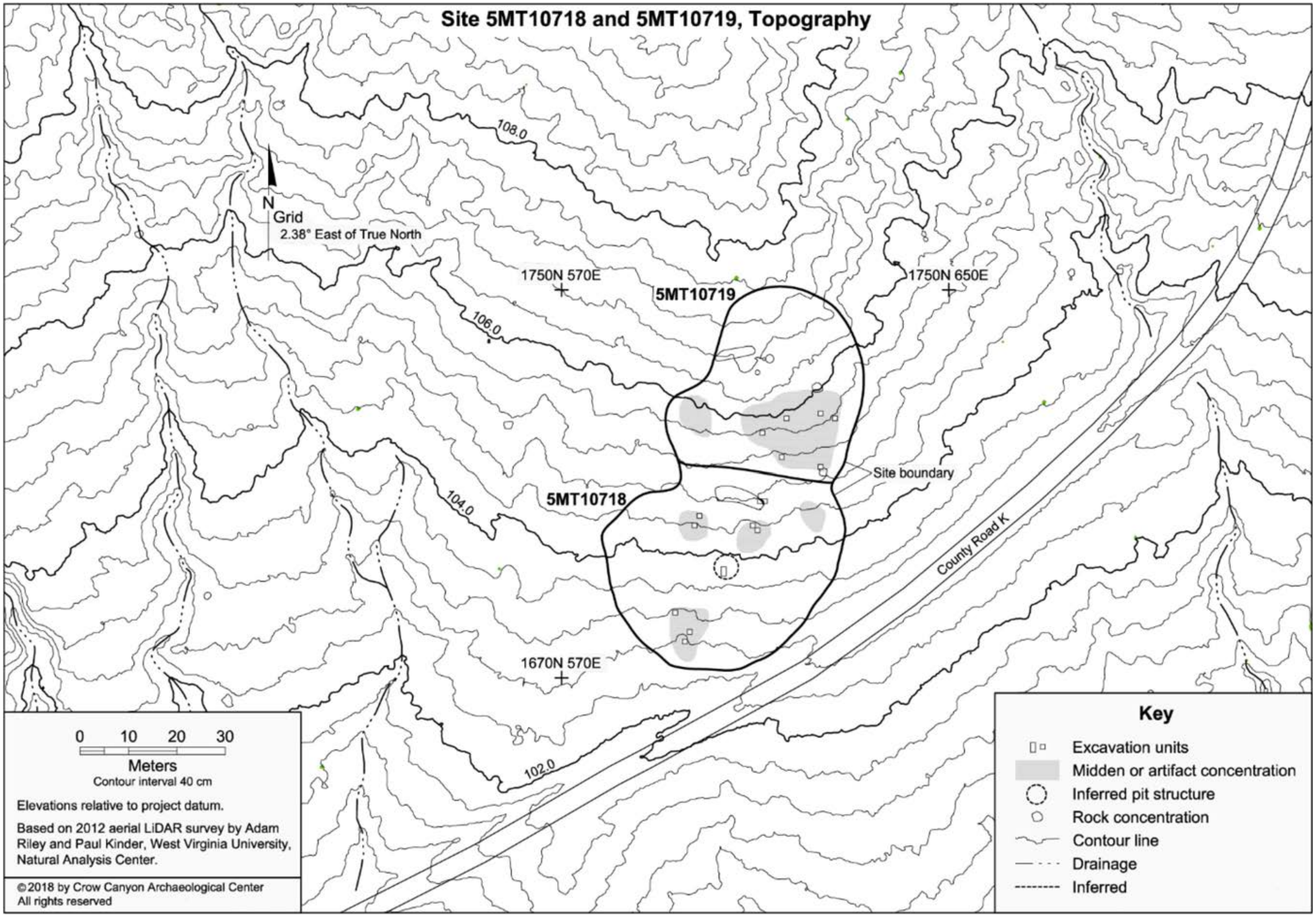

Figure 12.1. Topographic map of 5MT10718 and 5MT10719.


Figure 12.2. Photograph of 5MT10718 and 5MT10719.

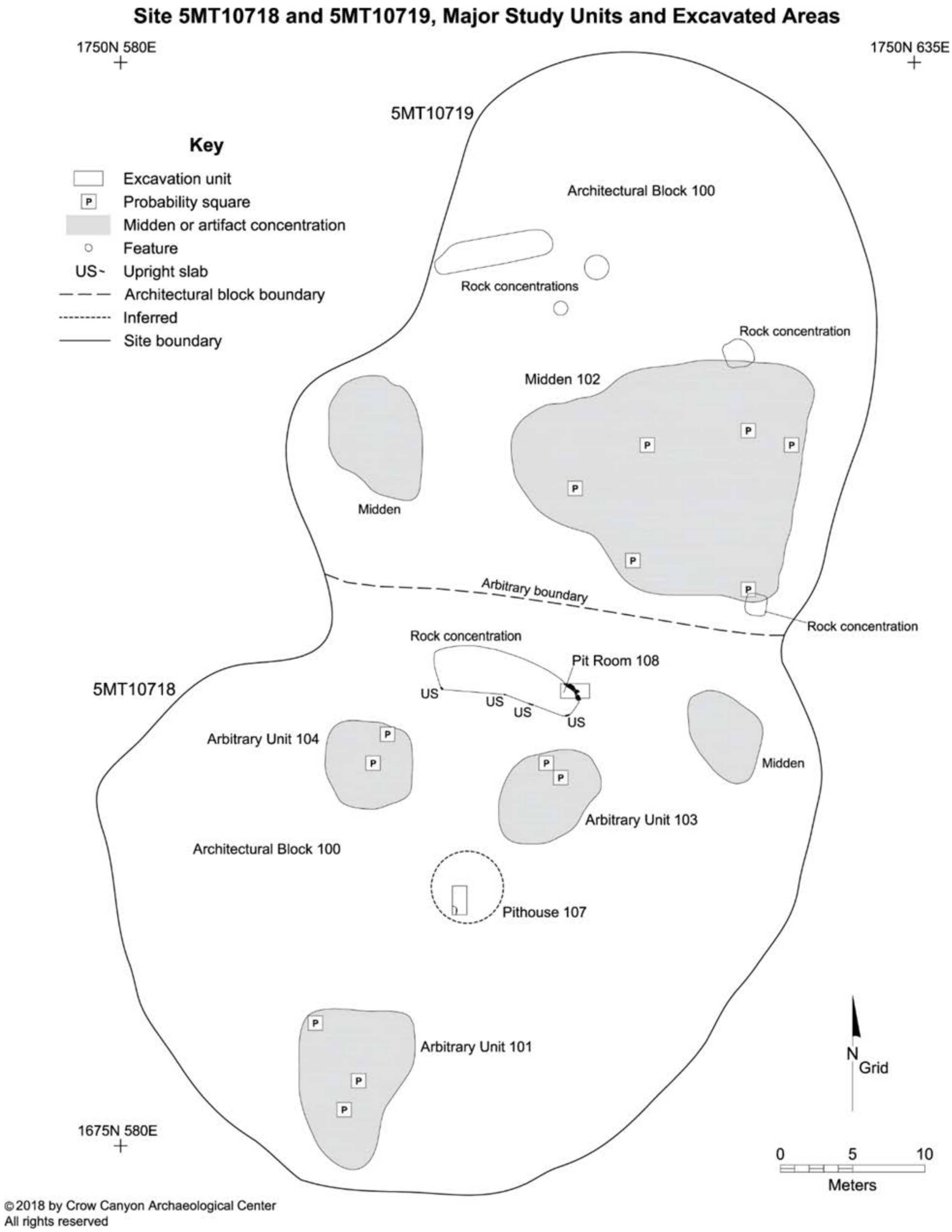

Figure 12.3. Map of 5MT10718 and 5MT10719 showing all major study units and excavation units.

Figure 12.4 Photograph of Pit Room 108 in the upright-slab roomblock at 5MT10718.

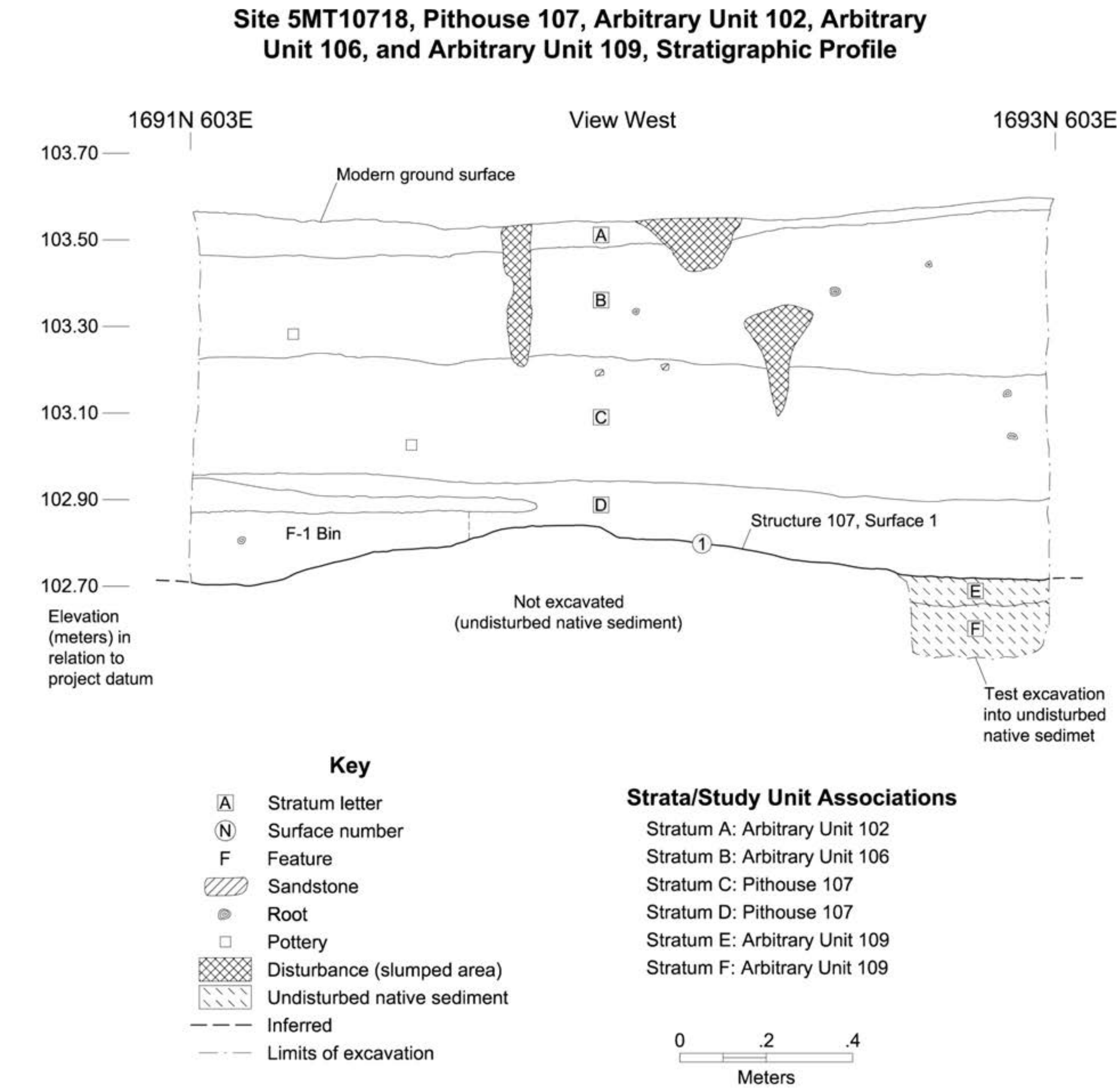

Figure 12.5. Stratigraphic profile of Pithouse 107 at 5MT10718.

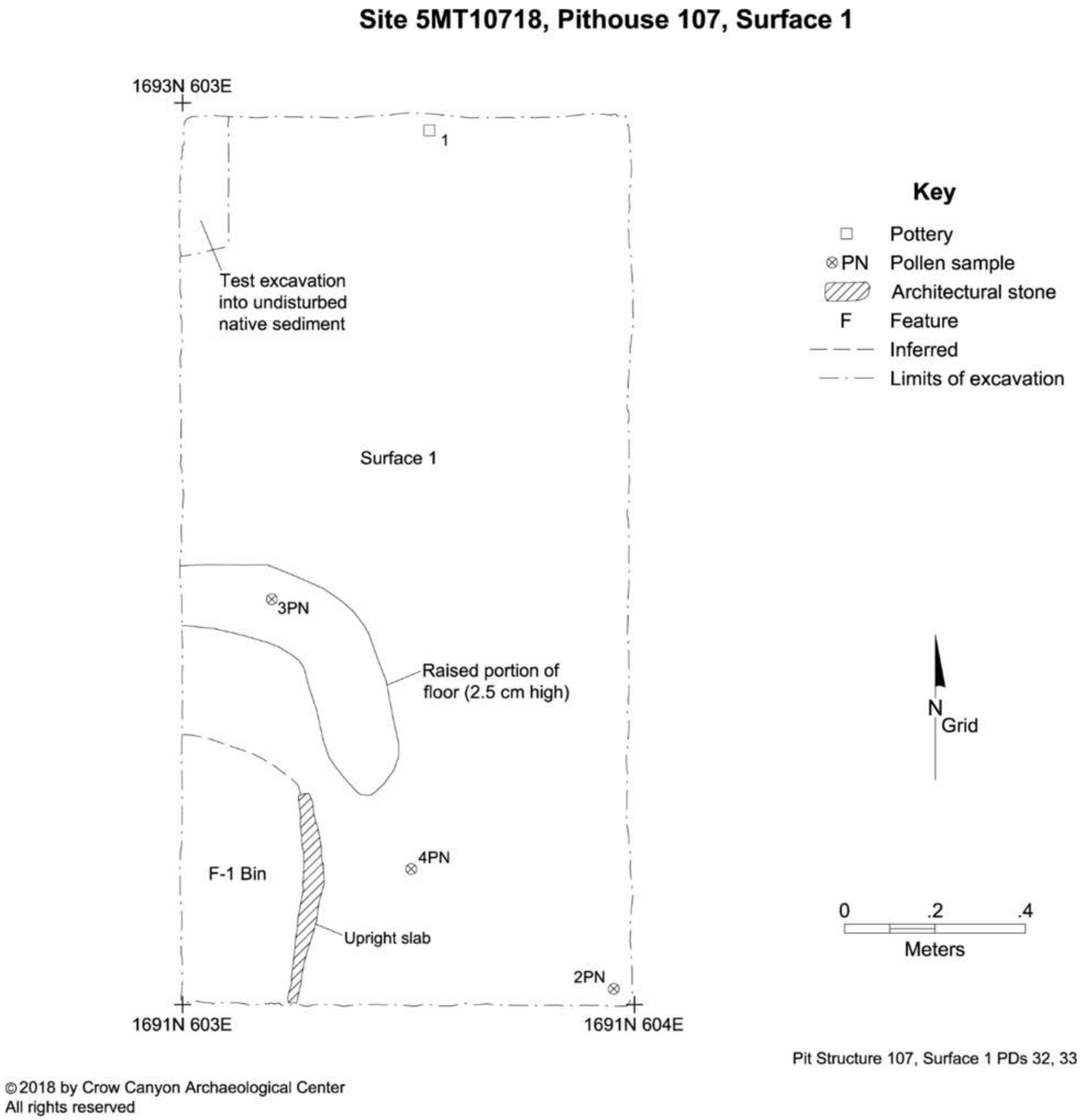

Figure 12.6. Map of Pithouse 107, Surface 1 at 5MT10718.

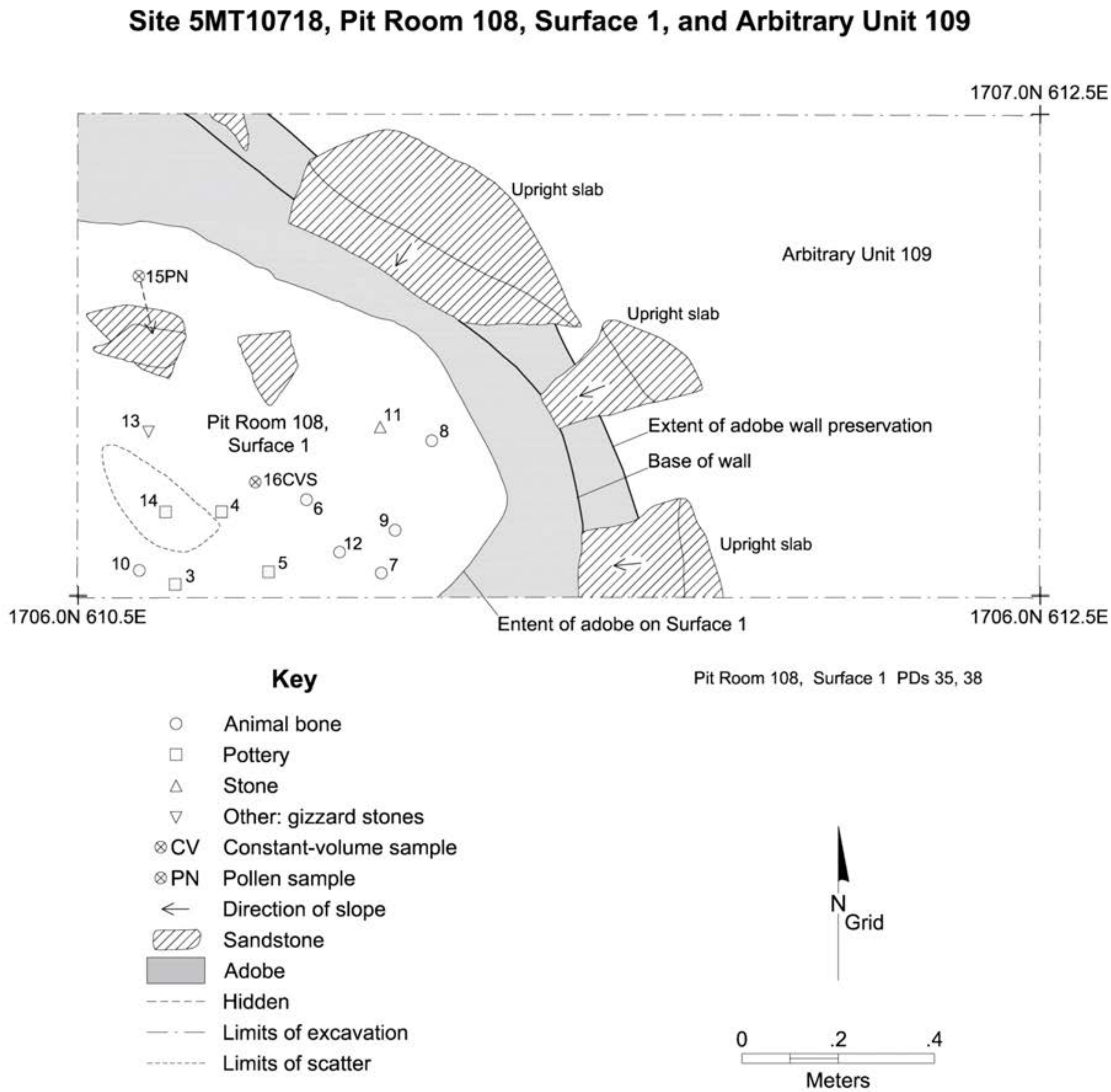

Figure 12.7. Map of Pit Room 108, Surface 1 at 5MT10718.

Table 12.1. Summary of Unmodified Sherds by Ware and Type for 5MT10718 and 5MT10719.

Ware and Type	5MT10718				5MT10719			
	Count	% by Count	Weight (g)	% by Weight (g)	Count	% by Count	Weight (g)	% by Weight (g)
Plain Gray Ware								
Chapin Gray	6	5.26	26.80	3.87	5	6.02	25.80	6.57
Indeterminate Local Gray	97	85.09	587.00	84.73	68	81.93	323.20	82.34
Indeterminate Local Gray, Polished	1	0.88	6.90	1.00				
Corrugated Gray Ware								
Indeterminate Local Corrugated Gray	3	2.63	11.50	1.66				
White Ware								
Chapin Black-On-White	1	0.88	28.50	4.11	3	3.61	13.50	3.44
Early White Painted	6	5.26	32.10	4.63	7	8.43	30.00	7.64
Total	114	100.00	692.80	100.00	83	100.00	392.50	100.00

Table 12.2. Count of Chipped-Stone Artifacts by Raw Material Type for 5MT10718 and 5MT10719, Basketmaker Communities Project.

Material Category	Raw Material	5MT10718				5MT10719			
		Count	% by Count	Weight (g)	% by Weight (g)	Count	% by Count	Weight (g)	% by Weight (g)
Local	Dakota/Burro Canyon silicified sandstone	2	2.17	0.30	0.07	17	17.00	118.10	27.38
	Igneous	2	2.17	13.20	2.97				
	Morrison chert	4	4.35	1.00	0.22	6	6.00	5.50	1.28
	Morrison mudstone	15	16.30	96.40	21.69	25	25.00	80.70	18.71
	Morrison silicified sandstone	59	64.13	320.90	72.20	46	46.00	207.20	48.04
	Sandstone	1	1.09	0.60	0.13	2	2.00	10.50	2.43
	Slate/shale	2	2.17	0.39	0.09				
Semi-local	Agate/chalcedony	2	2.17	0.60	0.13	1	1.00	0.00	0.00
	Burro Canyon chert	5	5.43	11.10	2.50	3	3.00	9.30	2.16
Total		92	100.00	444.49	100.00	100	100.00	431.30	100.00

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Chapter 13

Sagebrush House (5MT10687)

by Grant D. Coffey

Introduction

Sagebrush House is located in the south-central part of the Indian Camp Ranch Archaeological District. It is situated on the south end of a low ridge near the southeastern part of the subdivision. It was originally recorded in 1969 by Daniel Martin of the University of Colorado (Fetterman and Honeycutt 1994). It was later recorded as Mound 5 of 5MT2037 (the Pasquin site) by Crow Canyon in 1983 and was later given its current designation and site number by Woods Canyon in 1991 (Fetterman and Honeycutt 1994). Woods Canyon characterized the site as a Pueblo II habitation with a Basketmaker III component but noted that the site had been mechanically excavated (i.e., bulldozed) in the late 1980s. The results of Crow Canyon's later electrical resistivity survey revealed remnants of one kiva; however, the roomblock and any Basketmaker III features or structures had apparently been largely destroyed by previous excavations.

This site is the southernmost of five sites collectively referred to as the Hatch group of sites (Sommer et al. 2017). These sites are closely spaced along the same ridge, and the group was named for the owners of the property (Pat and Sarah Hatch) during Crow Canyon's excavations. The proximity of this site to others in the Hatch group suggests all of these sites were likely part of a broader cultural landscape; considerable time depth is represented across the sites that compose the group.

Sagebrush House was selected for testing due to its inferred status as a possible Basketmaker III habitation and the research goals set forth in the original and expanded research design (Ortman et al. 2011; Ryan and Diederichs 2014). Specifically, these excavations were meant to gather data to address research topics like changes in community organization and land-use patterns over time.

The surface signature of the site is expansive but badly disturbed (Figure 13.1). A rubble scatter is present in the area where the roomblock rubble mound was once located, and a subtle kiva depression is located just to the south. A mechanically pushed area is present in the eastern part of the site, and a large midden area is located in the southeastern part of the site. Remote sensing conducted at the site helped to confirm the presence of the kiva (see Chapter 3).

Thirty-six excavation units were dug to test subsurface deposits at the site. Twenty-five of these excavation units were 1-x-1-m units placed to test midden deposits. The other units were used to test potential architectural areas and other features. This included three areas that were trenched or stripped by a backhoe to expose previously disturbed architectural areas. Combined, this excavated area accounts for about 5.3 percent of the total site area. What follows is a summary of these excavations.

Chronology

Pottery data, AMS carbon dates, and architectural evidence suggest the site was occupied primarily in the Pueblo II period (A.D. 900 to 1150), although pottery evidence suggests limited use in the Basketmaker III (A.D. 500 to 750), Pueblo I (A.D. 750 to 900), and Pueblo III (A.D. 1150 to 1280) periods as well. In terms of diagnostic pottery, 2,264 corrugated gray sherds and 529 plain gray ware sherds were recovered from all contexts at the site (Table 13.1). Plain gray pottery was primarily used in the Basketmaker III and Pueblo I periods, while corrugated pottery was used in the Pueblo II and Pueblo III periods (Ortman et al. 2005). The far greater number of later diagnostic white ware pottery sherds recovered also supports more-intensive use and occupation of the site in the Pueblo II period as does the limited intact architecture documented at the site (see Architecture below). That said, the substantial number of plain gray ware sherds and the smaller number of earlier white wares support some type of limited use of the site in the Basketmaker III and Pueblo I periods.

Dates produced through AMS carbon dating also support a Pueblo II occupation of the kiva at the site. A burned *Zea mays* cob from the fill of Kiva 113 that was submitted for AMS carbon dating produced two-sigma calibrated dates from A.D. 1045 to 1095 and A.D. 1120 to 1220 (Beta 422943). This span includes the middle-to-late Pueblo II period as well as the early Pueblo III period. The disturbed nature of the fill in the structure where the cob was found and the divergence of dates make precise interpretations difficult, but the earlier range is supported by other pottery and architectural data from the site.

Though artifacts suggestive of Basketmaker III and Pueblo I use are present in small numbers (e.g., Chapin Black-on-white and Piedra Black-on-white sherds), no features or structures were assigned to this period of time. Materials dating from these periods could be associated with the broader occupation of the ridgetop elsewhere, perhaps at one of the nearby sites to the north.

Architecture

Only one architectural block was defined at the site. This architectural unit includes a disturbed roomblock, a kiva, and a midden area. All of these features have been badly impacted by mechanical excavation that took place at the site in the 1980s.

Only one structure was documented at the site, Kiva 113. Previously excavated with heavy machinery, this kiva retained an intact portion of the floor and some architectural elements (Figure 13.2). Crow Canyon's excavations revealed part of a plastered bench face and some intact bench masonry. The structure was burned at the end of its use life; some dendrochronological samples were intact and recovered during excavation (these samples are currently awaiting date and species assignment at the Laboratory of Tree-Ring Research in Tucson, Arizona). Though much of the structure fill and the floor area of the kiva was removed by previous excavation, this kiva looks to be a masonry-lined kiva built and occupied during the Pueblo II period (Lipe 1989; Lipe and Varien 1999; Ryan 2013).

No intact surface rooms associated with the kiva were observed. A series of postholes dug in the disturbed roomblock area could represent the partial remains of a stockade of some type, although it is difficult to interpret given the amount of disturbance and the portion exposed (Kuckelman 1988).

Midden areas at the site produced artifacts that reflect occupation of the site in the Pueblo II period. A smaller number of diagnostic sherds dating to the Pueblo III period and earlier periods was also recovered (see Chronology section). The overall pottery assemblage collected from the midden deposits (Nonstructure 105; see Table 13.1) suggests most of this cultural refuse was deposited in the Pueblo II period.

Demography

Using the single kiva observed as an indicator of the number of households present at the site (Kuckelman 2003; Lightfoot 1994:148), we infer that at least one household, or between five and seven people, inhabited Sagebrush House during the middle Pueblo II period. The presence of earlier and later pottery in the overall assemblage supports a longer occupation of the ridge where the site is located, but architecture supporting these periods is lacking in tested portions of the site.

Artifact Interpretations

Pottery sherds were the most abundant type of artifact recovered: 4,955 sherds are large enough to have been captured by 1/2-in mesh (bulk sherds, large, see Table 13.1). Smaller sherds were not counted or analyzed but were recorded by weight (bulk sherds, small). Indeterminate Local Corrugated Gray was the most common pottery type in the analyzed assemblage (see Table 13.1). Among decorated white ware sherds, Mancos Black-on-white sherds are most numerous (N = 168), followed by Pueblo II White Painted (N = 35).

Chipped stone was the second most numerous type of artifact recovered: 1,448 lithic flakes and other pieces of chipped-stone debitage were collected (Table 13.2). Lithic materials available locally and semi-locally in bedrock formations dominated this assemblage. Interestingly, about one-third of the total chipped-stone collection (N = 477) was Brushy Basin Chert. A semi-local fine-grained multi-colored stone originating from the Brushy Basin Member of the Morrison Formation, this type of stone is generally found in much smaller frequencies at sites of this age (Gerhardt 2001; Ortman et al. 2005; see also Chapter 24 of this report). This may indicate residents of this pueblo had a strong preference for this material or that some type of specialized production of artifacts made from this stone was taking place at the site. Other types of stone from the Morrison Formation, including Morrison silicified sandstone (N = 301) and Dakota/Burro Canyon silicified sandstone (N = 214), were the next-most-common types of stone.

Other types of artifacts found during excavation include fragments of ground-stone tools, gizzard stones, nonhuman bone, and tool fragments. Tested midden deposits were generally shallow and disturbed, but the diversity of the assemblage suggests various domestic and/or processing activities took place at the site (see Chapter 24).

Subsistence

This section details how the inhabitants of Sagebrush House obtained materials and resources needed for daily survival. This section includes data presented in other chapters of this report, including Chapter 20 (Faunal Remains) and Chapter 21 (Archaeobotanical Remains).

The land around the Sagebrush House site would have provided wild plant resources to the residents of the farmstead. Today the surrounding native vegetation consists of pinyon and juniper woodland containing stands of sagebrush and grasses. Other vegetation nearby includes Gambel oak, serviceberry, rabbitbrush, ricegrass, lupine, yucca, yarrow, and a variety of cacti.

Two flotation samples were assessed for macrobotanical remains from the midden at Sagebrush House (Nonstructure 105). Much of the burned macrobotanical material appears to be fuelwood, including juniper and sagebrush. Pollen samples analyzed from Kiva 113 revealed high levels of beeweed indicating that this native plant was likely used for paint or spice in the structure (see Chapters 21 and 22).

Faunal remains collected from the site indicate that occupants of the Sagebrush House site used wild-animal resources as well. Bones of cottontail rabbits, deer, and coyote/dog were found at the site. These animals were likely used for food, clothing, bone tools, and other purposes (see Chapter 20). Interestingly, no turkey bones were identified from excavations at the site.

Pottery and tools would have been used by people at the Sagebrush House site in a variety of ways including material processing and the storage of food. Data regarding pottery production and exchange for this site can provide evidence of trade relations and the potential for craft specialization during the Pueblo II period in this region. Lithic and bone tools can provide information about the variety of acquisition activities and possible special uses of artifacts.

The pottery sample from the Sagebrush House site suggests that most vessels at the farmstead were produced locally from local materials. Two polychrome sherds were collected as were three Deadmans Black-on-red sherds indicating the procurement and use of some semi-local or nonlocal pottery at the site (Ortman et al. 2005). The very small number of these extralocal sherds suggests few pots made outside of the region were used or broken at the site during its occupation.

The assemblage of lithic artifacts is also dominated by types of stone found locally or semi-locally and available in bedrock outcrops in nearby canyons. This is true for both chipped-stone debris and chipped-stone tools found at the site. The unusually high number of Brushy Basin chert flakes suggests a strong selection for that type of semi-local material among the residents of the pueblo and may also suggest some type of specialized production of lithic artifacts (Wenker 1999). Morrison silicified sediment is the second most-abundant type of lithic material in the assemblage followed by Dakota/Burro chert and Morrison mudstone.

The data for the Sagebrush House site suggest that both pottery and lithic tools were primarily produced from locally available materials. This assemblage suggests that the residents of this farmstead were very familiar with local technologies and material sources.

Depopulation

The pottery, AMS dates, and architectural data at hand suggest Sagebrush House was depopulated by the early Pueblo III period (by the early A.D. 1200s). There is little artifactual or architectural evidence for a robust Pueblo III use of the site, although the presence of Mesa Verde Black-on-white sherds does indicate some type of activity at the site after A.D. 1180 (Ortman et al. 2005). Larger numbers of earlier pottery sherds also indicate some use of the site area prior to the Pueblo II period. Materials dating from these periods could be associated with the broader occupation of the ridgetop elsewhere, perhaps at one of the nearby sites. Alternatively, architectural evidence of an earlier occupation could have been destroyed by mechanical excavation or simply not exposed.

Site Summary and Conclusions

Sagebrush House was sampled with 36 excavation units placed in the single architectural block defined at the site. The resulting data help address questions posed in the research design for this project (Ortman et al. 2011; Ryan and Diederichs 2014), including better defining the chronology and occupational history of the site, creating a detailed map of the site, and achieving a better understanding of how ancestral Pueblo people made a living on this landscape during the Pueblo II period.

Data suggest that five to seven people occupied the site late in the Pueblo II period, probably in the mid-to-late A.D. 1000s. Artifact data from the midden area and elsewhere suggest a longer use of the general area, although no architecture dating prior to or after the Pueblo II period was observed.

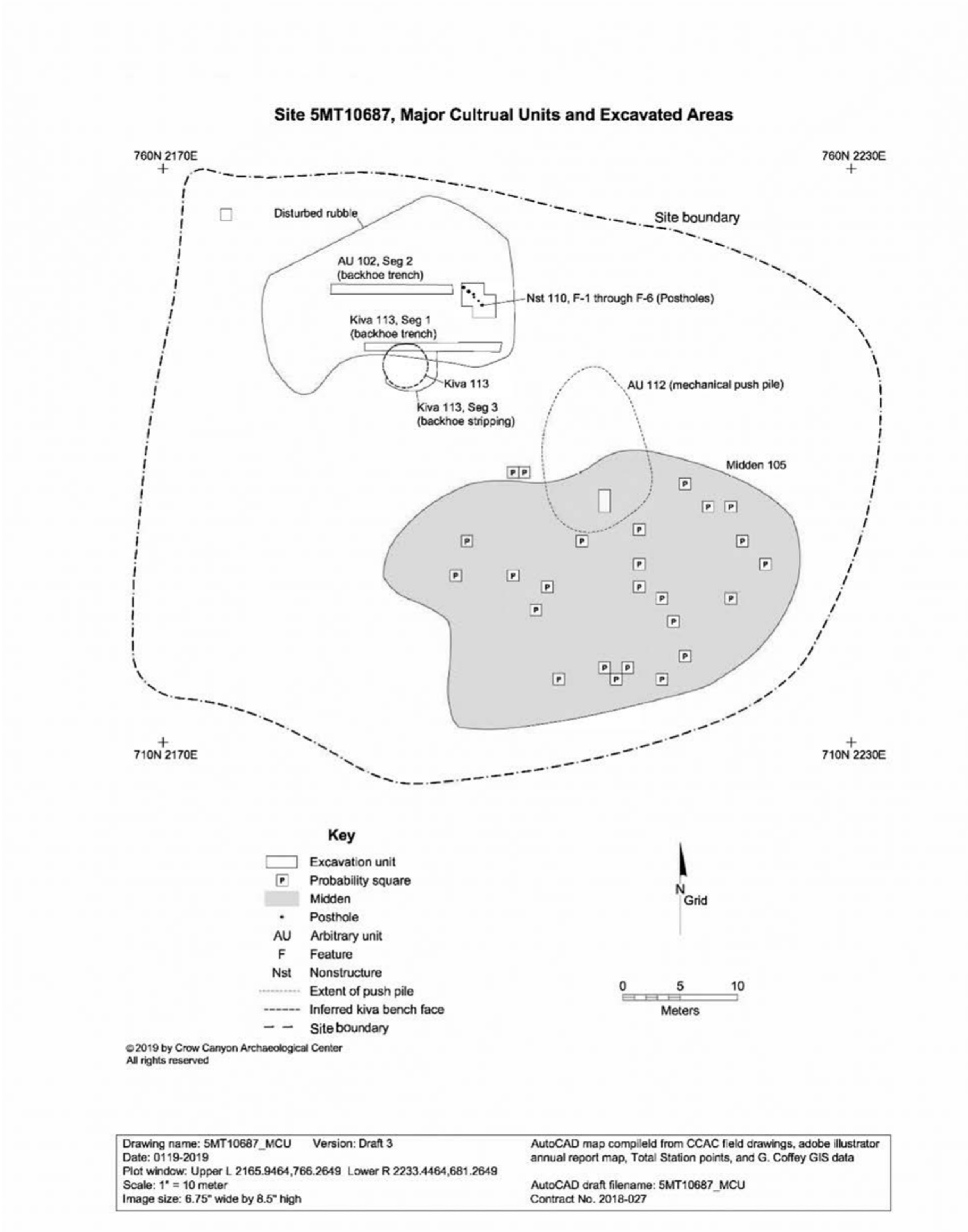

Figure 13.1. Site plan showing cultural features and excavation units, Sagebrush House.

Figure 13.2. Photograph of Kiva 113, Sagebrush House, showing a portion of the preserved floor surface and bench face.

Table 13.1. Typed Pottery Sherds by Study Unit, Sagebrush House.

Ware and Type	Study Unit											Count	% by Count
	101	102	104	105	107	109	110	112	113	114	115		
Brown Ware													
Basketmaker Mud Ware	1											1	0.02
Plain Gray Ware													
Chapin Gray	3							1	2	2		8	0.16
Indeterminate Local Gray	112	127	4	109	30	16	1	56	38	35	1	529	10.68
Indeterminate Local Gray, Polished				1								1	0.02
Indeterminate Neckbanded Gray		1										1	0.02
Mancos Gray	2	2										4	0.08
Corrugated Gray Ware													
Indeterminate Local Corrugated Gray	391	690	14	316	146	132	5	291	185	91	3	2,264	45.69
Mancos Corrugated Gray	2	14		1	1	4		6	2			30	0.61
Mesa Verde Corrugated Gray	1	3		1		1		2	2			10	0.20
White Ware													
Chapin Black-on-white								1				1	0.02
Cortez Black-on-white	1											1	0.02
Early White Painted	3	2		2	2			1		1		11	0.22
Early White Unpainted		1						1	1			3	0.06
Indeterminate Local White Painted		3										3	0.06
Indeterminate Local White Unpainted				1								1	0.02
Late White Painted	171	235	8	113	62	48		136	63	48		884	17.84
Late White Unpainted	202	250	7	138	70	61	2	135	49	59	1	974	19.66
Mancos Black-on-white	9	58		19	18	9		34	16	5		168	3.39
McElmo Black-on-white		2						1				3	0.06
Mesa Verde Black-on-white		4										4	0.08
Piedra Black-on-white	1	1										2	0.04
Pueblo II White Painted	8	3	2	4	2	3		9	1	3		35	0.71
Pueblo III White Painted		3	1					1				5	0.10
Red Ware													
Deadmans Black-on-red				1	1					1		3	0.06
Indeterminate Local Red Painted		1		1								2	0.04
Indeterminate Local Red Unpainted		2		1								3	0.06
Nonlocal													
Polychrome					2							2	0.04
Unknown													
Unknown Pottery				1						1		2	0.04
Total	907	1,402	36	709	334	274	8	675	359	246	5	4,955	100.00

Table 13.2. Lithic Materials in the Assemblage of Bulk Chipped Stone, Sagebrush House.

Material Category	Raw Material	Count	% by Count	Weight (g)	% by Weight (g)
Local	Dakota/Burro Canyon silicified sandstone	214	14.78	1,026.81	19.44
	Igneous	6	0.41	9.80	0.19
	Morrison chert	83	5.73	146.98	2.78
	Morrison mudstone	196	13.54	748.16	14.16
	Morrison silicified sandstone	301	20.79	1,363.14	25.81
	Sandstone	1	0.07	2.10	0.04
	Slate/shale	3	0.21	26.30	0.50
Nonlocal	Nonlocal chert/siltstone	2	0.14	9.70	0.18
	Red jasper	3	0.21	1.40	0.03
	Washington Pass chert	1	0.07	0.00	0.00
Semi-local	Agate/chalcedony	39	2.69	21.00	0.40
	Brushy Basin chert	477	32.94	1,621.50	30.70
	Burro Canyon chert	112	7.73	299.30	5.67
	Petrified wood	1	0.07	1.70	0.03
Unknown	Other mineral	1	0.07	0.40	0.01
	Unknown chert/siltstone	8	0.55	3.85	0.07
Total		1,448	100.00	5,282.14	100.00

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Chapter 14

The Pasquin Site (5MT2037)

by Grant D. Coffey

Introduction

The Pasquin site is located in the south-central part of the Indian Camp Ranch Archaeological District. It is situated near the south end of a low ridge near the southeastern part of the subdivision. It was originally recorded in 1969 by Daniel Martin of the University of Colorado (Fetterman and Honeycutt 1994). It was later recorded as Mound 3 of 5MT2037 by Crow Canyon in 1983 and was later reassessed and recorded by Woods Canyon in 1991 (Fetterman and Honeycutt 1994). Woods Canyon characterized the site as a Pueblo II habitation but noted that the site had been mechanically excavated (i.e., bulldozed) in the late 1980s. The results of Crow Canyon's later electrical resistivity survey and testing failed to reveal intact features or structures; if such features or structures had been present, they appear to have been largely destroyed by previous looting activity.

This site is in the northern part of a group of five sites collectively referred to as the Hatch group of sites (Sommer et al. 2017). These sites are closely spaced along the same ridge, and the group was named for the owners of the property (Pat and Sarah Hatch) during Crow Canyon's excavations. The proximity of this site to others in the Hatch group suggests all of these sites were likely part of a broader cultural landscape; considerable time depth is represented across the sites that compose the group.

The Pasquin site was selected for testing due to its inferred status as a possible Pueblo II habitation and the research goals set forth in the expanded research design (Ortman et al. 2011; Ryan and Diederichs 2014). Specifically, these excavations were meant to gather data to address research topics like changes in community organization and land-use patterns over time.

The surface signature of the site is badly disturbed (Figure 14.1). A rubble scatter is present in the area where the roomblock rubble mound was once located, and a subtle depression located just to the south of this area probably represents excavated kivas. Crow Canyon's 1983 recording, photos of the site from the initial site record, and previous accounts from people involved in the 1980s excavation all suggest substantial masonry surface architecture and that at least two kivas were once present at the site. These sources also indicate the presence of a large kiva courtyard or plaza framed by masonry walls south of the surface rooms. At present, an old two-track road runs north–south in the southwestern part of the site area.

Twenty-eight excavation units were dug to test subsurface deposits at the site. Twenty-four of these excavation units were 1-x-1-m units placed to test midden deposits. The other units were used to test potential architectural areas and other features. This included a backhoe trench in a previously disturbed architectural area. Combined, this excavated area accounts for about 1.7 percent of the total site area. What follows is a summary of these excavations.

Chronology

Pottery data and disturbed architectural evidence suggest the site was occupied primarily in the Pueblo II (A.D. 900 to 1150) period, although pottery evidence suggests limited use in the Basketmaker III (A.D. 500 to 750) and Pueblo III (A.D. 1150 to 1280) periods as well. In terms of diagnostic pottery, 3,465 corrugated gray sherds and 1,161 plain gray ware sherds were recovered from all contexts at the site (Table 14.1). Plain gray pottery was primarily used in the Basketmaker III and Pueblo I periods, and corrugated pottery was used in the Pueblo II and Pueblo III periods (Ortman et al. 2005). The far greater number of later diagnostic white ware pottery sherds recovered also supports more intensive use and occupation of the site in the Pueblo II period as does the limited architectural evidence (see Architecture below). That said, the substantial number of plain gray ware sherds and a small number of diagnostic earlier white wares support some type of use of the site in the Basketmaker III period. A smaller number of Pueblo III sherds suggests continued, limited use of the site after the more robust Pueblo II occupation.

Though artifacts suggestive of Basketmaker III and Pueblo III use are present in small numbers (e.g., Chapin Black-on-white and Mesa Verde Black-on-white sherds), no features or structures were assigned to these time periods. Materials dating from these periods could be associated with the broader occupation of the ridgetop elsewhere, perhaps at one of the nearby sites. Alternatively, architectural evidence of an earlier occupation could have been destroyed by mechanical excavation or simply not exposed.

Architecture

Only one architectural block was defined at the site. This architectural unit includes a probable roomblock, previously excavated kivas, a disturbed plaza or kiva courtyard, and a disturbed midden area. All of these features have been badly impacted by mechanical excavation that took place at the site in the 1980s.

Crow Canyon's excavations did not reveal intact structures or features. Though much of the associated architecture was destroyed by mechanical excavation, the number and type of sandstone blocks observed during excavation support previous accounts that suggest some buildings on site were once made of masonry—a style of construction consistent with a Pueblo II period occupation (Lipe 1989; Lipe and Varien 1999; Ryan 2013).

The site form and limited documentation from the 1980s excavation suggest an unusual architectural layout for the site. According to a map included in the materials, at least three surface rooms were present in the roomblock, and they seemed to have partially enclosed, or framed, at least one of the kivas. Long and substantial masonry walls appear to have framed a plaza or courtyard area and would have also enclosed the two kivas south of the surface architecture. The height of the original roomblock rubble mound appears substantial based on previous recordings (about 1.1 m high), suggesting surface rooms may have been taller than most rooms built at this time or that they incorporated more masonry. Some of these building attributes are consistent with Chaco-style building techniques used in Chaco great houses and outliers, but it is unclear precisely how these architectural attributes may have been expressed at the site (Lekson 1984; Ryan 2013).

The midden area at the site produced artifacts that reflect occupation of the site in the Pueblo II period. A smaller number of diagnostic sherds dating to the Pueblo III period and earlier periods was also recovered (see Chronology section). The overall pottery assemblage collected from the midden deposits (Nonstructure 106, see Table 14.1) suggests most of the cultural refuse present was deposited in the Pueblo II period.

Demography

Using the two mechanically excavated kivas recorded on the site form and in documentation of those excavations (these structures were largely destroyed by excavation in the 1980s) as an indicator of the number of households present at the site (Kuckelman 2003; Lightfoot 1994:148), We infer that at least two households, or 10 to 14 people, inhabited the Pasquin site sometime during the Pueblo II period. The presence of earlier and later pottery in the overall assemblage supports a longer occupation of the ridge where the site is located, but architecture supporting these periods is lacking in tested portions of the site. The relatively high number of plain gray ware sherds and other earlier pottery types, in particular, might support some type of occupation in the Basketmaker III (A.D. 500 to 750) and Pueblo I (A.D. 750 to 900) periods, but the scale or duration of any occupation at those times is unknown.

Artifact Interpretations

Pottery sherds were the most abundant type of artifact recovered: 7,977 sherds are large enough to have been captured by 1/2-inch mesh (bulk sherds, large, see Table 14.1). Smaller sherds were not counted or analyzed but were recorded by weight (bulk sherds, small). Indeterminate Local Corrugated Gray was the most common pottery type in the analyzed assemblage. Late White Painted sherds (N = 1,298) were the most numerous among decorated white ware sherds, followed by Mancos Black-on-white sherds (N = 292) and Pueblo II White Painted (N = 108).

Chipped stone was the second most numerous type of artifact recovered: 2,896 lithic flakes and other pieces of chipped-stone debitage were collected (Table 14.2). Lithic materials available locally and semi-locally in bedrock formations dominated this assemblage. Interestingly, over 25 percent of the total chipped-stone collection (N = 751) was Brushy Basin chert. A semi-local fine-grained multi-colored stone originating from the Brushy Basin Member of the Morrison Formation, this type of stone is generally found in much smaller frequencies at sites of this age (Gerhardt 2001; Ortman et al. 2005; see also Chapter 24 of this report). This may indicate residents of this pueblo had a strong preference for this material or that some type of specialized production of artifacts made from this stone was taking place at the site. Other types of stone from the Morrison Formation, including Morrison silicified sandstone (N = 1,091), were common as was Dakota/Burro Canyon silicified sandstone (N = 414).

Other types of artifacts found during excavation include fragments of ground-stone tools, gizzard stones, nonhuman bone, bifaces, and axe fragments. Tested midden deposits were generally shallow with varying degrees of disturbance, but the diversity of the assemblage suggests domestic and/or processing activities took place at the site (see Chapter 24).

Subsistence

This section details how the inhabitants of the Pasquin site obtained materials and resources needed for daily survival. This section includes data presented in other chapters of this report, including Chapter 20 (Faunal Remains) and Chapter 21 (Archaeobotanical Remains).

The land around the Pasquin site would have provided wild plant resources to the residents of the farmstead. Today the surrounding native vegetation consists of pinyon and juniper woodland containing stands of sagebrush and grasses. Other vegetation nearby includes Gambel oak, serviceberry, rabbitbrush, ricegrass, lupine, yucca, yarrow, and a variety of cacti.

One flotation sample from the midden area (Nonstructure 106) was assessed for macrobotanical remains. Much of the burned vegetal material represented appears to be fuelwood, including juniper and sagebrush, but burned *Zea mays* cupules were also present. Also present were charred cheno-am and *Portulaca* seeds indicating the collection and consumption of gathered wild plant resources (see Chapter 21).

Faunal remains collected from the site indicate that occupants of the Pasquin site used both domesticated and wild-animal resources as well. Bones of cottontail rabbits, deer, turkey, and coyote/dog were found at the site. A complete bone awl made from a turkey ulna was also recovered. Overall, these animal resources were likely used for food, clothing, bone tools, and other purposes (see Chapter 20).

Pottery and tools would have been used by people at the Pasquin site in a variety of ways including material processing and the storage of food. Data regarding pottery production and exchange for this site can provide evidence of trade relations and the potential for craft specialization during the Pueblo II period in this region. Lithic and bone tools can provide information about the variety of acquisition activities and possible special uses of artifacts.

The pottery sample from the Pasquin site suggests that most vessels at the farmstead were produced locally from local materials. A small number of sherds collected at the site were produced in the Chuska Mountains area to the south along the New Mexico and Arizona border (Ortman et al. 2005). One Cibola White sherd also suggests vessels from further afield, that were probably produced near the Zuni region of New Mexico, were also used at the site. The very small number of these extralocal sherds in the overall assemblage suggests few pots made outside of the region were used or broken at the site during its occupation, but they do hint at some kind of connection to peoples to the south.

The assemblage of lithic artifacts is also dominated by types of stone found locally or semi-locally and available in bedrock outcrops in nearby canyons. This is true for both chipped-stone debris and chipped-stone tools found at the site. The unusually high frequency of Brushy Basin chert flakes suggests a strong selection for that type of semi-local material among the residents of the pueblo and may also suggest some type of specialized production of lithic artifacts (Wenker 1999). Morrison silicified sediment is the most abundant type of lithic material in the assemblage with high numbers of Dakota/Burro silicified flakes present as well.

The data for the Pasquin site suggest that both pottery and lithic tools were primarily produced from locally available materials and that both wild and domesticated plant resources were used for food and tool production. This assemblage suggests that the residents of this farmstead were very familiar with local technologies and material sources.

Depopulation

The pottery and limited architectural data at hand suggest the Pasquin site was depopulated by the early Pueblo III period (by A.D. 1200). One tree-ring sample currently awaiting a date and species assessment at the Laboratory of Tree-Ring Research in Tucson, Arizona, might help refine this fairly broad inference. There is little artifactual or architectural evidence for a robust Pueblo III use of the site, although the presence of Mesa Verde Black-on-white sherds does indicate some type of activity at the site after A.D. 1180 (Ortman et al. 2005). Greater numbers of earlier pottery sherds indicate a more robust use of the site during the Basketmaker III and Pueblo I periods, but no features or structures were found that date to this period. Again, these poorly defined earlier and later uses could be associated with the broader occupation of the area that might include other sites in the Hatch group just to the north and south. It is also possible that architectural evidence of this earlier occupation could have been removed by previous excavation or simply not exposed.

Site Summary and Conclusions

The Pasquin site was sampled with 28 excavation units placed in the single architectural block defined at the site. The resulting data help address questions posed in the research design for this project (Ortman et al. 2011; Ryan and Diederichs 2014), including better defining the chronology and occupational history of the site and achieving a better understanding of how ancestral Pueblo people made a living on this landscape during the Pueblo II period.

Data suggest that 10 to 14 people occupied the site late in the Pueblo II period, probably around A.D. 1100. Artifact data from the midden area and elsewhere suggest a longer use of the general area although no architecture dating prior to or after the Pueblo II period was exposed.

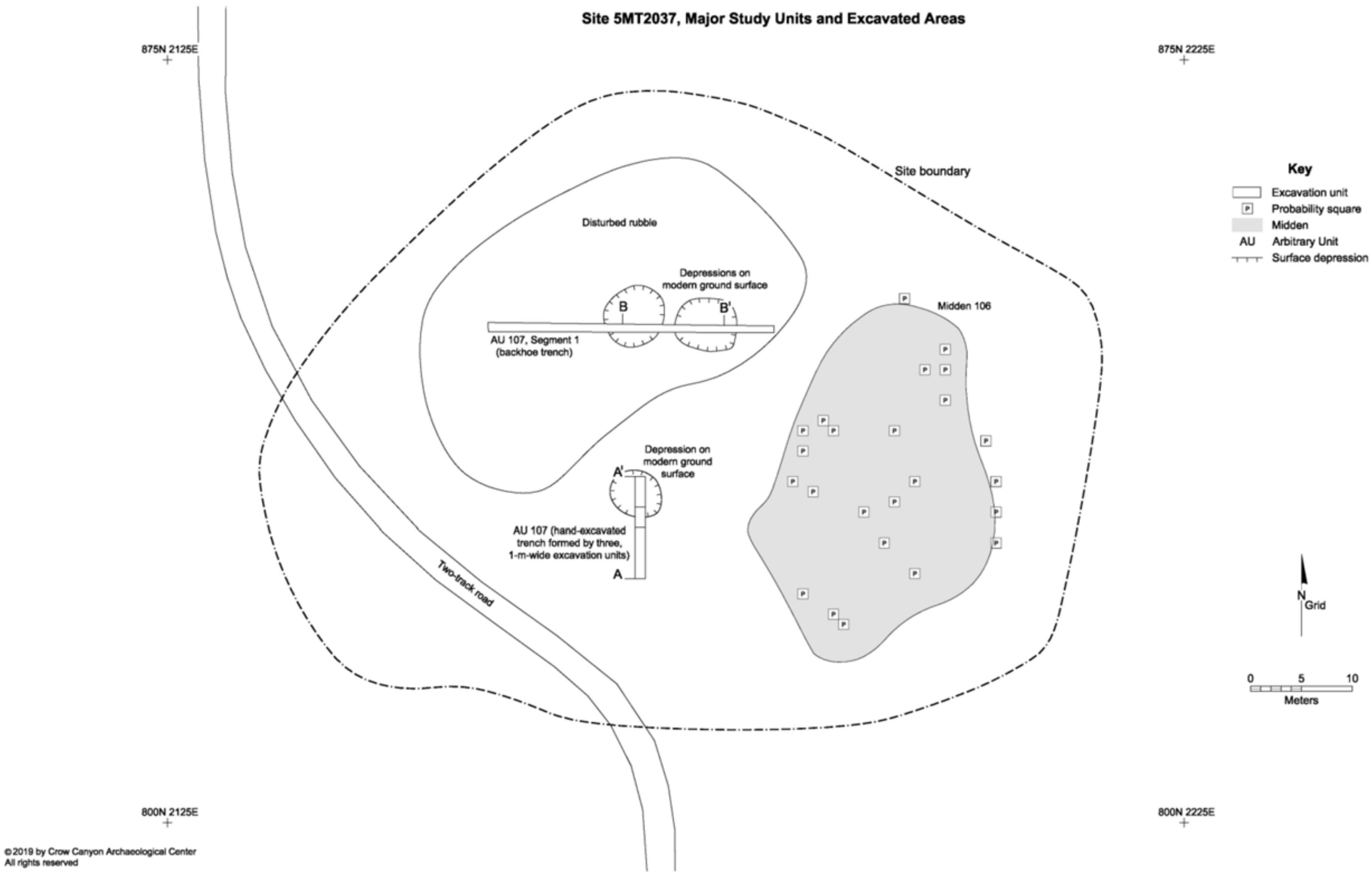

Figure 14.1. Site plan showing cultural features and excavation units, the Pasquin site.

Table 14.1. Typed Pottery Sherds by Study Unit, the Pasquin Site.

Ware and Type	Study Unit						Count	% by Count
	101	104	105	106	107	108		
Brown Ware								
Twin Trees Utility			1	1			2	0.03
Plain Gray Ware								
Chapin Gray				15			15	0.19
Indeterminate Local Gray	40	1	28	854	98	140	1,161	14.55
Indeterminate Local Gray, Polished					1		1	0.01
Indeterminate Neckbanded Gray		1					1	0.01
Mancos Gray				3	1		4	0.05
Moccasin Gray				3			3	0.04
Corrugated Gray Ware								
Indeterminate Local Corrugated Gray	74	9	76	2,586	322	398	3,465	43.44
Mancos Corrugated Gray	4		2	44	10	10	70	0.88
Mesa Verde Corrugated Gray	1			10	1	1	13	0.16
White Ware								
Chapin Black-on-white				5		1	6	0.08
Cortez Black-on-white	3			10	2	3	18	0.23
Early White Painted			2	18	2	10	32	0.40
Early White Unpainted	1				1		2	0.03
Late White Painted	50	1	27	945	141	134	1,298	16.27
Late White Unpainted	43		26	1,036	137	193	1,435	17.99
Mancos Black-on-white	16	1	9	199	34	33	292	3.66
McElmo Black-on-white	1			3		2	6	0.08
Mesa Verde Black-on-white				2			2	0.03
Piedra Black-on-white						1	1	0.01
Pueblo II White Painted	4		1	75	14	14	108	1.35
Pueblo III White Painted	1			5	1	1	8	0.10
Red Ware								
Abajo Red-on-orange				2			2	0.03
Bluff Black-on-red					1		1	0.01
Deadmans Black-on-red				4	1	1	6	0.08
Indeterminate Local Red Painted				8		2	10	0.13
Indeterminate Local Red Unpainted				6	1	1	8	0.10
Nonlocal								
Chuska Gray, Not Further Specified				2	1	1	4	0.05
Chuska White, Not Further Specified					1		1	0.01
Cibola White, Not Further Specified				1			1	0.01
Other White Nonlocal				1			1	0.01
Total	238	13	172	5,838	770	946	7,977	100.00

Table 14.2. Lithic Materials in the Assemblage of Bulk Chipped Stone, the Pasquin Site.

Material Category	Raw Material	Count	% by Count	Weight (g)	% by Weight (g)
Local	Dakota/Burro Canyon silicified sandstone	414	14.30	1,278.36	14.68
	Igneous	8	0.28	17.10	0.20
	Morrison chert	120	4.14	190.73	2.19
	Morrison mudstone	339	11.71	1,144.06	13.14
	Morrison silicified sandstone	1,091	37.67	3,951.11	45.37
	Slate/shale	12	0.41	10.71	0.12
Nonlocal	Nonlocal chert/siltstone	2	0.07	5.20	0.06
	Red jasper	4	0.14	4.40	0.05
	Washington Pass chert	2	0.07	1.80	0.02
Semi-local	Agate/chalcedony	35	1.21	66.80	0.77
	Brushy Basin chert	751	25.93	1,705.50	19.58
	Burro Canyon chert	110	3.80	316.50	3.63
	Petrified wood	3	0.10	2.80	0.03
Unknown	Other mineral	1	0.03	4.60	0.05
	Unknown chert/siltstone	4	0.14	9.70	0.11
Total		2,896	100.00	8,709.37	100.00

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Chapter 15

Badger Den (5MT10686)

by Grant D. Coffey

Introduction

Badger Den is located in the south-central part of the Indian Camp Ranch Archaeological District. It is situated near the south end of a low ridge near the southeastern part of the subdivision. It was originally recorded in 1969 by Daniel Martin of the University of Colorado (Fetterman and Honeycutt 1994). It was recorded as Mound 4 of 5MT2037 (the Pasquin site) by Crow Canyon in 1983 and was later given its current designation and site number by Woods Canyon in 1991 (Fetterman and Honeycutt 1994). Woods Canyon characterized the site as a Pueblo II habitation but noted that the site had been mechanically excavated (i.e., bulldozed) in the late 1980s. The results of Crow Canyon's later electrical resistivity survey and testing revealed remnants of one surface room; however, the kiva and any other features present in that location appear to have been destroyed by looting.

This site is in the southern part of a group of five sites collectively referred to as the Hatch group of sites (Sommer et al. 2017). These sites are closely spaced along the same ridge, and the group was named for the owners of the property (Pat and Sarah Hatch) during Crow Canyon's excavations. The proximity of this site to others in the Hatch group suggests all of these sites were likely part of a broader cultural landscape; considerable time depth is represented across the sites that compose the group.

Badger Den was selected for testing due to its inferred status as a possible Pueblo II habitation and the research goals set forth in the expanded research design (Ortman et al. 2011; Ryan and Diederichs 2014). Specifically, these excavations were meant to gather data to address research topics like changes in community organization and land-use patterns over time.

The surface signature of the site is badly disturbed (Figure 15.1). A rubble scatter is present in the area where the roomblock rubble mound was once located, and a subtle depression located just to the south probably represents an excavated kiva. An old two-track road runs north–south in the western part of the site area. Remote sensing conducted at the site helped to identify the lone surface structure recorded (see Chapter 3).

Twenty-one excavation units were dug to test subsurface deposits at the site. Seventeen of these excavation units were 1-x-1-m units placed to test midden deposits. The other units were used to test potential architectural areas and other features. This included a backhoe trench in a previously disturbed architectural area. Combined, this excavated area accounts for about 1.7 percent of the total site area. What follows is a summary of these excavations.

Chronology

Pottery data, AMS carbon dates, and architectural evidence suggest the site was occupied primarily in the Pueblo II (A.D. 900 to 1150) period, although pottery evidence suggests limited use in the Basketmaker III (A.D. 500 to 750) and Pueblo III (A.D. 1150 to 1280) periods as well. In terms of diagnostic pottery, 2,061 corrugated gray ware sherds and 382 plain gray ware sherds were recovered from all contexts at the site (Table 15.1). Plain gray pottery was primarily used in the Basketmaker III and Pueblo I periods, and corrugated pottery was used in the Pueblo II and Pueblo III periods (Ortman et al. 2005). The far greater number of later diagnostic white ware pottery sherds recovered also supports more intensive use and occupation of the site in the Pueblo II period as does the limited intact architecture documented at the site (see Architecture below). That said, the substantial number of plain gray ware sherds and the smaller number of earlier white wares support some type of limited use of the site in the Basketmaker III period. A small number of Pueblo III sherds suggests continued, limited use of the site after occupation.

Dates produced through AMS carbon dating also support a Pueblo II occupation of the single structure recorded at the site. A burned *Zea mays* cupule from the fill of a pit feature in Structure 111 that was submitted for AMS carbon dating produced two-sigma calibrated dates from A.D. 1025 to 1165 (Beta 471926). This span includes the middle-to-late Pueblo II period as well as the early Pueblo III period. However, the majority of pottery data would indicate primary occupation of the site prior to A.D. 1150.

Though artifacts suggestive of Basketmaker III and Pueblo III use are present in small numbers (e.g., Chapin Black-on-white and McElmo Black-on-white sherds), no features or structures were assigned to these time periods. Materials dating from these periods could be associated with the broader occupation of the ridgetop elsewhere, perhaps at one of the nearby sites. Alternatively, architectural evidence of earlier occupation could have been destroyed by mechanical excavation or simply not exposed.

Architecture

Only one architectural block was defined at the site. This architectural unit includes a probable roomblock area, a previously excavated kiva, and a disturbed midden area. All of these features have been badly impacted by mechanical excavation that took place at the site in the 1980s.

Only one structure was documented at the site, Structure 111 (Figure 15.2). Crow Canyon's excavations revealed part of a wall foundation, a plastered floor surface, and three interior pit features. A complete Mancos Black-on-white duck effigy vessel was recovered from the interior of the room near the floor of the structure (Figure 15.3). Though much of the associated roomblock was removed by mechanical excavation, the single-stone construction of the exposed wall segment supports a Pueblo II period construction and use (Lipe 1989; Lipe and Varien 1999; Ryan 2013).

The midden area at the site produced artifacts that reflect occupation of the site in the Pueblo II period. A smaller number of diagnostic sherds dating to the Pueblo III period and earlier periods was also recovered (see Chronology section). The overall pottery assemblage collected from the midden deposits (Nonstructure 106, see Table 15.1) suggests most of this cultural refuse was deposited in the Pueblo II period, probably near the time Structure 111 was built and used.

Demography

Using the single mechanically excavated kiva previously recorded (this structure was largely destroyed by excavation in the 1980s) as an indicator of the number of households present at the site (Kuckelman 2003; Lightfoot 1994:148), We infer that at least one household, or between five and seven people, inhabited Badger Den during the Pueblo II period. The presence of earlier and later pottery in the overall assemblage supports a longer occupation of the ridge where the site is located, but architecture supporting these periods is lacking in tested portions of the site.

Artifact Interpretations

Pottery sherds were the most abundant type of artifact recovered: 4,372 sherds are large enough to have been captured by ½-in mesh (bulk sherds, large, see Table 15.1). Smaller sherds were not counted or analyzed but were recorded by weight (bulk sherds, small). Indeterminate Local Corrugated Gray was the most common pottery type in the analyzed assemblage (see Table 15.1). Among decorated white ware sherds, Late White Painted sherds are the most numerous (N = 786), followed by Mancos Black-on-white sherds (N = 184) and Pueblo II White Painted sherds (N = 55).

Chipped stone was the second most numerous type of artifact recovered: 2,107 lithic flakes and other pieces of chipped-stone debitage were collected (Table 15.2). Lithic materials available locally and semi-locally in bedrock formations dominated this assemblage. Interestingly, over 39 percent of the total chipped-stone collection (N = 838) was Brushy Basin Chert. A semi-local fine-grained multi-colored stone originating from the Brushy Basin Member of the Morrison Formation, this type of stone is generally found in much smaller frequencies at sites of this age (Gerhardt 2001; Ortman et al. 2005; see also Chapter 24 of this report). This may indicate residents of this pueblo had a strong preference for this material or that some type of specialized production of artifacts made from this stone was taking place at the site. Other types of stone from the Morrison Formation, including Morrison silicified sandstone (N = 462) and Dakota/Burro Canyon silicified sandstone (N = 301), were the next most common types of stone.

Other types of artifacts found during excavation include fragments of ground-stone tools, gizzard stones, nonhuman bone, bifaces, and a tchamahia fragment. Tested midden deposits were generally shallow with varying degrees of disturbance, but the diversity of the assemblage suggests domestic and/or processing activities took place at the site (see Chapter 24).

Subsistence

This section details how the inhabitants of the Badger Den site obtained materials and resources needed for daily survival. This section includes data presented in other chapters of this report, including Chapter 20 (Faunal Remains) and Chapter 21 (Archaeobotanical Remains).

The land around the Badger Den site would have provided wild plant resources to the residents of the farmstead. Today the surrounding native vegetation consists of pinyon and juniper woodland containing stands of sagebrush and grasses. Other vegetation nearby includes Gambel oak, serviceberry, rabbitbrush, ricegrass, lupine, yucca, yarrow, and a variety of cacti.

Four flotation samples from different contexts at the site, including the midden area (Nonstructure 106), an extramural pit (Feature 1, Nonstructure 109), and Structure 111, were assessed for macrobotanical remains. Much of the burned macrobotanical material represented appears to be fuelwood, including juniper and sagebrush, but burned *Zea mays* cupules were also present. Also present were charred cheno-am and *Portulaca* seeds indicating the collection and consumption of gathered wild plant resources. Pollen samples analyzed from Structure 111 revealed high levels of maize pollen and preserved evidence of willow pollen again suggesting both wild and domesticated plant use (see Chapters 21 and 22).

Faunal remains collected from the site indicate that occupants of the Badger Den site used both domesticated and wild-animal resources as well. Bones of cottontail rabbits, deer, turkey, and coyote/dog were found at the site. Two fish bones were also found at the site suggesting some use of riverine species. These animals were likely used for food, clothing, bone tools, and other purposes (see Chapter 20).

Pottery and tools would have been used by people at the Badger Den site in a variety of ways including material processing and the storage of food. Data regarding pottery production and exchange for this site can provide evidence of trade relations and the potential for craft specialization during the Pueblo II period in this region. Lithic and bone tools can provide information about the variety of acquisition activities and possible special uses of artifacts.

The pottery sample from the Badger Den site suggests that most vessels at the farmstead were produced locally from local materials. A Tin Cup Polychrome sherd was collected as were six Deadmans Black-on-red sherds indicating the procurement and use of some semi-local or nonlocal pottery at the site (Ortman et al. 2005). One Tsegi Orange Ware sherd also suggests vessels from further afield, that were probably produced near the Kayenta region of Arizona, were also used at the site. The very small number of these extralocal sherds in the overall assemblage suggests few pots made outside of the region were used or broken at the site during its occupation.

The assemblage of lithic artifacts is also dominated by types of stone found locally or semi-locally and available in bedrock outcrops in nearby canyons. This is true for both chipped-stone debris and chipped-stone tools found at the site. The unusually high frequency of Brushy Basin chert flakes suggests a strong selection for that type of semi-local material among the residents of the pueblo and may also suggest some type of specialized production of lithic artifacts (Wenker 1999). Morrison silicified sediment is the second most abundant type of lithic material in the assemblage followed by Dakota/Burro chert and Morrison mudstone.

The data for the Badger Den site suggest that both pottery and lithic tools were primarily produced from locally available materials and that both wild and domesticated plant resources were used for food and tool production. This assemblage suggests that the residents of this farmstead were very familiar with local technologies and material sources.

Depopulation

The pottery, AMS dating, and architectural data at hand suggest the Badger Den site was depopulated by the early Pueblo III period (by A.D. 1200). There is little artifactual or architectural evidence for a robust Pueblo III use of the site, although the presence of Pueblo III White Painted sherds does indicate some type of activity at the site after A.D. 1100 (Ortman et al. 2005). Greater numbers of earlier pottery sherds indicate a more robust use of the site during the Basketmaker III period, but no features or structures were found that date to this period. Again, these poorly defined earlier and later uses could be associated with the broader occupation of the area that might include other sites just to the north and south. Alternatively, architectural evidence of an earlier occupation could have been destroyed by mechanical excavation or simply not exposed.

Site Summary and Conclusions

The Badger Den site was sampled with 21 excavation units placed in the single architectural block defined at the site. The resulting data help address questions posed in the research design for this project (Ortman et al. 2011; Ryan and Diederichs 2014), including better defining the chronology and occupational history of the site and achieving a better understanding of how ancestral Pueblo people made a living on this landscape during the Pueblo II period.

Data suggest that five to seven people occupied the site late in the Pueblo II period, probably around A.D. 1100. Artifact data from the midden area and elsewhere suggest a longer use of the general area, although no architecture dating prior to or after the Pueblo II period was exposed.

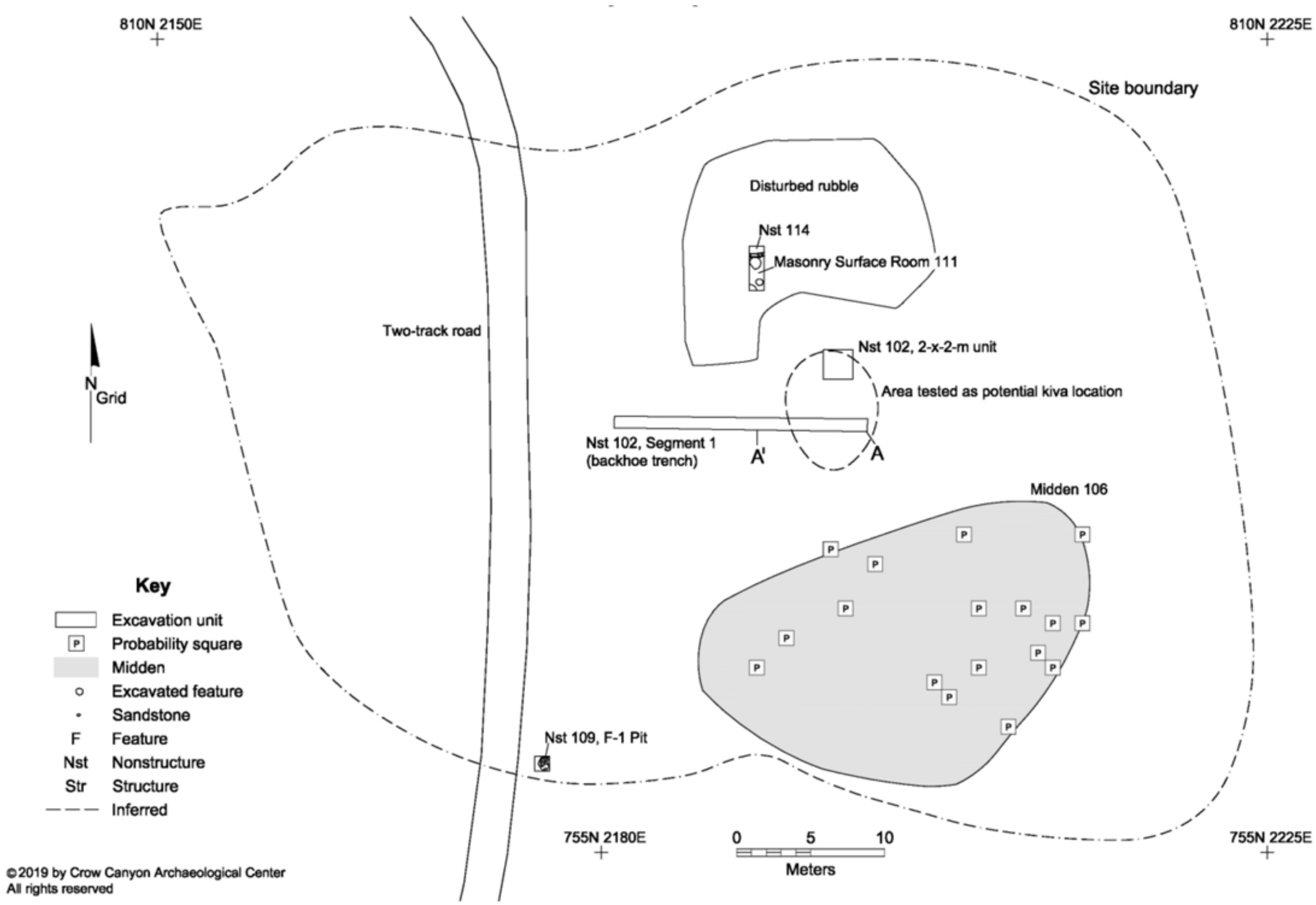

Figure 15.1. Site plan showing cultural features and excavation units, Badger Den.

Figure 15.2. Photograph of Structure 111, Badger Den, showing a portion of the preserved wall and interior pit features.

Figure 15.3. Photograph of Mancos Black-on-white duck effigy vessel recovered from near the floor of Structure 111.

Table 15.1. Typed Pottery Sherds by Study Unit, Badger Den.

Ware and Type	Study Unit									Count	% by Count
	101	102	106	107	108	111	112	113	114		
Brown Ware											
Basketmaker Mud Ware	1									1	0.02
Plain Gray Ware											
Chapin Gray		2		6						8	0.18
Indeterminate Local Gray	64	5	288	5	4	16				382	8.74
Corrugated Gray Ware											
Indeterminate Local Corrugated Gray	328	142	1,498	1	6	84			2	2,061	47.14
Mancos Corrugated Gray	4	1	27		1					33	0.75
Mesa Verde Corrugated Gray	1	2	3							6	0.14
White Ware											
Chapin Black-on-white	1		1							2	0.05
Cortez Black-on-white	1		7			1				9	0.21
Early White Painted	3		9							12	0.27
Early White Unpainted			1							1	0.02
Late White Painted	136	49	566	3	1	30		1		786	17.98
Late White Unpainted	105	81	560	6	2	35			1	790	18.07
Mancos Black-on-white	28	22	123			10	1			184	4.21
McElmo Black-on-white	1		2							3	0.07
Piedra Black-on-white	1		1							2	0.05
Pueblo II White Painted	15	5	33			1			1	55	1.26
Pueblo III White Painted	3	1	9							13	0.30
Rosa Black-on-white	1									1	0.02
Tin Cup Polychrome		1								1	0.02
Red Ware											
Deadmans Black-on-red		1	4			1				6	0.14
Indeterminate Local Red Painted	1		8			1				10	0.23
Indeterminate Local Red Unpainted		1	2							3	0.07
Nonlocal											
Other White Nonlocal	1									1	0.02
Tsegi Orange Ware			1							1	0.02
Unknown											
Unknown Pottery	1									1	0.02
Total	696	313	3,143	21	14	179	1	1	4	4,372	100.00

Table 15.2. Lithic Materials in the Assemblage of Bulk Chipped Stone, Badger Den.

Material Category	Raw Material	Count	% by Count	Weight (g)	% by Weight (g)
Local	Dakota/Burro Canyon silicified sandstone	301	14.29	1,127.50	17.14
	Igneous	4	0.19	7.00	0.11
	Morrison chert	123	5.84	144.20	2.19
	Morrison mudstone	298	14.14	720.30	10.95
	Morrison silicified sandstone	462	21.93	1,739.90	26.45
	Sandstone	3	0.14	106.00	1.61
	Slate/shale	4	0.19	6.20	0.09
Semi-local	Agate/chalcedony	17	0.81	9.70	0.15
	Brushy Basin chert	838	39.77	2,638.00	40.10
	Burro Canyon chert	44	2.09	60.80	0.92
	Petrified wood	2	0.09	0.30	0.00
Unknown	Unknown chert/siltstone	11	0.52	19.20	0.29
Total		2,107	100.00	6,579.10	100.00

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Chapter 16

The Dry Ridge Site (5MT10684)

by Grant D. Coffey

Introduction

The Dry Ridge site is located in the south-central part of the Indian Camp Ranch Archaeological District. It is situated near the north end of a low ridge near the southeastern part of the subdivision. It was originally recorded in 1969 by Daniel Martin of the University of Colorado (Fetterman and Honeycutt 1994). It was later recorded as Mound 2 of 5MT2037 (the Pasquin Site) by Crow Canyon in 1983 and was later reassessed and given its current site designation and number by Woods Canyon in 1991 (Fetterman and Honeycutt 1994). Woods Canyon characterized the site as a Pueblo II habitation and suggested that some subsurface features and structures might be intact despite mechanical excavation at the site in the 1980s. The results of Crow Canyon's later electrical resistivity survey and testing revealed an intact kiva, though much of the surface architecture and artifacts had been impacted by mechanical excavation.

This site is in the northern part of a group of five sites collectively referred to as the Hatch group of sites (Sommer et al. 2017). These sites are closely spaced along the same ridge, and the group was named for the owners of the property (Pat and Sarah Hatch) during Crow Canyon's excavations. The proximity of this site to others in the Hatch group suggests all of these sites were likely part of a broader cultural landscape; considerable time depth is represented across the sites that compose the group.

The Dry Ridge site was selected for testing due to its inferred status as a Pueblo II habitation and the research goals set forth in the expanded research design (Ortman et al. 2011; Ryan and Diederichs 2014). Specifically, these excavations were meant to gather data to address research topics like changes in community organization and land-use patterns over time.

The surface signature of the site is badly disturbed (Figure 16.1). A rubble scatter is present in the area where the roomblock rubble mound was once located, and a subtle depression located just to the southeast is a kiva depression. An expansive but disturbed midden area is present in the southeastern part of the site.

Fifteen excavation units were dug to test subsurface deposits at the site. Eleven of these excavation units were 1-x-1-m units placed to test midden deposits. The other four units were used to test potential architectural areas and other features. This includes a backhoe trench dug to expose the outline of the recorded kiva (Structure 108). Combined, this excavated area accounts for about 2.9 percent of the total site area. What follows is a summary of these excavations.

Chronology

Pottery data, AMS dates, archaeomagnetic dates, and architectural evidence suggest the site was occupied primarily in the Pueblo II (A.D. 900 to 1150) period, although pottery evidence suggests limited use in the Basketmaker III (A.D. 500 to 750) and Pueblo I (A.D. 750 to 900) periods as well. In terms of diagnostic pottery, 1,991 corrugated gray sherds and 482 plain gray ware sherds were recovered from all contexts at the site (Table 16.1). Plain gray pottery was primarily used in the Basketmaker III and Pueblo I periods, and corrugated pottery was used in the Pueblo II and Pueblo III periods (Ortman et al. 2005). The far greater number of later diagnostic white ware pottery sherds recovered also supports more intensive use and occupation of the site in the Pueblo II period as does the architecture of the tested kiva (see Architecture below). That said, the substantial number of plain gray ware sherds and the smaller number of diagnostic earlier white wares support some type of use of the site in the Basketmaker III and Pueblo I periods. A smaller number of Pueblo III sherds suggests continued but limited use of the site after occupation.

One charred *Zea mays* embryo collected from hearth fill and one *Zea mays* cupule recovered from the floor of Structure 108 returned two-sigma calibrated AMS dates of A.D 1016 to 1154 and A.D. 1025 to 1160 (Beta 471924, 471925). The significant overlap in these dates supports a late A.D. 1000s or early A.D. 1100s use of the structure.

An archaeomagnetic date produced from a sample collected along the fire-reddened margin of the hearth (Feature 3) in Structure 108 produced a broader date range, from A.D. 985 to 1315. This range represents the total span between the earliest and latest dates from the sample in which separate time windows cannot be excluded at the 5 percent confidence level. This range seems too broad to account for the use of the structure or to be representative of the final fire built in the hearth of the structure, but two of the three specific date windows produced from the sample (A.D. 985 to 1040 and A.D. 1060 to 1140) do include the range suggested by the AMS dates and/or pottery data from the site (Archaeomagnetic Laboratory Eastern Tennessee State University; ETSU-371).

Basketmaker III and Pueblo I pottery types are present in smaller numbers (e.g., Chapin Black-on-white and Moccasin Gray), and no features or structures were assigned to these time periods. Materials dating from these periods could be associated with the broader occupation of the ridgetop elsewhere, perhaps at one of the nearby sites. Alternatively, architectural or feature evidence of occupation at this time could have been destroyed by mechanical excavation or simply not exposed.

Architecture

Only one architectural block was defined at the site. This architectural unit includes a probable roomblock, a kiva, and a disturbed midden area. Any surface architecture and the midden area have been badly impacted or destroyed by mechanical excavation that took place at the site in the 1980s.

Crow Canyon's excavations revealed one structure, a Pueblo II kiva (Structure 108, Figure 16.2). Though much of the bench face and bench surface are native sediment, the pilasters and portions of the upper lining wall enclosing the structure were built of shaped-stone masonry. This type of hybrid earthen and masonry construction was fairly common in the area in the A.D. 1000s (Kuckelman 1988; Lipe 1989; Lipe and Varien 1999; Ryan 2013; Shanks 2010). The kiva was not fully burned at the end of its use life, but evidence of some limited interior burning may suggest larger structural timbers from the roof were salvaged for use elsewhere after the kiva was decommissioned while remaining small-diameter members were burned in place within the structure.

The normative layout of habitations dating to this time suggests surface rooms were once present north of Structure 108 (Lipe and Varien 1999). Despite testing, however, no intact surface rooms could be identified in an area of disturbed rubble just to the northwest of the kiva. Any rooms once present in this location were likely destroyed by previous mechanical excavation.

The midden area at the site produced artifacts that suggest the kiva was built and occupied in the Pueblo II period. A smaller number of diagnostic sherds dating to the Basketmaker III and Pueblo I periods was also recovered (see Chronology section), but the overall pottery assemblage collected from the midden deposits (Nonstructure 106, see Table 16.1) suggests most of the cultural refuse present was deposited in the Pueblo II period.

Demography

Using the recorded kiva as an indicator of the number of households present at the site (Kuckelman 2003; Lightfoot 1994:148), we infer that at least one household, or five to seven people, inhabited the Dry Ridge site during the Pueblo II period. The presence of earlier and later pottery in the overall assemblage supports a longer occupation of the ridge where the site is located, but architecture supporting occupation in these periods is lacking in tested portions of the site. The relatively high number of plain gray ware sherds and other earlier pottery types, in particular, might support some type of occupation in the Basketmaker III (A.D. 500 to 750) and Pueblo I (A.D. 750 to 900) periods, but the scale or duration of any occupation at those times is unknown.

Artifact Interpretations

Pottery sherds were the most abundant type of artifact recovered: 4,183 sherds are large enough to have been captured by ½-inch mesh (bulk sherds, large, see Table 16.1). Smaller sherds were not counted or analyzed but were recorded by weight (bulk sherds, small). Indeterminate Local Corrugated Gray was the most common pottery type in the analyzed assemblage (N = 1,991). Late White Painted sherds (N = 636) were the most numerous among decorated white ware sherds, followed by Mancos Black-on-white (N = 181) and Pueblo II White Painted sherds (N = 45).

Chipped stone was the second most numerous type of artifact recovered: 1,040 lithic flakes and other pieces of chipped-stone debitage were collected (Table 16.2). Lithic materials available locally and semi-locally in bedrock formations dominated this assemblage. Interestingly, over 38 percent of the total chipped-stone collection (N = 396) was Brushy Basin chert. A semi-local fine-grained multi-colored stone originating from the Brushy Basin Member of the Morrison Formation, this type of stone is generally found in much smaller frequencies at sites of this age (Gerhardt 2001; Ortman et al. 2005; see also Chapter 24 of this report). This may indicate residents of this pueblo had a strong preference for this material or that some type of specialized production of artifacts made from this stone was taking place at the site. Other types of stone from the Morrison Formation including Morrison silicified sandstone (N = 315) and Morrison mudstone (N = 162) were also common.

Other types of artifacts found during excavation include fragments of ground-stone tools, gizzard stones, nonhuman bone, bifaces, and projectile points. Tested midden deposits were generally shallow with varying degrees of disturbance, but the diversity of the assemblage suggests domestic and/or processing activities took place at the site (see Chapter 24).

Subsistence

This section details how the inhabitants of the Dry Ridge site obtained materials and resources needed for daily survival. This section includes data presented in other chapters of this report, including Chapter 20 (Faunal Remains) and Chapter 21 (Archaeobotanical Remains).

The land around the Dry Ridge site would have provided wild plant resources to the residents of the farmstead. Today the surrounding native vegetation consists of pinyon and juniper woodland containing stands of sagebrush and grasses. Other vegetation nearby includes Gambel oak, serviceberry, rabbitbrush, ricegrass, lupine, yucca, yarrow, and a variety of cacti.

One flotation sample from the hearth of Structure 108 and one sample from the floor of that kiva were assessed for macrobotanical remains. Much of the burned vegetal material present appears to be fuelwood, including juniper and sagebrush, but burned *Zea mays* cupules, kernels, and kernel embryos were also present. Also present were charred cheno-am and *Plantago* seeds indicating the collection and consumption of gathered wild plant resources (see Chapter 21).

Faunal remains collected from the site indicate that occupants of the Dry Ridge site used both domesticated and wild-animal resources as well. Bones of cottontail rabbits, deer, turkey, and coyote/dog were found at the site. Two complete bone awls made from deer metatarsals were also recovered. Overall, these animal resources were likely used for food, clothing, bone tools, and other purposes (see Chapter 20).

Pottery and tools would have been used by people at the Dry Ridge site in a variety of ways including material processing and the storage of food. Data regarding pottery production and exchange for this site can provide evidence of trade relations and the potential for craft specialization during the Pueblo II period in this region. Lithic and bone tools can provide information about the variety of acquisition activities and possible special uses of artifacts.

The pottery sample from the Dry Ridge site suggests that most vessels at the farmstead were produced locally from local materials. One Cibola White sherd suggests vessels from further afield, that were probably produced near the Zuni region of New Mexico, were also used or broken at the site (Ortman et al. 2005; see Table 16.1). The very small number of these extralocal sherds in the overall assemblage suggests few pots made outside of the region were used or broken at the site during its occupation.

The assemblage of lithic artifacts is also dominated by types of stone found locally or semi-locally and available in bedrock outcrops in nearby canyons. This is true for both chipped-stone debris and chipped-stone tools found at the site. The unusually high frequency of Brushy Basin chert flakes suggests a strong selection for that type of semi-local material among the residents of the pueblo and may also suggest some type of specialized production of lithic artifacts (Wenker 1999). Morrison silicified sediment is an abundant type of lithic material in the assemblage, and high numbers of Morrison mudstone flakes are present as well.

The data for the Dry Ridge site suggest that both pottery and lithic tools were primarily produced from locally available materials and that both wild and domesticated plant and animal resources were used for food and tool production. This assemblage suggests that the residents of this farmstead were very familiar with local technologies and material sources.

Depopulation

The pottery and limited architectural data at hand suggest the Dry Ridge site was depopulated by the early Pueblo III period (by the late A.D. 1100s). There is little artifactual or architectural evidence for a robust Pueblo III use of the site, although the presence of Pueblo III White Painted sherds does indicate some type of activity at the site after A.D. 1100 (Ortman et al. 2005). Greater numbers of earlier pottery sherds indicate a more robust use of the site during the Basketmaker III and Pueblo I periods, but no features or structures were found that date to these periods. Again, these poorly defined earlier and later uses could be associated with the broader occupation of the area that might include other sites in the Hatch group just to the south. It is also possible that architectural evidence of an earlier occupation could have been removed by previous excavation or simply not exposed.

Site Summary and Conclusions

The Dry Ridge site was sampled with 15 excavation units placed in the single architectural block defined at the site. The resulting data help address questions posed in the research design for this project (Ortman et al. 2011; Ryan and Diederichs 2014), including better defining the chronology and occupational history of the site and achieving a better understanding of how ancestral Pueblo people made a living on this landscape during the Pueblo II period.

Data suggest that five to seven people occupied the site late in the Pueblo II period, probably around A.D. 1100. Artifact data from the midden area and elsewhere suggest a longer use of the general area, although no architecture dating prior to or after the Pueblo II period was exposed.

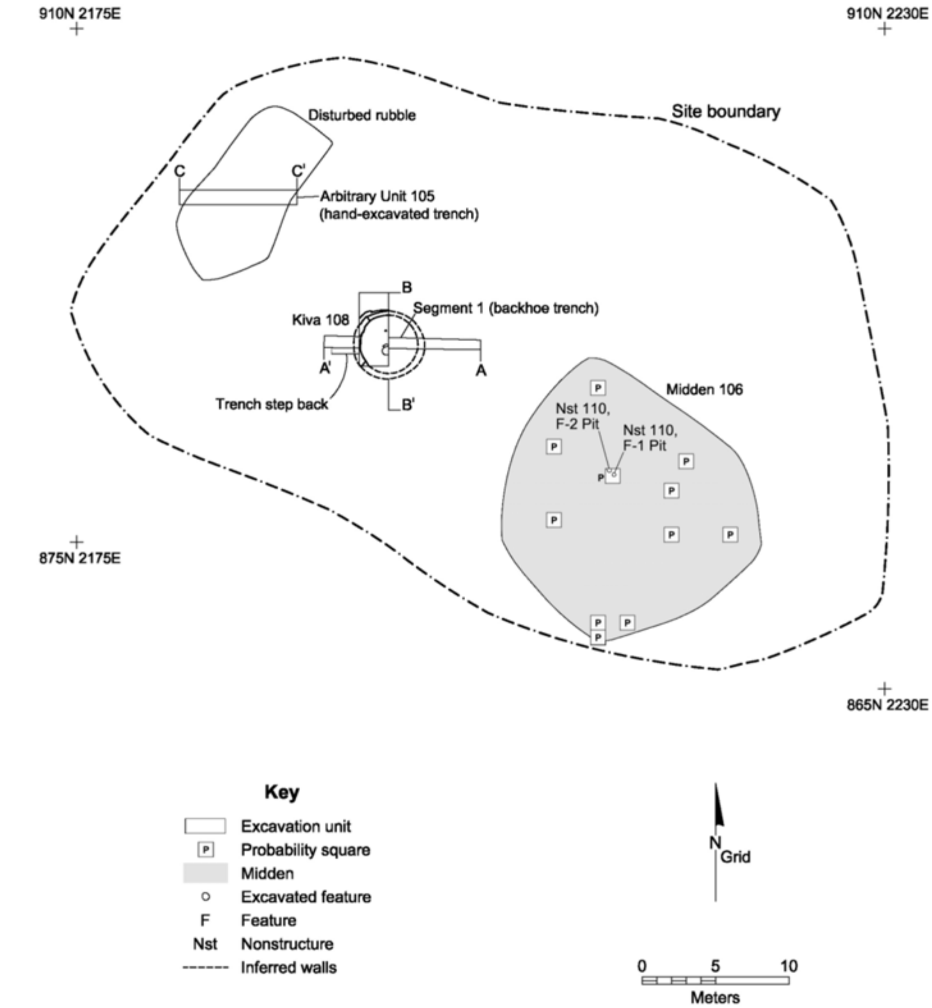

Figure 16.1. Site plan showing cultural features and excavation units, the Dry Ridge site.


Figure 16.2. Photograph of kiva, Structure 108, the Dry Ridge site.

Table 16.1. Typed Pottery Sherds by Study Unit, the Dry Ridge Site.

Ware and Type	Study Unit						Count	% by Count
	102	103	105	106	108	110		
Plain Gray Ware								
Chapin Gray		2	1	2	2		7	0.17
Indeterminate Local Gray	46	87	46	181	120	2	482	11.52
Indeterminate Neckbanded Gray					1		1	0.02
Mancos Gray	1	6		1			8	0.19
Moccasin Gray		2					2	0.05
Corrugated Gray Ware								
Indeterminate Local Corrugated Gray	230	335	199	868	352	7	1,991	47.60
Mancos Corrugated Gray	2	8	4	12	8		34	0.81
Mesa Verde Corrugated Gray				1	2		3	0.07
White Ware								
Chapin Black-on-white				1	6		7	0.17
Cortez Black-on-white				2	6		8	0.19
Early White Painted	3	1	2	4	2		12	0.29
Early White Unpainted				1	2		3	0.07
Late White Painted	69	97	46	279	143	2	636	15.20
Late White Unpainted	105	88	81	303	157	2	736	17.60
Mancos Black-on-white	15	28	25	59	53	1	181	4.33
Piedra Black-on-white				1			1	0.02
Pueblo II White Painted	1	9	4	17	14		45	1.08
Pueblo III White Painted	1			2			3	0.07
Rosa Black-on-white					1		1	0.02
Tin Cup Polychrome					1		1	0.02
Red Ware								
Abajo Red-on-orange	1	1					2	0.05
Deadmans Black-on-red	1	1		1	1		4	0.10
Indeterminate Local Red Painted	1	3	2	1	2		9	0.22
Indeterminate Local Red Unpainted		3		1	1		5	0.12
Nonlocal								
Cibola White, Not Further Specified			1				1	0.02
Total	476	671	411	1,737	874	14	4,183	100.00

Table 16.2. Lithic Materials in the Assemblage of Bulk Chipped Stone, Dry Ridge Site.

Material Category	Raw Material	Count	% by Count	Weight (g)	% by Weight (g)
Local	Conglomerate	1	0.10	5.30	0.14
	Dakota/Burro Canyon silicified sandstone	95	9.13	372.50	9.64
	Igneous	3	0.29	7.20	0.19
	Morrison chert	39	3.75	89.10	2.31
	Morrison mudstone	162	15.58	600.25	15.54
	Morrison silicified sandstone	315	30.29	1,675.40	43.38
	Porter mudstone	1	0.10	6.70	0.17
	Slate/shale	1	0.10	8.70	0.23
Nonlocal	Washington Pass chert	2	0.19	3.20	0.08
Semi-local	Agate/chalcedony	4	0.38	1.10	0.03
	Brushy Basin chert	396	38.08	1,054.59	27.31
	Burro Canyon chert	16	1.54	28.90	0.75
	Petrified wood	1	0.10	0.80	0.02
Unknown	Unknown chert/siltstone	3	0.29	4.80	0.12
	Unknown silicified sandstone	1	0.10	3.60	0.09
Total		1,040	100.00	3,862.14	100.00

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Chapter 17

Mapping, Artifact Analysis, and Archaeological Survey on the Galen Larson Property

by Grant D. Coffey and Kari L. Schleher

Introduction

This is a summary of work completed at sites on a private parcel of land owned by Galen Larson. This parcel is on the eastern flank of Alkali Canyon, in Montezuma County, and is immediately adjacent to the Indian Camp Ranch Archaeological District (Figure 17.1). Work was completed from 2014 through 2016 with the goal of gathering additional data about the Basketmaker III occupation and use of the landscape outside of Indian Camp Ranch. In particular, this work focused on creating more accurate maps of selected sites and collecting additional pottery data. Sites selected for this work were previously recorded during a survey of the property, and all reassessed sites were thought to have a Basketmaker III component (Davidson 2009). In addition to this work, a small-scale survey of an unsurveyed portion of the property was completed as part of Crow Canyon's 2016 college field school. The portion of the property surveyed includes 8.7 acres of canyon-valley land just east of Alkali Creek and below the eastern rim of Alkali Canyon. One new site was recorded on the property through this effort (5MT23094). None of this work would have been possible without the generous support of Galen Larson who was a tireless partner in the project. Work was completed under History Colorado state permits 2014-77, 2015-2, and 2016-3.

Methods

The following sections outline the methods used in each phase of the work done on the Larson property. Different aspects of the work included mapping sites with a digital transit or total station, conducting in-field artifact analysis, and conducting a small-scale archaeological survey.

Site Mapping

A mapping grid was defined at each of the sites mapped with a total station. At least two datums (large nails) were set in at each site to establish the grid. The primary datum for each site was assigned an arbitrary designation as 400N 400E and 100 m of elevation. This datum was marked as "Datum 1" with a foil tag tied around the nail. True north was defined for the grid by using a hand compass set to the declination suggested by the National Oceanic and Atmospheric Administration (geomag.models@noaa.gov) for Cortez, Colorado, on the date of mapping. Ideally, high-precision GPS readings on the primary datum and subsequent datums should be taken to correct for any variance from true north created during grid set-up. Based on georeferencing of the grid in GIS software using GPS points collected on mapping datums, it appears grid north is within a few degrees of true north and is suitable for roughly georeferencing each of the grids to real-world coordinates.

The grid system used was a “floating grid” (i.e., not georeferenced to the real world), and the coordinates of the primary datum were designated to allow for the extension of the grid system far beyond the boundary recorded during the survey. For future work, the existing two-datum grid could be extended considerably in any direction without running into negative numbers. A backsight point, which also served as an additional datum, was established at each site mapped and was tagged and designated as “Datum 2.”

A Topcon GT-303 electronic total station and a Topcon FC-250 data collector were used to map the sites and collect individual data points. Coffey operated the total station and Adult Research Participants held the prism rod that served to mark the points collected. Coffey also kept a written log of points collected and details about the height of the rod and the total station (which are also included in the digital data). Those records are on file at Crow Canyon.

Backsighting, or shooting to a known point from a set-up location, was done at several intervals during the mapping process. No obvious errors or discrepancies were noted in the data during this backsight process or in subsequent data processing.

Artifact Analysis

Dog leash collection units were selected in high-density areas of the sites; 3-m-radius dog leash collection units were used to determine the sampling area. All artifacts, regardless of size, were recorded and analyzed within these collection units. Pottery sherds and lithic artifacts were typed or assigned a material type using the Crow Canyon Laboratory Manual (Ortman et al. 2005). All artifacts were analyzed in the field, and no collections were made.

College Field School Survey

Field procedures consisted of a standard Class III pedestrian survey designed to record all sites in the area surveyed. The work was done by college field school students under the direction of Grant Coffey and Jonathan Dombrosky.

The pedestrian survey consisted of walking parallel transects through the study area with individual crew members spaced approximately 2-to-5 m apart. When cultural remains were observed, they were carefully examined to determine whether they should be classified as a cultural property (a site) or regarded as an isolated find. Individual artifacts were not recorded as sites, but artifact concentrations or artifact concentrations with features were recorded as sites.

The single site recorded as part of this work (5MT23094) was documented to the standards suggested by the Colorado Office of Archaeology and Historic Preservation (for more information, see http://www.historycolorado.org/oahp/survey-inventory-forms). This standard of quality was maintained by Crow Canyon staff throughout the survey to ensure consistent data collection and to provide a product useful to the landowner and other researchers.

The site recorded was documented in a systematic manner, which included the following: documenting the precise location of the site, creating a site map, and conducting in-field analyses of lithic and pottery artifacts. The pottery tallies provide information that helps date the site, and the lithic analysis provides information about natural resource procurement and tool manufacture.

Site overview photos were taken, and some individual artifacts were also photographed. Site boundaries were recorded by taking readings along the site boundary with a hand-held GPS receiver and were drawn based on the extent of recognized cultural materials. Site maps and other documentation include the following: definition of a perimeter or site boundary, inventory of all identified and suspected cultural features, location of the photographic stations, descriptions of unique or interesting artifacts, locations of modern disturbances, and notation of prominent aspects of the natural landscape. All of this information was recorded on archaeological site forms that were submitted to the Colorado Office of Archaeology and Historic Preservation.

Results

The following sections summarize the results of fieldwork by the year of completion. All fieldwork was completed with the assistance of participants in Crow Canyon's archaeological programs.

2014: Mapping and Artifact Analysis

In 2014 we mapped and analyzed artifacts at three sites on the Larson property (5MT18596, 5MT18632, and 5MT19106). This work was supervised by Grant D. Coffey (mapping) and Kari L. Schleher (artifact analysis). Participants in Crow Canyon's Adult Research Program helped to complete the work.

Site Mapping

Drafted digital transit maps were completed for two sites in 2014, 5MT18596 and 5MT19106, and a map for Site 5MT18632 was started. The locations of the sites on the Larson property are displayed on Figure 17.2, and the final drafted plan maps of 5MT18596 and 5MT19106 are included as Figures 17.3 and 17.4, respectively. Two hundred and twenty individual data points were collected during mapping. Mapped architectural elements suggest both sites likely served as habitations during this period.

In-Field Artifact Recording and Analysis

In-field artifact recording and analysis were completed for two sites in 2014, 5MT18596 and 5MT19106. Five collection units were selected at 5MT18596 and six were selected at 5MT19106. Pottery was identified to type, vessel form, and part of the vessel. Chipped-stone materials were identified to artifact type and material type. Other artifacts, including ground stone and minerals, were identified to type, material, and completeness (e.g., complete, incomplete, or fragment). Over 660 artifacts were recorded for the two sites (Table 17.1), primarily consisting of chipped-stone debitage of locally available Morrison Formation stone materials and plain gray ware body pottery sherds (Gerhardt 2001; Ortman et al. 2005). The artifacts indicate that these two sites date to the Basketmaker III (A.D. 500–750) period. The artifact assemblages, especially the predominance of plain gray jar sherds and local chipped-stone materials, are very similar to the artifact assemblage from the Dillard Site (5MT10647; Sommer et al. 2015).

2015: Mapping and Artifact Analysis

In 2015 we mapped and analyzed artifacts at two sites on the Larson property (5MT18629 and 5MT18632). This work was supervised by Crow Canyon staff Grant D. Coffey (mapping) and Kari L. Schleher (artifact analysis). Participants in Crow Canyon's Adult Research Program helped to complete the work.

Site Mapping

A drafted digital transit map was completed for two sites in 2015 (5MT18629 and 5MT18632). The locations of these sites on the Larson property are displayed on Figure 17.5, and the final plan maps of 5MT18629 and 5MT18632 are included as Figures 17.6 and 17.7, respectively. One hundred and fifty-one individual data points were collected during mapping.

In-Field Artifact Recording and Analysis

In-field artifact recording and analysis were completed for two sites during the 2015 field season, 5MT18629 and 5MT18632. Five collection units were selected at 5MT18629 and nine at 5MT18632. Pottery was identified to type, vessel form, and vessel part. Chipped-stone materials were identified to artifact type and material type. Other artifacts, including ground stone and minerals, were identified to type, material, and completeness (e.g., complete, incomplete, or fragment). Over 840 artifacts were recorded for the two sites (Table 17.2), primarily consisting of chipped-stone debitage of locally available Morrison Formation stone materials and plain gray or corrugated gray ware body sherds (Gerhardt 2001; Ortman et al. 2005). The artifacts indicate that 5MT18629 primarily dates to the Pueblo II (A.D. 900–1150) period, with a predominance of corrugated gray ware sherds and Mancos Black-on-white decorated sherds. Mapped architectural features suggest the site served as a habitation during this period. The artifacts from 5MT18632, especially the neckbanded and red ware pottery, indicate occupation during the Pueblo I (A.D. 700–900) period. The well-defined roomblock area, with discernable rooms framed by upright slabs, supports the dating suggested by the pottery assemblage, and overall the site appears to be a habitation dating to the Pueblo I period.

2016: College Field School Survey

As part of Crow Canyon's 2016 college field school curriculum approximately 8.7 acres of the Galen Larson property was surveyed for archaeological sites. The portion of the property surveyed is valley terrain just east of Alkali Creek and below the eastern rim of Alkali Canyon (Figure 17.8). In all, two days of survey were completed in the area, with college field school students providing the survey crew and Grant Coffey and Jonathan Dombrosky serving as the crew chiefs/instructors. The purpose of the survey was twofold: first, to teach college field school students the process of archaeological survey, and second, to look for new sites on the Larson property. A previous, more extensive survey of the Larson property was completed in 2008 and 2009 in the eastern upland portion of the parcel (Davidson 2009). This small survey is supplemental to that initial work.

This survey recorded a single site, 5MT23094, which could date from the Basketmaker III (A.D. 500 to 750) through the Pueblo III period (A.D. 1150 to 1280, Figure 17.9). It consists of a low-density artifact scatter situated along a western-trending ridge along the eastern margin of the Alkali Creek floodplain. The types of artifacts identified were flaked lithics, plain gray and corrugated pottery, and the tip of one Dakota/Burro silicified sandstone biface (Table 17.3). Collectively, these artifacts suggest some type of limited activity or processing in this area potentially spanning a long period of time.

Several isolated flakes and sherds are present in the survey area, as is limited evidence of historic and modern use. An old fence line runs roughly northeast to southwest through the northern portion of the surveyed area, and some barbed wire and limited historic refuse is present throughout. One tin can that had been nailed to a post could have been a uranium claim marker near the southern boundary of the study area. This marker could be associated with an old two-track road that winds up the eastern margin of the canyon, and both could be part of uranium exploration and extraction that took place in the area during the mid-1900s. These isolates and linear historic features were not recorded as sites, though they do reflect historic Anglo use of the area during the mid-1900s.

Though only a relatively small portion of the valley bottom was surveyed, one ancestral Pueblo site was recorded. This suggests a more extensive coverage of the valley bottom, and particularly the small ridges flanking Alkali Creek, would be productive. That said, the area immediately around the creek is covered with alluvial sediment suggesting features and artifacts once present may be buried. Some dense vegetation in this area also obscures ground visibility to varying degrees.

No diagnostic painted pottery or other artifacts were found at the site. The presence of plain gray and corrugated pottery suggests both pre- and post-A.D. 1000 use of the site by ancestral Pueblo people. The presence of at least one indeterminate red ware sherd also supports some type of use of the site during the Pueblo I (A.D. 750 to 900) or early Pueblo II (A.D. 900 to 1060) periods (Ortman et al. 2005). The single biface tip recorded at the site did not have the hafting element present. As such, this artifact is relatively undiagnostic in terms of the period of production. The overall thickness of the artifact suggests it was a final-stage preform or a finished projectile point at the time it was broken.

Overall, it seems this site served as a limited activity or processing site associated with the ancestral Pueblo occupation of the surrounding landscape sometime from A.D. 500 to 1280. This use is likely associated with the habitations recorded during the previous survey of the eastern portion of the Larson property (Davidson 2009). The variety of artifact types present suggests different types of activities were taking place, perhaps activities associated with raw material procurement or processing, or some type of agricultural activity. This site could be important in assessing the broader use of the landscape by Pueblo people over a long period of time.

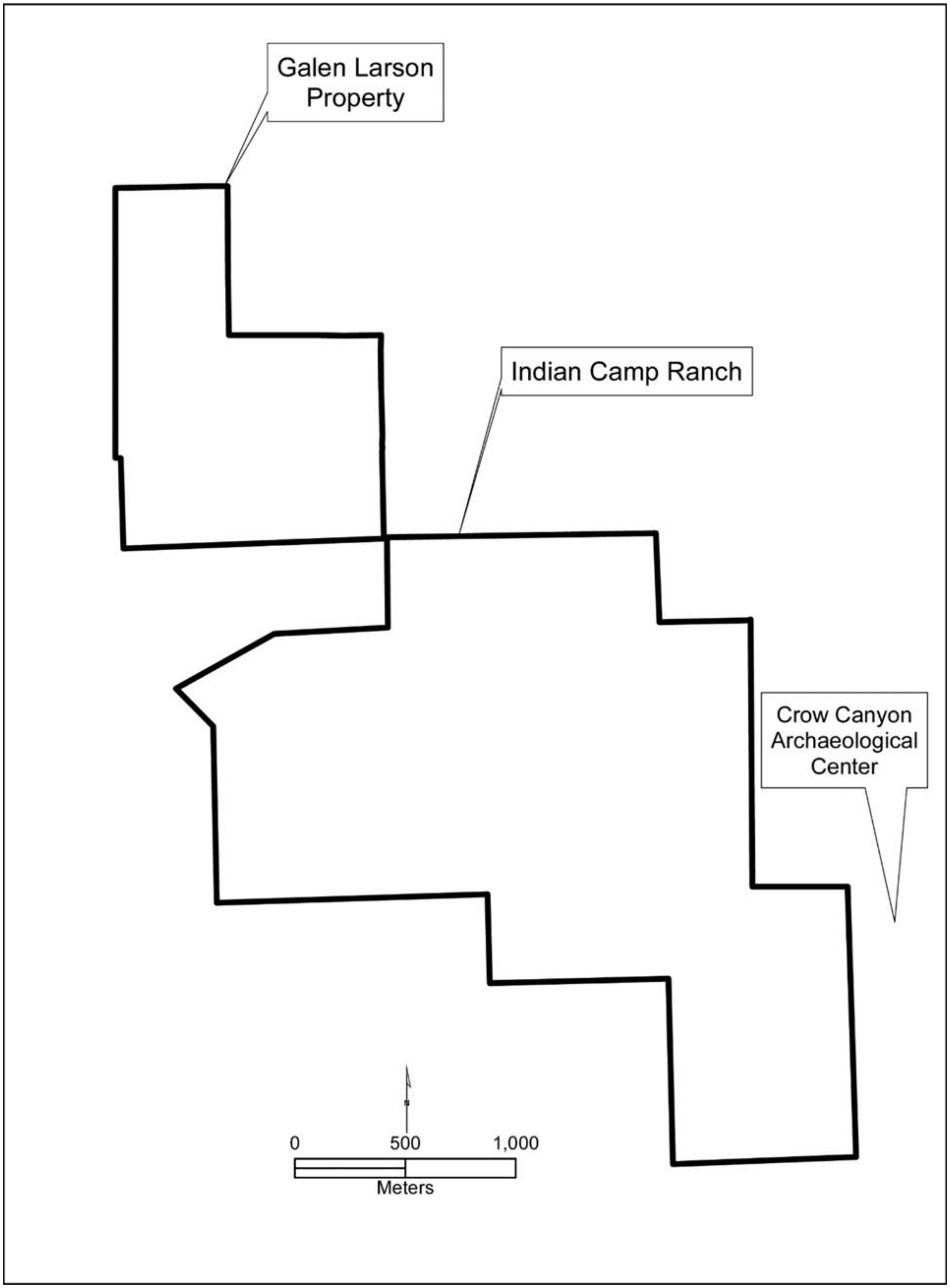

Figure 17.1. Location of the Galen Larson property.

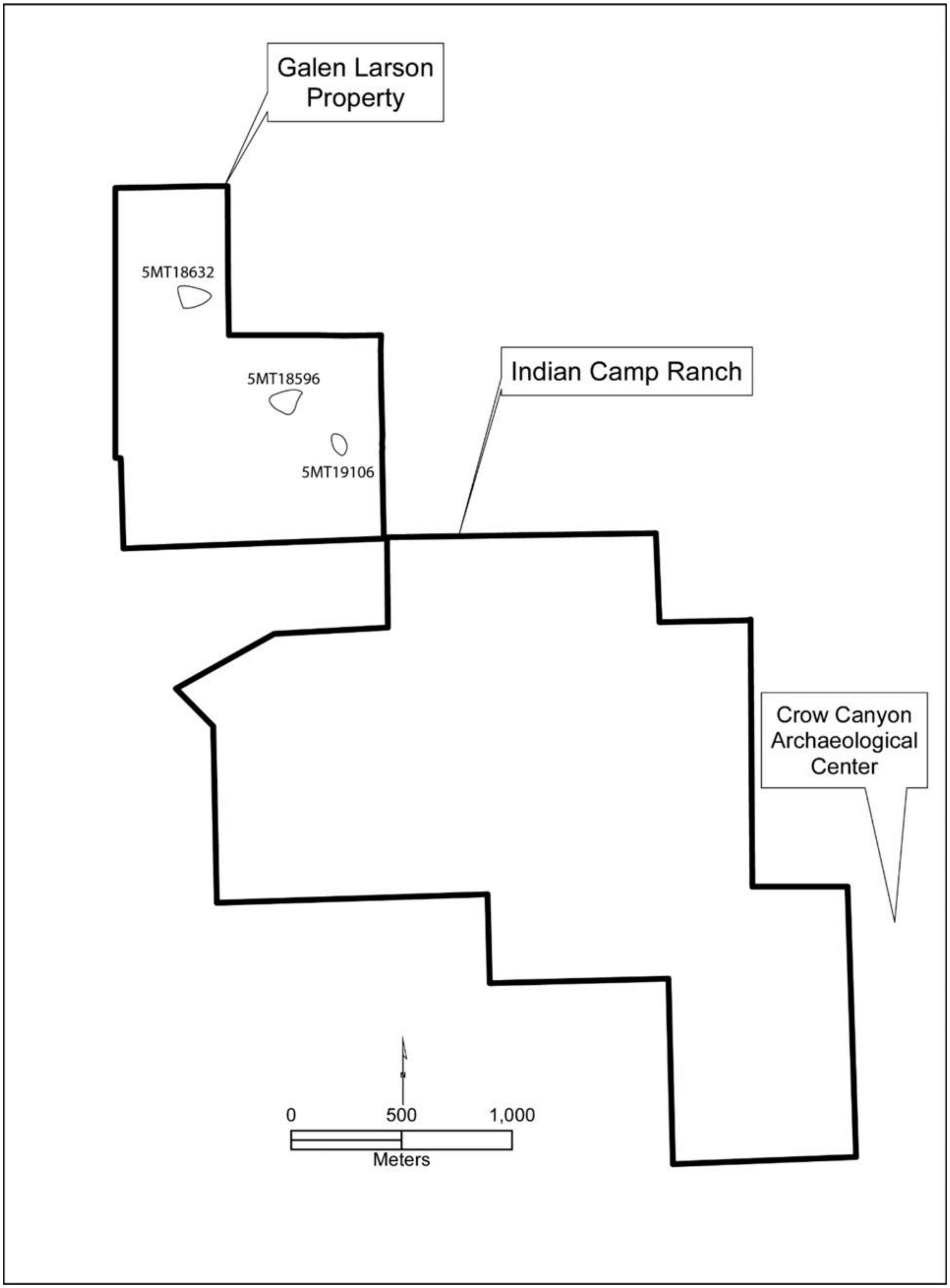

Figure 17.2. Location of sites that were part of work in 2014.

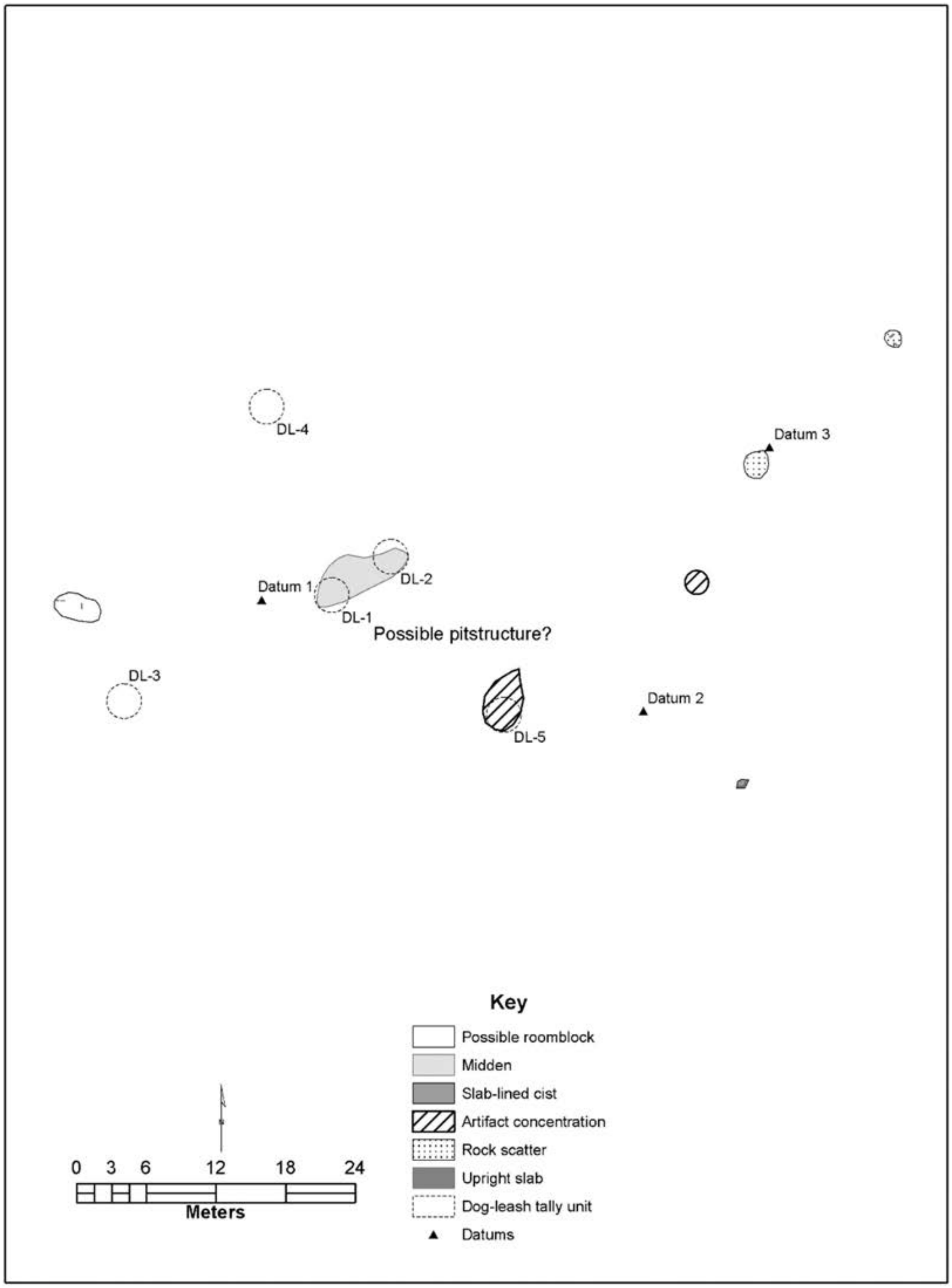

Figure 17.3. Plan map of 5MT18596.

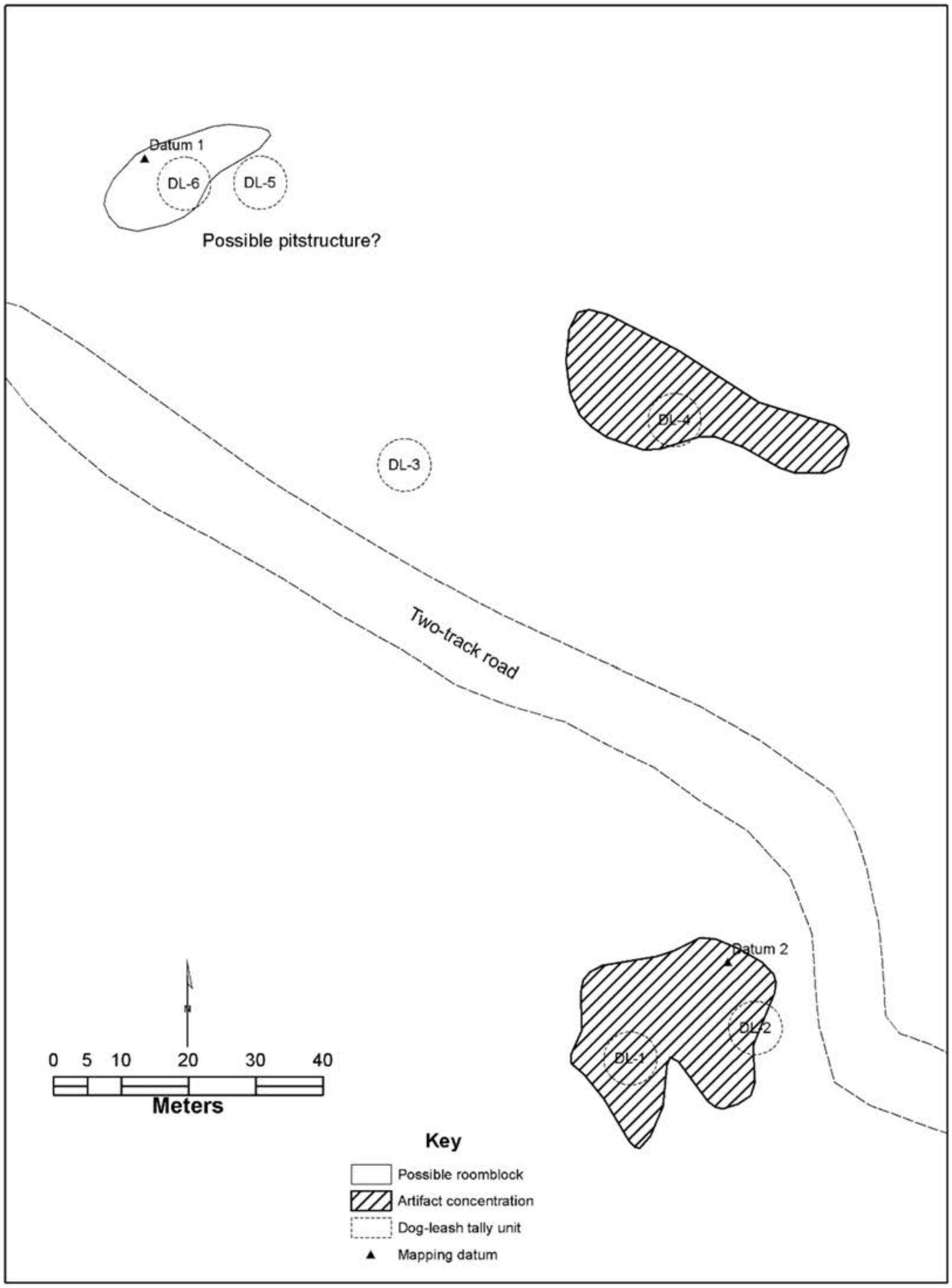

Figure 17.4. Final plan map of 5MT19106.

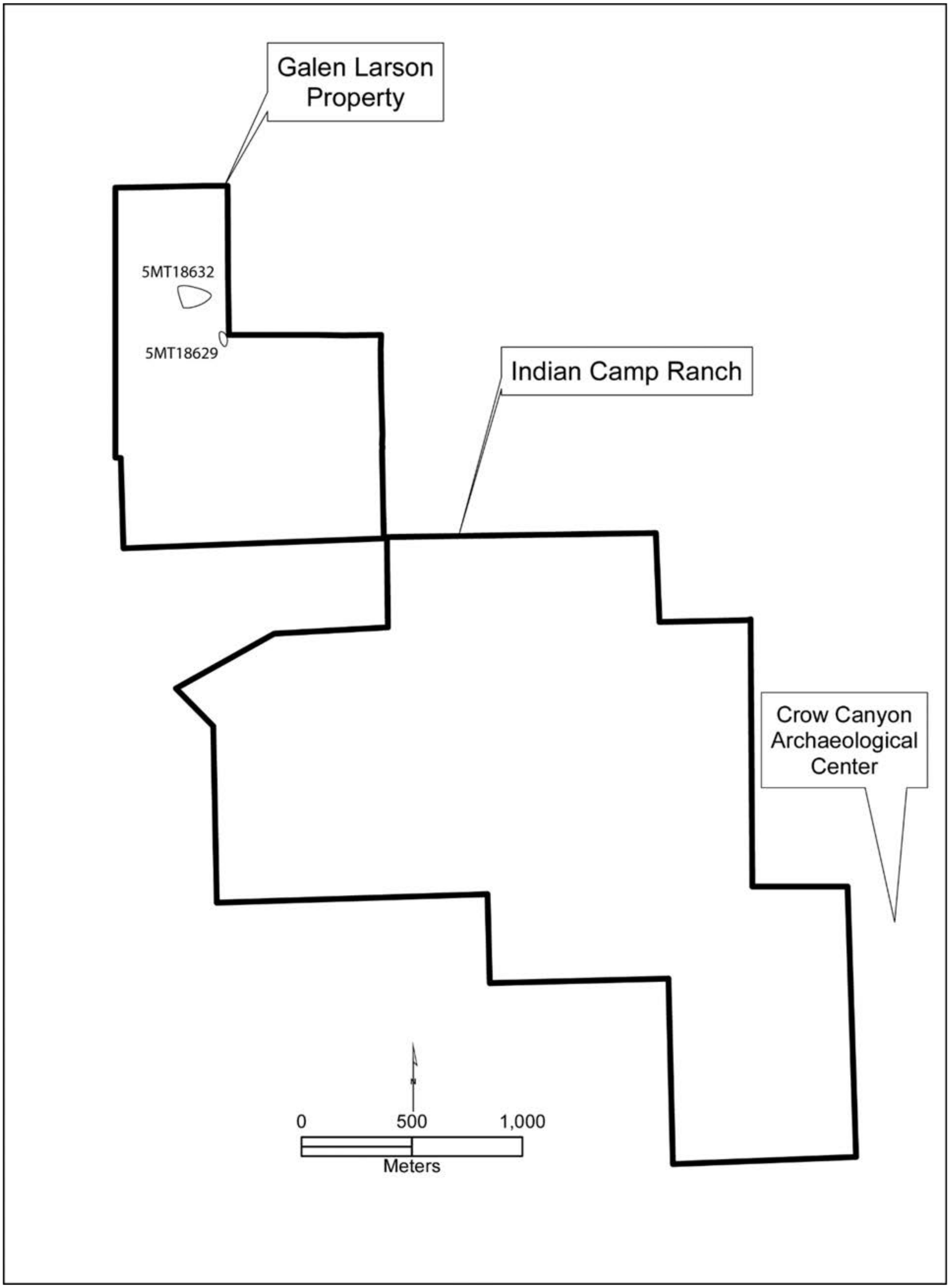

Figure 17.5. Location of sites that were part of work in 2015.

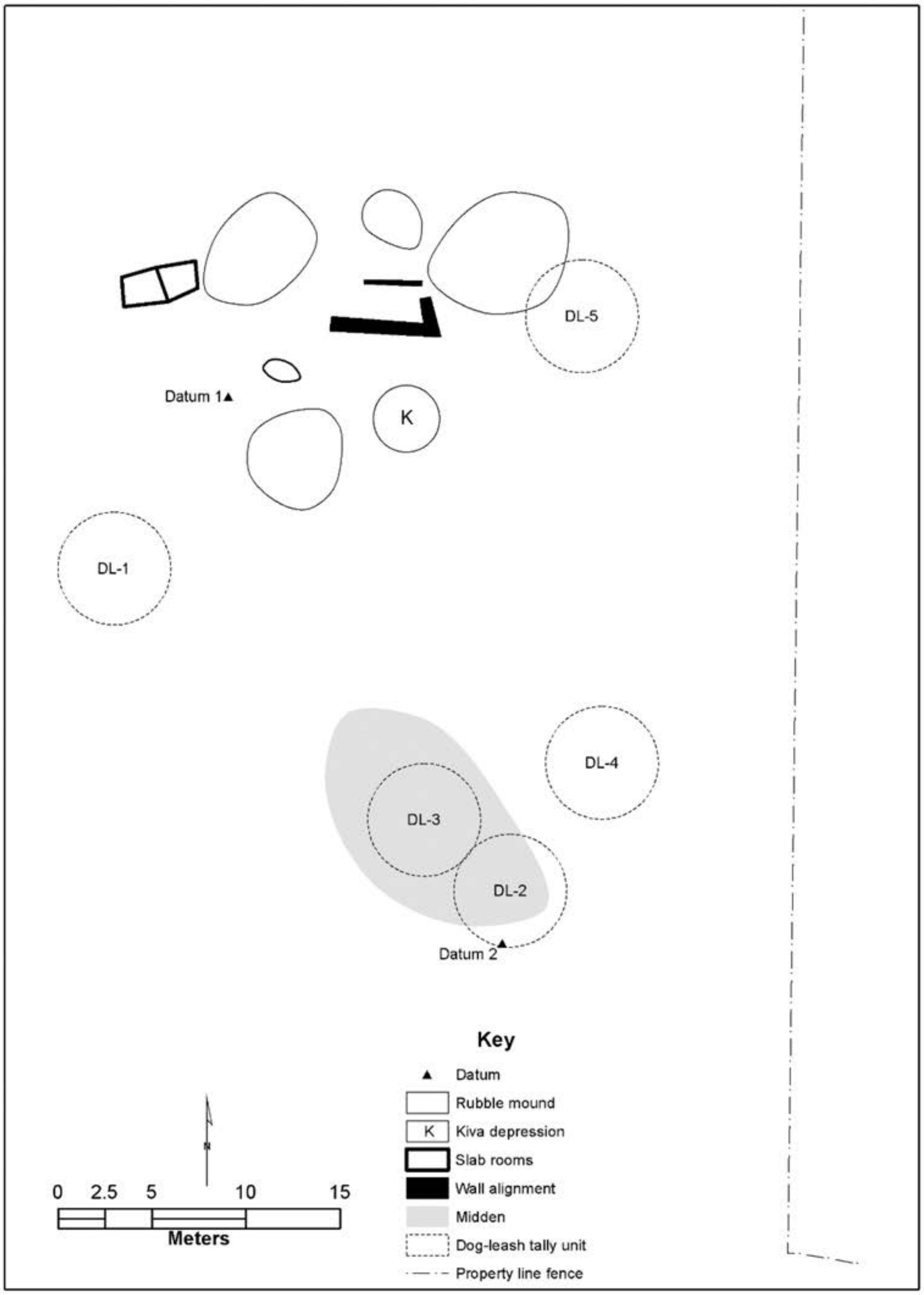

Figure 17.6. Final plan map of 5MT18629.

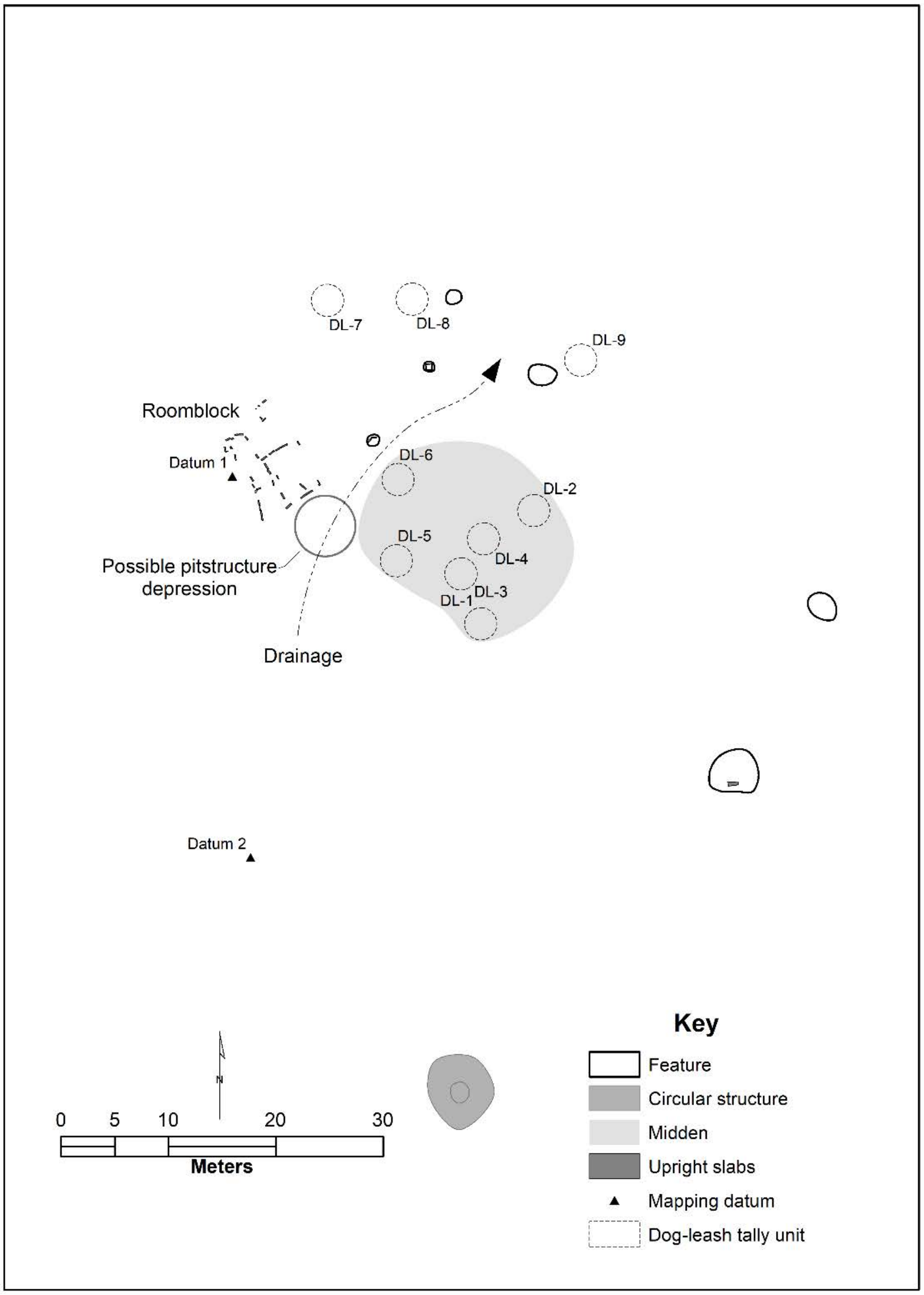

Figure 17.7. Final plan map of 5MT18632.

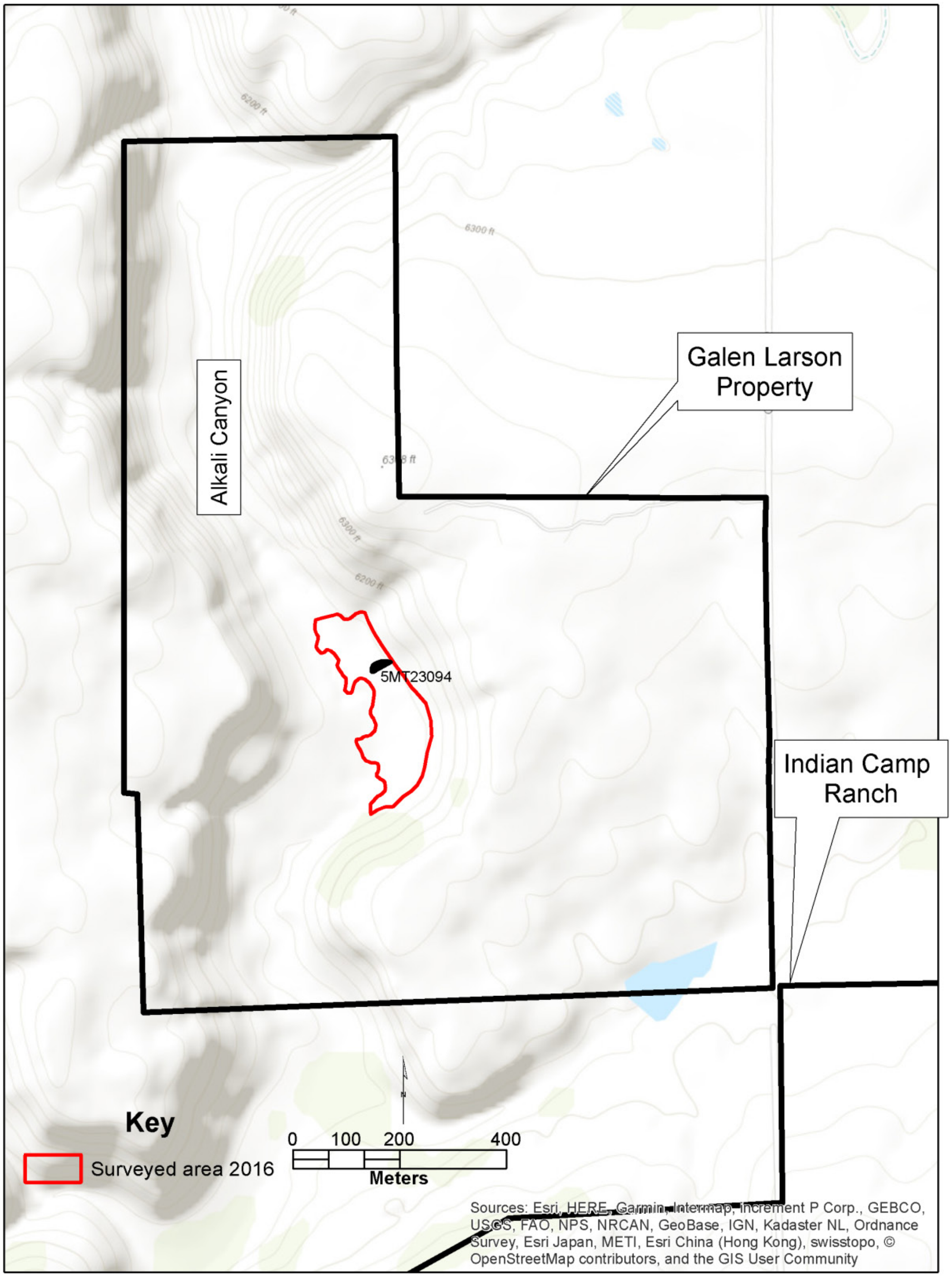

Figure 17.8. Area surveyed in 2016 showing the location of 5MT23094.

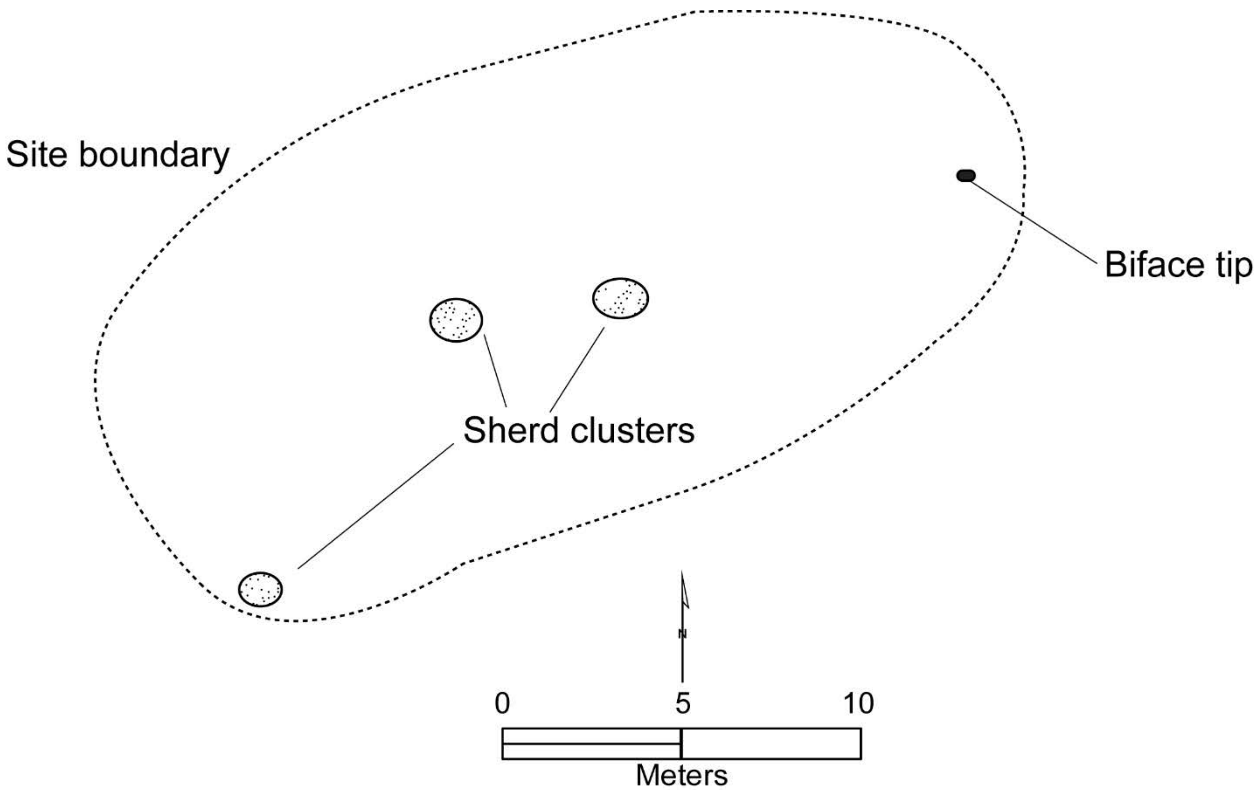

Figure 17.9. Plan map of 5MT23094.

Table 17.1. Artifacts Recorded from 5MT18596 and 5MT19106.

	5MT18596 Count	5MT19106 Count
Pottery		
Indeterminate Local Gray Jar	132	100
Indeterminate Local Gray Unknown Form	5	
Chapin Gray Jar Rim	2	2
Chapin Gray Seed Jar Rim	4	3
Chapin Gray Bowl Rim	1	
Chapin Black-on-white Bowl Body	2	3
Chapin Black-on-white Bowl Rim	1	1
Early White Painted Bowl Body	1	2
Early White Painted Bowl Rim	1	
Chipped-Stone Debitage		
Morrison Silicified Sandstone	64	66
Morrison Mudstone	104	83
Dakota Silicified Sandstone	10	9
Burro Canyon Chert	3	1
Chalcedony	3	1
Igneous	0	2
Shale	1	
Unknown Chert	1	1
Sandstone	1	
Chipped-Stone Tools		
Morrison Silicified Sandstone Core	3	1
Morrison Silicified Sandstone Peckingstone	1	
Morrison Mudstone Core	2	1
Dakota Silicified Sandstone Peckingstone	2	
Morrison Mudstone Scraper	1	
Burro Canyon Chert Biface		1
Other Artifacts		
Abrader (Sandstone)		1
Bulk Indeterminate Ground Stone (Sandstone)	4	1
Fossil Shell	2	
Gizzard Stone	3	2
Metate Fragment (Sandstone)	4	
Mineral (Needle-Like Texture)	1	
Mineral (Petrified Wood)	1	
Mineral (Pigment)	1	1
Non-human Bone (Burned)	1	
Other Modified Stone (Iron Concretion)	1	
Other Modified Stone (Mudstone)	1	
Pebble	7	
Pendant Fragment (Morrison Mudstone)		1
Pendent Fragment (Unknown Stone)	1	
Polishing Stone	1	
Masonry Shaped Stone (Sandstone)	6	
Stone Disk Fragment (Sandstone)	2	
Total	381	283

Table 17.2. Surface Artifacts Recorded From 5MT18629 and 5MT18632.

	5MT18629 Count	5MT18632 Count
Pottery Sherds		
Chapin Gray Jar	1	6
Chapin Gray Bowl		1
Indeterminate Local Gray Jar	25	119
Indeterminate Local Gray Handle		2
Abajo Red-on-orange		1
Moccasin Neckbanded Jar		1
Indeterminate Local Red Unpainted		1
Bluff Black-on-red		3
Indeterminate Local Corrugated Gray Jar	110	
Mancos Black-on-white Bowl	5	1
Mancos Black-on-white Jar	2	
Mancos Corrugated Jar	4	
Late White Painted Bowl	7	
Late White Painted Jar	4	
Late White Unpainted Bowl	22	
Late White Unpainted Handle	1	
Late White Unpainted Jar	41	
Mesa Verde Corrugated Jar	2	
Chipped-Stone Debitage		
Morrison Silicified Sandstone	92	30
Morrison Mudstone	65	36
Morrison Chert	11	4
Dakota Silicified Sandstone	49	70
Brushy Basin Chert	17	1
Burro Canyon Chert	33	11
Chalcedony	1	3
Petrified Wood	1	
Unknown Chert	1	3
Chipped-Stone Cores and Tools		
Morrison Silicified Sandstone Core	2	1
Morrison Silicified Sandstone Peckingstone	5	3
Morrison Silicified Sandstone Hammerstone		1
Morrison Mudstone Core	1	
Morrison Mudstone Peckingstone		1
Dakota Silicified Sandstone Core		2
Dakota Silicified Sandstone Peckingstone	3	2
Burro Canyon Chert Core		1
Burro Canyon Chert Biface		1
Other Artifacts		
Two Hand Mano Fragment (Conglomerate)	1	
Incomplete One Hand Mano (Sandstone)	1	
Bulk Indeterminate Ground Stone (Sandstone)	2	
Ground Stone Slab (Sandstone)	2	
Pendant Blank (Sandstone)	1	1
Axe with Maul Fragment (Igneous)	1	
Modified Stone (Unknown Stone)	1	
Gizzard Stone	4	4
Mineral (Igneous)	4	
Mineral (Iron Oxide)	1	

	5MT18629 Count	5MT18632 Count
Pebbles (*2 Are Possible Polishing Stones)	2	7*
Total	525	317

Table 17.3. Artifacts Observed at 5MT23094.

Description	Material	Quantity
Indeterminate Gray Ware	Pottery	23
Indeterminate Corrugated	Pottery	2
Indeterminate Red Ware	Pottery	1
Dakota/Burro Canyon Silicified Sandstone Flakes	Lithic	3
Morrison Chert Flakes	Lithic	2
Dakota/Burro Canyon Silicified Sandstone Biface	Lithic	1
Total		32

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Chapter 18

Architecture of the Basketmaker III Period

by Shanna R. Diederichs

Introduction

Like other material remains, architecture provides a wide range of information on past behavior. This is especially true in the central Mesa Verde region where architecture is often well preserved and datable using multiple methods. Until recently, Basketmaker III period architecture has not been a serious regional focus for two reasons: (1) Basketmaker III pit structure remains are difficult to locate and study, and (2) their morphology is extremely variable making them stylistically weakly patterned. According to Herr (2009) “weak patterns" indicate a lack of normative behavior and are associated with expediency, diversity, and mobility. As a lower middle-range society in expansion, the architectural diversity of the Basketmaker III period has frustrated researchers in the past (Lipe et al. 1999; Reed 2000; Wilshusen, Schachner, and Allison 2012). Consequently, only a few studies have attempted to parse Basketmaker III architecture into more precise behavioral categories or study the origin of particular architectural attributes.

The Basketmaker Communities Project is designed to study functional and response diversity in architecture across a Basketmaker III settlement to address the needs, integration, and origins of its population. This chapter focuses on 42 Basketmaker III period structures investigated during the Basketmaker Communities Project (Table 18.1). Most of the data presented was captured during excavation. However, five structures not excavated but imaged with electrical resistivity, probed with soil augers, and dated with AMS are included in the study because their size, shape, depth, chronology, and decomissioning patterns could be discerned.

Large-scale comparative analyses like this study require systematic typologies that account for both functional and response diversity. According to Walker and Salt (2006:886) social and ecological systems always include both functional and response diversity. Functional diversity relates to the categorical roles of architecture. For example, there are Basketmaker III architectural forms that address social and logistical needs such as housing, communal gathering, and small-scale ritual. Response diversity is the range of ways this function is met, which can be influenced by factors such as the way an individual learned to build a structure, religious and ethnic identity associated with their practice, or even the personal artistic style they bring to the project. The difference between functional and response behavior is the difference between what is created and how it is created. Here, Basketmaker Communities Project Basketmaker III architecture is framed in the context of two regional typologies. Using the first typology, Basketmaker Communities Project Basketmaker III architecture is grouped into functional categories (Diederichs 2016) to clarify the purpose and use of the buildings across the settlement. A second typology is used to track response production, and possible identities of the source populations, using roofing styles (Miller 2015).

Not discussed in this chapter are six later ancestral Pueblo structures excavated during the Basketmaker Communities Project (Table 18.2). These structures are discussed in site- specific chapters (Chapters 11–16).

The remainder of this chapter is dedicated to typing and analyzing the Basketmaker III architecture investigated during the Basketmaker Communities Project and summarizing patterns in their construction, use, style, and decommissioning to discuss research questions related to the origins and adaptations of the Indian Camp Ranch Basketmaker III population and the organization and integration of their community.

Research Questions

The Basketmaker Communities Project was designed to address questions of community development and social organization by studying the associations of various types of architecture across a Basketmaker III settlement through time. Research questions pertaining to architecture fall into three categories: farming adaptations, population origins and identity, and community integration.

Neolithic Adaptations

The first significant Basketmaker III use of the central Mesa Verde region occurred late in the sixth century as migrants poured into the region; subsequently, the population grew rapidly over the next century. Kohler and colleagues (Kohler et al. 2008; Kohler and Reese 2014) have made a convincing argument that this growth resembles the phenomenon that Bocquet-Appel (2002) has identified as the Neolithic Demographic Transition in early agricultural societies in Europe. Bocquet-Appel proposes that there is a multi-century period he calls the Neolithic Demographic Transition when there is high population growth and significant settlement change as hunter-gatherer societies transition to agricultural economies.

Both technological and social changes contribute to Neolithic Demographic Transitions (Bocquet-Appel 2002; Bocquet-Appel et al. 2006; Hodder and Cessford 2004; Schwindt et al. 2016). These changes are driven by innovation that eventually results in more efficient and stable practices centered on an agricultural lifeway. By tracking innovation and variation in the Basketmaker III period architecture of the Basketmaker Communities Project, we address two project research questions: (1) is there evidence of a Neolithic Demographic Transition in the central Mesa Verde region during the seventh century, and (2) if there is, what technological advances in architecture made this transition possible?

Population Origins and Ethnicity

Research on the origins of Pueblo tradition suggest that it formed through the intermingling of immigrant agricultural groups from southern Arizona with indigenous foraging groups of the Colorado Plateau (LeBlanc 2008; Matson 2002, 2006). According to this model, the Western Basketmakers represent the immigrant farmers who arrived by 400 B.C. (Coltrain et al. 2007), and the Eastern Basketmakers represent indigenous foragers who began experimenting with agriculture by 800 B.C. and became committed maize agriculturalists by the first few centuries

A.D. (Coltrain et al. 2006:Figure 20-2; Sesler and Hovezak 2002). Early agricultural settlement in the northern Southwest focused on relatively low-lying areas near permanent streams (Eddy 1961; Geib 1996; Hovezak and Sesler 2006; Lipe 1970; Matson 1991; Matson et al. 1988; Morris and Burgh 1954).

The central Mesa Verde region was not one of these areas; however, after A.D. 600 there was a rapid expansion of population in the central Mesa Verde region (Diederichs 2016; Wilshusen 1999) including the Basketmaker Communities Project study area. Colonization of the central Mesa Verde region must have involved extensive immigration. Basketmaker III settlements dating prior to A.D. 600 have been documented in southeast Utah (Neily 1982), the Chuska and Lukachukai Valleys of northeastern Arizona (Altschul and Huber 2000; Morris 1980), Chaco Canyon (Roberts 1929; Van Dyke 2007:63–70; Wills and Windes 1989), the La Plata valley (Toll and Dean Wilson 2000), and the Upper San Juan (Eddy 1961). No study has ever attempted to determine whether the immigrants who entered the central Mesa Verde region after A.D. 600 came from these or other areas of the northern U.S. Southwest.

By tracing the influx of particular regional architectural attributes into the Basketmaker Communities Project study area and the rate of adoption of those attributes over time, we address two project research questions: (1) is there evidence for a multi-ethnic immigration into the region from a variety of different geographic areas, and (2) what is the case for a northern San Juan Basketmaker III ethnogenesis?

Community Integration

Two types of Basketmaker III public architecture have been identified: great kivas and dance circles. *Great kivas* are circular, semi-subterranean, roofed structures at least 10 m in diameter. *Dance circles* are circular, shallowly excavated, unroofed structures between 10 and 25 m in diameter. Great kivas were often built in the center of aggregated settlements, whereas dance circles occur above the confluence of drainages, on topographic divides, or on prominences with expansive views of the surrounding landscape (Gilpin and Benallie 2000; Lightfoot 1988; Martin 1939; Morris 1980; Wilshusen, Ortman, and Phillips 2012).

Unlike mobile foragers, sedentary people cannot avoid most social problems simply by moving away (Price and Gebauer 1995). As such, social integration can be viewed as the way that conflict is avoided in sedentary societies through cooperation and communication (Hegmon 2002, 2008, 2013). Although it is clear that central Mesa Verde Basketmaker III architecture is variable, no studies of the ways that domestic pithouses relate to each other, or to public architecture, have been conducted. As a result, the nature of Basketmaker III society remains opaque.

The Basketmaker III occupation on Indian Camp Ranch is a suitable setting for studying the relationship between domestic and public architecture because prior to the Basketmaker Communities Project a Basketmaker III public structure was already known on the property. In 1995, Woods Canyon tested a large Basketmaker III pit structure on the Dillard site (5MT10647) and determined that it was a type of ancestral Pueblo structure known as a great kiva. This structure is the only known Basketmaker III great kiva north of Chaco Canyon in central New Mexico.

Based on the presence of public architecture, data from the Basketmaker Communities Project was collected to answer several questions regarding social interaction and integration: (1) do additional as yet unidentified community structures exist in the study area, (2) are community structures contemporary with the surrounding households, (3) do assemblages from community structures indicate that they functioned to integrate households across a large or small region, and (4) how were communal structures decommissioned and does the mode of decommissioning match that of contemporary domestic structures?

Basketmaker III Architectural Typology

Basketmaker III architecture is variable, so much so that the lexicon generally applied to it is filled with regional terminology and overlapping definitions. Before Basketmaker Communities Project architecture could be clearly analyzed or compared it was necessary to develop a new, clearly defined, set of architectural terms. The following typology categorizes Basketmaker III architecture into 12 types based on morphology and discusses the established function of each architectural type. The typology is based on a dataset of 128 structures across the northern Southwest to discern functional diversity during the period (Diederichs 2016).

Most of the architectural data used to generate this typology came from excavations of small farming hamlets in the central Mesa Verde, Upper San Juan region, San Juan Basin, Little Colorado, and western Mesa Verde regions (Figure 18.1). Farming hamlets are by far the most ubiquitous site type in each of these regions during the Basketmaker III period (Birkedahl 1976; Diederichs et al. 2003; Kleidon et al. 2003; Ortman et al. 2011; Windes 2015). Basketmaker III hamlets, consisting of one to two pithouses, storage rooms, and in some cases an encircling fence (or stockade), were likely occupied for one or two generations by a single extended family (Varien 1999).

The rest of the typology data set was derived from excavations of aggregated Basketmaker III settlements. These rare settlements are clusters of generally five to 19 pit structures centered on public architecture, such as a great kiva. The anomalous Shabik'eschee Village from Chaco Canyon in the San Juan Basin of New Mexico was included in this data set because Wills and colleagues (2012) demonstrate that the 64 pithouses at Shabik'eschee were not contemporaneously occupied but the result of consecutive occupations over a 300-year span. Consequently, the momentary population at Shabik'eschee probably reflects the same general momentary populations at other aggregated sites with shorter occupation spans.

Three simple attributes allowed pit structure categorization into 11 morphological types (Table 18.3). Single- and double-chambered pit structures were typed separately because the presence of an antechamber affects pit structure access, internal space, and activity segregation. Floor area was an attribute because it reflects the literal and social footprint of a building: how many people fit inside, what kinds of activities can take place, and the structure's comparative scale. Structure depth was the third attribute, reflecting the amount of labor investment in a structure and the seasonality of its use.

The resulting typology includes 12 architectural types (Table 18.4). To ensure that this typology is broadly applicable and replicable, each architectural type is mutually exclusive and consistently defined (Colton 1955; Gifford 1960). Common terms for types are used wherever appropriate; however, new descriptive terms were applied to types that had not been previously identified.

Eighty years of research has demonstrated that Basketmaker III architecture served semi-specialized functions as recognized in previous research (Chuipka 2007; Diederichs 2015; Lipe et al. 1999; Neily 1982; Wills 2001; Windes 2015; Wilshusen 1999): public gathering, permanent year-round housing, temporary seasonal housing, storage, specialized use structures, and the delineation of domestic space. The 12 architectural types found on the Basketmaker Communities Project fall into these functional capacities.

Basketmaker III Architecture of the Basketmaker Communities Project

Forty-two Basketmaker III structures were investigated on Indian Camp Ranch for the Basketmaker Communities Project. Most Basketmaker III architectural types are represented in the Basketmaker Communities Project sample. One great kiva, 22 pithouses, 17 pit rooms, and three stockade fences were documented and dated (Table 18.5). There are only a few shifts in architectural types through time. The most notable change is the appearance of a large shallow double-chambered pithouse at the Dillard site and oversized pithouses at the Ridgeline site and Windrow Ruin on the ridgetops west and east of the Dillard site in the late Basketmaker III phase.

Only three Basketmaker III architectural types are not represented in the Basketmaker Communities Project sample: dance circles, standard single-chambered pithouses, and small shallow double-chambered pithouses. The two known dance circle examples dating to the Basketmaker III period are found in regions south and west of the central Mesa Verde region. What was historically referred to as the great kiva circle at Broken Flute Cave in the Prayer Rock District of northwestern New Mexico is categorically a small dance circle based on its size and lack of roof. This structure was built late in the history of Broken Flute Cave on top of a decommissioned pithouse in a cluster of 17 pithouses. The second Basketmaker III dance circle is reported at the Montezuma Creek School site along the San Juan River in Utah, 50 miles west of the Basketmaker Communities Project study area. This dance circle is similar to the Broken Flute Cave structure, but it was built alongside a pithouse at a small hamlet. The lack of dance circles on the Basketmaker Communities Project is not surprising given how rarely they are found at Basketmaker III sites. Dance circles became more common during the following Pueblo I period (A.D. 750–900) before they fell out of use entirely.

Small shallow double-chambered pit structures are also absent from the Basketmaker Communities Project sample (Figure 18.2), though an example was excavated just 3 miles north of the Basketmaker Communities Project study area (Robinson 2014). These structures fall into a special use category defined more by what does not occur in a structure than what does occur (Neily 1982). Small double-chambered pit structures are not used for housing, storage, or public gathering leaving them open to more specialized activities such as housing animal burials and complex symbolic pit features.

The third Basketmaker III architectural type not found on the Basketmaker Communities Project is the category of single-chambered shallow pithouse. These structures are likely temporary habitations and are common at early Basketmaker III period aggregated sites such as Shabik'eshchee Village in the Chaco Canyon of New Mexico (Roberts 1929) and Step House in the central Mesa Verde region (Nichols n.d.). The lack of single-chambered shallow pithouses in the Basketmaker Communities Project study area may represent a temporal shift to larger temporary structures in the middle and late Basketmaker III periods rather than a regional stylistic marker.

Functions of Basketmaker Communities Project Architecture

Architecture served a variety of purposes for the Basketmaker III occupants of the Indian Camp Ranch community. Evidence for seasonality, length of occupation, scale of use, and specific activities was used to group the Basketmaker III Basketmaker Communities Project structures into categorical roles by their basic function: public architecture, permanent housing, temporary housing, storage, and the delineation of household space (Table 18.6). Though the Basketmaker III Basketmaker Communities Project structures are highly variable (reflecting activity specialization, wealth disparities, and personal design) the overarching pattern in their architectural forms show that they were constructed to meet basic social and logistical needs.

Archaeologists have argued for residential mobility during the Basketmaker III period (Hurst 2004; Wills and Windes 1989; Wills 2001), but none have assessed whether the architecture, and in particular the housing, reflects periodic occupation. One indicator of short-term residency is seasonal occupancy, which is heavily informed by pit structure depth. Prior to Basketmaker III, the Late Archaic period populations of the Colorado Plateau were still very mobile, occupying the elevations above 6,000 feet in the summer and fall and retreating to lower elevations to the south and west during the cold and windy winter and spring seasons (Horn et al. 2003; Hovesak et al. 2002; Kearns 2007). Their seasonally occupied summer/fall houses average 3.6 m in diameter and just 12 to 28 cm deep (Horn et al. 2003:2-14). In contrast a survey of 47 Basketmaker III pit structures from the same region found that 77 percent of possible habitation structures were built over 0.5 m deep and average 1.1 m deep. This jump in pithouse depth is likely related to increased sedentism and the daily logistics of surviving a high-elevation winter. The deeper a pithouse's construction, the more insulated it would be and the less susceptible the structure would be to moisture and wind erosion.

Also to be considered is the use life of Basketmaker III architecture. While some structures seem to be extremely expedient, serving their purpose over the course of a single season, other structures are kept in use for multiple generations. Variation in structure use life demonstrates a settlement's commitment to a particular building. While structure use life is difficult to recreate, several lines of evidence can help identify structures with extended use lives. Absolute dates are helpful in determining the actual span of activities associated with a structure. For instance, the difference between roof construction and the last hearth fire inside a structure can be gleaned from the difference between the tree-ring dates from the structure's roof and a series of AMS dates run on annual plants from the hearth fill. Extensive remodeling of a structure also indicates an extended use life. According to experimental studies, wooden beams do not last more than about 15 years in a pithouse; the wood eventually rots from its exposure to earth and moisture.

However, periodic reroofing of a pit structure can extend its use life almost indefinitely. Multiple floors and extensive floor feature remodeling is another indicator of an extended architectural use life; they signal that the inhabitants or users of a building are adapting it through time to accommodate their changing needs and preferences.

The occupation capacity and interior features of a structure speak to the building's overall function. Open floor space determines the scale of activity in a building: are activities limited to a single person, can an extended family fit comfortably inside the structure, or was the structure designed to hold the entire population of community at once? The density and types of features are also important. The presence of a hearth is an accepted sign of interior heating and/or cooking, and a large amount of food storage suggests year-round domestic food processing.

The presence and complexity of symbolic features provides insight into the ubiquity of shared concepts and the context in which those ideas are expressed. Sipapus, a symbolic feature referencing Pueblo origin stories and the underworld, first appear in recognizable form during the Basketmaker III period (Ware 2014; Wilshusen 1986, 1989). Basketmaker III sipapus are notably more complex and ubiquitous when compared to later ancestral Pueblo time periods (Diederichs 2016; Wilshusen 1986). For this study, sipapus are categorized by Wilshusen's early Pueblo sipapu typology, which includes simple sipapus, complex sipapus, and vaults (Figure 18.3). Simple sipapus are small conical pits ranging from 6 to 40 cm deep. Vaults are oval to rectangular basins ranging in size from 0.30 to 1.2 m long and 0.10 to 0.60 m deep. They often have a slight shelf along the edge that supports wooden planks that "roof" the vault feature. Complex sipapus combine elements of the vault and simple sipapu categories; they are the size and shape of vaults but include an additional conical pit in the bottom of the basin creating a simple sipapu within a vault.

Finally, artifacts and other materials left in association with a structure inform our understanding of a building's use. Artifact floor assemblages can suggest a structure's primary use, especially when left in place. Unfortunately, visible artifacts are portable and constantly brought to, moved within, and removed from structures. In contrast, microscopic material evidence for activities such as pollen, macrobotanical remains, and micro-artifacts, are rarely completely removed from a building. Microscopic materials play a crucial role in identifying past activities because they are too small to be completely removed, leaving at least a partial signature of an activity behind. During the Basketmaker Communities Project microscopic material samples were systematically collected from roof, floor, and feature contexts in each tested structure.

Public Architecture

Public architecture refers to structures accessible to at least some individuals from across an entire community for gathering in supra-household groups. Group rituals are an important element of creating and maintaining integration in societies that lack strong political institutions. Public architecture facilitates social integration in that it provides a space for such activities to take place. The size and form of public architecture dictates the number of people who can participate, the kinds of activities that can be performed within a space, the seasonality of the activity, and the ideological and physical boundaries between sacred and domestic space (Hegmon 1989, 2002). Moreover, public architecture promotes the persistence and repetition of activities by fixing them in space and providing a context for symbolically charged actions. In doing so, public architecture transmits and validates social rules that, in turn, create and perpetuate social identity and integration.

Based on this definition, the Dillard great kiva is the only confirmed example of public architecture in the Indian Camp Ranch settlement during the Basketmaker III period. Great kivas are large circular buildings 10 m or larger in diameter and at least 1.00 m deep with an encircling bench, four-post roof-support system, and a range of internal features (Figure 18.4). Great kivas are built for communal gathering with open floor designs large enough to accommodate 50 to 80 people comfortably.

Ancestral Pueblo populations began constructing great kivas at the dawn of the Basketmaker III period and continued to build them with uncanny consistency for the next 800 years (Wilshusen 1999; Ryan 2013; Schachner et al. 2012). Great kivas are the longest-lived architectural form in the ancestral Pueblo world, suggesting that they played a quintessential role in ancestral Pueblo social identity and integration.

Great kivas are rare during the Basketmaker III period; they proliferated only after A.D. 700 (Allison et al. 2012; Murrell and Vierra 2014; Wilshusen, Ortman, and Phillips 2012). The typology in this study excludes structures historically referred to as Basketmaker III great kivas at Broken Flute Cave and the Montezuma Creek School site (Wilshusen, Ortman, and Phillips 2012). These shallow, unroofed structures are instead recognized as small dance circles. Though dozens of possible Basketmaker III great kivas have been recorded in the Four Corners, only three have been excavated and confirmed to date to the Basketmaker III period: Shabik'eschee Village (Roberts 1929) and 29SJ423 (Windes 2015) in Chaco Canyon and Juniper Cove in the Black Mesa area of Arizona (Gilpin and Benallie 2000). Excavation of 65 percent of the Dillard site great kiva, determined that it is similar in construction, communal gathering capacity, and longevity to the other excavated great kivas but differs slightly in its use history.

Morphologically, the Dillard great kiva is similar to the other three excavated Basketmaker III great kivas. All four structures are round and semi-subterranean ranging from 10.20 to 12.19 m in diameter and 0.70 to 1.34 m deep. A low bench was built around the interior of all four great kivas and was likely used for seating and/or storage in all but the Shabik'eschee Village great kiva where it supported leaning stringer posts. The bench and upper walls of the great kivas were slab lined to different degrees, and all four were roofed with an interior four-post support system covered by multi-ton wood, rock, and mortar superstructures. A lack of roofing deposits in the center of the Dillard great kiva indicates that the 4-x-4-m center of the roof between the upright support posts was left open or only ephemerally covered, providing access and ample light into the structure. This configuration was also found at 29SJ423 in Chaco Canyon (Windes 2015).

Like the great kiva at Shabik'eschee Village, the Dillard site great kiva had a long use life of 70 to 105 years, from about A.D. 620 when it was first built until it was decommissioned and burned between A.D. 690 and 725. Though demographics shifted dramatically in the study area from the beginning of the mid-Basketmaker III phase to the end of the late Basketmaker III period, the Dillard great kiva was a continual community focal point.

Unlike the other three excavated Basketmaker III great kivas and nearly all other later ancestral Pueblo great kivas, there is no evidence that the Dillard great kiva ever had a hearth or a ventilation system associated with a hearth. The lack of a hearth in the Dillard great kiva has several implications: (1) detailed activities could only take place inside the structure during the day when ample sunlight entered the building through the large central roof hatch, (2) the structure was not warmed by fire and was therefore made comfortable by the body heat of a large number of individuals in the winter time or solely used by smaller groups during more temperate seasons, and (3) the community did not cook food inside the structure.

Periodic remodeling of the Dillard great kiva resulted in three layered floors, each evidencing ritualized group activity. Built into the original floor were two southwest to northeast–oriented subrectangular roofed floor vaults. One of the vaults was eventually filled with sand and capped over with plaster and the other vault was remodeled when the second floor was built. Southwest of the vaults were a series of rock-lined pits coated with colorful clays (white, bright blue, gray, and canary yellow) and three other small pits filled with clean sediment. A thick layer of plaster was applied to create the second floor of the Dillard great kiva. Wide shallow basins were left open around each primary support post on the second floor, and large slabs were seated in a meter-long section of the northeast bench to create a possible altar feature. Portions of the original clay-lined pits were left accessible from the new surface. A new subrectangular roofed floor vault, this time oriented directly east–west, was constructed in the center of the second floor along with two simple sand-filled sipapus. These clay-lined pits, stone altars, vaults, and sipapus represent a suite of symbolic activities periodically repeated in the Dillard great kiva over a 70-year period. Evidence of comparable ritual activity has not been found in other Basketmaker III great kivas.

Eventually the second floor was covered by a 4 to 15-cm-thick layer of sand. This sand layer was not uniform but ranged in color (tan, golden brown, green, and reddish brown) and was mixed and laminated with ash deposits, suggesting it was deposited periodically. Systematic sampling of the sand deposit found tens of thousands of micro-lithics, a direct sign of intensive and ongoing late-stage lithic reduction. Pollen analysis of the sand found heightened levels of riparian species, especially cattail. Ethnographic uses of cattail pollen include ritual blessings, face paint, and edible cakes. These activities, involving the repeated deposit of sand and ash, late-stage flintknapping, and the intensive use of cattail pollen, represent a new suite of symbolic behavior during the last 20 years of the great kiva's use

Excavation of the Dillard great kiva provides us with the first glimpse of Basketmaker III public architecture in the central Mesa Verde region. Activities inside the structure revolved around sipapu complexes for nearly four generations. This tradition was supplanted in the late Basketmaker III phase by a new ritual complex involving the deposition of sand, sustained flintknapping, and intensive use of riparian plants, especially cattail. Detailed and/or small group activities would have been possible in the daylight and temperate weather. The kiva could have been used in the winter or at night for large group activities. As Tom Windes has suggested for the great kivas in Chaco Canyon, the large roof opening in the Dillard great kiva would have been suitable for tracking the movement of celestial bodies in the night sky. Most importantly, the multi-generational use of the Dillard great kiva underscores the community's commitment to this structure and the institutional role it played in the community

Permanent Housing

Eleven of the 42 Basketmaker Communities Project Basketmaker III structures are permanent habitations. These pithouses include enough space to house an extended family throughout the year and provide evidence of domestic activities. Fourteen standard double-chambered pithouses, one standard single-chambered pithouse, and two oversized pithouses (only one of which was excavated) were investigated. The standard single-chambered pithouse is similar in size, construction, and use to the standard double-chambered pithouses; these types will be combined in the following discussion and referred to as standard pithouses. The oversized pithouses differ from the standard pithouses in many aspects and will be discussed separately.

Standard Pithouses

About half of the standard pithouses investigated during the Basketmaker Communities Project are from the Dillard site, and the other half are from smaller settlements across the Indian Camp Ranch community. The Dillard structures date to the mid-Basketmaker III phase, and the hamlet sites tend to date to the late Basketmaker III phase. Despite these temporal and contextual differences, all of the standard pithouses functioned similarly. Their internal floor areas range from 16 to 33 m^2, and their main chambers were excavated 0.62 to 1.23 m deep. Standard pithouses at hamlet sites tend to be slightly larger and deeper than the standard pithouses at the Dillard site. In the case of Pithouse 101-103 at the Mueller Little House, a small chamber big enough for sleeping was added off the side of the main chamber and partially walled off with jacal. Hearths were ubiquitous in standard pithouses and were generally substantial in size. Storage capacity varied between standard pithouses, but both internal storage pits and bins were common. In the extreme case of the Dillard site Pithouse 220-226, the internal floor area was severely limited by four slab-lined bins and numerous floor pits, suggesting that the structure was designed as much for food production as shelter. The microscopic remains of chipped-stone reduction in Dillard Pithouse 205-226 are the only other evidence of specialized activity in a standard pithouse.

Sipapus were ubiquitous in standard pithouses; they were found whenever a pithouse floor north/northeast of the hearth was exposed by excavation. At hamlet sites, simple single sipapus were built into standard pithouse floors. The range of sipapu types was more varied in the standard pithouses of the Dillard site; three of the pithouses had simple sipapus, one had double simple sipapus, one had a roofed vault feature, and another was built with a complex sipapu. Many of the sipapus were filled with clean sand or other distinctive sediment. The complex sipapu, built in a fairly deep pithouse northeast of the great kiva (Pithouse 309), had a false bottom and was filled with 12 alternating layers of reddish-brown and green sand.

Three-quarters of the standard pithouses showed signs of remodeling: old features were filled and capped, new features were built, and floors were replastered. The standard pithouses at the Switchback Site (5MT10709) and the Mueller Little House (5MT10631) were completely reroofed and more extensively remodeled than other standard pithouses. This level of effort likely doubled the use lives of these structures, reflecting the commitment of their occupants to living on the same homesteads for multiple generations.

Oversized Pithouses

Basketmaker III oversized pithouses, sometimes referred to as "greatsters" (Hurst 1983; Van Dyke 2008), were built at a scale comparable to great kivas (Wilshusen, Ortman, and Phillips 2012). These double-chambered monstrosities often resemble standard pithouses based on interior features, but the scale and location of these buildings suggest that they were often a focal point of a settlement. The largest example in the central Mesa Verde region is Pit Structure 3at 5MT1 in the Yellow Jacket community (Figure 18.5) 15 miles north of the Basketmaker Communities Project study area (Wheat 1955).

Two oversized pithouses are in the Indian Camp Ranch Basketmaker III settlement. Pithouse 101 of the Windrow Ruin (5MT3890) is an oversized pithouse imaged with resistivity, delineated with soil augers, and dated with AMS on corn fragments from the floor surface. Pithouse 101-103 at the Ridgeline site was also imaged with electrical resistivity and delineated with soil augers, but the entire east half of the structure was excavated making it the source of the intra-structure details below. As discussed in Chapter 20, the oversized pithouses were built on ridge tops adjacent to the Dillard site in the late Basketmaker III phase, Windrow Ruin to the east and the Ridgeline site to the west, providing the occupants of these structures direct access to the great kiva during that period.

Oversized pithouses at Windrow Ruin and the Ridgeline site are three to six times the size of Basketmaker Communities Project standard pithouses (100 and 105 m^2 of internal floor space respectively). Multiple lines of dating demonstrate that the Ridgeline site oversized pithouse was in use for at least 75 years between A.D. 650 and 725. The structure began as a standard pithouse, was enlarged to an oversized pithouse after A.D. 660, and was reroofed and replastered twice more before it was finally decommissioned sometime after A.D. 725. The shape and roofline of the antechamber was heightened at one point by adding a 20-cm-thick rind of mortar to the interior walls and mounting leaner posts on top of the new walls at a near-vertical angle. Based on the size of the oversized pithouse, each of these modifications and remodels would have likely required labor beyond the capacity of the affected household suggesting that they recruited labor from others in the Indian Camp Ranch settlement.

Most of the features in the Ridgeline oversized pithouse reflect domestic activities such as space delineation, heating, storage, and food preparation. Each of the three floors includes a hearth, deflector, and storage pits. An upright slab wing wall was added to final floor to delineate space in the main chamber, and the door between the chambers was modified so that it could be easily sealed off with a stone from either side. The floor assemblage of primary and secondary refuse in the Ridgeline oversized pithouse also reflects domestic activities such as cooking, water storage, and maize grinding.

Beyond the regular domestic activities, a case can also be made for specialized artisan activities in the Ridgeline oversized pithouse. Textile production is evident based on pollen samples from the upper two floors, which had the largest number of rare pollen taxa of any Basketmaker Communities Project tested structure—many of them specialty materials (walnut, willow, lemonadeberry, buckthorn, and chokecherry) used by artisans making wood implements, baskets, sandals, weapons, or other products, including medicine. One of these perishable items, a twill-plaited sandal, was carbonized when the structure burned, preserving it where it was left on the floor of the antechamber. There is a near absence of maize pollen signature in the oversized pithouse. Instead, high quantities of beeweed were preserved in the structure, which may reflect artisans working beeweed to create pottery paint. In addition, mineral samples of various types of pigment were recovered from the surface of this pithouse, which also suggests craft production (see Table 7.3). Pottery specialization in the structure is supported by the fact that pottery grinding tools and raw clay were found stored in a nearby pit room.

There is evidence of persistent ritual activity in the Ridgeline oversized pithouse. When the structure was converted from a standard to an oversized pithouse, the occupants built a slab-lined vault and a complex of 17 small sand-filled pits into the floor north and northeast of the hearth in the main chamber and filled five small pits in the antechamber with reddish-brown silty sand. A distinct paho (prayer stick) impression was visible in the fill of one of these antechamber pits. The occupants covered these features when they replastered the floor, but they remodeled the slab-lined vault feature into a slab-lined sipapu and filled it with reddish-brown sand and covered the northern quarter of the structure's floor with a layer of light brown sand.

Temporary Housing

Three examples of temporary housing were investigated as part of the Basketmaker Communities Project: two large shallow single-chambered pithouses and one large shallow double-chambered pithouse. All three structures were built at the Dillard site. Large shallow single-chambered pithouses and large shallow double-chambered pithouses are not regionally specific; both are documented in low numbers at hamlet sites and aggregated settlements across the larger Basketmaker III culture area (Diederichs 2016). Based on their large footprint and shallow construction, the Basketmaker Communities Project temporary habitations housed or hosted visitors seasonally at the Dillard site, possibly in association with gatherings in the great kiva.

Large Shallow Single-Chambered Pithouse

Two large shallow single-chambered pithouses (Pithouses 239 and 232) were part of the aggregated settlement at the Dillard site during the mid-Basketmaker III phase. These structures were built in the southern architectural block at the site, in the middle of a cluster of four standard pithouses. Pithouses 239 and 232 are lightly constructed when compared to the surrounding permanent housing. Both are round, 5 to 6 m in diameter, and less than 0.35 m deep with floor areas of 24 to 30 m^2. Their shallow construction would have required the upper three-quarters (approximately 1.5 m) of each pithouse to be built aboveground using jacal.

Both large shallow single-chambered pithouses show some signs of domestic use. Both structures have hearths, and a single pit and small bin were built into the floor of Pithouse 232. The paucity of floor features in these pithouses left large amounts of floor space for general use and sleeping. A lack of cumulative activity in these structures is evidenced by a near absence of floor artifacts and weak pollen signatures from both structures. Pollen analysis from the floors and features found only background environment pollens and no pollens from domesticated or cultivated plants.

Pithouses 232 and 239 were revitalized periodically; hearths in both structures were remodeled and a layer of plaster was added to the floor of Pithouse 232. The remodeling of these seasonally occupied structures demonstrates that they were kept in use for several years. There are no signs of ritualized activity in the form of sipapus in either structure.

Large Double-Chambered Pithouse

Pithouse 312-324, the only large double-chambered pithouse investigated during the Basketmaker Communities Project, was built directly north of the Dillard great kiva. By the late Basketmaker III phase, the two structures were the only buildings still in use at the Dillard site, suggesting that the function of Pithouse 312-324 was related to activities in the great kiva. Large double-chambered pithouses are rare; the few excavated examples come from Shabik'eshchee Village and a nearby site in Chaco Canyon (Windes 2015), Melloy Village in southeast Utah (Neily 1982), and a hamlet north of the Basketmaker Communities Project study area in the central Mesa Verde region (McNamee and Hammack 1999). All of these temporary habitations accompany more permanent architecture, which may indicate increased seasonal population at these sites for logistical, social, or even ritual purposes.

The seasonal nature of Pithouse 312-324 is attested to by its shallow, 0.26-m-deep construction. Despite its seasonal use, Pithouse 312-324 is large, with 40.25 m^2 of floor space, nearly double the average size of Basketmaker Communities Project permanent habitations. Because of its shallow construction, the aboveground portion of Pithouse 312-324 would have stood about 1.75 m aboveground making it, by far, the most prominent and visible building in the Indian Camp Ranch community.

The floor features and artifact assemblage associated with Pithouse 312-324 point to at least periodic domestic activities. Floor features were isolated to the main chamber and include a jacal deflector, hearth, a slab bin feature, and three storage pits. Three other pits north of the hearth represent potential sipapus, but they were cleaned out and sealed, deemphasizing their ritual symbolism. Scattered artifacts on the floor included milling implements, pottery, chipped-stone tools, and a few projectile points. Three bone beads, the only beads collected from Basketmaker Communities Project excavated structures, attest to body ornamentation inside the large shallow double-chambered pithouse. Like the mid-Basketmaker III temporary structures, Pithouse 312-324 presented a weak pollen signature; prickly pear was the only cultivated food present.

The only sign of specialized activity in Pithouse 312-324 is the comparatively high number of faunal remains; 176 faunal bones were recovered from Pithouse 312-324, about twice the average number found in the standard pithouses at the Dillard site. This high density of faunal remains suggests that periodic visitors to the Dillard site engaged in feasting or feast preparation inside the structure (Potter and Chuipka 2007), possibly related to communal gathering in the great kiva.

Storage Structures

Basketmaker III storage architecture was represented in Basketmaker Communities Project investigations by 18 pit rooms; about half of these were built independently and half were integrated into a series of adjacent rooms to form a roomblock. The mid-Basketmaker III pit rooms at the Dillard site in particular were built independent from one another and are generally scattered across each architectural block. Roomblock construction increased through time with most late Basketmaker III pit rooms integrated into linear roomblocks northeast of an associated habitation structure. The largest roomblocks are found in association with oversized pithouses at the Ridgeline and Windrow sites and a standard double-chambered pithouse at the Switchback site. These late Basketmaker III roomblocks are 30–40 m long and comprise eight to 12 pit rooms.

Excavation determined that the morphology of Basketmaker Communities Project pit rooms is fairly constant through time: all are round to semi-round, measure 1.3 to 2.4 m in diameter, and about half the cases are slab lined. Construction evidence indicates that most pit rooms were roofed with socketed arched or cribbed beams to create low domed roofs that would require a person to crouch down to enter the feature. Pollen, plant, and artifact remains from Basketmaker Communities Project pit rooms point to the storage of pottery and both wild and domesticated edible plants. Floor areas range from 2.4 to 4.52 m^2. Smaller structures would generally have been accessed from the exterior, but some of the larger pit rooms were large enough for interior activities.

A few of the Basketmaker Communities Project pit rooms associated with households at the Dillard site and the oversized pithouse at the Ridgeline site show signs of specialized activity. There is evidence that Dillard site residents stored, processed, and cooked food in Pit Room 228, one of the largest pit rooms in the sample. In the roomblock north of the Ridgeline oversized pithouse, ornament blanks were stored in Pit Room 116 and raw clay and pottery production implements in Pit Room 117. Raw clay was also stored in Pit Room 113 at the Switchback site, 35 m southeast of the Ridgeline oversized pithouse.

Only a few Basketmaker Communities Project pit rooms show signs of remodeling. Instead, many of the rooms were either deconstructed and salvaged or added late in a site's occupation. This suggests that Basketmaker Communities Project households constantly reconfigured their storage architecture and pit rooms were rarely kept in use as long as temporary or permanent housing.

None of the Basketmaker Communities Project pit rooms include sipapus. The only pit room feature interpreted as symbolic in nature is a shallow central pit holding a large piece of raw turquoise in Pit Room 124 at the Dillard site. This pit room is located just north of the great kiva but predates the construction of the great kiva by at least half a century, suggesting that it may have been associated with an earlier pithouse.

To determine whether storage capacity per household was consistent across the Indian Camp Ranch settlement we measured surface evidence of pit room storage on all 78 Basketmaker III sites in the study area (Ortman et al. 2016). The results show a dramatic increase in pit rooms per household through time and a substantial concentration of storage capacity in just a few households by the late Basketmaker III phase. This mirrors the transition from the few scattered pit rooms shared among households at the Dillard site in the mid-Basketmaker III phase to the extensive roomblocks associated with oversized pithouses in the late Basketmaker II phase.

Habitation Delineation

Fragments of stockade fence encircle habitation clusters in architectural Blocks 200 and 300 of the Dillard site and the Mueller Little House hamlet. Stockade fences are common architectural features at Basketmaker III sites in the central Mesa Verde region (Wilshusen 1999). Though referred to as stockades in the literature, these upright pole-and-brush fences only stood an average of 1.25 m high with widely spaced posts, making them unsuitable as defensive structures (Chuipka 2007). Instead these fences reflect an early ancestral Pueblo tradition of delineating residential space. Fully documented stockade fences at hamlet sites range from 35 to 45 m in diameter and encircle both the habitation and storage architecture at a site.

The Basketmaker Communities Project was not designed to find or study stockades as an architectural form. The three stockade fragments exposed during the Basketmaker Communities Project were revealed while sampling midden deposits. Based on their chance exposure at two sites, stockades were probably common elements at Basketmaker III habitations in the Basketmaker Communities Project study area.

The stockade segments found at the Dillard site and Mueller Little House were exposed 8–12 m away from the nearest pit structure. Based on their trajectories these fences could encircle all of the pit structures in the associated architectural block: four pithouses and five pit rooms in Block 200 of the Dillard site, six pithouses and three pit rooms in Block 300 of the Dillard site, and one pithouse and an unknown number of pit rooms in Block 100 of the Mueller Little House. The Dillard Block 300 fence is the most robust of the three, with 23 posts used to construct a 3.20-m-long section of fence. In all three cases, evidence for extramural activity and midden deposits was much higher inside the perimeter fence than outside of it. In the case of the Block 300 stockade, a series of roasting features was built just inside the fence line. In all three stockade examples, the concentration of activity along the fence line was visible on the modern surface as dense midden, soil staining, and a concentration of small pieces of burned and unburned sandstone.

As previously mentioned, the stockades at the Dillard site are the first perimeter fences documented at a large aggregated site. The fact that these stockades each encircle up to four standard pithouses suggests that economic resources may have been shared within these multi-household groups. This interpretation is supported by the collective access to the numerous scattered pit rooms in each architectural block.

Closure Patterns

Architecture was rarely just left behind by ancestral Pueblo people; instead, structures were generally salvaged for their construction material or formally decommissioned through a set of closing practices. To identify closure practices in the Basketmaker Communities Project Basketmaker III architecture, we assessed the treatment of floor features inside a structure, the deposition of sand and assemblages on the floor, evidence for burning, and post-occupation internments in the structure fill (Table 18.7).

Closing practices are closely tied to structure function in the Basketmaker Communities Project sample. Storage structures were treated very differently than other types of architecture. Pit rooms were rarely burned and were often salvaged for other construction. The few burned structures are larger than the average pit room and show signs of internal activity such as cooking or pottery production. Pit rooms were generally cleaned out and left empty. Sand was not found deposited in any of the storage rooms.

Habitation structures were closed with more formality than storage structures. Inhabitants at both the Dillard site and surrounding hamlets generally deposited sand and burned their permanent and temporary habitations when decommissioning them. Alluvial sand was found in features and/or on the floor of nearly every habitation; the only exceptions are the standard pithouse at the TJ Smith site and the late Basketmaker III shallow double-chambered pithouse at the Dillard site, which was only periodically used for feast preparations. Habitation structures were burned upon closing except for one permanent and one temporary habitation in the southern portion of the Dillard site. Burning intensity seems to have increased from the middle to the late Basketmaker III periods. Many of the late Basketmaker III habitations were burned so intensely that roof beams carbonized, floors were heat reddened, and their adobe roofs vitrified.

Households had more latitude when it came to the artifact assemblages they left behind in a structure. Many pithouses were completely cleaned out, and in some cases, fill was removed from the hearth and/or pit features. When artifacts were left behind, they generally consisted of a light scattered mix of primary and secondary refuse. In a few structures, artifacts appear to have been intentionally placed on the floor. Partial domestic assemblages were left on the floor of Dillard Pithouse 220, Switchback Pithouse 110, and the Portulaca Point Pithouse 106-111. Animals were buried on the floors of two permanent pithouses: a dog on the floor of Pithouse 309 at the Dillard site and a female turkey on the floor of Pithouse 101-103 at the Mueller Little House. The oversized pithouse at the Ridgeline site is the only structure to have been kept standing for an extended period after the inhabitants moved out. A 0.5-m-tall mound of refuse was dumped through the roof hatch onto the floor of the main chamber before the pithouse was burned.

The Dillard site great kiva experienced the most complex closing process, and this process was executed in many stages. In fact, the final floor in the structure may have been part of the decommissioning process, albeit one enacted over a long period. When the community finally committed to closing the great kiva, two large painted bowls and at least two gray ware jars were coated with fugitive red pigment, smashed into fragments, and scattered across the sand use surface along with lithic tools, stone beads, and four projectile points. Small fires were burned directly on the sand surface, fire-reddening it in patches and leaving behind concentrations of fine ash. In the next stage, the adobe lining was partially dismantled, which left a 10 to 15-cm-thick layer of construction material on the floor. A basalt slab, lithic tools (including two projectile points), and a few pieces of pottery were left on this surface. The great kiva was then filled with small-diameter saltbrush and wood and set on fire, which compromised and collapsed the superstructure.

The patterns in architectural closing practices uncovered by the Basketmaker Communities Project demonstrate a long-standing tradition (Adams and Fladd 2014). Such decommissioning traditions are “a suite of practices with material manifestations that ends the occupation of a structure or settlement with the added intent of either remembering or forgetting associated people, groups, or events” (Adams 2016:43). Basketmaker Communities Project households continued to recognize their connection with decommissioned standard pithouses in particular. Based on fragmentary human remains in the fill above five collapsed pithouses, the Indian Camp Ranch population had a tradition of burying their dead in the depressions of decommissioned year-round homes. The great kiva also appears to have lived on in the social memory of the community; bone, pottery, stone tools, and a possible shrine were left in the depression of the structure over the course of the Pueblo I and II periods

Stylistic Origins

The colonization of the central Mesa Verde region during the Basketmaker III period was a pivotal event in the history of the northern Southwest that reconfigured the area’s social and political landscape. Prior to the Basketmaker III period, the region was generally avoided by Eastern and Western Basketmaker II farmers for a thousand years. A fifth- and sixth-century drought in the late fifth century decimated both Eastern and Western late Basketmaker II populations, which may have led to refugee movement into and across the once-restricted central Mesa Verde region frontier. The region was colonized in several waves (Diederichs 2016). Large sites with public architecture were founded in the late sixth century. These sites became focal points of settlement and community activity over the next 150 years. Migration to the area continued on a large scale between A.D. 600 and 650, and then the population intrinsically grew until A.D. 700, effectively infilling the landscape with small farmsteads.

Over the course of the Basketmaker III period regionally specific architectural design traditions eventually developed. However, tracking regional signatures during the migrations of the Basketmaker III period has proven difficult for several reasons: (1) architectural adaptation was at an all-time high during the Basketmaker III period with populations across the entire cultural area adopting and experimenting with new forms at a rapid pace (Diederichs 2016), and (2) long-standing territorial boundaries broke down during the period allowing people in various-sized groups to move large distances, depopulating some regions and colonizing whole new farming territories (Figure 18.6). As a result, regional architectural patterns are subtle and emerged from the architectural data in just a few of the more demographically stable regions such as the Mogollon rim in central Arizona, the Upper San Juan region in northwestern New Mexico, the Little Colorado region of northeast Arizona, and the western Mesa Verde region of southeastern Utah.

Great Kiva Origins

The presence of a great kiva at the Dillard site suggests that the site was settled by migrants from the south and west. Great kivas were adopted into the ancestral Pueblo architectural lexicon at the dawn of the Basketmaker III period and differentially incorporated into settlements of certain regions. The first great kivas were constructed along the Mogollon rim of east-central Arizona in the late 400s (Schachner 2001). Examples of early great kivas dating to the late Basketmaker II period (500 B.C. to A.D. 500) are found in the Puerco and Tularosa Valleys of central New Mexico (Greenwald 2018; Schachner et al. 2012) just south of the ancestral Pueblo culture region. As previously discussed only four Basketmaker III great kivas have been excavated in the ancestral Pueblo culture area: two along Chaco Canyon in the San Juan Basin, one in the Little Colorado region, and one, the Dillard great kiva, in the central Mesa Verde region. Given the consistencies among these great kivas, it appears that the knowledge of their construction and function was shared across these populations.

Numerous other possible Basketmaker III great kivas have been recorded in the northern Southwest based on surface indications (Young and Herr 2012). In the Little Colorado region, possible great kiva features are concentrated in the Lukachukai Valley at sites like AZ E:12:5 (Altschul and Huber 2000), Bad Dog Ridge, and the Ganado site (Gilpin and Benallie 2000; Schachner et al. 2012) and in the Redrock Valley on Kiva Mesa on the northeast side of the Lukachukai Mountains (Gilpin and Benallie 2000). Great kiva features are also documented north of the San Juan River in Cottonwood Canyon (Allison et al. 2012) and Montezuma Creek (Hurst 2004; Matheny et al. 2013; Spittler 2018) in the western Mesa Verde region. The density of Basketmaker III great kiva features is comparatively low in the San Juan Basin and central Mesa Verde regions despite the presence of excavated examples in those areas. In addition, several proposed Basketmaker III great kivas in the San Juan Basin and central Mesa Verde regions have either been dated to later periods or reassigned to other architectural categories (Diederichs 2016; Dykeman and Lagenfeld 1987; Murrell and Vierra 2014; Wilshusen, Ortman, and Phillips 2012). Basketmaker III great kiva features are generally non-existent in the Upper San Juan region further to the east and the Virgin Anasazi region to the far west. This distribution suggests that great kivas were a Basketmaker III tradition that flourished along corridors associated with the Chinle, San Juan, and Montezuma Creek drainages in the Little Colorado and western Mesa Verde regions. The Dillard site great kiva is at the upper end of McElmo Creek, a tributary of the San Juan River, on the northeast edge of the great kiva architectural tradition. Hence, the great kiva was likely built at the Dillard site by migrants from the Little Colorado or western Mesa Verde regions who had direct experience with the construction and use of this type of public architecture.

Pan-regional Pithouse Attributes

Southwestern archaeologists have been attempting to identify regional pit structure characteristics for the Basketmaker III period for many years (Hensler 1999; Miller 2015). As excavation data have accumulated some of these cited regional traits have been proven to be logistical adaptations broadly adopted by farming populations across the northern Southwest. For instance, the four-post interior-support system was adopted or even independently developed by populations across the Colorado Plateau prior to the Basketmaker III period. It was nearly ubiquitously applied to structures over 4 m in diameter suggesting that it is a technological adaptation to larger structure footprints associated with increased sedentism.

Other attributes once cited as regional markers are now more clearly seen as temporal changes in broadly adopted form. Prior to A.D. 500, pit structures across the northern Southwest were round or oval and less than 50 cm deep (Kearns 1995; Sesler and Hovezak 2002, 2003; Wilshusen 1999). Most roofs were supported on numerous upright posts, and the structures were entered via an opening between two of the roof posts (Hensler 1999). Early pit structures often had hearths, but not consistently, suggesting seasonal use or a storage function.

Several elements of pit structure form transitioned over the course of the Basketmaker III period. The size and depth of pit structures increased, their general shape transitioned from round to rectangular, and the use of benches to support perimeter leaner wall posts increased. In addition, antechambers were adopted, at least by populations in the San Juan Basin, Little Colorado, and Mesa Verde regions. By the end of the period, double-chambered pithouses with D-shaped or square main chambers roofed with perimeter benches were common across most of the northern Southwest.

There is intriguing evidence that the classic central Mesa Verde Basketmaker III pithouse form is rooted in Eastern Basketmaker II traditions. Early Eastern Basketmaker II houses in the Durango area were large and built with cribbed-log style roofs (Charles and Cole 2006; Morris and Burgh 1954; Potter and Perry 2010). This eastern cribbed-roof tradition continued into the sixth century with the addition of an entry room or antechamber during the Los Pinos and Sambrito Phases in the Navajo reservoir area (Chuipka et al. 2010; Eddy 1966, 1972; Hovezak and Sesler 2006). As previously discussed, antechambers were adopted into the San Juan Basin, Little Colorado, and Mesa Verde regions over the course of the next two centuries.

Adoption of Eastern Basketmaker–style cribbed roofing technology by Basketmaker III populations is less well recognized. A cursory review of excavated Basketmaker III pit structures identified evidence for cribbed-roof construction, in the form of horizontal perimeter wall trenches filled with decomposed wood, at 10 sites (Diederichs 2016). Given the distribution of these sites, cribbed roofing technology appears to have been incorporated into the architectural traditions of the San Juan Basin, Little Colorado, central Mesa Verde, western Mesa Verde, and Rainbow Plateau regions (Ahlstrom and Roberts 2019; Diederichs 2015; Geib 1996, 2011; Kearns 1995, 2012; Murrell and Vierra 2014; Shelley 1990, 1991). In the recorded instances, cribbed roofs are often paired with four-post roof-support systems. Because cribbed roofs leave such an ephemeral archaeological signature, the use of this roof style may be greatly overlooked at other sites.

Many Basketmaker III pit structures, including several structures excavated on the Basketmaker Communities Project, have four-post-support roof systems with no evidence of exterior wall leaner posts. If we put aside the assumption that these structures were roofed with exterior leaners rather than cribbing, nearly all of the pit rooms and at least four of the standard pithouses on the Basketmaker Communities Project may have been roofed with cribbed, rather than leaner post, wall construction.

Despite their historical origins in Eastern Basketmaker architectural traditions, the presence of antechambers and cribbed roofing in Basketmaker Communities Project architecture sheds little light on the origins of the Indian Camp Ranch community. Both attributes were widely adopted across the northern Southwest by the mid-Basketmaker III phase, and their presence in the Basketmaker Communities Project sample reflects no particular regional origins.

Roofing Tradition Origins

Though most pit structure attributes cannot be used to track Basketmaker IIII immigration, Kye Miller statistically determined that certain roofing styles are regionally specific (Miller

2015:183). Miller traced the origins of upright jacal wall construction to the western Mesa Verde region of southeast Utah and the development of bench-supported leaner posts to the eastern Chuska slopes and central Mesa Verde regions.

Miller found quantitative similarities between central Mesa Verde and Chuska Valley Basketmaker III pithouses. Pithouses in both regions were built with separately constructed main chambers and antechambers connected by a short passageway and roofed with a four-post superstructure supporting either bench or exterior leaner posts (Figure 18.7). The only regional difference was a more formal division of interior space using wing walls and raised clay collars in the Chuska Valley pithouses. These similarities suggest that Chuska Valley and central Mesa Verde populations were in close contact during the Basketmaker III period and that they shared a pithouse construction tradition.

In contrast, Miller identified a distinct construction tradition in the western Mesa Verde region of southeast Utah (2015:185). In this tradition, the internal superstructures supported flat roofs cantilevered out to cover the entire pithouse and meet vertical posts built along the interior perimeter of the building (Figure 18.8). The densely spaced posts were probably woven together and covered in adobe to form jacal perimeter walls. While this style has been recorded at a few other sites in the central Mesa Verde region it is much more pervasive at both hamlet sites and aggregated settlements in southeast Utah such as Malloy and Recapture Villages (Allison et al. 2012; Chenault and Motsinger 2000; Chenault et al. 2003; Neily 1982).

In the Basketmaker Communities Project sample, roofing style could only be determined for about half of the Basketmaker III tested pit structures (Table 18.8). Cribbed construction is a possibility in eight cases where there is no evidence of leaner or vertical jacal wall posts. Miller's architectural tradition markers were found in seven buildings, four of which are associated with the mid-Basketmaker III colonization of the Dillard site. Permanent Pithouses 220-234 and 505-508 and Temporary Pithouse 202 at the Dillard site were built with bench-supported leaner posts, and Pithouse 205-226 was built with jacal-style perimeter walls.

Bench-supported leaner post construction at the Dillard site was expected and demonstrates that the occupants were part of a shared Mesa Verde and Chuska architectural tradition. More surprising is the presence of jacal-style construction at the Dillard site, which signals that the builders of Pithouse 205-226 may have immigrated from the western Mesa Verde region.

Summary

The Basketmaker III architecture sampled over the course of the Basketmaker Communities Project confirms that the Indian Camp Ranch settlement represents a middle-range agricultural society in the midst of colonizing a new frontier. The architecture is functionally diverse, reflecting the community's experimentation with storage, permanent housing, temporary housing, public architecture, and household delineation. Certain patterns specific to this Neolithic Demographic Transition experience include multi-generational commitments to communal ceremony embodied in the Dillard great kiva, experimentation with collective and private household economies, and increased specialization in association with accumulations of wealth by a few household lineages.

Importantly, the community was made up of a diverse population. The architectural heritage of the settlement suggests several centuries of integration and adoption of practices from earlier Mogollon and Eastern and Western Basketmaker II traditions. More directly, the initial Dillard site migrants likely migrated from both the Chuska Valley area to the south and the canyon country of southeast Utah and northeast Arizona to the west.

Though the initial migrants had no historical ties with the area, they invested heavily in architectural representations of their community and families, shaping their collective landscape for many generations. They especially invested in the Dillard site great kiva, repeatedly using it for symbolically charged gatherings for nearly a century. Investment in oversized pithouses was important to the community. These pithouses were home to wealthy families with deep hereditary connections in the settlement. Despite disparities in wealth, every Basketmaker III household in the Indian Camp Ranch community appears to have had general access to land and resources, and even the most humble pithouses were formally decommissioned with burning and were often memorialized with burials after the occupants had moved on. These architectural practices imbued the settlement landscape with meaning and wove the Indian Camp Ranch community together through collective memory and practice.

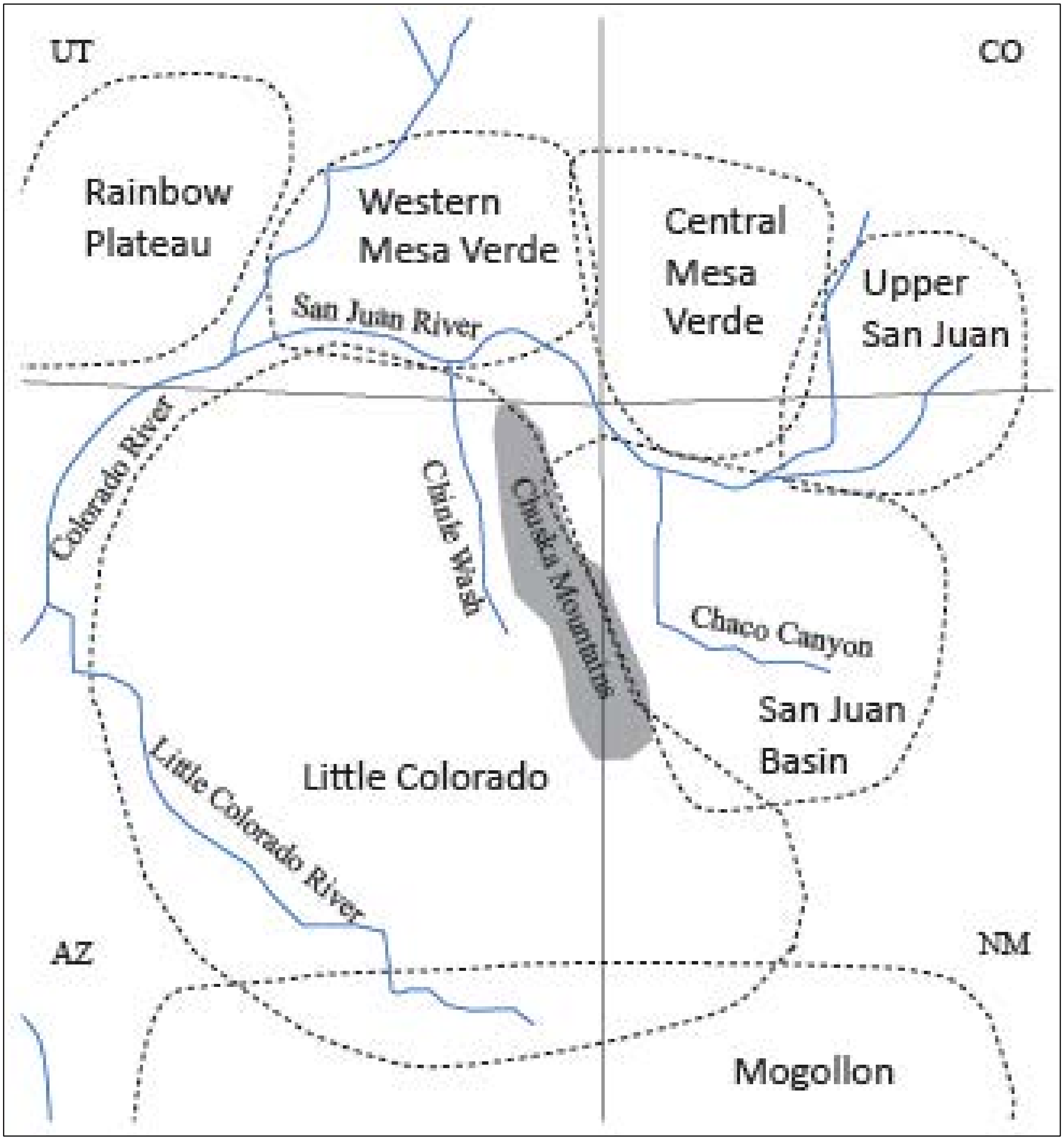

Figure 18.1. Map of cultural regions discussed in this chapter.

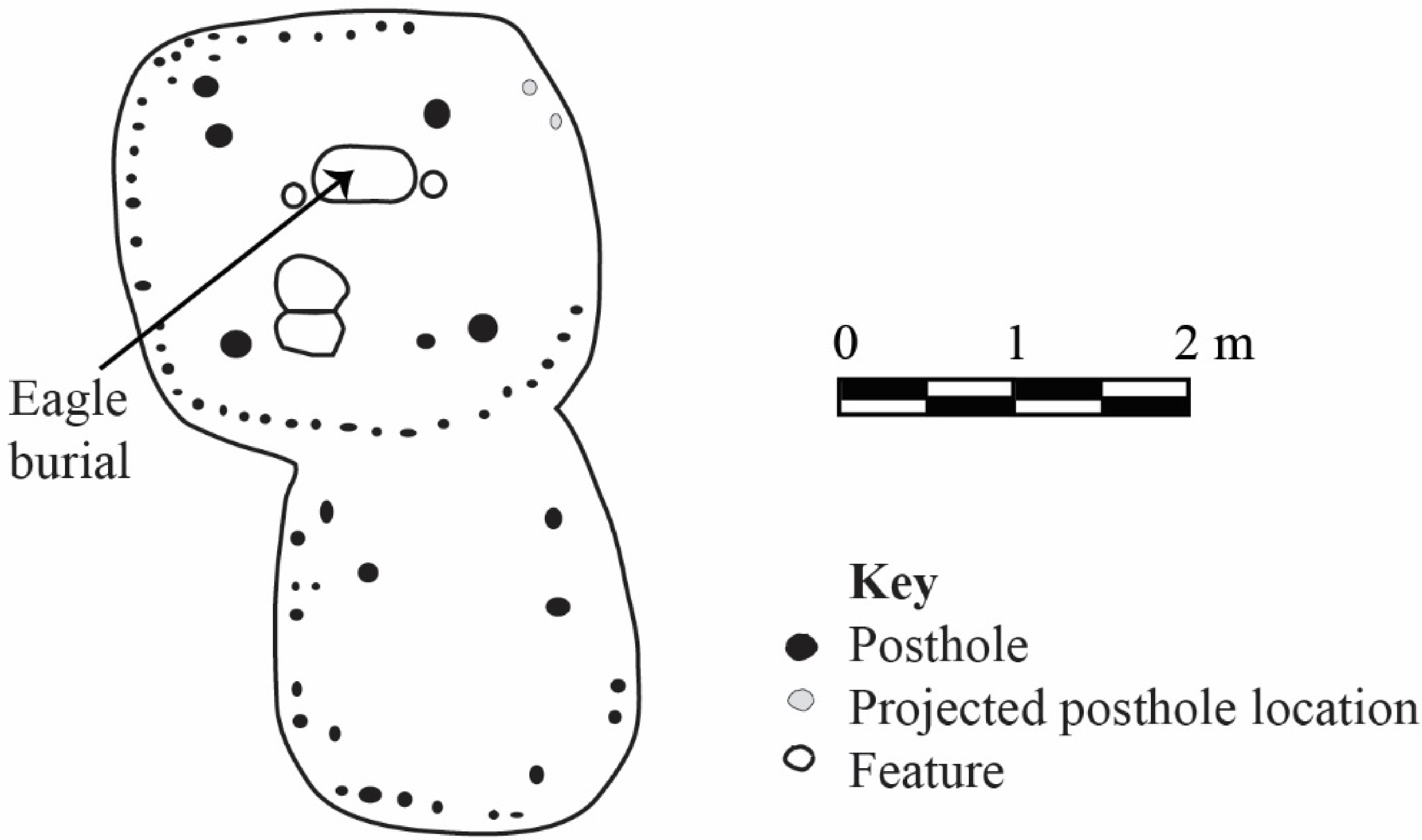

Figure 18.2. Example of a small double-chambered pit structure (Structure 1) at Altar De Aquila De Oro (42SA8545), Melloy Village, Utah. (Plan view drawing adapted from Neily 1982:Figure 52.)

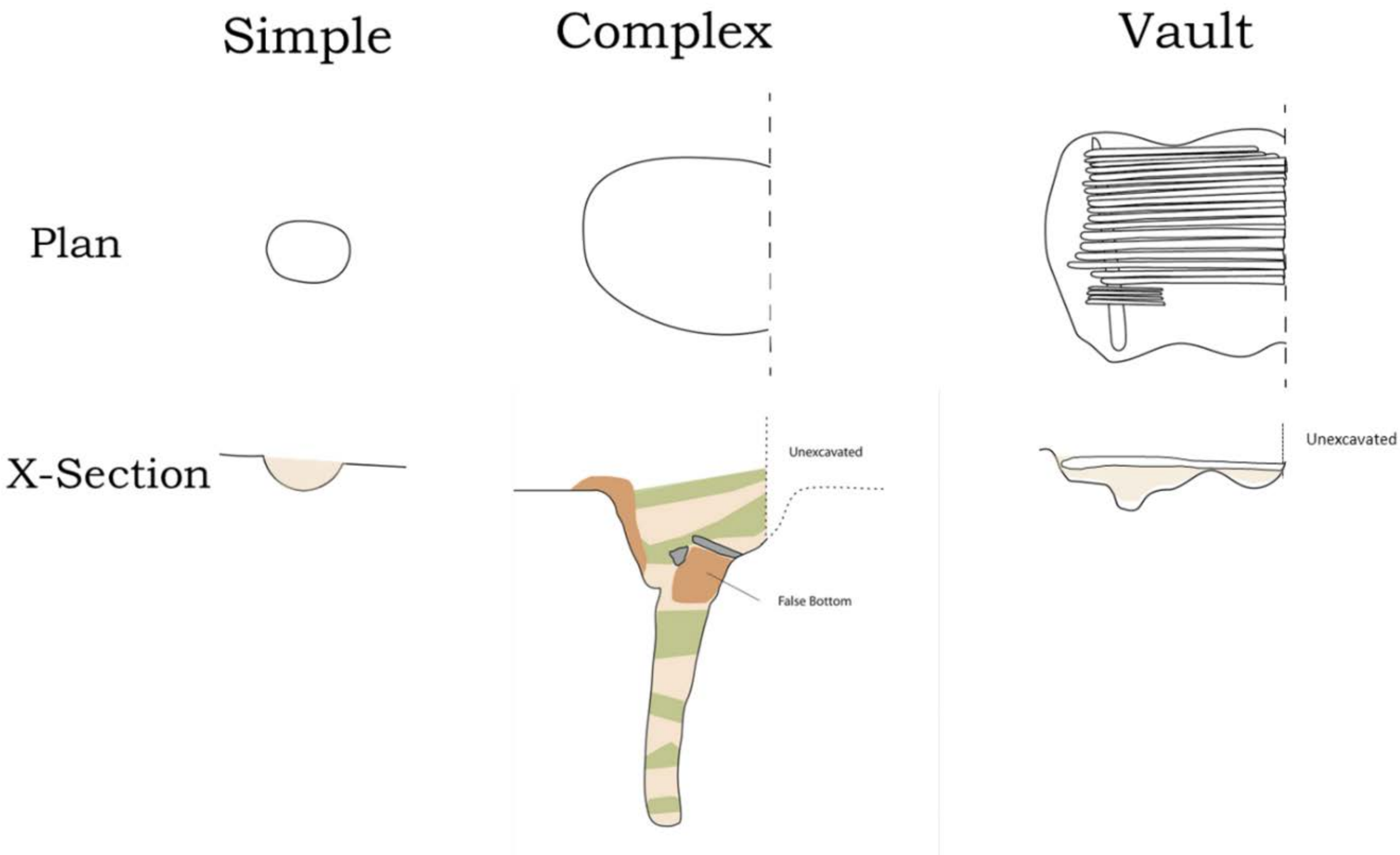

Figure 18.3. Stylized sipapu types: simple, complex, and vault (after Wilshusen 1986).

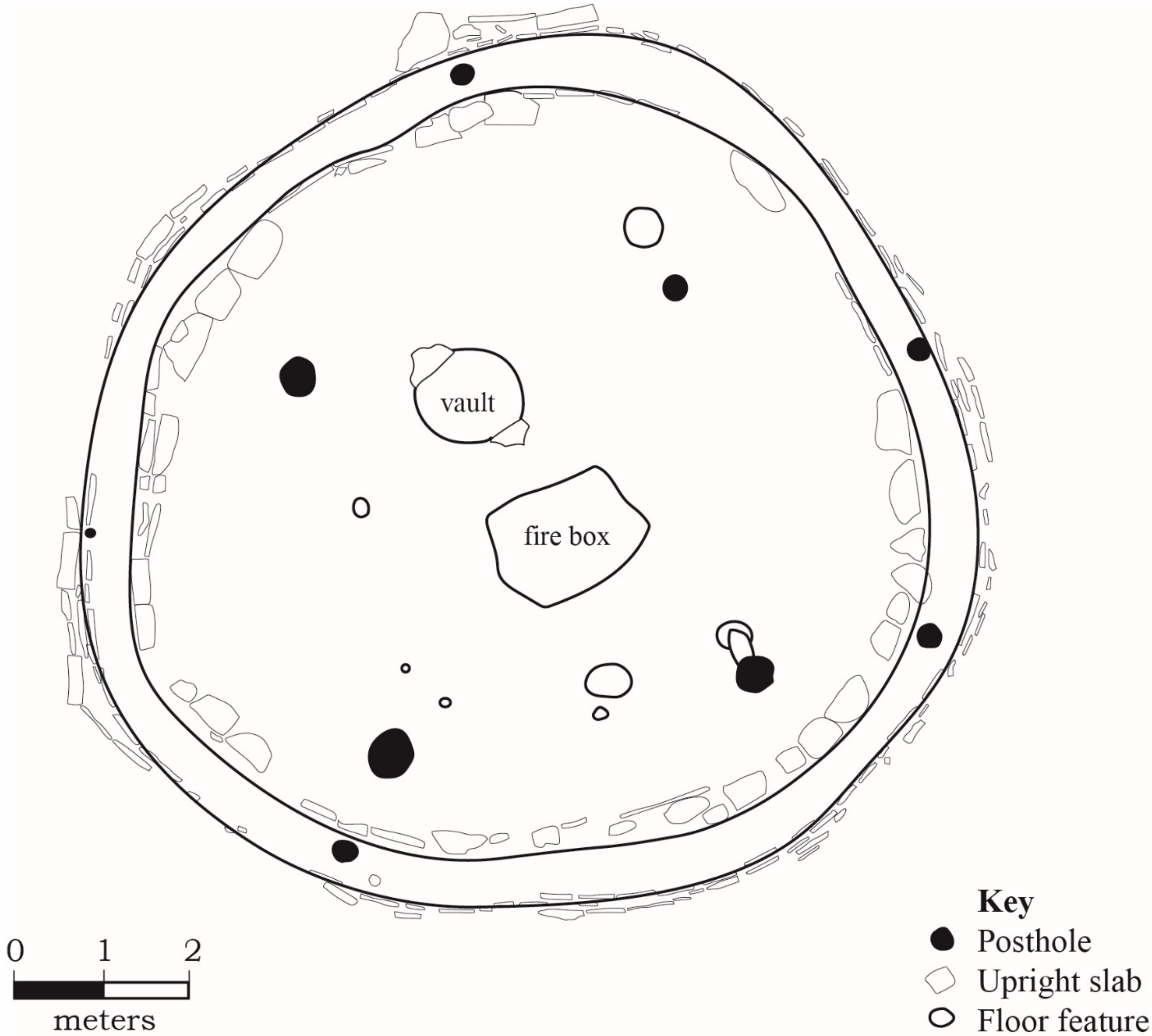

Figure 18.4. The great kiva at Site 29SJ423 in Chaco Canyon. (Plan view drawing adapted from Windes 2015:Figure 1.3.17.)

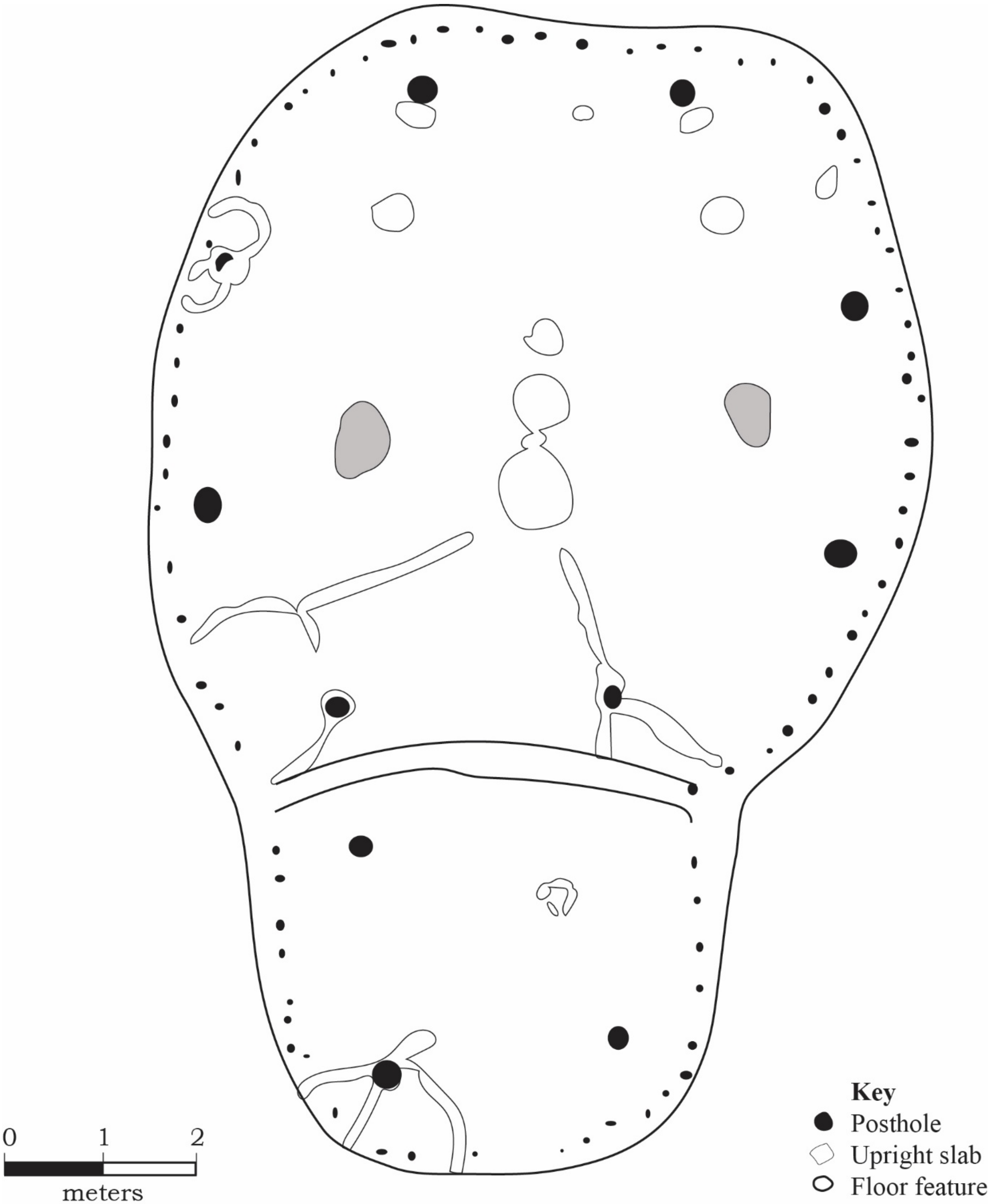

Figure 18.5. Example of oversized pithouse at Site 5MT1. (Adapted from plan map of Pit Structure 3 Stevenson area [Mitchell 2015]).

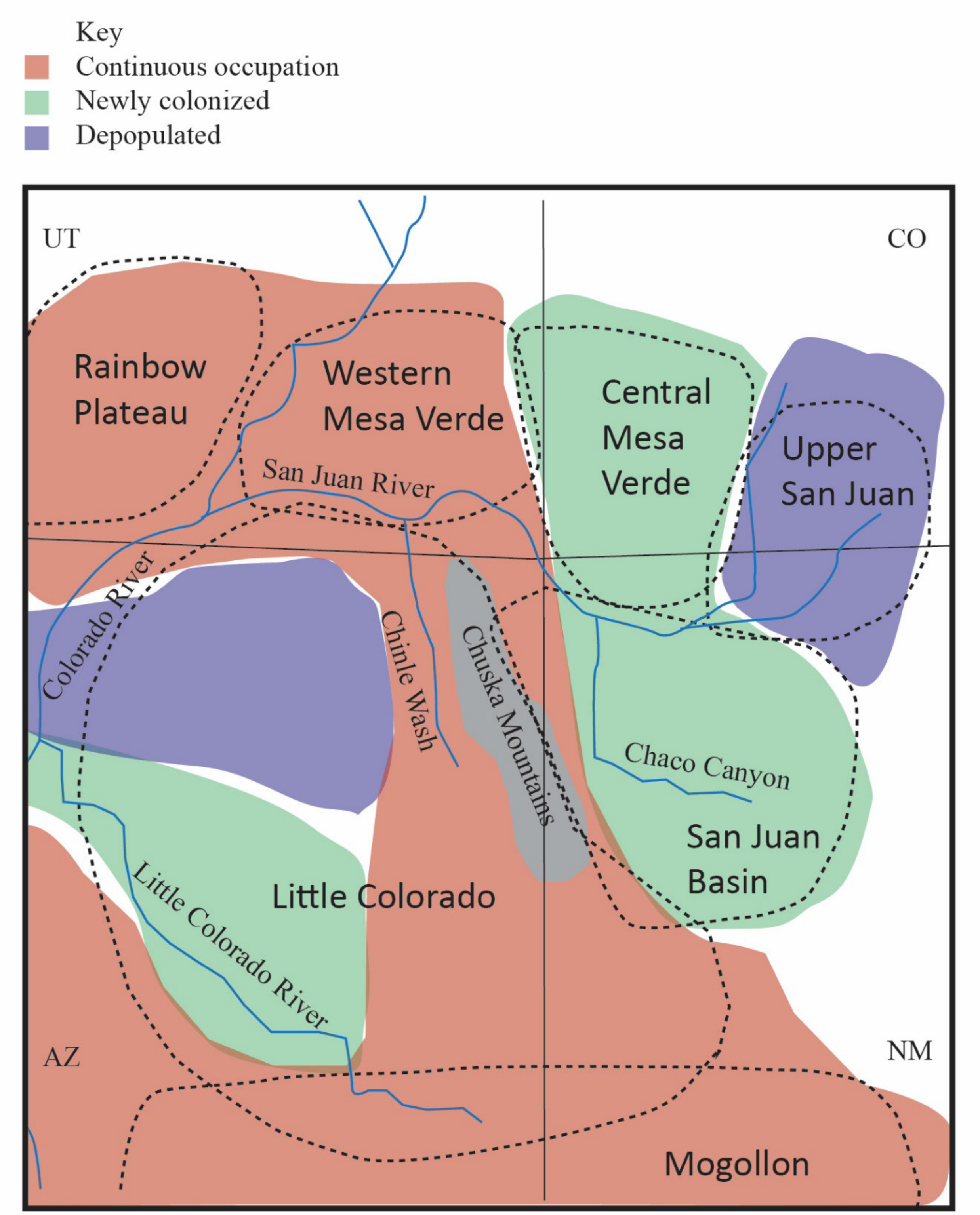

Figure 18.6. Map of cultural regions across the Southwest and changes to their populations during the Basketmaker III period. (Adapted from Schachner et al. 2012:Figure 1.1.)

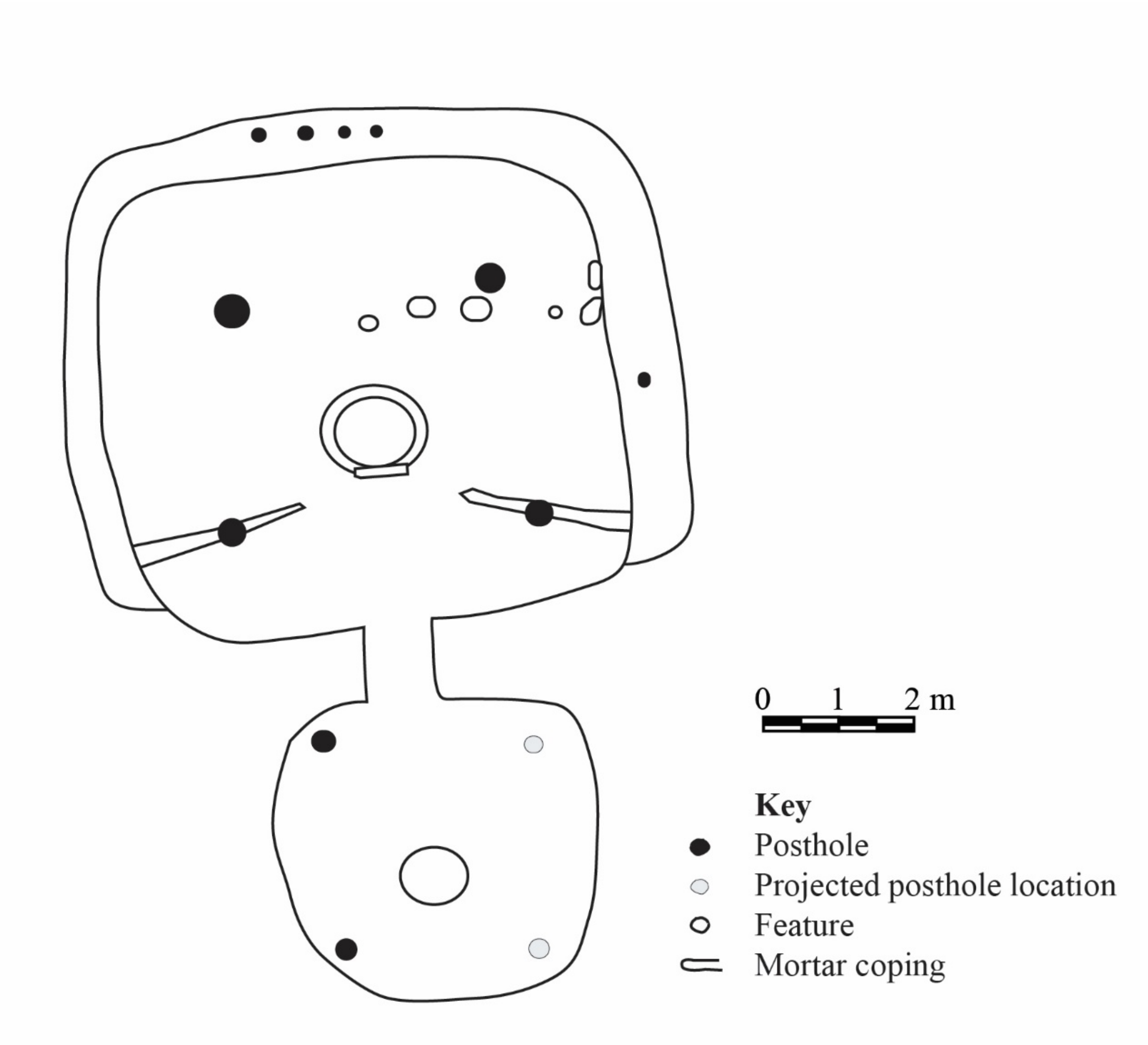

Figure 18.7. Example of the Basketmaker III pithouse bench-supported roof style shared between the Mesa Verde and Chuska Valley regions. Plan view of Pithouse 2 at Rusty Ridge Hamlet (5MT2848). (Adapted from Kane and Gross 1986:Figure 2.35.)

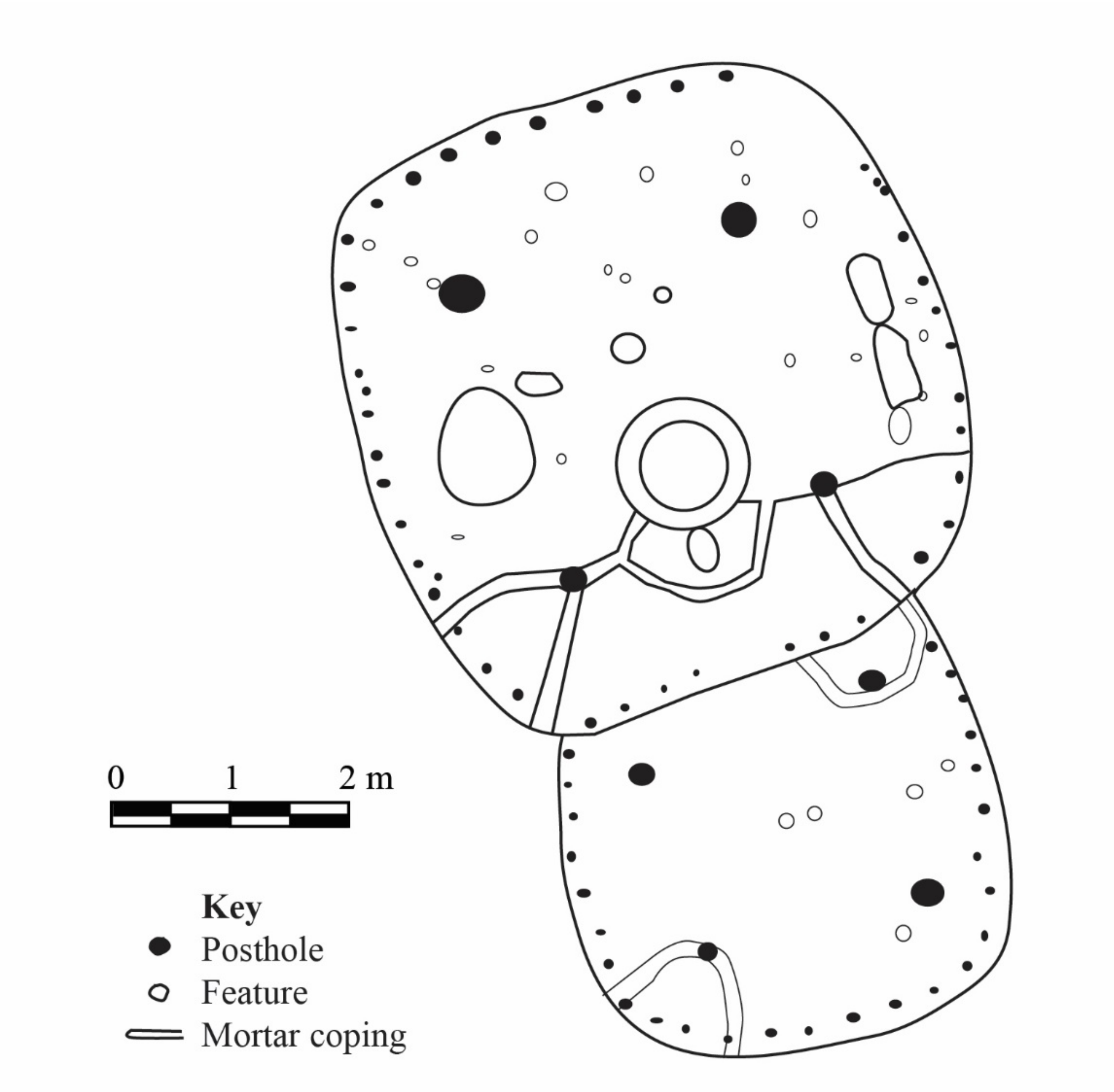

Figure 18.8. Jacal-style wall pithouse from Pueblo Vaca Apestosa (42SA8543) Melloy Village, southeast Utah (adapted from Neily 1982: Figure 51).

Table 18.1. List of Basketmaker III Architectural Features by Functional Type Investigated during the Basketmaker Communities Project.

Structure Type	Count
Great Kiva	1
Pithouse	20
Surface/Pit Room	18
Stockade	3
Total	42

Table 18.2. Pueblo I and Pueblo II period Architecture Investigated during the Basketmaker Communities Project.

Site Number	Structure Name	Period	Date Range (A.D.)	Description
5MT10718	Pithouse 107	Pueblo I	725–900	Standard single pit structure
5MT10718	Pit Room 108	Pueblo I	725–900	Slab-lined storage room
5MT10684	Kiva 108	Pueblo II	920–1140	Kiva with earthen bench and masonry pilasters
5MT10686	Room 111	Pueblo II	920–1180	Masonry surface room in roomblock
5MT3875	Room 111	Pueblo II	1045–1095	Isolated masonry surface room
5MT10687	Kiva 113	Pueblo III	920–1280	Kiva with earthen floor

Table 18.3. Attributes of the Basketmaker III Architectural Typology.

Attribute
Double vs. Single Chamber
Floor Area
Depth

Table 18.4. Basketmaker III Architectural Types.

Architecture Type	Description	Diameter (m) (Main Chamber)	Area (m^2)	Depth (m)	Functional Category*
Great Kiva	Roofed communal architecture	>10	>80	>0.50	Public architecture
Dance Circle	Unroofed communal architecture	>10	>80	<0.50	Public architecture
Oversized Pithouse	Massive permanent pithouse with domestic features and extra storage	>7	>130	>1.00	Permanent housing
Large Shallow Double	Seasonal pithouse	>5	>30	<0.50	Temporary housing
Large Single	Common year-round pithouse	>6	>20	>0.50	Permanent housing
Large Shallow Single	Seasonal pithouse	>5	>20	<0.50	**Temporary housing**
Double-Chambered Pithouse	Common year-round pithouse	<6	15–50	>0.50	Permanent housing
Small Shallow Double	Cooking, ritual, etc.	<3.5	<15	<0.50	Specialized use
Standard Single	Year-round pithouse	2.3–4.6	6–20	0.60–1.30	Permanent housing
Single Shallow	Seasonal pithouse	4–5.5	17–18	<0.50	**Temporary housing**
Pit Room (Sometimes in Roomblock)	Small surface room	<3	<6	0.20–0.70	Storage
Stockade	Perimeter fence	25–45	254–962	0	Delineation of domestic space

***Bolded** text: functional category based on Basketmaker Communities Project findings.

Table 18.5. Basic Attributes, Occupation Period, and Structure Type of Basketmaker III Structures Investigated for the Basketmaker Communities Project.

Site Number	Structure Name	Structure Type	Diameter (m) (Main Chamber)	Floor Area (m^2)	Depth (m)	Occupation period*	Date Begin (A.D.)	Date End (A.D.)
5MT10631	Pithouse 101-102-114	Double-chambered pithouse	5.25	32.8	0.93	LB3	660	690
5MT10631	Block 100 post alignment	Stockade/ fence	30?	30?		LB3		
5MT10632	Pithouse 101	Double-chambered pithouse	5	30	1.1	LB3		
5MT10647	Pithouse 236	Double-chambered pithouse	5	28.98	0.78	MB3	600	660
5MT10647	Pithouse 309	Double-chambered pithouse	4.3	21.52	0.85	MB3	600	660
5MT10647	Pithouse 311	Double-chambered pithouse	3.5	15.91	0.52	MB3	600	660
5MT10647	Pithouse 505-508	Double-chambered pithouse	4.9	23.76	1.1	MB3	600	660
5MT10647	Dillard great kiva	Great kiva	11.5	103.87	1.3	MB3/LB3	600	725
5MT10647	Pithouse 312-324	Large shallow double-chambered pithouse	6.3	40.25	0.35	LB3	660	725
5MT10647	Pithouse 232	Large shallow single-chambered pithouse	6.2	30.19	0.3	MB3	600	660
5MT10647	Pithouse 239	Large shallow single-chambered pithouse	5	19.63	0.35	MB3	600	660
5MT10647	Pithouse 313	Double-chambered pithouse	5.5	23.76	0.9	MB3	600	660
5MT10647	Pit Room 124	Pit room	1.8	2.54	0.38	EB3	420	600
5MT10647	Pit Room 228	Pit room	2.4	4.5	.5	MB3	600	660
5MT10647	Pit Room 317	Pit room	1.5	1.5	0.36	MB3	600	660

Site Number	Structure Name	Structure Type	Diameter (m) (Main Chamber)	Floor Area (m^2)	Depth (m)	Occupation period*	Date Begin (A.D.)	Date End (A.D.)
5MT10647	Pit Room 330	Pit room	1.8	2.54	0.29	MB3	600	660
5MT10647	Pit Room 331	Pit room	1.5	1.77	0.27	MB3	600	660
5MT10647	Pit Room 332	Pit room	2	3.14	0.17	MB3	600	660
5MT10647	Pit Room 333	Pit room	1.65	2.13	0.23	MB3	600	725
5MT10647	Pithouse 205-226	Double-chambered pithouse	5	35.89	0.85	MB3	600	660
5MT10647	Pithouse 220-234	Double-chambered pithouse	4.75	33.98	0.7	MB3	600	660
5MT10647	Pithouse 231	Standard single-chambered pithouse	4.5	15.9	0.9	MB3	600	660
5MT10647	Block 200 post alignment	Stockade/ fence	40?	35?		MB3		
5MT10647	Block 300 post alignment	Stockade/ fence	30?	30?		MB3		
5MT10709	Pithouse 106-111	Double-chambered pithouse	5.5	23.76	1.25	MB3	570	670
5MT10709	Pit Room 115	Pit room	1.7	2.27	0.44	MB3	570	670
5MT10711	Pithouse 101-103	Oversized pithouse	8.2	100.42	1.26	MB3/LB3	560	770
5MT10711	Pit Room 110	Pit room	2.8	6.16	0.35	LB3	560	770
5MT10711	Pit Room 116	Pit room	2.75	5.94	0.3	LB3	560	770
5MT10711	Pit Room 117	Pit room	2.4	4.5	0.1	LB3	560	770
5MT10736	Pit Room 108	Pit room	1.5	1.77	0.14	MB3	535	650
5MT10736	Pit Room 109	Pit room	1.5	1.77	0.2	MB3	650	720
5MT10736	Pithouse 111	Single-chambered pithouse	4.5	15.9	1.24	LB3	650	720
5MT2032	Pithouse 110	Double-chambered pithouse	4.25	23.13	1.15	LB3	640	740
5MT2032	Pit Room 113	Pit room	2.1	3.46	0.18	LB3	640	740
5MT3875	Pit Room 131	Pit room	1.3	1.32	0.27	LB3	640	720

Site Number	Structure Name	Structure Type	Diameter (m) (Main Chamber)	Floor Area (m^2)	Depth (m)	Occupation period*	Date Begin (A.D.)	Date End (A.D.)
5MT3875	Pit Room 132	Pit room	2.3	4.15	0.24	LB3	640	720
5MT3890	Pithouse 103	Double-chambered pithouse	5	25	0.7	LB3	605	650
5MT3890	Pithouse 201	Double-chambered pithouse	6	48	0.8	LB3	650	725
5MT3890	Pithouse 101	Oversized pithouse	8.5	105.43	1.27	LB3	650	725
5MT3890	Pit Room 202	Pit room	2	2.2	.3	LB3	605	725
5MT3890	Pit Room 102	Pit room in roomblock	2	2.2	0.3	LB3	650	725

*Occupation Period: EB3 = early Basketmaker III phase (A.D. 420–600), MB3 = mid-Basketmaker III phase (A.D. 600–660), and LB3 = late Basketmaker III phase (A.D. 660–750).

Table 18.6. Basketmaker Communities Project Basketmaker III Structure Attributes Associated with Architectural Function.

Function	Site Number	Structure Name	Structure Type	Remodeling	Hearth	Storage	Ritual	Specialized Activity
Public	5MT10647	Dillard great kiva	Great kiva	Extensive remodeling, roof replaced, three floors, one use surface	No	No	3 vaults, 2 sipapu, clay pits	Ritual gathering 60+ people, lithic reduction
Permanent Housing	5MT10631	Pithouse 101-102-114	Double-chambered pithouse	Extensive remodeling, roof replaced	Yes	Pits	Sipapu	Sleeping chamber
Permanent Housing	5MT10647	Pithouse 205-226	Double-chambered pithouse	Some remodeling	Yes	Bins, pits	Vault, sipapu	Lithic reduction
Permanent Housing/ Food Preparation	5MT10647	Pithouse 220-234	Double-chambered pithouse	Some remodeling	Yes	Bins, pits	Sipapu	Food storage and preparation
Permanent Housing	5MT10647	Pithouse 231	Standard single-chambered pithouse	None	Unknown	Pits	Unknown	
Permanent Housing	5MT10647	Pithouse 236	Double-chambered pithouse	None	Yes	Unknown	Unknown	
Permanent Housing	5MT10647	Pithouse 309	Double-chambered pithouse	Some remodeling	Yes	Pits	Complex sipapu/vault	
Permanent Housing	5MT10647	Pithouse 311	Double-chambered pithouse	None	Yes	Pits	Single sipapu	
Permanent Housing	5MT10647	Pithouse 313	Double-chambered pithouse	Some remodeling	Yes	Unknown	Double sipapu	
Permanent Housing	5MT10647	Pithouse 505-508	Double-chambered pithouse	Some remodeling	Unknown	Unknown	Unknown	
Permanent Housing	5MT10709	Pithouse 106-111	Double-chambered pithouse	Some remodeling	Yes	Unknown	Unknown	
Permanent Housing	5MT10711	Pithouse 101-103	Oversized pithouse	Enlarged extensive remodeling, roof replaced, two floors	Yes	Bins, pits	Vault, sipapu	Textile production, pottery production
Permanent Housing	5MT10736	Pithouse 111	Standard single-chambered pithouse	Some remodeling	Yes	Pits	Sipapu	
Permanent Housing	5MT2032	Pithouse 110	Double-chambered pithouse	Extensive remodeling, two floors	Yes	Bins, pit	Unknown	

Function	Site Number	Structure Name	Structure Type	Remodeling	Hearth	Storage	Ritual	Specialized Activity
Permanent Housing	5MT3890	Pithouse 101	Oversized pithouse	Unknown	Unknown	Unknown	Unknown	
Permanent Housing	5MT3890	Pithouse 103	Double-chambered pithouse	Unknown	Unknown	Unknown	Unknown	
Permanent Housing	5MT3890	Pithouse 201	Double-chambered pithouse	Unknown	Unknown	Unknown	Unknown	
Permanent Housing	5MT5891	Pithouse 101	Double-chambered pithouse	Unknown	Unknown	Unknown	Unknown	
Storage	5MT10647	Pit Room 124	Pit room	None	No	No	No	
Storage	5MT10647	Pit Room 228	Pit room	Some remodeling	Yes	Pit	No	Food preparation
Storage	5MT10647	Pit Room 317	Pit room		No	No	No	
Storage	5MT10647	Pit Room 330	Pit room	None	No	No	No	
Storage	5MT10647	Pit Room 331	Pit room	None	No	No	No	
Storage	5MT10647	Pit Room 332	Pit room	None	No	No	No	
Storage	5MT10647	Pit Room 333	Pit room	None	No	No	No	
Storage	5MT10709	Pit Room 115	Pit room	None	No	No	No	
Storage	5MT10711	Pit Room 110	Pit room in roomblock	Salvaged	No	No	No	
Storage	5MT10711	Pit Room 116	Pit room in roomblock	Some remodeling	No	No	No	Ornament production
Storage	5MT10711	Pit Room 117	Pit room in roomblock	Added, salvaged	No	Bin	No	Pottery production
Storage	5MT10736	Pit Room 108	Pit room	Salvaged	No	No	No	
Storage	5MT10736	Pit Room 109	Pit room	None	No	No	No	
Storage	5MT2032	Pit Room 113	Pit room	None	No	Pit	No	Pottery production
Storage	5MT3875	Pit Room 131	Pit room	None	No	No	No	
Storage	5MT3875	Pit Room 132	Pit room	None	No	No	No	
Storage	5MT3890	Pit Room 202	Pit room		Unknown	Unknown	Unknown	
Storage	5MT3890	Pit Room 102	Pit room in roomblock		Unknown	Unknown	Unknown	
Temporary Housing	5MT10647	Pithouse 232	Large shallow single-chambered pithouse	Some remodeling	Yes	Pits	No	
Temporary Housing	5MT10647	Pithouse 239	Large shallow single-chambered pithouse	None	Yes	Unknown	No	
Temporary Housing	5MT10647	Pithouse 312-324	Large shallow double-chambered pithouse	Some remodeling	Yes	Bin, pits	No	

Table 18.7. Basketmaker Communities Project Basketmaker IIII Structure Attributes Associated with Closing Patterns.

Site Number	Structure Name	Features	Sand	Assemblage*	Decommissioning Process	Fragmentary Human Remains in Fill
5MT10631	Pithouse 101-102-114	Cleaned out	Feature	P,S,D, turkey burial	Burned	Yes
5MT10647	Dillard great kiva	NA	Floor and features	P,S,D	Burned	
5MT10647	Pit Room 124	NA	No	D	Burned	
5MT10647	Pit Room 228	Hearth clean, pits clean	No	P	Burned	
5MT10647	Pit Room 317	N/A	No	C	Not burned	
5MT10647	Pit Room 330	N/A	No	C	Not burned	
5MT10647	Pit Room 331	N/A	No	C	Not burned	
5MT10647	Pit Room 332	N/A	No	C	Not burned	
5MT10647	Pit Room 333	N/A	No	C	Salvaged	
5MT10647	Pithouse 205-226	Hearth clean, pits clean	Floor and features	S	Burned lightly	
5MT10647	Pithouse 220-234	Hearth clean, pits refilled	Floor and features	S, D	Burned	
5MT10647	Pithouse 231	Hearth intact, pit clean	Floor and features	C	Burned	
5MT10647	Pithouse 232	Hearth intact, pits clean	Features	C	Burned	Yes
5MT10647	Pithouse 236	Hearth intact	No	C	Not burned	
5MT10647	Pithouse 239	Hearth clean	Floor and features	C	Not burned	Yes
5MT10647	Pithouse 309	Hearth refilled, ashpit intact	Floor and features	S,D Dog burial	Burned	Yes
5MT10647	Pithouse 311	Hearth intact, pits refilled	Floor and features	S	Burned	
5MT10647	Pithouse 312-324	Hearth intact, pits refilled	No	P,S	Burned lightly	
5MT10647	Pithouse 313	Hearth intact, pits clean	Features	P	Burned	
5MT10647	Pithouse 505-508	Unknown	Unknown	C	Burned	
5MT10709	Pit Room 115	NA	No	C	Not burned	
5MT10709	Pithouse 106-111	Hearth clean	Floor	D	Burned	
5MT10711	Oversized Pithouse 101-103	Hearth intact, ashpit clean	Sand	P,S,D	Burned	Yes
5MT10711	Pit Room 110	NA	No	S	Salvaged	
5MT10711	Pit Room 116	NA	No	P	Salvaged	
5MT10711	Pit Room 117	NA	No	P	Burned, salvaged	
5MT10736	Pit Room 108	NA	No	C	Salvaged	
5MT10736	Pit Room 109	NA	No	C	Not burned	
5MT10736	Pithouse 111	Hearth and ashpit cleaned out	No	P,S	Burned	Yes
5MT2032	Pit Room 113	NA	No	P,S	Burned	
5MT2032	Pithouse 110	Hearth intact, pit cleaned out	Floor and features	P,D	Burned	

Site Number	Structure Name	Features	Sand	Assemblage*	Decommissioning Process	Fragmentary Human Remains in Fill
5MT3875	Pit Room 131	NA	No	C	Burned	
5MT3875	Pit Room 132	NA	No	C	Burned	
5MT3890	Oversized Pithouse 101	Unknown	Unknown	Unknown	Burned	
5MT3890	Pit Room 102	Unknown	Unknown	Unknown	Burned	
5MT3890	Pit Room 202	Unknown	Unknown	Unknown	Burned	
5MT3890	Pithouse 103	Unknown	Unknown	Unknown	Burned	
5MT3890	Pithouse 201	Unknown	Unknown	Unknown	Burned	

*P=primary refuse, S=secondary refuse, D=de facto assemblage, C=cleaned out.

Table 18.8. Roofing Styles of Basketmaker Communities Project Basketmaker III period Structures.

Site Number	Structure Name	Roofing Style*
5MT10631	Pithouse 101-102-114	**4-post bench-leaner**
5MT10647	Dillard great kiva	4-post/cribbed
5MT10647	Pit Room 124	Domed/cribbed
5MT10647	Pit Room 228	**Slab and post domed**
5MT10647	Pit Room 317	Unknown
5MT10647	Pit Room 330	Domed/cribbed
5MT10647	Pit Room 331	Domed/cribbed
5MT10647	Pit Room 332	Domed/cribbed
5MT10647	Pit Room 333	Domed/cribbed
5MT10647	Pithouse 205-226	**4-post jacal**
5MT10647	Pithouse 220-234	**4-post bench-leaner**
5MT10647	Pithouse 231	4-post/cribbed
5MT10647	Pithouse 232	**12-post bench-leaner**
5MT10647	Pithouse 236	Post/unknown
5MT10647	Pithouse 239	Unknown
5MT10647	Pithouse 309	Unknown
5MT10647	Pithouse 311	Post/unknown
5MT10647	Pithouse 312-324	**4-post bench-leaner**
5MT10647	Pithouse 313	Post/unknown
5MT10647	Pithouse 505-508	**4-post bench-leaner**
5MT10709	Pit Room 115	Slab and post domed
5MT10709	Pithouse 106-111	Unknown
5MT10711	Pit Room 110	**Slab and post domed**
5MT10711	Pit Room 116	Unknown
5MT10711	Pit Room 117	**Slab and post domed**
5MT10711	Pithouse 101-103	**4-post bench-leaner**
5MT10736	Pit Room 108	Unknown
5MT10736	Pit Room 109	**Slab and post domed**
5MT10736	Pithouse 111	Unknown
5MT2032	Pit Room 113	**Slab and post domed**
5MT2032	Pithouse 110	4-post/cribbed
5MT3875	Pit Room 131	Unknown
5MT3875	Pit Room 132	Unknown
5MT3890	Pit Room 202	Unknown
5MT3890	Pithouse 101	Unknown
5MT3890	Pithouse 103	Unknown
5MT3890	Pithouse 201	Unknown
5MT3890	Roomblock 102	Unknown

* Confirmed roofing styles in **bold**.

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Chapter 19

Chronology and Occupational History

by Shanna R. Diederichs

Introduction

The Basketmaker III period has not previously been approached at the settlement scale in the central Mesa Verde region for several reasons related to chronological imprecision. Though dozens of Basketmaker III sites have been tested or excavated in the region, they have been investigated in isolation under cultural resource mitigation projects leaving them with little settlement context. On rare occasions, sites have been discussed in a settlement framework, but the lack of reliable early Pueblo dating methods has made Basketmaker III occupations difficult to confirm and/or refine into occupation sequences. The Basketmaker Communities Project differs from previous Basketmaker III studies in the central Mesa Verde region in three ways that allow for the first reconstruction of a settlement-scale occupation history: (1) the refinement of Basketmaker III surface dating methods, (2) application of geophysical imaging at a broad scale, and (3) a large investment in numerous and overlapping absolute dating methods of tested contexts.

One of the primary objectives of the Basketmaker Communities Project is to develop dating methods applicable to the Basketmaker III period to refine site occupation chronologies (See Chapter 1 Introduction). The lack of Basketmaker III dating precision was identified by researchers involved with the Village Ecodynamics Project (Village Project), a paleodemographic reconstruction for a 65-square–kilometer portion of the central Mesa Verde region (Ortman et al. 2007; Schwindt et al. 2016; Varien et al. 2007). Based on the available calibration data, Village Project researchers subdivided the ancestral Pueblo occupation into 14 modeling periods dating between A.D. 600 and 1280. Most of these periods were 40 years in duration; however, the initial period, which corresponds to Basketmaker III, was 125 years in duration, more than three times longer than the average.

This inability to subdivide the Basketmaker III period into shorter chronological intervals is problematic because artifact accumulations associated with residences dating to this period suggest that many were only inhabited for 8–15 years (Varien and Ortman 2005). This means that, over the course of the initial Village Project modeling period of 125 years, each family lineage could have built, inhabited, and left behind 9–16 pit houses that look "contemporaneous" with respect to the Village Project calibration dataset. Thus, even though the most common site type in the Village Project database is a Basketmaker III habitation, the average momentary population of this period may have been the lowest of the entire sequence.

The Basketmaker Communities Project approaches the Village Project Basketmaker III chronology questions on a localized scale. To determine how many people "seeded" the Basketmaker Communities Project area in the sixth century A.D. or how fast the population actually grew during the following seventh century, it was necessary to refine and apply various spatial and chronological assessment methods. These include distinguishing shorter archaeological phases from surface remains, refining household estimates for each site, and applying overlapping absolute dating methods to clarify the sequence and use life of Basketmaker III pit structures. The result is an occupation sequence that begins with short forays by Basketmaker III farmers into the study area between A.D. 420 and 575, continues with a small group of homesteaders willing to construct a communal great kiva shortly after A.D. 600, and ends with an eightfold increase in the community's population by the time the great kiva is decommissioned a century later.

Chronological information from Pueblo I and Pueblo II/Pueblo III period sites investigated during the project provide evidence for continuity of occupation in the study area through the early twelfth century and a comparative set of data to assess the anthropogenic impacts of Basketmaker III homesteading on later Pueblo occupations.

Dating Results

Dating by Stratigraphy

Stratigraphy may be used to detect the existence of multiple occupations or components at a site, determine the length of occupation of a settlement, or to relatively date cultural deposits and construction episodes. Stratigraphic dating of occupations in the Basketmaker Communities Project study area was complicated by eolian deflation at the landscape level and modern disturbance at certain sites. As such, stratigraphy was not useful in detecting the existence of multiple occupations or determining the length of occupations. Instead, stratigraphic dating was only used to date past events relative to one another in deeply excavated settings such as pit structures and deep midden deposits.

Deflated Stratigraphy

The sediments in the Basketmaker Communities Project study area vary with physiography. The Basketmaker III occupants of the district generally located their habitation sites on patches of soil deep enough and fertile enough to support maize and other crops. The most extensive areas of good farmland are on upland ridges, where there are continuous and often deep deposits of eolian-derived silty loam soils. These soils are collectively known as the Mesa Verde loess (Arrhenius and Bonatti 1965), which was primarily deposited during the Pleistocene Era. Based on Basketmaker Communities Project excavations, the Mesa Verde loess deposit ranges from 1.5 to 1.8 m thick across the study area.

A geomorphology study determined that ridgetop loess soils in the study area are generally deflated due to scouring wind erosion and have likely been slowly deflating for the last 10,000 years (see Chapter 4). Areas that might have developed stratified deposits during the ancestral Pueblo occupation, such as middens, were constantly stripped of parent loess sediments. Only heavier cultural material, such as construction stone and lithic and pottery, were left behind. The result is the compression of occupation deposits from the last 1,400 years into the upper 5 to 15 cm of loose sediment across archaeological sites. In addition, recent chaining and/or plowing mixed surface deposits on all tested sites up to 25 cm deep. Because occupation deposits are compressed into a single stratigraphic layer and often mixed, stratigraphic dating methods could not be applied to surface deposits. Instead, surface collections from the project are assumed to represent a mix of all occupations at any given site.

Compromised Stratigraphy

Stratigraphic dating could not be applied in any form to three of the five Hatch sites (5MT2037, 5MT10686, and 5MT10687) because they were heavily disturbed by mechanical looting. In 1986 Richard McClellan and other locals from Montezuma County systematically destroyed all four sites in an effort to collect saleable prehistoric artifacts. Notes taken by McClellan (1986) during the site's excavation along with a verbal description of the digging were passed on to Jerry Fetterman of Woods Canyon. This information was summarized when the complex was rerecorded in 1991 (Fetterman and Honeycutt 1994). During the pot-hunting episode, McClellan sketched and described four roomblocks, six kivas, one pithouse, and a plaza (see Chapters 13–16). He reported digging several of these structures with a bulldozer; he cleared away standing walls to access roomblock floors and removed upper kiva walls while digging large shallow pits to find kiva floors. Middens were not directly targeted at the time.

Geophysical imaging, augering, and testing during the Basketmaker Communities Project confirmed that of the 12 structures mentioned by McClellan, only a fragment of one kiva floor and a section of one roomblock remained intact. The other 10 structures appear to have been completely obliterated. Testing also confirmed that masonry stone was pushed out of context or buried in excavation pits and that subsurface deposits in the vicinity of structures were excavated up to 3 m deep, often down to underlying bedrock. With geophysical imaging, Crow Canyon found one kiva (Structure 108) on the Dry Ridge site (5MT10684) that escaped excavation in 1996, but even in this structure, the upper walls and fill had been compromised by bulldozer activity. No stratigraphic dating was applied to the Hatch group based on the pervasive mechanical disturbance.

Stratigraphic Dating Results

Stratigraphic data did contribute relative dating information at other sites in deeply excavated contexts such as subterranean pit structures. Stratified prepared and unprepared use surfaces were used to reconstruct the long use lives of the great kiva (Structure 102) at the Dillard site (5MT10647), the oversized pithouse (Structure 101-103) at the Ridgeline site (5MT10711), and the domestic pithouse (Structure 101-102) at Mueller Little House (5MT10631).

The construction of the Dillard great kiva truncated a cultural deposit that likely represents an earlier pithouse in the same location. Once built, the great kiva was occupied for over a century (see AMS and archaeomagnetic dating below) on three stratified surfaces including a floor of unmodified native sediment, a plastered surface, and a sand deposit surface. During the great kiva's final decommissioning, an expedient use-surface was created. Artifacts in the naturally accumulating fill above the collapsed great kiva show that the site continued to be visited by ancestral Pueblo people for the next 400 years.

Oversized Pithouse 101-103 at the Ridgeline site showed stratigraphic signs of a long occupation (see AMS and archaeomagnetic dating below) and heavy remodeling. Three floor surfaces were stratified in the main chamber. A smaller roof support configuration on the deepest floor suggests that the structure may have originally been an average-sized habitation. Two later floors, one built of mottled construction fill and the other of thick plaster, represent sequential occupations of the oversized pithouse. This corresponds with the super-positioning of a native-sediment floor below a mottled construction-fill floor in the antechamber associated with the addition of construction deposits to the walls and chamber-dividing bulk.

Stratified floors were also identified in averaged-sized pithouses at hamlet sites. Two floor surfaces were identified in each chamber of the standard-sized pithouse (Structure 101-102) at the Mueller Little House. Stratified floors and remodeling of pithouses at hamlet sites suggest that some households invested in remodeling to extend the use lives of their homes.

Stratigraphic data also established that nearly all pit structures tested as part of the Basketmaker Communities Project were purposefully collapsed at the end of their use life rather than left standing for any period of time. These data consist of collapsed, often burned, roofing material that rested directly on structure floors with no intervening naturally deposited sediment. This is a consistent pattern in Basketmaker III structures and holds true for the Dillard great kiva, the oversized pithouse at the Ridgeline site, all standard pithouses in the study area, all temporary pithouses, and most of the storage pit rooms. This practice also holds true in later components in the study. Pueblo I and Pueblo II pithouse, pit room, and kiva roofs were collapsed directly onto structure floors.

In some cases, collapsed pithouse depressions were filled with midden deposits. This phenomenon is considered stratigraphic evidence that a site continued to be occupied despite the decommissioning of a particular pithouse. This pattern was only found at two sites: the Switchback site and the Dillard site. Both sites have, or are part of, pithouse clusters. The midden deposit in Pithouse 110 at the Switchback site (5MT2032) suggests that it was decommissioned before the oversized Pithouse 101-103 on the adjacent Ridgeline site. At the Dillard site, midden was deposited in collapsed pithouse depressions in Block 200 (Pithouses 205-226, 220-234, 232, and 239) and in Block 300 (Pithouses 309 and 311). This pattern indicates either consecutive occupation in those blocks during the mid-Basketmaker III phase or purposeful midden deposit in pithouse depressions during the communal gatherings at the Dillard site during the late Basketmaker III phase (see Dating with Pottery below).

Dating by Architectural Style

Ancestral Pueblo building styles are well documented through time for the Mesa Verde region and can be used to categorize construction into general occupation periods. Certain architectural attributes identified during the Basketmaker Communities Project were particularly diachronic.

Basketmaker III

Though Basketmaker III architecture varies widely and can be difficult to discern (see Chapter 18 Architecture) some architectural elements are clear temporal markers.

The most diagnostic architectural element of Basketmaker III is the double-chambered pithouse, which was only constructed between A.D. 500 and 740 (Reed 2000:53). Double-chambered pithouses can vary radically in size (5–80 m^2) and depth (0.15–1.6 m deep), but always consist of two connected semi-subterranean earthen rooms divided by a constructed or natural wall (Figure 19.1). During the Basketmaker Communities Project, double-chambered pithouses were located with electrical resistivity imaging and soil augering at 11 sites, including seven sites that were not further investigated during the project (5MT3882, 5MT3890, 5MT3907, 5MT10632, 5MT10637, and 5MT10674, 5MT10721. The only excavated Basketmaker III–era sites where double-chambered pithouses were not identified include the Shepherd site and the TJ Smith site. It is suspected that any pithouses at the Shepherd site were not captured in the electrical resistivity survey area and the pithouse at the TJ Smith site is a deep single-chambered pithouse dating to the late Basketmaker III phase (see archaeomagnetic and AMS dating below).

There are also indications that agricultural storage shifted from a combination of small, isolated pit rooms and internal pithouse storage to robust slab-lined contiguous roomblocks during the Basketmaker III period (Gross 1992). Early in the project, a demographic reconstruction was created for Basketmaker III sites (n = 69) in the study area (Ortman et al. 2016) based on proportions of seed jars and painted bowl rims (see Pottery Dating below). This produced two Basketmaker III demographic phases: Phase 1 A.D 600–650 and Phase 2 A.D. 650–725, which are generally comparable to the mid-Basketmaker III phase and the late Basketmaker III phase. From this demographic reconstruction we considered extramural storage space through time by multiplying the area of sandstone and adobe construction material and the density of sandstone slabs in the concentration (area x density of sandstone slabs). The density of sandstone slabs was incorporated into the formula to account for mechanical plowing disturbance at half the sites, presuming that the total number of slabs would not be as affected by plowing as the area of the concentration.

The study found relatively little evidence of aboveground storage during the mid-Basketmaker III phase, with surface storage construction material only encompassing a total of 275 m^2, or 25 m^2 per estimated household. In contrast, there is a mean of 49 m^2 of extramural storage area per estimated household dating to the late Basketmaker III phase. This supports earlier findings (Gross 1992) in suggesting that agricultural storage gradually shifted to extramural surface roomblocks constructed of sandstone slabs over the course of Basketmaker III period. This change may be related to the shift from flint/pop to dent/flour maize varieties (Kohler and Glaude 2008) (the former were easily stored as seeds/kernels in jars, whereas the latter were best stored on the cob.)

However, there is evidence that shifts in maize varieties are not the only influencing factors in the trend toward robust extramural storage because such shifts are not consistent across the population. When estimated numbers of households at each site are compared to the storage capacity the overall distribution is statistically log-normal, which means that some households have disproportionate amounts of surface storage compared to other households of the same size.

This finding is important because socioeconomic quantities in both contemporary and ancient societies tend to be log-normally distributed (Abul-Megd 2002; Gomez-Lievano et al. 2012;

Limpert et al. 2001; Ortman et al. 2016). Such distributions are typically seen in income and wealth distributions in societies characterized by private property (Piketty and Saez 2014) and emerging social stratification. As a temporal trend, this pattern suggests that agricultural storage in robust roomblocks increases over the Basketmaker III period, but that the disparities in storage capacity among sites also increases through time in the study area.

Dating with Pottery

The vast majority of the pottery from all Basketmaker Communities Project sites, excluding the Hatch group sites, dates to the Basketmaker III period. The individual site chapters in this volume list the pottery recovered from each site but, in general, the most prevalent formal pottery types are Chapin Gray and Chapin Black-on-white. The Hatch group site pottery assemblages consist of late Pueblo II and early Pueblo III formal types, especially Mancos Black-on-white and Mancos Corrugated.

A number of changes in pottery can be used to divide the Basketmaker III period into earlier and later phases. Using preliminary artifact data from the Basketmaker Communities Project and other regional sites, Scott Ortman and colleagues (2016) developed a method to divide the Basketmaker III period into early (A.D. 600–650) and late (A.D. 650–750) phases based on pottery form changes. Comparison of 17 Basketmaker III period sites in the central Mesa Verde area, including preliminary data from the Dillard site, showed that the ratio of painted bowl to seed jar rims doubles from the earlier to the later Basketmaker III phase. The research by Ortman and colleagues (2016) also included new analysis of collections from well-dated sites housed at the University of Colorado at Boulder from the Yellow Jacket area (Sites 5MT1, 5MT3, 5MT9168, and 5MT9387) (Espinosa 2015) as well as additional analysis of collections from the Payne site (5MT12205).

The data presented here from the Crow Canyon Basketmaker Communities Project excavations (Table 24.4) show a similar pattern, but the shift is not quite as dramatic as that documented by Ortman and colleagues (2016). The ratio for mid-Basketmaker III to late Basketmaker III white ware bowl rims to gray ware seed jar rims increases from 0.52 to 0.68 (Chapter 24).

In addition to these changes in pottery vessel form over time, we document changes in gray ware temper over time, with sand/sandstone temper more common earlier in the Basketmaker III period and igneous rock temper dominating gray ware assemblages by the late Basketmaker III phase (Table 24.15). Both of these pottery characteristics require large assemblages to determine relative time period but could be used together for greater precision in separating earlier from later Basketmaker III period sites.

Tree-Ring Dating

In total, 617 wood samples were collected during the Basketmaker Communities Project and submitted to the Laboratory of Tree-ring Research in Tucson for tree-ring dating.

As recommended by the Laboratory, burned and unburned wood specimens that appeared to contain 30 or more rings were collected for tree-ring dating. All tree-ring dates, as ascertained by the Laboratory, are presented with suffixes that indicate whether a given date is a cutting or a noncutting date. The following suffixes are used by the Laboratory:

B = Bark is present.

L = A characteristic surface patination and smoothness, which develops on beams stripped of bark, is present.

r = Less than a full section is present, but the outermost ring is continuous around the available circumference.

v = A subjective judgment that, although there is no direct evidence of the true outside on the sample, the date is within a very few years of being a cutting date.

vv = There is no way of estimating how far the last ring is from the true outside; many rings may be lost.

+ = One or a few rings may be missing near the outside whose presence or absence cannot be determined because the series does not extend far enough to provide adequate cross dating.

++ = A ring count is necessary beyond a certain point in the series because cross dating ceases.

The suffixes "B: and "r" indicate cutting dates; that is, the year given is the year the tree died. The suffix "v" is considered by many researchers, including the author of this chapter, to be near enough to the year the tree died to be interpreted as a cutting date. The suffix "vv" indicates a noncutting date.

Although tree-ring dating provides calendar dates, not all tree-ring dates indicate the year in which a building was constructed. Techniques and principles used to guide the interpretation of tree-ring dates have been presented by Dean (1982) and Ahlstrom (1985) and have been summarized by Lightfoot (1994:25–26). The basic principles and assumptions used in interpreting the 186 tree-ring dates for the Basketmaker Communities Project are the following:

- Construction usually occurred soon after trees were cut.
- The latest cluster of cutting dates for a structure indicates the trees that were cut to construct that building.
- Earlier clusters of cutting dates indicate beams salvaged from earlier buildings.
- Noncutting dates result from damage to the outside of the beam and do not reflect the year of construction.
- If there are no clusters of cutting dates for a building, the latest cutting date is the best estimate of when the building was constructed.

The Laboratory of Tree-ring Research identified the taxa of all analyzed samples. In addition, archaeobotanical analyst Dr. Karen Adams identified the taxa of an additional 12 charcoal fragments from the Dillard site prior to their submission to the Laboratory of Tree-ring Research Of the 597 identified samples, Juniper (*Juniperus*) wood composed 514 (86 percent) of the samples, 43 samples (7 percent) were pinyon *(Pinus edulis*) wood, and 37 samples (6 percent) were identified as Ponderosa pine (*Pinus ponderosa*). Just three wood samples (.05 percent) were identified as spruce fir, most likely Douglas fir (*Pseudotsuga menziesii*).

Both pinyon and juniper trees would have been readily available in the immediate environment. The lateral strength of pinyon is poor because the wood grain checkerboards horizontally and vertically making it prone to snapping under heavy weight (Karen Adams, personal communication August 15, 2016). Juniper is the superior construction wood for its rot resistance and superior lateral strength; the high incidence of juniper thus reflects a clear preference by builders for this species.

Douglas fir and Ponderosa pine trees did not grow in the Basketmaker Communities Project study area. These timbers would have required transport over a considerable distance. Douglas fir was only used for construction at the Dillard site in the roof of the great kiva and the roof of Pithouse 205-226. Pithouse 205-226 was a standard-sized double-chambered pithouse dating to the mid-Basketmaker III phase. Pithouse 205-226 stands out from other habitation structures of the same period because it was built in a style originating in the western Mesa Verde region of southeast Utah (see Chapter 18). The Douglas fir in the great kiva served as a main support beam holding up the 3-ton stone-and-mortar-capped roof (See Chapter 5). The presence of Douglas fir in the great kiva roof underscores the pre-planned engineering and the communal effort it took to build. Ponderosa pine beams were used in a wider variety of structures: Pithouse 111 at the TJ Smith site, Pithouse 110 at the Switchback site, oversized Pithouse 101-103 at the Ridgeline site, and the great kiva at the Dillard site. All five structures date to the late Basketmaker III phase suggesting that Ponderosa pine became an important resource for the community.

Of the 618 burned beams analyzed by the Laboratory of Tree-ring Research, 46 samples (7 percent) could be dated (Table 19.1). Of the 17 sampled structures, only two were very productive: Pithouse 101-102 from the Mueller Little House and oversized Pithouse 101-103 from the Ridgeline site. Both pithouses date to the late Basketmaker III phase. The disparity in tree-ring dating results between early and late Basketmaker III structures is likely due to changes in decommissioning practices over the course of the period (see Chapter 18). Though early and mid-Basketmaker III populations in the settlement clearly burned structures, they put less effort into burning the roofs completely. As a result, only the exterior rings of roofing beams from the early and mid-Basketmaker III phases burned hot enough to carbonize, leaving the beam interiors susceptible to rot and collapse. The poor quality of early and mid-Basketmaker III samples has profound implications for archaeologists, potentially skewing the Basketmaker III momentary population estimates to the later period. For this reason, it was imperative that we give equal weight to results from other absolute dating methods when reconstructing the settlement history of the project area.

Archaeomagnetic Dating

During the Basketmaker Communities Project excavations, archaeomagnetic dating was applied whenever feasible. Archaeomagnetic dating tracks shifts in the earth's magnetic field in response to changes in the flow of liquid iron in the planet's core (for more information, see the Crow Canyon website https://www.crowcanyon.org/index.php/archaeomagneticdating). By tracking and cross-dating past changes in the location of the magnetic field, geophysicists have reconstructed a series of magnetic polar positions or what is known as the "archaeomagnetic reference curve" (Lengyel 2010:3081). When iron-bearing sediments are superheated, iron particles reorient to the earth's magnetic field at that moment and become fixed in that orientation. This orientation is compared to the archaeomagnetic reference curve to find date ranges associated with that magnetic orientation.

As previously discussed, the soils in the project area are primarily 1.5 to 2.5–m thick Mesa Verde loess. The loess, transported by wind from the southwest, is a fine-grained, permeable, well-drained sediment composed primarily of quartz and iron oxide (Arrhenius and Bonatti 1965). It is especially conducive to archaeomagnetic dating because its fine texture is cohesive for sampling and it has a high iron content.

Fifteen archaeomagnetic samples were analyzed during the Basketmaker Communities Project. Kay Barnett, trained at the Colorado State University Archaeomagnetic Laboratory, collected all samples in the field (Figure 19.2). Samples were processed and dated by Dr. Stacey Lengyel at either the Archaeomagnetic Laboratory at the Illinois State Museum or the Archaeomagnetic Laboratory at East Tennessee State University using the Southwest archaeomagnetic reference curve SWCV2010 (Diederichs and Copeland 2013; Sommer et al. 2014; Sommer et al. 2015; Sommer et al. 2017; Sommer et al. 2018). The magnetic quality of all samples was reportedly very good, and all but two exhibited excellent internal consistency.

Fourteen of the 15 archaeomagnetic samples were taken from hearths built into the floor surfaces of subterranean pit structures (Table 19.2). Most of the hearths were not clay lined or coped but were simple pits excavated into the underlying undisturbed native sediment. These samples date the last and/or the most intense burn in the hearth, providing a near end date for the structure's use. The fifteenth sample was collected from construction fill in the Dillard great kiva, burned during the structure's decommissioning. A 15-cm-thick layer of adobe, presumably peeled from interior walls and ceiling, covered the floor of the great kiva. Small-diameter brush and wood were scattered across this layer of sediment and set on fire. The blaze burned hot enough to fire redden the exposed sediments and provide an archaeomagnetic date of the structure's closing.

The archaeomagnetic sample dates range in length from 30 to 690 years. The more precise (short) date ranges indicate the late use of a pit structure hearth or final decommissioning of the Dillard great kiva. These "event" dates are generally serrated across the seventh and eighth centuries A.D. Hearth dates from Pithouses 220, 239, and 309 at the Dillard site are generally contemporaneous and date to the mid-seventh century, and hearth use in Pithouses 236 and 312 at the Dillard site are slightly later, dating to the late seventh century. The decommissioning of the Dillard great kiva, Pithouse 226 at the Dillard site, and Pithouse 110 at the Switchback site are the latest suite of dates and date to the end of the seventh century–early eighth century.

Accelerator Mass Spectrometry Dating

AMS measures the amount of carbon-14 in an organic sample. Carbon-14 is an unstable isotope produced high in the earth's atmosphere and then absorbed by plant life during photosynthesis, entering the entire food chain (Beta Analytic 2018). Plants and animals retain a constant level of carbon-14 until they die, after which time the carbon-14 isotope decays at a consistent rate.

Radiometric and AMS dating are the two methods used to date organic matter based on measured carbon-14 levels. Advances in nuclear physics over the last 20 years have made AMS the preferred carbon-14 dating method; it requires as little as 20 mg of material and produces a high accuracy and relatively tight date range.

Small, carbonized plant material was found at every tested site on the Basketmaker Communities Project, making AMS the most ubiquitous and comparable dating method for the project. To ensure that AMS dates do not reflect "old wood" and are as accurate as possible, only annual plant materials were targeted for dating. Maize parts were preferentially selected to further confirm samples were of a cultural rather than natural origin; as a domesticated plant, maize requires human planting to reseed and is therefore direct evidence of human farming (Adams 2015).

The Basketmaker Communities Project produced 71 AMS dates (Table 19.3). Nine of these were processed by Mitzi de Martino at the University of Arizona Accelerator Mass Spectrometry Laboratory (Martino 2013). These dates were reported in an uncalibrated format, and Crow Canyon's Laboratory Analysis Manager Kari Schleher calibrated the dates using the University of Oxford OxCal online radiocarbon calibration program (see https://c14.arch.ox.ac.uk/oxcal/OxCal.html). The other five radiocarbon dates were processed by Darden Hood of Beta Analytic, Inc. (Hood 2012, 2013, 2014, 2015, 2016, 2017). By international convention, the modern reference standard for all samples was 95 percent of the carbon-14 activity of the National Institute of Standards and Technology Oxalic Acid (SRM 4990C) and calculated using the Libby carbon-14 half-life (5,568 years). All results were reported in a two-sigma, 95-percent probability range.

The precision of AMS results from the project ranges from 35 to 207 years long, making results difficult to compare. Despite this variation, AMS data contributed to the relative seriation of structures across the study and to the identification of occupation outliers (Figure 19.3).

The Dillard site and the TJ Smith site returned the earliest dates from the project. At the Dillard site, annual plant material from a shallow pit room (Structure 124) dated between A.D. 420 and 575 and, at the TJ Smith site, a similar pit room (Structure 108) dated between A.D. 435 and 610. These two dates represent the only confirmed early Basketmaker III presence in the study area.

AMS results for other Basketmaker III components demonstrate a continuous occupation of the study area from the late sixth century A.D. through the early eighth century A.D. (middle and late Basketmaker III phases). Most AMS dates from the Dillard site cluster between A.D. 550

and 675; only the great kiva (Structure 102) and the unique double-chambered seasonal pithouse (Structure 312-324) returned dates between A.D. 675 and 780.

AMS results identified probable Pueblo I occupations at Site 5MT10718 and Windrow Ruin. The only AMS date from Site 5MT10718 and one of five AMS dates from Windrow Ruin fell into a late eighth-century through ninth-century range.

The Hatch group sites (Dry Ridge, Sagebrush House, and Badger Den) returned expected AMS dates in the eleventh century (Pueblo II period). One date was unexpected: the twelfth- to thirteenth-century date (Pueblo III period) from a field house (Structure 106) at the Shepherd site.

Summary of Dating

Together, the relative and absolute dating methods applied to the Basketmaker Communities Project resulted in a broad comparative, and in some cases nuanced, chronology of occupation. Surface pottery and architectural studies confirmed ancestral Pueblo presence in the area from the Basketmaker III period through the Pueblo III period (generally A.D. 500–1300) and serrated Basketmaker III sites into three phases: early Basketmaker III (A.D. 420–600), mid-Basketmaker III (A.D. 600–660), and late Basketmaker III (A.D. 660–750). Stratigraphic data confirmed long use lives for the largest structures in the study—the Dillard great kiva and the Ridgeline oversized pithouse—and identified pithouses decommissioned and collapsed long before site depopulation (six pithouses at the Dillard site and one at the Switchback site). Nearly one hundred absolute dates were generated between tree-ring, archaeomagnetic, and AMS dating methods, allowing for a fairly precise occupation history (see Occupation History below).

Some of the dating methods failed to contribute to the project's chronological reconstruction as expected. Surface cultural deposits were generally deflated, compressing diagnostic materials and stratified deposits into a single stratum across every site. Almost no stratigraphic data were salvageable from the mechanically disturbed Hatch sites. Tree-ring data contributed little to the project chronology because not every structure produced tree-ring samples, most submitted samples could not be dated, and only a few of the dated samples produced cutting dates.

Using all available dating methods, a series of occupation components was created for each site to capture the estimated date range of every culturally derived deposit (Crow Canyon Archaeological Center 2020). Well-dated contexts are associated with tighter components that reflect direct evidence of continuous occupation by a group of people using the site in a consistent manner. Breaks in occupation or changes in site use mark a new component in these contexts. For poorly dated and/or mixed deposits, such as deflated middens, the associated component reflects the entire ancestral Pueblo date range for the site as generated by Bayesian calibration of pottery types.

We further organized site components into general periods of occupation (Table 19.4) to more easily discuss the occupation history in the study area and to compare analyzed materials between periods. In a few cases, component date ranges did not fall completely into a single period but extended partially into another time range. In those cases, we assessed all dating material from the component to ensure that the preponderance of evidence suggested the occupation fell into the dominant date range. These terms will be used in the following demographic reconstruction and in the analytic and synthetic chapters to follow (Chapters 21–26).

Population Estimates by General Occupation Period

Household estimates were derived for each Basketmaker III general occupation period. Figure 19.4 presents a histogram of settlement sizes, as measured by the estimated number of pithouses present, for the 69 Basketmaker III components in the study area. To generate these estimates, we assumed that each habitation site had at least one pit structure, a pattern confirmed by geophysical imaging and testing across the project (Diederichs and Copeland, 2011, 2012, 2013; Sommer et al. 2014; Sommer et al. 2015; Sommer et al. 2016; Sommer et al. 2017; Sommer et al. 2018). The household estimate was increased when necessary based on the number of pit structure surface depressions, the number of pit structure anomalies identified through geophysical imaging (see Chapter 3 Geophysical Imaging), and/or the number of sandstone and adobe concentrations visible on the site surface. Sandstone and adobe concentrations were relied on as a household indicator even without the presence of a pithouse depression because the shallow and unburned nature of Basketmaker III pithouses makes them difficult to discern on the surface whereas aboveground storage granaries are consistently associated with pithouses on excavated sites (Gross 1992; Wilshusen 1989). The three temporarily occupied seasonal pithouses (Structures 232, 239, and 312-324) and the great kiva (Structure 102) at the Dillard site were not included in household estimates. In all other cases we infer that each pithouse was the primary living space of one household.

In total, 110 Basketmaker III households are estimated for the study area. These households are divided into general occupation phases based on the dating results for each site (Table 19.5). Accumulation studies of Basketmaker III residences suggest households only occupied a pithouse for 8–15 years (Varien and Ortman 2005). To develop momentary household estimates, the number of households in an occupation period is divided by the length of the period divided by the pithouse occupation length of 15 years. Based on ethnographic studies of Neolithic populations around the globe, Wilshusen suggests that early Pueblo societies lived in extended families with an average of seven persons per pithouse (Wilshusen 1999:214). Therefore, the momentary population for each period was generated by multiplying the momentary household estimate by seven.

Occupational History during the Basketmaker III Period

Early Basketmaker III Phase (A.D. 420–600)

Basketmaker III presence in the study area prior to A.D 600 is minimal, seasonal, and possibly even transitory (Figure 19.5). With just one small shallow pit room and one extramural feature dating to this period (5MT10647 and 5MT10736) only short-term activities are evident. Of course, we cannot rule out early Basketmaker III occupation of the 55 unexcavated Basketmaker III components in the study area, but the lack of habitations at tested sites indicates a transitory rather than settled pattern.

The momentary population during early Basketmaker III would likely be less than one. The few households moving through the area were the first wave of migrants into this unfarmed frontier. Their light footprint suggests that they may have simply been testing the agricultural productivity in the vicinity before moving on to other locations.

Mid-Basketmaker III Phase (A.D. 600–660)

Homesteading of the study area began in earnest during the mid-Basketmaker III phase (A.D. 600–660). Multiple dating methods suggest that this occupation was concentrated at the Dillard site but that a few single-household hamlets were also settled in the surrounding area (Figure 19.6). We infer that 17 households (15 percent of all Basketmaker III households) were inhabited during this phase and that about half of these were concentrated at the Dillard site. These estimates produce a momentary population of five households, or 25 to 30 people, during the mid-Basketmaker III occupation phase.

The Dillard Settlement

The first evidence for permanent occupation in the study area is a group of households that homesteaded the Dillard site around A.D. 600 and built a great kiva soon after. Within a generation, up to seven year-round pithouses were contemporaneously occupied at the Dillard site, creating a peak population of approximately 30 to 40 people (Ortman et al. 2016). These households clustered south and north of the great kiva into two "neighborhoods" with shared storage and courtyard space. Each of these "neighborhoods" was likely enclosed by a perimeter fence. After two generations at the site, some of the pithouses were decommissioned and an eighth lone habitation was built 70 m northwest of the core of the site.

Homesteading of Small Hamlets

Based on surface analysis and testing, approximately six hamlets (including Portulaca Point, Ridgeline site, and Windrow Ruin) were also settled in the study area during the mid-Basketmaker III occupation phase. Portulaca Point is a good example of these small hamlets; it includes a lone south to southeast–oriented double-chambered pithouse built along the eastern edge of a ridgetop. Remnants of multiple discontinuous slab-lined rooms and features are scattered north and south of the pithouse, and the slope below is covered by a light midden.

Communal Gathering

It is likely that the aggregated population at the Dillard site and the scattered households living in hamlet sites considered themselves to be part of the same extended community with the great kiva as its focal point. Even in its earliest configuration, the great kiva would have accommodated twice as many occupants than lived at the Dillard site, and two large seasonal pithouses in the southern neighborhood of the Dillard site (Pithouses 236 and 239) would have provided short-term housing for visitors from surrounding hamlets.

Late Basketmaker III Phase (A.D. 660–750)

By A.D. 660, all residents had moved away from the core Dillard site neighborhoods. Despite a resident population, the great kiva continued to function as a community focal point until approximately A.D. 725. During this period, the population in the study area grew exponentially in small hamlets and a few well-resourced multiple-household compounds (Figure 19.7).

Population Growth

Population rose exponentially during the late Basketmaker III phase to an estimated 95 households (85 percent of all Basketmaker III households in the study area) and a momentary population of 22 households, or approximately 110 people, at any given time. These estimates indicate that the small initial population roughly quadrupled between the middle and late Basketmaker III phases, with an implied growth rate of about 8 percent per year.

Researchers have suggested that the rapid increase in Mesa Verde populations between A.D. 600 and 800 was due, at least in part, to robust intrinsic growth calculated from age-at-death distributions of human skeletal samples; specifically, the fraction of individuals at least five years old that died before age 20, often referred to as the juvenility index (Kohler and Reese 2014; Kohler et al. 2008; Wilshusen and Perry 2008). This population growth was likely supported by several improvements in the subsistence economy that only came together around A.D. 600, including the introduction of starchy maize varieties (Kohler and Glaude 2008:97), the adoption of beans, and the development of true cooking pottery (Ortman 2006:102–103). The adoption of this full economic package resulted in a complete vegetable protein mix within a purely agricultural diet (Ortman et al. 2016:234).

While robust intrinsic population growth is likely during the Basketmaker III period in the study area, it does not fully explain the 8-percent per year growth rate. We estimated the maximum intrinsic growth rate for the initial mid-Basketmaker III population by combining the juvenility index for the early Pueblo Northern San Juan (Kohler and Reese 2014:Table S2) with life table information (Bocquet-Appel 2002:Table 2). The resulting estimate is just 1 percent per year. Even if only one-quarter of settlements were inhabited at any given moment, in-migration must have contributed to the dramatic rise of population during the late Basketmaker III phase.

Settlement Patterns and Social Institutions

Initial homesteaders and immigrants alike established dispersed single-household hamlets during the late Basketmaker III phase. Tested examples include the TJ Smith site, the Shepherd site, and the Mueller Little House site. There is some evidence that these hamlets were purposefully spaced apart to provide 10 acres of arable ridgetop between homesteads. Nearest neighbor analysis of these settlements suggests the distribution of farmsteads was much more evenly spaced than would be expected by chance (Figure 19.8). This follows a similar distribution pattern found across the larger Village Ecodynamics Project study area and Mesa Verde National Park where Basketmaker III households are significantly more evenly dispersed than randomly simulated households (Fadem and Diederichs 2019; Kohler 2012).

Such consistent dispersed patterning suggests that late Basketmaker III settlements were consciously spaced on the landscape. Numerous factors could have contributed to this behavior including dry-farming soil conservation adaptations (see Geomorphology chapter) or concepts of private property (see Chapter Synthesis). But the ability to institute a distributed settlement tradition and adhere to it across multiple generations indicates that the driving concept must have been compelling on a community scale and that it had some sort of institutional support (religious, economic, kinship system, etc.).

Nuances in the settlement pattern provide evidence that institutions involving hereditary land tenure may have guided settlement behavior during the late Basketmaker III phase. As mentioned previously, a few hamlet sites settled earlier, during the mid-Basketmaker III phase, continued to be occupied through the late Basketmaker III phase. Testing confirmed century-long occupations and high artifact densities (Figure 19.9) on the ridgetops directly east (Windrow Ruin) and west (the Ridgeline site and Switchback sites) of the Dillard site.

Higher artifact densities probably reflect not only the long occupation of these ridgetops but an accumulation of wealth and status in these locales over time. Geophysical imaging and testing confirmed the presence of a late Basketmaker III phase oversized pithouse at the Ridgeline site on the ridgetop west of the Dillard site and at Windrow Ruin on the ridge east of the Dillard site. In the case of Structure 101-103 on the Ridgeline site, a standard double-chambered pithouse dating to the mid-Basketmaker III phase was expanded and converted into an oversized pithouse in late Basketmaker III. And at Windrow Ruin, a massive adobe roomblock associated with a nearby late Basketmaker III phase oversized pithouse was built over a standard double-chambered pithouse dating to the mid-Basketmaker III phase. This pattern suggests that families that homesteaded hamlets in the vicinity of the Dillard site during the mid-Basketmaker III phase continued to occupy the same locale for several generations, accumulated more goods and wealth than other households, and constructed oversized homes nearly as large as the nearby great kiva (see Chapter Synthesis).

Communal Gathering

Though no one resided at the Dillard site during the late Basketmaker III phase, the surrounding community continued to return to the site for communal gathering, feasting, and burial of their dead. A large investment was made in the great kiva as a communal space when it was remodeled between A.D. 670 and 690; original support beams were left in place, but the rest of the roof appears to have been rebuilt, which required an estimated 20,000 hours of labor from the community (See Dillard chapter). The interior of the great kiva was plastered at this time and the floor features reoriented. Despite these changes, the general configuration of the great kiva was retained from its earlier form suggesting that its function remained consistent through most of the seventh century A.D. Just north of the great kiva, a large but extremely shallow double-chambered pithouse (Pithouse 312-324) was likely used as a seasonal habitation and/or activity space. Large amounts of faunal bone were found on the pithouse floor suggesting feasting or at least feast preparation, which may be related to communal gathering in the great kiva. Community members also returned to the Dillard site to bury select individuals during the late Basketmaker III phase. Two adult women were interred in a courtyard between pithouses at the south end of the site. They were buried in intrusive pits excavated into and through midden deposits and features dating to the site's earlier occupation (see Chapter 23 Human Remains). One of these women appears to have died of a severe systemic infection and would have required extensive care at the end of her life.

Late in the use life of the great kiva, community activities in the building shifted. All features were filled, and the floor was covered with a thick layer of sand. Sustained activities on this sand surface included lithic tool sharpening (see Chapter 24 Artifacts) and sage burning events that left the sand covered and mixed with ash, charcoal, and thousands of micro-lithics. At the end of its use life, sagebrush was burned in piles across the sand floor and several pottery vessels were broken and scattered. The great kiva was finally decommissioned around A.D. 725 when the structure was partially dismantled, lithic tools and projectile points were deposited on the construction debris, and the roof was burned and collapsed.

Pueblo Settlement Patterns After the Basketmaker III Period

Pueblo I (A.D. 750-900)

Pueblo I period sites were not targeted for investigation during the Basketmaker Communities Project (Figure 19.10). However, several inferences can be made about population levels during the Basketmaker III to Pueblo I transition and Pueblo I settlement patterns with available data.

The population in the study area was robust at the end of the Basketmaker III period. Four of the seven tested Basketmaker III sites (TJ Smith site, Ridgeline site, Switchback site, and Windrow Ruin) date to the early half of the eighth century just prior to the transition to the Pueblo I period between A.D. 725 and 750. Only Windrow Ruin produced absolute dating evidence that it continued to be inhabited during the Pueblo I period with an A.D. 770–900 AMS date on a maize kernel from the massive adobe roomblock (Structure 102) at the site. The 1991 survey of Indian Camp Ranch dated five additional sites to "Late Basketmaker III–Pueblo I" (Fetterman and Honeycutt 1994) based on surface remains. Together, this evidence suggests that the ancestral Pueblo population continued to grow early in the Pueblo I period.

Despite their commitment to the area, Pueblo I occupants shifted their settlement patterns (Fetterman and Honeycutt 1994). Except for the roomblock at Windrow Ruin, no evidence was found for Pueblo I reoccupation of Basketmaker III sites. In fact, Pueblo I occupants generally avoided the exposed north–south trending ridgetops heavily inhabited during Basketmaker III, preferring more dissected and higher-elevation topography nearby. Sites 5MT10709 and 5MT10718 are examples of this shift. Though located within 50 m of the Dillard site, these small hamlets were built on gentle terraced benches between exposed sandstone outcrops. There was also a new trend toward aggregated settlement during Pueblo I; at least two villages (5MT3890 and 5MT3895) were established, and at least some of the hamlets became multi-household rather than single-household farmsteads (Lightfoot 1993).

Pueblo II and Pueblo III (A.D. 900-1280)

Several sites dating to the Pueblo II and Pueblo III periods have been excavated on Indian Camp Ranch over the last 30 years (Fetterman and Honeycutt 1994; Fetterman, Honeycutt, and

McAndrews 1994; Spittler 2020). During the Basketmaker Communities Project Crow Canyon investigated the Hatch group (5MT2037 and 5MT10684–5MT10687), a substantial cluster of late ancestral Pueblo habitations in the southeast portion of Indian Camp Ranch, and a Pueblo II period field house at the Shepherd site (5MT3875) (Figure19.11). In addition, Pueblo II activity on the ranch was found in the form of surface artifacts at the Dillard site (5MT10647) and Windrow Ruin (5MT3890). Based on the findings of these projects and the initial survey of Indian Camp Ranch (Fetterman and Honeycutt 1994), several inferences can be made about the late ancestral Pueblo settlement patterns.

Pueblo II peoples intensively settled the study area suggesting that population levels increased in the eleventh century A.D., possibly due to immigration. Most of the population lived in extended family groups in small Prudden Units with a roomblock and one or two kivas and off-site fields with associated field houses. Sites were generally occupied for several generations and, in some cases, were founded as early as the late Pueblo I period. Tensions broke out in the community in the mid-twelfth century, resulting in violence at one of the small pueblos. The Hatch group, and the probable Chacoan Great House at the Pasquin site in particular, may have served as the settlement's community center in the late ancestral Pueblo periods.

Summary and Conclusion

The Basketmaker Communities Project provided the opportunity to combine relative and absolute dating techniques at multiple scales to reconstruct the initial settlement and development of one community in southwest Colorado. The results confirm migration into the area around A.D. 600 followed by high intrinsic growth and a continued influx of migrants for 125 years. The community founders settled the Dillard site together and established a community focal point in the great kiva. The great kiva was kept in use during the final decades of the seventh century and early decades of the eighth century A.D. even as the Dillard inhabitants moved into single-family hamlets and the area in-filled with migrants. A few of the early farmstead households accumulated wealth, and likely authority, during this time. The great kiva was finally decommissioned around A.D. 725 marking the end of the homesteading era. The Dillard site was never reoccupied.

The community continued to occupy the study area during the Pueblo I period (A.D. 750–900) but avoided previously occupied ridgetop settlements, preferring dissected higher-elevation topography. A few small site complexes and field houses were eventually established on Basketmaker III sites during the late ancestral Pueblo period (A.D. 900–1280), but the largest complexes were built away from these earliest settlements.

Figure 19.1. Photograph of the excavated northeast half of double-chambered Pithouse 205-226 at the Dillard site. The main chamber is the foreground, and the antechamber is in the background.

Figure 19.2. Contractor Kay Barnett collecting archaeomagnetic samples from Pithouse 309 at the Dillard site.

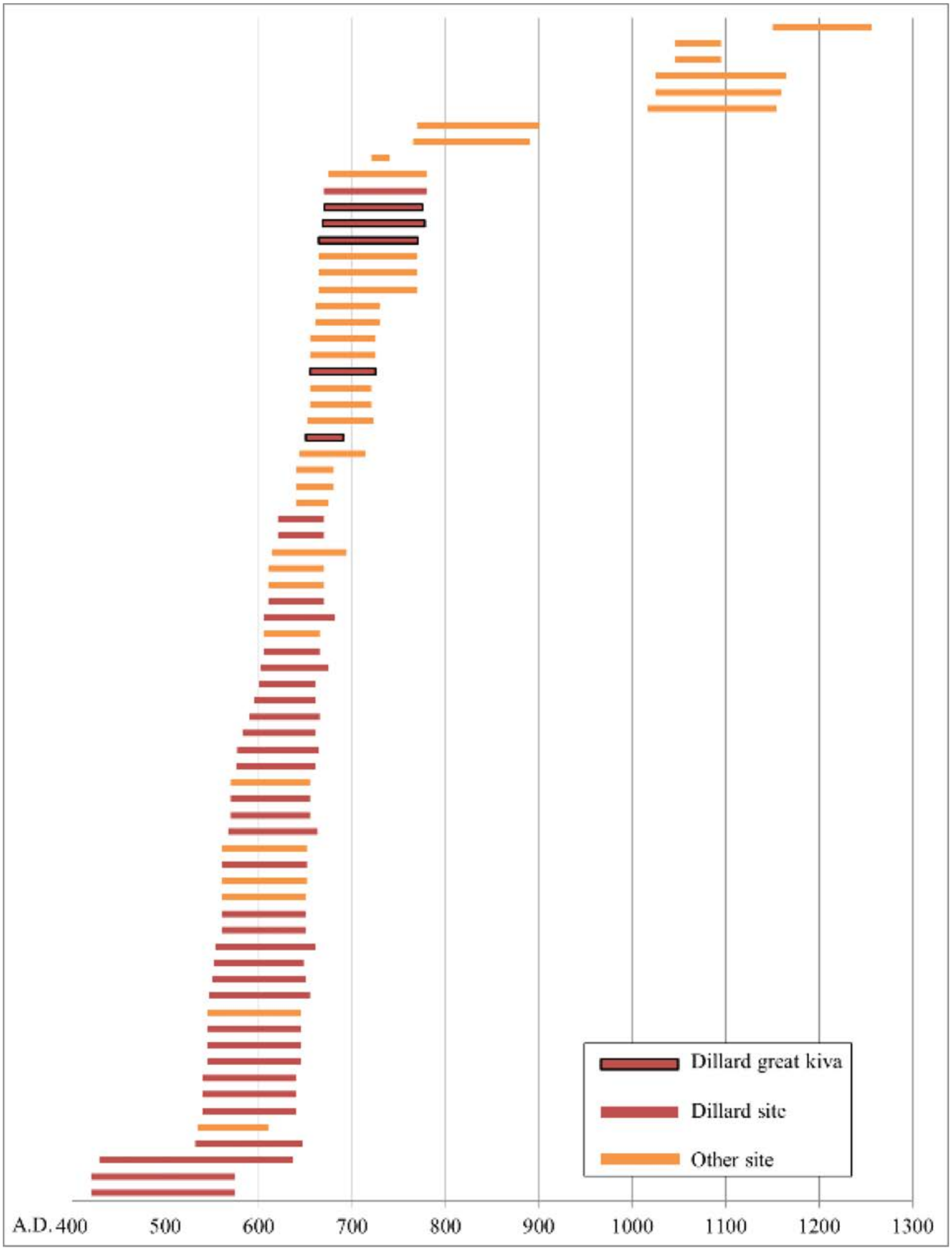

Figure 19.3. Graph of accelerator mass spectrometry two-sigma (95-percent probability) date ranges from the Basketmaker Communities Project. If multiple ranges were generated, the highest probability range is displayed.

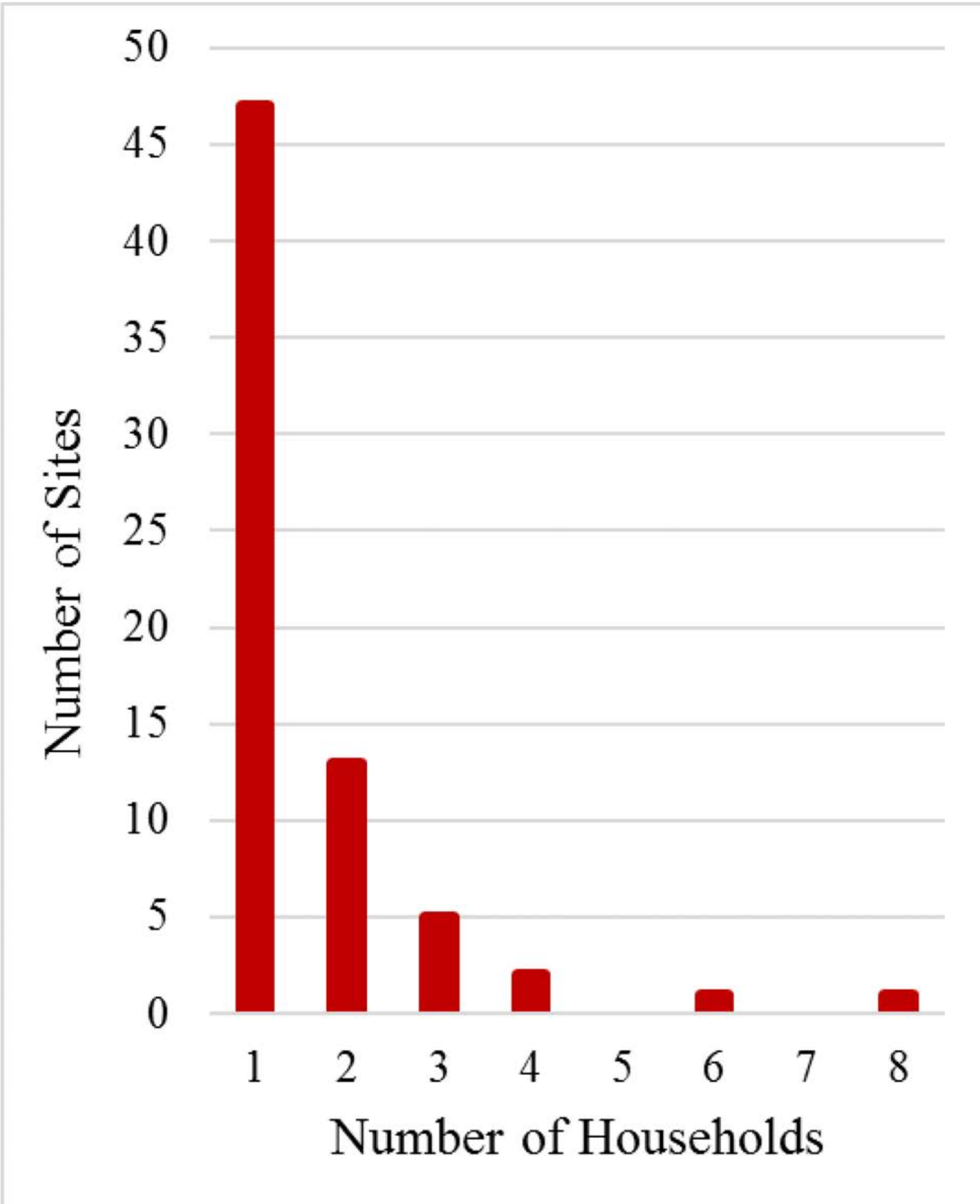

Figure 19.4. Distribution of settlement size for the 69 Basketmaker III habitations in the study area.

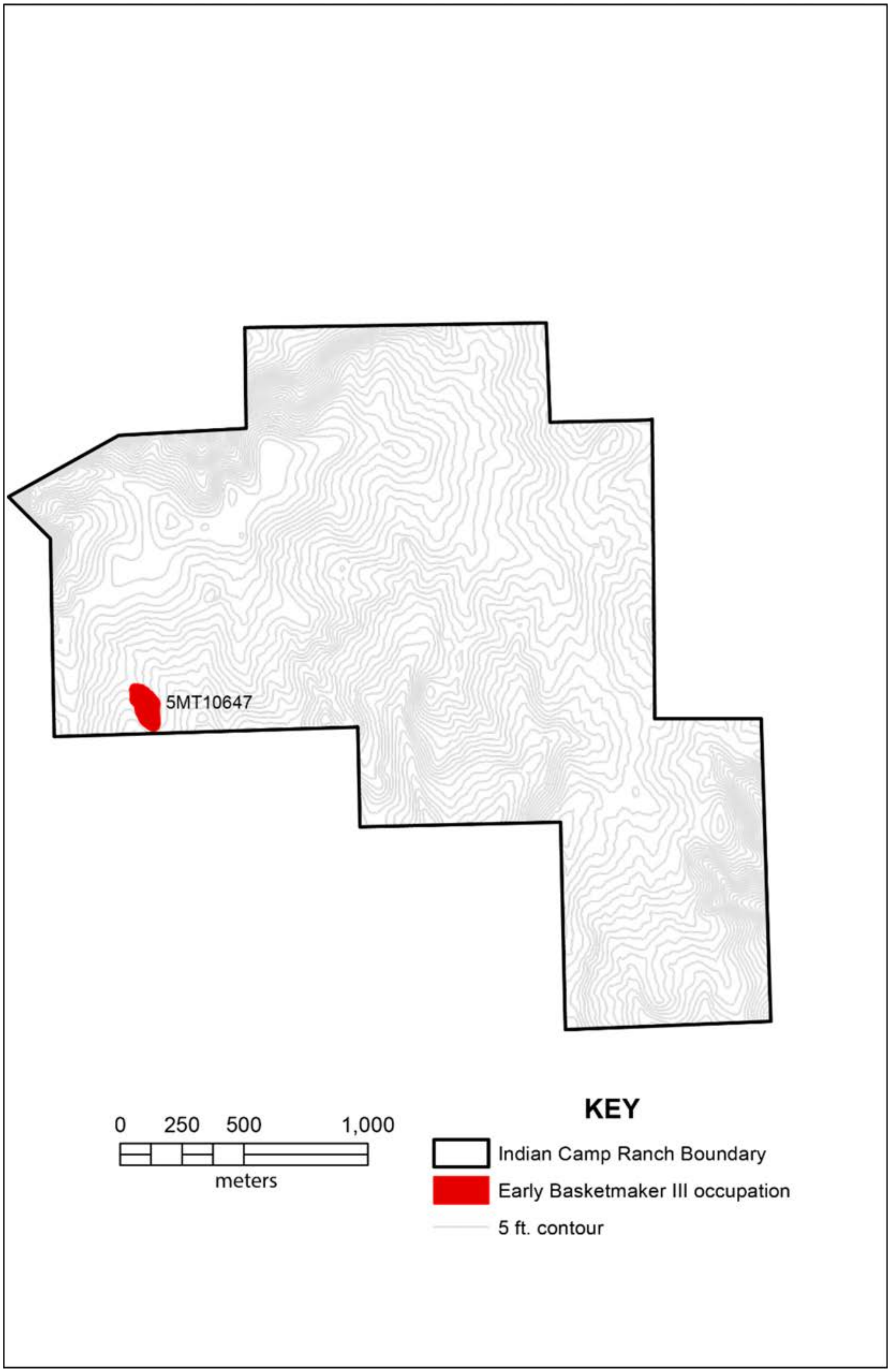

Figure 19.5. Map of the Basketmaker Communities Project Study Area with the confirmed early Basketmaker III occupation highlighted.

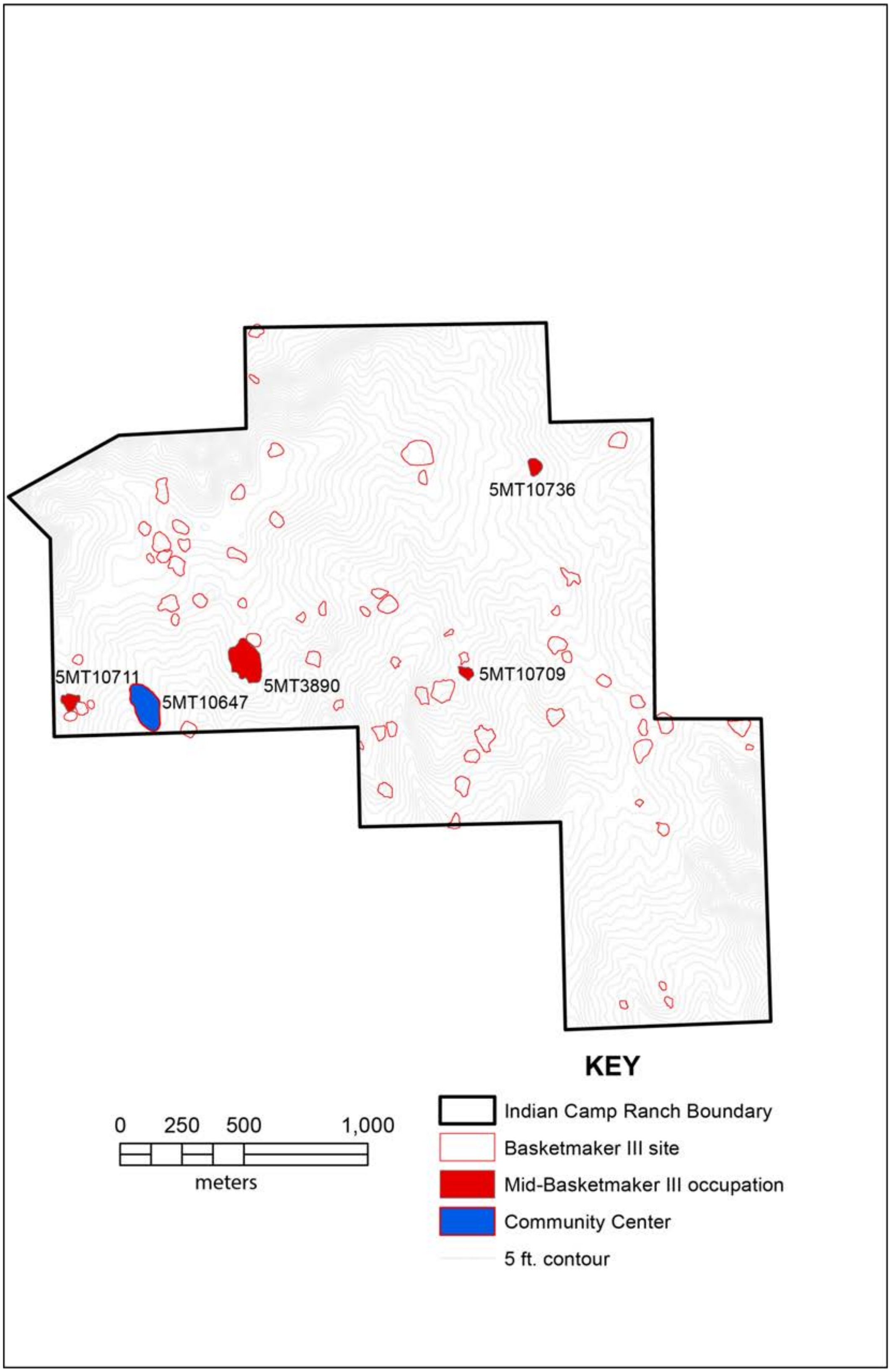

Figure 19.6. Map of Basketmaker III period sites with confirmed mid-Basketmaker III occupations highlighted.

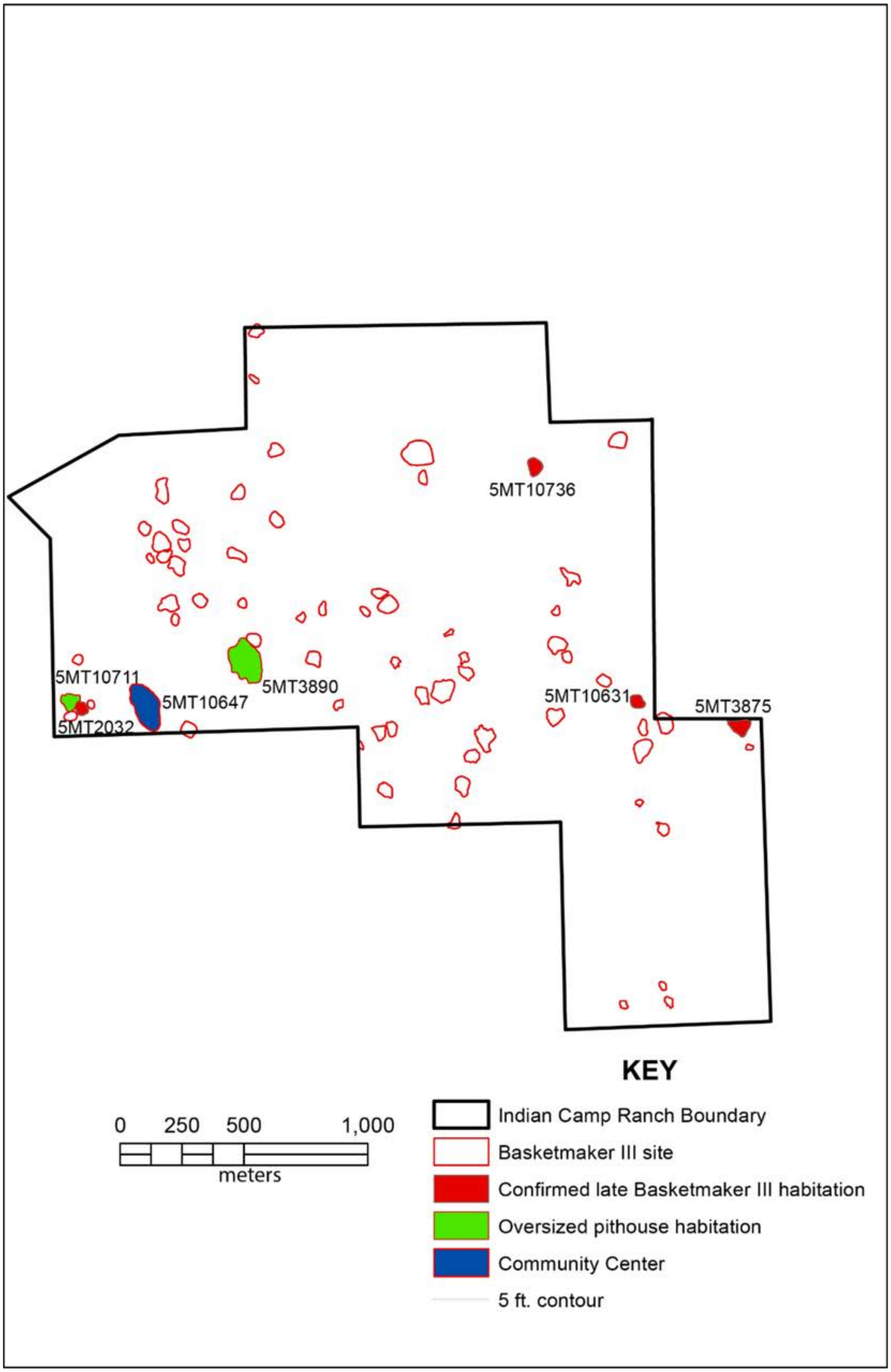

Figure 19.7. Map of Basketmaker III period sites with confirmed late Basketmaker III occupations highlighted.

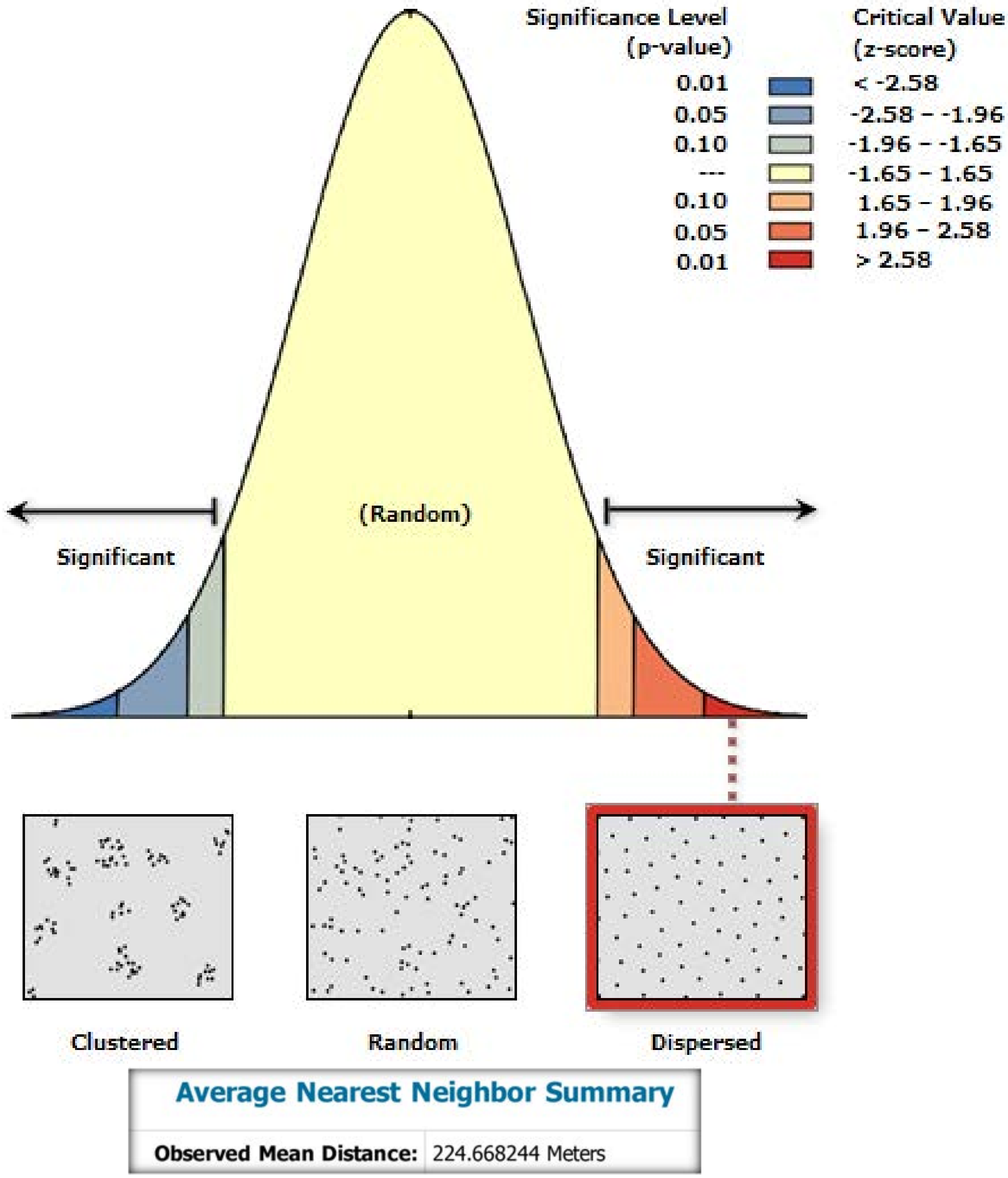

Figure 19.8. Nearest neighbor analysis of confirmed pithouse distribution along 500 m of a north–south ridge in the eastern portion of the Basketmaker Communities Project study area.

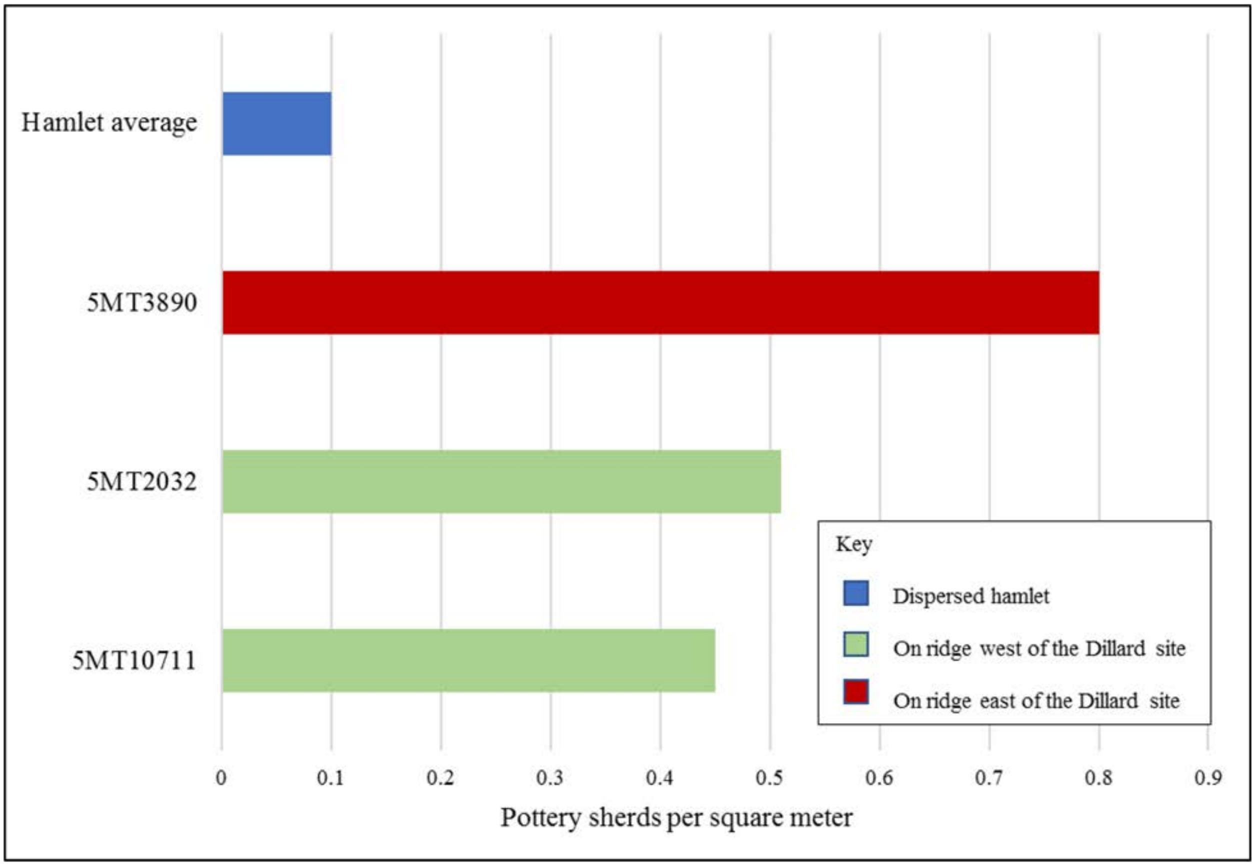

Figure 19.9. Density of pottery on sites with Basketmaker III components. Note that the pottery densities are up to six times higher on the ridgetops east and west of the Dillard site than on dispersed hamlet sites.

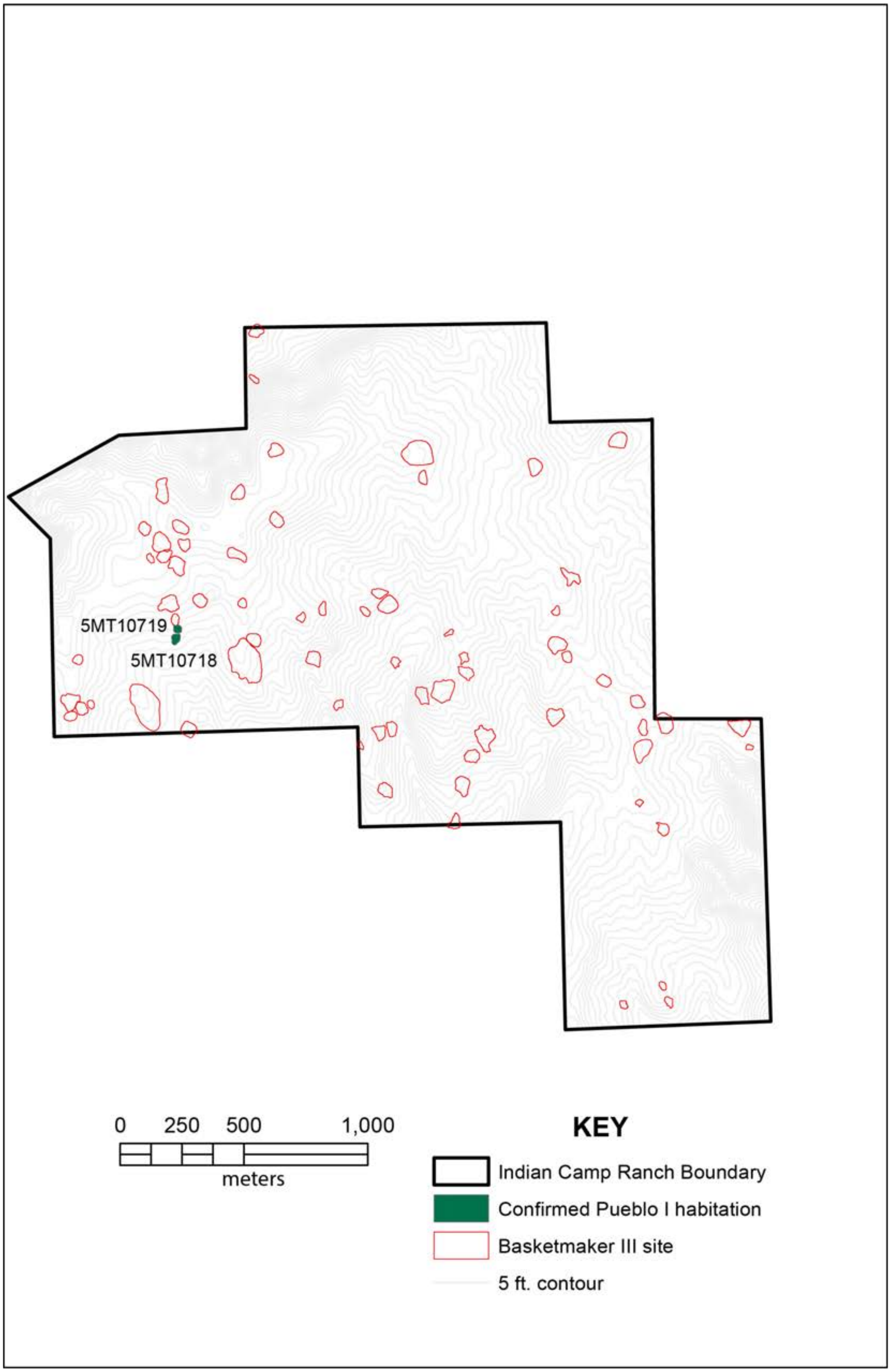

Figure 19.10. Map of Basketmaker III period sites with confirmed Pueblo I period occupations highlighted.

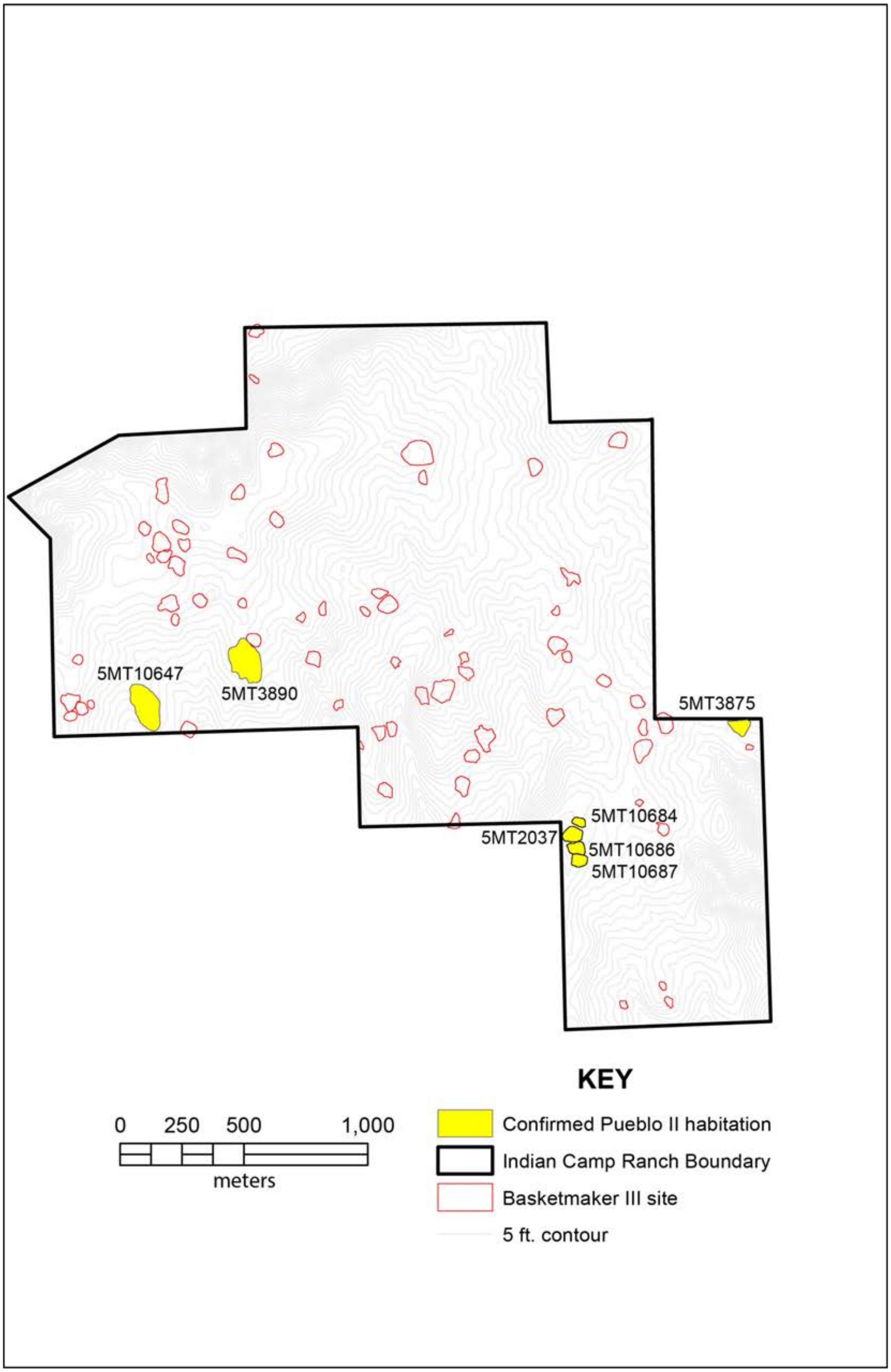

Figure 19.11. Map of Basketmaker III period sites with confirmed Pueblo II period occupations highlighted.

Table 19.1. Basketmaker Communities Project Tree-Ring Dating Results from the Laboratory of Tree-ring Research, Tucson, Arizona.

Tree-Ring Lab Number	Site Number	Study Unit Type and Number	Species	Inside Date	Symbol Inside Date	Outside Date	Symbol Outside Date
CCC-3693	5MT10631	Structure 101	Juniper	460		575	+B
CCC-3698	5MT10631	Structure 101	Juniper	485	±	575	+vv
CCC-3688	5MT10631	Structure 101	Juniper	488		587	vv
CCC-3703	5MT10631	Structure 101	Pinyon pine	538	p	607	+vv
CCC-3696	5MT10631	Structure 101	Juniper	502	±	663	r
CCC-3691	5MT10631	Structure 101	Juniper	564	±p	675	+v
CCC-3689	5MT10631	Structure 101	Juniper	658		724	B
CCC-3692	5MT10631	Structure 101	Juniper	615	±p	761	++B
CCC-3704	5MT10631	Structure 102	Juniper	335	±	436	vv
CCC-3700	5MT10631	Structure 102	Juniper	445		549	+vv
CCC-3695	5MT10631	Structure 102	Pinyon pine	513		566	vv
CCC-3701	5MT10631	Structure 102	Pinyon pine	503		566	+vv
CCC-3694	5MT10631	Structure 102	Juniper	456	±	600	vv
CCC-3702	5MT10631	Structure 102	Pinyon pine	539	p	620	+vv
CCC-3697	5MT10631	Structure 102	Pinyon pine	572		625	+B
CCC-3690	5MT10631	Structure 102	Juniper	603	±p	729	+vv
CCC-3699	5MT10631	Structure 102	Juniper	696		757	+vv
CCC-3653	5MT10647	Structure 228	Juniper	531		601	+vv
CCC-3663	5MT10647	Structure 102	Ponderosa pine	580		621	+vv
CCC-3652	5MT10647	Structure 220	Juniper	530	"+"	607	vv
CCC-3654	5MT10647	Structure 220	Juniper	561		623	+vv
CCC-3656	5MT10647	Structure 220	Juniper	543		625	+vv
CCC-3662	5MT10647	Structure 231	Juniper	556		623	vv
CCC-3687	5MT10687	Structure 113	Juniper	490		537	+v
CCC-3686	5MT10687	Structure 113	Juniper	466		557	++vv
CCC-3685	5MT10687	Structure 113	Pinyon pine	494		570	+vv
CCC-3684	5MT10709	Structure 106	Juniper	442		521	+vv
CCC-3681	5MT10709	Structure 106	Juniper	450		537	+vv
CCC-3683	5MT10709	Structure 106	Juniper	452		541	+v
CCC-3680	5MT10709	Structure 106	Juniper	424		548	+vv
CCC-3682	5MT10709	Structure 106	Juniper	459		594	vv
CCC-3716	5MT10711	Structure 101	Juniper	348		418	LB
CCC-3707	5MT10711	Structure 101	Juniper	387	±	494	+L

Tree-Ring Lab Number	Site Number	Study Unit Type and Number	Species	Inside Date	Symbol Inside Date	Outside Date	Symbol Outside Date
CCC-3706	5MT10711	Structure 101	Juniper	347	±	510	+L
CCC-3708	5MT10711	Structure 101	Ponderosa pine	475		541	+vv
CCC-3705	5MT10711	Structure 101	Ponderosa pine	476	±p	561	++vv
CCC-3715	5MT10711	Structure 101	Pinyon pine	572		610	+LB
CCC-3718	5MT10711	Structure 101	Ponderosa pine	550	p	623	++vv
CCC-3719	5MT10711	Structure 101	Juniper	627	p	667	LB
CCC-3717	5MT10711	Structure 101	Ponderosa pine	605		686	vv
CCC-3714	5MT10711	Structure 101	Ponderosa pine	625		693	vv
CCC-3713	5MT10711	Structure 101	Pinyon pine	686		722	+LB
CCC-3710	5MT10711	Structure 101	Pinyon pine	708	p	759	vv
CCC-3711	5MT10711	Structure 101	Pinyon pine	688	±p	763	LB
CCC-3709	5MT10711	Structure 101	Juniper	691	±	788	+L
CCC-3712	5MT10711	Structure 103	Pinyon pine	488	±	580	+vv

Table 19.2. Archaeomagnetic Dates by Context.

Lab Sample #	Site #	Study Unit #	Context	2-Sigma Calibrated Results (95% Probability)*
ISM-350	5MT10647	Nonstructure 227	Hearth	A.D. 350–625
ISM-340	5MT10647	Structure 102	Stratum 7 (decommissioning burn)	A.D. 660–740
ISM-349	5MT10647	Structure 220	Hearth	A.D. 625–675
ISM-338	5MT10647	Structure 226	Hearth	A.D. 660–740
ISM-337	5MT10647	Structure 228	Hearth	A.D. 1–690
ISM-341	5MT10647	Structure 232	Hearth	A.D. 88–690
ISM-339	5MT10647	Structure 236	Hearth	A.D. 625–690
ISM-245	5MT10647	Structure 239	Hearth	A.D. 610–665
ISM-246	5MT10647	Structure 309	Hearth	A.D. 635–665
ISM-352	5MT10647	Structure 311	Hearth	A.D. 350–625
ISM-351	5MT10647	Structure 312	Hearth	A.D. 625–690
ISM-348	5MT2032	Structure 110	Hearth	A.D. 685–740
ISM-356	5MT10709	Structure 106	Hearth	500 B.C.–A.D. 400 and A.D. 910–1015
ETSU-383	5MT10711	Structure 101	Hearth	A.D. 1535–1565, A.D. 1760–1790, and A.D. 1835–1865
ISM-342	5MT10736	Structure 111	Hearth	No Date

* Shaded dates indicate poor samples with either an aberrant location on the reference curve that did not intersect with the dating curve or sample data that intersected with the curve in multiple locations incompatible with the date of the structure based on other dating methods.

Table 19.3. Accelerator Mass Spectrometry Carbon-14 Dates by Context.

Lab Sample #*	Site #	Study Unit #	Vertical Context	Feature # (Type)	2-Sigma Calibrated Results (95% Probability) (A.D.)	Identified Material
B471929	5MT10631	STR 101	Surface 1		1150–1256	Maize kernel
B471923	5MT10631	STR 101	Surface 1		664–770	Maize kernel
B471928	5MT10631	STR 102	Surface 1		664–770	Bone
B471922	5MT10631	STR 114	Surface 1		652–722 and 740–768	Maize kernel
B416907	5MT10647	STR 124	Surface 1	1 (pit)	420–575	Maize cupule
B322011	5MT10647	NST 215	Stratum 2		602–674	
B322012	5MT10647	NST 215	Stratum 2		606–681	
B408358	5MT10647	NST 227	Surface 1	2 (firepit)	545–645	Maize cupule
AA100813	5MT10647	NST 230	Stratum 2		577–664	Maize kernel
AA100807	5MT10647	NST 241	Surface 1		547–655	Maize kernel
B416910	5MT10647	NST 248	Surface 1	7 (posthole)	540–640	
B471920	5MT10647	STR 102	Stratum 7		668–778 and 790–828 and 838–864	Maize
B408363	5MT10647	STR 102	Surface 1	20 (pit)	650–690 and 750–760	Chokecherry seed
B408360	5MT10647	STR 102	Surface 1	17 (floor vault)	670–775 and 790–800	Maize
B383551	5MT10647	STR 102	Surface 2		655–725 and 740–770	
B408356	5MT10647	STR 205	Surface 1	22 (pit)	545–645	Maize kernel
B408355	5MT10647	STR 205	Surface 1	22 (pit)	595–660	Sagebrush wood
B408354	5MT10647	STR 205	Surface 1	20 (pit)	605–665	Maize cupule
B408365	5MT10647	STR 220	Surface 1	1 (corner bin)	620–670	Maize kernel
B408366	5MT10647	STR 220	Surface 2	2 (bench)	540–640	Maize cupule
B408364	5MT10647	STR 220	Surface 2	2 (bench)	560–650	Maize cupule
AA100805	5MT10647	STR 226	Surface 1		532–647	Maize plant
B408367	5MT10647	STR 226	Surface 1	2 (pit)	610–670	Maize cupule
AA100810	5MT10647	STR 228	Surface 1		567–663	Maize
B471917	5MT10647	STR 228	Surface 1		582–660	Maize cupules
AA100811	5MT10647	STR 231	Surface 1		554–660	Maize
B471918	5MT10647	STR 232	Surface 1		561–651	Maize
AA100809	5MT10647	STR 232	Surface 1		570–655	Maize
B471921	5MT10647	STR 236	Surface 1		552–648	Maize
AA100808	5MT10647	STR 239	Surface 1		576–661	Maize
B408357	5MT10647	STR 304	Surface 1	4 (posthole)	550–650	Maize cupule
AA100806	5MT10647	STR 309	Surface 1		430–637	Maize
B416906	5MT10647	STR 309	Surface 1	3 (ashpit)	600–660	
B408361	5MT10647	STR 311	Surface 1	1 (hearth)	540–640	Maize embryo

Lab Sample #*	Site #	Study Unit #	Vertical Context	Feature # (Type)	2-Sigma Calibrated Results (95% Probability) (A.D.)	Identified Material
B408362	5MT10647	STR 311	Surface 1	1 (hearth)	545–645	Maize cupule
B365060	5MT10647	STR 312	Stratum 3		670–780 and 790–810 and 850–850	Maize
B408359	5MT10647	STR 313	Surface 1		570–655	Maize kernel
B416909	5MT10647	STR 330	Stratum 4		560–650	Maize cupule
B471919	5MT10647	STR 331	Stratum 1		590–665	Maize
B416908	5MT10647	STR 505	Surface 1		620–670	
B471924	5MT10684	STR 108	Surface 1	3 (hearth)	1016–1154	Maize
B471925	5MT10684	STR 108	Surface 1	1 (pit)	1025–1160	Maize
B471926	5MT10686	STR 109	Surface 1		1025–1165	Maize
B422943	5MT10687	NST 109	Stratum 2		1045–1095 and 1120–1220	
B422939	5MT10709	STR 106	Surface 1		560–650	
B422940	5MT10709	STR 106	Surface 1		570–655	
B422941	5MT10709	STR 115	Surface 1		610–670	
B422942	5MT10709	STR 115	Surface 1		610–670	
B479186	5MT10711	STR 101	Stratum 5		664–770	Maize cob
B479190	5MT10711	STR 101	Surface 1	1 (bench)	660–730 and 736–770	Maize cupules
B479189	5MT10711	STR 110	Surface 1		660–730 and 736–770	Maize cob
B479188	5MT10711	STR 116	Surface 1		664–770	Maize cupules
B479187	5MT10711	STR 117	Surface 1		614–694 and 747–763	Maize cupules
B479185	5MT10711	STR 103	Surface 1	27 (other)	561–651	Reed
AA100812	5MT10718	STR 107	Surface 1		765–890 (80.8%); 694–748 (14.6%)	Maize
B471927	5MT10736	STR 102	Surface 1		561–651	Seeds
B408404	5MT10736	NST 104	Surface 1	1 (pit)	545–645	Maize cupule
B383552	5MT10736	STR 108	Surface 1		435–490 and 535–610	
B408368	5MT10736	STR 111	Surface 1	3 (hearth)	655–720 and 740–765	Maize cupule
B383553	5MT10736	STR 111	Surface 1		655–725 and 740–770	
B365061	5MT10736	STR 111	Surface 1		720–740 and 770–890	Maize
B383546	5MT2032	STR 113	Surface 1		640 to 675	
B383544	5MT2032	STR 110	Stratum 6		640–680	
B383545	5MT2032	STR 110	Surface 1		675–780 and 790–870	
B416911	5MT3875	STR 106	Stratum 3		1045–1095 and 1120–1220	Maize cupule
B479184	5MT3875	STR 132	Stratum 1		644–714 and 744–765	Maize cupule
B365059	5MT3890	STR 102	Full cut		770–900 and 920–940	Maize
B383548	5MT3890	STR 101	Full cut		655–720 and 740–765	Maize
B383547	5MT3890	STR 101	Full cut		655–725 and 740–770	Maize
B383549	5MT3890	STR 103	Full cut		605–665	Maize

Lab Sample #*	Site #	Study Unit #	Vertical Context	Feature # (Type)	2-Sigma Calibrated Results (95% Probability) (A.D.)	Identified Material
B383550	5MT3890	STR 201	Full cut		640–680	Maize

* Lab sample numbers starting with "B" processed by Beta Analytic, Inc. Lab sample numbers starting with "AA" processed by University of Arizona Accelerator Mass Spectrometry Laboratory.

Table 19.4. Component Numbers for Basketmaker Communities Project Sites Listed by General Period of Occupation.

Site Name	Site #	General Occupation Periods*							
		Early BMIII A.D. 420–600	Mid-BMIII A.D. 600–660	Late BMIII A.D. 660–750	General BMIII A.D. 500–750	Pueblo I A.D. 750–900	Pueblo II and Early Pueblo III A.D. 900–1200	Late Pueblo A.D. 800–1300	General Ancestral Pueblo
Dillard	5MT10647	1	2	3	4		6		5
TJ Smith	5MT10736	1		2	3				
Switchback	5MT2032			1					
Shepherd	5MT3875			1			2		3
Windrow Ruin	5MT3890		1	2	3				
Sagebrush House	5MT10687							1	3
Pasquin	5MT2037						1		
Badger Den	5MT10686						1	2	5, 6
Dry Ridge	5MT10684						1	2	3
Portulaca Point	5MT10709		1						
Mueller Little House	5MT10631			1					
Ridgeline	5MT10711		1	1					
	5MT10718					1			
	5MT10719					1			

* BMIII refers to the Basketmaker III period.

Table 19.5. Estimated Momentary Population by Occupation Period Based on Fifteen-Year Use Life and Seven Persons per Household.

General Occupation Period	Length of Period	Total Households	Momentary Household Estimate	Momentary Population Estimate
Early Basketmaker III	180	0	0	0
Mid-Basketmaker III	60	16	4	28
Late Basketmaker III	65	94	21.9	153

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Chapter 20

Faunal Remains

Kari M. (Schmidt) Cates

Introduction

In this chapter, the analysis of faunal remains collected during Crow Canyon's Basketmaker Communities Project excavations in southwestern Colorado is discussed. Faunal remains were recovered from 12 sites: 5MT10631 (Mueller Little House), 5MT10647 (the Dillard site), 5MT10684 (Dry Ridge), 5MT10686 (Badger Den), 5MT10687 (Sagebrush House), 5MT10709 (Portulaca Point), 5MT10711 (the Ridgeline site), 5MT10718 (unnamed), 5MT10736 (the TJ Smith site), 5MT2032 (the Switchback site), 5MT2037 (the Pasquin site), and 5MT3875 (the Shepherd site). The faunal assemblages from these 12 sites include all nonhuman bones and teeth, antler, and ossified cartilage found at the sites. Both modified and unmodified materials are discussed.

Methods used to identify and quantify the faunal remains are discussed first, followed by a general description of the taphonomic processes that may have influenced the assemblages. These include natural and cultural processes related to deposition and preservation that likely affected the kinds of remains that were recovered, as well as the condition in which they were found. A detailed discussion of the assemblages from each of the 12 sites is presented, followed by a discussion of the Basketmaker Communities Project assemblage as a whole. Discussions include investigations of faunal remains from particular types of features/structures, as well as discussions by temporal context. The large assemblage of modified bone tools is then discussed. The chapter concludes with some general observations about the Basketmaker Communities Project faunal assemblages.

Methods: Identification, Recording, and Quantification of the Basketmaker Communities Project Faunal Remains

All faunal remains were analyzed using a standardized identification and recording system developed by Jon Driver for Crow Canyon (Driver 1992). The following information was recorded for each specimen: taxon, element, part of element, side, state of epiphyseal fusion, type of breakage, modifications (cut marks, grinding, burning, weathering, gnawing, etc.), and length and width of each fragment. Identifications were made using the comparative collection of the author, as well as several osteological manuals (including Elbroch 2006; Gilbert 1993; Gilbert et al. 1981; Lawrence 1951; Olsen 1964, 1968).

During the identification process, a considerable effort was made to reconstruct elements that had been broken during or after excavation. No attempt was made to reconstruct elements that displayed breaks that occurred before excavation. Fragments that were obviously parts of the same bone were noted. In the subsequent analysis, each fragment or reconstructed element was counted as a distinct specimen. A specimen was considered “identifiable” only if the skeletal element could be positively determined. All specimens that could not be identified to a specific element were thus classified taxonomically as “unidentifiable,” thereby ensuring analyses are not unduly biased by the analyst.

All identifiable specimens were assigned to the most specific taxonomic category possible, given the limitations of the available reference collections and observable variation. Bones were assigned to a species or genus only when all other possibilities had been examined and ruled out on the basis of morphology and size. Species-level identifications were made only by direct comparison with modern skeletons. Many specimens were assigned to more general taxonomic categories as defined by Driver (1992).

Frequency data for the faunal remains from the sites are provided as “number of identified specimens” or NISP counts (Grayson 1979). NISP counts represent the total number of specimens that can be positively identified as belonging to a particular taxon. This method has a number of potential problems (for a thorough discussion, see Grayson [1979]), including the overrepresentation of taxa with greater numbers of elements (Klein and Cruz-Uribe 1984), greater degrees of fragmentation (Grayson 1979; Thomas 1969), and higher rates of recovery (Thomas 1969). NISP data have been used here to allow direct comparison to faunal data produced by other researchers, but they do not provide a particularly precise estimate of taxonomic abundance.

General Observations on Taphonomy at the Basketmaker Communities Project Sites

Taphonomy is the study of the natural and cultural processes that affect the deposition and preservation of organic materials. Cultural behavior associated with artifact manufacture, food preparation, and refuse disposal will influence the composition of archaeological assemblages. In general, the overall preservation of the bones from the Basketmaker Communities Project sites was very good. The bones were largely intact, with many large fragments and complete elements. Very few bones displayed characteristics of weathering. Only one item contained evidence of root-etching. Fourteen fragments showed evidence of carnivore damage, and six items were gnawed, probably by rodents. Ten specimens contained pathological conditions including seven jackrabbit (*Lepus* sp.) specimens, one turkey (*Meleagris gallopavo*) phalanx, one chipmunk (*Eutamias* sp.) innominate, and one ground squirrel (*Spermophilus* sp.) mandible.

The most frequently identified cultural modification at the Basketmaker Communities Project sites was burning. In total, 360 bones (12.2 percent) in the assemblages were burned; 63 (17.5 percent of burned items) contained localized burning, 120 (33.3 percent of burned items) were burned black, and 177 (49.2 percent of burned items) were calcined. Results from each site will be discussed in more detail in the next section.

In addition, 64 bones were culturally modified into tools, items of adornment, or items of other unspecified functions. These items include 31 awl or awl fragments, three beads, one possible bracelet fragment, one gaming pieces, two needles, 13 tubes and one possible tube fragment, one scraper, two spatulate-shaped items, and nine unspecified items, all of which will be discussed further in the individual site discussions and in the discussion section.

In addition to purposeful tool/adornment manufacturing, which can include grinding and polishing, identification of cultural modification can usually be made using criteria such as breakage patterns and the presence of cut marks; this assessment is more difficult for the remains of smaller animals, which can be procured, processed, cooked, and consumed with little modification to skeletal elements. The butchery and processing of animals can produce diagnostic modifications, including cut marks, cut edges, or saw marks (in historic period assemblages). Remains that display these types of evidence are indicative of human procurement of the animals that they represent, although such markings are not likely to occur on all, or even a majority, of culturally introduced specimens.

Based on evidence of cultural modification observed in the Basketmaker Communities Project faunal assemblages, a definitive cultural origin for jackrabbit (*Lepus* sp.), cottontail rabbit (*Sylvilagus* sp.), deer (*Odocoileus* sp.), turkey (*Meleagris gallopavo*), and dog/wolf/coyote (*Canis* sp.) can be inferred. In addition, rabbit-sized, deer-sized, and elk/bison-sized mammal long bone fragments were also definitively modified. A "large bird" remain from Mueller Little House (5MT10631) was also fashioned into a bone tube. All display direct cultural modification in the form of grinding, polishing, and cut marks.

Additionally, a number of specimens were polished but not definitively identified as modified artifacts. Twenty-seven specimens also displayed spiral fractures (12 cottontail [*Sylvilagus* sp.], nine jackrabbit [*Lepus* sp.], one deer [*Odocoileus* sp.], one rabbit-sized mammal, one deer-sized mammal, two turkey [*Meleagris gallopavo*], and one turkey-sized bird). The origins of the remaining taxa are uncertain, as these groups display no definitive evidence of cultural modification.

While the above taxa are, at least in part, the result of human activities, small- and medium-size rodents displays characteristics that suggest their presence is primarily the result of natural occurrence at these sites. Though some rodents have been documented as a food source in the ethnographic literature of the Pueblo peoples (e.g., Henderson and Harrington 1914), no evidence of butchering or burning was observed among the many small rodent remains recovered from the Basketmaker Communities Project assemblages. This suggests these animals likely died naturally in their burrows, though the sciurids (squirrels) may be an exception. The presence of burning on a small percentage of ground squirrel (*Spermophilus* sp.) remains suggests they may be the result of cultural activities. None of the other rodent remains in the assemblage (chipmunks, prairie dog, kangaroo rats, mice, and wood rats) were burned or otherwise culturally modified. The majority of the non-sciurid rodent remains were complete long bones, mandibles, and innominates, the largest and most easily collected skeletal elements.

Faunal Remains from the Basketmaker Communities Project Sites

Specific characteristics of each of the excavated sites are discussed extensively in earlier chapters in this report, but in general, the study area consists of gently rolling uplands with an average elevation of 1,890 m (6,200 ft). The area was probably once completely covered by pinyon-juniper woodland with an understory of bunch grasses, yucca, and prickly pear cactus. Today, remnants of this woodland can be found in the project area, but elsewhere the native vegetation has been recently replaced by ranchland and farm fields. Ranchlands, including a portion of the tract on which the Dillard site is located, are dominated by big sagebrush, rabbitbrush, and bunch grasses (Sommer et al. 2016).

Crow Canyon's excavations at the Basketmaker Communities Project sites resulted in the collection of 2,980 pieces of bones and teeth from 12 sites ranging from late Basketmaker II through Pueblo II times (A.D. 400–1200) (Table 20.1). The general characteristics of the individual faunal assemblages from the sites are discussed in the following pages. Where applicable, faunal remains are presented by structure type; at the end of the individual site assemblages section, faunal data are presented by structure type and time period, as well as in chronological groups. In-depth site descriptions are presented in Chapters 5 through 17 and should be consulted for additional information.

5MT10631 (Mueller Little House)

5MT10631 is situated on the north end of a low ridge. Table 20.2 lists the faunal remains recovered from this site, including the number and percentages of burned bone. In total, 539 bones were recovered from Mueller Little House; just under 50 percent (n = 260) came from contexts within Structure 101/102/114 (a double-chambered pithouse, see below), and the remaining 279 were collected from midden deposits outside the structure. Faunal remains from the nonstructure contexts cannot be dated more precisely than "ancestral Pueblo," and aside from their inclusion in Table 20.2, are not discussed further in this section.

Table 20.3 lists the faunal remains recovered from 5MT10631 by excavation context and time phase. Structure 101/102/114 (a double-chambered pithouse) is a late Basketmaker III pithouse (A.D. 660–690) that included a main chamber (Structure 101), an antechamber (Structure 102), and a side room (Structure 114), which was constructed through the east wall of the main chamber. The east halves of the main chamber and antechamber, as well as the entire side room, were excavated (Sommer et al. 2017). Aside from the cottontail remains found in the nonstructure midden deposits, the majority of the remains appear to be from intrusive species and small animals. All but one of the 45 burned elements from this site were found in structure contexts, as were all six of the modified bones (see below).

Just over 43 percent (n = 112) of all the bones recovered in the structure were part of an articulated turkey skeleton found on the floor of the antechamber (Figure 20.1). These remains were examined by Crow Canyon Archaeological Center volunteer Robin Lyle (Sommer et al. 2017).

Description of the Turkey Skeleton

The primary skeleton (head, neck, and body cavity) was mostly articulated and in a fair state of preservation. The turkey rested on its left side at an approximately 45-degree angle. The head and neck extended toward the northwest with the thoracic vertebrae, back, and pelvis in anatomical alignment toward the southeast. The sternum was adjacent to the fused thoracic vertebrae just north of the back and right pelvic bone. The right acetabulum was clearly visible. Several refitting fragments of the mandible were recovered (PD 79, PLs 108 and 110). The atlas, axis, and several cervical vertebrae were arrayed in the area south and southeast of the skull. Four isolated gizzard stones were also identified (PD 78, PLs 114, 119, 120, and one without a PD number).

The extremities of the skeleton were somewhat scattered, with some broken and some burned, and not all elements were present. Those limbs found were not in their anatomical positions with respect to the primary skeleton. The right leg (femur and tibiotarsus) was found west of the main body cavity in a northeast to southwest alignment. The complete right femur and tibiotarsus were articulated, with a midshaft fracture to the latter. The two fragments of tibiotarsus refitted and were directly associated with several ossified tendons. The distal condyles on the tibiotarsus were broken off, leaving a blunt end. One fragment of condyle was identified among the small bones collected. No evidence of cut marks was observed. Parallel to and a few centimeters south of the tibiotarsus, several burned pieces of bone were exposed; they appear to be fragments of the diaphysis of a humerus.

Directly south of the articulated leg bones was the right tarsometatarsus. It had no spur, the distal end was absent, and the extant distal shaft was burned. There were no associated phalanges, nor were there articular features on either end, but several long bone fragments and ossified tendons were found in alignment.

North and slightly deeper than the right leg bones, and adjacent to the skull and cervical vertebrae, was a midshaft fragment of the left tibiotarsus (80 mm in length). Both proximal and distal ends were broken off and were absent. Several centimeters south was a cluster of ossified tendons. The left femur was not present, and no other parts of the left hind limb were recovered except for two small but identifiable fragments of a second tarsometatarsus (PD 79, PL 121).

Several elements of the left wing were recovered but were not visible in the photographs. The left coracoid and scapula were mostly complete as was one carpal bone. Only the intact proximal end of the left humerus was recovered (57.5 mm fragment). The remaining diaphysis and distal end below the fracture were absent.

Isolated bones included a furculum (wishbone) fragment (PD 79, PL 121), one phalange (PD 78, PL 125), and two phalanges (one is a terminal toe, PD 78, no PL).

Interpretation of the Turkey Skeleton

The skeleton was represented by all major body elements except the right wing. It is reasonable to speculate that that wing was above the rest of the body (since the right side was on top) and may have been removed in a higher stratum. The left wing is represented by the coracoid, scapula, a carpal, and a large piece of the proximal humerus. Missing are the radius, ulna, and carpometacarpus, as well as the distal humerus. The head, neck, and back were represented by the skull; mandible; atlas; axis; two cranial cervical, five cervical, four fused thoracic (II, III, IV, and V), and two thoracic (I and VI) vertebrae; and several vertebral fragments. The back and both sides of the pelvis were present. No evidence of the coccygeal vertebrae (tail) was found. Gizzard stones indicate the internal organs were present when the carcass was deposited.

The right leg was fully represented but was rotated 180 degrees from its natural position (cartwheeled). It can be visualized as if the leg (originally extended to the northwest) was pivoted on the ball of the femur in the acetabulum, then moved up and over the back, dislocated, and left to rest about 10 centimeters to the west. The cause of this is unknown, but several things can be ruled out. The femoral joint is very heavily muscled and is not easily detached by contortion. No cut marks were present that would indicate butchering, and gnawing was not evident. Also of note, the relative position of the leg appendage (lateral side up, flexed at the knee) was the same when excavated as it would have been biologically. And last, the ultimate decomposition of the fleshed/feathered carcass occurred in-situ, where it was found upon excavation, as evidenced by the in-situ ossified tendons closely aligned with the long bones. One explanation is that, after death and possibly during purification, the leg was exposed, and there was a failed attempt by a scavenger to carry it off.

The distal right tibiotarsus was broken off bluntly at a right angle just below the supratendinal bridge. The missing end of the element was represented by a single condyle fragment. It was not a fracture of the epiphysis and may have been the result of impact from a sandstone slab in the roof fall. The cross-sectional surface of the bone end is rough and shows no evidence of healing or cutting. Portions of the left leg (tibiotarsus, ossified tendons, two tarsometatarsus fragments, and at least some digits of the foot) provide evidence that both sides were represented. The position of this limb and the wing is unknown but is consistent with the above discussion.

Evidence of burning and burned wood fragments surrounded the skeleton, but only two instances of burning were observed in the bones. This suggests that the main carcass was protected, perhaps by dirt or roof fall, from thermal damage.

The breakage and distribution of wing and leg appendages suggest postmortem disturbance or a traumatic perimortem event. Given the high degree of head, neck, and body cavity articulation, the former scenario is favored. The head and body cavity were largely undisturbed after initial deposition. The extremities were scattered, elements were broken, and parts are missing. This suggests some scavenger activity, although no gnawing and only one bite mark was observed.

Conclusions about the Turkey Skeleton

The turkey was a healthy, female adult, dead when buried, not butchered, decomposed in place, and approximately 80–90 percent present. This interment exhibits no outward cause of death or signs of ritual treatment. Collapse of the structure roof could have been the cause of death but was, most probably, the process of burial. The anatomical position of the extremities was unnatural and may have been the result of postmortem disturbance of the fleshed carcass. Fracturing appears to have been postmortem.

Preservation was good with some fragmentation, although some key faunal elements were not present. Rodent burrowing was observed during excavation, and areas of burning on the floor were numerous. Several intrusive rodent remains were also identified. Only two examples of burning on the bone were recorded. Concurrent but spotty burning would not have consumed a fleshed and feathered turkey but would have allowed some charring of the extremities. As suggested, roof collapse could have caused death but, either way, would account for major fractures to the long bones.

Modified Bone

Six pieces of modified bone, all recovered from the pithouse structure, were identified at Mueller Little House including two awl or awl fragments (Figures 20.2 and 20.3), three bone tubes (Figure 20.4), and one possible bone tube (not photographed). The complete awl (see Figure 20.2) was manufactured from a deer metatarsal, contained a perpendicular cut mark near midshaft, and was heavily polished (no flash was used in Figure 20.2). The whole awl was recovered from Structure 101, the main chamber of the pithouse.

The awl fragment (see Figure 20.3) was manufactured from an unidentified fragment and was also recovered from the main chamber of the structure. The three definitive bone tubes are depicted in Figure 20.4. The large, complete tube (bottom left) was manufactured from a large bird long bone, likely a turkey. This tube was recovered from the bumped-out side room of the pithouse. The two smaller tube fragments (bottom right and upper) were approximately the same size, both about half present, and both recovered in the antechamber to the pithouse structure. The final possible bone tube fragment was not photographed but showed signs of polishing. It was recovered from the main chamber of the pithouse structure.

In addition to the intentionally modified bones, three bones were altered in other ways. One medium-sized mammal long bone fragment contained evidence of carnivore digestion, one chipmunk innominate contained a pathological condition, and one jackrabbit radius shaft fragment was heavily polished. It is possible that the polishing occurred intentionally, but without corroborating evidence, this is uncertain.

5MT10647 (The Dillard Site)

By far, the largest faunal assemblage among the Basketmaker Communities Project sites was recovered from the Dillard site. In total, 1,614 pieces of bone were recovered; three of these were recovered from flotation samples and not analyzed. These three items are not included as part of Table 20.4, which shows the taxonomic distribution of the faunal remains recovered from excavation at the site.

The lagomorphs (pikas, rabbits, and hares) are the most common taxonomic group at the Dillard site, representing just under 54 percent of the assemblage. Cottontails (*Sylvilagus* sp.) are more abundant than jackrabbits (*Lepus* sp.) (31.2 versus 21.4 percent). Ground squirrel and domestic dog are the next most common taxa at around 10 percent for each. The domestic dog remains are likely intrusive given the minimum number of individuals (MNI) of one, their general appearance, and their presence in a single burrow in Structure 309 (the main chamber of a double-chambered pithouse), but the squirrel remains do indicate a cultural origin. Just over 16 percent of the squirrel remains are burned, and the MNI of four (based on the mandible) suggests they were being used by the inhabitants of the site. Artiodactyls represent just under 4 percent of the assemblage, which is low compared to other Basketmaker III sites in the northern Southwest (Reynolds 2012). The remaining taxa are represented by only trace amounts but are varied and include amphibians, reptiles, and birds.

Element Frequencies

In general, it is expected that most animals will be represented archaeologically by more-or-less complete skeletons. In some instances, however, cultural and/or natural processes influence the relative frequencies of particular skeletal regions, elements, or element parts. For example, large game may be represented at a habitation site by only those elements returned to the site by hunters, or alternatively, at a kill site by only those elements that are left behind (Binford 1980). Smaller animals are less likely to be affected by such differential transport of parts, but they may become disarticulated and distributed throughout a site as a result of butchering and processing. Consistent and repeated cultural activities may cause skeletal portions of some taxa to be selectively preserved, destroyed, or removed from the archaeological assemblage.

Natural agents can have similar effects on frequencies of skeletal parts. For example, carnivores may remove or destroy specific elements of some species, thus creating assemblages that contain incongruent element compositions. Rodents may also collect elements of a particular size range or density, resulting in removal of these elements from a site or their preservation within a burrow. Colluvial and fluvial forces may also selectively affect skeletal part frequencies because it is easier to move smaller materials.

For this analysis, the remains for the most common taxa from the site are assigned to one of seven skeletal regions: cranial, axial, pectoral girdle, forelimbs (further categorized into upper and lower), innominate, hind limbs (further categorized into upper and lower), and phalanges (following Muir and Driver 2003) (Table 20.5). The assemblages from the other Basketmaker Communities Project sites are too small to lend themselves to such an analysis.

Several patterns are apparent in the Dillard site assemblage. Predictably, regions with fewer skeletal components (for example, the shoulder and pelvis) have consistently lower specimen frequencies. Otherwise, the two taxa with elevated numbers of identified specimens (cottontail and jackrabbit) are well represented in all skeletal regions. The small rodents present an exception to this pattern, as no phalanges or metapodials were identified for these taxa. This is not surprising given these tiny elements are unlikely to be recovered during excavation. Also, because morphological similarities exist across different families, precisely identifying phalanges of small mammals during analysis is difficult.

Elements of the cranial region far outnumber those of all other skeletal regions for all taxa (except artiodactyls). Although it is possible that this reflects evidence of human procurement, it seems more likely that the frequencies reflect recovery and identification biases. Elements of the cranial region are large and are likely to be collected consistently. This is also true for long bones. Axial elements and phalanges, if recovered, are unlikely to be identified precisely and will often be classified as small mammal or small rodent. The large number of axial elements for the cottontails suggests these animals were likely minimally processed or that they were naturally introduced into the assemblage post-depositionally.

Overall, the element frequencies at the Dillard site suggest that complete animal carcasses were deposited at the site. The observed variability among element frequencies can be accounted for by commonly recognized recovery, identification, and quantification biases. No strong patterns indicative of selective transportation or distribution of specific butchery units are evident for any of the taxa.

Intrasite Variation

The pit structures and great kiva on the Dillard site were occupied earlier than other dated farmsteads in the project area. The dates suggest that Basketmaker III people settled on the Dillard site in the late sixth and early seventh centuries. Dates for the great kiva suggest that the use life of this structure extended beyond the main occupation of the Dillard site in the mid-A.D. 600s and continued into the early eighth century, perhaps alluding to evidence of early community organization around a central community structure. Evidence of a stockade southwest of the great kiva was found. Given the clustering of households to the north (Block 300) and south (Block 200) of the great kiva (Block 100), the stockade might have acted as a physical boundary between these two neighborhoods (Diederichs and Copeland 2013; Sommer et al. 2016).

The distribution of faunal remains at the Dillard site is examined here in an attempt to identify spatial patterning within the site pursuant to the demarcations referenced above. The distributions of the identified taxa at the Dillard site are presented by architectural block in Table 20.6, and only remains identified to element were included, thus excluding all unidentified remains. No faunal remains were recovered from Blocks 400 and 500, which are both northwest of Blocks 100, 200, and 300. The small sample sizes of many taxa in the remaining blocks may make comparisons tenuous, but they do indicate some interesting patterns, which are briefly discussed below. Patterns could be strengthened with comparisons to botanical datasets.

Small rodents are fairly evenly dispersed throughout the blocks, which points to their primarily natural origin, though Block 100 seems to have more identified taxa. The exception to this is ground squirrel (*Spermophilus* sp.). Ground squirrels are present in all three blocks, but their relative frequency is elevated in Block 200 (8.5, 17.5, and 3.0 percent, respectively). This pattern is similar for the artiodactyls (all combined). Their relative frequencies in the individual blocks are 1.2 percent (Block 100), 5.1 percent (Block 200), and 3.4 percent (Block 300). The domestic dog remains are most common in Block 300, but this is the result of an intrusive skeleton in Structure 309 (main chamber of a double-chambered pithouse). If these remains are removed from the identified total, relative frequencies are fairly similar across the blocks. Lagomorphs (all combined) are 46.3 percent (Block 100), 55.6 percent (Block 200), and 71.7 percent (Block 300) of the individual block assemblages. Not surprisingly, they are the most abundant group in all blocks.

Within the lagomorphs, however, an interesting pattern is present. The relative frequency of cottontail remains is fairly consistent across the blocks. They represent 36.7 percent of the bones identified to element in Block 100, 37.4 percent in Block 200, and 31.0 percent in Block 300 (with the intrusive dog remains removed from the total, so n = 226 not 298). Jackrabbit remains, however, are much more common in Block 300. Jackrabbits account for only 7.3 percent of the remains in Block 100, 16.2 percent in Block 200, and nearly 40.3 percent in Block 300, making jackrabbits more common than cottontails in this block. Element frequencies between the blocks are fairly consistent, with much of the skeleton present in all the block assemblages. One discernable pattern is that the distal, non-meaty hind limb elements (distal tibia, metatarsals, astragalus, and calcaneus) are more abundant in Block 300.

The exploitation of both high-desert and woodland species suggests that these biotic communities were both significant to the inhabitants of the site. Also, the exploitation of animal resources from varied habitats indicates movement across the landscape and exploitation of diverse niches. Jackrabbits and pronghorn are inhabitants of high-desert environments, while deer, cottontails, ground squirrels, and chipmunks all inhabit more wooded habitats. Although the distance between these habitats is not particularly great in the project area, the use of both zones appears to have been important to the residents of the site.

Structures versus Nonstructures

Bones were recovered from structures and nonstructures (primarily middens). The remains recovered from these proveniences are listed in Table 20.7. In Block 100, all but three of the bones in the "structures" column came from the great kiva (Structure 102). Many of the intrusive rodent taxa were identified in Structure 102, perhaps as a result of burrowing activities. Surprisingly, "exotic" taxa are absent from the great kiva, and diversity is low, which is different from the palynological results (see Chapter 22). These results indicate a broader spectrum of subsistence resources and/or different cultural activities inside the great kiva than in other sampled contexts (Sommer et al. 2016). One would expect a similar pattern for the faunal remains, but this is not the case.

In general, the structures contain more bones in all blocks than the nonstructures. The structures also contain more identifiable remains than the nonstructures, again perhaps due to post-depositional burrowing. The most abundant taxon, cottontail, is present in greater numbers in the structures with the exception of Block 300 where there are three times as many cottontail remains in the nonstructures than in the structures. For jackrabbits, the numbers are virtually equal in and out of structures in Block 100, but there are twice as many in the structures in Blocks 200 and 300. This is the inverse pattern for cottontails in Block 300.

Bird remains are higher in structures than out. Rodent remains are present more often inside the structures than out, though with the exception of Block 100 (the great kiva) where all the rodent remains were identified in the structures, they are in both contexts. Canid remains are skewed in this analysis given the intrusive domestic dog remains in the main chamber of Structure 309. If these are removed, small numbers of canids are found both in and out of the structures. Finally, artiodactyl remains are found in about equal numbers inside and outside the structures. Many of the artiodactyl remains in this assemblage were fashioned into tools or items of adornment, which may explain their elevated presence within structures.

Structures at the Dillard Site

Faunal remains were recovered from 16 different structures at the Dillard site (Table 20.8). Using this information, Table 20.9 shows the distribution of faunal remains by structure type and temporal component. This will be discussed further in the discussion section of this chapter.

Based on the data presented in Tables 20.8 and 20.9, pit rooms have very few faunal remains. Antechambers also have small amounts of bone (averaging 25 specimens per features), and those taxa identified were primarily rodents, which are likely intrusive. Though samples are small, both antechambers contain relatively more jackrabbits than cottontails. And, though cottontails are more numerous at the site in general and in the Block 200 pit structures, jackrabbits are more numerous in the Block 300 pithouses, which have almost 8 times more jackrabbits than cottontails. The late Basketmaker III structures from Block 300 contain more jackrabbit than structures in other blocks. Block 200 pithouses have more artiodactyls, and the Block 200 pithouses have more artiodactyls (both NISP and taxa) than the Block 200 pit structures. Both the Block 300 pit structures and pithouses are virtually devoid of artiodactyls. Artiodactyls seem to be slightly more abundant at middle Basketmaker III structures. And, not surprisingly, the pithouses have the largest sample sizes of all features.

Modified Bone

Thirty-six specimens were identified as purposeful tools or items of adornment in the Dillard site assemblage (Table 20.10).

In terms of spatial differences across the site, one tool was found in the great kiva, 29 tools were recovered in Block 200 contexts, and six were found in Block 300 contexts. Of the six items identified in Block 300, three were recovered from structures (double-chambered Pithouses 311 and 312), including two tubes from the main chamber of double-chambered Pithouse 311 and one awl from the main chamber of double-chambered Pithouse 312. The other three items included one awl and two polished items from nonstructure contexts. The 29 tools/adornment items recovered from Block 200 were predominantly recovered from structures. Only three items came from nonstructure contexts, including an awl, a gaming piece, and a burned bead. Many more (11x) tools and items of adornment were recovered from the main chambers of double-chambered pithouse contexts relative to single-chambered pithouse, antechambers, and communal/ritual contexts. No tools were recovered from pit rooms.

Of the 36 manufactured items, only one awl came from late Basketmaker III contexts, six items were from general nonstructure contexts, and the remaining 29 items were from middle Basketmaker III structures. Five bones contained cut marks. Three of these came from Block 200 (a jackrabbit metatarsal from the main chamber of double-chambered Pithouse 205, a cottontail tibia from the main chamber of double-chambered Pithouse 220, and a large mammal long bone fragment from SCP 232). The other two were recovered from Block 300 and included a small mammal long bone shaft fragment from the main chamber of double-chambered Pithouse 309 and a medium mammal long bone shaft fragment from a nonstructure context. None of these items were burned, and all were from middle Basketmaker III contexts. Figures 20.5 through 20.9 show a selection of the modified items recovered at the Dillard site.

5MT10684 (Dry Ridge)

5MT10684 is situated atop a ridge and was originally designated as “Mound 2” at the Pasquin site (see site description below). This feature did not experience the same degree of mechanical disturbance as other areas of the site. Crow Canyon’s efforts were focused on excavation of the midden (Nonstructure 106) and a subterranean kiva (Structure 108), which was not sealed and contained primary refuse (Sommer et al. 2017). A total of 120 pieces of bone was recovered from this site. Table 20.11 lists the faunal remains recovered from 5MT10684, and Table 20.12 shows their distribution by context.

The majority of the bones (60 percent) at the site were recovered from a Pueblo II and early Pueblo III (A.D. 900–1200) kiva. The subterranean kiva contained an earthen bench and at least two masonry pilasters. It is probable that the kiva originally had four pilasters, but only two were exposed during excavation. Cottontail and jackrabbit remains were equal in the kiva deposits and were less abundant than the turkey remains. One turkey rib shows indications of carnivore gnawing, and one jackrabbit tibia was heavily polished. Additionally, a proximal turkey phalanx contained a pathological condition. Deer and intrusive rodent remains were also identified in the kiva. Burning was identified on very few remains.

Two pieces of bone from the kiva were manufactured into awls. Both awls were complete (23.15 and 23.65 mm, respectively), both were made from a deer (*Odocoileus* sp.) metatarsal, and since one was a right and one was a left, it is possible they came from the same animal. One of the awls (PD 65 FS 8) was broken at midshaft into two pieces and contained a cut mark (Figures 20.10 and 20.11, bottom); the other (PD 65 FS 7) was complete (see Figures 20.10 and 20.11, top). The appearance of the break suggests it did not occur as a result of recent excavations, but at some point prior.

5MT10686 (Badger Den)

5MT10686 is situated atop a ridge and was originally designated as “Mound 4” at the Pasquin site (see site description below). This feature experienced heavy mechanical disturbance (Sommer et al. 2017). Crow Canyon’s efforts were focused on excavation and documentation of the midden (Nonstructure 106) and a Pueblo II and early Pueblo III (A.D. 900–1200) masonry surface structure (Structure 111), which was part of a larger roomblock that was identified via a surface scatter of rubble and storage features that were dug into the floor. A total of 118 pieces of bone was recovered from this site. Table 20.13 lists the faunal remains recovered from 5MT10686, and Table 20.14 shows their distribution by context. Not surprisingly, the few identified remains suggest lagomorphs and artiodactyls were most dominant in the assemblage.

No manufactured tools were recovered from the Badger Den site. One medium-sized mammal long bone fragment from the midden shows evidence of carnivore digestion, and one unidentified fragment was polished, perhaps intentionally.

Two “large” fish bones were identified in the midden deposits. Both of these are larger than the typical minnow-sized vertebrae that are most often recovered from sites in the Southwest. One fragment could not be identified to element (Figure 20.12, specimen is 12.48 mm at its widest point) but may be part of the quadrate. The other was a vertebral centrum (Figure 20.13, 9.15 mm). It is likely these bones come from a species of catfish, but that is based only on observations of faunal assemblages from archaeological sites across the greater Southwest region.

5MT10687 (Sagebrush House)

5MT10687 is situated on the south end of a low ridge and was originally designated as "Mound 5" at the Pasquin site (see site description below). This mound experienced heavy mechanical disturbance, which likely destroyed the Basketmaker deposits at the site (Sommer et al. 2017). Crow Canyon's excavation efforts were focused on excavation and documentation of the midden (Nonstructure 105) and a heavily disturbed Pueblo II and early Pueblo III (A.D. 900–1200) kiva (Structure 113) that was identified by a small portion of undisturbed floor. A total of 71 pieces of bone was recovered from this site. Table 20.15 lists the faunal remains recovered from 5MT10687, and Table 20.16 shows their distribution by context.

Two manufactured tools were identified in nonstructure contexts at Sagebrush House: a bone tube and a scraper. The bone tube (Figure 20.14) was manufactured from a large bird long bone fragment, and the scraper (Figure 20.15) was manufactured from a medium-sized mammal long bone fragment.

The assemblage from the kiva was generally unremarkable with rodents, lagomorphs, and artiodactyls. Two bones from nonstructure contexts showed evidence for carnivore chewing and digestion; both were medium-sized mammal long bone fragments. Two long bone fragments (one small-sized mammal and one medium-sized mammal) were polished; both were from nonstructure deposits.

5MT10709 (Portulaca Point)

5MT10709 is a single habitation site dating to the middle Basketmaker III phase (A.D. 575–660). One double-chambered pithouse (Structure 106/111), one slab-lined storage room (Structure 115), and midden deposits were identified (Sommer et al. 2015). Faunal remains (n = 4) were only recovered from the main chamber (Structure 106) of the double-chambered pithouse and included one unidentified fragment and three awls. One awl was manufactured from an *Odocoileus* sp. metapodial; it was broken during excavation but refits and is charred. A second awl is a small fragment from a medium-sized artiodactyl and is calcined. The third awl (Figure 20.16) is burned black and was manufactured from a medium-sized mammal long bone fragment.

5MT10711 (The Ridgeline Site)

5MT10711 is a late Basketmaker III phase (A.D. 660–750) site situated on a low ridge. Crow Canyon's excavation efforts were focused on excavation of the east half of a pithouse (Structure 101-103) and on testing an associated midden (Nonstructure 106), two extramural surfaces (Nonstructures 109 and 112), and a pit room (Structure 110) (Sommer et al. 2017). Excavations revealed an oversized pithouse (Structure 101-103) and three pit rooms (Structures 110, 116, and

117). A total of 226 pieces of bone was recovered from this site. Table 20.17 lists the faunal remains recovered from 5MT10711, and Table 20.18 shows their distribution by context.

In general, the assemblage from this late Basketmaker III habitation site is fairly unremarkable. The assemblage contains the usual suspects in Southwestern faunal assemblages, dominated by lagomorphs and rodents. This site does differ from the middle Basketmaker III habitation sites associated with the Basketmaker Communities Project in that there are fewer artiodactyls (no deer) and more birds.

Interesting finds include one root-etched jackrabbit tibia and one pathological jackrabbit radius from Structure 101 (main chamber of an oversized pithouse), and 17 pieces of altered bone. Six of these were moderately to heavily polished but not fashioned into formal tools. These included four items from Structure 103 (antechamber of an oversized pithouse), including one medium-sized mammal long bone fragment, one cottontail tibia, and two jackrabbit vertebrae. The other two items came from Structure 101 and included one large bird long bone shaft fragment and one jackrabbit tibia.

In addition to the six polished items, 11 items were manufactured into formal tools. With the exception of a possible gaming piece from a nonstructure context and an awl from Pit Room 116 (Figure 20.17), all of these items came from the main chamber of an oversized pithouse.

Manufactured items from this structure included one bone tube (Figure 20.18, PD 55 FS 20), six awls (Figure 20.19 [PD 37 FS 10], Figure 20.20 [PD 14 FS 8], Figure 20.21 [PD 55 FS 4], Figure 20.22 [PD 121 FS 5], and Figure 20.23 [PD 217 FS 15 on the left and PD 222 FS 10 on the right]), one needle (Figure 20.24 [PD 54 FS 3]), and one possible tool blank (Figure 20.25 [PD 54 FS 3]) that was not manufactured into a tool before its discard. The bone tube (see Figure 20.18) was manufactured from a small mammal long bone shaft fragment, the needle from an unidentified fragment (see Figure 20.24), and the blank from the rib of a large mammal. A large fragment of antler (deer or elk) was found in Structure 101. The antler was heavily eroded, heavily burned, and fragmented.

5MT10718 (Unnamed)

5MT10718 lies approximately 150 m north-northeast of the center of the Dillard site at the head of a drainage that trends southward along the east edge of the Dillard site (Diederichs and Copeland 2013). Two features were identified at the Pueblo I (A.D. 750–900) site including a single-chambered pithouse (Structure 107) and a slab-lined pit room (Structure 108). A disturbed area was also tested (AU 101), and a single calcined *Sylvilagus* sp. (cottontail) cervical vertebra was recovered. Forty-five bones were recovered from Structure 108; no bones were recovered from Structure 107. Table 20.19 shows the distribution of recovered faunal remains.

5MT10736 (The TJ Smith Site)

5MT10736 is a mid-to-late Basketmaker III (A.D. 575–750) site that was severely disturbed by heavy equipment used in the wheat cultivation of the area. The plow zone on the site is about 20 cm thick, but excavation revealed that cultural deposits were intact below this zone. After testing in the area, two surface rooms (Structures 108 and 109), a pithouse (Structure 111), and an associated midden were tested (Sommer et al. 2014). Structures 108 and 109 are contiguous, small, aboveground storage rooms located directly south of the single-chambered pithouse (Structure 111). Excavations indicate that the surface rooms were constructed after the pithouse was decommissioned and the pithouse depression filled.

Twenty-nine fragments of bone were recovered from this site. Table 20.20 shows the distribution of faunal remains recovered from 5MT10736. The single jackrabbit bone was calcined. One awl fragment was collected from a flotation sample (PD 27 FS 5); this is not included in the site total because it was only noted, not analyzed.

No faunal remains were recovered from Structure 108, and a single unidentified bone fragment was recovered from Structure 109. Twenty pieces of bone were recovered from Structure 111, the majority of which were unidentified (n = 14). Four cottontail remains (mandible, phalanx, humerus, and calcaneus) were identified as were two intrusive rodent remains (one ground squirrel sacrum fragment and one unidentified maxillary rodent incisor).

5MT2032 (The Switchback Site)

5MT2032 is a small, late Basketmaker III habitation site that sits on a north to south–trending ridge approximately 250 m northwest of the Dillard site in a cluster of Basketmaker III sites. 5MT2032 was sampled and portions of a midden (Nonstructures 101 and 102), a pithouse (Structure 110), and a slab-lined pit room (Structure 113) were excavated (Sommer et al. 2015). Faunal remains were recovered from the midden and from Structures 110 and 113 (Table 20.21).

Structure 110 is the main chamber of a double-chambered pithouse that was to the late Basketmaker III phase (A.D. 660–760). Seventeen bones were recovered in the structure; these included 16 cottontail remains, three of which were burned, and one ground squirrel mandible.

Structure 113 is a slab-lined storage room that appears to have been roofed. Sixteen pieces of bone were recovered from this structure including 15 pieces of medium-sized mammal remains and one awl manufactured from a right dog/wolf/coyote ulna. The awl was broken during excavation but includes three distinct pieces that fit together (Figure 20.26). The medium mammal remains are primarily cancellous bone fragments with the exception of two fragments, both of which are modified. One piece of a long bone fragment has been polished, and a rib fragment may be a portion of a bracelet or other type of adornment.

Nonstructure contexts included 29 pieces of bone. Nine of these were small-sized mammal (two calcined, one calcined and polished), 16 were identified as medium-sized mammal (all calcined), and four were unidentified (one calcined).

5MT2037 (Pasquin)

5MT2037 sits on a north to south–trending ridge. In the mid-1980s, mechanical disturbance destroyed most of the cultural deposits (Sommer et al. 2017), but kivas, roomblocks, and a plaza were all reported (McClellan 1986). In 1991, Woods Canyon resurveyed the site and divided it into four sites on the basis of four discrete rubble mounds: (1) Pasquin (5MT2037), which had been previously designated Mound 3; (2) 5MT10684 (Dry Ridge), previously designated Mound 2; (3) 5MT10686 (Badger Den), previously designated Mound 4; and (4) 5MT10687 (Sagebrush House), previously designated Mound 5 (Sommer et al. 2017). Mound 3, or 5MT2037, included a disturbed midden deposit (Nonstructure 206) and one feature composed of thermally altered rocks. These features were investigated by Crow Canyon via 28 excavated 1-x-1-m units and found to date to the Pueblo II and early Pueblo III period (A.D. 900–1200). A total of 141 faunal remains was recovered from these units, none of which were associated with structures or features. Table 20.22 lists the recovered faunal remains.

One jackrabbit tibia exhibited a pathological condition. Three small mammal–sized long bone fragments and one jackrabbit tibia showed evidence of polishing; these items were not manufactured into formal tools. Two other pieces of bone were fashioned into tools. The function of one was not identified, nor was the specimen identified; it did contain a cut mark (Figure 20.27, PD 97 FS 10). The other tool was a complete awl manufactured from a turkey ulna (Figure 20.28, PD 9 FS 7).

5MT3875 (The Shepherd Site)

5MT3875 occupies the east slope of a ridge that drops away into the Crow Canyon drainage system on the far eastern edge of the project area. Testing was focused in the western half of the site, sampling two small rubble mounds (Structure 102 and Nonstructure108), a possible pit structure (Nonstructure 115), and portions of three middens (Nonstructures 105, 109, and 112) (Sommer et al. 2015). Eight pieces of bone were recovered. Table 20.23 lists the faunal remains recovered from 5MT3875.

Structure 102 is a small rubble mound that was sampled during excavations. A single cottontail mandible fragment was the only bone recovered.

Nonstructure 108 is an L-shaped rock concentration measuring 10-x-6 m that was only slightly elevated above the modern ground surface. A 2-x-2-m unit was excavated off the northwest edge of the concentration and five bones were recovered. Identified specimens include two right posterior cottontail mandible fragments and one right cottontail calcaneus. A jackrabbit first rear phalanx was also identified as was a charred unidentified fragment.

One 2-x-2-m unit was placed within a geophysical anomaly detected with the electrical resistivity survey. Sparse deposits of burned adobe were observed. One charred unidentified small mammal fragment was recovered from Nonstructure 115.

Nonstructure 119 is an unspecified pit. One jackrabbit right first metatarsal was identified. The metatarsal was charred.

Discussion of the Faunal Remains from All Basketmaker Communities Project Sites

Faunal remains were recovered from 12 Basketmaker Communities Project sites. Table 20.24 presents the faunal data from each of the sites. Burning is included parenthetically next to the total. The identified specimens in the overall assemblage represent a minimum of 32 discrete taxonomic groups, including at least 22 mammal taxa, five bird taxa, three reptile taxa, one amphibian taxon, and one fish taxon). Additional taxonomic categories may be represented in the remains, as a considerable number of specimens have been assigned to general categories such as "small mammal," "medium artiodactyl," and "large bird." The majority of these remains probably belong to taxa already identified within the assemblage. For example, most specimens identified as "medium artiodactyl" are undoubtedly *Odocoileus* sp. (deer), *Antilocapra americana* (pronghorn antelope), or *Ovis canadensis* (bighorn sheep). Similarly, most remains identified as "small mammal" are likely *Lepus* sp. (jackrabbits) or *Sylvilagus* sp. (cottontails). On the contrary, the wide variety of Muridae (deer mice, voles, etc.) is difficult to separate osteologically, and it is possible that species in addition to those named are represented by these remains. Similarly, remains identified as "Rodentia" (rodents) may represent a number of species not already included. Also, some of the taxa may be intrusive.

Mammal remains dominate the identifiable assemblage, accounting for 86 percent of the identified specimens from all the sites (Table 20.25). Birds represent just over 12 percent of the identified remains, and trace amounts of amphibian, fish, and reptile remains make up the balance of the assemblage.

The mammal remains from the Basketmaker Communities Project sites include a wide variety of taxa, although many are represented by only a few specimens (Table 20.26). The lagomorphs are most common, representing just under 60 percent of the mammalian subassemblage. Cottontails (*Sylvilagus* sp.) are more abundant than jackrabbits (*Lepus* sp.) (39.5 versus 19.3 percent). Two species of cottontail may be represented: desert cottontail (*Sylvilagus audubonii*) and Nuttall's cottontail *(Sylvilagus nuttallii*). No attempt was made to distinguish between these species. Similarly, two species of jackrabbit occur in the area (*Lepus californicus* [black-tailed jackrabbit] and *Lepus townsendii* [white-tailed jackrabbit]). The *Lepus* remains were not assigned to a species, although they are more likely to be the white-tailed jackrabbit (*Lepus townsendii*) based on geographic range (higher altitude versus arid lowlands) and size. White-tailed jackrabbits are larger than their black-tailed counterparts, and the remains from the Basketmaker Communities Project sites were consistently on the larger side of the jackrabbit skeletal range. No pikas (*Ochotona* sp.) were identified.

A large number of rodent remains were recovered from the sites, representing almost 23 percent of the mammalian specimens. Most of the elements that were identified to genus and species were mandibles, crania, teeth, innominates, and major long bones. Other rodent elements have been identified only to the family level. Small rodents such as wood rats (*Neotoma* sp.), deer mice (*Peromyscus* sp.), kangaroo rats (*Dipodomys* sp.), pocket gopher (*Thomomys* sp.), and chipmunk (*Eutamias* sp.) are most numerous, followed by fewer specimens of murids (mice and voles) and grasshopper mice (*Onochomys* sp.). These animals are probably underrepresented, given the potential for their very small bones to be lost or overlooked during excavation. The larger rodents include rock and ground squirrel (S*permophilus* sp.) and prairie dog (*Cynomys* sp.), which were likely part of the cultural assemblage as is supported by burning on 13 percent of the squirrel remains.

The order Carnivora is represented by at least four taxa and accounts for just under 11 percent of the total mammalian remains. Canids (fox, coyote, dog, and wolf) and felids (bobcat) are represented. Three species, domestic dog (*C. familiaris*), gray fox (*Urocyon cinereoargenteus*), and bobcat (*Lynx rufus*), were positively identified. The *C. familiaris* remains appear to be from a single skeleton (PD 771), which includes the cranium, mandibles, thoracic vertebrae, and ribs, as well as other miscellaneous fragments. These remains were found in a large burrow that truncated a portion of the hearth in a double-chambered pithouse (Structure 309) at the Dillard site; it is likely these remains are intrusive based on their appearance, completeness, and lack of burning. The majority of the other *Canis* sp. specimens were also recovered from Structure 309 (PDs 763, 766, 767, and 768), suggesting they may actually be part of the same individual since elements do not overlap. In further support of this claim is the fact that two *Canis* sp. remains from other proveniences at the Dillard site are burned, suggesting a cultural origination. If the potentially intrusive canid remains are excluded from the NISP totals, carnivore remains at the Basketmaker Communities Project sites are virtually non-existent.

Artiodactyl remains account for just under five percent of the mammalian assemblage. At least three species are represented: deer *(Odocoileus sp.*)*,* pronghorn antelope *(Antilocapra americana)*, and elk (*Cervus elaphus*). Artiodactyls in the Basketmaker Communities Project sites seem underrepresented when compared to other contemporaneous sites in the northern Southwest. Many of the artiodactyl items are tools.

Birds are approximately 12 percent of the identified assemblage. Bird remains are dominated by turkey (*Meleagris gallopavo*) remains; although the species was identified at five sites, the remains come primarily from a turkey burial at Mueller Little House. Other identified bird taxa include possible grouse (Tetraoninae), hawks (*Buteo* sp.), great blue heron (*Ardea herodias*), and perching birds (passerines).

The reptile subassemblage contains 12 colubrid snake remains (Colubridae), two box turtle (Testudinidae) remains, five lizard (Sauria) remains, and one horned lizard (*Phrynosoma douglassii*) specimen. The horned lizard specimen was likely an intrusive remain given the presence of desiccated flesh still adhered to the innominate bone. One fragmentary amphibian femur was also identified at the Dillard site. Little effort was made to specifically identify any of these specimens because the comparative collections used did not include a complete range of species. One possible catfish vertebra was identified at Badger Den.

Faunal Remains by Time Period

Excavations at the Basketmaker Communities Project sites produced faunal remains that dated to several different time periods, the distribution of which is shown in Table 20.27. Table 20.28 shows which sites included deposits/structures from each time period. Faunal remains dating to Basketmaker contexts are far more abundant than those dating to Pueblo period contexts, but there are no striking differences. Assemblages from both Basketmaker and Pueblo contexts are dominated by lagomorphs (cottontails and jackrabbits), followed by rodents, birds, and artiodactyls. The small number of artiodactyls is a little surprising given their natural abundance in the project area. The faunal remains identified in deposits that are not affiliated with a specific temporal period are generally found in nonstructure contexts (i.e., middens).

Faunal Remains by Structure Type

A wide variety of structures were excavated at the Basketmaker Communities Project sites. Faunal remains were found in many (n = 33) of these structures. Table 20.29 lists the number and types of faunal remains identified in the different types of structures. Several of the structural categories were collapsed because of small data sets. For example, the "antechamber" category includes both "antechamber of double-chambered pithouse" and "antechamber of oversized pithouse;" this also occurred for the main chambers of both structure types. Likewise, "pit room" includes "pit room (adobe surface room)," "pit room (storage)," "pit room (slab-lined)," and "pit room (round)." The "kiva" category includes a general assignation as well as a subterranean assignation, but these were kept separate from the "great kiva" category. Burning on the remains is included in the table parenthetically.

Table 20.30 presents the same data included in Table 20.29 by site and structure. The taxa recovered in specific structures at each site were previously discussed in the individual site sections if additional information is desired. 5MT2037 is not included in Table 20.30 because no structures were identified during the excavations.

Several interesting patterns appear when comparing the faunal data from structure types. First, lagomorphs are present in all structures regardless of type or function, though their presence is higher in the main chambers of double-chambered pithouses and single-chambered pithouses. Both of these structure types are primarily residential, suggesting these taxa were important components of general food consumption and probably not as important in structures used for specialized purposes. This is further supported by the higher percentage of burned lagomorph remains from residential structures relative to structures used for other purposes. Jackrabbits in structures were burned more frequently than cottontail rabbits on bones recovered (8.2 versus 6.4 percent, respectively). Lagomorphs are the only culturally modified taxa identified in the great kiva at the Dillard site.

Second, the pattern for birds is nearly the opposite of the lagomorphs. Birds are virtually non-existent in the main chambers of double-chambered pithouses and in single-chambered pithouses, but are prevalent in the antechambers, general kiva structures (not the great kiva), and pit rooms. The presence of a single turkey skeleton in an antechamber (Structure 102) of a double-chambered pithouse (Structure 101) at Mueller Little House inflates these numbers, but if it is removed from the NISP total, the pattern is still present, just not as robust. Antechambers also include more bird taxa relative to the main chambers and single-chambered pithouses. The presence of several bird taxa at most of the Basketmaker Communities Project sites suggests birds were commonly used as both food and ceremonial resources.

Third, artiodactyls are only found in residentially used structures, with the exception of five items recovered in kivas (but not the great kiva at the Dillard site). Of these five remains, three were fashioned into tools. In general, artiodactyls are seemingly underrepresented in assemblages from an area where they can be naturally abundant. Their presence in residentially used structures from the middle and late Basketmaker III phase suggests they may have been hunted during this time but may have been quickly depleted (see Table 20.27).

Fourth, ground squirrels appear to be the only rodent taxon found in most structure types, and many of the ground squirrel specimens show direct evidence of cultural use via burning. The great kiva (Structure 102) at the Dillard site has a large number of intrusive rodents and lizards and lacks ground squirrel remains. The residential structures also contain what are likely intrusive rodents, suggesting that rodents were not significant food or ceremonial resources.

Finally, carnivores, amphibians, and reptiles are a very small percentage of the faunal assemblages from structures, regardless of structure type. Their low frequency at all of the sites suggests their use at the Basketmaker Communities Project sites was not significant.

Faunal remains from the Basketmaker III structures listed in Tables 20.29 and 20.30 are assigned to specific structure types (e.g., pithouses, kivas, pit rooms, etc.). Pueblo period structures are not included in this discussion because the sample size is too small to be meaningful. And, even though the Basketmaker III sample sizes are small, comparisons between structure types were made to be comparable to datasets from other artifact classes.

Faunal data were examined in broader categories to determine whether activities differed at functionally distinct structures (Tables 20.31 and 20.32). Categories of structures from six Basketmaker sites (5MT2032, 5MT10631, 5MT10647, 5MT10709, 5MT10711, and 5MT10736) include public architecture (n = 1, from the Dillard site), permanent housing (n = 14, from all six sites), temporary housing (n = 1, from the Dillard site), and specialized activity (n = 6, from four sites). Burned elements are included parenthetically in Table 20.31.

As mentioned previously, the faunal remains from structures of different functions do vary in subtle ways, and some interesting patterns are highlighted. Bones from publicly used architecture (in this case, a great kiva) seem to have many of the same taxa as residential and specialized structures but have a plethora of rodent species. The rodents are likely intrusive, suggesting the deep deposits of the kivas may have attracted these taxa, both while the buildings were being used and after the structures were decommissioned. Only squirrels appear to have been used purposefully as evidenced by burning.

Artiodactyls are virtually non-existent in all structures except those used as permanent housing. A handful of deer (*Odocoileus* sp.) remains were identified in the great kiva, but over half of these were manufactured into tools. The lack of artiodactyl remains in any of the specialized activity structures also indicates that these animals were not being processed for consumption on site.

Lagomorphs were found in all types of structures, with the only subtle difference between jackrabbits and cottontails being that jackrabbits have a slightly higher percentage of burned remains (13 vs. 6 percent).

Birds are found in all functional categories except temporary housing. Bird remains account for nearly all the remains from a round pit room (Structure 116) at 5MT10711, suggesting this could have been a structure used for processing or containing turkey (the only identified taxon). Similarly, nearly all the bones from Structure 113 at 5MT2032 were medium-sized mammal remains (except for a single *Canis* sp. awl), suggesting some sort of specialized processing may have occurred in this slab-lined storage feature. None of the other structures/features showed any clear patterns.

A final comparison is made between two structures that were occupied at virtually the same time (A.D. 660–750), are from two different sites, have two very different functions, and have virtually the same size assemblages. The great kiva at 5MT10647 (the Dillard site) is compared to an oversized pithouse at 5MT10711 (the Ridgeline site) in Table 20.33. Burned items are included parenthetically.

With the exception of the lagomorphs, which are found in both the great kiva and oversized pithouse assemblage, the assemblages appear to be dichotomous. Where the pithouse has a number of bird taxa, the great kiva has none; where the great kiva has rodent taxa (most of which are probably intrusive), the pithouse assemblage contains the rodent taxa that were most likely used culturally (perhaps with the exception of chipmunks and kangaroo rats). Both are lacking in artiodactyls and carnivores: the great kiva has none, but the pithouse contains a few. With the exception of a single bone needle, the great kiva lacks modified tools whereas the pithouse has six awls, one needle, one tube, and one artifact of unknown function (all of which came from the main chamber of the pithouse). The great kiva assemblage contains only three burned remains (1.5 percent), but the pithouse contains 49 (27.1 percent). All these distinctions suggest two very different activities were occurring in these structures.

Modified Bones and Tools

As mentioned earlier, 64 bones from the Basketmaker Communities Project sites were modified into tools, items of adornment, or items of other unspecified function. These items include 31 awl or awl fragments, three beads, one possible bracelet fragment, one gaming piece, two needles, 13 tubes and one possible tube fragment, one scraper, two spatulate-shaped items, and nine unspecified items, which could possibly be the result of manufacturing debris. Photographs of many of these items can be found in the individual site descriptions in the earlier portion of this chapter. Modified and/or polished items were found at nine of the 12 sites that contained faunal remains and are shown in Table 20.34. Table 20.35 presents the same data but separates the modified items into separate temporal contexts. Table 20.36 groups the modified items into temporal groups regardless of site.

More modified items were present in the sites with Basketmaker components relative to the Pueblo period components. This difference could be a function of sample size since many more bones were identified from the Basketmaker components in general. It is also possible, as already mentioned, that artiodactyls were less abundant by the Pueblo period, thereby reducing the number of large tools used and/or discarded. However, not enough data are available from the Pueblo period to adequately evaluate this difference.

Bones from a variety of animals were used to manufacture artifacts at the Basketmaker Communities Project sites. The taxon and element for each artifact are listed in Table 20.37. Many of the artifacts are not identifiable to specific taxon or skeletal element because the manufacturing process obscures or even eliminates many of the identifying landmarks on the bone. Also, many of the artifacts are fragmentary, which also limits the ability to identify them. Therefore, the most common recorded raw material for bone artifacts, particularly awls, is medium or large mammal long bones. These items probably represent elements from artiodactyls (e.g., deer, elk, pronghorn). Several items were positively identified to deer (*Odocoileus* sp.).

Among the identifiable bone, awls were most frequently manufactured from artiodactyl metapodials, and primarily the metatarsal of the hind foot. Less typical artiodactyl elements used for tools include ribs and a single polished astragalus (unknown function). Tools and ornaments manufactured from the elements of small mammals, carnivores, and birds were recovered in much lower proportions. One needle was manufactured from a cottontail (*Sylvilagus* sp.) metatarsal (see Figure 20.6). Artifacts made from unidentifiable small mammal long bones include two beads, eight tubes, and a single awl. One awl was manufactured from a dog/coyote/wolf (*Canis* sp.) ulna (see Figure 20.26), and one was from a turkey ulna (see Figure 20.28). Long bone shafts from unspecified mammals and birds were also used for beads and tubes.

Awls or awl fragments compose nearly 50 percent of all bone artifacts in the Basketmaker Communities Project bone artifact assemblages. Most of the awls (90 percent) were found in Basketmaker III contexts, with 54 percent coming from middle Basketmaker III contexts (A.D. 575–660), 39 percent coming from late Basketmaker III contexts (A.D. 660–775), and the remaining 7 percent coming from unspecified Basketmaker III deposits (A.D. 500–775). Just under 10 percent of the awl or awl fragments come from Pueblo II/early Pueblo III deposits (A.D. 900–1200). Most of the awls (n = 23, 75 percent) were manufactured from deer, artiodactyl, or indeterminate deer-sized mammal bone, and most appeared to be made by cutting, snapping, grooving, and grinding. The remaining 25 percent of the awls were made from dog/coyote/wolf (n = 1), indeterminate turkey-sized bird bone (n = 1), turkey (n = 1), small mammal (n = 1), and unidentified (n = 4) bones. Nearly half (45.2 percent) of the awls were recovered from the Dillard site, with 22.3 percent coming from the Ridgeline site, and nominal amounts from all the other sites with the exception of Sagebrush House. It appears that most of the awls in the Basketmaker Communities Project assemblage were manufactured by cutting and grinding long bones to shape.

Two spatulate-shaped bone tools were identified in the Basketmaker Communities Project assemblage, both of which were from middle Basketmaker III deposits at the Dillard site. Both of these items were manufactured from indeterminate deer-sized or larger mammal bone, and both were identified in a double-chambered pithouse; one came from the main chamber (Structure 205), and one came from the associated antechamber (Structure 226). The item from the antechamber (see Figure 20.9) was much larger than the other, was more formally worked, has a roughly curved spatulate end, was slightly scraped along one side, and has a battered end. The item from the main chamber was less formally worked and was roughly spatulate shaped.

Non-utilitarian bone artifacts from the Basketmaker Communities Project sites include beads, tubes, a possible bracelet fragment, a possible gaming piece, and manufacturing debris. These items typically do not exhibit use wear.

Discussions and Conclusions

The faunal assemblages from the Basketmaker Communities Project sites are generally typical of faunal assemblages from the central Mesa Verde region. Lagomorphs are the dominant taxa represented in the assemblages. Hunting of larger animals was less common as was the hunting of carnivores (most of the canid remains at the Dillard site, which has the most canid remains of any Basketmaker Communities Project site, are likely intrusive). Skeletal representation at this site also suggests that complete animals were brought to the site for butchery, processing, and consumption, but the small sample sizes at the other sites precludes similar assessments. The rodent remains recovered from the Basketmaker Communities Project sites appear to be primarily the result of natural taphonomic processes rather than cultural activities, with the exception of the sciurid (squirrel) remains, which include burned items.

Intrasite analysis at the Dillard site (the only site with a large enough assemblage to make meaningful comparisons) indicates no significant differences among the different areas, although Block 300 has some interesting patterns. Among the lagomorphs, there are more jackrabbit vs. cottontail in Block 300 as compared to Block 200, as well as fewer cottontail remains *within* structures relative to the rest of the site. In addition, artiodactyls are nearly all concentrated in Block 200, with only a handful recovered from Block 300. More data (faunal and otherwise) are necessary to elucidate these patterns. For now, it is fair to say that differences in the use of space had some effect on the faunal assemblage, but the significance is not well understood.

The broad distribution of lagomorph remains throughout the Basketmaker Communities Project faunal assemblages excavated as part of this project suggest that these animals were commonly used throughout the sites. This is not surprising given that lagomorphs are documented as having been primary sources of meat for many prehistoric and historic Pueblo peoples (Henderson and Harrington 1914). The distribution of these taxa appears to be consistent with that of common household refuse. Lagomorph remains are more prevalent in structure deposits than they are in nonstructural and midden areas. The storage of these animals might explain this pattern since lagomorphs are often stored whole (complete with bones). Although cottontails may find the collapsed stone masonry ideal locations for dens and burrows, the presence of lagomorphs at these sites seems to be primarily the result of cultural activities (based on burning and element representation).

The predominance of lagomorph remains at the Basketmaker Communities Project sites is typical of Basketmaker III sites in the central Mesa Verde region, but the relatively low abundance of artiodactyl remains is uncommon (Muir 2007). Artiodactyls were heavily used by Basketmaker II people in the Durango area (Reynolds 2012), with several sampled sites (e.g., Darkmold, North Falls, and Talus Village) having Artiodactyl Indices above 0.85. The Artiodactyl Index (the NISP of artiodactyls divided by the NISP of lagomorphs + artiodactyls) at the Dillard site is 0.07 (the other sites have assemblages that are too small or lack artiodactyls), which is extremely low given the abundance of resources that should have been in the site area at the time. Later ancestral Pueblo sites in the project area have artiodactyl remains that are higher (Sand Canyon = 0.19, Yellow Jacket = 0.16) or comparable to lower (Woods Canyon = 0.02, Castle Rock = 0.05) (Driver 2000, 2002; Muir 2007; Muir and Driver 2002, 2003).

Artiodactyls are known to have been in the project area, and pronghorn, deer, and elk were all identified in the Dillard assemblage, with artiodactyls also identified at most of the other sites. Many artiodactyl remains were fashioned into tools or items of adornment, which makes it interesting that they were not present in larger numbers as domestic refuse. While cultural factors would have certainly impacted how people hunted, the technologies they used to capture prey, and how they interacted with the surrounding landscape, it is likely that if high-ranking resources such as deer were available, people would have used them (see Barlow 2006).

Typically, the remains of artiodactyls become less common through time, a pattern that has been documented as part of a gradual, long-term (Basketmaker II–Pueblo III) decrease in dependence on large game and a corresponding increase in dependence on domesticated species and smaller wild species. The virtual lack of artiodactyls from the refuse/subsistence assemblage is interesting. Muir (2007) has argued that the distribution of artiodactyl remains at Sand Canyon Pueblo suggests that remains found among towers and other associated structures are related to communal hunting activities. Alternatively, bones of artiodactyls might have been disposed of in particular locations or structures, possibly to protect them from scavengers. Whatever the case, the paucity and abundance of artiodactyl remains at various proximately located sites through time in the project area is unexpected, and further study may elucidate interesting patterns.

The exploitation of high-desert, woodland, riverine, and montane species suggests that these biotic communities were all significant to the inhabitants of the Basketmaker Communities Project sites. The exploitation of animal resources from varied habitats indicates movement across the landscape and exploitation of diverse niches. Jackrabbits, bobcat, grouse, and pronghorn are inhabitants of high-desert environments, while deer, turkey, cottontails, ground squirrels, and chipmunks all inhabit more wooded habitats. Elk inhabit montane niches, while fish are found in riverine areas. Although the distance between these habitats may not be particularly great in the project area, the use of a wide variety of ecotones appears to have been important to the residents of these sites.

Figure 20.1. Remains of a turkey on the floor of an antechamber (Structure 102) at 5MT10631. (Image taken from Figure 13, Sommer et al. 2017.)

Figure 20.2. Complete awl from 5MT10631 (PD 39 FS 19).

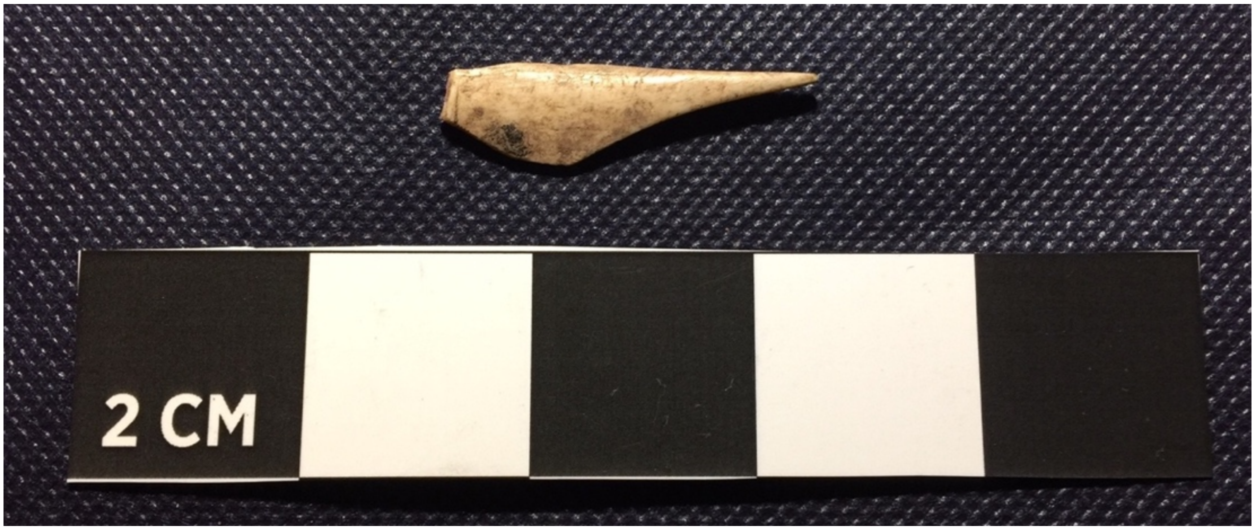

Figure 20.3. Awl fragment from 5MT10631 (PD 83 FS 15).

Figure 20.4. Three bone tubes from 5MT10631.

Figure 20.5. Awl fashioned from an artiodactyl rib from the main chamber of double-chambered Pithouse 205-226 at the Dillard site (PD 547, FS 42; scale same as in Figure 7).

Figure 20.6. Needle fashioned from a cottontail metatarsal from the great kiva at the Dillard site (PD 21, FS 3).

Figure 20.7. Awl fashioned from an artiodactyl metapodial from Structure 232 at the Dillard site.

Figure 20.8. A Large artiodactyl awl from the main chamber of Structure 205 at the Dillard site.

Figure 20.9. Large artiodactyl spatulate-shaped item from Structure 226 at the Dillard site.

Figure 20.10. Complete awls from 5MT10684 (Dry Ridge). Outside of bone shown.

Figure 20.11. Complete awls from 5MT10684 (Dry Ridge). Inside of bone shown.

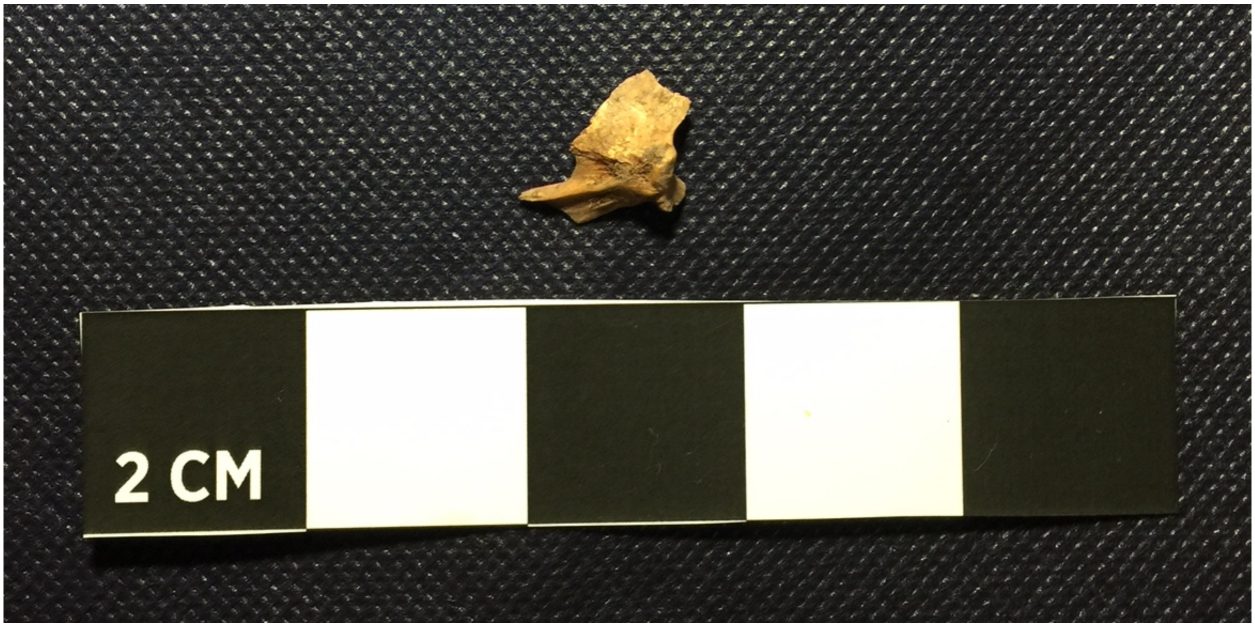

Figure 20.12. An unidentified fish bone recovered from 5MT10686.

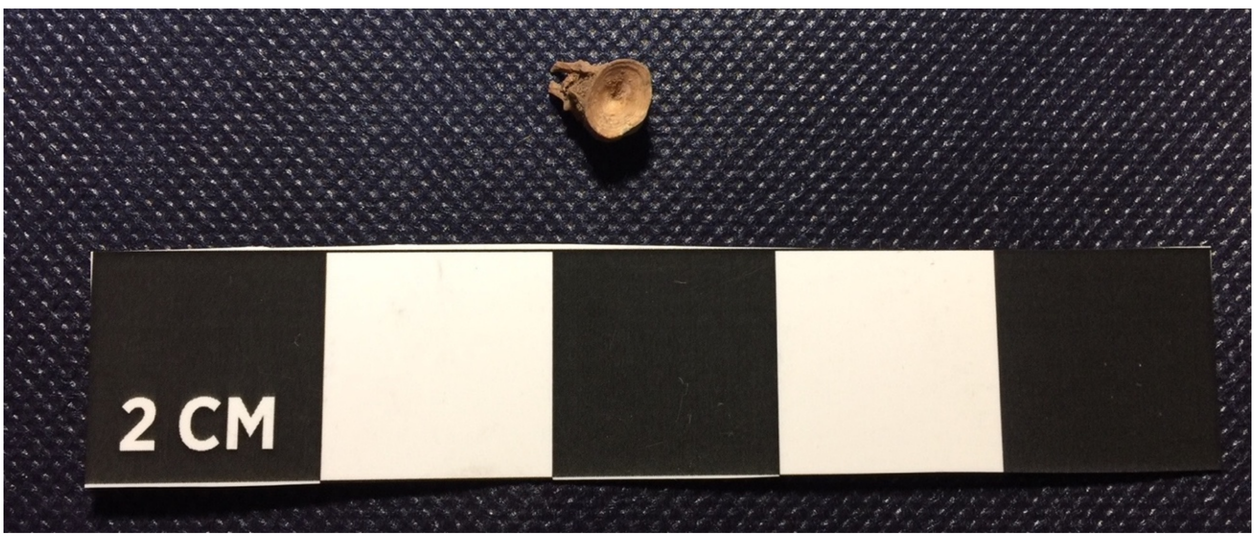

Figure 20.13. A fish vertebral fragment recovered from 5MT10686.

Figure 20.14. A bone tube (PD 65, FS 15) from 5MT10687 (Sagebrush House).

Figure 20.15. Scraper (PD 81, FS 12) from 5MT10687 (Sagebrush House) (19.07 mm).

Figure 20.16. Awl fragment (PD 62, FS 12) from 5MT10709 (Portulaca Point).

Figure 20.17. Awl from a large mammal rib from Structure 116 at 5MT10711 (PD 121 FS 5).

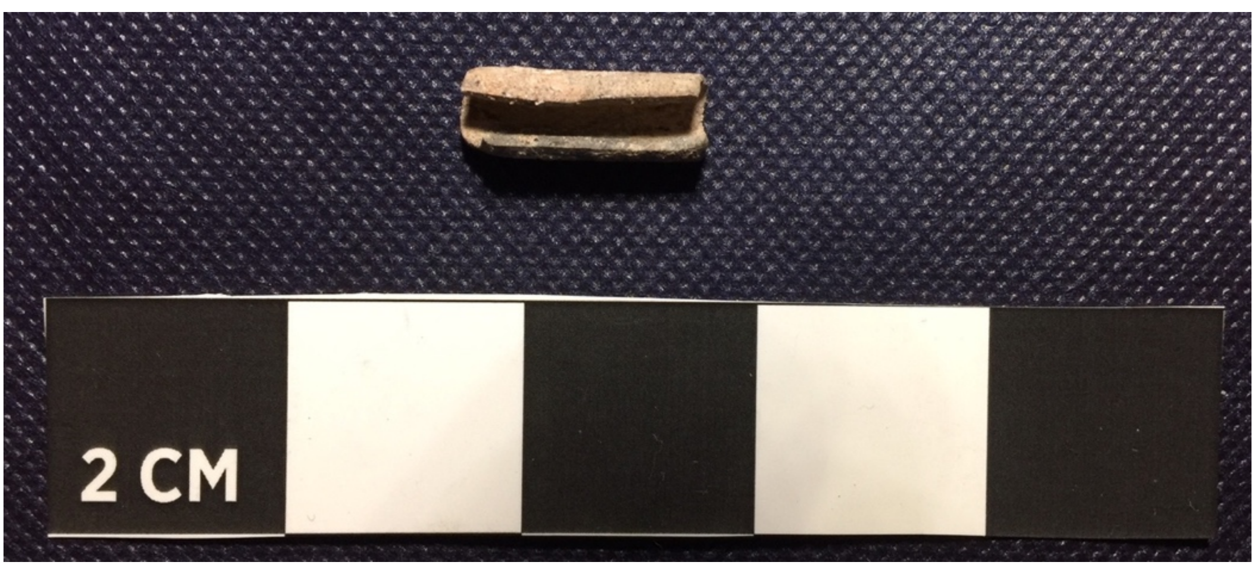

Figure 20.18. Bone tube from 5MT10711 (PD 55 FS 20).

Figure 20.19. Awl from a medium mammal shaft fragment from 5MT10711 (PD 37 FS 10).

Figure 20.20. Awl from a large bird shaft fragment from 5MT10711 (PD 14 FS 8).

Figure 20.21. Awl from a medium mammal shaft fragment from 5MT10711 (PD 55 FS 4).

Figure 20.22. Awl from a medium mammal rib fragment from 5MT10711 (PD 121 FS 5).

Figure 20.23. Awls from 5MT10711 (PD 217 FS 15, left and PD 222 FS 10, right).

Figure 20.24. Needle from 5MT10711 (PD 54 FS 3).

Figure 20.25. Possible tool blank from 5MT10711 (21.25 mm, PD 54 FS 3).

Figure 20.26. An awl (refit) made from a *Canis* sp. ulna from 5MT2032 (PD 133 FS 5).

Figure 20.27. A tool of unknown function, with a pronounced cut mark from 5MT2037.

Figure 20.28. A complete awl from a turkey ulna at 5MT2037.

Table 20.1. Summary Faunal Information from the Basketmaker Communities Project Sites.

Site Number	Site Name	Time Period	Number of Bones Recovered
5MT10631	Mueller Little House	Late Basketmaker (A.D. 660–750) and ancestral Pueblo (A.D. 420–1300)	539
5MT10647	Dillard site	Basketmaker II and III and Pueblo II and III (A.D. 420–1300)	1,614*
5MT10684	Dry Ridge	Pueblo II and early Pueblo III (A.D. 900–1200)	120
5MT10686	Badger Den	Pueblo II and early Pueblo III (A.D. 900–1200)	118
5MT10687	Sagebrush House	Pueblo II and early Pueblo III (A.D. 900–1200)	71
5MT10709	Portulaca Point	Middle Basketmaker (A.D. 575–660)	4
5MT10711	Ridgeline site	Late Basketmaker (A.D. 660–750)	227
5MT10718	Unnamed	Pueblo I (A.D. 750–900)	46
5MT10736	TJ Smith site	Basketmaker III (A.D. 500–750)	30
5MT2032	Switchback site	Late Basketmaker III (A.D. 660–750)	62
5MT2037	Pasquin site	Pueblo II/early Pueblo III (A.D. 900–1200)	141
5MT3875	Shepherd site	Ancestral Pueblo (A.D. 420–1300)	8
Total			2,980

* Includes 3 bones from flotation.

Table 20.2. Analyzed Faunal Remains from 5MT10631 (Mueller Little House).

Common Name	Taxon	Total				Burned		
		NISP	MNI	% of NISP		NISP	% of NISP	% of Taxon
Lizards	Lizards	3	1	1.0		-	-	-
Non-venomous Snakes	Colubridae	1	1	0.3		-	-	-
Medium Bird	Mallard size and smaller	3	1	1.0		-	-	-
Large Bird	Mallard size and larger	1	1	0.3		-	-	-
Turkey	*Meleagris gallopavo*	112	1	35.8		4	26.7	3.6
Pocket Mice	*Perognathus* sp.	2	1	0.6		-	-	-
Pocket Gopher	*Thomomys* sp.	2	1	0.6		-	-	-
Chipmunks	*Eutamias* sp.	8	1	2.5		-	-	-
Antelope Squirrel	*Ammospermophilus* sp.	11	1	3.5		-	-	-
Ground Squirrel	*Spermophilus* sp.	12	1	3.8		-	-	-
Small Rodents	Rodentia	5		1.6				
Rodents	Rodentia	4	-	1.2		-	-	-
Cottontail	*Sylvilagus* sp.	133	4*	42.5		4	26.7	3.0
Jackrabbit	*Lepus* sp.	10	1	3.2		2	13.2	20.0
Bobcat	*Lynx rufus*	1	1	0.3		-	-	-
Dog/Coyote/Wolves	*Canis* sp.	1	1	0.3		1	6.7	100.0
Deer	*Odocoileus* sp.	4	1	1.2		3	20.0	75.0
Elk	*Cervus elaphus*	1	1	0.3		1	6.7	100.0
NISP† Subtotal		314	-	100.0		15	100.0	-
Small Mammals	Jackrabbit or smaller	9	-	-		3	-	33.3
Medium Mammals	Deer or smaller	15	-	-		7	-	46.7
Unidentified		201	-	-		21	-	10.4
Total		539	-	-		46	-	-

Note: NISP = number of identified specimens; MNI = minimum number of individuals.
* Based on calcaneus; † identified to element.

Table 20.3. Faunal Remains from Different Contexts at 5MT10631 (Mueller Little House).

Common Name	Excavation Context (Period of Occupation)				
	Arbitrary Units (Ancestral Pueblo)	Main Pithouse Chamber (Late BMIII)	Antechamber (Late BMIII)	Side Room (Late BMIII)	Total
Lizards	2	-	-	1	3
Non-venomous Snakes	1	-	-	-	1
Medium Bird	-	-	2	1	3
Large Bird	-	-	-	1	1
Turkey	-	-	112 (4)	-	112 (4)
Pocket Mice	-	1	-	1	2
Pocket Gopher	2	-	-	-	2
Chipmunks	6	2	-	-	8
Antelope Squirrel	7	4	-	-	11
Ground Squirrel	11	1	-	-	12
Rodents	2	-	-	2	4
Small Rodents	-	5	-	-	5
Cottontail	95	22 (2)	4 (1)	12 (1)	133 (4)
Jackrabbit	2	2	2 (1)	4 (1)	10 (2)
Bobcat	-	1	-	-	1
Dog/Coyote/Wolves	-	1	-	-	1
Deer	-	4 (3)	-	-	4 (3)
Elk	-	1 (1)	-	-	1 (1)
Small Mammals	3	2	-	4 (3)	9 (3)
Medium Mammals	7	7 (6)	1 (1)	-	15 (7)
Unidentified	141 (1)	37 (19)	15	8 (1)	201 (21)
Total	279 (1)	90 (31)	136 (7)	34 (6)	539 (45)

Note: (parenthetical numbers indicate burned bones); Late BMIII = late Basketmaker III phase.

Table 20.4. Faunal Remains from the Dillard Site.

Common Name	Total			Burned		
	NISP	MNI	% of NISP	NISP	% of NISP	% of Taxon
Amphibians	1	-	0.15	0	0	0
Non-venomous Snake	2	-	0.3	0	0	0
Box Turtles	2	1	0.3	0	0	0
Lizards	1	-	0.15	0	0	0
Horned Lizard	2	1	0.3	0	0	0
Small Bird	2	-	0.3	0	0	0
Hawks	5	-	0.75	0	0	0
Deer, Mice, Voles, etc.	3	-	0.4	0	0	0
Northern Grasshopper Mouse	5	1	0.75	0	0	0
Mice	16	4	2.4	0	0	0
Ord's Kangaroo Rat	11	2	1.6	0	0	0
Wood Rats	23	5	3.4	0	0	0
Prairie Dog	1	1	0.15	0	0	0
Chipmunks	2	1	0.3	0	0	0
Ground Squirrel	70	5	10.3	11	27.5	16.2
Small Rodents	30	-	4.4	0	0	0
Rodents	7	-	1.0	0	0	0
Rabbits, Hares, and Pikas	9	-	1.3	0	0	0
Cottontail	211	7	31.2	10	25.0	4.7
Jackrabbit	145	5	21.4	12	30.0	8.3
Gray Fox	1	1	0.15	1	2.5	100.0
Domestic Dog	72	1	10.6	0	0	0
Dog/Coyote/Wolves	20	2	2.9	2	5.0	10.0
Deer	15	2	2.2	3	7.5	20.0
Pronghorn	1	1	0.15	0	0	0
Elk	1	1	0.15	0	0	0
Artiodactyls	8	-	1.2	1	2.5	12.5
Large Artiodactyls	1	-	0.15	0	0	0
Small Mammals	8	-	1.2	0	0	0
Medium Mammals	1	-	0.15	0	0	0
Large Mammals	2	-	0.3	0	0	0
NISP* Subtotal	678	-	100.0	40	100.0	-
Large Bird	5	-	-	0	-	-
Small Rodent	14	-	-	0	-	-
Rodents	51	-	-	0	-	-
Small Mammals	126	-	-	41	-	-
Medium Mammals	55	-	-	14	-	-
Large Mammals	5	-	-	0	-	-
Large Artiodactyls	2	-	-	0	-	-
Unidentified	675	-	-	69	-	-
Total	1,611	-	-	164	-	-

Note NISP = number of identified specimens; MNI = minimum number of individuals.
* Identified to element.

Table 20.5. NISP Counts by Skeletal Region for Selected Faunal Taxa from the Dillard Site.

Taxon	Skeletal Region												
				Upper Forelimb		Lower Forelimb			Upper Hind Limb		Lower Hind Limb		
	Cranial (Excluding Teeth)	Axial	Pectoral Girdle	Humerus	Radius and Ulna	Carpal	Metacarpal	Innominate	Femur	Tibia and Fibula	Calcaneus, Tarsals, and Astragalus	Metatarsal	Phalanges
All Artiodactyls	0	0	1	0	0	1	0	0	0	0	12	2	4
Lepus sp.	14	4	3	9	12	0	4	6	8	13	21	26	16
Sylvilagus sp.	38	24	9	18	12	0	5	18	15	17	10	10	8
All Sciuridae	25	7	3	10	4	0	0	3	5	5	3	0	0
Neotoma sp.	4	1	1	3	0	0	0	2	10	2	0	0	0

Note NISP = number of identified specimens.

Table 20.6. NISP Counts for Identified Faunal Taxa by Architectural Block at the Dillard Site.

Common Name	Blocks		
	100	200	300
Amphibians	-	1	-
Non-venomous Snake	-	2	-
Box Turtles	-	2	-
Lizards	1	-	-
Horned Lizard	-	-	2
Small Bird	1	-	1
Hawks	1	1	3
Deer, Mice, Voles, etc.	3	-	-
Northern Grasshopper Mouse	5	-	-
Mice	8	8	-
Ord's Kangaroo Rat	-	-	11
Wood Rats	4	9	10
Prairie Dog	1	-	-
Chipmunks	2	-	-
Ground Squirrel	7	54	9
Small Rodents	4	25	1
Rodents	5	2	-
Rabbits, Hares, and Pikas	2	6	1
Cottontail	30	111	70
Jackrabbit	6	48	91
Gray Fox	-	1	-
Domestic Dog	-	-	72
Dog/Coyote/Wolves	1	4	14
Deer	1	7	7
Pronghorn	-	1	-
Elk	-	1	-
Artiodactyls	-	5	3
Large Artiodactyls	-	1	-
Small Mammals	-	5	3
Medium Mammals	-	1	-
Large Mammals	-	2	-
Total	82	297	298

Note NISP = number of identified specimens.

Table 20.7. NISP Counts for All Faunal Taxa by Architectural Block at the Dillard Site.

Common Name	Blocks					
	100		200		300	
	Structures	Nonstructures	Structures	Nonstructures	Structures	Nonstructures
Amphibians	-	-	1	-	-	-
Non-venomous Snake	-	-	1	1	-	-
Box Turtles	-	-	1	1	-	-
Horned Lizard	-	-	-	-	2	-
Small Bird	-	1	-	-	-	1
Large Birds	-	-	4	-	1	-
Hawks	-	1	1	-	3	-
Deer, Mice, Voles, etc.	3	-	-	-	-	-
Northern Grasshopper Mouse	5	-	-	-	-	-
Mice	8	-	4	4	-	-
Ord's Kangaroo Rat	-	-	-	-	11	-
Wood Rats	4	-	8	1	4	6
Prairie Dog	1	-	-	-	-	-
Chipmunks	2	-	-	-	-	-
Ground Squirrel	7	-	26	28	6	3
Small Rodents	15	-	25	2	1	1
Rodents	-	-	2	-	-	-
Rabbits, Hares, and Pikas	-	-	5	1	1	-
Cottontail	26	2	79	32	16	54
Jackrabbit	2	3	32	15	55	36
Gray Fox	-	-	-	1	-	-
Domestic Dog	-	-	-	-	72	-
Dog/Coyote/ Wolves	-	1	4	-	11	4
Deer	-	1	4	3	2	5
Pronghorn	-	-	1	-	-	-
Elk	-	-	1	-	-	-
Artiodactyls	-	-	4	1	2	1
Large Artiodactyls	-	-	2	1	-	-
Small Mammals	10	7	36	26	36	19
Medium Mammals	1	3	25	13	4	10
Large Mammals	-	-	7	-	-	-
Unidentified	51	14	174	156	224	41
Total	135	33	447	286	451	181

Note NISP = number of identified specimens.

Table 20.8. Dillard Site Features with Faunal Remains.

Feature	Feature Type	Number of Bones	Age
Structure 102	Great kiva	206	All Basketmaker
Structure 124	Pit room	3	Early Basketmaker III
Structure 205	Main chamber of DCP	83	Middle Basketmaker III
Structure 220	Main chamber of DCP	144	Middle Basketmaker III
Structure 226	Antechamber to 205	73	Middle Basketmaker III
Structure 231	Single-chambered pithouse	1	Middle Basketmaker III
Structure 232	Single-chambered pithouse	95	Middle Basketmaker III
Structure 234	Antechamber to 220	2	Middle Basketmaker III
Structure 236	Main chamber of DCP	17	Middle Basketmaker III
Structure 239	Single-chambered pithouse	33	Middle Basketmaker III
Structure 309	Main chamber of DCP	237	Middle Basketmaker III
Structure 311	Main chamber of DCP	21	Middle Basketmaker III
Structure 312	Main chamber of DCP	151	Late Basketmaker III
Structure 313	Single-chambered pithouse	10	Middle Basketmaker III
Structure 324	Antechamber to 312	25	Late Basketmaker III
Structure 330	Pit room	6	Middle Basketmaker III

Note: DCP = Double-chambered pithouse.

Table 20.9. Distribution of Faunal Remains by Structure Type and Age at the Dillard Site.

Common Name	Feature Type							
	Great Kiva (n = 1)	Pit Room, Early BMII (n = 1)	Pit Room, Mid-BMIII (n = 1)	Main Chamber of DCP, Mid-BMIII (n = 5)	Antechamber, Mid-BMIII (n = 2)	Main Chamber of DCP, Late BMIII, (n = 1)	Antechamber of DCP, Late BMIII (n = 1)	SCP, Mid-BMIII (n = 4)
Amphibians	-	-	-	-	1	-	-	-
Non-venomous Snake	-	-	-	-	1	-	-	-
Box Turtles	-	-	-	-	-	-	-	1
Lizards	1	-	-	-	-	-	-	-
Horned Lizard	-	-	-	-	-	2	-	-
Small Bird	-	-	-	-	-	-	-	-
Large Birds	-	-	-	3	1	-	-	1
Hawks	-	-	-	3	-	-	-	1
Deer, Mice, Voles, etc.	3	-	-	-	-	-	-	-
Northern Grasshopper Mouse	5	-	-	-	-	-	-	-
Mice	8	-	-	4	-	-	-	-
Ord's Kangaroo Rat	-	-	-	-	-	11	-	-
Wood Rats	4	-	-	10	1	1	-	-
Prairie Dog	1	-	-	-	-	-	-	-
Chipmunks	2	-	-	-	-	-	-	-
Ground Squirrel	7	-	2	17 (1)	8 (1)	-	2 (1)	2
Small Rodents	15	-	-	3	21	1	-	1
Rodents	56	-	-	1	1	-	-	-
Rabbits, Hares, and Pikas	2	-	-	1	-	-	1	4
Cottontail	28 (1)	-	-	61 (2)	2	5	4	23 (3)
Jackrabbit	3	-	-	28 (1)	4	39	5	11 (1)
Bobcat	-	-	-	-	-	-	-	-
Gray Fox	-	-	-	-	-	-	-	-
Domestic Dog	-	-	-	72	-	-	-	-
Dog/Coyote/Wolves	-	-	-	12 (1)	-	-	-	3
Deer	-	-	-	4	-	1	1	-
Pronghorn	-	-	-	1	-	-	-	-
Elk	-	-	-	1	-	-	-	-
Artiodactyls	-	-	-	2	1	1	-	2
Large Artiodactyls	-	-	-	1	-	-	-	-
Small Mammals	7 (1)	3 (2)	-	31 (6)	2 (1)	22 (1)	7 (3)	10 (2)
Medium Mammals	1 (1)	-	-	13 (4)	1	3	-	12 (2)
Large Mammals	-	-	-	4	1	-	-	3
Unidentified	63	-	4 (3)	230 (11)	30 (4)	65 (2)	5	65 (7)
Total	206 (3)	3 (2)	6 (3)	502 (26)	75 (6)	151 (3)	25 (4)	139 (15)

Note: Parenthetical values represent burned items; DCP = double-chambered pithouse; SCP = single-chambered pithouse; BM = Basketmaker.

Table 20.10. Tools and Items of Adornment from the Dillard Site.

Item	Context					
	Nonstructures	Great Kiva	Main Chambers of DCPs	Antechambers of DCPS	Single-Chambered Pithouses	Total
Awl	2	-	10	-	2	14
Bead	1	-	2	-	-	3
Gaming Piece	1	-	1	-	-	2
Needle	-	1	-	-	-	1
Spatula-Shaped	-	-	1	1	-	2
Tube	-	-	8	-	-	8
Unidentified	2	-	3	1	-	6
Total	6	1	25	2	2	36

Note: DCP = Double-chambered pithouse.

Table 20.11. Analyzed Faunal Remains from 5MT10684 (Dry Ridge).

Common Name	Taxon	Total			Burned		
		NISP	MNI	% of NISP	NISP	% of NISP	% of Taxon
Large Bird	Mallard size and larger	2	-	3.5	1	33.3	50.0
Turkey	*Meleagris gallopavo*	20	1	35.2	-	-	-
Mice	*Peromyscus* sp.	2	1	3.5	-	-	-
Antelope Squirrel	*Ammospermophilus* sp.	1	1	1.7	-	-	-
Ground Squirrel	*Spermophilus* sp.	1	1	1.7	1	33.3	100.0
Cottontail	*Sylvilagus* sp.	13	1	22.8	-	-	-
Jackrabbit	*Lepus* sp.	13	2*	22.8	1	33.3	7.7
Dog/Coyote/Wolves	*Canis* sp.	2	1	3.5	-	-	-
Deer	*Odocoileus* sp.	3	1	5.3	-	-	-
NISP* Subtotal		57	-	100.0	3	99.9	-
Small Mammals	Jackrabbit or smaller	6	-	-	-	-	-
Medium Mammals	Deer or smaller	3	-	-	1	-	-
Unidentified		54	-	-	5	-	-
Total		120	-	-	9	-	-

Note NISP = number of identified specimens; MNI = minimum number of individuals.
* Identified to element.

Table 20.12. Faunal Remains from Different Contexts at 5MT10684 (Dry Ridge).

Common Name	Excavation Context						
	Nonstructure 102	Nonstructure 103	Nonstructure 105	Nonstructure 106	Midden (Nonstructure 110)	Kiva (Structure 108)	Total
Large Bird	-	-	-	-	-	2 (1)	2 (1)
Turkey	-	-	-	-	-	20	20
Pocket Mice	-	-	-	-	-	2	2
Antelope Squirrel	-	-	-	-	1	-	1
Ground Squirrel	-	-	-	-	-	1 (1)	1 (1)
Cottontail	-	3	1	-	-	9	13
Jackrabbit	1	-	3	-	-	9 (1)	13 (1)
Dog/Coyote/Wolves	1	1	-	-	-	-	2
Deer	-	-	-	-	-	3	3
Small Mammals	-	1	2	3	-	-	6
Medium Mammals	-	2 (1)	-	-	1	-	3 (1)
Unidentified	3 (1)	5 (1)	8 (1)	8 (2)	4	26	54 (5)
Total	5 (1)	12 (2)	14 (1)	11 (2)	6	72 (3)	120 (9)

Note: Parenthetical values represent burned items.

Table 20.13. Analyzed Faunal Remains from 5MT10686 (Badger Den).

Common Name	Taxon	Total			Burned		
		NISP	MNI	% of NISP	NISP	% of NISP	% of Taxon
Fish	Pisces	2	-	6.9	-	-	-
Hawks	*Buteo* sp.	1	1	3.4	1	20.0	100.0
Turkey	*Meleagris gallopavo*	2	1	6.9	-	-	-
Kangaroo Rat	*Dipodomys* sp.	1	1	3.4	-	-	-
Wood Rat	*Neotoma* sp.	1	1	3.4	-	-	-
Chipmunks	*Eutamias* sp.	1	1	3.4	-	-	-
Rodents	Rodentia	1	-	3.4	-	-	-
Cottontail	*Sylvilagus* sp.	6	1	20.8	1	20.0	16.7
Jackrabbit	*Lepus* sp.	7	1	24.2	2	40.0	28.6
Dog/Coyote/Wolves	*Canis* sp.	2	1	6.9	-	-	-
Deer	*Odocoileus* sp.	2	1	6.9	-	-	-
Artiodactyls	Artiodactyla	3	-	10.4	1	20.0	33.3
NISP* Subtotal		29	-	100.0	5	100.0	-
Small Mammals	Jackrabbit or smaller	9	-	-	1	-	-
Medium Mammals	Deer or smaller	4	-	-	-	-	-
Unidentified		76	-	-	14	-	-
Total		118	-	-	20	-	-

Note NISP = number of identified specimens; MNI = minimum number of individuals.
* Identified to element.

Table 20.14. Faunal Remains from Different Contexts at 5MT10686 (Badger Den).

Common Name	Excavation Context					
	Arbitrary Unit 101	Arbitrary Unit 102	Nonstructure 102	(Midden) Nonstructure 106	Masonry Room (Structure 111)	Total
Fish	-	-	-	2	-	2
Hawks	1 (1)	-	-	-	-	1 (1)
Turkey	-	1	-	1	-	2
Kangaroo Rat	-	-	-	1	-	1
Wood Rat	-	-	-	1	-	1
Chipmunks	-	-	-	-	1	1
Rodents	-	-	-	1	-	1
Cottontail	-	-	1	4	1 (1)	6 (1)
Jackrabbit	2	-	-	4 (1)	1 (1)	7 (2)
Dog/Coyote/Wolves	2	-	-	-	-	2
Deer	-	-	-	2	-	2
Artiodactyls	2 (1)	-	-	1	-	3 (1)
Small Mammals	-	-	-	7 (1)	2	9 (1)
Medium Mammals	1	-	1	2	-	4
Unidentified	18 (2)	-	2 (1)	55 (10)	1 (1)	76 (14)
Total	26 (4)	1	4 (1)	81 (12)	6 (3)	118 (20)

Note: Parenthetical values represent burned items.

Table 20.15. Analyzed Faunal Remains from 5MT10687 (Sagebrush House).

Common Name	Taxon	Total			Burned		
		NISP	MNI	% of NISP	NISP	% of NISP	% of Taxon
Medium Bird	Mallard size or smaller	2	-	9.1	-	-	-
Large Bird	Mallard size or larger	1	-	4.5	-	-	-
Kangaroo Rat	*Dipodomys* sp.	1	1	4.5	-	-	-
Wood Rat	*Neotoma* sp.	1	1	4.5	-	-	-
Antelope Squirrel	*Ammospermophilus* sp.	2	1	9.1	-	-	-
Ground Squirrel	*Spermophilus* sp.	2	1	9.1	-	-	-
Cottontail	*Sylvilagus* sp.	6	1	27.4	-	-	-
Dog/Coyote/Wolves	*Canis* sp.	2	1	9.1	-	-	-
Deer	*Odocoileus* sp.	2	1	9.1	-	-	-
Artiodactyls	Artiodactyla	1	-	4.5	-	-	-
Medium Mammal	Deer size or smaller	2	-	9.1	2	100.0	100.0
NISP* Subtotal	-	22	-	100.0	2	100.0	-
Small Mammals	Jackrabbit or smaller	11	-	-	4	-	-
Medium Mammals	Deer or smaller	8	-	-	1	-	-
Unidentified		30	-	-	5	-	-
Total		71	-	-	12	-	-

Note NISP = number of identified specimens; MNI = minimum number of individuals.
* Identified to element.

Table 20.16. Faunal Remains from Different Contexts at 5MT10687 (Sagebrush House).

Common Name	Excavation Context										
	Arbitrary Unit 101	Arbitrary Unit 102	Arbitrary Unit 111	Nonstructure 102	Midden (Nonstructure 105)	Nonstructure 107	Nonstructure 109	Nonstructure 110	Nonstructure 112	Kiva (Structure 113)	Total
Medium Bird	-	-	-	1	-	-	-	-	-	1	2
Large Bird	-	-	-	1	-	-	-	-	-	-	1
Kangaroo Rat	-	-	-	-	-	-	-	-	1	-	1
Wood Rat	-	-	-	-	-	-	1	-	-	-	1
Antelope Squirrel	-	-	-	-	-	-	-	-	-	2	2
Ground Squirrel	-	-	-	-	-	-	-	-	-	2	2
Cottontail	1	-	-	-	-	-	2	1	-	2	6
Dog/Coyote/Wolves	-	-	-	-	1	-	-	-	-	1	2
Deer	-	-	-	-	-	-	-	-	-	2	2
Artiodactyls	-	-	-	-	-	-		-	1	-	1
Small Mammals	-	-	-	2	3 (2)	-	3 (1)	-	3 (1)	-	11 (4)
Medium Mammals		-	-	6 (2)	-	1	-	-	1	2 (1)	10 (3)
Unidentified	3 (1)	1	2 (2)	1	1 (1)	2	1	-	9 (1)	10	30 (5)
Total	4	1	2 (2)	11 (2)	5 (3)	3	7 (1)	1	15 (2)	22 (1)	71 (12)

Note: Parenthetical values represent burned items.

Table 20.17. Analyzed Faunal Remains from 5MT10711.

Common Name	Taxon	Total			Burned		
		NISP	MNI	% of NISP	NISP	% of NISP	% of Taxon
Non-venomous Snakes	Colubridae	9	-	8.7	-	-	-
Small Bird	Robin size and smaller	1	-	1.0	-	-	-
Medium Bird	Mallard size and smaller	1	-	1.0	-	-	-
Perching Birds	Passeriformes	1	-	1.0	-	-	-
Hawks	*Buteo* sp.	3	1	2.8	2	16.7	66.6
Turkey	*Meleagris gallopavo*	18	2	17.2	-	-	-
Great Blue Heron	*Ardea herodias*	3	1	2.8	-	-	-
Kangaroo Rat	*Dipodomys* sp.	1	1	1.0	-	-	-
Chipmunks	*Eutamias* sp.	1	1	1.0	-	-	-
White-tailed Antelope Squirrel	*Ammospermophilus leucurus*	1	1	1.0	-	-	-
Small Rodents	Wood rat size or smaller	1	-	1.0	-	-	-
Rodents	Rodentia	1	-	1.0	-	-	-
Cottontail	*Sylvilagus* sp.	22	2	21.1	-	-	-
Jackrabbit	*Lepus* sp.	15	1	14.4	4	33.3	26.7
Dog/Coyote/Wolves	*Canis* sp.	16	1	15.4	-	-	-
Cervids	Cervidae	6	-	5.8	6	50.0	100.0
Medium Mammal	Deer size or smaller	3	-	2.8	-	-	-
Large Mammal	Larger than deer	1	-	1.0	-	-	100.0
NISP* Subtotal	-	104	-	100.0	12	100.0	-
Large Bird	Mallard size and larger	13	-	-	3	-	-
Small Mammals	Jackrabbit or smaller	33	-	-	16	-	-
Medium Mammals	Deer or smaller	6	-	-	1	-	-
Unidentified		70	-	-	19	-	-
Total		226	-	-	51	-	-

Note NISP = number of identified specimens; MNI = minimum number of individuals.
* Identified to element.

Table 20.18. Faunal Remains from Different Contexts at 5MT10711.

Common Name	Excavation Context						
	Nonstructure Contexts	Pit Room 17	Structure 101 (Main Chamber of Oversized Pithouse)	Structure 103 (Antechamber of Oversized Pithouse)	Structure 110 (Pit Room)	Structure 116 (Pit Room)	Total
Non-venomous Snakes	-	-	9	-	-	-	9
Small Bird	-	-	-	1	-	-	1
Large Bird	-	-	4 (2)	4 (1)	-	-	8(3)
Perching Birds	-	-	-	1	-	-	1
Hawks	-	-	-	3 (2)	-	-	3 (2)
Turkey	-	-	-	4	-	-	4
Great Blue Heron	-	-	-	3	-	-	3
Kangaroo Rat	-	-	1	-	-	-	1
Chipmunks	-	-	-	1	-	-	1
White-tailed Antelope Squirrel	-	-	1	-	-	-	1
Small Rodents	-	-	-	1	-	-	1
Rodents	-	-	-	1	-	-	1
Cottontail	-	-	4	17	-	-	21
Jackrabbit	1	-	7 (3)	6 (1)	-	-	14 (4)
Dog/Coyote/Wolves	-	-	15	1	-	-	16
Cervids	-	-	6 (6)	-	-	-	6(6)
Small Mammals	-	-	14 (11)	19 (5)	-	-	33 (16)
Medium Mammals	-	-	6 (1)	1	-	-	7 (1)
Large Mammals	-	-	1	-	-	-	1
Unidentified	9 (1)	-	9 (1)	41 (16)	6(1)	5	70 (19)
Total	10 (1)	0	77 (24)	104 (25)	6 (1)	5	226 (51)

Note: Parenthetical values represent burned items.

Table 20.19. Analyzed Faunal Remains from 5MT10718.

Common Name	Taxon	Total			Burned		
		NISP	MNI	% of NISP	NISP	% of NISP	% of Taxon
Ground Squirrel	*Spermophilus* sp.	1	1	10.0	0	-	-
Cottontail	*Sylvilagus* sp.	5	1	50.0	1	100.0	20.0
Small Mammal	Jackrabbit or smaller	3	-	30.0	0	-	-
Large Bird	Mallard or larger	1	-	10.0	0	-	-
NISP* Subtotal		10	-	100.0	1	100.0	-
Small Mammal	Jackrabbit or smaller	5	-	-	0	-	-
Unidentified		31	-	-	0	-	-
Total		46	-	-	1	-	-

Note NISP = number of identified specimens; MNI = minimum number of individuals.
* Identified to element.

Table 20.20. Analyzed Faunal Remains from 5MT10736.

Common Name	Taxon	Total			Burned		
		NISP	MNI	% of NISP	NISP	% of NISP	% of Taxon
Ground Squirrel	*Spermophilus* sp.	7	1	50.0	0	-	-
Rodent	Rodentia	2	-	14.2	0	-	-
Cottontail	*Sylvilagus* sp.	4	1	28.6	0	-	-
Jackrabbit	*Lepus* sp.	1	1	7.2	1	100.0	100.0
NISP* Subtotal		14	-	100.0	1	100.0	-
Unidentified		15	-	-	0	-	-
Total		29	-	-	1	-	-

Note NISP = number of identified specimens; MNI = minimum number of individuals.
* Identified to element.

Table 20.21. Analyzed Faunal Remains from 5MT2032.

Common Name	Taxon	Total			Burned		
		NISP	MNI	% of NISP	NISP	% of NISP	% of Taxon
Ground Squirrel	*Spermophilus* sp.	1	1	5.0	0	-	-
Cottontail	*Sylvilagus* sp.	16	1	80.0	3	100.0	19.0
Dog/Coyote/Wolves	*Canis* sp.	1	1	5.0	0	-	-
Medium Mammals	Deer or smaller	2	-	10.0	0	-	-
NISP* Subtotal		20	-	100.0	3	100.0	-
Small Mammals	Jackrabbit or smaller	9	-	-	3	-	33.3
Medium Mammals	Deer or smaller	29	-	-	16	-	55.2
Unidentified		4	-	-	1	-	25.0
Total		62	-	-	23	-	-

Note NISP = number of identified specimens; MNI = minimum number of individuals.
* Identified to element.

Table 20.22. Analyzed Faunal Remains from 5MT2037.

Common Name	Taxon	Total			Burned		
		NISP	MNI	% of NISP	NISP	% of NISP	% of Taxon
Grouse*	Tetraonidae	1	1	2.0	0	-	-
Turkey	*Meleagris gallopavo*	4	1	8.0	0	-	-
Pocket Gopher	*Thomomys* sp.	4	1	8.0	0	-	-
Chipmunks	*Eutamias* sp.	1	1	2.0	0	-	-
Small Rodents	Wood rat size or smaller	1	1	2.0	0	-	-
Cottontail	*Sylvilagus* sp.	14	3†	28.0	0	-	-
Jackrabbit	*Lepus* sp.	19	1	38.0	2	66.7	11.0
Dog/Coyote/Wolves	*Canis* sp.	1	1	2.0	1	33.3	100.0
Deer	*Odocoileus* sp.	3	1	6.0	0	-	-
Artiodactyl	Even-toed ungulates	1	-	2.0	0	-	-
Medium Mammals	Deer or smaller	1	-	2.0	0	-	-
NISP‡ Subtotal		50	-	100.0	3	100.0	-
Small Mammals	Jackrabbit or smaller	19	-	-	6	-	31.6
Medium Mammals	Deer or smaller	4	-	-	2	-	50.0
Unidentified		68	-	-	15	-	22.1
Total		141	-	-	26	-	-

Note NISP = number of identified specimens; MNI = minimum number of individuals.
* cf. Sage grouse (*Centrocercus urophasianus*) based on photos; †based on humerus; ‡identified to element.

Table 20.23. Analyzed Faunal Remains from 5MT3875.

Common Name	Taxon	Total			Burned		
		NISP	MNI	% of NISP	NISP	% of NISP	% of Taxon
Cottontail	*Sylvilagus* sp.	4	2	57.1	0	-	-
Jackrabbit	*Lepus* sp.	2	1	28.6	1	50.0	50.0
Small Mammal	Jackrabbit or smaller	1	-	14.3	1	50.0	-
NISP* Subtotal		7	-	100.0	2	100.0	-
Unidentified		1	-	-	1	-	-
Total		8	-	-	3	-	-

Note NISP = number of identified specimens; MNI = minimum number of individuals.
* Identified to element.

Table 20.24. Comparison of Faunal Assemblages from 12 Basketmaker Community Sites.

Common Name	5MT10631	5MT10647	5MT10684	5MT10686	5MT10687	5MT10709	5MT10711	5MT10718	5MT10736	5MT2032	5MT2037	5MT3875	Total
Fish	-	-	-	2	-	-	-	-	-	-	-	-	2
Amphibians	-	1	-	-	-	-	-	-	-	-	-	-	1
Colubrids (Non-venomous Snakes)	1	2	-	-	-	-	9	-	-	-	-	-	12
Box Turtles	-	2	-	-	-	-	-	-	-	-	-	-	2
Horned Lizard	-	2	-	-	-	-	-	-	-	-	-	-	2
Lizards	3	1	-	-	-	-	-	-	-	-	-	-	4
Small Bird	-	2	-	-	-	-	1	-	-	-	-	-	3
Medium Bird	3	-	-	-	2	-	1	-	-	-	-	-	6
Large Bird	1	5	2 (1)	-	1	-	13 (3)	1	-	-	-	-	23 (4)
Perching Birds	-	-	-	-	-	-	1	-	-	-	-	-	1
Grouse*	-	-	-	-	-	-	-	-	-	-	1	-	1
Hawks	-	5	-	1 (1)	-	-	3 (2)	-	-	-	-	-	9 (3)
Turkey	112 (4)	-	20	2	-	-	18	-	-	-	4	-	156 (4)
Great Blue Heron	-	-	-	-	-	-	3	-	-	-	-	-	3
Deer Mice, Voles, etc.	-	3	-	-	-	-	-	-	-	-	-	-	3
Northern Grasshopper Mouse	-	5	-	-	-	-	-	-	-	-	-	-	5
Mice	-	16	2	-	-	-	-	-	-	-	-	-	18
Pocket Mice	2	-	-	-	-	-	-	-	-	-	-	-	2
Ord's Kangaroo Rat	-	11	-	1	1	-	1	-	-	-	-	-	14
Pocket Gopher	2	-	-	-	-	-	-	-	-	-	4	-	6
Wood Rats	-	23	-	1	1	-	-	-	-	-	-	-	25
Prairie Dog	-	1	-	-	-	-	-	-	-	-	-	-	1
Chipmunks	8	2	-	1	-	-	1	-	-	-	1	-	13
Antelope Squirrel	11	-	1	-	2	-	-	-	-	-	-	-	14
White-tailed Antelope Squirrel	-	-	-	-	-	-	1	-	-	-	-	-	1
Ground Squirrel	12	70 (11)	1 (1)	-	2	-	-	1	7	1	-	-	94 (12)
Small Rodents	5	44	-	-	-	-	1	-	-	-	1	-	51
Rodents	4	58	-	1	-	-	1	-	2	-	-	-	66
Rabbits, Hares, and Pikas	-	9	-	-	-	-	-	-	-	-	-	-	9

Common Name	5MT10631	5MT10647	5MT10684	5MT10686	5MT10687	5MT10709	5MT10711	5MT10718	5MT10736	5MT2032	5MT2037	5MT3875	Total
Cottontail	133 (4)	211 (10)	13	6 (1)	6	-	22	5 (1)	4	16 (3)	14	4	434 (19)
Jackrabbit	10 (2)	145 (12)	13 (1)	7 (2)	-	-	15 (4)	-	1 (1)	-	19 (2)	2 (1)	212 (25)
Bobcat	1	-	-	-	-	-	-	-	-	-	-	-	1
Gray Fox	-	1 (1)	-	-	-	-	-	-	-	-	-	-	1 (1)
Domestic Dog	-	72	-	-	-	-	-	-	-	-	-	-	72
Dog/Coyote/Wolf	1 (1)	20 (2)	2	2	2	-	16	-	-	1	1 (1)	-	45 (4)
Deer	4 (3)	15 (3)	3	2	2	1 (1)	-	-	-	-	3	-	30 (7)
Pronghorn	-	1	-	-	-	-	-	-	-	-	-	-	1
Elk	1 (1)	1	-	-	-	-	-	-	-	-	-	-	2 (1)
Cervids	-	-	-	-	-	-	6 (6)	-	-	-	-	-	6 (6)
Artiodactyls	-	8 (1)	-	3 (1)	1	-	-	-	-	-	1	-	13 (2)
Medium Artiodactyls	-	-	-	-	-	1 (1)	-	-	-	-	-	-	1 (1)
Large Artiodactyls	-	3	-	-	-	-	-	-	-	-	-	-	3
Small Mammals	9 (3)	134 (41)	6	9 (1)	11 (4)	-	33 (16)	8	-	9 (3)	19 (6)	1 (1)	239 (75)
Medium Mammals	15 (7)	56 (14)	3 (1)	4	10 (3)	1 (1)	9 (1)	-	-	31 (16)	5 (2)	-	134 (45)
Large Mammals	-	7	-	-	-	-	1	-	-	-	-	-	8
Unidentified	201 (21)	675 (69)	54 (5)	76 (14)	30 (5)	1	70 (19)	31	15	4 (1)	68 (15)	1 (1)	1,226 (150)
Total (Number Burned)	539 (46)	1,611† (164)	120 (9)	118 (20)	71 (12)	4 (3)	226‡ (51)	46 (1)	29‡ (1)	62 (23)	141 (26)	8 (3)	2,975 (359)

Note: Parenthetical values represent burned items.
* cf. Sage grouse (*Centrocercus urophasianus*) based on illustrations; † Does not include three items from flotation samples. ‡ Does not include one item from flotation samples.

Table 20.25. Frequency of Identified Faunal Remains by Class at the Basketmaker Communities Project Sites.

Class Mammalia	Common Name	NISP	% of Identified Total
Mammals	Mammals	1,523 (NISP = 1,098)	86
Aves	Birds	202 (NISP = 158)	12.2
Amphibia	Amphibians	1	0.08
Pisces	Fish	2	0.16
Reptilia	Reptiles	20	1.6
Total Identified (43.0%)		1,279	100.04
Total Unidentified (57.0%)		1,696	
Total		2,975	

Note: NISP = number of specimens identified to the taxon.

Table 20.26. Frequency of Identified Mammalian (Mammalia) Taxa in the Basketmaker Communities Project Assemblages.

Order	Taxon	Common Name or Description	NISP	% of Identified Mammal (n = 1,098)	% of All Identified Taxa (n = 1,279)
Lagomorpha	Lagomorpha	Rabbit, hare, and pikas	9	0.8	0.7
	Lepus sp.	Jackrabbit or hare	212	19.3	16.6
	Sylvilagus sp.	Cottontail	434	39.4	33.9
Rodentia	Rodentia	Rodent	15	1.4	1.2
	Eutamias sp.	Chipmunks	13	1.2	1.0
	Ground squirrels		2	0.2	0.2
	Spermophilus sp.	Ground squirrel	92	8.4	7.2
	Ammospermophilus leucurus	White-tailed antelope squirrel	15	1.4	1.2
	Cynomys sp.	Prairie dog	1	0.1	0.1
	Dipodomys ordii	Ord's kangaroo rat	14	1.3	1.1
	Muridae	Deer mice, voles, etc.	3	0.3	0.2
	Peromyscus sp.	Mice	18	1.6	1.4
	Perognathus sp.	Pocket mice	2	0.2	0.2
	Thomomys sp.	Pocket gopher	6	0.5	0.5
	Neotoma sp.	Wood rat	25	2.3	1.9
	Onochomys leucogaster	Northern grasshopper mouse	5	0.5	0.4
	Small rodent	Wood rat or smaller	36	3.3	2.8
Carnivora	*Lynx rufus*	Bobcat	1	0.1	0.1
	Canis sp.	Dog, wolf, coyote	45	4.1	3.5
	Canis familiaris	Domestic dog	72	6.6	5.6
	Urocyon cinereoargenteus	Gray fox	1	0.1	0.1
Artiodactyla	Artiodactyla	Even-toed ungulate	13	1.2	1.0
	Cervidae	Antlered artiodactyls	6	0.5	0.5
	Cervus elaphus	Elk	2	0.2	0.2
	Odocoileus sp.	Deer	30	2.7	2.3
	Antilocapra americana	Pronghorn antelope	1	0.1	0.1
	Medium artiodactyl	Deer-size artiodactyl	1	0.1	0.1
	Large artiodactyl	Elk-size artiodactyl	1	0.1	0.1
Miscellaneous	Small mammal		10	0.9	0.8
	Medium mammal		10	0.9	0.8
	Large mammal		3	0.3	0.2
Total			1,098	100.1	86.1

Note: NISP = number of identified specimens.

Table 20.27. Distribution of Faunal Remains at Basketmaker Communities Project Sites by Temporal Period.

Common Name	Temporal Period							
	Early Basketmaker III (A.D. 420-575)	Mid-Basketmaker III (A.D. 575-660)	Late Basketmaker III (A.D. 660-750)	All Basketmaker III (A.D. 420-750)	Pueblo I (A.D. 750-900)	Pueblo II and Early Pueblo III (A.D. 900-1200)	Ancestral Pueblo (A.D. 420-1300)	No Temporal Affiliation
Fish	-	-	-	-	-	-	-	2
Amphibians	-	1	-	-	-	-	-	-
Non-venomous Snake	-	1	9	1	-	-	1	-
Box Turtles	-	1	1	-	-	-	-	-
Lizards	-	-	1	-	-	-	2	1
Horned Lizard	-	-	2	-	-	-	-	-
Perching Birds	-	-	1	-	-	-	-	-
Small Bird	-	-	1	1	-	-	1	-
Medium Bird	-	-	4	-	-	-	-	2
Large Bird	-	5	14	-	1	-	-	3
Grouse	-	-	-	-	-	-	-	1
Hawks	-	4	3	-	-	-	1	1
Turkey	-	-	130	-	-	-	-	26
Great Blue Heron	-	-	3	-	-	-	-	-
Deer, Mice, Voles, etc.	-	-	-	3	-	-	-	-
Northern Grasshopper Mouse	-	-	-	5	-	-	-	-
Mice	-	4	2	10	-	-	-	2
Pocket Mice	-	-	2	-	-	-	-	-
Ord's Kangaroo Rat	-	-	12	-	-	-	-	2
Wood Rats	-	11	1	11	-	-	-	2
Pocket Gopher	-	-	-	-	-	-	2	4
Prairie Dog	-	-	-	1	-	-	-	-
Chipmunks	-	-	3	2	-	-	6	2
White-tailed Antelope Squirrel	-	-	5	-	-	-	7	3
Ground Squirrel	-	30	23	20	1	-	11	9
Small Rodents	-	25	7	18	-	-	-	1
Rodents	-	2	4	-	-	-	2	58
Rabbits, Hares, and Pikas	-	5	2	-	-	-	-	2
Cottontail	-	96	107	84	4	1	96	46
Jackrabbit	-	46	69	44	-	2	6	45
Bobcat	-	-	1	-	-	-	-	-
Gray Fox	-	-	1	-	-	-	-	-
Domestic Dog	-	72	-	-	-	-	-	-
Dog/Coyote/Wolves	-	15	18	5	-	-	-	7
Deer	-	6	7	2	-	-	5	10
Pronghorn	-	1	-	-	-	-	-	-
Elk	-	1	1	-	-	-	-	-
Artiodactyls	-	5	2	1	-	-	-	5
Antlered Artiodactyls (Cervids)	-	-	6	-	-	-	-	-

Common Name	Temporal Period							
	Early Basketmaker III (A.D. 420-575)	Mid-Basketmaker III (A.D. 575-660)	Late Basketmaker III (A.D. 660-750)	All Basketmaker III (A.D. 420-750)	Pueblo I (A.D. 750-900)	Pueblo II and Early Pueblo III (A.D. 900-1200)	Ancestral Pueblo (A.D. 420-1300)	No Temporal Affiliation
Medium Artiodactyls	-	1	-	-	-	-	-	-
Large Artiodactyls	-	2	-	-	-	-	-	1
Small Mammals	3	42	81	36	8	3	8	58
Medium Mammals	-	27	44	11	-	1	9	42
Large Mammals	-	7	1	-	-	-	-	-
Unidentified	-	333	319	127	31	1	155	260
Total	3	743	887	382	45	8	312	595

Table 20.28. Temporal Contexts at Each Site that Included Faunal Remains.

Site	Temporal Context								
	Early Basketmaker III	Mid-Basketmaker III	Late Basketmaker III	All Basketmaker	Pueblo I	Pueblo II/ Early Pueblo III	All Ancestral Pueblo	None	Total
5MT10631	-	-	260	-	-	-	279	-	539
5MT10647	3	738	358	382	-	8	33	89	1,611
5MT10684	-	-	-	-	-	-	-	120	120
5MT10686	-	-	-	-	-	-	-	118	118
5MT10687	-	-	-	-	-	-	-	71	71
5MT10709	-	4	-	-	-	-	-	-	4
5MT10711	-	-	216	-	-	-	-	10	226
5MT10718	-	-	-	-	45	-	-	1	46
5MT10736	-	1	20	-	-	-	-	8	29
5MT2032	-	-	33	-	-	-	-	29	62
5MT2037	-	-	-	-	-	-	-	141	141
5MT3875	-	-	-	-	-	-	-	8	8
Total	3	743	887	382	45	8	312	595	2,975

Table 20.29. Faunal Remains by Structure Type at all Sites.

Taxon (Common Name)	Structure Type							
	Main Chamber of DCP (n = 11)	Antechamber of DCP (n = 5)	Great Kiva (n = 1)	Kiva (n = 2)	Pit Room (n = 8)	Masonry Surface Room (n = 1)	Single-Chambered Pithouse (n = 5)	Total
Amphibians	-	1	-	-	-	-	-	1
Non-venomous Snake	9	1	-	-	-	-	-	10
Box Turtles	-	-	-	-	-	-	1	1
Lizards	1	-	1	-	-	-	-	2
Horned Lizard	2	-	-	-	-	-	-	2
Small Bird	-	1	-	-	-	-	-	1
Medium Bird	1	2	-	1	1	-	-	5
Large Bird	8 (2)	5 (1)	-	2 (1)	6	-	1	22 (4)
Perching Birds	-	1	-	-	-	-	-	1
Hawks	3	3 (2)	-	-	-	-	1	7 (2)
Turkey	-	116 (4)	-	20	14	-	-	150 (4)
Great Blue Heron	-	3	-	-	-	-	-	3
Deer, Mice, Voles, etc.	-	-	3	-	-	-	-	3
Northern Grasshopper Mouse	-	-	5	-	-	-	-	5
Mice	4	-	8	2	-	-	-	14
Pocket Mice	2	-	-	-	-	-	-	2
Ord's Kangaroo Rat	12	-	-	-	-	-	-	12
Wood Rats	11	1	4	-	-	-	-	16
Prairie Dog	-	-	1	-	-	-	-	1
Chipmunks	2	1	2	-	-	1	-	6
White-tailed Antelope Squirrel	5	-	-	2	-	-	-	7
Ground Squirrels	19 (1)	10 (2)	7	3 (1)	3	-	3	45 (4)
Small Rodents	9	22	15	-	-	-	1	47
Rodents	3	2	56	-	-	-	1	62
Rabbits, Hares, and Pikas	1	1	2	-	-	-	4	8
Cottontail	120 (8)	27 (1)	28 (1)	11	6	1 (1)	27 (3)	220 (14)
Jackrabbit	80 (5)	17 (2)	3	9 (1)	1	1 (1)	11 (1)	122 (10)
Bobcat	1	-	-	-	-	-	-	1
Domestic Dog	72	-	-	-	-	-	-	72
Dog/Coyote/Wolves	28 (1)	1	-	1	1	-	3	34 (1)

Taxon (Common Name)	Structure Type							
	Main Chamber of DCP (n = 11)	Antechamber of DCP (n = 5)	Great Kiva (n = 1)	Kiva (n = 2)	Pit Room (n = 8)	Masonry Surface Room (n = 1)	Single-Chambered Pithouse (n = 5)	Total
Deer	10 (4)	1	-	5	-	-	-	16 (4)
Pronghorn	1	-	-	-	-	-	-	1
Elk	2 (1)	-	-	-	-	-	-	2 (1)
Antlered Artiodactyls (Cervids)	6 (6)	-	-	-	-	-	-	6 (6)
Artiodactyls	3	1	-	-	-	-	2	6
Medium Artiodactyls	1	-	-	-	-	-	-	1
Large Artiodactyls	1	1	-	-	-	-	-	2
Small Mammals	73 (21)	28 (10)	7 (1)	-	11 (2)	2	10 (2)	131 (35)
Medium Mammals	30 (12)	3 (1)	1 (1)	2 (1)	17	-	12 (2)	65 (17)
Large Mammals	5	-	-	-	-	-	3	8
Unidentified	350 (34)	91 (20)	63	36	47 (5)	1 (1)	79 (7)	667 (67)
Total	875 (87)	340 (43)	206 (3)	94 (4)	107 (7)	6 (3)	159 (15)	1,787 (169)

Notes: Parenthetical values represent burned items. DCP = double-chambered pithouse.

Table 20.30. Faunal Remains by Site and Structure Type.

Site Number	Structure Type							
	Main Chamber of Double-Chambered Pithouse	Antechamber of Double-Chambered Pithouse	Great Kiva	Kiva	Pit Room	Masonry Surface Room	Single-Chambered Pithouse	Total
5MT10631	124	136	-	-	-	-	-	260
5MT10647	653	100	206	-	9	-	139	1,107
5MT10684	-	-	-	72	-	-	-	72
5MT10686	-	-	-	-	-	6	-	6
5MT10687	-	-	-	22	-	-	-	22
5MT10709	4	-	-	-	-	-	-	4
5MT10711	77	104	-	-	35	-	-	216
5MT10718	-	-	-	-	45	-	-	45
5MT10736	-	-	-	-	1	-	20	21
5MT2032	17	-	-	-	16	-	-	33
5MT3875	-	-	-	-	1	-	-	1
Total	875	340	206	94	107	6	159	1,787

Table 20.31. Faunal Remains by Functional Category of Structures at All Sites.

Taxon (Common Name)	Functional Category of Structure				
	Public Architecture (n = 1)	Permanent Housing (n = 14)	Temporary Housing (n = 1)	Specialized Activity (n = 6)	Total
Amphibians	-	1	-	-	1
Non-venomous Snake	-	10	-	-	10
Box Turtles	-	-	1	-	1
Lizards	1	1	-	-	2
Small Bird	-	1	-	-	1
Medium Bird	-	3	-	1	4
Large Bird	-	12 (3)	-	5	17 (3)
Perching Birds	-	1	-	-	1
Hawks	-	3 (2)	-	-	3 (2)
Turkey	-	116 (4)	-	14	130 (4)
Great Blue Heron	-	3	-	-	3
Deer, Mice, Voles, etc.	3	-	-	-	3
Northern Grasshopper Mouse	5	-	-	-	5
Mice	8	4	-	-	12
Pocket Mice	-	2	-	-	2
Ord's Kangaroo Rat	-	1	-	-	1
Wood Rats	4	8	-	-	12
Prairie Dog	1	-	-	-	1
Chipmunks	2	3	-	-	5
White-tailed Antelope Squirrel	-	5	-	-	5
Ground Squirrels	7	28 (2)	-	2	37 (2)
Small Rodents	15	30	-	-	45
Rodents	56	6	-	-	62
Rabbits, Hares, and Pikas	2	1	-	-	3
Cottontail	28 (1)*	136 (9)	5 (1)	1	170 (11)
Jackrabbit	3	47 (7)	2	1	53 (7)
Bobcat	-	1	-	-	1
Dog/Coyote/Wolves	-	19 (1)	2	1†	22 (1)
Deer	-	9 (4)	-	-	9 (4)
Pronghorn	-	1	-	-	1
Elk	-	2 (1)	-	-	2 (1)
Antlered Artiodactyls (Cervids)	-	6 (6)	-	-	6 (6)
Artiodactyls	-	2	-	-	2
Medium Artiodactyls	-	1 (1)	-	-	1 (1)
Large Artiodactyls	-	2	-	-	2
Small Mammals	7 (1)	66 (25)	5 (1)	3 (2)	81 (29)
Medium Mammals	1 (1)	29 (13)	4 (1)	17†	51 (15)
Large Mammals	-	5	-	-	5
Unidentified	63	237 (51)	14 (5)	16 (4)	330 (60)
Total	206 (3)	803‡ (129)	33 (8)	61‡ (6)	1,103 (146)

Note: Parenthetical values represent burned items.
* Includes 1 needle; †includes 1 awl; ‡includes 1 unidentified item from flotation.

Table 20.32. Faunal Remains by Site and Function Type of Structure (Basketmaker Period).

Site Number	Functional Category of Structure				
	Public Architecture	Permanent Housing	Temporary Housing	Specialized Activity	Total
5MT10631	-	260	-	-	260
5MT10647	206	321	33	9	569
5MT10709	-	4	-	-	4
5MT10711	-	181	-	35	216
5MT10736	-	20	-	1	21
5MT2032	-	17	-	16	33
Total	206	803	33	61	1,103

Table 20.33. Faunal Remains from Two Contemporaneous Structures.

Taxon (Common Name)	Structure	
	Great Kiva (Structure 102) 5MT10647	Oversized Pithouse (Structure 101-103) 5MT10711
Non-venomous Snake	-	9
Lizards	1	-
Small Bird	-	1
Large Bird	-	8 (3)
Perching Birds	-	1
Hawks	-	3 (2)
Turkey	-	4
Great Blue Heron	-	3
Deer, Mice, Voles, etc.	3	-
Northern Grasshopper Mouse	5	-
Mice	8	-
Ord's Kangaroo Rat	-	1
Wood Rats	4	-
Prairie Dog	1	-
Chipmunks	2	1
White-tailed Antelope Squirrel	-	1
Ground Squirrels	7	-
Small Rodents	15	1
Rodents	56	1
Rabbits, Hares, and Pikas	2	-
Cottontail	28* (1)	21
Jackrabbit	3	13 (4)
Dog/Coyote/Wolves	-	16
Antlered Artiodactyls (Cervids)	-	6 (6)
Small Mammals	7 (1)	33 (16)
Medium Mammals	1 (1)	7 (1)
Large Mammals	-	1
Unidentified	63	50 (17)
Total	206 (3)	181 (49)

Note: Parenthetical values represent burned items.
* Includes one needle.

Table 20.34. Modified Faunal Remains by Type and Site.

Site Number	Modified Items									
	Awl or Awl Fragments	Beads	Bracelets	Gaming Pieces	Needles	Tubes	Scraper	Spatulate-shaped Items	Modified, Unknown Function	Total
5MT10631	2	-	-	-	-	4	-	-	-	6
5MT10647	14	3	-	1	1	8	-	2	6	35
5MT10684	2	-	-	-	-	-	-	-	-	2
5MT10687	-	-	-	-	-	1	1	-	-	2
5MT10709	3	-	-	-	-	-	-	-	-	3
5MT10711	7	-	-	-	1	1	-	-	1	10
5MT10736	1	-	-	-	-	-	-	-	-	1*
5MT2032	1	-	1†	-	-	-	-	-	2	4
5MT2037	1	-	-	-	-	-	-	-	-	1
Total	31	3	1	1	2	14	1	2	9	64

* Found in flotation sample; † possible bracelet fragment.

Table 20.35. Modified Faunal Remains by Type and Site, Separated into Temporal Contexts.

Site Number and Temporal Context	Modified Items									
	Awl or Awl Fragments	Beads	Bracelets	Gaming Pieces	Needles	Tubes	Scraper	Spatulate-shaped Items	Modified, Unknown Function	Total
5MT10631, Late BMIII	2	-	-	-	-	4	-	-	-	6
5MT10647, Middle BMIII	12	2	-	1	-	8	-	2	4	29
5MT10647, Late BMIII	1	1	-	-	-	-	-	-	-	2
5MT10647, All BM	1	-	-	-	1	-	-	-	2	4
5MT10684, PII/EPIII	2	-	-	-	-	-	-	-	-	2
5MT10687, PII/EPIII	-	-	-	-	-	1	1	-	-	2
5MT10709, Middle BMIII	3	-	-	-	-	-	-	-	-	3
5MT10711, Late BMIII	7	-	-	-	1	1	-	-	1	10
5MT10736, BMIII	1	-	-	-	-	-	-	-	-	1*
5MT2032, Late BMIII	1	-	1†	-	-	-	-	-	2	4
5MT2037, PII/EPIII	1	-	-	-	-	-	-	-	-	1
Total	31	3	1	1	2	14	1	2	9	64

Notes: BM = Basketmaker, PII = Pueblo II, EPII = early Pueblo III.
* Found in flotation sample; † possible bracelet fragment.

Table 20.36. Modified Items Divided into Temporal Contexts.

Modified Item	Temporal Context					
	Mid-BMIII	Late BMIII	BMIII	All BM	PII/Early PIII	Total
Awl or Awl Fragment	15	11	1*	1	3	31
Bead	2	1	-	-	-	3
Bracelet	-	1†	-	-	-	1
Gaming Piece	1	-	-	-	-	1
Needle	-	1	-	1	-	2
Tube	8	5‡	-	-	1	14
Scraper	-	-	-	-	1	1
Spatulate Shaped	2	-	-	-	-	2
Unknown Function	4	3	-	2	-	9
Total	32	22	1	4	5	64

Note: BM = Basketmaker; PII = Pueblo II; PIII = Pueblo III.
* From flotation; † possible bracelet fragment; ‡ 1 possible tube fragment.

Table 20.37. General Characteristics of Modified Items.

Site	PD/FS	Structure Type	Period	Taxon	Element	Artifact Type
5MT10631	53/2	Antechamber of DCP	LBMIII	Indeterminate	Indeterminate	Tube
5MT10631	37/1	Antechamber of DCP	LBMIII	Indeterminate	Indeterminate	Tube
5MT10631	82/2	Side room of main chamber	LBMIII	Large bird	Long bone shaft	Tube
5MT10631	83/15	Main chamber of DCP	LBMIII	Indeterminate	Indeterminate	Awl
5MT10631	39/19	Main chamber of DCP	LBMIII	Deer	Metatarsal	Awl
5MT10631	23/2	Main chamber of DCP	LBMIII	Indeterminate	Indeterminate	Tube?
5MT10647	21/3	Great kiva	All BM	Cottontail	Metatarsal	Needle
5MT10647	101/4	Nonstructure	All BM	Large artiodactyl	Metapodial	Awl
5MT10647	408/10	Nonstructure	LBMIII	Small mammal	Long bone shaft	Bead
5MT10647	447/3	Main chamber of DCP	MBMIII	Indeterminate	Indeterminate	Gaming piece
5MT10647	472/2	Antechamber of DCP	MBMIII	Medium mammal	Indeterminate	Unknown
5MT10647	494/1	Main chamber of DCP	MBMIII	Indeterminate	Long bone shaft	Awl
5MT10647	495/2	Main chamber of DCP	MBMIII	Small mammal	Long bone shaft	Bead
5MT10647	495/3	Main chamber of DCP	MBMIII	Large artiodactyl	Long bone shaft	Awl
5MT10647	498/10	Main chamber of DCP	MBMIII	Large mammal	Long bone shaft	Awl
5MT10647	498/21	Main chamber of DCP	MBMIII	Large mammal	Long bone shaft	Awl
5MT10647	498/20	Main chamber of DCP	MBMIII	Large mammal	Long bone shaft	Awl
5MT10647	520/28	Main chamber of DCP	MBMIII	Medium mammal	Long bone shaft	Unknown
5MT10647	544/13	Antechamber of DCP	MBMIII	Large artiodactyl	Long bone shaft	Spatulate shaped
5MT10647	546/13	Main chamber of DCP	MBMIII	Small mammal	Long bone shaft	Tube
5MT10647	546/12	Main chamber of DCP	MBMIII	Medium mammal	Indeterminate	Spatulate shaped
5MT10647	546/2	Main chamber of DCP	MBMIII	Medium mammal	Long bone shaft	Awl
5MT10647	547/64	Main chamber of DCP	MBMIII	Small mammal	Long bone shaft	Tube
5MT10647	547/7	Main chamber of DCP	MBMIII	Small mammal	Long bone shaft	Tube
5MT10647	547/41	Main chamber of DCP	MBMIII	Medium mammal	Long bone shaft	Unknown
5MT10647	547/42	Main chamber of DCP	MBMIII	Large mammal	Rib	Awl
5MT10647	547/47	Main chamber of DCP	MBMIII	Indeterminate	Long bone shaft	Awl
5MT10647	624/21	Main chamber of DCP	MBMIII	Small mammal	Long bone shaft	Tube
5MT10647	737/12	Nonstructure	All BM	Artiodactyl	Astragalus	Unknown/polished
5MT10647	825/5	Main chamber of DCP	MBMIII	Large bird	Long bone shaft	Tube
5MT10647	832/4	Main chamber of DCP	MBMIII	Indeterminate	Indeterminate	Bead
5MT10647	864/3	Single-chambered pithouse	MBMIII	Large mammal	Long bone shaft	Awl
5MT10647	982/20	Main chamber of DCP	MBMIII	Artiodactyl	Metapodial	Unknown
5MT10647	997/8	Single-chambered pithouse	MBMIII	Artiodactyl	Metapodial	Awl
5MT10647	1051/13	Main chamber of DCP	MBMIII	Small mammal	Long bone shaft	Tube

Site	PD/FS	Structure Type	Period	Taxon	Element	Artifact Type
5MT10647	1051/20	Main chamber of DCP	MBMIII	Small mammal	Long bone shaft	Awl
5MT10647	1208/11	Nonstructure	All BM	Small mammal	Long bone shaft	Unknown/polished
5MT10647	1396/4	Main chamber of DCP	MBMIII	Small mammal	Long bone shaft	Tube
5MT10647	1547/7	Main chamber of DCP	MBMIII	Small mammal	Long bone shaft	Tube
5MT10647	1629/8	Main chamber of DCP	LBMIII	Medium mammal	Long bone shaft	Awl
5MT10647	1635/5	Nonstructure	MBMIII	Deer	Metatarsal	Awl
5MT10684	65/7	Subterranean kiva	PII/EPIII	Deer	Metatarsal	Awl
5MT10684	65/8	Subterranean kiva	PII/EPIII	Deer	Metatarsal	Awl
5MT10687	63/15	Nonstructure	PII/EPIII	Large bird	Long bone shaft	Tube
5MT10687	81/12	Nonstructure	PII/EPIII	Medium mammal	Long bone shaft	Scraper
5MT10709	63/28	Main chamber of DCP	MBMIII	Medium mammal	Long bone shaft	Awl
5MT10709	62/13	Main chamber of DCP	MBMIII	Deer	Metapodial	Awl
5MT10709	62/12	Main chamber of DCP	MBMIII	Medium artiodactyl	Metapodial	Awl
5MT10711	195/18	Main chamber of oversized pithouse	LMBIII	Medium mammal	Long bone shaft	Awl
5MT10711	222/10	Main chamber of oversized pithouse	LBMIII	Medium mammal	Metapodial	Awl
5MT10711	121/5	Round pit room	LBMIII	Medium mammal	Rib	Awl
5MT10711	217/15	Main chamber of oversized pithouse	LBMIII	Medium mammal	Long bone shaft	Awl
5MT10711	55/20	Main chamber of oversized pithouse	LBMIII	Small mammal	Long bone shaft	Tube
5MT10711	37/10	Main chamber of oversized pithouse	LBMIII	Medium mammal	Long bone shaft	Awl
5MT10711	54/3	Main chamber of oversized pithouse	LBMIII	Indeterminate	Indeterminate	Awl
5MT10711	21/1	Main chamber of oversized pithouse	LBMIII	Large mammal	Rib	Unknown
5MT10711	14/8	Main chamber of oversized pithouse	LBMIII	Large bird	Long bone shaft	Awl
5MT10711	55/4	Main chamber of oversized pithouse	LBMIII	Medium mammal	Long bone shaft	Awl
5MT10736	27/5	Uncertain	Uncertain	Uncertain	Uncertain	Awl*
5MT2032	133/5	Pit room (slab-lined storage)	LBMIII	Coyote/dog/wolf	Ulna	Awl
5MT2032	132/13	Pit room (slab-lined storage)	LBMIII	Medium mammal	Long bone shaft	Unknown/polished
5MT2032	133/15	Nonstructure	LBMIII	Small mammal	Long bone shaft	Unknown/polished
5MT2032	133/7	Pit room (slab-lined storage)	LBMIII	Medium mammal	Rib	Bracelet?
5MT2037	9/7	Nonstructure	PII/EPIII	Turkey	Ulna	Awl

Note: DCP = Double-chambered pithouse; BM = Basketmaker; LBMIII = late Basketmaker III; MBMIII = Mid-Basketmaker III; PII = Pueblo II; EPIII = early Pueblo III.
* Recovered in flotation sample (not analyzed as part of the faunal assemblage).

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Chapter 21

Archaeobotanical Remains

by Karen R. Adams

Introduction

A rich and diverse botanical assemblage was preserved within 13 separate archaeological sites partially excavated during the Basketmaker Communities Project. This assemblage sheds light on plant resources that contributed to the subsistence economy and other needs of ancestral Pueblo groups during the following time periods and phases: late Basketmaker II and early Basketmaker III (A.D. 420–600), mid-Basketmaker III (A.D. 600–660), late Basketmaker III (A.D. 660–750), Pueblo I (A.D. 750–900), and Pueblo II and early Pueblo III (A.D. 900–1200). Sites included here are 5MT10631 (Mueller Little House); 5MT10709 (Portulaca Point); 5MT10718 and 5MT10719; Architectural blocks 100, 200, 300, 500, and the great kiva at the Dillard site (5MT10647); 5MT10711 (Ridgeline site); 5MT10736 (the TJ Smith site); 5MT2032 (Switchback site); and 5MT3875 (the Shepherd site). Also discussed are a separate group of four Pueblo II–early Pueblo III sites occupied between A.D. 900 and 1140, known collectively as the Hatch sites: 5MT10684 (Dry Ridge site), 5MT10686 (Badger Den), 5MT10687 (Sagebrush House), and 5MT2037 (Pasquin site).

This chapter begins with a brief summary of the modern environmental setting of the Basketmaker Communities Project area, followed by a description of the methods used to process, analyze, and interpret 170 flotation samples. Macrofossil samples, handpicked from site strata and screens during excavation, are included when they bring additional insights into ancient plant usage. Analytic results are reported for each site or small group of sites. Discussion of a range of topics follows, including foods (domesticates and wild plants), construction elements, fuels and other daily wood needs, plant use during distinct time periods, changes in foods through time, changes in wood use through time, seasons of Pueblo occupation, the nature of the paleoenvironment, and similarities/differences in food and nonfood usage among different structure types and between two specialized structures (Dillard great kiva and Ridgeline oversized pithouse). All data used in this chapter were current as of January 24, 2019.

Environmental Setting

Vegetation in the vicinity of the Basketmaker Communities Project sites is essentially the same as that described for Goodman Point Pueblo (Adams 2012), The Goodman Point Community Testing Project (Adams 2014), Sand Canyon Pueblo (Adams et al. 2007), and Shields Pueblo (Adams 2015a). The local area supports two major biotic communities: Great Basin Desertscrub (Turner 1982) and Great Basin Conifer Woodland (Brown 1982). The sites are all situated in the midst of a sparse pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) woodland that includes shrubs such as big sagebrush (*Artemisia tridentata*). The understory is composed of numerous herbaceous plants, among them members of the grass family (Poaceae, formerly

Gramineae), mustards (Brassicaceae, formerly Cruciferae), and annuals and short-lived herbaceous perennials such as globemallow (*Sphaeralcea* spp.). Some plants, such as reedgrass (*Phragmites*), cottonwoods (*Populus*), and willows (*Salix*), prefer the moister soils in the area, whereas others such as prickly pear (*Opuntia*) plants in the cactus family are found in drier locations. For a more complete list of plants in the Sand Canyon locality, see Lightfoot and colleagues (1993:6).

Farming was an important component of the subsistence system of the occupants of this location, who most likely practiced both dryland farming and runoff irrigation agriculture. Many environmental traits would have affected farming success, including the following: soil type, precipitation amount and timing, length of the growing season and amounts of heat during the growing season, and surface topography, briefly reviewed below. More-comprehensive discussions of environmental factors relevant to crop yields of ancient farmers are available elsewhere (Adams 2015b; Dean and Van West 2002; Lightfoot et al. 1993; Van West and Dean 2000; Van West and Lipe 1992).

The best locations for growing maize in the Mesa Verde region are determined by many factors. Eolian silts such as Mesa Verde loess and Sage Plain loess are major components of upland soils in the area (Arrhenius and Bonatti 1965), and historically farmers have had great success farming these very arable soils (Lightfoot et al. 1993). Precipitation and temperature are environmental variables important for successful maize agriculture. Precipitation occurs as winter snows and summer monsoon rains (Lightfoot et al. 1993). As winter snows melt, moisture that seeps into the soil contributes to seed germination and helps keep seedlings and young plants alive until the mid-summer monsoons begin (Erdman et al. 1969:19). Cumulative growing degree day units, a measure of the accumulation of heat over the course of the growing season, can be another important factor for maize success (Muenchrath and Todey 2002). Surface topography (slope and aspect) and edaphic factors such as soil depth also affect the agricultural productivity of the area (Lightfoot et al. 1993). Reconstructions of ancient climate and agriculture in southwestern Colorado have shown that, within the Sand Canyon locality, agricultural productivity would have varied considerably between locations and from year to year (Dean and Van West 2002; Van West and Dean 2000).

Methods

Two types of archaeobotanical samples were collected from the 11 sites: sediment samples processed via a flotation process for small plant parts and larger plant samples handpicked during excavation and referred to as macrofossil (vegetal) remains. The contexts sampled represent a diversity of cultural deposits: thermal features containing primary refuse (hearths, ash pits, and burned spots), midden deposits containing secondary refuse, many nonthermal features associated with pithouses, and some extramural features. Primary refuse is defined as cultural materials left at their location of use; secondary refuse consists of materials produced in one location and then discarded elsewhere (Schiffer 1972, 1987:18, 58). Thermal features are inferred to represent short periods of time in which focused activities involving plants can be documented; for definitions of these feature types, see Crow Canyon's online field manual. The primary refuse in thermal features is assumed to represent final fires built within them. Midden samples represent locations where trash accumulated over time, providing a longer-term record of plant use by a household or larger group; midden samples probably also reflect a relatively broader range of activities than last-use thermal features do. Surface floor contact materials may represent cultural materials that were left behind on structure floors, some of which might still have been usable (Schiffer 1972, 1987:89).

Flotation and Macrofossil (Vegetal) Samples

Flotation samples are sediment samples from which plant remains are extracted in the laboratory using a water-separation technique. In total, 225 flotation samples were analyzed from a range of feature types (Table 21.1). Forty-one of these samples (18.2 percent) represent thermal features (hearths, ash pits, burned spots), and 22 samples (9.8 percent) represent middens; together, thermal features and middens are expected to retain evidence of food processing, fuel use, and discarded remains from daily activities. One hundred twenty-six samples (56 percent) acquired from nonthermal features provide perspective on activities not involving cooking, heating, or routine trash discard. Finally, 14 samples from extramural features (6.2 percent) represent activities outside of dwellings or special structures.

The flotation samples were generally a standard one-liter in size. Samples less than 1,000 ml represent features of relatively small volume. Because the collection of flotation samples is guided by a systematic sampling strategy, and because the aim is for a standard sample volume, the plant remains they contain are considered reliable for detecting patterns of plant usage.

Macrofossil (vegetal) samples are larger plant specimens handpicked by archaeologists during excavation from sediment strata and from material within screens. These samples provide a more subjective sample of the larger plant materials in use in the past. Macrofossil samples are considered most useful for recovering plant parts not identified within flotation samples or for recovering larger specimens such as maize (*Zea mays*) ears or cobs. In total, 861 macrofossil (vegetal) samples were examined from a variety of feature types for any nonwood specimens that survived within them. Because wood fragments are routinely identified within flotation samples, analysis of wood from macrofossil samples generally produces redundant information. Nonwood specimens within macrofossil samples have been incorporated into this chapter only when they provide insights beyond, or support for, interpretations made from the large flotation sample database.

Additional information regarding the sample types, and the general procedures used in the collection, processing, and analysis of flotation and macrofossil samples collected by Crow Canyon archaeologists, is presented in two of Crow Canyon's online publications: *The Crow Canyon Archaeological Center Laboratory Manual* (Ortman et al. 2005) and *Archaeobotanical Analysis: Principles and Methods* (Adams 2004). Several references were consulted for morphological or anatomical descriptions of plants (Cutler and Whitaker 1961; Martin and Barkley 1961; Welsh et al. 1987). In addition, a collection of modern comparative plant parts in the laboratory at the Crow Canyon Archaeological Center aided in the identification of taxa. Scientific nomenclature used in this report conforms to *A Utah Flora* (Welsh et al. 1987) to the extent possible.

Interpretive Framework

The composition of the plant assemblages from archaeological sites can shed light on which domesticated and wild foods were prepared within and outside of the pithouses, and which wood types provided fuels for cooking, heat, light, and other needs such as construction materials. Domesticates could have been grown in agricultural fields or small garden plots, perhaps located nearby. Weedy annual plants thrive in disturbed agricultural fields, as well as in other naturally or humanly disturbed areas such as midden heaps and along pathways. Some trees and shrubs that are useful as fuelwood would have been available in relatively undisturbed woodland and riparian habitats and as woody plants recolonizing fallow agricultural fields. The degree of reliance on domesticates, weedy plants, and trees/shrubs as fuels—as reflected in the plant assemblages—can provide some insight into the composition of the plant communities around the pueblos, as well as a measure of the extent of disturbance in the local area during pithouse occupations.

To aid in the interpretation of data, calculations of ubiquity are reported in this chapter (see also *Archaeobotanical Analysis: Principles and Methods,* paragraphs 27–28, available on the Crow Canyon web page). Ubiquity is the percentage of flotation samples in a particular site or time period in which a given taxon/plant part(s) was identified. This provides a sense of the level of use and discard of each plant and its parts, allowing inferences of past plant availability and preferences at different time periods. For this report, all parts of the same genus are considered to represent one taxon when they occur in the same sample or subset of samples; for example, within a single sample *Pinus*-type bark scales, *Pinus*-type wood, and *Pinus*-type twig specimens are all discussed as a single taxon.

Two publications pertaining to all archaeological sites investigated by the Crow Canyon Archaeological Center support the interpretations offered below and are not repeated here. The first is a compendium that reports historical uses of plants by native peoples in the American Southwest (Rainey and Adams 2004); interpretations of plant specimens (below) rely heavily on this resource. This compendium thoroughly reports relevant Southwestern U.S. ethnographic literature on the range of uses for all plants and plant parts recovered from sites excavated by Crow Canyon. A second document (Adams and Murray 2004) presents identification criteria for these plant parts. This document includes metric and nonmetric observations and photographs of all of the different wood and nonwood plant parts recovered in archaeological sites excavated by the Center.

Results

A variety of parts representing at least 40 different plants, including domesticates and wild plants (trees, shrubs, annuals, and herbaceous perennials), were preserved in flotation samples (Table 21.2). This tally does not include "unknown" specimens, many of which were too fragmented or degraded to identify, and due to their unknown nature provide no additional interpretive information. The bulk of plant parts recovered in the Basketmaker Communities Project sites were charred and are assumed to have become so as a result of human activities during pithouse occupations. However, uncharred specimens were also present in some samples, and because such specimens usually represent post-occupational intrusion into archaeological sites, they will not be presented nor discussed further. Most occurred in low frequency and appeared too well preserved to be ancient. Seeds of goosefoot (*Chenopodium*) and pigweed (*Amaranthus*) plants are often difficult to separate when charred and broken and have been referred to as cheno-am seeds throughout this report.

Site by Site Discussion of Plant Remains

Archaeobotanical samples discussed below represent 11 archaeological sites. These sites were occupied for portion(s) of (1) the late Basketmaker II and early Basketmaker III (A.D. 420–600) phase, (2) the mid-Basketmaker III (A.D. 600–660) phase, and (3) the late (A.D. 660–770) Basketmaker III phase. In addition, evidence of limited presence of groups on the landscape during the Pueblo I (A.D. 750–900) period and the Pueblo II and early Pueblo III (A.D. 900–1200) periods was also observed at these sites.

Dillard Site (5MT10647)

Five major sections of the Dillard site were sampled for plant remains: Architectural Blocks 100, 200, 300, 500, and the great kiva.

Architectural Block 100 Beyond the Great Kiva

Two flotation samples from a pit room and a midden (Table 21.3) indicate use of maize and the annual weeds of maize fields (pigweed, goosefoot). This is the only site with any evidence of early Basketmaker III subsistence. Later in the Pueblo II/early Pueblo III period, two flotation samples from a surface preserved tansy mustard seeds, an important spring season food resource. Wood and smaller twigs from locally available woody sagebrush bushes and juniper trees provided fuel and other daily needs in this location over time.

Architectural Block 200

Numerous flotation samples have been analyzed from architectural Block 200. These include 18 samples from double-chambered Pithouse 205-226; 15 samples from Storage Room 228, Temporary Pithouse 232, and double-chambered Pithouse 239; and seven extramural middens and pits.

Double-Chambered Pithouse 205-226

Occupants of this mid-Basketmaker III (A.D. 620–660) pithouse were reliant on maize, indicated by charred cupules (a cupule is a portion of a maize cob that formerly held two kernels) in 61.1 percent of samples analyzed (Table 21.4). The presence of seeds from goosefoot and pigweed (cheno-am) plants in 66.7 percent of samples supports this interpretation. These plants, along with purslane, are weeds of agricultural fields and other disturbed locations. Families also had access to domesticated squash (*Cucurbita*). On occasion they harvested wild tansy mustard seeds in the late spring, and bulrush achenes from mesic (damp) habitats. The recovery of juniper wood and other nonreproductive parts in every sample reveals the importance of juniper trees as a fuel source and for other daily needs. People also frequently utilized pinyon pine wood, and less often sagebrush wood. A stem in the monocotyledon group of plants, which includes grasses, sedges, rushes, and yucca, was preserved in the main chamber hearth of Pithouse 205-226.

Double-Chambered Pithouses 220-234 and 236 and Single-Chambered Pithouse 231

Other villagers occupying double- and single-chambered Pithouse structures 220-234, 236, and 231 utilized maize often, indicated by preservation of maize in 81.8 percent of 22 flotation samples examined (Table 21.5). They also ate the cheno-am and purslane weeds of maize fields and other disturbed locations, along with eight other wild plants including spiderling and bugseed. Their wood preferences tended to juniper, pinyon, and sagebrush.

Pit Room 228, Temporary Pithouse Room 232, and Double-Chambered Pithouse 239

Maize plant specimens were preserved in every one of the 15 mid-Basketmaker III (A.D. 620–660) flotation samples analyzed from these three structures; maize was accompanied by the cheno-am and purslane weeds of agricultural fields in many samples (Table 21.6). Spring-ready tansy mustard seeds and fall-ripening stickleaf seeds indicate collecting in different seasons. Grass caryopses (grains) and embryo evidence suggest occasional use of wild grasses, along with tansy mustard and stickleaf seeds. The recovery of wild tobacco seeds in two structures may well reflect ceremonial usage. Juniper and pinyon trees provided wood for fuels and other daily needs, along with cottonwood/willow trees. Grass stems and sagebrush wood were carried in on occasion, and to a lesser extent rabbitbrush and wood/twigs from shrubs in the rose family.

Extramural Features

Based on 20 mid-Basketmaker III (A.D. 620–660) flotation samples from midden and extramural surface and pit features (Table 21.7), families grew maize and harvested the pigweed, goosefoot, and purslane weeds of their fields and other disturbed locations. They also gathered spring-ripening tansy mustard seeds and ricegrass grains, late summer–ripening sunflower achenes, and fall-ripening sagebrush seeds. Charred tobacco seeds within an extramural pit could indicate use of a plant generally important in ceremonial/ritual contexts. Wood of juniper and pine trees was gathered often. Occasionally, families also utilized grass stems, oak wood, and wood from a member of the rose family.

Architectural Block 300

Thirty-one flotation samples have been analyzed from architectural Block 300. These include two samples from Storage Pit Room 330 and an extramural surface below a midden, and 29 samples from double-chambered and single-chambered pithouses.

Storage Pit Room 330 and an Extramural Surface

Single flotation samples from a pit room surface and extramural surface below a midden preserved evidence of maize and cheno-am use (Table 21.8), again suggesting maize and the weeds of maize fields were subsistence resources. Juniper and sagebrush wood were both recovered from the pit room surface, reflecting wood types gathered for fuel and other needs.

Double-Chambered and Single-Chambered Pithouses

A variety of features associated with mid-Basketmaker III (A.D. 620–660) double-chambered Pithouses 309, 311 and 313, and late Basketmaker III (A.D. 660–750) Pithouse 312-324 preserved plant parts suggestive of reliance on maize and the weeds (purslane, pigweed) of maize fields (Table 21.9). This supports subsistence patterns reported above. Wild plants likely sought as food included dropseed grass grains, sagebrush achenes, and seeds of spiderling (*Boerhavia* aka *Boerhaavia*) plants that have not been documented in the area today and are discussed in more detail below. Juniper seed and groundcherry seed evidence was preserved in single samples. This cluster of architectural Block 300 pithouses reveals a diverse set of Basketmaker III plant resources sought as foods. Also, as established above, juniper and pinyon wood were utilized more often than any other wood type, along with occasional use of sagebrush and saltbush wood and grass stems.

Architectural Block 500

Six flotation samples within architectural Block 500 represent pithouses 505 and 508 and Midden 502. All date to the mid-Basketmaker III (A.D. 620–660) phase

The plant record in this architectural block is sparse (Table 21.10). Only maize and the wild weeds of plants that likely grew in maize fields were preserved as evidence of agricultural efforts. Wood of juniper and pinyon trees was regularly carried into the structures, eventually ending up in middens. One other wood type, single leaf ash, was preserved within a posthole of Structure 505, possibly reflecting a special structural use of a rarely recovered wood type.

Dillard Great Kiva Architectural Block 100

In total, 18 flotation samples represent the Dillard great kiva in architectural Block 100 (Table 21.11). These samples represent sequentially occupied surfaces, including the original mid-Basketmaker III lower surface (Surface 2), a later late Basketmaker III (A.D. 670–690) plastered layer (Surface 1), and a final late Basketmaker III (A.D. 690–725) burned surface.

Surface 2

Eight mid-Basketmaker III (A.D. 621–660) flotation samples from two original Surface 2 floor vaults, two pit features, and two postholes preserved a record of maize and the wild goosefoot/pigweed plants of maize fields. Wild globemallow seeds were also gathered. The community utilized wood of juniper and pine trees and saltbush shrubs.

Surface 1

Seven flotation samples represent a subsequent late Basketmaker III (A.D. 670–690) plastered floor, sand floor, and sipapu. Again, maize and the cheno-am weeds of maize fields were preserved, along with limited evidence of four-wing saltbush fruit and sagebrush achene use. Juniper, pine, and saltbush wood were gathered, along with wood from mountain mahogany, serviceberry/peraphyllum, and single leaf ash.

Final Burned Surface

Three flotation samples from the late Basketmaker III (A.D. 690–725) final burned surface preserved no specimens of maize. Rather, samples contained evidence only of wild plants including cheno-am and globemallow seeds. Absence of maize on this final burned surface could indicate farming difficulties at the end of the great kiva use. Some of the same wood types gathered earlier continued to be burned during this terminal occupation of the great kiva.

Summary

These three surfaces are assumed to preserve plant specimens from ceremonial activities. However, foods eaten within these structures were likely also everyday foods. Maize was preserved on two surfaces, and cheno-am seeds on all three (see Table 21.11). Globemallow seeds were recovered on the earliest and latest of the three surfaces. Three additional wild foods were preserved only on Surface 1.

Ridgeline Site (5MT10711)

At the Ridgeline site, archaeologists acquired 23 flotation samples from a number of pithouse/pit rooms and their associated features (Table 21.12). These samples represent both the mid-Basketmaker III (A.D. 620–660) and late Basketmaker III (A.D. 655–740) phases.

Pithouse 101-103 Main Chamber

Surfaces 2 and 3 of the main chamber of Pithouse 101, occupied during the mid-Basketmaker III phase (A.D. 620–660) preserved evidence of domesticated squash and wild spring-ripening ricegrass (*Stipa*) use in two flotation samples. Later, in the late Basketmaker III phase (A.D. 655–740), nine Surface 1, bench, and hearth samples contained maize remains, along with seeds of weedy cheno-am and purslane plants and a variety of other wild plant foods (saltbush and grass fruit, prickly pear, groundcherry and globemallow seeds, and cone scale remains suggesting pinyon nut harvest). A pithouse main chamber surface pit preserved evidence only of maize and the weeds of maize fields. A single roof sample with maize could indicate maize was stored on or suspended from the roof when it burned and collapsed. Charred wood types preserved within these contexts include commonly recovered juniper and pine, along with sagebrush and mountain mahogany. The presence of reedgrass stems suggests use of these long, even-diameter, sturdy stems as a roofing layer. This is supported by recovery of reedgrass stem fragments in the main chamber roof and on the bench. Two flotation samples with evidence of Douglas fir wood reveal long-distance transport of a high mountain tree into the Ridgeline site.

Pithouse 101-103 Antechamber

One mid-Basketmaker III wall construction and two late Basketmaker III Surface 1 flotation samples from the antechamber reinforce use of juniper and pine wood and reedgrass stems in antechamber construction. The Surface 1 samples also preserved reproductive plant parts of maize and the goosefoot and or pigweed and purslane seed of maize field weeds, along with globemallow seeds, and the same wood types preserved elsewhere at the Ridgeline site.

Pit Rooms 110, 116, and 117

Limited evidence of maize and the goosefoot, pigweed, and purslane weeds of maize fields were preserved in five flotation samples from three late Basketmaker III pit rooms at the Ridgeline site. People commonly carried juniper and pine wood into these rooms.

Summary

Macrobotanical samples preserved roofing layers at the Ridgeline site. In addition to main beams identified as juniper and pine trees, some of the smaller closing material layers included sagebrush twigs and reedgrass stem/stalk segments and other grass stems. Limited amounts of cliffrose and mountain mahogany twigs were recovered among burned wall debris.

Switchback Site (5MT2032)

At the Switchback site, adjacent to the Ridgeline site discussed above, archaeologists collected 23 flotation samples. These samples represent a pithouse with thermal features, a midden, and a pit room utilized for storage (Table 21.13). All samples from the Switchback site date to the late Basketmaker III phase.

The hearth and ashpit within the pithouse preserved reproductive plant parts suggestive of subsistence resources and nonreproductive parts representing fuel and other wood needs. Foods included maize and seeds of weedy plants that thrive in maize fields, such as pigweed, goosefoot, and purslane. A wide range of wild plants representing additional foods were also recovered within these thermal features, among them sagebrush, sunflower, and bulrush achenes; grasses including domesticated little barley grains and wild ricegrass grains; and wild tansy mustard seeds, globemallow seeds, groundcherry seeds, and juniper seeds. Preserved wild tobacco seeds may come from smoking tobacco near the hearth. The domesticated little barley grains, a first for the southwestern Colorado region, have been fully reported elsewhere (Graham et al. 2017). Little barley grass has not been found growing in the area by the author, so the possibility of travel or trade with groups hundreds of miles to the southwest in central Arizona must be considered. Juniper and pine wood provide evidence of fuel use.

Nine flotation samples from pithouse roofing and floor contact contexts contained many of the same resources as the hearth and ashpit, with some additions. These included saltbush fruit, bugseed seeds, and dropseed grass grains. Again, juniper and pine wood provide evidence of wood use.

Two flotation samples from the midden contained only charred juniper and cliffrose/bitterbrush wood, providing no insight into subsistence resources. Finally, two flotation samples from a pit room utilized for storage preserved charred juniper seeds, along with juniper and pine wood and single leaf ash wood.

Shepherd Site (5MT3875)

The Shepherd site was occupied in the Basketmaker III (A.D. 600–725) period and later in the Pueblo II (A.D. 1045–1095) period. Five flotation samples were examined for evidence of both foods and nonfoods (Table 21.14). Based on a single flotation sample, the occupants of a late Basketmaker III pit room utilized maize and the weeds of maize fields. They also carried in groundcherry fruit on occasion. The presence of saltbush and juniper wood reveals wood choices. Four flotation samples from the later Pueblo II (A.D. 1045–1095) surface of a masonry surface room preserved only maize remains.

Mueller Little House (5MT10631)

Based on five flotation samples from two pithouses and a pit room, the occupants of Mueller Little House had access to maize and harvested the weeds of maize fields during the late Basketmaker III phase (Table 21.15). They also harvested grains of wild ricegrass and other grasses. They commonly carried in juniper wood, and less often saltbush, sagebrush, and pine wood.

Portulaca Point (5MT10709)

Basketmaker III (A.D. 570–670) occupants of Portulaca Point were farmers (Table 21.16). Based on three flotation samples from one pithouse and a pit room surface, occupants ate maize and the weeds of maize field (pigweed, goosefoot, purslane). Thousands of charred purslane seeds were preserved as a macrofossil sample within a pottery vessel collected from the floor surface of Pithouse 106, an earth-walled pit structure. Occupants also had access to domesticated common beans (*Phaseolus vulgaris*), based on cotyledon (seed half) remains in the pithouse hearth, and they harvested wild tansy mustard seeds and ricegrass grains. Wood preferences included juniper, sagebrush, and serviceberry/peraphyllum.

5MT10718 and 5MT10719

Two Pueblo I period (A.D. 750–900) unnamed sites revealed continuity in subsistence and wood use habits from the previous Basketmaker III period. Eight flotation samples from a pithouse, a pit room, and a midden indicate the importance of the weeds of maize fields (Table 21.17). Also preserved were tansy mustard seeds and grass grains, along with juniper seeds. Charred juniper and pine wood were recovered most often as evidence of fuel, along with sagebrush and saltbush wood. Charred tobacco seeds on the pit room floor likely document a ritual/ceremonial usage of wild tobacco.

TJ Smith Site (5MT10736)

The TJ Smith site, representing primarily the late Basketmaker III (A.D. 655–740) phase, preserved a record of foods and nonfoods. Fifteen flotation samples from two extramural pit features, two pit rooms, and from various locations within a pithouse indicate reliance on maize and the weeds of maize fields (Table 21.18). Tansy mustard seeds and grass grains, including ricegrass, were also important. Prickly pear cactus fruit and lemonadeberry seeds were harvested on occasion, as was wild tobacco. A number of nonfood wood, twigs, stems, and bark scales are indicative of fuels and other daily needs. These resources included juniper, sagebrush, mountain mahogany, cottonwood/willow, pine, saltbush, and grass stems. Douglas fir wood within the pithouse hearth was carried some distance from a higher elevation. Yucca fibrovascular bundles from the pithouse floor may have been left over from processing yucca leaves for basketry or some other fiber use.

Hatch Sites (5MT10684, 5MT10686, 5MT10687, 5MT2037)

Four sites, collectively called the Hatch sites and dating to the Pueblo II–early Pueblo III period (A.D. 900–1140), reveal continuity of plant use through time. Nine flotation samples from one kiva, a masonry surface room, an extramural pit feature, and three middens suggest that, like the Basketmaker III archaeological evidence discussed above, maize and the weeds of maize fields were preserved more often than any other subsistence resources (Table 21.19). Wild resources included ricegrass grains and woolly wheat seeds. Gathered wood types included juniper, pine, sagebrush, cliffrose/bitterbrush, and less often wood of serviceberry/peraphyllum, saltbush, and mountain mahogany shrubs.

Discussion

Foods of Basketmaker III and Later Pueblo I and Pueblo II Occupations of the Dillard Site

Because each flotation sample was assigned to a time period based on archaeological criteria such as absolute dating methods, associated pottery types, and archaeological position, it has been possible to organize all 225 flotation samples from all Basketmaker Communities Project sites into the following chronological sequence: late Basketmaker II and early Basketmaker III (A.D. 420–575), mid-Basketmaker III (A.D. 575–660), late Basketmaker III (A.D. 660–750), Pueblo I (A.D. 750–900), and Pueblo II and early Pueblo III (A.D. 900–1120). Summary data presented in the following summary tables are based on sample details presented in Tables 21.3–21.19, and omit the single flotation sample (Dillard site, architectural Block 100) representing the early Basketmaker III phase.

A general examination of all flotation samples presents a robust data set to evaluate plant use. However, caveats must be mentioned. The Dillard site is very well represented by mid-Basketmaker III samples; in contrast, the smaller Basketmaker Communities Project sites, with their individual site histories, represent the late Basketmaker III and Pueblo I/Pueblo II occupations. Another difference is that structures were utilized differently. Public structures, including the Dillard great kiva (Structure 102) and the Ridgeline site oversized pithouse (Structures 101-103), likely served different functions than the structures at the remaining smaller sites, which represent various daily family-oriented activities. More specific focus on different architectural styles (permanent housing, temporary housing, activity structures, and public architecture), implying different activities, is presented below, as is a comparison of the two sites (Dillard and Ridgeline) interpreted as having hosted communal events.

Based on all samples examined, the charred plant specimens considered to represent subsistence includes a variety of reproductive parts of both domesticated and wild plants (Table 21.20). Food plants are well represented in the sites and contexts sampled. Foods were probably spilled into fires during parching or as they were added to cooking pots set over burning coals; some of these charred food bits were then transferred to middens when thermal features were cleaned out. Foods might have also been processed or stored temporarily on roofs or suspended from roof rafters inside pithouses and other structures; some of these foods could have burned when structures burned.

Three Meso-American domesticates were grown by Basketmaker III families. These include maize/corn (*Zea mays*), squash (*Cucurbita*), and common beans (*Phaseolus vulgaris*). In addition, one indigenous North American domesticated annual grass known as little barley (*Hordeum pusillum* Nutt.) was represented by two charred grains (caryopses) in the Switchback site (Graham et al. 2017). As discussed below, these grains may have been brought to the village by travel or trade.

In the following discussion, one clarification is needed regarding date ranges reported here for samples representing the late Basketmaker II and early Basketmaker III phase. The date range (A.D. 540–620) listed for the Dillard Block 100 samples (see Table 21.3) represents the range of likely occupation dates for that phase at that site. To facilitate the discussion of changing trends through time at the Dillard site (see Table 21.20), the full absolute date range (A.D. 420–620) for those same samples is cited.

Meso-American Domesticates: Maize

Charred maize (*Zea mays*) remains in the flotation samples generally consisted of cupules, cob fragments, kernels, and kernel embryos. In the systematically acquired flotation samples, the common recovery of these parts suggests that maize was an important crop plant for farmers, and that fields may have been close enough so that leftover cobs regularly served a secondary purpose as fuel or tinder (see Table 21.20).

Maize Cob and Ear Segments

Maize cob and ear "segments" are specimens with a complete circumference for at least a portion of their length, allowing an accurate count of the number of kernel rows. Cob segments and ear segments were examined for a range of traits as described by Wellhausen and colleagues (1952) and Nickerson (1953). Basketmaker Communities Project ear and cob segment fragments contained from 10 to 12 rows of kernels, with a few having up to 14 rows. Mean cupule width of 20 ear segments averaged 4.3 mm.

Maize Kernels/Embryos

Maize kernels are fragile and break easily when subjected to the rigors of archaeological excavation and processing. Their relatively sparse presence within many open archaeological sites might be due to both poor preservation and/or to great care taken by residents to not waste kernels. One hundred fifty-nine charred maize kernels, ranging in shape from rectangular to rounded to irregular, were complete enough for measurement. These averaged 7.3 mm in length, 6.5 mm in width, and 3.9 mm in thickness. Those few kernels with visible interiors that were not severely damaged appeared to contain a soft flour endosperm. None were dented in the top, and none showed clear evidence of husk imprints. Embryos sometimes pop out of kernels during burning and can be recognized as a portion of a kernel; these were occasionally also preserved within flotation samples.

Maize Types

Even with information on traits of charred ear/cob segments and kernels, it is difficult to state with certainty which types of ancient maize were present in the Basketmaker assemblage. Numerous traits of maize ears, cobs, and kernels have been shown to be affected by the environment (Adams 2015b; Adams et al. 1999) and by charring (Goette et al. 1994). Shorter cob length results from reduced moisture during the growing season (Adams et al. 1999) and also from burning (Brugge 1965; Hildebrand 1994; Stewart and Robertson 1971). Maize kernel dimensions, especially length and width, are affected by access to water during growth (Adams et al. 1999), and kernel thickness can be increased by charring (Goette et al. 1994). Cupule width is moderately responsive to moisture (Adams et al. 1999), and cupules generally shrink when charred (Goette et al. 1994). One of the most stable traits is the number of kernel rows, which is relatively unaffected by moisture (Adams et al. 1999) and not affected by burning.

Maize recovered from other Mesa Verde–area sites representing Basketmaker through Pueblo periods has been described by others (Cutler and Meyer 1965:147, 150). Regional evidence suggests that some of the maize grown by ancient farmers in this region belonged to a widespread and variable landrace called Pima-Papago, which includes ears with 10–16 rows of flint kernels and smaller ears with 12–14 rows of pop or flint kernels (Adams 1994:277). When an 8-rowed flour maize, along with other cultural traits, entered the Tularosa Cave region of west-central New Mexico in the A.D. 500–700 period, the average row number of maize ears dropped noticeably. It is thought that this new “mais de ocho” represented an easy-to-grind flour type that became of immediate interest to famers in the American Southwest (Cutler 1952:469; Martin 1952:506) and rapidly spread outward from that area of New Mexico, including northward into the Mesa Verde region. Possibly some of this flour maize was being grown by the Basketmaker Communities Project farmers.

Meso-American Domesticates: Squash and Beans

Limited evidence of squash (*Cucurbita*) and common beans (*Phaseolus vulgaris*) was also preserved. *Cucurbita* rind was recovered from a flotation sample in a mid-Basketmaker III phase sipapu at the Ridgeline site pithouse main chamber. This unusual ritual context for a rare domesticate may have been intentional. *Cucurbita* rind was also preserved within the Dillard

Block 200 double-chambered Pithouse 205-226 from the same time period. The earliest U.S. Southwest *Cucurbita* evidence dates to 2,800 years ago in northern New Mexico (Simmons 1986).

Common bean (*Phaseolus vulgaris*) cotyledon (seed half) evidence was recovered from a pithouse hearth at the mid-Basketmaker III phase Portulaca Point. Measurements on 15 charred whole or nearly whole cotyledons from 5MT10709 averaged 10.07 mm in length, 5.2 mm in width, and 2.1 mm in thickness. Some of the earliest dates on common beans in the U.S. Southwest reveals they were in lower, hotter deserts of southern Arizona by 3,000 years ago and in the uplands of New Mexico around 500 years later (Fish 2004:124).

The low ubiquity of these two domesticates (see Table 21.20) is more likely due to the relatively poor preservation potential of these two crops than to the lack of access or use. Domesticated squash and beans rarely preserve in quantity in open archaeological deposits (Hunter 1997:233), in part because they were usually prepared by boiling, rather than parching, which lowers their preservation potential. Therefore, it is assumed that the level of use of both squash and beans was higher within Basketmaker III communities than their preserved parts suggest. Studies of the contents of coprolites from ancestral Pueblo groups in this region indicate that squash and beans were consumed more frequently than indicated by their presence within flotation samples (e.g., Minnis 1989; Stiger 1979).

Indigenous Southwest U.S. Domesticate: Little Barley (Hordeum pusillum *Nutt.*)

During the Basketmaker Communities Project, a new record of domesticated little barley grass was discovered in a hearth feature at the Switchback site (Graham et al. 2017). Two charred hull-less (naked) little barley grains were recovered along with other burned subsistence products, and all were associated with a floor that has been radiocarbon dated to A.D. 750 ± 48. Well-known to Hohokam farmers in central and southern Arizona hundreds of miles to the southwest, this new southwestern Colorado little barley record was surprising. Travel or trade are two reasonable explanations for this disjunct record, but a case has also been presented that independent domestication during the Basketmaker III period might also explain the evidence (Graham et al. 2017). It is important to point out that no modern populations of little barley plants have been noted in the region by the author, though decades of historic grazing, farming, and other pressures on native plant communities could account for plants missing from modern landscapes. Little barley is a "cool-season" grass whose grains ripen in late winter/early spring, capable of providing important nutrition prior to the summer and fall season availability of most other subsistence resources (Bohrer 1975).

Wild Plant Foods

Evidence of as many as 24 different wild plants was preserved in the form of charred seeds, fruit, or other reproductive parts (see Table 21.20). This represents a combination of annual and perennial plants. The interpretation that many or all of these wild plants were used as foods is supported by ethnographic records of historic wild plant usage (Rainey and Adams 2004) and by the thermal feature, midden, and pithouse contexts within which the remains were found. Plant reproductive parts recovered from thermal features are presumed to have been prepared there, and parts preserved in middens are inferred to have accumulated during deposit of refuse materials from the regular cleaning of thermal features and other food preparation locations. The interpretation of wild plant parts as foods is strengthened when many archaeological sites in a region reveal similar patterning of these same plant remains in features associated with food preparation and discard (Adams and Bowyer 2002).

Many of the annual resources, such as *Amaranthus*, *Chenopodium*, cheno-ams, and *Portulaca*, were likely harvested as the weeds of disturbed locations such as agricultural fields, on accumulating middens, and along the edges of pathways. These weeds can be eaten as greens, when young, and mature plants can be harvested later for seeds (Rainey and Adams 2004). The common harvest of cheno-ams during the mid-Basketmaker III phase is suggested by recovery of burned seeds in 54.9 percent of flotation samples examined (see Table 21.20); this level of use remains essentially the same during the late Basketmaker III period, when the recovery rate was 54.4 percent.

Other annual plants also produced seeds/fruits that were harvested by Basketmaker III families (see Table 21.20). These included tansy mustard (*Descurainia*), spurges (*Euphorbia*) that can be edible on occasion (Adams 1980:39–42), sunflower (*Helianthus annuus*), and other members of the Compositae (sunflower) family. The seeds of wild annual tobacco plants (*Nicotiana*, *Nicotiana attenuata*) are not considered a food, but rather a resource likely obtained for ritual smoking needs (Adams 1990).

In addition to domesticated little barley discussed above, seeds of four additional annual species were identified in limited numbers in Basketmaker III or later Pueblo contexts (see Table 21.20). These include spiderling (*Boerhavia*) seeds in three mid-Basketmaker III contexts (N= 4 flotation samples), bugseed (*Corispermum*) seeds in one middle and one late Basketmaker III context (N=3 flotation samples), woolly wheat/plantain (*Plantago*) seeds in one Pueblo II/early Pueblo III location (N=1 flotation sample), and stickleaf (*Mentzelia albicaulis*) seeds in a mid-Basketmaker III pit room roof.

Spiderling plants have not been collected or observed in the Cortez, Colorado, region by the author during more than three decades of plant reconnaissance. Nor have any *Boerhavia* pollen grains been recovered in any Crow Canyon Archaeological Center pollen samples (N=412) analyzed (Susan Smith, personal communication). A query to archaeobotanical colleagues has not revealed any references to *Boerhavia* seeds or pollen grains in southwestern Colorado. The closest archaeological records of spiderling seeds are reported from Hohokam and Tonto Basin Salado archaeological sites in Arizona (Huckell and Toll 2004:74–76).

In terms of modern *Boerhavia* plant distribution, *Boerhavia erecta* plants are said to be "widely distributed in tropical and subtropical America," reported from the southern and central Arizona counties of Yavapai, Cochise, Santa Cruz, Pima, and Yuma (Kearney and Peebles 1960:276). An online plant database also indicates its presence in the Four Corners states (USDA PLANTS, date of use February 25, 2019). However, *Boerhavia* is not listed in two Colorado floras (Harrington 1964; Weber 1987), but one species (*Boerhavia spicata* Choisy) was collected from Kane County, Utah, along the southern border of that state (Welsh et al. 1987:427). Current distribution in a separate online database (SEINet, date of use February 25, 2019) shows

Boerhavia erecta in a number of southern and central counties in Arizona (Cochise, Gila, Graham, La Paz, Maricopa, Pima, Pinal, Santa Cruz, and Yavapai) and New Mexico (Doña Ana, Grant, Hidalgo, Lincoln, Luna, Sierra, and Socorro). This same database also lists a number of *Boerhavia* species along the southern border of Utah in Kane and Washington Counties, separated from southwestern Colorado by San Juan County, Utah. The modern distribution data reveals that the closest modern *Boerhavia* populations to southwestern Colorado are currently some distance to the west in Utah and to the south in Arizona and New Mexico. As discussed above for little barley, and acknowledging that the prehistoric distribution of spiderling plants may have included southwestern Colorado, it is also possible that the Basketmaker III Community groups in southwestern Colorado may have traveled some distance west or south to collect spiderling seeds or traded for seeds with Hohokam groups hundreds of miles to the southwest. The fact that *Boerhavia* seeds stick tightly to clothing and sandals also opens the possibility that people traveling to/from the region where the plants naturally grow may have unintentionally brought spiderling seeds to southwestern Colorado. It would not explain why these inadvertent seed travelers would end up becoming charred in thermal features.

Bugseeds, woolly wheat/plantain seeds, and stickleaf seeds have been reported from Archaic, Early Agricultural, Basketmaker II, ancestral Pueblo (Anasazi), Sinagua, Mogollon, and Western Pueblo sites in the broad Southwest U.S. region (Huckell and Toll 2004). In this study, bugseeds were found in one flotation sample from a mid-Basketmaker III context at the Dillard site and in two flotation samples from one late Basketmaker III context at the Switchback site. Bugseeds have also been preserved in later Pueblo contexts at the Albert Porter and Yellow Jacket sites in southwestern Colorado. Woolly wheat/plantain seeds were recovered from one of the Hatch group sites (5MT10684) in Pueblo II and early Pueblo III deposits. A small amount of woolly wheat/plantain pollen grains were preserved in oversized pithouse 101-103 at the Ridgeline site and in mid-Basketmaker III Structure 106 at Portulaca Point (5MT10709). As a spring-ripening resource woolly wheat/plantain seeds were previously identified in limited numbers from three regional Pueblo sites from later in time: Troy's Tower, Castle Rock Pueblo, and Sand Canyon Pueblo. Finally, stickleaf seeds from a single mid-Basketmaker III context indicate a rarely utilized food; later occupants of the region at Albert Porter Pueblo, Monsoon House, Castle Rock Pueblo, the Duckfoot site, Troy's Tower, Catherine's site, and Goodman Point Pueblo continued to occasionally gather stickleaf seeds (Crow Canyon Database, accessed March 5, 2019).

Herbaceous (nonwoody) perennials offered additional foods (see Table 21.20). These included fruit/seeds of groundcherry (*Physalis*) and other plants (*Solanum*) in the potato family, bulrush (*Scirpus*) achenes, globemallow (*Sphaeralcea*) seeds, and grass caryopses (grains) such as ricegrass (*Stipa hymenoides*), dropseed (*Sporobolus*), and unidentified grasses (Poaceae). These plants represent spring, summer/fall, and fall-ripening resources (see Table 21.2).

Three local shrubs provided edible reproductive parts (see Table 21.20). Fruit of big sagebrush (*Artemisia tridentata*), 4-wing saltbush (*Atriplex*), and lemonadeberry (*Rhus aromatica*) shrubs were preserved in 7.4 percent or less of samples analyzed. This attests to occasional use of these shrubs whose fruit are generally ripe in the summer/fall (lemonadeberry) or fall (big sagebrush, 4-wing saltbush). Four-wing saltbush fruit can cling to branches for months following ripening, making them available for an extended period while offering "on the plant" storage (Bohrer 1981).

The fruits of two different trees were likely gathered as food (see Table 21.20), although their presence as burned specimens in archaeological sites could also result from fruit being attached to branches brought in as fuelwood, discussed below. Juniper (*Juniperus*) seeds were preserved in low amounts in mid-Basketmaker III flotation samples and in later contexts as well. Pinyon (*Pinus edulis*–type/*Pinus*-type) cone scales/cone scale fragments were preserved within a small number of samples, suggesting occasional use of pinyon nuts. However, evidence of pinyon nut use is often scarce in archaeological sites, in comparison to their potential food value. The unpredictable nature of pinyon nut availability may be partly responsible for this.

Construction Wood

Samples of roof construction elements submitted for tree-ring dating were identified to species by the Laboratory of Tree-Ring Research (see Chapter 19). Many of the identifiable structural elements were of juniper wood (N=33). A few samples were identified as pinyon (*Pinus edulis*), ponderosa pine (*Pinus ponderosa*), or Douglas fir (*Pseudotsuga menziesii*). The remaining specimens (N=65) listed as "unknown" have not yet been examined for identification purposes. All these construction elements likely served as the vigas or main roof timbers. Sagebrush twigs/wood provided raw materials for roofing layers above the structural elements; many of these twigs ranged from 0.3–2.5 cm in diameter. Occasionally cliffrose/bitterbrush, reedgrass, and grass family stems were also utilized. These "closing" materials formed a continuous brushy layer before the addition of adobe and sediment to seal the roof.

The local pinyon/juniper woodland likely provided most of the construction elements and closing materials. The abundance of juniper wood specimens collected from Basketmaker Communities Project sites indicates that juniper was the construction wood of choice. Juniper trees provide a strong and insect-resistant wood, and this type of wood is preferred even today as fence posts. In a study of the supply and use of construction timbers in the vicinity of nearby Sand Canyon Pueblo dating to the late thirteenth century, Hovezak (1992) concluded that the local pinyon/juniper woodland offered enough juniper trees for building construction, particularly if these were supplemented with timbers salvaged from collapsed structures in the area. Pinyon wood is structurally less sound and apparently was not preferred for construction. Some travel was required to obtain the limited number of ponderosa pine and Douglas fir beams used in Dillard site Structure 102 and the Ridgeline site, respectively.

Wood Used in Bins/Ritual Features

Dillard Structure 220 Bin Features 2 and 3 were constructed of sagebrush or unknown wood/twigs. Wood from a Dillard sipapu (Feature 7) within Structure 226 could not be identified. A paho (prayer stick) within Feature 25 at the Ridgeline site was made from juniper wood. These identifications by the Laboratory of Tree-Ring Research are discussed more fully elsewhere (see Chapter 19).

Fuels and Other Nonfood Needs

The identification of charred wood and other nonreproductive plant parts in flotation samples reveals that at least 16 different wood or fiber resources were used by the villagers. As for the foods discussed above, summary wood data (Table 21.21) is based on data in Tables 21.3–21.19. Most charred wood specimens probably represent tinder or fuels, debris from tool manufacture or other activities, or collapsed construction elements that fell onto benches, floors, or other features.

Village residents utilized at least three types of trees. Charred fragments of juniper wood and pinyon pine wood were identified in 178 (79.1 percent) and 98 (43.6 percent) of all flotation samples, respectively. These resources are assumed to have been locally available then, as now. However, the wood of Douglas fir (*Pseudotsuga*) trees, which grew in higher elevations or deep within canyons, was preserved in only 1.3 percent of samples. Fragments of single leaf ash and cottonwood/willow trees were preserved in 1.8–3.1 percent of samples, suggesting relatively rare use.

Shrub wood was also important, as were stems and fibers (see Table 21.21). Fragments of sagebrush and saltbush wood were recovered in 54 (24.0 percent) and 22 (9.8 percent) of flotation samples, respectively. Less often, villagers carried in wood of five additional shrubs (serviceberry/peraphyllum, mountain mahogany, cliffrose/bitterbrush, oak, and rose family), which preserved within 0.4–5.3 percent of flotation samples. The only information on other nonfood plant uses consists of reedgrass (*Phragmites*) and other grass (Poaceae) stems, each in less than 4.4 percent of samples, and monocotyledon stem fibrovascular bundle evidence in single samples. Use of yucca in basketry and sandals is discussed in Chapter 24.

The presence of charred maize (*Zea mays*) cupules and cob fragments in 128 (56.9 percent) of flotation samples (see Table 21.20) suggests use of cobs as tinder or fuel after the kernels had been removed. Cupules are the most durable parts of the cob and often survive burning. As an alternative use, maize cobs were reported being eaten in the historic period during times of famine (see Rainey and Adams 2004).

Overview of Plant Use during Distinct Basketmaker III Periods and Later Pueblo I and Pueblo II/Early Pueblo III Periods

Basketmaker III Trends Through Time

An examination of plant use through time within the Basketmaker Communities Project sheds light on changing patterns of subsistence and nonsubsistence resource procurement between the mid-Basketmaker III and late Basketmaker III phases (see Table 21.20). The single sample representing the early Basketmaker III phase (A.D. 420–575) only reveals use of maize and the weeds (cheno-am and pigweed seeds) of agricultural fields, plus gathering of sagebrush and juniper wood for heating and cooking.

Maize was clearly important throughout the Basketmaker III occupation. However, one trend appears to be a reduction in maize cob availability between the mid-Basketmaker III and late Basketmaker III phases. Maize cupule/cob fragments declined in ubiquity (presence) from 66.4 percent to 50.6 percent of flotation samples between these two well-sampled time periods. Kernel and embryo specimens also show a decline in recovery between the mid-Basketmaker (15.6 percent) and late Basketmaker (5.1 percent) phases (see Table 21.20). Explanations might include declining fertility of farmlands, unfavorable environmental conditions for farming, or a combination of these or other factors. Increasing population size might also play a role. Less well-sampled Pueblo I and Pueblo II/early Pueblo III deposits, with notably lower sample numbers, preserved even lower ubiquities of maize cob/cupule parts, not exceeding 26.7 percent.

Associated weeds of agricultural fields and other disturbed locations indirectly confirm a decline in farming efforts. The regular harvest of the cheno-am weeds of agricultural fields and other disturbed locations during the mid-Basketmaker III phase is suggested by recovery of burned seeds in 55.9 percent of flotation samples (see Table 21.20). Cheno-am seed ubiquity declined very little during the late Basketmaker III phase, to a recovery rate of 54.4 percent. These weedy plants, which can occur in high populations, continued to be an important food source.

The number of different wild plants assumed to represent foods also varies during the Basketmaker III occupation. Sixteen different wild foods were recovered within 122 mid-Basketmaker III flotation samples, in contrast to 22 different wild foods recovered within 79 late Basketmaker III flotation samples. This smaller number of late Basketmaker III flotation samples preserved the longest list of wild foods. This trend may indicate that an increasing number of wild plant foods was harvested to counter lowered or less-predictable agricultural harvests during the late Basketmaker III phase or to feed increasing numbers of individuals.

Uncommon resources contribute to this discussion. In the mid-Basketmaker III phase, spiderling seeds were likely traded in from the Hohokam region hundreds of miles to the southwest. This established relationship between the two regions continued into the late Basketmaker III phase, when grains of the indigenous domesticate little barley were utilized, likely also carried in from that region.

Pueblo I

Eight Pueblo I (A.D. 750–900) flotation samples from two sites (5MT10718 and 5MT10719) reveal limited maize farming in the area via two flotation samples (see Table 21.20). Weeds of maize fields (cheno-am seeds, purslane seeds) continued to be harvested at a high rate (62.5 percent). Maize and cheno-am seeds together suggest a continuing focus on agriculture and food gathering in locations where weedy annuals thrive. Three additional wild foods were also occasionally harvested. Juniper and pine wood dominated the wood assemblage, and occupants also sought saltbush wood for household use. Tobacco seeds within a single sample indicate continuing ritual activities.

Pueblo II and Early Pueblo III

Fifteen flotation samples represent Pueblo II and early Pueblo III use of the area (see Table 21.20). These samples came from the following sites: (1) nine samples from four Hatch sites (5MT10684, 5MT10686, 5MT10687, 5MT2037), (2) two samples from Dillard Block 100, and (3) four samples from the Shepherd site (5MT3875). Evidence of maize use was preserved along with the weeds (cheno-ams, purslane) of maize fields. Limited recovery of tansy mustard and ricegrass grains suggest collection in the late spring/early summer. Juniper seeds in 80 percent of the samples could represent a food product, or possibly that fruit came into the village on branches carried in for fuel, or both. The only woolly wheat/plantain (*Plantago*) evidence in any Basketmaker Communities Project site was preserved within a kiva hearth at the Hatch site (5MT10684). This is another late winter/early spring resource. Wood types gathered included juniper, sagebrush, pinyon, cliffrose/bitterbrush, and other rare acquisitions.

Changes in Food Use Through Time

When all flotation samples from all sites are considered, subsistence resources varied through time (see Table 21.20). A single flotation sample from the late Basketmaker II and early Basketmaker III phase (A.D. 420–575), with evidence of only maize and the weeds of maize fields, is not included in this discussion. The remaining data suggest there were shifts in plant usage between the mid-Basketmaker III and late Basketmaker III phases. These changes rest on large sets of flotation samples: N=122 samples for mid-Basketmaker III and N=79 for late Basketmaker III. These changes include the following: (1) drops in the ubiquities of maize cob/cupule remains (from 66.4 percent to 50.6 percent) and kernel/embryo remains (from 15.6 percent to 5.1 percent), (2) an increase in the number of wild plant foods from 17 to 22, and (3) potential reliance on Hohokam connections to the south and west during the mid-Basketmaker III phase for nonlocal foods such as spiderling, and continuation of these ties during the late Basketmaker III phase for resources such as little barley. The recovery of seeds of weedy plants in over half of the flotation samples from both Basketmaker III phases suggests heavy reliance on disturbed-ground plants throughout the Dillard site occupation.

Another way to consider this evidence is to examine any changes in ranking of major foods. Within each time period, foods with the top five highest ubiquities within flotation samples have been assigned ranks from #1–#5 (see Table 21.20). If more than one resource had the same ubiquity, they were given the same ranking. The top two ranked subsistence resources indicate that maize and cheno-am seeds ranked first and second in both middle and late Basketmaker phases. With relatively smaller sample sizes, the top two rankings of later time periods deviate. Based on N=8 flotation samples, the highest-ranking Pueblo I period food was cheno-am seeds, followed by maize, juniper, and purslane seeds. Based on N=15 Pueblo II and early Pueblo III flotation samples, the highest-ranked food was juniper seeds, followed by maize and cheno-am seeds. The third-ranked resources for each time period were wild plants, though they varied through time.

Considering the issue of dependability, maize and other domesticates can be considered relatively undependable foods. Weeds of disturbed habitats around villages, including agricultural fields, pathways, and middens, are highly dependable unless summer rains are lacking. Juniper trees have fruits that can cling to branches for months following maturity, which can be considered “on the plant storage” (Bohrer 1981), especially important during winter months. It is no surprise that dependable juniper fruits show up in the archaeological plant record. Their regular recovery and relatively high ranking during the Pueblo periods imply they served as important resources for these later farming communities.

Changes in Wood Use Through Time

Many of the same wood resources were gathered through the Basketmaker occupation of the region (see Table 21.21). Basketmaker occupants carried twigs and wood of at least 16 different trees and shrubs into their dwellings. The top three ranked woods utilized were juniper, pine, and sagebrush in both the middle and late Basketmaker III phases. The number of different wood types varied little between mid-Basketmaker III (N=14) and late Basketmaker III (N=13). Juniper wood also ranked #1 in later Pueblo time periods. Pine wood was gathered often until the Pueblo II and early Pueblo III period, when occupants focused more on sagebrush shrubs. It is reasonable to assume that nearly three hundred years of gathering wood for fuel, construction timbers, tools, and other daily needs may have shifted the relative proportions of woody plants available to later Pueblo groups. The fact that sagebrush (*Artemisia*) wood and twigs ranked second in use by Pueblo II and early Pueblo III people suggests a somewhat open landscape with shrubs, rather than a dense juniper/pine woodland, surrounding the Basketmaker Communities.

Seasons of Pueblo Occupation

The question of whether these pueblos were occupied year-round or not can be considered from more than one viewpoint. Farmers have a range of tasks that are generally performed in different seasons. Different wild resources mature over the course of the growing season from late spring through mid–late fall.

Implications of Farming

The recovery of domesticates in archaeological sites implies the presence of people laboring on a landscape through much of the calendar year. Planting, tending, harvesting, drying, and storing the harvest spans the period from spring through fall, and some field preparations could have occurred during the late winter/early spring. Agricultural products can be stored in bulk in storage facilities, so their period of use likely extended through the winter and into the next growing season. The record of maize, squash, and common beans in the Basketmaker Communities Project sites suggests at least some occupants may have been in residence during much of the calendar year.

Wild Plant Seasonal Availability

The wild plant foods gathered by Basketmaker Communities Project occupants represent more than one season. These include important late spring/early summer resources (*Descurainia, Plantago, Sphaeralcea, Stipa hymenoides,* and domesticated *Hordeum pusillum*) that are ripe before any agricultural products and most other wild plants produce edible products. It also includes summer-ripening plants of active and fallow fields (cheno-ams, *Amaranthus*, and *Portulaca*). A variety of late summer through fall-ripening wild foods (*Artemisia, Atriplex, Boerhaavia, Corispermum, Euphorbiaceae, Helianthus annuus, Mentzelia albicaulis, Opuntia*, *Physalis*, *Pinus edulis, Polygonum, Prunus virginiana, Rhus trilobata, Scirpus*, *Solanum*, *Sphaeralcea*, and *Sporobolus*) would all be available during or following the squash, common bean, and maize harvest. The seasons of wild plant gathering suggested by this record coincide with early spring through fall seasons of agricultural tasks such as field preparation and maintenance and crop planting, tending, and harvesting. Although collection and processing of wild plants can link people to season(s) of resource availability, because these products can be stored for indefinite periods, their season(s) of collection and use may not always coincide (Adams and Bohrer 1998). Ritually important tobacco (*Nicotiana*) flowers and produces mature seeds over many weeks, starting in mid-summer. Because wood can be gathered at any time of the year, no inferences about wood season(s) of collection or use can be made.

Paleoenvironment

The archaeobotanical record indicates that the inhabitants of the Basketmaker Communities Project village exploited plants in a variety of natural habitats, including pinyon-juniper woodland and well-established sagebrush parklands, along with disturbed habitats such as agricultural fields, middens, and pathways. The occupants obtained juniper and pinyon construction elements and fuel in surrounding pinyon-juniper woodlands. This conclusion is supported by the variety of conifer tree parts (bark scales, cone scales, scale leaves, seeds, twigs, wood) carried into their dwellings. Heavy reliance on juniper (*Juniperus*) trees as construction elements could have reduced their availability in the surrounding area, but not to the point of being unavailable.

People also gathered the wood of several additional woodland trees and shrubs, including *Amelanchier/Peraphyllum, Cercocarpus*, *Prunus/Rosa*, *Purshia,* and Rosaceae. Other woody resources grew in open parklands or locations formerly disturbed by agriculture or fire, such as *Artemisia* and *Quercus*. In addition, mesic (damp) habitats supported *Fraxinus anomala*, *Populus/Salix* trees, and *Phragmites* stems. All of these trees, shrubs, and grasses grow in the local area today.

Impacts to native vegetation would have resulted from clearing areas for agricultural fields and gardens, from harvesting beams for building construction and wood for fuel, and from the presence of residents using the landscape during much if not all of the calendar year. The data suggest that the environment around the Basketmaker Communities village was altered during use. The relatively high ubiquities of cheno-am seeds and the abundance of maize cob remains both indicate that agricultural fields might have been relatively close. Goosefoot and pigweed plants prefer disturbed habitats, and it is likely that people carried maize ears to their dwellings and used the leftover cobs as tinder/fuel. Other plants that can be considered weedy occupiers of disturbed soils include purslane (*Portulaca*), bugseed (*Corispermum*), tansy mustard (*Descurainia*), and sunflowers (*Helianthus*), all recovered in flotation samples. Weedy wild tobacco (*Nicotiana*) plants, important for ceremonial/ritual activities, also prefer recently burned or disturbed locations.

Differences in Foods and Nonfoods by Architectural Styles

The entire database of Basketmaker flotation samples has also been organized by structure function to perceive any differences in food and nonfood resource use between permanent housing, temporary housing, activity structures, and public architecture. Permanent housing is well represented by 107 samples, and the other categories all have between 16 and 20 flotation samples each.

Foods are distributed unevenly among Basketmaker III structure types. Maize remains ranked highest in permanent and temporary housing and second in activity structures and public architecture (Table 21.22). The rankings of the weeds of maize fields (cheno-am and *Chenopodium* seeds) were just the reverse. Although these differences may be minor, there might have been a slight emphasis on maize consumption within houses and a slight emphasis on the weeds of maize fields in the activity and public architecture structures. The group of permanent housing structures preserved evidence of 25 different plant foods, suggesting families consumed a fairly diverse diet while in their homes. The other, less well-sampled, structure types preserved between 6 and 11 foods, possibly because their primary function was not daily activities that included meals or meal preparation. However, it is clear that some food consumption occurred in all major structure types of the Basketmaker Communities Project.

Nonfoods are distributed more evenly among structure types. Juniper and pine wood generally rank first and second across all structure types (Table 21.23). As with foods, well-sampled permanent housing preserved evidence of 13 different wood, fiber, and stem/stalk taxa. The other structure types preserved evidence of between 6 and 10 nonfoods. Tobacco (*Nicotiana*) seeds were recovered in single samples in all structure types except for public architecture. This absence is interesting if tobacco served religious/ceremonial needs for the occupants of this area.

Comparison of the Dillard Great Kiva (Structure 102) with the Ridgeline Site Oversized Pithouse (Structure 101-103)

Two excavated structures were both large and unusual in their features. Both structures were utilized during mid-Basketmaker III and late Basketmaker III occupations of the site. Flotation samples from these structures are comparable in number, with an emphasis on samples representing the late Basketmaker III phase (Tables 21.24–21.25). Foods recovered most often from the Dillard great kiva from middle and late Basketmaker time phases were weeds of maize fields (cheno-ams) and maize (see Table 21.24). At the nearby Ridgeline site, three flotation samples preserved very little information regarding mid-Basketmaker III foods. However, cheno-ams and maize were preserved most often from the late Basketmaker III Ridgeline occupation, along with six other foods. Low numbers of wild foods (1–4) were preserved in these structures, with the exception of six different wild food resources within the late Basketmaker III component of the Ridgeline site. It is possible that the Ridgeline site served as a food preparation location, possibly for the great kiva, during the final occupation of the site.

The nonfood plant record from these two special locations reveals some patterning (see Table 21.25). The number of wood types preserved within the Dillard great kiva rose from three (mid-Basketmaker III) to eight (late Basketmaker III). Although frequently recovered wood types were juniper and pine, during the late Basketmaker III occupation charred saltbush wood was preserved in more samples than any other wood type. This implies that saltbush wood was burned often in the great kiva; *Atriplex canescens* is considered one of four chief kiva fuels (Whiting 1966:38). The Ridgeline site wood use record is similar between the middle and late Basketmaker III, with juniper and pine wood ranking 1 and 2 through time. In both large structures a wider variety of local trees and shrubs were harvested for wood during the late Basketmaker III phase. Long-term pressure on preferred juniper and pine trees may have caused an increase in the use of less-preferred fuel sources. Leftover maize cobs were commonly burned within both structures, except for the minimally sampled mid-Basketmaker III Ridgeline oversized pithouse.

Summary and Conclusions

The archaeobotanical samples analyzed for the Basketmaker Communities Project sites provide information on important plant resources during a nearly 200-year occupation of the area between the mid-Basketmaker III and late Basketmaker III phases. Based on ample numbers of flotation samples, a broad suite of domesticated and wild plants met the subsistence needs of the residents. Main plant foods relied upon included maize (*Zea mays*) and weedy annual plants such as goosefoot-pigweed (cheno-am) and purslane (*Portulaca*). Several lines of evidence, including regular use of maize cobs as fuel or tinder, suggest that ancient occupants were dependent upon maize. However, wild foods were also important. The seasonality inferences from reproductive parts suggest people acquired wild plants throughout the growing season while they also tended their crops. Tobacco seeds recovered in limited locations from the mid-Basketmaker III phase through the Pueblo I period likely served ceremonial needs. Seeds of four rarely recovered resources (spiderling, bugseed, woolly wheat/plantain, and stickleaf) were sought on occasion.

Comparisons of the foods and nonfoods preserved in two special structures, the Dillard great kiva and the Ridgeline site oversized pithouse, reveal some differences. It is possible that the Ridgeline occupants prepared foods for occupants of the great kiva. In both locations, increased activities involving foods and nonfoods occurred during the late Basketmaker III phase. The presence of saltbush wood in the great kiva reflects an important historically documented kiva fuel. An increase in diversity of both wild foods and wood types during the late Basketmaker III phase suggests people may have been running low on favored foods and wood sources. Maize cobs continued to be used as tinder/fuel through the final Basketmaker III occupation.

Some evidence suggests that subsistence stress may have developed by the late Basketmaker III phase. By then, maize ubiquity had declined from 66.4 percent to 50.6 percent, and the number of wild plants utilized had increased from 17 to 22. Both domesticated little barley grains and spiderling seeds may have supplemented local foods via community ties to the Hohokam region to the south and west. An increase in juniper seed recovery that began in the late Basketmaker III phase accelerated in the Pueblo I period and reached a high of 80 percent ubiquity by the Pueblo II and early Pueblo III periods. Juniper berries, available on juniper branches throughout the calendar year, may have been increasingly sought as a reliable food source.

In addition to a record of foods, various plant materials were gathered as construction material, fuels, tools, and for other daily uses. Juniper wood was preferred for major roof elements. Juniper (*Juniperus*) and pine (*Pinus*) woods were gathered often for fuel from local pinyon-juniper woodlands. Shrubby sagebrush (*Artemisia*) plants, leftover maize cobs, and numerous other woody shrubs including saltbush (*Atriplex canescens, Atriplex*), mountain mahogany (*Cercocarpus*), and others, were also used as tinder or fuel. By the Pueblo II and early Pueblo III periods, an increased emphasis on use of sagebrush wood and twigs may reflect a more open landscape of recovering agricultural fields, rather than the juniper/pine woodland of the initial Basketmaker III occupation.

Differences in Basketmaker food and nonfood resources among different structure types are present, although heavy sampling emphasis on permanent housing must be acknowledged. Families living in permanent housing left evidence of 25 different foods and 13 nonfoods, attesting to a range of plants utilized during daily activities. Activities in the temporary housing, activity structures, and public architecture structures were not as diverse, likely because these locations served more specialized purposes. Similarities between plant remains from two special structures, the Dillard great kiva and the Ridgeline site oversized pithouse, suggest that the Ridgeline occupants may have prepared foods for the great kiva. The predominance of saltbush wood within the great kiva may indicate an important ceremonial fuel. Increased diversity in both foods and fuels within these specialized structures during the late Basketmaker III phase may reflect increasing reliance on less favored foods and fuels.

Table 21.1. Analyzed Flotation Samples, Organized by Context.

Sample Type	Context		Totals
Flotation Samples	Non-Kivas*	Kivas*	
Ashpit	12		12
Bench	2		1
Bin	9		6
Burned Spot/Surface		1	1
Extramural Features			
Floor	22	1	17
Floor Vault	4	5	9
Hearth	30	1	28
Masonry Surface	5		5
Midden Deposits	21	1	22
Non-thermal Features			
Pit	11		8
Pit Room	7		7
Pit/Surface Pit/Slab-Lined Pit/Pit Not Further Specified	16	3	19
Posthole Fill	2	2	4
Roofing	35		30
Sand Room Floor		3	3
Sipapu	4	1	4
Storage	2		2
Surface	15	3	18
Surface Pit	4		4
Thermal Features	2		2
Wall Construction	1		1
Totals	204	21	225

* = Number of samples from each context.

Table 21.2. Charred Plant Taxa and Parts Identified in Analyzed Flotation Samples.

Taxon	Common Name	Part	Lifeform	Seasonality of Reproductive Part(s)
Domesticated Plants				
Cucurbita Type	Gourd/squash	Rind	Annual	Summer/fall
**Hordeum pusillum* Type	Little barley	Caryopsis	Annual	Late winter/early spring
Phaseolus vulgaris Type, *Phaseolus* Type	Common bean	Cotyledon	Annual	Summer/fall
Zea mays	Maize/corn	Cob fragment, cupule, kernel, kernel embryo	Annual	Summer/fall
Wild Plants				
Amaranthus Type	Pigweed	Seed	Annual	Summer/fall
Amelanchier/*Peraphyllum* Type	Serviceberry/peraphyllum	Wood	Shrub	
Artemisia tridentata Type, *Artemisia* Type	Big sagebrush	Achene, flowering head, seed, leaf, twig, wood	Shrub	Fall
Atriplex canescens Type, *Atriplex* Type	Four-wing saltbush, saltbush	Utricle core, twig, wood	Shrub	Fall
**Boerhavia* Type	Spiderling	Seed	Annual	Late summer/fall
Cercocarpus montanus Type, *Cercocarpus* Type	Alderleaf mountain mahogany	Wood	Shrub	
Cheno-am, *Chenopodium* Type	Goosefoot/pigweed	Seed	Annual	Summer/fall
Compositae Type	Sunflower family	Achene	Annual	Summer/fall
Chrysothamnus Type	Rabbitbrush	Wood	Shrub	
**Corispermum nitidum* Type, *Corispermum* Type	Bugseed, slender bugseed	Seed	Annual	Summer/fall
Descurainia Type	Tansy mustard	Seed	Annual	Late spring/early summer
Euphorbia Type	Spurge family	Seed	Annual	Summer/fall
Fraxinus anomala Type	Single leaf ash	Wood	Tree	
Gramineae Type	Grass family	Caryopsis, stem/stalk	Annual/ perennial	Spring/summer/fall
Helianthus annuus Type; *Helianthus* Type	Sunflower	Achene	Annual	Fall
Juniperus osteosperma Type, *Juniperus* Type	Utah juniper	Seed, scale leaf, twig, wood	Tree	Fall
Mentzelia albicaulis Type	Stickleaf	Seed	Annual	Fall
Monocotyledon Type	Monocotyledon	Stem	Annual/ perennial	
Nicotiana Type	Tobacco	Seed	Annual	Summer/fall
Opuntia Type	Cholla/prickly pear	Seed	Perennial	Summer/fall

Taxon	Common Name	Part	Lifeform	Seasonality of Reproductive Part(s)
Phragmites australis Type, *Phragmites* Type	Reedgrass	Stem	Perennial	
Physalis longifolia Type, *Physalis* Type	Groundcherry	Seed	Perennial	Fall
**Plantago* Type	Woolly wheat, plantain	Seed	Annual	Spring/early summer
Pinus edulis Type, *Pinus* Type	Pinyon pine, pine	Bark scale, bark fragment, needle, wood	Tree	Fall
Populus/Salix—Type, *Populus* Type	Cottonwood/willow	Wood	Tree	
Portulaca parvula Type, *Portulaca* Type	Purslane	Seed	Annual	Summer/fall
Pseudotsuga Type	Douglas fir	Wood	Tree	
Purshia Type	Cliffrose, bitterbrush	Wood	Shrub	
Quercus Type	Oak	Wood	Shrub	
Rhus aromatica var. *trilobata* Type	Lemonadeberry	Seed	Shrub	Summer/fall
Rosaceae Type	Rose family	Wood	Shrub	
Scirpus acutus Type, *Scirpus* Type	Bulrush	Achene	Perennial	Fall
Solanum Type	Potato genus	Seed	Perennial	Fall
Sphaeralcea digitata Type, *Sphaeralcea* Type	Globemallow	Seed	Perennial	Summer/fall
Sporobolus Type	Dropseed	Caryopsis	Perennial	Summer/fall
Stipa hymenoides Type, *Stipa* Type	Indian ricegrass	Caryopsis, floret, lemma, palea	Perennial	Spring
Yucca Type	Yucca	Fibrovascular bundles	Perennial	

* Indicates a plant not common or not known to be in the region at present.

Table 21.3. Macrobotanical Results from the Dillard Site (5MT10647) Block 100 General.

Scientific Name	Part	Early BMIII (A.D. 540–600) Pit Room (124)	Mid-BMIII (A.D. 600–725) Midden (109)	Pueblo II (A.D. 800–1000) Late Pueblo Surface (125)	Totals	%
Total Number of Samples in Each Context		1	1	2	4	100.0
Domesticates						
Zea mays	Cupule	1			1	25.0
Wild Foods						
Amaranthus Type	Seed	1			1	25.0
Chenopodium Type, Cheno-am	Seed	2			2	50.0
Descurainia Type	Seed			1	1	25.0
Wild Nonfoods						
Artemisia tridentata Type	Wood	1			1	25.0
Juniperus Type	Twig	1	1	2	4	100.0

Note: BM = Basketmaker.

Table 21.4. Macrobotanical Results from the Dillard Site (5MT10647) Block 200 Double-Chambered Pithouse 205-226, Mid-Basketmaker III (A.D. 620–660).

Scientific Name	Part	Structure 205				Structure 226			Totals	%
		PH MC Roof	PH MC PF 2	PH MC PF 20	PH MC Pit Floor Vault 21	PH AC Roof	PH AC Floor	PH AC Hearth		
Total Number of Samples in Each Context		6	2	2	2	2	3	1	18	100.0
Domesticates										
Cucurbita Type	Rind	1							1	5.6
Zea mays	Cupule	4	1			2	3	1	11	61.1
Zea mays	Kernel							1	1	5.6
Wild Foods										
Cheno-am	Seed	2	2	2	1	2	2	1	12	66.7
Descurainia Type	Seed						1		1	5.6
Portulaca Type	Seed						2		2	11.1
Scirpus Type	Achene	1							1	5.6
Wild Nonfoods										
Artemisia Type	Wood						1	1	2	11.1
Juniperus Type, *Juniperus osteosperma* Type	Scale leaf, twig, wood	6	2	2	2	2	3	1	18	100.0
Monocotyledon Type	Stem	1							1	5.6
Pinus edulis Type, *Pinus* Type	Bark scale, needle, wood	2				2	3		7	38.9

Note: AC = Antechamber, MC = Main Chamber, PF = Pit Feature, and PH = Pithouse,

Table 21.5. Macrobotanical Results from the Dillard Site (5MT10647) Block 200 Double-Chambered Pithouses 220-234 and 236 and Single-Chambered Pithouse 231, Mid-Basketmaker III (A.D. 620–660).

Scientific Name	Part	Str. 220-234							Str. 231			Str. 236			
		PH Roof	PH Bench	PH Bin 1	PH Bin 2	PH Hearth	PH PF 5	PH Sipapu	PH Roof	PH Floor	PH PF 1	PH Floor	PH Roof	Totals	%
Total Number of Samples in Each Context		2	1	1	2	3	2	1	1	3	1	3	2	22	100.0
Domesticates															
Zea mays	Cupule, glume	2	1	1		3	2	1		3		4	1	18	81.8
Zea mays	Kernel, kernel embryo	1	1	1		1	1	1		1		1		8	36.4
Wild Foods															
Artemisia Type	Achene				1									1	4.5
Boerhavia Type	Seed											1		1	4.5
Cheno-am, *Chenopodium* Type	Seed	3	1			2	1			2		2		11	50.0
Compositae Type	Achene					1								1	4.5
Corispermum Type	Achene									1				1	4.5
Descurainia Type	Seed	1												1	4.5
Gramineae Type	Caryopsis				1							1	1	3	13.6
Portulaca Type	Seed	2		1	1							1		5	22.7
Sphaeralcea Type	Seed	1					1							2	9.1
Stipa hymenoides Type	Caryopsis									1		1		2	9.1
Wild Nonfoods															
Artemisia tridentata Type, *Artemisia* Type	Wood	2	1	1	1		2			1		2	1	11	50.0
Atriplex canescens Type	Wood			1								1		2	9.1
Cercocarpus montanus Type	Wood, twig				1					1		1		3	13.6
Fraxinus anomala Type	Wood						1							1	4.5
Juniperus osteosperma Type, *Juniperus* Type	Wood, twig, bark scale	2	1	1	1	3	2	1	1	3	1	3		19	86.4
Pinus edulis Type, *Pinus* Type	Bark scale	1	1	1		3	2			4		2		14	63.6
Populus/Salix Type	Wood			1										1	4.5

Notes: PH = Pithouse, PF = Pit Feature, and Str. = Structure.

Table 21.6. Macrobotanical Results from the Dillard Site (5MT10647) Block 200 Storage Room 228, Temporary Pithouse 232, and Double-Chambered Pithouse 239, Mid-Basketmaker III (A.D. 620–660).

Scientific Name	Part	Str. 228				Str. 232		Str. 239			
		PR Rf	PR Bin	PR Hth	PR PstH 3	PH Hth	PH Bin 2	PH Surf.	PH Hth	Totals	%
Total Number of Samples in Each Context		2	2	2	1	3	1	2	2	15	100.0
Domesticates											
Zea mays	Cupule, cob fragment	2	2	2	1	3	1	2	2	15	100.0
Zea mays	Kernel			2	1					3	20.0
Wild Foods											
Cheno-am	Seed	1	1	2	1		3	2	2	12	80.0
Descurainia Type	Seed			1		1				2	13.3
Gramineae Type	Caryopsis, embryo					2			1	3	20.0
Mentzelia albicaulis Type	Seed	1								1	6.7
Nicotiana Type	Seed				1				1	2	13.3
Portulaca Type	Seed			1		1	1	1	2	6	40.0
Wild Nonfoods											
Artemisia Type	Wood					1	1		1	3	20.0
Chrysothamnus Type	Wood					1	1			2	13.3
Gramineae Type	Stem	1		1		1				3	20.0
Juniperus osteosperma Type	Wood	2		2	1	2	1	2	2	12	80.0
Monocotyledon Type	Stem			1						1	6.7
Pinus edulis Type, *Pinus* Type	Bark scale, wood, needle	2		2	2		3	1	2	12	80.0
Populus/*Salix* Type	Wood		1	1	1	1	1	2		7	46.7
Rosaceae Type	Wood		1		1					2	13.3

Notes: Hth = Hearth, PH = Pithouse, PstH = Posthole, PR = Pit Room, Rf = Roof, Surf. = Surface, and Str. = Structure.

Table 21.7. Macrobotanical Results from the Dillard Site (5MT10647) Block 200 Extramural, Mid-Basketmaker III (A.D. 620–660).

Scientific Name	Part	Mid. (Str. 203)	EPF 3 (Str. 208)	Mid. (Str. 213)	EMP 1 (Str. 216)	ESP 1 (Str. 241)	ESP 2 (Str. 241)	ES (Str. 248)	Totals	%
Total Number of Samples in Each Context		5	1	6	3	2	2	1	20	100.0
Domesticates										
Zea mays	Cupule	3	1		3	2	2	1	12	60.0
Wild Foods										
Artemisia Type	Flowering head, seed	2		1	1	1	1		6	30.0
Cheno-am	Seed	1	1	2	1	1			6	30.0
Descurainia Type	Seed	1		1					2	10.0
Helianthus Type	Achene				1				1	5.0
Portulaca Type	Seed	2	1	1					4	20.0
Stipa hymenoides Type	Caryopsis					1			1	5.0
Wild Nonfoods										
Artemisia Type	Leaf, wood	1	1	2					4	20.0
Gramineae Type	Stem	1							1	5.0
Juniperus Type, *Juniperus osteosperma* Type	Twig, wood	5	1	6	3	2	2		19	95.0
Nicotiana Type	Seed		1						1	5.0
Pinus Type	Wood, bark scale	1		2	2	2	2		9	45.0
Quercus Type	Wood		1						1	5.0
Rosaceae Type	Wood				1		1		2	10.0

Notes: EMP = Extramural Pit, EPF = Extramural Pit Feature, ES = Extramural Surface, ESP = Extramural Surface Pit, Mid. = Midden, and Str. = Structure.

Table 21.8. Macrobotanical Results from the Dillard Site (5MT10647) Block 300 Storage Room and Extramural Surface, Mid-Basketmaker III (A.D. 620–660).

Scientific Name	Part	Extramural Surface Below Midden (Structure 304)	Pit Room Surface (Structure 330)	Totals	%
Total Number of Samples in Each Context		1	1	2	100.0
Domesticates					
Zea mays	Cupule	1	1	2	100.0
Wild Foods					
Cheno-am, *Chenopodium* Type	Seed		1	1	50.0
Wild Nonfoods					
Artemisia tridentata Type	Wood		1	1	50.0
Juniperus osteosperma Type	Wood		1	1	50.0

Table 21.9. Macrobotanical Results from the Dillard Site (5MT10647) Block 300: Double-Chambered Pithouses 309 and 313, Single-Chambered Pithouse 311, Temporary Double-Chambered Pithouse 312-324.

Scientific Name	Part	Mid-Basketmaker III (A.D. 620–660)										Late Basketmaker III (A.D. 660–725)						
		Str. 309	Str. 311					Str. 313				Str. 312-324						
		PH AP 3	PH Rfg	PH Surf.	PH Hth 1	PH PNS 4	PH PNS 2	PH Rfg	PH Fl	PH Hth 1	PH Sp 2	PH Rf	PH Fl	PH Hth 2	PH PF 32	PH PF 27	Totals	%
Total Number of Samples in Each Context		8	1	2	2	2	1	1	1	2	2	1	2	2	1	1	29	100.0
Domesticates																		
Zea mays	Cupule, cob fragment	6	1	1	2	1		1		1	2		2	2			19	65.5
Zea mays	Kernel	2			1	1		1									5	17.2
Wild Foods																		
Amaranthus Type	Seed			1	1					1	1			1			5	17.2
Artemisia Type	Seed, achene	1								1					1		3	10.3
Boerhavia Type	Seed				2					1							3	10.3
Cheno-am, *Chenopodium* Type	Seed	8	1	1	1	1	1	1		3			1			1	19	65.5
Juniperus osteosperma Type	Seed		1														1	3.4
Physalis longifolia Type	Seed									1							1	3.4
Portulaca Type	Seed	7		1	1	1		1		1							12	41.4
Sporobolus Type	Caryopsis				2					1			1				4	13.8
Wild Nonfoods																		
Artemisia tridentata Type	Wood, stem	1	1			1		1					1	1			6	20.7
Atriplex Type	Wood	1															1	3.4
Gramineae Type	Stem	1															1	3.4
Juniperus osteosperma Type, *Juniperus* Type	Wood, twig	7	1	1	2	2	1	1	1	2	2	1	2	2		1	26	89.7
Pinus edulis Type, *Pinus* Type	Bark scale, wood, bark fragment	8	1		2	2		1					1				15	51.7

Notes: AP = Ashpit, F = Feature, Fl = Floor, Hth = Hearth, PF = Pit Feature, PH = Pithouse, PNS =Pit feature not further specified , Rf = Roof, Rfg = Roofing, Sp = Sipapu, Surf. = Surface, and Str. = Structure.

Table 21.10. Macrobotanical Results from the Dillard Site (5MT10647) Block 500: Double-Chambered Pithouse 505-508 and Midden 502, Mid-Basketmaker III (A.D. 620–660).

Scientific Name	Part	Midden (Str. 502)	Pithouse Main Chamber Roofing (Str. 505)	Pithouse Main Chamber Bench Posthole 1 (Str. 505)	Pithouse Antechamber Surface (Str. 508)	Totals	%
Total Number of Samples in Each Context		2	1	1	2	6	100.0
Domesticates							
Zea mays	Cupule		1		1	2	33.3
Zea mays	Kernel, embryo	1				1	16.7
Wild Foods							
Cheno-am	Seed	1			1	2	33.3
Wild Nonfoods							
Fraxinus anomala Type	Wood			1		1	16.7
Juniperus osteosperma Type, *Juniperus* Type	Twig, wood	2		1	2	5	83.3
Pinus edulis Type, *Pinus* Type	Wood	1		1	1	3	50.0

Note: Str. = Structure.

Table 21.11. Macrobotanical Results from the Dillard Site (5MT10647) Block 100 Great Kiva.

Scientific Name	Part	Mid-BMIII*						Late BMIII[†]					Late BMIII[‡]		
								Structure 102							
		GK OS 2 FV 26	GK OS 2 FV 27	GK OS 2 PF 20	GK OS 2 PF 29	GK OS 2 PstH 24	GK OS 2 PstH 31	GK PS 1 BSF 13	GK PS 1 FV 17	GK PS 1 Sp 22	GK SF Lw SR1 10 above	GK SF Up ST 8	GK FBS ST 6 and 7	Totals	%
Total Number of Samples in Each Context		1	2	2	1	1	1	1	2	1	2	1	3	18	100.0
Domesticates															
Zea mays	Cob fragment, cupule	1	1	1				1	1	1	1	1		8	44.4
Wild Foods															
Amaranthus Type	Seed								1			1		2	11.1
Artemisia Type	Achene										1			1	5.6
Atriplex canescens Type	Utricle core							1			1			2	11.1
Cheno-am, *Chenopodium*	Seed			2	1		1		2		2	1	2	11	61.1
Sphaeralcea Type	Seed		1										1	2	11.1
Wild Nonfoods															
Amelanchier/ *Peraphyllum* Type	Wood										1			1	5.6
Artemisia Type	Wood												1	1	5.6
Atriplex canescens Type	Wood		1			1		1	2		2	1	1	9	50.0
Cercocarpus Type, *Cercocarpus montanus* Type	Wood										1		1	2	11.1
Fraxinus anomala Type	Wood											1		1	5.6
Juniperus osteosperma Type; *Juniperus* Type	Wood, twig	2	1			1			1		2	1	2	10	55.6
Pinus edulis Type	Bark scale, wood	1				1					2			4	22.2
Populus/*Salix* Type	Wood										1			1	5.6

Notes: BM = Basketmaker, BSF = Burned Spot Feature, FBS = Final Burned Surface, FV = Floor Vault, GV = Great Kiva, Lw = Lower, OS = Original Surface, PF = Pit Feature, PS = Plastered Surface, PstH = Posthole, SF = Sand Floor, Sp = Sipapu, SR1 10 = 0–10 cm Above Surface, ST = Strata/Stratum, Str. = Structure, Up = Upper.
* A.D. 621–650, [†] A.D. 670–690, [‡] A.D. 690–725.

Table 21.12. Macrobotanical Results from the Ridgeline Site (5MT10711).

		Mid-BMIII (A.D. 620–660)				Late BMIII (A.D. 655–740)											
Scientific Name	Part	PH MC Surface 3 Sipapu Feature 69 (Str. 101)	PH MC Surface 2 Floor Vault Feature 47 (Str. 101)	PH AC Wall Construction Feature 27 (Str. 103)	PH MC Roof (Str. 101)	PH MC Surface 1 (Str. 101)	PH MC Surface 1 Bench Feature 1 (Str. 101)	PH MC Surface 1 Hearth Feature 34 (Str. 101)	PH MC Surface 1 PF 35 (Str. 101)	PH AC Surface 1 (Str. 103)	PR 110 Surface 1	PR 110 Roof	PR 116 Surface 1	PR 117 Surface 1 PF 1	PR 117 Surface 1 Bin Feature 3	Totals	%
Total Number of Samples in Each Context		1	1	1	1	4	1	4	3	2	1	1	1	1	1	23	100.0
Domesticates																	
Cucurbita Type	Rind															1	4.3
Zea mays	Cupule/cob fragment				1	2	1	1	2	2	1		1			11	47.8
Zea mays	Kernel							1								1	4.3
Wild Foods																	
Atriplex Type	Utricle core							1								1	4.3
Cheno-am	Seed					2		4	2	3	1			1	1	14	60.9
Gramineae Type	Caryopsis					1		3								4	17.4
Opuntia Type	Seed					1		1								2	8.7
Physalis Type	Seed					1										1	4.3
Pinus Type	Cone scale							1								1	4.3
Portulaca Type	Seed					1				1						2	8.7
Sphaeralcea Type	Seed					1		1		1					1	4	17.4
Stipa Type	Caryopsis		1													1	4.3
Wild Nonfoods																	
Artemisia Type	Wood	1						1	2				1			5	21.7
Cercocarpus Type	Wood		1													1	4.3
Gramineae Type	Stem/stalk segment	1							1	1						3	13.0
Juniperus Type	Wood	1	1			5		4	3	3	1	1	1	1	1	22	95.7
Phragmites Type	Stem			1		2	1			2						6	26.1
Pinus Type	Needle/bark scale/wood	1			1	2		3	2	1			1	1		12	52.2
Pseudotsuga Type	Wood					2										2	8.7

Notes: AC = Antechamber, BM = Basketmaker, MC = Main Chamber, PF = Pit Feature, PH = Pithouse, PR = Pit Room, Str. = Structure.

Table 21.13. Macrobotanical Results from the Switchback Site (5MT2032), Late Basketmaker III (A.D. 640–740).

Scientific Name	Part	Midden (101)	PH Roofing and Floor Contact (Str. 110)	PH Hearth (Str. 110)	PH Ashpit (Str. 110)	PR Storage (Str. 113)	Totals	%
Total Number of Samples in Each Context		2	9	7	3	2	23	100.00
Domesticates								
Zea mays	Cupule, cob fragment		2	4	2		8	34.8
Zea mays	Embryo, kernel			2	1		3	13.0
Wild Foods								
Amaranthus Type	Seed		1	4			5	21.7
Artemisia tridentata Type *Artemisia* Type	Achene			2			2	8.7
Atriplex Type	Utricle core		1				1	4.3
Cheno-am, *Chenopodium* Type	Seed		3	5		2	10	43.5
Compositae Type	Achene		1				1	4.3
Corispermum nitidum, *Corispermum* Type	Seed		2				2	8.7
Descurainia pinnata	Seed		1	3			4	17.4
Gramineae Type	Caryopsis		1	1			2	8.7
Helianthus annuus Type, *Helianthus* Type	Achene			4			4	17.4
Hordeum pusillum	Caryopsis			1			1	4.3
Juniperus osteosperma Type	Seed			1		2	3	13.0
Physalis longifolia Type	Seed			3			3	13.0
Portulaca parvula	Seed		1	1			2	8.7
Scirpus acutus, *Scirpus* Type	Achene		1	2			3	13.0
Solanum	Seed		1				1	4.3
Sphaeralcea digitata	Seed		1	5	2		8	34.8
Sporobolus Type	Caryopsis		1				1	4.3
Stipa hymenoides Type	Caryopsis			1			1	4.3
Wild Nonfoods								
Artemisia tridentata Type *Artemisia* Type	Wood		3				3	13.0
Atriplex canescens Type	Wood				2		2	8.7
Fraxinus anomala Type	Wood					1	1	4.3
Juniperus osteosperma Type	Scale leaf, twig, wood	2	3	7		2	14	60.9
Nicotiana attenuata Type	Seed			1			1	4.3

Scientific Name	Part	Midden (101)	PH Roofing and Floor Contact (Str. 110)	PH Hearth (Str. 110)	PH Ashpit (Str. 110)	PR Storage (Str. 113)	Totals	%
Pinus edulis Type	Wood, bark scale		4	6		2	12	52.2
Purshia Type	Wood	1					1	4.3

Notes: PH = Pithouse, PR = Pit Room.

Table 21.14. Macrobotanical Results from the Shepherd Site (5MT3875).

Scientific Name	Common Name	Part	Late Basketmaker III (A.D. 600–725)	Pueblo II (A.D. 1045–1095)	Totals	%
			PR (Str. 132)	Masonry Surface Room (Str. 106)		
Total Number of Samples in Each Context			1	4	5	100.00
Domesticates						
Zea mays	Maize/corn	Cupule	1	1	2	40.0
Wild Foods						
Cheno-am	Goosefoot/pigweed	Seed	1		1	20.0
Physalis Type	Groundcherry	Seed	1		1	20.0
Wild Nonfoods						
Atriplex Type	Saltbush	Wood	1		1	20.0
Juniperus Type	Juniper	Wood	1		1	20.0

Note: PR = Pit Room, Str. = Structure.

Table 21.15. Macrobotanical Results from the Mueller Little House (5MT10631) Pithouse 101-102-114, Late Basketmaker III (A.D. 660-725).

Scientific Name	Part	PH Early PF 7 (Str. 101-102)	PH Floor Vault Feature 8 (Str. 101-102)	PH Late PF 9 (Str. 101-102)	PH Ashpit Feature 28 (Str. 101-102)	PR (Str. 114)	Totals	%
Total Number of Samples in Each Context		1	1	1	1	1	5	100.0
Domesticates								
Zea mays	Cupule	1	1	1	1	1	5	100.0
Wild Foods								
Cheno-am	Seed			1		1	2	40.0
Gramineae Type	Caryopsis			1			1	20.0
Portulaca Type	Seed			1		1	2	40.0
Stipa hymenoides Type	Caryopsis			1			1	20.0
Wild Nonfoods								
Artemisia Type	Wood, twig		1			1	2	40.0
Atriplex Type	Wood, twig			1	1	1	3	60.0
Juniperus Type	Wood	1	1	1	1	1	5	100.0
Pinus Type	Wood					1	1	20.0

Notes: PF = Pit Feature, PH = Pithouse, PR = Pit Room, Str. = Structure.

Table 21.16. Macrobotanical Results from Portulaca Point (5MT10709), Mid-Basketmaker III (A.D. 570–670).

Scientific Name	Part	Pithouse Floor (Structure 106)	Pithouse Hearth (Structure 106)	Pit Room Surface (Structure 115)	Totals	%
Total Number of Samples in Each Context		1	1	1	3	100.0
Domesticates						
Phaseolus vulgaris Type	Cotyledon		1		1	33.3
Zea mays	Cupule		1		1	33.3
Zea mays	Kernel			1	1	33.3
Wild Foods						
Cheno-am	Seed		1		1	33.3
Descurainia Type	Seed			1	1	33.3
Portulaca Type	Seed	1	1	1	3	100.0
Stipa hymenoides Type	Caryopsis, floret		1		1	33.3
Wild Nonfoods						
Amelanchier/Peraphyllum Type	Wood		1		1	33.3
Artemisia Type	Wood		1		1	33.3
Juniperus Type	Wood		1		1	33.3

Table 21.17. Macrobotanical Results from Sites 5MT10718 and 5MT10719, Pueblo I (A.D. 725–900).

Scientific Name	Part	5MT10719 Midden (102)	5MT10718 PH Floor (Str. 107)	5MT10718 PH Bin Feature 1 (Str. 107)	5MT10718 PR Roofing (Str. 108)	5MT10718 PR Floor (Str. 108)	Totals	%
Total Number of Samples in Each Context		2	1	2	1	2	8	100.0
Domesticates								
Zea mays	Cupule			1			1	12.5
Wild Foods								
Cheno-am	Seed	1		2		2	5	62.5
Descurainia Type	Seed	1					1	12.5
Gramineae Type	Caryopsis					1	1	12.5
Juniperus Type	Seed	2					2	25.0
Portulaca Type	Seed			2			2	25.0
Wild Nonfoods								
Artemisia Type	Wood					1	1	12.5
Atriplex Type	Wood					1	1	12.5
Juniperus Type	Wood, twig	1	1	2		2	6	75.0
Nicotiana Type	Seed					1	1	12.5
Pinus Type	Bark scale, wood	1		2	1	2	6	75.0

Notes: PH = Pithouse, PR = Pit Room, Str. = Structure.

Table 21.18. Macrobotanical Results from the TJ Smith Site (5MT10736).

Scientific Name	Part	Mid-BMIII (A.D. 545–655)		Late BMIII (A.D. 655–740)							
		Extramural PF 1 (104)	PR (Str. 108)	Extramural PF 2 (104)	PR (Str. 109)	PH Roof (Str. 111)	PH Floor (Str. 111)	PH Hearth (Str. 111)	PH Slab-lined Pit (Str. 111)	Totals	%
Total Number of Samples in Each Context		1	1	1	1	3	6	1	1	15	100.0
Domesticates											
Zea mays	Cupule, cob fragment	1	1				4	1	1	8	53.3
Wild Foods											
Cheno-am	Seed	1		1	1	1	2	1	1	8	53.3
Descurainia Type	Seed			1	1	2	3			7	46.7
Euphorbiaceae Type	Seed						1			1	6.7
Gramineae Type	Caryopsis	1		1			3			5	33.3
Opuntia (prickly pear) Type	Seed						1			1	6.7
Portulaca retusa Type	Seed	1					1			2	13.3
Rhus aromatica var. *trilobata* Type	Seed						2			2	13.3
Stipa hymenoides Type	Caryopsis, floret, lemma, palea				1		2			3	20.0
Wild Nonfoods											
Artemisia Type	Wood, achene, twig	1				3	2		1	7	46.7
Atriplex canescens Type, *Atriplex* Type	Wood					1	1		1	3	20.0
Cercocarpus montanus Type	Wood		1		1	1	2			5	33.3
Gramineae Type	Stem						1	1		2	13.3
Juniperus Type	Twig, wood	1	1	1	1	1	3	1	1	10	66.7
Nicotiana Type	Seed			1						1	6.7
Pinus edulis Type, *Pinus* Type	Wood, bark scale		1				1	1	1	4	26.7
Populus/*Salix* Type	Wood					2	2	1		5	33.3
Pseudotsuga Type	Wood							1		1	6.7
Yucca Type	Fibrovascular bundles						1			1	6.7

Note: BM = Basketmaker, PF =Pit Feature, PH = Pithouse, PR = Pit Room, Str. = Structure.

Table 21.19. Macrobotanical Results from the Hatch Sites, Pueblo II to Early Pueblo III. (A.D. 900–1140).

Scientific Name	Part	5MT10684 Kiva Floor (Str. 108)	5MT10684 Kiva Hearth F3 (Str. 108)	5MT10686 Midden (106)	5MT10686 EM PF1 (109)	5MT10686 Masonry Surf. Room (Str. 111)	5MT10687 Midden (105)	5MT2037 Midden (106)	Totals	%
Total Number of Samples in Each Context		1	1	1	2	1	2	1	9	100.0
Domesticates										
Zea mays	Cupule	1	1	1				1	4	44.4
Zea mays	Kernel		1						1	11.1
Zea mays	Kernel embryo		1						1	11.1
Wild Foods										
Cheno-am	Seed		1	1		1		1	4	44.4
Plantago Type	Seed		1						1	11.1
Portulaca Type	Seed				1	1			2	22.2
Stipa hymenoides Type	Caryopsis					1			1	11.1
Wild Nonfoods										
Amelanchier/ *Peraphyllum* Type	Wood			1					1	11.1
Artemisia Type	Wood	1	1	1		1	2	1	7	77.8
Atriplex Type	Wood		1						1	11.1
Cercocarpus Type	Wood		1						1	11.1
Juniperus Type	Wood	1	1	1	2	1	2	1	9	100.0
Pinus Type, *Pinus edulis* Type	Needle, wood, bark scale				1	1	1		3	33.3
Purshia Type	Wood	1	1			1		1	4	44.4

Notes: EM = Extramural, F = Feature, PF = Pit Feature, Str. = Structure, Surf. = Surface.

Table 21.20. Plant Food Synthesis and Rankings.

Scientific Name	Part	Mid-BMIII (A.D. 575–660)			Late BMIII (A.D. 660–750)			Pueblo I (A.D. 750–900)			Pueblo II and early Pueblo III (A.D. 900–1200)			All Time Periods		
		Ttl	%	Rk	Ttl	%	Rk	Ttl	%	Rk	Ttl	%	Rk	Ttl	%	Rk
Total Number of Samples by Time Period		122			79			8			15			225		
Domesticates																
Zea mays	Cupule, cob fragment	81	66.4	1	40	50.6	1	2	25.0	2	4	26.7	2	128	56.9	1
Zea mays	Kernel, embryo	19	15.6		4	5.1					2	13.3		25	11.1	
Cucurbita Type	Rind	2	1.6											2	0.9	
Phaseolus vulgaris Type	Cotyledon	1	0.8											1	0.4	
Wild Foods																
Amaranthus Type	Seed	4	3.3		8	10.1	4							13	5.8	
Artemisia tridentata Type *Artemisia* Type	Achene	9	7.4	4	4	5.1								13	5.8	
Atriplex Type *Atriplex canescens* Type	Utricle core				4	5.1								4	1.8	
Boerhavia Type	Seed	4	3.3											4	1.8	
Cheno-am, *Chenopodium* Type	Seed	67	54.9	2	43	54.4	2	5	62.5	1	4	26.7	2	120	53.3	2
Compositae Type	Achene	1	0.8		1	1.3								2	0.9	
Corispermum nitidum, *Corispermum* Type	Seed	1	0.8		2	2.5								3	1.3	
Descurainia pinnata Type, *Descurainia* Type	Seed	6	4.9		7	8.9	5	1	12.5	3	1	6.7	4	15	6.7	
Euphorbiaceae Type	Seed				1	1.3								1	0.4	
Helianthus annuus Type, *Helianthus* Type	Achene	1	0.8		4	5.1								5	2.2	
Hordeum pusillum	Caryopsis				1	1.3								1	0.4	
Juniperus osteosperma Type	Seed	1	0.8		3	3.8		2	25.0	2	12	80.0	1	18	8.0	4
Mentzelia albicaulis Type	Seed	1	0.8											1	0.4	
Opuntia Type	Seed				1	1.3								1	0.4	
Physalis Type, *Physalis longifolia* Type	Seed	1	0.8		5	6.3								6	2.7	

Scientific Name	Part	Mid-BMIII (A.D. 575–660)			Late BMIII (A.D. 660–750)			Pueblo I (A.D. 750–900)			Pueblo II and early Pueblo III (A.D. 900–1200)			All Time Periods		
		Ttl	%	Rk	Ttl	%	Rk	Ttl	%	Rk	Ttl	%	Rk	Ttl	%	Rk
Pinus edulis Type, *Pinus* Type	Cone scale				1	1.3								1	0.4	
Plantago Type	Seed										1	6.7	4	1	0.4	
Poaceae Type	Caryopsis	7	5.7	5	8	10.1	4	1	12.5	3				16	7.1	
Portulaca Type, *Portulaca parvula*, *Portulaca retusa* Type	Seed	33	27.0	3	7	8.9	5	2	25.0	2	2	13.3	3	44	19.6	3
Rhus aromatica var. *trilobata* Type	Seed				2	2.5								2	0.9	
Scirpus acutus, *Scirpus* Type	Achene, seed	1	0.8		3	3.8								4	1.8	
Solanum	Seed				1	1.3								1	0.4	
Sphaeralcea Type, *Sphaeralcea digitata*	Seed	3	2.5		13	16.5	3							16	7.1	5
Sporobolus Type	Caryopsis	3	2.5		2	2.5								5	2.2	
Stipa Type, *Stipa hymenoides* Type	Caryopsis, floret, lemma, palea	5	4.1		5	6.3					1	6.7	4	11	4.9	

Notes: BM = Basketmaker, Rk = Rank, Ttl = Total.

Table 21.21. Wild Plant Nonfoods Synthesis and Rankings.

Scientific Name	Part	Mid-BMIII (A.D. 575–660)			Late BMIII (A.D. 660–750)			Pueblo I (A.D. 750–900)			Pueblo II and early Pueblo III (A.D. 900–1200)			All Time Periods		
		Ttl	%	Rk	Ttl	%	Rk	Ttl	%	Rk	Ttl	%	Rk	Ttl	%	Rk
Total Number of Samples by Time Period		122			79			8			15			225		
Amelanchier/ *Peraphyllum* Type	Wood	1	0.8		1	1.3					1	6.7	5	3	1.3	
Artemisia Type	Wood, twig	28	23.0	3	18	22.8	3				7	46.7	2	54	24.0	3
Atriplex canescens Type, *Atriplex* Type	Wood	5	4.1	5	16	20.3	4				1	6.7	5	22	9.8	4
Cercocarpus Type, *Cercocarpus montanus* Type	Wood	5	4.1		6	7.6	5				1	6.7	5	12	5.3	5
Chrysothamnus Type	Wood	2	1.6													
Fraxinus anomala Type	Wood	2	1.6		2	2.5								4	1.8	
Juniperus osteosperma Type	Scale leaf, twig, wood	104	85.2	1	60	75.9	1	2	25.0	1	11	73.3	1	178	79.1	1
Monocotyledon Type	Stem	2	1.6											2	0.9	
Nicotiana Type	Seed	2	1.6		2	2.5		1	12.5	2				5	2.2	
Phragmites Type	Stem	1	0.8		5	6.3								6	2.7	
Pinus edulis Type, *Pinus* Type	Wood, bark scale	63	51.6	2	30	38.0	2	2	25.0	1	3	20.0	4	98	43.6	2
Poaceae Type	Stem, twig, stalk segment	6	4.9	4	4	5.1								10	4.4	
Populus/ *Salix* Type	Wood	1	0.8		6	7.6								7	3.1	
Purshia Type	Wood				1	1.3					4	26.7	3	5	2.2	
Pseudotsuga Type	Wood				3	3.8								3	1.3	
Quercus Type	Wood	1	0.8											1	0.4	
Rosaceae Type	Wood	2	1.6											2	0.9	
Yucca Type	Fibro-vascular bundles				1	1.3								1	0.4	

Note: BM = Basketmaker, Rk = Rank, Ttl = Total.

Table 21.22. Plant Foods and Structure Functions.

Scientific Name	Part	Permanent Housing			Temporary Housing			Activity Structure			Public Architecture			All Structure Functions		
		Ttl	%	Rk	Ttl	%	Rk	Ttl	%	Rk	Ttl	%	Rk	Ttl	%	Rk
Total Number of Samples by Structure Function		107			20			16			18			161		
Domesticates																
Cucurbita Type	Rind	2	1.9											2	1.2	
Phaseolus vulgaris Type	Cotyledon	2	1.9					1	6.3					3	1.9	
Zea mays	Cob fragment, cupule	76	71.0	1	12	60	1	13	81.3	2	8	44.4	2	109	67.7	1
Zea mays	Kernel embryo	19	17.8	4				5	31.3	3				24	14.9	3
Wild Food																
Amaranthus Type	Seed	9	8.4		1	5	5	1	6.3		2	11.1	3	13	8.1	
Artemisia Type	Achene, seed	5	4.7		1	5	5				1	5.6	4	7	4.3	
Atriplex Type; *Atriplex canescens* Type	Utricle core	2	1.9								2	11.1	3	4	2.5	
Boerhavia Type	Seed	4	3.7											4	2.5	
Cheno-am, *Chenopodium*	Seed	70	65.4	2	9	45	2	15	93.8	1	14	77.8	1	108	67.1	1
Compositae Type	Achene	2	1.9											2	1.2	
Corispermum nitidum, *Corispermum* Type	Achene	3	2.8											3	1.9	
Descurainia pinnata Type, *Descurainia* Type	Seed	11	10.3		1	5	5	4	25.0	4				16	9.9	4
Euphorbiaceae Type	Seed	1	0.9											1	0.6	
Gramineae Type	Caryopsis	4	3.7		3	15	4							7	4.3	
Helianthus annuus Type, *Helianthus* Type	Achene	5	4.7											5	3.1	
Hordeum pusillum	Caryopsis	1	0.9											1	0.6	
Juniperus osteosperma Type	Seed	1	0.9					2	12.5					3	1.9	
Mentzelia albicaulis Type	Seed							1	6.3					1	0.6	
Opuntia (prickly pear) Type	Seed	3	2.8											3	1.9	
Physalis longifolia Type	Seed	5	4.7					1	6.3					6	3.7	
Portulaca Type, *Portulaca parvula*, *Portulaca retusa* Type	Seed	29	27.1	3	5	25	3	3	18.8	5				37	23.0	2
Rhus aromatica var. *trilobata* Type	Seed	2	1.9											2	1.2	

Scientific Name	Part	Permanent Housing			Temporary Housing			Activity Structure			Public Architecture			All Structure Functions		
		Ttl	%	Rk	Ttl	%	Rk	Ttl	%	Rk	Ttl	%	Rk	Ttl	%	Rk
Scirpus acutus Type, *Scirpus* Type	Achene	4	3.7											4	2.5	
Solanum	Seed	1	0.9											1	0.6	
Sphaeralcea Type, *Sphaeralcea digitata*	Seed	12	11.2	5				1	6.3		2	11.1	3	15	9.3	5
Sporobolus Type	Caryopsis	4	3.7		1	5			0.0					5	3.1	
Stipa Type, *Stipa hymenoides* Type	Caryopsis, floret, lemma, palea	9	8.4					1	6.3					10	6.2	

Notes: Rk = Rank, Ttl = Total. Charred reproductive plant part(s) in flotation samples from structures of different function. Data based on information in Tables 21.3–21.19. Ranking based on ubiquity (%) of taxa/part(s) within all samples considered by structure function.

Table 21.23. Wild Plant Nonfoods by Structure Function.

Scientific Name	Part	Permanent Housing			Temporary Housing			Activity Structure			Public Architecture			All Structure Functions		
		Ttl	%	Rk	Ttl	%	Rk	Ttl	%	Rk	Ttl	%	Rk	Ttl	%	Rk
Total Number of Samples by Structure Function		107			20			16			18			161		
Amelanchier/ *Peraphyllum* Type	Wood, twig, stem	1	0.9								2	11.1	5	3	1.9	
Artemisia Type	Wood	34	31.8	3	4	20	3	3	18.8	3	3	16.7	4	44	27.3	3
Atriplex canescens Type, *Atriplex* Type	Wood, twig, stem	11	10.3	5				1	6.3	5	9	50.0	2	21	13.0	5
Cercocarpus Type, *Cercocarpus montanus* Type	Wood, twig, axillary bud	7	6.5					2	12.5	4	2	11.1	5	11	6.8	
Fraxinus anomala Type	Wood	2	1.9					2	12.5	4	1	5.6		5	3.1	
Gramineae Type	Stalk segment, stem	6	5.6		1	5	4	2	12.5	4				9	5.6	
Juniperus osteosperma Type	Scale leaf, twig, wood	84	78.5	1	13	65	1	16	100.0	1	10	55.6	1	123	76.4	1
Monocotyledon Type	Stem	1	0.9					1	6.3	5				2	1.2	
Nicotiana attenuata Type, *Nicotiana* Type	Seed	1	0.9		1	5	4	1	6.3	5				3	1.9	
Phragmites Type	Stem	6	5.6											6	3.7	
Pinus edulis Type, *Pinus* Type	Wood, bark scale, needle	52	48.6	2	7	35	2	11	68.8	2	4	22.2	3	74	46.0	2
Populus/*Salix* Type	Wood	15	14.0	4	4	20	3	3	18.8	3	1	5.6		23	14.3	4
Pseudotsuga Type	Wood	3	2.8											3	1.9	

Notes: Rk = Rank, Ttl = Total. Charred nonreproductive plant part(s) in flotation samples from structures of different function. Data based on information in Tables 21.3–21.19. Ranking based on ubiquity (%) of taxa/part(s) within all samples considered by structure function.

Table 21.24. Plant Foods from the Dillard Site vs. the Ridgeline Site.

Scientific Name	Part	Dillard (5MT10647) Great Kiva (Structure 102)						Ridgeline (5MT10711) Oversized Pithouse (Structure 101-103)					
		Mid-BMIII (A.D. 621–650)			Late BMIII (A.D. 690–725)			Mid-BMIII (A.D. 620–660)			Late BMIII (A.D. 655–740)		
		Total	%	Rank	Total	%	Rank	Total	%	Rank	Total	%	Rank
Total Number of Samples by Kiva Location		8			10			3			20		
Domesticates													
Cucurbita Type	Rind							1	33.3	1			
Zea mays	Cob fragment, cupule	3	37.5	2	5	50.0	2				9	45.0	2
Zea mays	Kernel										1	5.0	5
Wild Foods													
Artemisia Type	Achene				1	10	4						
Atriplex canescens Type, *Atriplex* Type	Utricle core				2	20	3				1	5.0	5
Cheno-am, *Chenopodium*, *Amaranthus* Type	Seed	4	50.0	1	10	100	1				11	55.0	1
Gramineae Type	Caryopsis										4	20.0	3
Opuntia Type	Seed										2	10.0	4
Physalis Type	Seed										1	5.0	5
Portulaca Type	Seed										2	10.0	4
Sphaeralcea Type	Seed	1	12.5	3	1		4						
Stipa Type	Caryopsis							1	33.3	1			

Notes: BM = Basketmaker. Charred reproductive part(s) in flotation samples from Dillard great kiva and Ridgeline oversized pithouse. Data based on information in Tables 21.11–21.12. Ranking based on ubiquity (%) of taxa/part(s) within all samples considered by kiva location.

Table 21.25. Wild Plant Nonfoods from the Dillard Site (5MT10647) vs. the Ridgeline Site (5MT10711).

Scientific Name	Part	Dillard Great Kiva (Structure 102)						Ridgeline Oversized Pithouse (Structure 101-103)					
		Mid-BMIII (A.D. 621–650)			Late BMIII (A.D. 690–725)			Mid-BMIII (A.D. 620–660)			Late BMIII (A.D. 655–740)		
		Total	%	Rank	Total	%	Rank	Total	%	Rank	Total	%	Rank
Total Number of Samples by Location		8			10			3			20		
Amelanchier/ *Peraphyllum* Type	Wood				1	10	4						
Artemisia Type	Wood				1	10	4	1	33.3	2	3	15.0	4
Atriplex canescens Type	Wood	2	25.0	2	7	70	1						
Cercocarpus Type, *Cercocarpus montanus* Type	Wood				2	20	3						
Fraxinus anomala Type	Wood				1	10	4						
Gramineae Type	Stem/stalk segment							1	33.3	2	2	10.0	5
Juniperus osteosperma Type, *Juniperus* Type	Wood, twig	4	50.0	1	6	60	2	2	66.7	1	15	75.0	1
Phragmites Type	Stem							1	33.3	2	5	25.0	3
Pinus edulis Type	Bark scale, wood, cone scale, needle	2	25.0	2	2	20	3	1	33.3	2	9	45.0	2
Populus/*Salix* Type	Wood				1	10	4						
Pseudotsuga Type	Wood										2	10.0	5

Notes: BM = Basketmaker. Charred nonreproductive part(s) in flotation samples from Dillard great kiva and Ridgeline oversized pithouse. Data based on information in Tables 21.11–21.12. Ranking based on ubiquity (%) of taxa/part(s) within all samples considered by kiva location.

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Chapter 22

Pollen Analysis

by Susan J. Smith

Introduction

The Basketmaker Communities Project pollen database consists of 170 samples collected primarily from Basketmaker III structures at 11 sites (Table 22.1). The sampling emphasis on structures is ideal for pollen studies because roofs protected interior space from the dilution effects of environmental pollen rain. Additionally, in most Basketmaker Communities Project structures, roofs were deliberately collapsed, which sealed living surfaces when houses were decommissioned versus slow collapse over many years, which creates the potential for temporally mixed pollen assemblages.

One of the main aspects of the excavations is the variety of structure styles, and one of the more interesting research questions is whether there are distinct architectural pollen signatures. Thirty-four structures are represented by 136 pollen samples, and these buildings span the early Basketmaker III (1 sample), middle and late Basketmaker III (115 samples), and Pueblo I and Pueblo II (20 pollen samples). Another key question for the pollen data is whether there are any chronological trends in the occurrence and abundance of plant resources. The following is a list of the research questions explored in this synthetic chapter:

1. In addition to cultigens, what pollen types might reflect subsistence resources and cultural activities?
2. Are there pollen signatures unique to Basketmaker architectural styles?
3. Are there patterns in pollen representation that correlate to chronological periods, specifically middle Basketmaker III compared to late Basketmaker III and the Pueblo period?
4. Is there evidence for environmental change related to occupation history and land use?

Unraveling Archaeological Pollen Records

Archaeological pollen assemblages are difficult to interpret because pollination systems differ by species resulting in uneven production of pollen, which is then transported and deposited into archaeological contexts by a variety of vectors, further distorting species' representation. The key to archaeological palynology is that pollen is linked to flowers, and each plant species has evolved unique reproductive strategies that determine the amount of pollen produced, how it is dispersed, and the probability that grains will preserve in soil (Fægri and van der Pijl 1979; Fægri et al. 1989).

Once pollination biology filters are evaluated, the next interpretive layer is the confounding complexity of human-plant interactions. Cuisine and the technologies employed to acquire, consume, and store foods dictate which plant parts are preserved and where, including the types and quantity of pollen (Adams and Smith 2011; Geib and Smith 2008). Plant products removed in space and time from flowering structures, for example tubers, are essentially invisible through the pollen lens, whereas other resources can overwhelm a sample, such as ritual use of corn pollen or a flush of Cheno-am weeds across a midden. Context also strongly influences pollen preservation. Storage and cooking features often yield ambiguous evidence of economic plants because at this stage of food processing, little pollen persists on stripped seeds and other cleaned products (Geib and Smith 2008), whereas house floors represent surfaces where pollen from everyday human activities was more likely to accumulate.

Methods

Laboratory Methods

The Basketmaker Communities Project pollen samples were all processed and analyzed by the same personnel using consistent methods, which is a rare standard for a multiyear project, and the result is a database with exceptional precision. The 170 project samples were sent to the Palynology Laboratory at Texas A&M University for chemical extraction. The Texas A&M procedure and techniques have been developed and refined by Dr. Vaughn Bryant, Jr., and are based on acid treatments (hydrochloric and hydrofluoric) to reduce carbonates and silicates followed by heavy liquid flotation (zinc bromide, specific gravity 2.0) to separate pollen from sediment.

The processed residues were mounted on microscope slides and analyzed by Susan Smith with a Reichert Microstar compound microscope at 400x magnification. Pollen grains were identified and counted until sums of greater than 200 grains were tallied, if possible, and then the entire slide was scanned at lower magnification (100x) to search for additional taxa. Scanning is a proven technique used to document larger pollen grains, especially cultigens, that might have been missed in the conventional counts. Clumps of grains of the same taxon, referred to as *aggregates*, were added to the pollen sum as one grain per occurrence, and the types, numbers, and sizes of aggregates were documented. Pollen identifications were made to the lowest taxonomic level possible based on published keys (Fægri et al. 1989; Kapp et al. 2000).

Analytical Methods

This chapter is focused on an overview of how pollen assemblages might have recorded human activities and subsistence. The first research goal is to define the economic taxa as not every pollen grain recovered from an archaeological sample is de facto evidence of cultural plant use.

The next task is to “mine the data” for statistical patterns and correlations within and between economic pollen types that might relate to context and/or feature chronology. Sample pruning is required to compile categories of statistically significant numbers of samples. Control and extramural feature samples are excluded in part because there are inadequate numbers of samples for comparison (see Table 22.1), but also because the emphasis is on structure floors to reduce bias derived from mixing contexts with different functions and histories (Adams and Smith 2011).

The parameters used to evaluate pollen types are tailored by taxon to mediate the effects of different pollination systems. For low-count types occurring in only a few samples, simple presence is adequate and groups of sorted samples can be compared by ubiquity, which is the percentage of samples within a defined group recording a specific taxon. Weedy plants, such as Cheno-am, and local native vegetation (grasses, sagebrush, juniper, and pinyon) dominate counts in all Basketmaker Communities Project samples. For these common and abundant taxa, some transformation of the raw counts is required, and the tool used here is pollen abundance as measured by concentration.

Pollen concentration is an estimate of the absolute abundance or density of pollen grains in a sample; this calculation is made possible by the addition to each sample of a known amount of exotic tracer grains. Concentration is calculated by taking the ratio of the taxon pollen count to the tracer count and multiplying by the initial tracer concentration. Dividing this result by the sample weight yields the number of pollen grains per gram of sample sediment, abbreviated gr/gm. Palynologists generally work with relative frequencies or pollen percentages based on sample pollen sums, but the proportional approach smoothes data and can mask real shifts in abundance. For example, two samples, both with maize counts that calculate to 10 percent of sample pollen sums, could yield concentrations of 1,000 gr/gm in one sample and 10,000 gr/gm in the second. Clearly the amount of maize in the second sample is exceptional.

Once the counts of dominant types were transformed to concentration values, samples were filtered through the project average concentration for each taxon, based on all structure samples (n = 136). If a sample taxon concentration exceeds the average concentration for that pollen type, a code value of 1 was assigned. The coded data were then summarized for structure study units by summing the number of samples with high values and representing the result as sample ubiquity or the percentage of samples *by structure study unit*. There are admittedly issues with this approach in that some structures are represented by only single samples and others by multiple samples, but the two-stage manipulation does highlight structures where specific types were particularly abundant or suppressed.

Results

The Basketmaker Communities Project pollen results are archived electronically as part of the master pollen database maintained by the Crow Canyon Archaeological Center that includes all archaeological pollen samples analyzed from 1985 to 2018 (412 samples from 36 sites). Annual site reports of Basketmaker Communities Project pollen results (see Table 22.1) are also available upon request. Research topics outlined in the chapter Introduction are discussed in the following sections.

Economic Pollen Types

Only two cultigens were documented—lots of maize (occurs in 110 of the 170 samples) and a glimpse of squash (only two samples). Reliance on wild native resources is also clear in the consistent recovery of native herbs and perennial plants that are well known ethnobotanical resources and are common in the regional archaeobotanical record (Adams et al 2007; Smith 2017b, 2018b; Smith et al. 2015). Fifty-four pollen types were documented from the 170 project samples and, excluding cultigens, 30 are evaluated as representing potential wild resources. The economic taxa are listed in Table 22.2 with flowering seasons, the most likely local genera where appropriate, and detailed descriptions of uses. A few types are emphasized in this analysis and are described below with expanded narratives.

Carrot Family

Pollen identified as carrot family (Apiaceae) is consistently present in Basketmaker Communities Project samples, but the species and possible uses remain a mystery. The Basketmaker Communities Project carrot family representation is unusually high compared to other nearby archaeological projects. At Goodman Point Pueblo, only three of 20 samples (15 percent of the samples analyzed) preserved carrot family pollen (Smith 2017b), and at Sand Canyon Pueblo carrot family was documented in eight of 40 samples (20 percent) (Crow Canyon Archaeological Center Pollen Database). In contrast, out of the 170 Basketmaker Communities Project samples, 71 yielded carrot family (42 percent), and there are high counts in specific samples. Portulaca Point (5MT10709) is the only project site lacking carrot family pollen.

Most carrot family plants grow in wet meadows or along riparian corridors, but there are dryland species, notably an edible resource called wafer parsnip, wild celery, or spring parsley (*Cymopterus* and *Pseudocymopterus*). Both genera are found in juniper woodland and forest environments throughout the Southwest; however, this ground-hugging perennial is nearly invisible except in early spring when yellow or purple flowers poke up above the soil. The roots were eaten raw or baked by several Southwest tribes, the aromatic leaves and flowers widely used as a spice, and the plant eaten like celery (Dunmire and Tierney 1995; Moerman 1998). Curtin (1997:52) describes a Hispanic holiday cordial called *mestela* that was made by infusing whiskey with sugared *Cymopterus* flowers.

Beeweed

Seventy Basketmaker Communities Project samples preserved beeweed pollen (41 percent, n = 170) though generally at low counts. Beeweed is an annual plant that flowers in late summer following monsoons, and it is related to capers, a spicy modern condiment made by pickling the flowers and/or young seed pods of the caper plant (*Capparis*). The Colorado beeweed (*Cleome serrulata*) is known for spicy leaves, flowers, and fruits, and the whole plant can be cooked down to a black mush that was dried into cakes and widely used as a dye and pottery paint (Adams et al. 2002).

Large Grass

A large grass pollen type was identified in 17 samples, and this category is used to distinguish a grain that is between 40 and 60 µm in diameter. Grasses generally cannot be identified to genera, except for maize, which is a big grain with diameters exceeding 60 µm. However, based on size, potential genera for the large grass type include Indian rice grass (*Achnatherum hymenoides*), little barley grass (*Hordeum pusillum*), panic grass (*Panicum* spp.), or introduced cereal grasses, such as rye and wheat. Recently, the first southwestern Colorado identification of charred little barley grass grains (*Hordeum pusillum*) was documented at the Basketmaker Communities

Project Switchback site. *Hordeum pusillum* grows across broad ecological ranges in the United States and Canada, produces a hull-less grain that was easily harvested and milled, and is a suspected prehistoric cultivar in the Southwest (Adams 2014).

Possible Hog Potato

One of the more interesting pollen discoveries is a distinctive, but unknown, pea family (Fabaceae) grain identified only at the Ridgeline site (5MT10711) in nine samples—seven of the samples are from the oversized Pithouse 101-103 and two pit rooms, Study Units 110 and 117. The morphology of the unknown pollen compares well to pollen from plants grouped in a subdivision of the pea family called the Caesalpinioideae. Representative genera include rush pea (*Caesalpinia repens*), a creeping plant that grows in sandy soils, and hog potato (*Hoffmannseggia* spp.), a perennial that grows in deep, often disturbed soils. Microphotographs of the unknown pollen are shown in Figure 22.1. The grain is prolate, tricolporate with annulated pores (pores with thickened border), and colpi (furrows) contained in a broad band of thinned exine. The longest dimension of the grain is approximately 50 µm. The grain morphology compares best to reference slides of *Hoffmannseggia*.

The distribution of possible hog potato pollen within the oversized Pithouse 101-103 at 5MT10711 is concentrated in intramural pits, but the greatest abundance is from two main chamber floor samples and an adobe sample from Antechamber 103. If the unknown identification is correct and this grain represents pea family (Fabaceae), possibly hog potato, the archaeological expression is extremely high, because Fabaceae species are characterized by flowers that tightly enclose reproductive structures and are essentially self-pollinating (Fægri and van der Pijl 1979; McGregor 1976:100), which makes natural pollen accumulation in soils improbable. The Ridgeline site record suggests either direct manipulation of flowers for some purpose or abundant quantities of flowering material placed on the floor of the structure. A third alternative could relate to plaster made from sediment dug from a location where the unknown plant grew in abundance.

Pollen Signatures from Basketmaker Communities Project Structure Floors/Floor Fill Samples

Thirty-two structures (36 study units) assigned to seven architectural categories are represented by one or more floor or floor fill samples (Table 22.3), and this group of 69 samples is the core of a comparison of structure types. A graphic summary of the numerical manipulation of pollen concentrations described above in Analytical Methods is shown in Figure 22.2 for select dominant taxa and for maize, beeweed, and carrot family. In Figure 22.2, study units are organized along the y-axis by architectural style, and within each style category, samples are sorted by chronology. The histogram graphs depict the ubiquity or *percentage of samples per study unit* that register taxon pollen concentrations greater than the project average, based on all structure samples (n = 136). The occurrence of rare economic pollen types by architectural style and study unit, including intramural feature samples, is summarized in Table 22.4. Rare taxa are present typically in only one to a few samples within each study unit, usually from floors or floor fill, but there are instances of presence in samples from intramural features. Footnotes at the bottom of Table 22.4 list unusual frequencies.

Public Architecture

One of the more striking results visible in Figure 22.2 is the relatively low representation of maize pollen in the two community buildings, the great kiva (Study Unit 102) at the Dillard site (5MT10647) and the oversized pithouse (Study Units 101-103) at the Ridgeline site (5MT10711), but both structures preserved high values of beeweed compared to most other Basketmaker Communities Project structures. The correspondence between public architecture and enriched beeweed suggests artisans working inside these buildings with beeweed paint or possibly preparation of special foods spiced with beeweed. At Site 5MT10631, a double-chambered pithouse with a small 2.0-by-1.5-m add-on (Study Unit 101-102-114) is characterized by the same signature of suppressed maize and enhanced beeweed, which could signify another house with specialized activities. Carrot family is also notable in Study Unit 101-102-114 and in the oversized Pithouse 101-103 at the Ridgeline site.

Rare economic taxa are particularly visible in the two community buildings (see Table 22.4), and in part, the variety is a function of greater numbers of samples per structure. Seventeen samples were analyzed from the Dillard site great kiva and 19 samples from the Ridgeline site oversized Pithouse 101-103, which contrasts with the one to four samples analyzed from all other structures. However, the number of rare taxa is also inferred to reflect the long use life of these structures, both of which were first constructed during the middle Basketmaker III and remodeled and repaired through the late Basketmaker III.

Double-Chambered Pithouses

Floor or floor fill samples were analyzed from 10 double-chambered pithouses. These structures were classified as permanent housing with one exception, Pithouse 312-324 at the Dillard site described as temporary housing (see Table 22.3). The double-chambered pithouses are characterized by mixed signatures, and overall these buildings present individual pollen personalities. There is an unequal structure distribution by site with seven of the 10 pithouses located at the Dillard site. Within the Dillard site, Study Unit 508 and the Block 300 double-chambered pithouses recorded high values of sagebrush, juniper, and grass, but sagebrush is suppressed in Block 200 pithouses, though juniper remains high. This could reflect either a spatial difference in prehistoric site vegetation, construction practices related to builders' preferences, fuelwood choices, or some other cultural aspect.

Pit Rooms

Twelve pit rooms are represented by floor or floor fill samples, and these buildings present strong chronological pollen patterns. Pit rooms are small structures generally less than 3.0 m wide that were used for specialized activities. There is only one Pueblo I pit room from site 5MT10718 (Study Unit 108), and all economic pollen types are suppressed except for carrot family and Cheno-am. A single early Basketmaker III phase pit room from the Dillard site (5MT10647) is characterized by high maize, carrot family, and Cheno-am, which is consistent with a storage and processing function.

Late Basketmaker III pit rooms are characterized by low maize (three of four rooms), but enriched carrot family. Beeweed pollen is low in late Basketmaker III pit rooms, except for Pit Room 113 at 5MT2032, which is one of two rooms described as containing raw clay; the high beeweed could relate to pottery manufacture and design. Contrasting with the late Basketmaker III rooms, maize is high in three of four middle Basketmaker III pit rooms, and carrot family is suppressed in three rooms. Another general pattern is that environmental types (sagebrush, juniper, Cheno-am, and grass) are suppressed in late Basketmaker III rooms, whereas middle Basketmaker III rooms preserved high values, although different taxa register in specific rooms.

The contrasts between middle and late Basketmaker III pit rooms suggest the function of these outbuildings changed through time or at least within the specific rooms sampled. The four middle Basketmaker III pit rooms are all described as probable storage and/or processing features. The late Basketmaker III pit rooms may have served specialized uses. Three of the late Basketmaker III pit rooms (Study Units 110, 116, and 117) are from the Ridgeline site (5MT10711) where the oversized Pithouse 101-103 is located, and two of these rooms (Study Units 116 and 117) contained evidence of craft manufacture—pendant blanks in the fill of Pit Room 116 and raw clay in Pit Room 117. The late Basketmaker III pit room from Site 5MT2032 (Study Unit 113) also contained raw clay suggesting pottery manufacture, but high maize from this room indicates another use was food storage and/or processing.

Single-Chambered Pithouses

There are six single-chambered pithouses: one structure is assigned to the Pueblo I (5MT10718), one structure is late Basketmaker III (5MT10736), and, at the Dillard site, four are middle Basketmaker III pithouses. Compared to other architectural styles, single-chambered pithouses preserved the least evidence of ethnobotanical resources, especially rare taxa, although there is a slightly high frequency of cacti pollen (prickly pear or cholla) found in two of four Dillard site middle Basketmaker III pithouses (see Table 22.4). Cholla is especially notable in Pithouse 232 at the Dillard site where cholla was identified in three of the four samples analyzed (floor, intramural bin, and posthole).

Maize is suppressed in five of the six single-chambered pithouses (Figure 22.2). Middle Basketmaker III Pithouse 313 from the Dillard site is the exception and is the only single-chambered pithouse that looks like a house where subsistence activities were occurring, based on high values of maize, beeweed, and carrot family in addition to cacti and environmental taxa (Cheno-am, sagebrush, juniper, and grass). Similar to Block 200 double-chambered pithouses at the Dillard site, single-chambered pithouses in Block 200 preserved high juniper and suppressed sagebrush.

Another pattern in single-chambered pithouses is a correlation between enriched carrot family pollen and structures interpreted as permanent housing. Temporary or short-term-use Basketmaker pithouse Study Units 232 and 239, both from the Dillard site (5MT10647), preserved low levels of carrot family, whereas the other three permanent-use Basketmaker pithouses yielded enhanced carrot family values (Figure 22.2).

Pueblo Period Kivas and Surface Masonry Rooms

Four Pueblo II period structures, two kivas and two surface masonry structures, are represented by only eight floor samples. With the exception of Surface Room 111 at 5MT10686, there are no enriched maize values in floor or floor fill samples. This result may be due partially to the history of the sampled structures. At 5MT10687, Kiva 113 was described as severely disturbed, and at 5MT3875, Surface Room 106 was probably an isolated field house used seasonally. Beeweed is high in Kiva 108 at Site 5MT10687, which might reflect use of beeweed paint or culinary spice similar to community buildings at the Dillard and Ridgeline sites.

A pattern seen at the Pueblo II sites is the presence of prickly pear and willow pollen in all four structures (see Table 22.4). Three of the Pueblo II sites are clustered adjacent one other (the Hatch sites), and the fourth site (5MT3875) is less than a half mile to the northeast. The consistent recovery of willow indicates an accessible perennial water source in the Pueblo II neighborhood. The prickly pear indicates a preferred food resource that may also have been easily harvested near the sites or even encouraged.

Pollen Results from Select Structures

Dillard Site (5MT10746) Great Kiva Study Unit 102

The majority of the 17 pollen samples analyzed from the great kiva are from late Basketmaker III contexts. Cattail pollen is extremely rare from Basketmaker Communities Project sites, occurring in only eight samples, but five of the eight samples are from the Dillard site with three samples from the great kiva (fill, floor, and Floor Vault 2, Feature 27). Manufacture and application of plaster and adobe with mud and water containing pollen from wetland vegetation might account for the cattail presence, and there are also direct uses for the pollen including ritual blessings, face paint, and edible cakes. Cattail is an incredibly valuable resource, and every part of the plant was used (see Table 22.2). Other rare types found in three great kiva floor samples are purslane, lemonadeberry type (*Rhus*), and birch.

Birch pollen was recovered in only three project samples, all from the Dillard site—a great kiva floor sample, a posthole from Pithouse 205, and a corner bin from Pithouse 220.

Birch is an interesting pollen type that could represent trees of water birch (*Betula occidentalis*) or the shrub called bog birch (*Betula glandulosa*), which grows in seasonally wet, marshy meadows, alpine tundra, and around springs and streams. The modern range of both species is contracted due to historic surface water management. Bog birch is especially scarce, but during the late Pleistocene and early Holocene (13,000 to 10,000 years ago), this northern shrub may have had a greater distribution and isolated populations might have persisted at favorable locations into the Basketmaker period. A modern example of relict bog birch shrubs is in the northern Jemez Mountains of New Mexico in a small marshy meadow (Brunner Jass 1999). The occurrence of cattail pollen and possibly the birch in Dillard site samples indicates a local water source, which might explain why the Dillard site location was first selected and persisted through several centuries.

One other great kiva pollen trait is maximum Cheno-am values. The Basketmaker Communities Project average Cheno-am pollen concentration from 34 structures (n = 136 samples) is 1,692 gr/gm; samples from just the great kiva (n =17 samples) have an average of 2,714 gr/gm. The other 15 Dillard site structures (excluding the great kiva) are represented by 41 pollen samples, which yield an average 1,545 gr/gm Cheno-am concentration. The high Cheno-am concentration is interpreted to relate to the long history of this structure and cumulative ground disturbance in and directly adjacent to the kiva.

Dillard Site Double-Chambered Pithouse 505-508

The middle Basketmaker III double-chambered pithouse 505-508 was an isolated residential structure located northwest of the great kiva. Three pollen samples were analyzed from the antechamber (Study Unit 508, 2.5 m wide), where squash pollen in a floor sample is one of two examples of squash from all Basketmaker Communities Project samples (n = 170). Archaeological evidence of squash is rare in the region, with just seven squash-positive pollen samples out of 412 samples from 36 sites including the Basketmaker Communities Project sites (Crow Canyon Archaeological Center pollen database), and the counts are low with just a single squash grain in each sample. The squash count from Antechamber 508 is high at 23 grains. This same study unit also registered two of the highest Basketmaker Communities Project maize counts of 21 and 19 grains in two floor samples, yet no other rare economic taxa were identified. The results suggest the small space was used to stockpile harvests of maize and squash.

Ridgeline Site (5MT10711) Oversized Pithouse Study Units 101-103

The oversized pithouse 101-103 is impressive with a combined interior diameter of 11 m. Nineteen pollen samples were analyzed from mainly late Basketmaker III levels, and the results are remarkable for the largest number of rare taxa from any Basketmaker Communities Project structure. Eleven rare types were identified, and two of these (buckthorn and walnut) occur only in Pithouse 101-103 samples. The composition of the rare types is unique because of the number of woody shrubs represented that grow in canyons and riparian environments (walnut, willow, lemonadeberry, buckthorn, and chokecherry). This variety suggests specialty materials used by artisans making wood implements, baskets, weapons, or other products including medicines, as the bark, roots, and stems from these shrubs were valued for healing compounds (see Table 22.2).

Rose family pollen is relatively common in Basketmaker Communities Project samples, but at low counts of 1 to 2 grains. A high expression of 3 to 4 grains is documented in four of the oversized pithouse samples. Most of the local rose family plants are woody shrubs that were valued for wood to make tools and implements, used for fuel, or provided edible fruits. Ash pollen from an extramural slab-lined pit (Study Unit 109) suggests another specialized wood brought into the Ridgeline site.

The first Crow Canyon Archaeological Center pollen record of an unknown pea family, possibly hog potato (*Hoffmannseggia*), was discussed previously in the Economic Pollen section. The hog potato type occurs only at the Ridgeline site and is concentrated in the oversized pithouse. Perhaps the most interesting Basketmaker Communities Project pollen sample analyzed is from the earliest floor Surface 3 in Pithouse 101-103. This sample produced high counts of hog potato type, carrot family, and 10 grains of Indian wheat (*Plantago*), another extremely rare taxon documented in only two out of 412 samples in the Crow Canyon pollen database.

Mueller Little House (5MT10631) Double-Chambered Pithouse 101-102-114

This late Basketmaker III pithouse is the third most intensively sampled Basketmaker Communities Project structure with 14 productive pollen samples. The structure had three chambers: a 3-x-3-m antechamber (Study Unit 102), a 5-x-5-m main chamber (Study Unit 101), and a small (2-x-1.5-m) addition (Study Unit 114). In the main chamber, four samples were collected from the floor and nine samples were excavated from seven pits, a floor vault, and a hearth. Maize pollen is present in 10 samples but at low counts, except for 13 maize grains and a maize aggregate in intramural pit Feature 26. Beeweed and carrot family concentrations are high in floor samples, and the sample frequency of cacti pollen is high.

Cacti pollen morphology is subdivided into cholla and prickly pear, which have distinct grains, and the broader cactus family that subsumes hedgehog (*Echinocereus*), pincushion (*Mammillaria*), and other cacti. All of the cacti were prized food resources for sweet flowers, flower buds, and fruit (see Table 22.2). In Pithouse 101-102-114, cholla occurs in two pits (Features 25 and 26), cactus family in one pit (Feature 9), and prickly pear in the hearth sample (Feature 24). The link between cacti and intramural features indicates cacti products were harvested and brought into the structure.

One other interesting result from this pithouse is the highest Basketmaker Communities Project expression of rose family pollen. Eleven of the 14 samples preserved high counts of two to five rose family pollen grains, and seven of the 11 samples are from intramural pits (Features 7, 9, 24, 25, and 26), a floor vault (Feature 8), and the hearth (Feature 24). Similar to the correlation between cacti pollen and intramural features, the frequency of rose family pollen in intramural contexts indicates some use of a member of the rose family that might have included materials used for construction and fuel and food use of fruits.

Portulaca Point 5MT10709 Double-Chambered Pithouse 106

Pithouse 106 is the only middle Basketmaker III double-chambered pithouse not located at the Dillard site. Four pollen samples were analyzed: three from floor locations and one from the structure hearth. During excavation, a nearly intact Chapin Gray jar was uncovered on the structure floor that contained thousands of charred purslane seeds (*Portulaca retusa*) (Beresh et al. 2016). No purslane pollen was identified from Pithouse 106 or the site, which is an example of how archaeological contexts influence the types of botanical materials preserved. Pollen is not a good sensor of cleaned seed, and the results suggest purslane harvests were not processed inside the pithouse. From the pollen perspective, Pithouse 106 does stand out for recording the project maximum maize count of 90 grains in a floor sample, producing the single Basketmaker Communities Project example of knotweed (Polygonaceae), having an absence of carrot family pollen, and having the presence of Indian wheat, which is one of only two samples with Indian wheat from the region.

Dry Ridge Site 5MT10684 Pueblo II Kiva 108

Five pollen samples were analyzed from Kiva 108, and the usual background of maize, beeweed, and carrot family pollen is present, but there are two significant results. First, high Cheno-am counts were documented from two floor samples and the hearth sample. Second, one sample from the kiva bench registered several key resources (willow, cholla, prickly pear, and a high maize count).

A first identification from the region is hophornbeam (*Ostrya* sp.) in the Feature 3 hearth sample from Kiva 108. When Feature 3 was excavated, a strong anise or licorice aroma was noticed by Crow Canyon archaeologists Caitlin Sommer and Shanna Diederichs that persisted for several hours. The unusual smell and recovery of a unique pollen type suggests specialized activities were part of the kiva history. Hophornbeam is a member of the birch family (Betulaceae) and grows from shrub size up to small tree. It is known from Texas, New Mexico, Arizona, and southeastern Utah, but is rare and found primarily in restricted canyon habitats, for example hanging gardens, at the base of talus slopes, and along streams (Carter 1997; Welsh et al. 1987). The Canyons of the Ancients National Monument surrounding the Basketmaker Communities Project area probably contains the environmental niches where hophornbeam can grow. Ethnographic accounts document use of the bark for medicines (Moerman 1998:373), and the wood is particularly dense and hard (Carter 1997:399), which would have value for tools, implements, and perhaps as a unique fuelwood.

Chronological Trends: High Concentrations of Maize, Key Ethnobotanical Resources, and Dominant Taxa

The Basketmaker Communities Project population of floor samples sorted by chronology show definite trends of high values in a select set of pollen types (Figure 22.3). Maize, beeweed, and carrot family are chosen to reflect ethnobotanical resources, juniper is evaluated as primarily an environmental indicator, and Cheno-am and sagebrush are used as disturbance markers. Interpretation of shifts in high values for these taxa is based on the following model: if the area of fields and/or site construction increased over time, juniper trees would likely have been cleared and replaced by sagebrush, similar to the modern agricultural landscape north of Cortez. The response from pollen signatures would show decreased juniper and increased sagebrush. This same pattern is also predicted for juniper depletion for fuel and construction wood. Cheno-am should reflect both on-site disturbance from construction and occupation history in addition to agricultural expansion. The samples graphed in Figure 22.3 exclude the two community buildings (Dillard site great kiva and Ridgeline site oversized pithouse 101-103) for two reasons: (1) longer use histories for public architecture compared to pithouses and rooms, and (2) more specialized activities versus daily subsistence.

The frequency of high maize values shows a nearly linear decrease from the middle Basketmaker III to the Pueblo period, which suggests less area cultivated through time or decreasing field productivity. Beeweed and carrot family increase from the middle Basketmaker III to late Basketmaker III and are lowest in Pueblo structures. Juniper is highest in middle Basketmaker III structures, but so is sagebrush, which, as a disturbance indicator, should be low when juniper is high, especially given the high middle Basketmaker III maize that should reflect greater field areas. This model worked in the late Basketmaker III and Pueblo floor samples with low juniper and high sagebrush, but the lower maize from late Basketmaker III and Pueblo floors does not support field expansion, although forest clearance for construction and fuelwood might be indicated.

Settlement Pattern Model

The important question for the chronological analysis concerns the structure of these data—what exactly is being compared? The distribution of architectural styles and time periods between Basketmaker Communities Project sites (Figure 22.4) is skewed to overrepresent the structure-dense middle Basketmaker III Dillard site (5MT10647). Dillard site pollen samples represent 13 of the 16 Basketmaker Communities Project middle Basketmaker III structures and dominate all architectural styles (see Table 22.3). Dillard site structures include six of seven Basketmaker Communities Project middle Basketmaker III double-chambered pithouses, all four of the single-chambered pithouses, and three of five middle Basketmaker III pit rooms. Only three middle Basketmaker III structures represented in the pollen data are not located at the Dillard site but are at two outlying sites, Portulaca Point (5MT10709) and the TJ Smith site (5MT10736), which are both more than a mile from the Dillard site and may represent different environments.

In contrast, the late Basketmaker III pollen samples come from eight structures excavated from five small sites containing either single structures or, if there were multiple structures, they were typically built in different time periods. One late Basketmaker III double-chambered pithouse (Study Unit 312-324) is from the Dillard site, but this is the only double-chambered pithouse classified as a temporary use house. The breakdown by architecture for late Basketmaker III pithouses is three double-chambered pithouses from three sites, five pit rooms from three sites, and one single-chambered pithouse from 5MT10736.

Based on this distribution of structure pollen samples, the model proposed to explain the trends graphed in Figure 22.3 is the shift in settlement pattern from the Dillard site middle Basketmaker III community to small late Basketmaker III residential sites. The larger Dillard site population would have funneled more resources into the site, whereas at the small and dispersed late Basketmaker III farms, relatively less maize and fewer resources would have been consumed. It is also possible some of the late Basketmaker III structures were seasonal or occupied for short periods of time, which would have further muted the late Basketmaker III pollen imprint. The Pueblo I–II sites are different because three of the five sites are clustered next to each other, which suggests an integrated settlement, or at least an affiliated community. The fewer high-value maize samples from Pueblo structures might indicate lower crop yields compared to the middle Basketmaker III Dillard community, but the signature could also reflect some technology difference in how harvests were handled and processed, as Pueblo II architecture contrasts significantly with Basketmaker III architecture.

One pollen type and time period stands out in Figure 22.3—the late Basketmaker III carrot family. The high pollen values are mainly from specific structures at two sites: three pit rooms (Study Units 110, 116, 117) at the Ridgeline site (5MT10711) and the substantial double-chambered Pithouse 101-102-114 at Mueller Little House (5MT10631). In previous sections, interpretations considered for pollen spectra from these four structures included materials used for ceremony and craft manufacture. It is possible that the carrot family is in some way a specialized resource or represents use of water from local springs where riparian species might have grown.

Architectural and Chronological Patterns from Cacti and Rare Economic Taxa

Cholla and prickly pear pollen were identified in 33 of the project samples (n = 170), primarily in samples collected from inside structures (n = 27). Ethnographic accounts from Indian tribes across the Southwest emphasize the importance of edible cacti fruits, young vegetative growth, and, in the case of cholla, the flower buds just before opening (see Table 22.3). The faint trail of cacti in Basketmaker Communities Project structures is interpreted as significant and related to harvest of local species. The highest frequency of cacti is from Pueblo II structures. The distribution of Basketmaker structures containing cacti by architectural style and chronology (Figure 22.5) shows that cacti are most common in pithouses, especially middle Basketmaker III single-chambered pithouses, which are all from the Dillard site.

Occurrence of rare economic taxa (see Table 22.4) are also plotted by architectural style and time period. The results in Figure 22.6 show that the highest Basketmaker expression of rare types is in middle Basketmaker III double-chambered pithouses. No rare types were recorded in the four single-chambered middle Basketmaker III pithouses, but rare types are present in the only late Basketmaker III single-chambered pithouse, which is from 5MT10736. Similar to the trends in cacti pollen, the highest representation of rare taxa is in the four Pueblo II structures.

Conclusions

The Basketmaker Communities Project pollen record is based on an exceptional database of 170 samples that were all processed and analyzed by the same personnel using consistent methods, which is a rare standard for a multiyear project. It is clear from the results that local economies were intensely invested in maize agriculture from the Basketmaker through the Pueblo periods. Squash was another cultivar, although rare, occurring in just two pollen samples. Squash and other crops might have been grown in small plots or house gardens, whereas the abundance of maize indicates fields were developed. Interpretations and insights for the research questions posed in the chapter introduction are presented below.

1. In addition to cultigens, what pollen types might reflect subsistence resources and cultural activities?

Consistent recovery of pollen from native herbs and perennial plants with deep ethnographic histories demonstrate reliance on wild resources. Fifty-four pollen types were documented from Basketmaker Communities Project samples, and 30 are evaluated as representing native species with subsistence uses (see Table 22.2). These taxa include local fuelwoods, construction materials, foods (juniper, pinyon, and sagebrush), possible specialty materials (lemonadeberry, hophornbeam, ash, hackberry, buckthorn, walnut, chokecherry, other rose family shrubs, and possibly birch), local water indicators of cattail and willow, and a variety of other useful plants.

Pollen types emphasized as native foods are cacti (cholla and prickly pear), beeweed, which may have supplied an organic dye and pottery paint in addition to culinary spice, and some member of the carrot family. The unknown identity of the carrot family species is frustrating because of the correlation between high values and specific structures that hint at an artisan resource or valued food, perhaps a spice. It is also possible the carrot family reflects use of accessible water sources, as several species grow in riparian habitats.

Other potential economic indicators occur in few samples at low counts. These rare types include an unknown pea family tentatively identified as hog potato (*Hoffmannseggia*), which occurs only at the Ridgeline site (5MT10711) and is concentrated in the oversized Pithouse 101-103; a large grass type that probably represents species valued for grain, for example Indian ricegrass or possibly little barley (*Hordeum pusillum*, see Graham et al. 2017); nightshade that might represent tobacco (*Nicotiana*) or ground cherry (*Physalis*), based on recovery of these taxa in flotation samples (Karen Adams, Chapter 21); sunflower type (*Helianthus*); Indian wheat; and purslane.

2. Are there pollen signatures unique to Basketmaker architectural styles?

Five categories of Basketmaker structures are represented in the pollen data by 30 buildings, and there are patterns in the abundance and composition of pollen taxa that distinguish the different styles (Table 22.5). Double-chambered pithouses are interpreted as the most typical residential structure sheltering a range of daily activities. Houses that stand out include Pithouse 101-102-114 at 5MT10631, Pithouse 106-111 at 5MT10709, and Pithouses 505-508 and 220-234 at the Dillard site (5MT10647).

Pit rooms served several uses specific to the site and room. Three late Basketmaker III pit rooms (110, 116, and 117) at the Ridgeline site (5MT10711) are interpreted as artisan workshops and/or special use spaces, whereas three middle Basketmaker pit rooms from three sites (Pit Room 115, Site 5MT10709; Pit Room 108, Site 5MT10736; and Pit Room 330, Site 5MT10647) and the single early Basketmaker III phase Pit Room 124 at 5MT10647 are interpreted as maize storage and processing rooms.

Single-chambered pithouses preserved the least evidence of ethnobotanical resources, with the possible exception of cacti in two pithouses (232 and 111) at the Dillard site. Single-chambered pithouses may have been used less intensively, for example as seasonal structures or special use. The exception is the only example of a late Basketmaker III single-chambered pithouse (Study Unit 313), which was located at the Dillard site. The pollen results from Pithouse 313 indicate a full range of subsistence activities consistent with a residential structure.

The two public buildings—the great kiva at the Dillard site and the oversized Pithouse 101-103 at the Ridgeline site—are characterized by rare taxa but low maize, which supports the idea that these large (11-m-diameter) buildings were not locations for everyday subsistence but were community centers. Pollen results from the oversized pithouse at the Ridgeline site are particularly striking, with several shrubs represented that suggest manufacture of practical or ceremonial products (tools, weapons, baskets, and art) and possibly medicines or other products.

3. Are there patterns in pollen representation that correlate to chronological periods, specifically middle Basketmaker III compared to the late Basketmaker III and Pueblo periods?

The chronological comparison excluded the two Basketmaker community structures, the great kiva at the Dillard site and the oversized pithouse at the Ridgeline site, because the main research interest is focused on shifts in the base economy between the middle and late Basketmaker III phases. The two large public buildings were undoubtedly community centers used for specialized activities.

There are contrasts in the distribution of high pollen concentrations of key taxa (see Figure 22.3) that emphasize abundance during the middle Basketmaker III and decreases by the late Basketmaker III and during the Pueblo period. And there are significant differences in the frequency of cacti and rare economic taxa between the Basketmaker and Pueblo periods (see Figures 22.5 and 22.6). The model proposed here considers the unequal distribution of pollen samples by site type and period. Middle Basketmaker III pollen samples are almost exclusively from the Dillard site, which was a small village containing several residential and special use structures. The residential late Basketmaker III structures are almost exclusively at five small and dispersed sites where one to three structures were constructed.

The chronological contrasts in pollen abundance of maize and other key resources reflect the difference in settlement patterns. The larger Dillard site would have procured more resources, whereas at the small late Basketmaker III farms relatively less maize and fewer resources would have been consumed. It is also possible some of the late Basketmaker III structures were seasonal or occupied for short periods of time, which would have further muted the late Basketmaker III pollen imprint.

The Pueblo I–II sites are different because three of the five sites are clustered next to each other, which suggests an integrated community. The fewer high-value maize samples from Pueblo structures might indicate lower crop yields compared to the middle Basketmaker III Dillard community, but the signature could also reflect some technology difference in how harvests were handled and processed. What is clear is the greater variety of Pueblo period plant resources with cacti and rare economic taxa preserved in every structure.

4. Is there evidence for environmental change related to occupation history and land use?

There are no definitive trends in the pollen data that indicate vegetation changes related to land use. The question of anthropogenic legacy is complicated by the Basketmaker III shift in settlement pattern from the Dillard site to dispersed farms; the spatial distances among sites, where there is no perspective on local environmental differences; and the variety of architectural styles and mixtures of occupation histories. In order to build a statistically valid pollen record of diachronic vegetation composition, the ideal contexts are sediment cores or profiles from locations near archaeological communities, but outside the influence of disturbance associated with house, field, and infrastructure construction.

The pollen results do show that from the Basketmaker through the Pueblo periods, people were accessing resources from areas not just adjacent to their neighborhoods, but from the canyons surrounding the Basketmaker Communities Project area, and perhaps through trade with other cultures. There is also the record of water in the occurrences of cattail and willow that indicate perennial water was available near the Dillard site and the cluster of Hatch sites in the southeast portion of the project area.

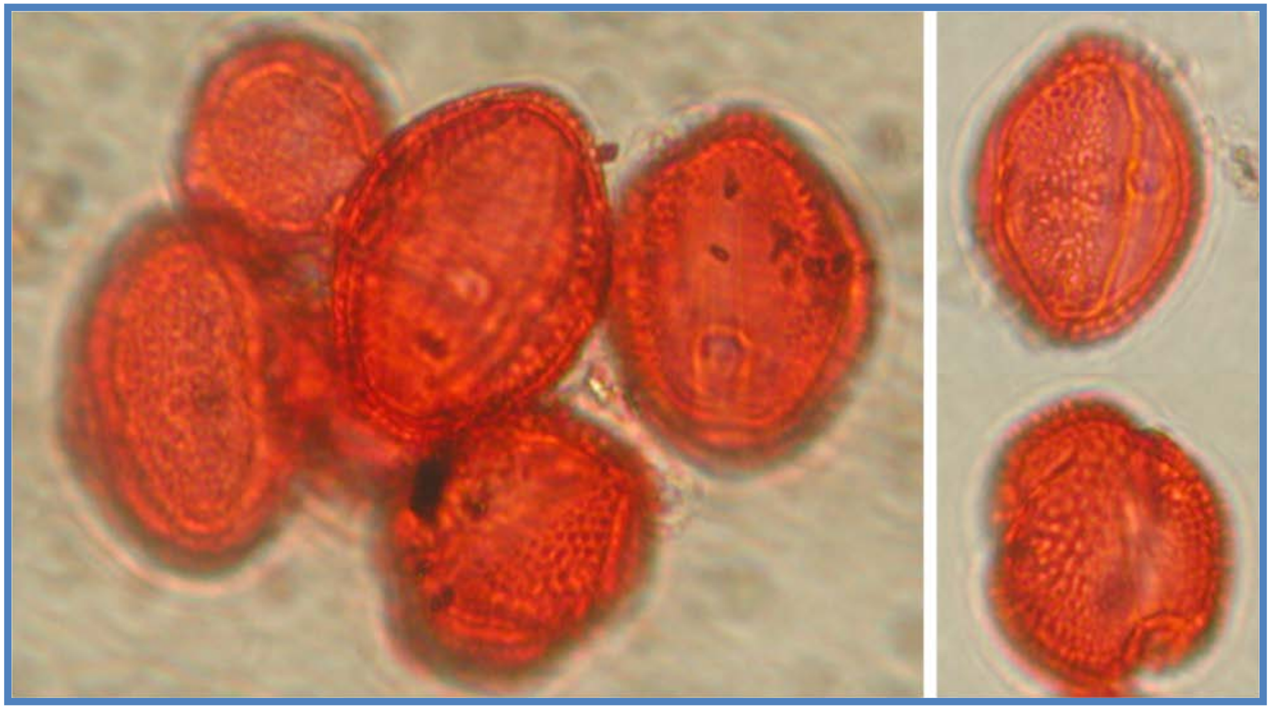

Figure 22.1. Microphotographs of unknown pea family, Caesalpinioideae type (cf. Hoffmannseggia) identified from Site 5MT10711, oversized Pithouse 101-103, from sample PD 201. Longest grain dimension approximately 50 µm; photographer Susie Smith, December 2017.

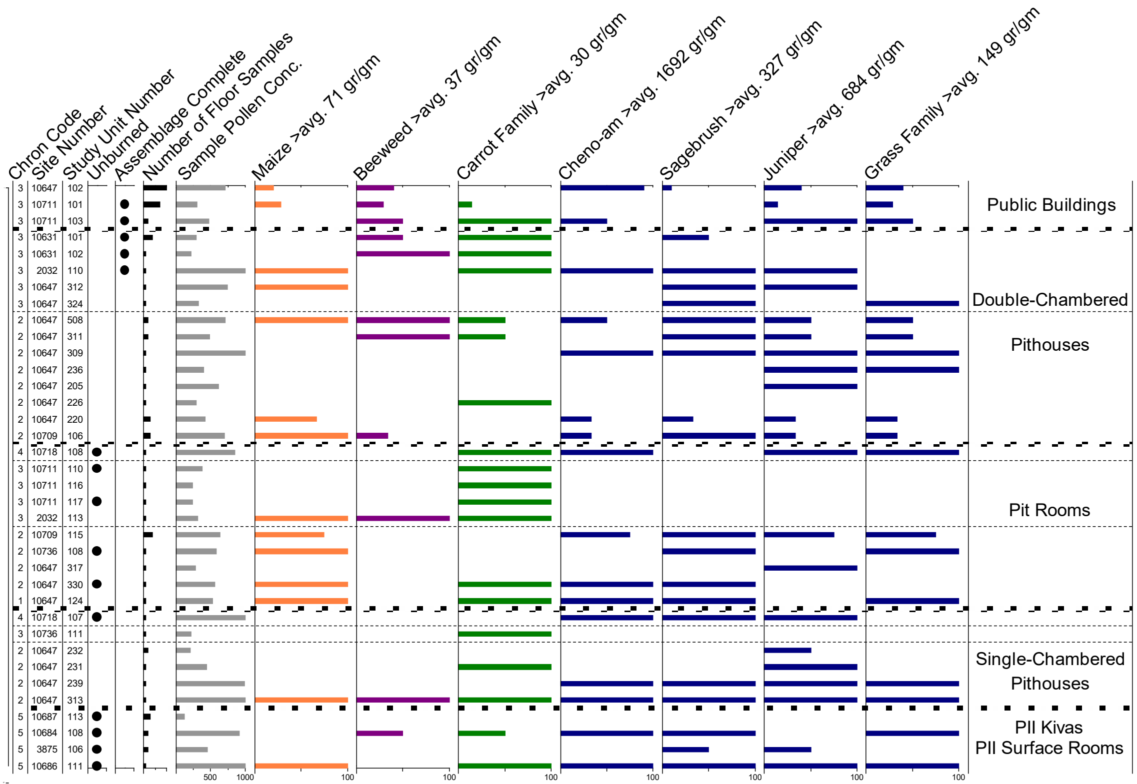

Figure 22.2. Economic and environmental pollen types. Percent of samples by study unit with high pollen concentrations greater than the average (n = 136). Architecture categories separated by horizontal hatched gray lines; dashed gray lines separate most chronology intervals. Chron Code Legend: 5 = Pueblo II, 4 = Pueblo I, 3 = late Basketmaker III, 2 = middle Basketmaker III, 1 = early Basketmaker III.

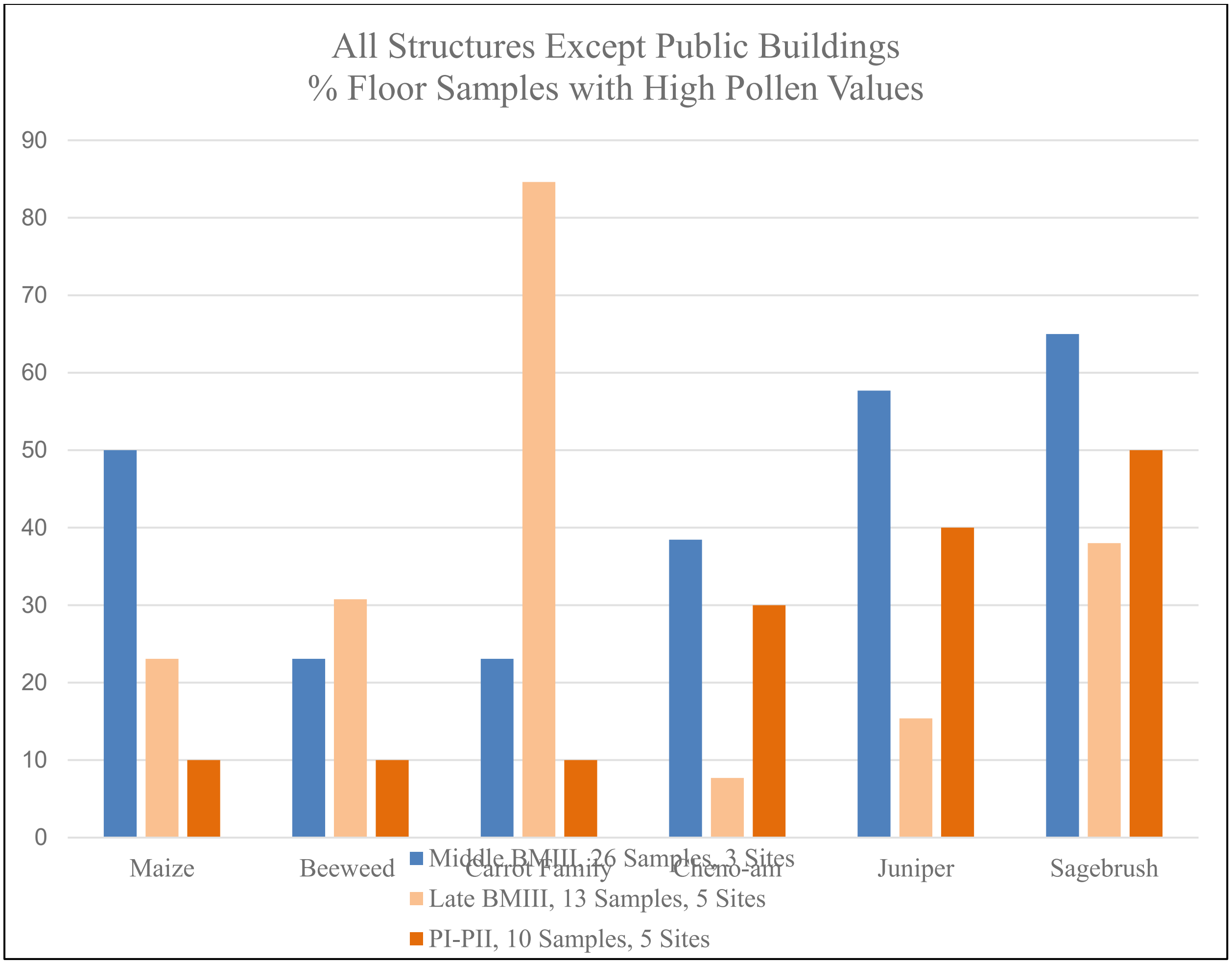

Figure 22.3. Chronological trends for key economic and environmental pollen types from structure floor samples, excluding two public buildings (Dillard site great kiva and Ridgeline site oversized Pithouse 101-103). Note: BM = Basketmaker, PI = Pueblo I, PII = Pueblo II.

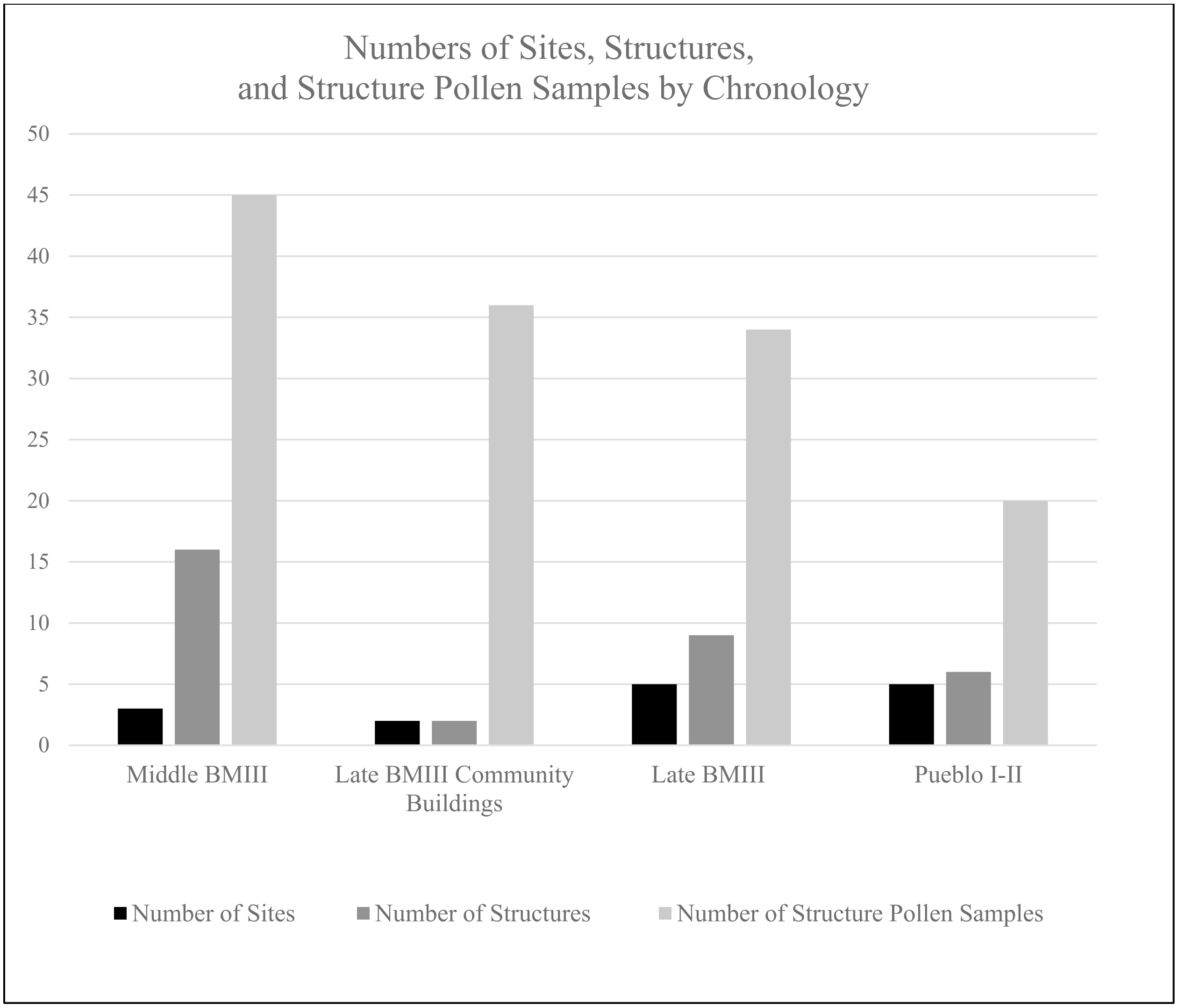

Figure 22.4. Distribution of structure pollen samples from all contexts by time period. Note: BM = Basketmaker.

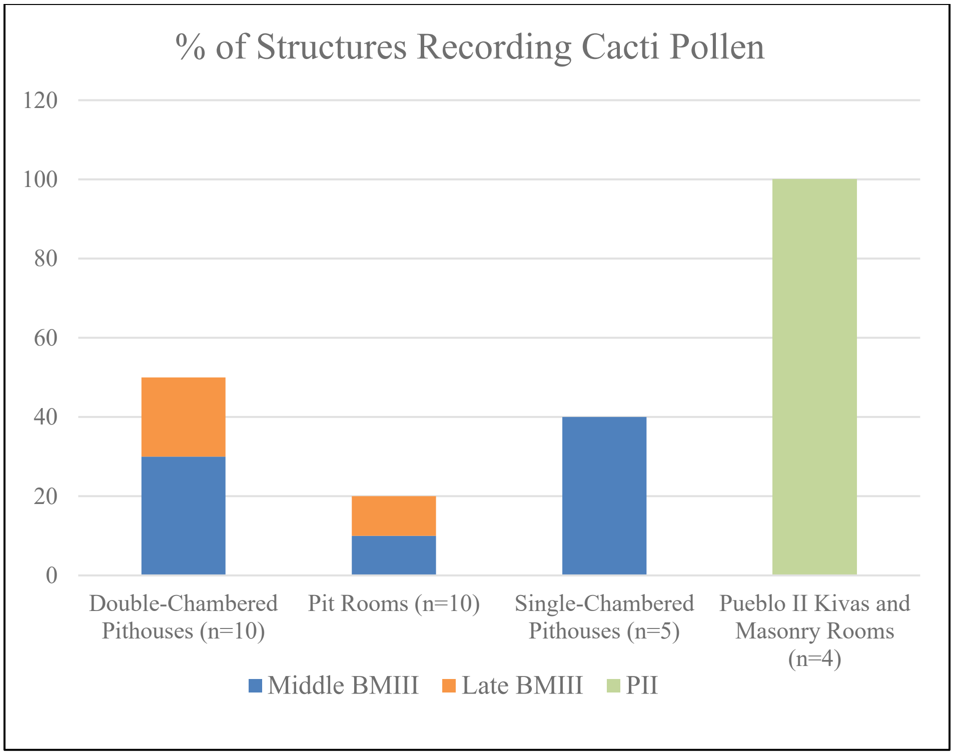

Figure 22.5. Structures with cacti pollen by architectural style, excluding two public buildings (Dillard site great kiva and Ridgeline site oversized Pithouse 101-103). Note: BM = Basketmaker.

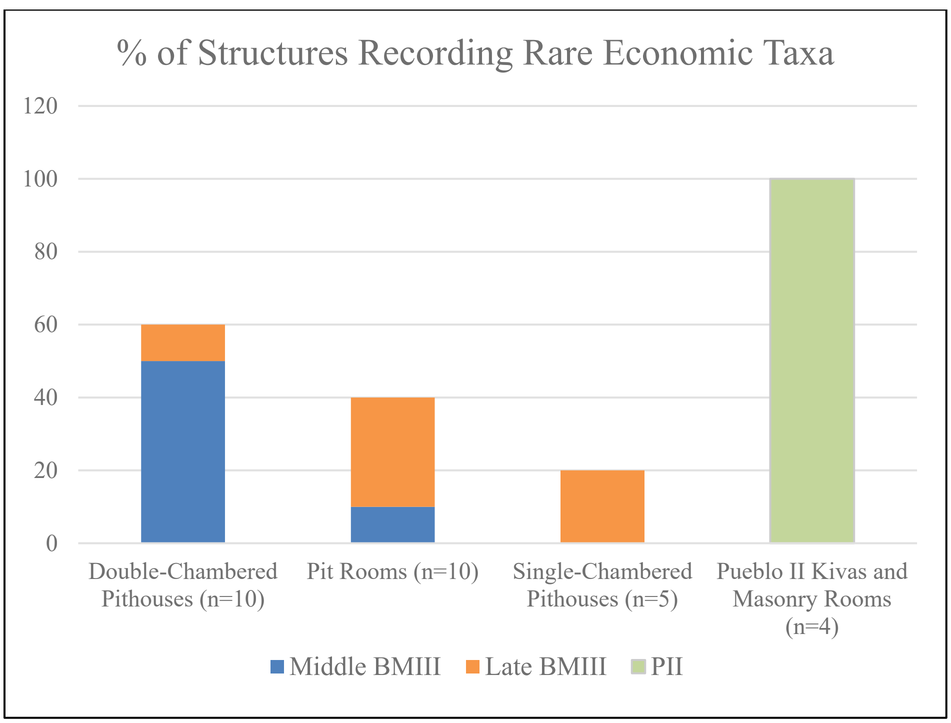

Figure 22.6. Structures containing rare economic taxa by architectural style, excluding two public buildings (Dillard site great kiva and Ridgeline site oversized Pithouse 101-103). Note: BM = Basketmaker.

Table 22.1. Numbers of Basketmaker Communities Project Pollen Samples by Site and Context.

Site Name	Site Number	Chronology	Number of Structures Sampled*	Total Samples	Number of Pollen Samples Analyzed by Context				Reference[†]
					Structures	Extramural Features	Control and Special Interest	Pollen-Sterile	
Dillard Site	5MT10647	Early–late BMIII	16	74	58	12	3	1	Smith 2015a, 2016
Switchback Site	5MT2032	Late BMIII	2	5	5				Smith 2015b
Ridgeline	5MT10711	Middle–late BMIII	4	28	24	3		1	Smith 2018a
Unnamed Site	5MT10718	PI	2	3	3				Smith 2013
Unnamed Site	5MT10726	(Surface control sample)		1			1		Smith 2013
Portulaca Point	5MT10709	Middle BMIII	2	10	8			2	Smith 2016
Dry Ridge Site	5MT10684	PII	1	7	5	2			Smith 2016, 2017a
Badger Den	5MT10686	PII	1	7	5	2			Smith 2016a
Sagebrush House	5MT10687	PII	1	3	3				Smith 2016a
Shepherd Site	5MT3875	Late BMIII/PII	2	12	7	5			Smith 2016a
Mueller Little House	5MT10631	Late BMIII	1	15	14			1	Smith 2017a
TJ Smith Site	5MT10736	Middle–late BMIII	2	5	4		1		Smith 2014
Total			34	170	136	24	5	5	

Note: BM = Basketmaker, PI = Pueblo I, PII = Pueblo II.
* Number of structures combines all study units excavated in the same structure including multiple chambers, antechambers, and add-ons.
[†] Annual site reports of pollen results available by request from Crow Canyon Archaeological Center.

Table 22.2. Interpreted Economic Pollen Types from the Basketmaker Communities Project.

Pollen Types	Flowering Season, Pollination Vector	Uses	Select References
Cultigens			
Squash (*Cucurbita*)	Summer, insect	Flowers and pulp consumed for food; pulp dried and stored; seeds dried or roasted and eaten or ground to meal; emptied fruits used as containers; some species medicinal uses	Moerman 1998
Maize (*Zea mays*)	Summer, wind	Pollen used in ceremony and as dye; kernels for food, flour, and alcoholic beverage; husks for wrappers and containers; cobs for fuel and tools	Moerman 1998; Rainey and Adams 2004
Cacti			
Cactus Family (Cactaceae)	Late spring/ early summer, insect	In BCP project area, includes hedgehog (*Echinocereus*) and fishhook cactus (*Mammillaria*); sweet hedgehog fruits were prized by several tribes eaten raw or dried for storage; fruits were also pulped and baked or dried	Moerman 1998; Rainey and Adams 2004
Cholla (*Cylindropuntia*)	Late spring/early summer, insect	Flower buds harvested, dried, or roasted and consumed or stored; dried buds reconstituted in stews	Dunmire and Tierney 1997; Hodgson 2001
Prickly Pear (*Platyopuntia*)	Late spring/early summer, insect	Prized for sweet fruits, which were dried and stored or juiced; seeds dried and ground to storable meal; young pads and flowers consumed; young pads (*nopales*) are relished in modern Southwest cuisines and have topical anti-inflammatory medicinal uses	Curtin 1997; Dunmire and Tierney 1997; Hodgson 2001
Important Native Foods and Rare Herbs			
Carrot Family (Apiaceae)	Spring (majority of species) to summer and fall, insect	Several species used for medicine and/or food, especially roots or tubers of biscuitroot (*Lomatium* sp.) and yampah (*Perideridia*); dryland species harvested for roots, spicy leaves, and aromatic flowers include wafer parsnip or spring parsley (*Cymopterus, Pseudocymopterus*)	Dunmire and Tierney 1997; Moerman 1998
Mistletoe (*Arceuthobium*)	Summer, insect	Navajo used a cold infusion as ceremonial medicine; several Indian tribes report medicinal uses	Moerman 1998
Mustard Family (Brassicaceae)	Spring through summer, insect	Mustard species, such as tansy mustard (*Descurainia*), pepperweed (*Lepidium*), bladderpod (*Lesquerella*), and prince's plume (*Stanleya*), provided spring greens and seasonal seeds that were parched and ground to flours and meals	Dunmire and Tierney 1995; Moerman 1998; Rainey and Adams 2004
Cheno-am	Year-round, wind	Seeds and greens of annual Cheno-am weeds were staples for most Southwest American Indians; leaves and seeds of perennial saltbush shrubs (*Atriplex* spp.) used for medicine and culinary spice; burned Cheno-am seeds from annual species are common at archaeological sites across the Southwest and there are examples of seed storage in vessels and cooking in hearths (Hunter et al. 1999; Toll and McBride 1998)	Dunmire and Tierney 1995; Huckell and Toll 2004; Moerman 1998
Beeweed (*Cleome*)	Summer, insect	Leaves used for food, spice, medicine, and to make a black dye and paint	Adams et al. 2002

Pollen Types	Flowering Season, Pollination Vector	Uses	Select References
Pea Family (Fabaceae)	Spring through fall, insect	Several species could be represented in archaeological pollen samples; most produce edible roots, fruit, and/or seeds; medicinal uses	Moerman 1998
Hog Potato (*Hoff-mannseggia*)	Spring, insect	Underground tubers eaten like potatoes; consumed raw, roasted, or boiled	Moerman 1998
Indian wheat (*Plantago*)	Early spring, wind	Seeds harvested, parched, and ground to meal; medicinal infusions made from seeds	Moerman 1998
Grasses (Poaceae)	Early spring through late summer, wind	Leaves used for padding, packaging, tinder, thatch, and textiles; seeds parched and/or dried and ground into storable meals and flours	Doebley 1984
Large Grass (Large Poaceae)	Early spring through late summer, wind	Grasses with larger pollen grains; examples include Indian ricegrass (*Achnatherum*), panic grass (*Panicum*), and little barley (*Hordeum*), which were all harvested for grain that could be stored and ground to meals; charred grains of little barley grass were recovered from the BCP Switchback site (5MT2032) (Graham et al. 2017)	Adams 2014; Moerman 1998
Purslane (*Portulaca*)	Summer, insect	Greens and seeds consumed	Moerman 1998
Phlox (*Phlox*)	Summer, insect	Decoction from roots for medicinal uses; poultice of plant applied to skin; food use of greens	Moerman 1998
Nightshade Family (Solanaceae)	Late spring through late fall, insect	Several possible species including tobacco (*Nicotiana*) and *Physalis* and *Lycium*, which are sources of edible fruits; recently identified relict gardens of *Solanum jamesii* in the Four Corners region (Kinder et al. 2017) suggest a wild food cultivated for edible tubers	Kinder et al. 2017; Moerman 1998; Rainey and Adams 2004
Cattail (*Typha*)	Summer, wind	Roots were dug and baked for food; Curtin (1997) discusses value of roots as a source of starch, equal to corn and rice; leaves were woven into matting, basketry, and sandals; fuzzy down from cattail head used as stuffing and padding; seeds and pollen were eaten; Havasupai made a ceremonial face paint from the pollen; Apache use pollen for ritual blessings	Curtin 1997; Moerman 1998
Rare Shrubs			
Birch (*Betula*)	Spring, wind	*Betula occidentalis* (water birch) bark used by Jemez Indians as ingredient in red dye; Blackfoot Indians used water birch leaves and flowers for birth control; *Betula glandulosa* (bog birch) is another possible species	Moerman 1998
Hackberry (*Celtis*)	Spring through summer, insect	Small fruits, available summer through fall, were dried, pounded to pulp, or ground to meal and dried or caked for storage; branch boiled for brown dye	Moerman 1998; Rainey and Adams 2004
Ash (*Fraxinus*)	Spring, wind	Wood used to make tools, arrow shafts, bows, and other implements; Navajo used singleleaf ash (*Fraxinus anomala*) seeds in rain prayer	Moerman 1998
Walnut (*Juglans*)	Spring, wind	Roots, bark, leaves, and walnuts used to make brown to black dyes; edible nuts harvested in late summer; wood used for tools and implements; medicinal uses for bark and sap	Moerman 1998

Pollen Types	Flowering Season, Pollination Vector	Uses	Select References
Hop Hornbeam (*Ostrya*)	Spring, wind	Medicinal uses for roots, bark, and heartwood; flowers used in face paint; wood is particularly dense and hard (Carter 1997:399), which would have value for tools, implements, and perhaps as a special fuelwood	Carter 1997; Moerman 1998
Cherry Type (*Prunus*)	Summer, insect	Wild cherry or chokecherry (*Prunus virginiana*) is a common shrub in southwest Colorado with edible drupes that could be dried or ground into cakes; wood prized for ceremonial items and tools; medicinal uses	Moerman 1998; Rainey and Adams 2004
Buckthorn Family (Rhamnaceae)	Spring, insect	Infusions made from bark, leaves, and stems widely used for medicine; wood used for fuel, tools, and other items	Moerman 1998
Sumac/ Lemonadeberry (*Rhus*)	Summer, insect	*Rhus trilobata* most likely local species; produces edible drupe (fleshy fruit) that was pressed with water to make beverages or dried and ground with other foods; medicines were made from fruits and leaves; young stems preferred basketry material and wood used for tools; leaves and twigs for dyes or to set dyes (mordant)	Moerman 1998; Rainey and Adams 2004
Willow (*Salix*)	Spring, wind	Wood valued for building materials, tools, utensils, and baskets; bark medicinal; decoction of leaves used as ceremonial emetic	Moerman 1998
Local Environmental Taxa: Subsistence Staples			
Sagebrush (*Artemisia*)	Summer, wind	Ceremonial and medicinal uses; leaves used as spice; leaves and achenes eaten; wood used as fuel; shredded bark source of fiber, ties, and padding	Moerman 1998; Rainey and Adams 2004
Juniper (*Juniperus*)	Spring, wind	Juniper berries were a dependable food staple harvested in late summer to early fall, ground to powder to mix with other foods or dried and reconstituted for use; bark and wood used for construction, fuel, and other practical products; medicinal uses	Moerman 1998; Rainey and Adams 2004
Pinyon (*Pinus edulis*)	Late spring, wind	Nuts prized for food; sap used for glue; wood for fuel and construction; ritual use of pollen	Rainey and Adams 2004
Rose Family (Rosaceae)	Summer to late summer, insect	Several species produce sweet fruits used for food and specialty woods for tools, ceremonial items, or fuel; examples of serviceberry (*Amelanchier*), *Peraphyllum*, cliffrose (*Purshia*), and strawberry (*Fragaria*)	Moerman 1998; Rainey and Adams 2004

Note: BCP = Basketmaker Communities Project.

Table 22.3. Numbers of Pollen Samples from Structures by Architectural Style and Chronology.

Architecture	Use	5MT Site No.	Study Unit No.	Chronology	Structure Width (m)	Not Burned	Hearth Present	Floor/Fill Samples (n=69)	Intramural Samples (n=67)
Great Kiva	Community center	10647	Great Kiva 102	Late BMIII	11.5		X	10	7
Oversized PH	Public/domestic	10711	Oversized PH 101-103, MC		7.8		X	7	8
		10711	Oversized PH, AC 103		4.8		X	2	2
DC PHs	Permanent housing	10631	MC101	Late BMIII	5.0		X	4	9
	Permanent housing	10631	AC 102		3.0			1	
	Permanent housing	2032	MC110		4.2	X	X	1	2
	Temporary housing	10647	MC312		6.0		X	1	2
	Temporary housing	10647	AC 324		3.8			1	
	Permanent housing	10647	AC 508	Middle BMIII	2.5			2	1
	Permanent housing	10647	MC311		4.0		X	2	1
	Permanent housing	10647	MC309		4.3		X	1	1
	Permanent housing	10647	MC 236		5.0		X	1	
	Permanent housing—domestic and ritual	10647	MC 205		5.2		X	1	3
	Permanent housing	10647	AC 226		4.2			1	1
	Permanent housing	10647	MC 220 (full milling assemblage)		4.9		X	3	3
	Permanent housing	10709	MC 106		5.5		X	3	1
Pit Rooms	Specialized	10718	108	Pueblo I	1.3	X		1	
		10711	110	Late BMIII	2.3	X		1	
		10711	116		2.2			1	
		10711	117		3.0	X		1	2
		3875	132		2.3				3
		2032	113		2.0			1	1
		10709	115	Middle BMIII	1.6			4	
		10736	108		1.5	X		1	

Archi-tecture	Use	5MT Site No.	Study Unit No.	Chron-ology	Structure Width (m)	Not Burn-ed	Hearth Present	Floor/Fill Samples (n=69)	Intra-mural Samples (n=67)
		10647	228		4.7	X	X		2
		10647	317					1	
		10647	330		1.8	X		1	
		10647	124	Early BMIII	1.8			1	
SC PHs	Permanent housing	10718	107	Pueblo I	5.0	X	X	1	1
	Permanent housing—domestic and ritual	10736	111	Late BMIII	4.5		X	1	2
	Permanent housing	10647	231	Middle BMIII	4.5		X	1	2
	Temporary housing—domestic and ritual	10647	232		6.2		X	2	2
	Permanent housing—domestic and ritual	10647	313		4.0		X	1	2
	Temporary housing	10647	239		5.0		X	1	
Kiva	Kiva	10684	108	Pueblo II	4.8	X	X	2	3
	Kiva, heavily disturbed	10687	113		3.8	X	X	3	
Surface Room	Masonry surface room	3875	106		2.0	X	X	2	2
	Masonry surface room	10686	111		3.0	X	X	1	4

Notes: AC= antechamber, BM = Basketmaker, DC = double-chambered, MC = main chamber, PH = pithouse, SC = single-chambered.

Table 22.4. Occurrence of Rare Economic Pollen Taxa by Study Unit.

Structure Style	5MT Site Number	Study Unit	Chronology	Single Occurrences by Study Unit	Cattail	Willow	Squash	Cacti	Nightshade Family	Poss. Hog Potato	Purslane	Indian Wheat	Large Grass Type	Lemonadeberry (*Rhus*)	Cherry	Birch
Great Kiva	10647	102	Late BMIII		X*						X		X	X		X
Oversized Pithouse	10711	101	Late BMIII	Buckthorn, walnut		X		Prickly pear		X		X	X	X	X	
Double-Chambered Pithouses	10631	MC 101	Late BMIII	Sunflower (*Helianthus* type)				Prickly pear, cholla, cactus family			X		X			
	10631	Antechamber 102	Late BMIII		X	X										
	2032	MC 110	Late BMIII													
	10647	MC 312	Late BMIII					Prickly pear								
	10647	MC 311	Middle BMIII											X		
	10647	MC 220	Middle BMIII	Phlox family				Prickly pear	X				X			X
	10647	MC 205	Middle BMIII		X											X
	10647	MC 309	Middle BMIII					Prickly pear								
	10647	MC 508	Middle BMIII				X									
	10709	MC 106	Middle BMIII					Cholla, prickly pear				X	X[†]		X	

Structure Style	5MT Site Number	Study Unit	Chronology	Single Occurrences by Study Unit	Cattail	Willow	Squash	Cacti	Nightshade Family	Poss. Hog Potato	Purslane	Indian Wheat	Large Grass Type	Lemonadeberry (*Rhus*)	Cherry	Birch
Pit Rooms	10711	117	Late BMIII							X			X			
	10711	110	Late BMIII					Cholla		X						
	3875	132 (intramural pit)	Late BMIII				X				X					
	10709	115	Middle BMIII					Prickly pear								
	10736	108	Middle BMIII						X							
	10647	124	Early BMIII										X			
Single-Chambered Pithouse	10736	111	Late BMIII	Mistletoe type					X							
	10647	232	Middle BMIII					Cholla[‡], prickly pear								
	10647	313	Middle BMIII					Cholla, prickly pear								
Kiva	10684	108	Pueblo II	Possible hophorn-beam (*Ostrya*) in kiva hearth Feature 3		X		Prickly pear	X							
	10687	113	Pueblo II		X	X		Cholla, prickly pear								
Masonry Room	3875	Surface Structure 106	Pueblo II			X		Prickly pear					X[§]			
	10686	Room part of roomblock 111	Pueblo II	Hackberry		X[‖]		Prickly pear						X		

Structure Style	5MT Site Number	Study Unit	Chronology	Single Occurrences by Study Unit	Cattail	Willow	Squash	Cacti	Nightshade Family	Poss. Hog Potato	Purslane	Indian Wheat	Large Grass Type	Lemonadeberry (*Rhus*)	Cherry	Birch

Note: B = Basketmaker, MC = Main Chamber.
* Cattail identified in 3 of 17 great kiva samples (fill, floor, and Floor Vault 2).
[†] At 5MT10709, in Study Unit 106, large grass pollen recovered in two of four samples.
[‡] Cholla pollen was identified in three of four samples collected from single-chambered Pithouse 232 at the Dillard Site (floor, intramural bin, and posthole).
[§] At 5MT3875, in Study Unit 106, project maximum frequency of large grass pollen (in four of four samples).
[‖] At 5MT10686, in room 111, two of five samples preserved willow pollen.

Table 22.5. Pollen Signatures and Interpretations of Basketmaker Architectural Styles.

Architectural Style	Numbers of Structures	Use	Interpretations of Pollen Signatures
Great Kiva (Dillard Site, 5MT10647)	1	Community center	Specialized activities: low maize, high beeweed, variety of rare economic taxa; long history: high Cheno-am
Oversized Pithouse (Ridgeline Site, 5MT10711)	1	Public architecture	Specialized activities: relatively low maize, high beeweed, high carrot family, variety of rare and unique taxa, especially specialty woods and possible hog potato (*Hoffmannseggia*)
Double-Chambered Pithouses	10	Permanent housing*	Individual pollen personalities reflect range of residential activities
Pit Rooms	12	Storage and/or specialized	Storage and processing harvested crops: high maize, low carrot family, high environmental types (juniper, sagebrush, Cheno-am, and grass); specialized craft or other uses: low maize, high carrot family, and suppressed environmental taxa
Single-Chambered Pithouses	6	Mixed permanent and temporary housing	Less intense use due to brief history or possibly seasonal occupation: low maize, low representation of rare taxa with exception of cacti at Dillard site; Dillard site Pithouse 313 is different and interpreted as a more intensively occupied permanent residence

* Late Basketmaker III double-chambered Pithouse 312-324 from the Dillard site described as a temporary structure.

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Chapter 23

Human Skeletal Remains

By Kathy Mowrer

Introduction

Human skeletal remains, and the contexts of those remains, have the potential to provide important information about the lives of ancestral Pueblo peoples who once occupied the central Mesa Verde region. Adhering to the Crow Canyon Archaeological Center Policy on the Treatment of Human Remains and Associated Funerary Artifacts, staff archaeologists did not seek out human remains during the Basketmaker Communities Project. Nevertheless, during the seven seasons of excavation on the Basketmaker Communities Project sites, two human remains occurrences (HROs) representing two individuals were documented. A minimum of at least 32 additional individuals are represented in an assemblage of over 58 isolated human bones (IHB). A "human remains occurrence" is defined by Crow Canyon as either a human burial or a concentration of articulated or disarticulated human skeletal remains from one or more individuals. "Isolated human bone" is defined as fewer than five disarticulated bones. A "skeletal element" is defined as a single bone or a tooth. Isolated teeth and phalanges were excluded from calculations of MNI because neither is definitive evidence of death.

Human skeletal remains were discovered at eight of the 15 sites tested during the Basketmaker Communities Project excavations. The skeletal remains varied from complete, articulated, formal burials to IHBs that consisted of a single tooth, bone, or bone fragment. In accordance with the research design (Ortman et al. 2011) to conduct archaeological testing at Indian Camp, Montezuma County, Colorado, and addendum (Ryan and Diederichs 2014), all skeletal elements recognized as human were analyzed in situ with minimal disturbance to the elements themselves and were reburied immediately after documentation was completed. Diagnostic pottery and/or architectural data were used to group the sites into general occupation periods.

The MNI tabulated from the IHB and HRO from the Basketmaker III sites and the Hatch group Pueblo II–III sites totaled 32 individuals. The IHB and HRO observed at Mueller Little House (n = 2), TJ Smith (n = 1), Ridgeline (n = 1), and all but one of the nine individuals at the Dillard site (n = 8) were in contexts dated to the middle to late Basketmaker III occupation phases (A.D. 575–750). One IHB observed at the Dillard site was from a Pueblo I–early Pueblo III phase context (A.D. 750–1200). All the IHB identified at the sites collectively referred to as the Hatch group are from contexts dated to the Pueblo II and early Pueblo III phases (A.D. 900–1200), except one IHB from Dry Ridge for which the context could not be narrowed to a specific occupation period; this IHB was assigned to the general ancestral Pueblo category, (A.D. 420–1300). No HRO were exposed at the Hatch sites. The Hatch group IHB consist of human remains identified at Dry Ridge (n = 5), Badger Den (n = 3), Sagebrush (n = 5), and Pasquin (n = 6). The demographic data (Table 23.1) show the Basketmaker III and Pueblo HRO and IHB assemblages. In sum, the Basketmaker III sites human remains consists of two HRO and 11 IHB for a total of 13 individuals.

The IHB exposed at the Hatch sites represent 19 individuals. The MNI for the Hatch group should be considered an estimate as the sites experienced significant disturbance and are considered secondary deposits. Those sites are excluded from this chapter other than to determine age category and note whether any pathologies were observed on a bone or bone fragment.

Most of the human skeletal remains exposed at the Basketmaker Communities Project Basketmaker III sites were in structures. IHB that represent seven individuals were identified in pit structures at the sites, two IHB were identified in middens, and two IHB that represent one individual were observed in an arbitrary unit in a plow zone. Both HRO and one IHB that is likely associated with one of the two HRO were identified in an extramural open area encircled by several pithouses (Structures 205-226, 220-234, 232, and 239). The HRO are approximately 5 m apart. It should be noted that additional anomalies found with electrical resistivity (see Chapter 3 Remote Sensing) in the extramural open area suggest at least one other burial in the vicinity.

The data from this sample of human remains were generated through the implementation of the research design (Ortman et al. 2011) and design addendum, (Ryan and Diederichs 2014) and the excavation strategies used during the Basketmaker Communities Project. Individual excavation units were placed to gather data that would answer questions presented in the research design, and this strategy aimed to address research goals and follow the ethos of conservation archaeology. The size of each excavation unit was chosen to gather data on selected portions of individual structures or nonstructures such as middens, and only a small percentage of each site was excavated. As a result, the human remains discussed here are likely a small sample of the remains at any given site.

Methods

This section provides an overview of the analytical methods used to evaluate the human remains discovered during the Basketmaker Communities Project. As noted previously, all skeletal remains recognized during excavation were analyzed in the field with minimal disturbance to the elements and were reburied immediately after documentation was completed. A few skeletal elements could be measured. Measurements were recorded in millimeters using digital sliding calipers, measuring tape, or a metric ruler. For the Basketmaker Communities Project, HRO 1 was analyzed by Lara Nolder, HRO 2 was analyzed by Kate Barnett, and the IHB were analyzed by Kathy Mowrer or Lara Nolder. The osteological analysis drew from several sources (Bass 1987; Buikstra and Ubelaker 1994; Morse 1978; Ortner 2003; Reichs 1986; Scheuer and Black 2000; Steele and Bramblett 1988; White 1992; White and Folkens 1999).

For the purposes of this chapter, I define a burial or interment as a deceased individual whose remains were placed in the ground. In general, "formal" burials are articulated or partly articulated and exhibit one or more of the following characteristics: (1) the remains are most often found in their primary depositional context, although formal secondary burials are possible;

and (2) a burial pit is discernible and may contain associated burial items. An "informal" burial is a burial without a prepared burial pit or associated funerary items; the remains might have been placed on the prehistoric ground surface and expediently covered with soil or rocks. A "primary" burial is an interment that was found in its original depositional context. A "secondary" burial is an interment that was intentionally moved from one location to another, and skeletal elements are often disarticulated. Formal and informal burials can be either primary or secondary burials.

Human remains found in abandonment contexts differ considerably from formal burials. When deposited, these bodies are often sprawled, loosely flexed, prostrate, or haphazardly placed (Kuckleman, Lightfoot, and Martin 2000). Bodies can be disarticulated and exhibit perimortem trauma and/or healed (antemortem) fractures of the cranial and/or postcranial elements, and there is no evidence of a prepared burial pit or associated funerary objects (Kuckelman and Martin 2007; Kuckleman, Lightfoot, and Martin 2000). Human remains in abandonment contexts have been observed in a variety of locations including structure floors, roof fall, and ventilator shafts (Kuckelman and Martin 2007).

Results

The results of the osteological analyses are discussed in this section. Topics discussed include burial context, mortuary practices, and the results of osteological analysis. Burial context is important because it can provide insights into rank, status, social position(s), social affiliation(s), and age and gender differentiation (Binford 1971; Saxe 1970). Analytic topics discussed include demographics, pathologies, trauma, and metric and nonmetric traits, as well as evidence of cultural modification. Basic mortuary data are provided for the IHB and HRO in Table 23.1. Detailed mortuary information for the HROs is provided in Table 23.2. In addition, Crow Canyon's research database includes maps, photographs, and other information about human remains that is not available online.

Demography

In Crow Canyon's human remains documentation system, a "human remains occurrence" can represent one or more individuals. Thus, the remains of multiple individuals might have been originally interred together, or the remains of multiple individuals might have become commingled because of forces such as postoccupational processes (e.g., nonprofessional digging or erosion). At the Basketmaker Communities Project sites, every effort was made to distinguish between intentional multiple burials and commingling resulting from postoccupational processes.

To estimate the MNI for Basketmaker Communities Project sites, I followed the method employed by Kuckelman and Martin (2007) to estimate the MNI for Sand Canyon Pueblo. That is, after tallying the number of HROs for each architectural block, I calculated the IHBs for that block. After determining that an IHB could not belong to any documented HRO or other IHB, that IHB was counted as an individual, and the number of individuals represented in each age category at that block was tallied, with special attention given to avoid counting an individual twice.

Isolated teeth and phalanges that could not be assigned to an HRO or other individual represented by a different IHB were excluded from these calculations, because they are not definitive evidence of death. The MNI for the Basketmaker Communities Project sites totals 32: two individuals are represented by HROs, and a minimum of 30 individuals are represented among the IHBs, 13 from the Basketmaker III period sites and 19 from the Pueblo II to early Pueblo III phase Hatch group.

As noted above, the IHB identified at the Pueblo II–III Hatch group sites were disturbed and likely secondary deposits. Every effort was made to determine age based on age-related degenerative changes to the bone and epiphyseal fusion rates; however, most of the elements were small, and therefore age is primarily based on bone robusticity for the Hatch group. To determine MNI, elements identified in the same structure or nonstructure were grouped together based on age. For example, at the Pasquin site 13 cases of IHB were identified in Nonstructure 106, and none of the elements were duplicated. Two fell into the subadult category, one into the infant category, seven fell into the adult category, and three fell into the indeterminate category. Thus, the MNI for Nonstructure 106 is four; one subadult, one infant, one adult, and one indeterminate.

Most of the Basketmaker Communities Project human skeletal elements were exposed in pithouses and probably represent formal, disturbed burials. The sparse number of skeletal remains may result from sampling strategies, although the number of burials generally found at ancestral Pueblo sites is variable and can be many fewer than expected (Akins 1986; Kuckelman and Martin 2007; Morris 1924, 1929, 1939; Morris 1933; Schlanger 1992).

Basketmaker III Comparison Sites

Although there are numerous Basketmaker III sites in the northern Southwest that could provide comparative information about Basketmaker III burials, due to time constraints seven sites with human skeletal remains were chosen for comparison with the Basketmaker Communities Project Basketmaker III sites. Two of the sites are approximately 3.5 miles to the south and were excavated for the Towaoc Canal by Complete Archaeological Service Associates (CASA) in 1989. Site 5MT8938 is a multicomponent site that data suggest was occupied from the Basketmaker III period (beginning in A.D. 639) through the early Pueblo III period (A.D. 1300). Three burials at 5MT8938 are thought to be associated with the Basketmaker III period. Site 5MT9072 consists of a small single-component habitation dating to approximately A.D. 700–775, with two Basketmaker III burials (Errickson 1995; Stoddard 2016–2018).

Two sites are from the Navajo Reservoir district approximately 48 miles to the southeast. The sites were excavated as part of the Navajo Reservoir Study in what is now the Navajo Reservoir and Irrigation System; both are multicomponent sites. Site LA4169, the Oven site, was occupied during the late Sambrito phase, A.D. 500–700, which is contemporary with the Basketmaker Communities Project sites, as well as the Piedra phase, A.D. 850–950, with a later Navajo occupation. Four of the 12 burials recovered from the site are associated with the Sambrito phase. Another site, LA4195, Sambrito Village, was occupied during the Sambrito phase and Arboles Phase, A.D. 900–1100 and has a later Navajo component as well. Four of the 25 burials recovered from the site are attributed to the Sambrito phase (Eddy 1966).

Two Basketmaker III sites excavated by CASA in 1985 and 1986, as part of efforts to mitigate the effects of uranium mill tailings for the U. S. Department of Energy's Uranium Mill Tailings Remedial Action Project, provide insights into the Basketmaker III period near Durango Colorado, approximately 40 miles to the east as the crow flies from the Basketmaker Communities Project area. Both are multicomponent sites with Basketmaker III–Pueblo I occupations, A.D. 600–800. Burial location and ceramics suggest the seven burials and four burials recovered from 5LP481 and 5LP483, respectively, are Basketmaker III burials (Fuller 1998).

The last site is in southeast Utah, approximately 60 miles to the west as the crow flies from the Basketmaker Communities Project area. The site was excavated as part of the realignment of a portion of U. S. Highway 163, west of Bluff, Utah, in 1980 by the Antiquities Section of the Utah Division of State History. Site 42SA8540, the Duna Leyenda site, is a single-component Basketmaker III site; 18 burials were recovered from the site, one of five Basketmaker III sites excavated for the project, and the only site that contained burials (Neily et. al. 1982).

Age and Sex Distributions

Age and sex data provide the foundation for all subsequent analysis. Studies that examine diet, pathologies, activity patterns, behavior, social dynamics, and death all involve the categorization of individuals by sex and age. To increase the accuracy of age and sex estimations, multiple lines of evidence were used whenever possible. Because primary sex characteristics have not developed for infants (0–3 years of age), children (four to 12 years of age), some subadults (13–18 years of age), and some juveniles (birth to 20 years of age), elements from remains in these groups were placed in the "immature" category to differentiate them from the remains of adults whose sex could not be determined, which are categorized as "indeterminate."

Sex could be determined for only two individuals; both were exposed at the Dillard site and both are females (Table 23.3). This is somewhat unusual as males account for the largest number of adult burials at four of the contemporary comparison sites. Males outnumbered females six (75 percent) to two (25 percent) at the Duna Leyenda site, two males (66 percent) and one female (33 percent) were identified at 5LP481, and one male (100 percent) and no females were identified at 5LP483. Three males and one subadult male (80 percent) versus one subadult female (20 percent) were recovered at the Oven site, and one adult more than 20 years of age was recovered at Sambrito Village. At the Towaoc Canal sites, 5MT9072, sex could be determined for one male (50 percent), and one female (50 percent). No adult burials were recovered at 5MT8938.

Inferences about age distributions for the adults at the Basketmaker Communities Project Basketmaker III sites are difficult because we have age ranges for only the two adults, two infants, and one juvenile. The adults consist of HRO 1, a middle-aged adult female between 35 and 45 years of age (50 percent), and HRO 2, a young adult, probable female, between 25 and 35 years of age (50 percent). The Basketmaker Communities Project HRO however, do seem to fall within the range for adult burials at Basketmaker III comparison sites. The adult burials at the Duna Leyenda site include four (40 percent) young adults, two middle-aged adults (20 percent), one older adult (10 percent), two adults more than 18 years (20 percent), and one unknown age

(10 percent). The one adult at 5LP483 is a young adult (100 percent), and at 5LP481 two adult burials are in the young adult category (67 percent), and one is in the middle-aged adult range (33 percent). All three of the adult burials (100 percent) at the Oven site are in the young adult category, and one adult more than 18 years of age was recovered from the Sambrito site. The adults recovered from 5MT9072 consisted of two young adults (50 percent) and two adults (50 percent) more than 18 years of age. As noted above, no adult burials were recovered at 5MT8938 (Table 23.4).

The age-group distributions for infants, children, subadults, and juveniles for sites excavated as part of the Basketmaker Communities Project varies somewhat from the distributions for nearby sites occupied during the same approximate time span. Just one juvenile was identified at the Basketmaker Communities Project Basketmaker III sites (0.8 percent), which is much lower than the percent of juveniles identified at most of the comparison sites. Children were recovered at six of the seven Basketmaker III comparison sites with two child burials (40 percent) at 5LP483, two child burials at 5LP481 (29 percent), three child burials at 5MT8939 (100 percent), one child burial (13 percent) at the Oven site, one child burial (25 percent), and two child burials (11 percent) at Duna Leyenda. Two infant burials (22 percent) were exposed at the Dillard site, and none were exposed at the Mueller Little House, TJ Smith, or Ridgeline sites. Infant burials were recovered at five of the seven Basketmaker III comparison sites. Five (27 percent) infant burials were recovered at the Duna Leyenda site, one infant (13) was recovered at the Oven site, two infants (50 percent) were recovered at Sambrito Village, two infants (28 percent) were identified at 5LP481, and two infants (40 percent) were recovered from 5LP483. As noted above, the burial assemblage at 5MT8938 consisted of child burials only, and adult burials only were identified at 5MT9072. Subadults and juvenile burials consisted of one juvenile (11 percent) exposed at the Dillard site and two subadults (25 percent) were recovered at the Oven site. No subadult or juvenile burials were identified at any of the other Basketmaker Communities Project Basketmaker III sites or the Basketmaker III comparison sites. These variations can probably be attributed to the limited excavation sampling.

The distribution of male vs. female burials for the Basketmaker Communities Project Basketmaker III sites differs from the selected comparison sites (see Table 23.3). Sex could be estimated for two individuals at the Basketmaker Communities Project sites. Both are females exposed at the Dillard site, one middle-aged adult female and one young adult probable female. For the nearby sites, males generally outnumber females (see Table 23.3). The sparse number of individuals represented by these data probably results from the sampling strategies used to test these sites. It is also probable that some skeletal elements of indeterminate sex at the Basketmaker Communities Project sites represent adult females. In any case, the low percentages of female skeletal remains and high percentage of male burials at Basketmaker III sites deserves further research.

Basketmaker III Mortuary Practices

Mortuary practices, where and how a burial is placed in a grave, orientation of the body, and grave goods can provide information about the changing social structures and ideologies that likely occurred with the increased aggregation of Eastern and Western Basketmaker II people moving into the Mesa Verde area. This aggregation probably had its own set of problems because Eastern and Western Basketmaker II groups likely spoke different languages and differences in Eastern and Western Basketmaker II material culture, rock art, and burial practices are well documented (Matson 1991, 1994, 1999; Mowrer 2003; Robins 1997; Schaafsma 1986; Webster and Hays-Gilpin 1993). Mowrer (2003) compiled Basketmaker II burial data for the Four Corners area and found that Eastern Basketmaker II groups, those from present-day Colorado, preferred single inhumations with the head oriented to the north, whereas Western Basketmaker II groups from Utah and Arizona favored multi-individual burials with no preference for body orientation. Similarities between Eastern and Western Basketmaker II groups included funerary items found with adults, which often reflected economic activities, such as hunting tools.

Despite the problems that can occur with the aggregation of two distinct Basketmaker III groups, the evidence of violence during the Basketmaker III period is minimal (Kuckleman et al. 2000). However, it was common practice to burn pit structures, making it difficult to determine whether burned or fragmentary human skeletal remains were the result of accidental burning, burning at the hands of an enemy, or burning when the site was depopulated (LeBlanc 1999).

Research suggests a move away from the formal burials in middens that were prominent during the Basketmaker II period to formal burials in structures, exterior pits, and on extramural surfaces (Cater 2007; Eddy 1966; LeBlanc 1999). This could be the result of aggregation of groups into larger sedentary communities; many Basketmaker III sites are multicomponent, and the site was used either continually or returned to, probably on a seasonal basis, over many years. With larger communities staying in one place for longer periods of time or returning seasonally, communities had to find new places to place the deceased. This could also account for the incidences of small human bone fragments identified at numerous Basketmaker III multicomponent sites. Pithouses were usually used for relatively short periods of time before another one was dug in the same area, either accidentally disturbing older burials or intentionally moving them. (Eddy 1966; Errickson 1995; Stoddard, A. W. L., personal communication November 15, 2019) Most of the IHB recovered from the Basketmaker Communities Project Basketmaker III sites were small fragments recovered in pithouse fill.

Distribution of Formally Buried Remains

A determination of whether a burial was formal or informal, primary or secondary, or in an abandonment context was possible for the remains of only two individuals at Basketmaker Communities Project sites: both females identified at the Dillard site. Both are formal, primary burials exposed in an extramural, exterior use surface surrounded by structures. Both had been placed into prepared burial pits, and HRO 2 was accompanied by a seed jar (see Table 23.2).

It is likely that the HROs and most of the IHBs found in structures and middens were once part of formal burials that were disturbed by natural or cultural processes or both. Following this interpretation, at least 92 percent of the remains exposed at the Basketmaker Communities Project sites were probably from formal burials that were subsequently disturbed or displaced. One IHB at Mueller Little House was identified in an arbitrary unit in a plow zone; therefore, burial context could not be determined. This sub-assemblage includes individuals of all age groups. The Basketmaker Communities Project assemblage is small, but if the distribution of formal burials and inferred formal burials vs. other remains is considered by site, the data suggest that formal structure burial was the primary type of interment for all age groups at all the Basketmaker III Basketmaker Communities Project sites.

Distribution of Remains Found in Structure Fills

The remains of eight individuals, or about 62 percent of the total number of individuals represented in the human remains assemblage for the Basketmaker Communities Project sites, were discovered in structures (Table 23.5). At Mueller Little House, IHB that represents one adult was exposed in the fill above roof fall in a pit structure. Five of the 9 IHB identified at the Dillard site were found in structures: two IHB that represent an infant and juvenile were discovered in the fill of a pithouse, the remains of an adult was exposed in another pithouse, and indeterminate IHB were exposed in the fill of a third pithouse. At TJ Smith, IHB that represents an adult was identified in the fill above the roof fall of a pithouse, and IHB that represents one adult was identified in the roof fall of a pithouse at Ridgeline. The one IHB from the Pueblo II–III context at the Dillard site was recovered from a postoccupational context, in naturally occurring loess in a depression left by a collapsed great kiva, suggesting continued use by later Pueblo occupants as late as the Pueblo III period.

Mortuary Patterns

At the Basketmaker Communities Project sites, most human skeletal remains were found in the following types of mortuary contexts: formal, informal, primary, secondary, or abandonment. Some remains could not be assigned to any of these categories and so are considered to have an unknown mortuary context. The data suggest that the remains of individuals represented by the HROs at the Dillard site were formally buried on an extramural surface on the top of the ridge between pithouses. Two additional burial-sized electrical resistivity anomalies in this plaza area suggest other burials could be present. The IHBs that represent 11 other individuals are inferred to be from disturbed formal burials. These skeletal elements were exposed in middens and structures, which suggests that they were once portions of formal burials that were disturbed by postoccupational processes. The burial contexts for the IHB exposed in the plow zone at Mueller Little House are unknown; those remains could have been portions of a formal burial or skeletal elements left in abandonment contexts.

Mortuary Patterns of Formally Buried Remains

Formal ancestral Pueblo burials in the Southwest, including those in the Mesa Verde region, most often include remains placed in prepared oval or rectangular pits. Legs were semi-flexed (legs together and knees drawn up) or flexed (fetal position); some were extended with the hands alongside, or folded across, the body (Bradley 2002, 2003; Cattanach 1980; Eddy 1966; Errickson 1995; Fuller 1998; Kuckelman and Martin 2007; Morris 1924; Mowrer 2003; Neily et al. 1982; Nordenskiöld 1979; Schlanger 1992; Stodder 1984, 1987; Turner and Turner 1999). Funerary objects, including pottery vessels, were placed with many individual burials (Akins 1986; Bradley 1988; Eddy 1966; Rohn 1971, 1977; Neily et al. 1982; Whittlesey and Reid 2001). In some cases, dogs were buried with an individual or individuals (Eddy 1966).

From the Basketmaker II through at least the Pueblo II period, formal burials were often placed in middens (Mowrer 2003; Neily et al. 1982; Schlanger 1992; Stodder 1984, 1987, 2018). However, formal burials have also been discovered in pit structures, kivas, rooms, rock crevices, and under the floors of rooms and excavated into extramural surfaces that were still in use (Bradley 1988; Cattanach 1980; Eddy 1966; Errickson 1995; Fuller 1998; Kuckelman and Martin 2007; Morris 1980; Mowrer 2003; Neily et al. 1982).

At the Dillard site, IHB that represent two individuals—an adult and an infant or newborn—were in midden deposits. These are the only human bone identified in a midden at the Basketmaker III Basketmaker Communities Project sites.

The HROs at the Dillard site were partially exposed in an extramural area surrounded by pithouses. HRO 1 represents a middle-aged adult female between 35 and 39 years of age. The age estimate is based on age-related degenerative changes to the bone, and sex assessment is based on pelvic characteristics. The body was extended and oriented along a southwest–northwest axis with the head to the southwest. The arms were extended over the pelvis, the right leg was flexed up toward the body, and the left leg was extended. It appears that sandstone slabs and mortar were used to cap the oval-shaped burial pit. No associated funerary objects were identified with the burial. HRO 2 represents a young adult, possible female, between 21 and 35 years of age. Age is based on the absence of degenerative changes to the bone and dental wear, and the sex assessment is based on pelvic characteristics. The body was face down, with the arms possibly folded up under the torso; they were not exposed. The mid-portion of the body was oriented along a southwest–northeast axis. The shoulders were to the southwest, and the pelvis was to the northeast. The legs were not exposed. Several upright slabs were exposed over and in the burial suggesting the oval-shaped burial pit was covered with slabs. Funerary items include a Chapin Gray unpolished seed jar that was next to the right shoulder (see Table 23.2). One IHB that represented an adult was exposed between the two HROs and was assigned to HRO 1. The remaining five IHB at the Dillard site were exposed in structures: four in pithouse fill and one, the IHB that dates to the Pueblo I–II period (A.D. 800–1000), in kiva fill. Both IHB exposed at TJ Smith and Ridgeline were identified in pithouses (see Table 23.1).

In sum, it appears that most of the burials at the Basketmaker Communities Project Basketmaker III sites were in structures, reflecting a broader trend in the Mesa Verde area. Many of these contexts were disturbed after interment. Some were disturbed during the Basketmaker III occupation of the site, some were disturbed by later occupants, and some were disturbed in the recent past by agricultural activities.

Mortuary Circumstances of Remains Found in Structure Fill Contexts

The IHB discussed above could be the result of human remains discovered in structure fill that might be related to structure closing contexts. Some of the IHB were mixed with construction debris within structures; this suggests the IHB that represent eight individuals may have been left either on, or in, the structure before the structure was decomissioned. None of the elements display direct evidence of perimortem trauma. One IHB exposed at Mueller Little House exhibited burning that may be related to architectural decommissioning; however, pithouses frequently burned by accident during the Basketmaker III period, and without corroborating evidence cannot be considered proof of architecture closing practices. Alternatively, the IHB could be portions of formal burials that were disturbed by structure remodeling events.

I have drawn the following inferences about the mortuary circumstances of skeletal remains found at Basketmaker Communities Project Basketmaker III sites. Some remains found at Mueller Little House, the Dillard site, TJ Smith site, and Ridgeline site were identified on or just above the floor in structures. The high number of fragmentary remains identified in collapsed roofing or just above the roofing suggests the occupants were burying the deceased in the depressions of already collapsed structures. This is somewhat consistent with Basketmaker III burials from at least three of the comparison sites (Table 23.6). In the Navajo Reservoir district, the deceased were placed in one of 45 ovens identified at the site. At Sambrito Village burials were found primarily in pits originally dug for other purposes (Eddy 1966). At the Duna Leyenda site in southeast Utah, several of the burials appear to have been placed in the midden subsequent to the development of the midden, and the deceased continued to be interred in the midden while it was in use (Neily et. al 1982). These examples suggest that in most cases burials were interred in expedient locations, and that daily activities continued to occur in the areas where burials were interred. Moreover, the large number of human remains identified at the Dillard site may indicate the site was a kind of burial center. Eddy (1966) suggests the Oven site was a multi-unit habitation site that drew people from other sites to participate in cooking activities and burying the dead, and Neily and colleagues suggests the Duna Leyenda site may also have served as a central location for burying the dead. In contrast, no burials were identified at the other four Basketmaker III sites excavated as part of the US 163 Archaeological Project. The circumstances are difficult to determine given the small sample size and lack of evidence of perimortem trauma.

Skeletal Indicators of Health

Examining human skeletal elements can provide information about health, living conditions, and quality of life. All observable signs of disease were recorded for human remains identified at Basketmaker Communities Project Basketmaker III sites (Table 23.7). Possible diseases include cribra orbitalia and porotic hyperostosis, localized and systemic infections, periosteal lesions, osteoarthritis, spinal osteophytosis, dental caries, enamel hypoplasia, and periodontal disease. The following sections discuss pathologies that were common in the prehistoric Southwest and that may be represented in remains found at Basketmaker Communities Project sites. The absence of a specific pathology does not necessarily mean that it was absent from the population; it simply reflects that none of the skeletal remains found exhibit that pathology. Only small portions of each site were excavated, and the human remains exposed were mostly limited to bone fragments. The observed diseases probably represent a subset of diseases suffered by the residents of the Basketmaker Communities Project sites at any point in time.

Enamel Hypoplasia

Enamel hypoplasia is defined as a pathological condition that affects the thickness of tooth enamel, and it can be a reliable indicator of health stress (Buikstra and Ubelaker 1994). Hypoplastic lesions form when childhood growth is disturbed by systemic metabolic disturbances, usually from nutritional stress or disease, although some lesions are hereditary or traumatic in origin. Hypoplasia is especially useful to analysts, because these lesions provide a record of the age and duration of the affliction. The defects most often occur as linear, horizontal grooves, but can be vertical lines, pits, notches, or amorphous areas of enamel irregularity on the labial surface of the tooth (Kreshover 1960; Sarnat and Schour 1941). No enamel hypoplasia was observed on any of the human skeletal remains exposed at Basketmaker Communities Project sites.

Caries

The frequency of caries in pre-contact agricultural communities varies widely in the U.S. Southwest. Dental caries consist of a chronic disease in which acids are produced by bacteria that demineralize or destroy tooth enamel. This demineralization creates an environment favorable for the growth of bacteria, which can lead to accelerated tooth decay and loss. The impact of caries on the health of the individual is usually not significant unless the disease progresses and spreads to other parts of the body. Dental caries can develop in either deciduous or permanent dentition but are most common in the latter. Dental caries are usually considered a progressive age-related disease (Larsen 1983, 1995). No dental caries were identified at the Basketmaker Communities Project sites.

Porotic Hyperostosis and Cribra Orbitalia

Many researchers today agree that porotic hyperostosis and/or cribra orbitalia are the result of various factors including nutritional deficiencies, parasites, and infectious disease (Akins 1986; Kuckelman and Martin 2007; Martin et al. 1991; Mensforth et al. 1978; Stodder 1987; White 1992). Porotic hyperostosis expresses itself most often in the eye orbits or near the sagittal, lambdoid, or coronal sutures. In more-severe cases, large portions of the frontal, parietal, and occipital bones are affected (Buikstra and Ubelaker 1994). None of the individuals represented at Basketmaker Communities Project sites exhibited porotic hyperostosis or cribra orbitalia. This absence is probably the result of sampling; few crania or cranial fragments large enough to assess for porotic hyperostosis or cribra orbitalia were exposed.

Periostitis and Infectious Disease

Periostitis is defined as an inflammatory condition of the osteogenic tissue (periosteum) that surrounds the bone. Infectious disease, traumatic injury, nutritional deficiency, and other conditions can cause periosteal reactions (Cook 1984; Lambert 1999; Ortner 2003; Ortner and Putschar 1985). Periosteal reactions that involve multiple long bones, often bilaterally, are probably the result of systemic infectious diseases, whereas many isolated reactions are the result of localized trauma (Martin et al. 1991). The remains of one individual, a middle-aged adult female at the Dillard site, exhibited an active infection that affected the long bones on both legs and possibly the right radius (no other long bones were exposed). Elements involved include the end portions of the leg bone shafts as well as the distal epiphyses on both femora, the proximal epiphyses on the right tibia and fibula, and possibly the proximal shaft of the right radius, (the radius was not exposed completely). More common in the long bones of adults, *Staphylococcus aureus* is the most common organism responsible for chronic osteomyelitis. The in-field analysis by Barnett suggests chronic pyrogenic osteomyelitis; however, diagnosing osteomyelitis is difficult on dry bone. The best evidence for osteomyelitis in skeletal remains is a drainage canal (cloaca) or sequestration in association with periosteal bone formation. In this case, it appears there is no evidence of the cloaca penetrating the cortex to the medullary cavity. Therefore, it difficult to attribute the infection to osteomyelitis (Ortner 2003). Other possibilities include tuberculosis, syphilis, trauma-related change, a non-specific disorder, or a metabolic disorder. In any case, the infection was severe, likely limiting mobility as the distal femora and proximal tibia and fibula are completely eroded away. It is difficult to imagine the individual could stand or walk alone. This individual also exhibited a healed fracture to the left metacarpal (see Table 23.7).

Metrics

Although metric measurements could not be obtained for any elements in the Basketmaker Communities Project population, estimates of long-bone length can provide useful information about age, sex, estimates of stature, and activity patterns (Krogman and Işcan 1986; Ubelaker 1989). Stature can be an important indicator of overall health, because nutritional deficiencies and infection can have a direct effect on development and growth. Stature estimates in the Southwest most often follow Genovés' (1967) formulae for Mesoamerican adult females and males. In the absence of other age indicators, long-bone lengths (Scheuer and Black 2000) could be used to estimate ages of children and subadults.

Degenerative Joint Disease and Occupational Stress Markers

Degenerative joint disease (DJD), or osteoarthritis, is a progressive disease of the synovial and intervertebral joints (Ortner 2003). There are three major stages of DJD. Stage 1 is characterized by the development of bony outgrowths, lipping on the vertebral articular surfaces and joints, (especially the elbow and knee), and bony outgrowths on the vertebral centra. Stage 2 includes the development of small deposits of bone or pitting on the vertebral articular surfaces and joints. Stage 3 is characterized by the growth of bony deposits that may grow large enough to destroy cartilage. When this occurs, bone rubs directly on bone, producing eburnation, abrasion, or polishing of the surfaces (Ubelaker 1989).

Although DJD is thought to be a normal part of the aging process, lifestyle and activity patterns can have a significant influence on the inception and progress of the disorder. In most cases the vertebral articular surfaces, as well as the bones of the arms, legs, and extremities were scored for DJD, and the intervertebral joints (vertebral bodies) were scored for osteophytosis. For the Basketmaker Communities Project testing assemblage, the remains of one individual exhibited DJD: lipping (stage not listed by analyst) on the margins of the promontory and ala of the sacrum and the proximal phalanges of the hand. These age-related changes are consistent with a middle-aged adult.

Spinal osteoarthritis, or osteophytosis, is similar to joint changes seen on the bones of the arms, legs, hands, feet, pelvic girdle, and shoulders and can range from minimal to significant. Osteophytosis is characterized by osteophyte formation, lipping, or bony protrusions along the superior and inferior margins of the centrum. It usually occurs in individuals older than 40 years of age but can occur as early as the third decade of life. Any segment of the spine can be affected, and one or more vertebrae can be involved (Ortner 2003). Spinal osteophytosis (stage not listed by analyst) was exhibited on the four lumbar centra exposed on the middle-aged adult female discussed above.

Repetitive activities associated with biomechanical stress can result in musculoskeletal stress markers, as well as DJD, within and between skeletal elements. Different types of stress will affect the development of muscle attachments and arthritis in different ways (Ortner 2003; Perry 2004). These patterns can provide clues about workload, patterns of movement, and the sexual division of labor. Although some tasks in Pueblo society are performed seasonally, such as labor related to agriculture, others such as weaving, hunting, and pottery production may be performed any time or when agricultural activities are less intense. Overall, activities typically engaged in probably produce skeletal patterns characteristic of women's and men's daily lives (Perry 2004).

In archaeological populations, DJD related to biomechanical stress is most commonly found at the elbow and was probably caused by flexion–extension and rotation movements associated with the joint; these movements stimulate osteophyte formation (Ortner 2003). DJD related to biomechanical stress is also commonly found in the knee joint. All joint surfaces and vertebrae analyzed at Basketmaker Communities Project sites were examined for evidence of DJD caused by repetitive motion of a specific joint. HRO 2, the middle-aged adult female discussed above, exhibited signs of repetitive motion on the hands; the inner surfaces of the proximal phalanges exhibited lipping that suggested excessive repetitive activity, perhaps from grinding activities.

Another possible indicator of occupational stress is unusual dental wear. For example, the remains of several adolescents at Sand Canyon Pueblo exhibit extreme wear on anterior molars that might have been produced by the processing of leather (Kuckelman and Martin 2007). None of the dentition examined at Basketmaker Communities Project sites exhibited unusual dental wear.

Cultural Modification/Trauma

In this section, cultural modifications to human bones are examined. Topics include cranial deformation and traumatic culturally induced injuries such as burning, fractures, abrasions, and cut marks. Traumatic injuries can provide information about different physical and social settings and the ability of a population to safeguard itself from risk. All skeletal elements found during the Basketmaker Communities Project were examined for antemortem and perimortem trauma as well as postmortem damage. Antemortem injuries occur before death and are actively healing or healed, perimortem injuries were sustained around the time of death, and postmortem damage, such as fracturing caused by the collapse of a structure on a burial, occurred after death. The methods I employed to analyze and record the presence of perimortem trauma were adapted from White (1992). Overall, a conservative approach was taken when assessing bones for perimortem damage.

Cranial Deformation

Cranial deformation is one of the most pervasive cultural practices found throughout the world (Ortner and Putschar 1985; White and Folkens 1999). In ancestral Pueblo populations, cranial deformation is thought to have been caused primarily by "cradleboarding" (Piper 2002). A marked increase in the frequency of flattened posterior portions of crania is seen among remains that date during the transition from the Basketmaker III period (approximately A.D. 500 to 750) to the Pueblo I period (about A.D. 750 to 900) (Reed 2002). Piper's (2002) examination of cradleboards from the Colorado Plateau demonstrates that, with the adoption of agriculture as the chief subsistence strategy, practices for the care of infants and young children changed to include a greater use of cradleboards at about this time.

The principal types of cranial deformation seen in the prehistoric Southwest consist of occipital and lambdoidal deformation (Piper 2002). Occipital deformation is characterized by a flattened area at the back of the skull that is at a 90-degree angle from the Frankfort plane. The Frankfort plane is the standard position of reference in which the upper border of the external auditory meatus, the passageway into the inner ear, is on a horizontal plane with the lower border of the eye. Crania with lambdoidal deformations are flattened at a 50 to 60–degree angle on the upper portion of the occiput, which is the posterior part of the head above the base of the skull. None of the skulls at the Basketmaker Communities Project sites were exposed enough to determine whether cradleboarding was present.

Thermal Alteration

According to Binford (see White 1992:156), the degree of burning is determined by the length of time exposed to fire, the intensity of the heat, the thickness of the protecting muscle tissue, and the position of the bone in relation to the point of oxidation. Low temperatures turn bone tan or brownish, whereas higher temperatures result in dark brown or black coloration. In temperatures above 600–800°F, the residual carbon in the bone is burned to carbon dioxide, leading to bluish coloration or, near the higher end of the temperature range, a chalky white appearance. Above 700–800°F, bone structure is altered. Burning can occur antemortem, perimortem, or postmortem. All skeletal remains discovered at Basketmaker Communities Project sites were examined for evidence and degree of burning. One indeterminate long-bone shaft fragment identified at Mueller Little House exhibited thermal alteration. This fragment was one of four IHB identified in the fill above roof fall from a Basketmaker III pit structure; none of the other bone fragments were burned. In *Prehistoric Warfare in the Southwest* LeBlanc (1999) discusses the overwhelming evidence for burned pit structures during the Basketmaker III period, but notes it is difficult to determine whether the burning was intentional or accidental without corroborating evidence such as unburned human remains in the structure or the presence of large quantities of food or tools. Therefore, the one element identified in the main chamber of the pithouse (Structure 101) at Mueller Little House may or may not be evidence of violence. The element was identified in the fill above roof fall and may be a secondary deposit.

Fractures, Abrasions, and Cut Marks

At the Basketmaker Communities Project Basketmaker III sites, two of the exposed skeletal elements exhibited healed or active fractures. None of the skeletal remains found exhibited evidence of perimortem trauma. The middle-aged adult female from the Dillard site exhibited a healed fracture on the distal portion of the fifth left metacarpal. One of the later Pueblo II to early Pueblo III phase Hatch group individuals, an IHB rib fragment that represents a child, exhibited a healed fracture with remodeling.

Evidence of Relatedness/Biodistance

Variation in nonmetric traits, also termed discrete traits, epigenetic traits, or discontinuous morphological traits, can show familial inheritance in *Homo sapiens* (Saunders and Popovich 1978; Torgersen 1951a, 1951b, 1963). Barnes (1994) notes that population differences in skeletal morphology can be the result of genetic as well as environmental differences. Cranial and postcranial nonmetric traits could not be recorded for the Basketmaker Communities Project assemblage.

Summary and Conclusions

The sample of human remains from the Basketmaker Communities Project sites is small; however, these remains provide insights into ancestral Pueblo life in the Mesa Verde region and the greater Southwest. The Basketmaker III remains in this sample represent a minimum of 13 individuals. Two individuals are represented by two HRO and one IHB, and at least 11 individuals are represented in the IHB assemblage. All the IHB show evidence of postoccupational disturbance. IHB representing one individual were observed at Mueller Little House, TJ Smith, and Ridgeline; IHB representing five individuals were observed at the Dillard site, exposed in pithouse fill; IHB representing two individuals were identified in the midden at the Dillard site; and one IHB was exposed in an arbitrary unit in the plow zone at Mueller Little House.

The age and sex distributions of remains found at the Basketmaker Communities Project Basketmaker III sites generally fall within the ranges recorded for the approximately contemporaneous comparison sites (see Tables 23.3 and 23.4). Adult remains compose 62 percent of the individuals represented, the remains of infants and unknown age or sex compose 15 percent each, and the remains of juveniles compose 8 percent. No children or subadult skeletal remains were identified, although the juvenile may fall into the subadult range. Most of the adult remains at nearby contemporary sites represent young adults between 21 and 35 years of age, and middle and older remains are conspicuously absent. The remains of one older adult (50+ years) were found at Duna Leyenda, and the remains of three middle-aged adults were recovered at two sites, two from Duna Leyenda and one from 5LP481. The lack of the remains of older individuals from the Basketmaker Communities Project Basketmaker III assemblage and the contemporary sites may be the result of sampling bias or could indicate that no individuals who lived past 50 years of age died at any of the sites tested, although the first alternative seems more likely. These data suggest that if an individual survived childhood, the likelihood of living into at least young adulthood was fairly good (see Table 23.4).

The age distributions of remains at Basketmaker Communities Project Basketmaker III sites vary slightly (see Table 23.4). At Mueller Little House, TJ Smith, and Ridgeline, the remains of one adult were recorded at each site. At the Dillard site, more than half of the burials were adults, two were infants, and one was a juvenile. No child or subadult remains were found, although the juvenile may fall into the subadult range (see Table 23.4). These variations are probably the result of excavation sampling design, and further investigation at these sites might help better understand the sample. The underrepresentation of male burials seen in the Basketmaker Communities Project Basketmaker III sites may be an early indication of a later pattern seen during the Pueblo II–III periods in the region. No confirmed male skeletal remains were found at the Basketmaker Communities Project Basketmaker III sites (see Tables 23.3 and 23.4). Adult males might be underrepresented for any of the following reasons: (1) their remains might have been buried outside site areas, (2) they might have died while hunting or raiding, or (3) their remains might have been interred in a specific location within a settlement, and that area of the site was not tested. It is also probable that some of the indeterminate elements are from adult males, and the lack of male burials could be the result of the sampling design or could reflect social, political, or ideological differences in the placement of male remains in that settlement. In contrast to the remains from the Basketmaker Communities Project sites, male burials dominate the burial assemblages from four of the nearby sites. Six of the eight adult burials from Duna Leyenda were male, all the adult burials were male at the Oven site, two of the three adults at 5LP481 were male, and the only adult at 5LP483 was male. Only at 5MT5072 are male and female burials equally represented with one male and one female (see Tables 23.3 and 23.4). Further research into demographics at other Basketmaker III sites in the area and the greater Southwest could provide information as to whether this is a trend in the Basketmaker III period; it may be that with the adoption of agriculture males were needed at home for sedentary activities such as planting and processing.

In general, residents of the Basketmaker III settlement in the Basketmaker Communities Project area appear to have experienced relatively good health. Only one individual exhibited evidence of pathologies or trauma (see Table 23.7). None of the individuals exhibited enamel hypoplasia that would suggest that childhood growth was disturbed by nutritional stress or disease, and no dental caries were observed. The remains of one individual, HRO 2, a middle-aged adult female at the Dillard site, exhibited an active infection, possibly chronic pyrogenic osteomyelitis, that affected the long bones on both legs and possibly the right radius (the bone was not completely exposed). *Staphylococcus aureus* is the most common organism responsible for chronic osteomyelitis; however, diagnosing osteomyelitis is difficult on dry bone. Other possibilities include tuberculosis, syphilis, trauma-related change, a non-specific disorder, or a metabolic disorder. In any case, the infection was severe, likely limiting mobility as the distal femora and proximal tibia and fibula are completely eroded away (Ortner 2003). It is difficult to imagine this individual could stand or walk alone. This middle-aged adult female also exhibited healed fractures on the left fifth metacarpal and on the palmar aspect of the hand that suggest excessive repetitive activity, perhaps from grinding activities.

No congenital anomalies were observed on skeletal remains exposed at Basketmaker Communities Project sites. Nonmetric traits could not be recorded for any of the human remains. No crania were exposed at the Basketmaker Communities Project sites that could be examined for cradleboarding, but evidence of this practice is common in the Mesa Verde region and throughout the Southwest (Espinosa 2006; Kuckelman and Martin 2007; Reed 2002).

No remains at the Basketmaker Communities Project sites exhibited compelling evidence of perimortem trauma. One adult element at Mueller Little House exhibited slight burning. The context of this fragment, in the fill of a burned pithouse, suggests that the bone was altered when the structure burned, possibly during accidental or intentional burning or a violent event. Errickson (1995) speculates that two individuals found on the floor of a pithouse at 5LP481, an adult and child, were trapped in the structure when it burned. It seems likely that the burned bone fragment at Mueller Little House was the result of nonviolent, possibly ritual, decommissioning of the pithouse or accidental burning. The overall lack of perimortem trauma in the sample of remains analyzed suggests that the residents of these tested sites were generally not subject to violence.

Although prepared burial pits, body position, and associated funerary items could be defined for only two individuals at Basketmaker Communities Project sites, the presence of these burials suggests that formal burials in this community were similar to ancestral Pueblo burials throughout much of the Southwest, with the legs flexed, the arms extended or across the body, and the body placed in an oval or rectangular pit. Interment with funerary items was also widely practiced in the Southwest. Although funerary items were observed with the remains of only one individual at the Basketmaker Communities Project sites, it is likely that some of the disturbed burials were once accompanied by funerary items.

The skeletal remains exposed at the Basketmaker Communities Project sites represent individuals ranging from infant to adult. The human remains exposed in midden areas were probably from formal burials that were disturbed by natural and/or cultural postoccupational processes. The presence of human remains at the Dillard site in kiva fill that dates from the Pueblo I to early Pueblo III phase (A.D. 800–1000) suggests continual occupation or reoccupation of that site. Remodeling, building new structures, and animal foraging in the midden could have disturbed formal burials already present. The presence of remains in middens at two of the Basketmaker Communities Project sites, Mueller Little House and the Dillard site, and at three comparison sites, Duna Leyenda, in southeast Utah, (Neily et al. 1982) and 5LP481 and 5LP483 in southwest Colorado (Fuller 1998), suggests that placing the deceased in middens was common between A.D. 500 and 750, the Basketmaker III period. Approximately 15 percent of the Basketmaker Communities Project burials were placed in middens versus 62 percent of the Basketmaker III burials at contemporary sites. In fact, all the burials at the Duna Leyenda site were found in the midden (Neily et al. 1982).

During the Basketmaker III period (A.D. 500–750), some remains were interred in middens, others were carefully arranged on structure floors, and others appear to have been carelessly disposed of or were trapped on structure floors or roofs when the structure was accidentally or intentionally burned (Cater 2007; Eddy 1966; Errickson 1995; Fuller 1998; LeBlanc 1999; Neily et al. 1982). Structures were the locations of the skeletal remains at three of the Basketmaker Communities Project Basketmaker III sites, Dillard, TJ Smith, and Ridgeline, and at several comparison sites—the Oven site and Sambrito Village (Eddy 1966), 5LP481 and 5LP483 (Fuller 1998), and 5MT8938 and 5MT9072 (Errickson 1995). Approximately 49 percent of the Basketmaker Communities Project Basketmaker III burials were in pithouses, and approximately 47 percent of the burials at contemporary comparison sites were placed in pithouses or other structures. At the Oven site, all the Basketmaker III burials were identified in extramural features (ovens); the bodies were not burned, did not exhibit evidence of perimortem trauma, were sometimes interred with one or more individuals (not necessarily placed into the grave at the same time), and were often accompanied by a dog burial (Eddy 1966). At least 44 ovens were documented at this multicomponent site, and it appears that burials were placed in these features during the later Pueblo occupations (Eddy 1966).

Two burials (15 percent) at the Dillard site were buried in pits in a plaza area between several pithouses. Electrical resistivity anomalies in the area suggest other burials may be present in this plaza. None of the nearby sites had burials on extramural surfaces.

At the Basketmaker Communities Project sites and at all but one (Duna Leyenda) of the nearby sites, structures were the primary location of human remains (see Table 23.6). The presence of remains in structures at these sites may be indicative of widespread conflict resulting in the inconsiderate disposition of remains rather than disposition in a formal burial context. The disposition and contexts of most the human remains identified at Dillard, TJ Smith, and Ridgeline were scattered and sometimes commingled elements in roof and wall fall. Without corroborating evidence, such as perimortem damage to the bone, violence cannot be assumed or ruled out. As noted above, many Basketmaker III sites are multicomponent with occupations that extend into the Pueblo II–III periods (A.D. 800–1000, A.D. 1000–1300), and human skeletal remains may have been moved intentionally or accidentally over time (LeBlanc 1999; A. W. L. Stoddard, personal communication November 15, 2018). By the same token, as people from the east and west with different ideologies, languages, and material culture came together, conflict was inevitable.

Other Basketmaker III community sites that contain human remains, such as Duna Leyenda, suggest midden burials were the norm for some groups during the Basketmaker III sequence. The IHB exposed in the great kiva fill at the Dillard site suggest a later Pueblo I (A.D. 800–1000) use of the site.

In conclusion, the human remains discovered at Basketmaker Communities Project sites offer new insights into the Basketmaker III period in the Mesa Verde region. The sample of human remains discovered at these sites is small; however, important similarities and contrasts with assemblages from nearby sites are evident. A comprehensive study of Basketmaker III sites in the Mesa Verde area and greater Southwest could provide information about how Eastern and Western Basketmaker III groups adapted to a more sedentary lifestyle.

Table 23.1. Human Bone Identified at Basketmaker III Community Sites.

Site	Temporal Assignment	HRO/ IHB	Context	Burial Type	Age Category	Age Estimate	Sex	Individuals
Basketmaker III Sites HRO and IHB								
Mueller Little House (5MT10631)	Late Basketmaker III phase (A.D. 700–750)	IHB	STR 101	Unk/D	Indeterminate	Indeterminate	Indeterminate	1
		IHB	STR 101	Unk/D	Indeterminate	Indeterminate	Indeterminate	
		IHB	STR 101	Unk/D	Indeterminate	Indeterminate	Indeterminate	
		IHB	STR 101	Unk/D	Indeterminate	Indeterminate	Indeterminate	
	Late Basketmaker III phase (A.D. 660–725)	IHB	NST 104	Plow zone	Indeterminate	Indeterminate	Indeterminate	1
		IHB	NST 104	Plow zone	Adult	<18 years of age	Indeterminate	
Total Individuals								2
Dillard (5MT10647)	Late Basketmaker III phase (A.D. 660–725)	HRO 1	NST 208	F	Middle adult	36–45 years	Female	1
		HRO 2	NST 227	F	Young adult	21–35 years	Possible female	
		IHB	NST 227	Unk/D	Adult	>18 years	Indeterminate	
	Mid to late Basketmaker III phase (A.D. 635–725)	IHB	STR 309	D/F	Juvenile	Birth–20 years	Indeterminate	1
		IHB	STR 309	Unk/D	Infant	<1 year	Immature	1
	Mid-Basketmaker III phase (A.D. 600–637)	IHB	STR 308	Unk/D	Infant	<2 years	Indeterminate	1
	Mid-Basketmaker III phase (A.D. 600–660)	IHB	STR 239	D/F	Adult	>18 years	Indeterminate	1
		IHB	STR 239	D/F	Adult	>18 years	Indeterminate	
		IHB	STR 232	Unk/D	Indeterminate	Indeterminate	Indeterminate	1
	Mid to late Basketmaker III phase (A.D.600–725)	IHB	NST 215	D/F	Adult	>18 years	Indeterminate	1
	Pueblo I to Pueblo II period (A.D. 750–1000)	IHB	NST 125	Unk/D	Adult	>18 years	Indeterminate	1
Total Individuals								9
TJ Smith (5MT10736)	Late Basketmaker III phase (A.D.700–750)	IHB	STR 111	D/F	Adult	>18 years	Indeterminate	1
Total Individuals								1
Ridgeline (5MT10711)	Late Basketmaker III phase (A.D. 700–750)	IHB	STR 103	D/F	Adult	>18 years	Indeterminate	1
Total Individuals								1
Total Individuals from Basketmaker III Sites								13

Site	Temporal Assignment	HRO/ IHB	Context	Burial Type	Age Category	Age Estimate	Sex	Individuals
Hatch Group Sites								
Dry Ridge (5MT10684) Some disturbance	General ancestral Pueblo (A.D. 420–1300)	IHB	NST 106	D/F	Indeterminate	NA	Indeterminate	1
		IHB	NST 106	Unk/D	Adult	<20 years	Indeterminate	
	Pueblo II and early Pueblo III phase (A.D. 1025–1160)	IHB	STR 108	Unk/D	Child	4–12 years	Immature	1
		IHB	STR 108	Unk/D	Indeterminate	NA	Indeterminate	
		IHB	STR 108	Unk/D	Infant	<4 years	Immature	1
		IHB	STR 108	Unk/d	Fetus/newborn	<1 year	Immature	1
		IHB	NST 110	Unk/D	Subadult	13–18 years	Immature	1
		IHB	NST 110	Unk/D	Indeterminate	NA	Indeterminate	
Total Individuals								5
Badger Den (5MT10686)	Pueblo II and early Pueblo III phase (A.D. 900–1165)	IHB	NST 106	D/F	Child	4–12 years	Immature	1
		IHB	NST 106	D/F	Child	4–12 years	Immature	
		IHB	NST 106	D/F	Child	4–12 years	Immature	
		IHB	NST 106	D/F	Adult	>18 years	Indeterminate	
		IHB	NST 106	D/F	Adult	>18 years	Indeterminate	1
		IHB	NST 106	D/F	Adult	>18 years	Indeterminate	
		IHB	Arb 101	Unk/D	Adult	>18 years	Indeterminate	1
Total Individuals								3
Sagebrush House (5MT10687)	Pueblo II and early Pueblo III phase (A.D.900–1165)	IHB	Arb 102	Unk/D	Adult	>18 years	Indeterminate	1
		IHB	NST 107	Unk/D	Child	4–12 years	Immature	1
		IHB	ARB 112	Unk/D	Subadult	13–18 years	Immature	1
		IHB	ARB 112	Unk/D	Infant	<1 year	Indeterminate	1
		IHB	ARB 112	Unk/D	Adult	>18 years	Indeterminate	1
		IHB	ARB 112	Unk/D	Adult	>18 years	Indeterminate	
		IHB	ARB 112	Unk/D	Adult	>18 years	Indeterminate	
Total Individuals								5

Site	Temporal Assignment	HRO/ IHB	Context	Burial Type	Age Category	Age Estimate	Sex	Individuals
Pasquin (5MT2037)	Pueblo II and early Pueblo III phase (A.D. 900–1100)	IHB	NST 106	Unk/D	Subadult	13–18 years	Immature	1
		IHB	NST 106	Unk/D	Subadult	13–18 years	Immature	
		IHB	NST 106	Unk/D	Infant	< 1 year	Immature	1
		IHB	NST 106	Unk/D	Adult	>18 years	Indeterminate	1
		IHB	NST 106	Unk/D	Adult	>18 years	Indeterminate	
		IHB	NST 106	Unk/D	Adult	>18 years	Indeterminate	
		IHB	NST 106	Unk/D	Adult	>18 years	Indeterminate	
		IHB	NST 106	Unk/D	Adult	>18 years	Indeterminate	
		IHB	NST 106	Unk/D	Adult	>18 years	Indeterminate	
		IHB	NST 106	Unk/D	Adult	>18 years	Indeterminate	
		IHB	NST 106	Unk/D	Indeterminate	NA	Indeterminate	1
		IHB	NST 106	Unk/D	Indeterminate	NA	Indeterminate	
		IHB	NST 106	Unk/D	Indeterminate	NA	Indeterminate	
	General ancestral Pueblo (A.D. 600–1300)	IHB	ARB 108	Unk/D	Subadult	13–18 years	Immature	1
		IHB	ARB 108	Unk/D	Subadult	13–18 years	Immature	
		IHB	ARB 107	Unk/D	Infant	<1 year	Immature	1
Total Individuals								6
Total Individuals from Hatch Group Sites								19
Total Individuals Identified for the Basketmaker Communities Project								32

Note: AC = decommissioning context; ARB=arbitrary unit; D = disturbed; F = formal burial; HRO = human remains occurrence; IHB = isolated human bone; NST = nonstructure; P = Pueblo; STR= structure; Unk = unknown.

Table 23.2. Mortuary Data for Individuals Represented in Human Remains Occurrences Exposed at Basketmaker Community Sites.

Site/HRO	Head Orientation/ Facing	Body Position	Context	Funerary Objects	Sex	Age
Dillard/ HRO 1	Southwest–northeast	Supine, right leg flexed, left leg extended, arms over the pelvis	NST 208: extramural area, oval-shaped pit, sandstone slabs suggest capped burial pit	None	Female	Middle adult 35–45 years
Dillard/ HRO 2	Southwest–northeast	Face down, with the arms possibly folded up under the torso, the legs were not exposed	NST 208: extramural area, oval-shaped pit, slabs suggest capped burial pit	Chapin Gray seed jar, 7.5-cm diameter, next to right shoulder	Female	Young adult, 21–35 years

Table 23.3. Distribution of Male and Female Remains Represented at Basketmaker Community Sites and Other Nearby Tested Sites.

Sites	Sample Size*	No. of Males/ Probable Males	% Males/ Probable Males	No of Female/ Probable Female	% Females/ Probable Females
Basketmaker Community Sites	2	0	0	2	100
Duna Leyenda†	8	6	67	2	33
Oven Site‡	5	4	80	1	20
Sambrito Village‡	0	0	0	0	0
5LP481§	3	2	67	1	33
5LP483§	1	1	100	0	0
5MT8963‖	0	0	0	0	0
5MT9072‖	2	1	50	1	50

* Number of individuals for whom sex could be determined.
† Neily et al. 1982.
‡ Eddy 1966.
§ Fuller 1998.
‖ Errickson 1995.

Table 23.4. Age and Sex Distributions for the Basketmaker Communities Project Basketmaker III Sites and Nearby Sites.

Site/Site Group/Age	Males/ Probable Males	Females/ Probable Females	Sex Unknown	Total	Percent
Basketmaker Communities Project Testing Sites					
Infant/Newborn/Fetus			2	2	0.15
Child			0	0	0
Subadult (12–18 Years)			0	0	0
Juvenile (Birth–20 Years)			1	1	0.08
Adult	0	2	6	8	0.62
Unknown			2	2	0.15
Total	0	2	11	13	100.00
Duna Leyenda (42Sa8540)*					
Infant/Newborn/Fetus)			5	5	0.28
Child			2	2	0.11
Subadult (12–18 Years)			0	0	0
Juvenile (Birth–20 Years)			0	0	0
Adult	6	2	2	10	0.55
Unknown			1[†]	1	0.06
Total	6	2	11	18	100.00
Oven Site (LA 4169) (Navajo Reservoir) [‡]					
Infant/Newborn/Fetus			1	1	0.125
Child			1	1	0.125
Subadult (12–18 Years)	1	1	0	2	0.25
Adult	3		0	3	0.37
Unknown			1	1	0.13
Total	4	1	3	8	100.00
Sambrito Village (Navajo Reservoir)[‡]					
Infant/Newborn/Fetus)			2	2	0.50
Child			1	1	0.25
Subadult (12–18 Years)			0	0	0
Adult			1	1	0.25
Total			4	4	100.00
5LP481 (Durango Area)[§]					
Infant/Newborn/Fetus			2	2	0.29
Child			2	2	0.29
Subadult (12–18 Years)			0	0	0
Adult	2	1	3	3	0.42
Total	2	1	7	7	100.00
5LP483 (Durango Area) [§]					
Infant/Newborn/Fetus			2	2	0.40
Child			2	2	0.40
Subadult (12–18 Years)			0	0	0
Adult	1			1	0.10
Total	1		4	5	100.00
5MT8938 (Towaoc Canal) [‖]					
Infant/Newborn/Fetus					0

Site/Site Group/Age	Males/ Probable Males	Females/ Probable Females	Sex Unknown	Total	Percent
Child			3	3	100
Subadult (12–18 Years)					0
Adult					0
Total			3	3	100.00
5MT9072 (Towaoc Canal) [‖]					
Infant/Newborn/Fetus					0
Child					0
Subadult (12–18 Years)					0
Adult	1	1	2	2	100
Total	1	1	2	2	100

* Neily et al. 1982.
[†] Although the report states 18 burials were recovered, no information is listed for Burial 17; therefore, it is assigned as unknown.
[‡] Eddy 1966.
[§] Fuller 1998.
[‖] Errickson 1995.

Table 23.5. Burial Context by Site, for the Basketmaker III Community Sites.

Site	Midden Burials	Remains in Structural Debris/Fill	Other Context*	Unknown Context	Total No. of Individuals	% of Midden Burials	% of Remains in Structural Debris/Fill	% Other Context	% of Unknown Context	% Total
Mueller Little House	0	1	0	1	2	0	0.50	0	0.50	100
Dillard	2	5*	2	0	9	0.22	0.56	0.22	0	100
Ridgeline	0	1	0	0	1	0	100	0	0	100
TJ Smith	0	1	0	0	1	0	100	0	0	100
Total	2	8	2	1	13	0.15	0. 62	0.15	0.08	100

* Includes one Pueblo burial located in kiva fill, c. 800–1000.

Table 23.6. Burial Contexts at the Basketmaker III Basketmaker Communities Project Sites and Nearby Basketmaker III Sites.

Site	Midden Burials	Remains in Structural Debris/Fill	Other Context*	Unknown Context	Total No. of Individuals	% of Midden Burials	% of Remains in Structural Debris/Fill	% Other Context	% of Unknown Context	% Total
Mueller Little House	0	1	0	1	2	0	0.50	0.50	0.50	100
Dillard	2	5	2	0	9	22	56	22	0	100
Ridgeline	0	1	0	0	1	0	100	0	0	100
TJ Smith	0	1	0	0	1	0	100	0	0	100
Total BCP Sites	2	8	2	1	13	0.15	0.62	0.15	0.08	100
Duna Leyenda, UT	18	0	0	0	18	100	0	0	0	100
Oven Site, NM	0	8†	0	0	8	0	100	0	0	100
Sambrito Village, NM	0	4†	0	0	4	0	100	0	0	100
5LP481 (Durango Area)	5	2‡	0	0	7	71	29	0	0	100
5LP483 (Durango Area)	4	1	0	0	5	80	20	0	0	100
5MT8938	0	3	0	0	3	0	100	0	0	100
5MT9072	0	2	0	0	2	0	100	0	0	100
Total for All Sites	29	28	2	1	60	0.49	0.47	0.3	0.1	100

Note: BCP = Basketmaker Communities Project.
* Placeholder.
† Oven site and Sambrito burials were recovered from exterior features, ovens.
‡ Burned appear trapped in pithouse (Errickson 1995); percentage the same with removal of these percentages.

Table 23.7. Pathologies and Stress Markers Observed on Remains at the Basketmaker Communities Project Basketmaker III Sites.

Site/Individual	Pathology	Sex	Age
Dillard HRO 1	1. DJD on the sacrum and the hand proximal phalanges 2. Osteophytosis of the lumbar centra 3. Possible osteomyelitis, systemic infection, both legs, possibly the left radius shaft 4. Healed fracture of the left fifth metacarpal	Female	Middle adult 35–39 years
Dry Ridge IHB (Hatch Group)	1. Remodeling of a healed fracture on a rib shaft	Immature	Child

Note: DJD = degenerative joint disease.

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Chapter 24

Artifacts

by Kari L. Schleher and Kate Hughes

Introduction

This chapter synthesizes artifact data for sites at which excavation occurred as part of the Basketmaker Communities Project. This project was conducted by Crow Canyon. The tables and figures included in this chapter were created using the artifact data as of the spring of 2020. Because errors were corrected after data were compiled for this chapter, future researchers using Crow Canyon's research database may find minor discrepancies between the data presented in this chapter and the data in that database. Any differences should be minor and should not affect larger patterns discussed and conclusions reached in this chapter.

The majority of artifacts and samples collected were processed using the laboratory procedures outlined in the *Crow Canyon Archaeological Center Laboratory Manual* (Ortman et al. 2005). Some new methods and analyses were developed specially for the Basketmaker Communities Project. These new methods or analyses are described at the beginning of each section of the report. All artifacts and samples, excluding tree-ring samples, will be permanently curated at the Canyon of the Ancients Visitor Center and Museum, which is managed by the Bureau of Land Management and is located near Dolores, Colorado. Tree-ring samples that were submitted to the Laboratory of Tree-Ring Research, University of Arizona, Tucson, are retained by that facility.

Numerous artifacts collected from Basketmaker Communities Project sites were analyzed using destructive methods: petrographic analysis, instrumental neutron activation analysis (NAA), residue analyses of pottery, and radiocarbon analysis of burned vegetal material. To obtain pollen and nutrient data, sediment and pollen samples were also analyzed destructively. Fifty-eight sherds were partly destroyed for a study of temper through petrographic analysis, and results are reported by Emma Britton (Britton 2014, 2016). NAA was conducted on 123 sherds for a study of clay and temper chemical composition (Ferguson and Glascock 2017). Residue analysis was conducted on 30 artifacts, consisting of 17 sherds, six projectile points, two bifaces, and five pieces of ground stone. Small portions of the 17 sherds were destroyed in this residue analysis (Barker et al. 2014). Radiocarbon dating was conducted on 71 samples at either the University of Arizona Accelerator Mass Spectrometry Laboratory or Beta Analytic, Inc. (see Chapter 19).

This chapter presents a synthesis of artifact data generated as part of the Basketmaker Communities Project and focuses on temporal patterns noted for the sites that were tested (see Chapter 1). Parts of this chapter include data that are published or presented elsewhere (e.g., Claypatch and Schleher 2015; Hughes et al. 2019; Cochran and Lorusso 2015; Ortman et al. 2016; Schleher et al. 2013; Schleher et al. 2018; Schleher 2019; Wurster et al. 2017), but this chapter focuses on social and technological changes in artifact production and use in the project area from the Basketmaker III period (A.D. 500–750) through the Pueblo II period (A.D. 900–1150). The Basketmaker III and Pueblo I periods (A.D. 500–900) are the primary components of all sites tested, with the exception of Sagebrush House (5MT10687), the Pasquin site (5MT2037), Badger Den (5MT10686), and the Dry Ridge site (5MT10684). The primary component of these four sites is the Pueblo II period (A.D. 900–1150).

The Basketmaker III covers a broad period of time (A.D. 500–750), so to break down variation within this period we have divided the period into three smaller segments based on chronometric dates from the Basketmaker III sites in the project area (see Chapter 19). These include early (A.D. 420–575), middle (A.D. 575–660), and late (A.D. 660–750) Basketmaker III phases.

Artifact analysis was a key component of the research design for the Basketmaker Communities Project (Ortman et al. 2011; Diederichs and Ryan 2014). Specifically, the analysis of pottery, chipped-stone artifacts, and other artifacts collected during the project was intended to help understand the occupation history, origins, community structure, the Neolithic Demographic Transition, and anthropogenic legacy of the Indian Camp Ranch community. Other studies examine settlement ecology by looking at changes in raw material procurement or use through time. These studies provide a comparative dataset for examining how the sites tested as part of the Basketmaker Communities Project compare to contemporary and later sites nearby.

Basic artifact descriptions for each site, especially white ware pottery types and chipped-stone material types, are presented in Chapters 5 through 16. In this chapter, we focus on artifact data for the wider Indian Camp Ranch community and also consider the data by temporal component (see Chapter 19).

Pottery

Pottery was the most abundant type of artifact collected during Basketmaker Communities Project excavations; more than 45,000 sherds weighing over 238 kilograms were recovered. During initial cataloging of artifacts in Crow Canyon's laboratory, sherds were divided into two categories—large bulk sherds (BSL) and small bulk sherds (BSS). Sherds were size-sorted using a 0.5-in screen: BSS are smaller than 0.5 in, and BSL are larger than 0.5 in. The only data recorded for sherds in the BSS category is weight, whereas sherds in the BSL category were analyzed for pottery type, count, paint type (for painted sherds), vessel form, and part of the vessel represented. We focus on BSL in the remainder of this section because more of these sherds display temporally sensitive attributes such as surface treatment. This section on pottery includes (1) a general description of pottery forms, types, and attributes; (2) detailed analyses of pottery and pottery attributes by period of production; and (3) discussion of evidence of pottery production and trade.

General Overview of Pottery Artifacts

The pottery from Basketmaker Communities Project sites includes 40 pottery types. Most of these are described in the Crow Canyon Laboratory Manual (Ortman et al. 2005), but a few additional types were added for this project. Most of the new types are plain gray or brown wares, which were added to document the variability present in the assemblage recovered from

Indian Camp Ranch. One plain gray ware type was added for the Basketmaker Communities Project: Indeterminate Local Gray, polished. This type is a plain gray ware that is characterized by a highly polished surface, typically on the exterior of jar sherds. Three brown ware types, Sambrito Utility, Obelisk Utility, and Twin Trees Utility, were added for the Basketmaker Communities Project. These brown ware types are identified by the presence of alluvial clay (Reed et al. 2000). Sambrito Utility is the local brown ware type in the central Mesa Verde region, and Obelisk Utility is the most common brown ware in areas to the south of this region (Reed et al. 2000). Sambrito Utility is characterized by alluvial clay with naturally occurring aplastic inclusions of mixed lithic silt and sand. Obelisk Utility is characterized by alluvial clay with naturally occurring aplastic inclusions of fine quartz silt and sand (Claypatch and Schleher 2015). Twin Trees Utility (Reed et al. 2000; Wilson and Blinman 1993, 1995), is a variation of traditional brown ware, and is sometimes called a brown/gray ware because it contains added temper, most typically crushed igneous rock, in addition to naturally occurring aplastic inclusions.

Table 24.1 summarizes the total counts, weights, and percentages for all unmodified sherds recovered. BSS are omitted from this tally. Most sherds are typed as Indeterminate Local Gray, Indeterminate Local Corrugated Gray, Late White Unpainted, or Late White Painted. Only 7 percent (by count) of the assemblage is assigned to a formal Mesa Verde type; the most abundantly represented are the following: Chapin Gray (2.73 percent), Mancos Black-on-white (1.83 percent), Chapin Black-on-white (0.82 percent), and Mancos Corrugated (0.37 percent). Decorated white ware sherds, specifically formally defined types, are most often used to date sites and contexts in the absence of absolute chronometric data (Ortman et al. 2005). The predominance of sherds characteristic of the Basketmaker III and Pueblo II periods in the overall assemblage indicates that the most significant periods of occupation at Basketmaker Communities Project sites occurred during those periods. Site-by-site summaries of pottery counts and weights can be found in the site-specific chapters of this volume.

Table 24.2 summarizes the total counts and percentages for all unmodified sherds recovered by temporal phase. Much like other Basketmaker III period sites across the Colorado Plateau (e.g., Toll and Wilson 1999, Wilshusen 1999), the Basketmaker III period pottery assemblages are heavily dominated by plain gray ware ceramics, with smaller amounts of white ware and brown ware. The majority of the formal types in the Basketmaker III period assemblages are Chapin Gray, Chapin Black-on-white, and Twin Trees Utility—the most dominant brown/gray ware in the assemblage.

Although the brown ware pottery consists of less than 1 percent of the total pottery assemblage for the community, its presence is significant (Claypatch and Schleher 2015). Brown ware pottery is the earliest pottery across the northern Southwest (e.g., Reed et al. 2000), with dates as early as A.D. 200 (Geib 2011). Lori Reed and colleagues explored the range of variation in brown wares and identified a number of regional types (Reed et al. 2000). The Basketmaker Communities Project pottery assemblage includes a number of brown ware types, including true brown wares like Sambrito Utility (vessels made with secondary alluvial clays that are self-tempered with naturally occurring sand) as well as brown/gray transitional types like Twin Trees Utility (again, vessels made with secondary alluvial clay that are self-tempered with sand and to which potters add additional temper, typically crushed igneous rock). We include all brown and brown/gray ware types in brown ware for this discussion because of the relatively small number of sherds in these types, but the two most common types of brown and brown/gray ware are Twin Tree Utility, with 59 percent of the brown ware assemblage (N = 111), and Sambrito Utility, with 28 percent (N = 51).

If we explore the changes in brown ware pottery through time, the amount of brown ware decreases from the early Basketmaker III contexts through the late Basketmaker III contexts for the Basketmaker Communities Project (see Table 24.2). This pattern becomes clearer if we look at the ratio of brown ware to gray ware sherd counts, which shows a decrease from the early Basketmaker III phase ratio of 0.08 to the late Basketmaker III phase ratio of 0.02. Interestingly, across the broader Colorado Plateau most sites with dates as early as A.D. 420–520, which corresponds to the earliest dates we have from the Basketmaker Communities Project, typically have significantly higher percentages of gray/brown wares (e.g., Hensler 1999:619; Reed 1998; Toll and Wilson 1999:23). For example, brown/gray wares consist of approximately 40 percent of the pottery assemblage for sites in the southern Chuska Valley (Reed 1998:7–3), 25 percent of the pottery assemblage for sites in the Cove-Redrock Valley area (Hensler 1999:619), and "most" of the pottery assemblage at early Basketmaker III phase sites in the La Plata Valley (Toll and Wilson 1999:23). Other researchers have interpreted these mixed assemblages as periods of experimentation (e.g., Reed 1998; Shepard 1939; Toll and Wilson 1999). The lack of significant amounts of brown ware in our assemblage suggests that potters in the Basketmaker Communities Project area more quickly adopted the new gray ware technology than their counterparts in other regions of the Southwest.

Rim Sherds by Ware and Form

Because rim sherds can be classified to vessel form more accurately than can body sherds, vessel form is presented for rim sherds only (Table 24.3). Ladle rims can be differentiated from bowl rims by their tighter curves, and by the fact that many have a specific wear pattern that results from use as a scoop. The attachment for the ladle handle or a portion of the handle also can be used to differentiate the sherds of ladle rims from those of bowl rims. Mug rims can be differentiated from jar rims because many of the former have a square and vertical profile. A portion of a handle is present on the sherds of many mug rims, which allows these sherds to be differentiated from jar rims. The necks of kiva jars and seed jars are unlike those of other jars, and these two forms can be distinguished from each other by the presence, on kiva jars, of an interior lip to support a lid. The rims of canteens can be distinguished from other jar rims by their tight curvature.

Table 24.3 summarizes unmodified rim sherds by ware and form. The ware/form combinations found most commonly in the assemblages for Basketmaker Communities Project sites are white ware bowls, plain gray ware jars, and plain gray ware seed/kiva jars. Sherds of white ware jars, ladles, and kiva/seed jars are also present, as are a few sherds of plain gray ware, red ware, and nonlocal vessels. Because of the respective shapes and sizes of the parent bowls and jars, rim sherds of white ware bowls are more abundant than those of plain gray and corrugated jars. Thus, although the overall assemblage is dominated by plain gray and corrugated sherds, the narrow necks and small-diameter rims of plain gray and corrugated jars yield fewer rim sherds than do white ware bowls, which are larger in diameter.

Table 24.4 lists, by ware type and form, unmodified rim sherds by temporal phase for the Basketmaker Communities Project sites. Gray ware sherds from jars and kiva/seed jars are most common for all Basketmaker III phases, except for the early Basketmaker phase in which gray ware jars and white ware bowls are most common. For the later Pueblo periods, most notably the late Pueblo II/early Pueblo III period, white ware bowl sherds are most common. There is not a significant change in the percentage of kiva/seed jars from middle to late Basketmaker III. Using preliminary artifact data from the Basketmaker Communities Project and other regional sites, Scott Ortman and colleagues (2016) developed a method to divide the Basketmaker III period into middle (A.D. 600–650) and late (A.D. 650–750) phases based on pottery form changes. Comparison of 17 Basketmaker III period sites in the area, including preliminary data from the Dillard site, showed that the ratio of painted bowl to seed jar rims doubles from the earlier to the later Basketmaker III phase. The data presented here (see Table 24.4) shows a similar pattern, but not quite as dramatic a shift, with the ratio for mid-Basketmaker III to late Basketmaker III white ware bowl rims to gray ware seed jar rims increasing from 0.52 to 0.68.

Table 24.5 lists, by vessel form, unmodified rim sherds by Basketmaker III period structure functional types for the Basketmaker Communities Project sites. Although only about 15 percent of the rim sherds from the project were recovered from structures, there are some interesting patterns. For all of the structure functional types, excluding public architecture, kiva/seed jars are the most common vessel form. The most common vessel form in public architecture is the bowl. This suggests different activities were going on in public architecture than in other structure types. Greater proportions of bowls than jars are often associated with communal feasting or communal gathering events that involve serving food. Feasting associated with kivas has been suggested for more recent time periods in the Mesa Verde region (Blinman 1989; Potter 1997, 2000; Potter and Ortman 2004), and this evidence from the Basketmaker Communities Project suggests that the pattern began in the Basketmaker III period.

White Ware Sherds by Type and Finish

The type of paint used by potters represents an element of learned pottery tradition (Duwe and Neff 2007; Herhahn 1995, 2006; Schleher et al. 2012), and thus diachronic changes in paint type reflect changes in pottery-production groups, technology, or both. Mesa Verde White Ware pottery vessels were painted with two kinds of paint—carbon, mineral, or both (Ortman 2006; Till and Ortman 2007; Wilson and Blinman 1995). Stewart and Adams (1999) report that carbon paint is made from the extract of Rocky Mountain beeweed (*Cleome serrulata*) or tansy mustard (*Descurainia richardsonii*). Mineral paint is made by mixing ground iron, manganese, or copper-rich rocks with a liquid (Till and Ortman 2007). In much of the Mesa Verde region, mineral paints were used more commonly on painted white ware vessels before the Pueblo III period, about A.D. 1150, and use of carbon-based paints became more common during the Pueblo III period (Breternitz et al. 1974; Ortman 2000:par. 17; Till and Ortman 2007; Wilson and Blinman 1995). Generally speaking, most pottery types associated with the Pueblo I period (A.D. 750–900), such as Piedra Black-on-white, and with the Pueblo II period (A.D. 900–1150), such as Cortez Black-on-white and Mancos Black-on-white, were decorated using mineral paint composed of crushed minerals found locally or semi-locally. There are some exceptions to this general rule; for example, Mancos Black-on-white vessels, which were produced during the

Pueblo II and Pueblo III periods, were decorated using mineral paint, organic paint, or both (Ortman et al. 2005).

Alternatively, Cortez Black-on-white, the earliest Pueblo II decorated white ware produced in the area, was decorated exclusively with mineral paint. Local formal types that tend to be painted with carbon paint include McElmo Black-on-white and Mesa Verde Black-on-white, which are more common during the Pueblo III period, A.D. 1150–1300 (Breternitz et al. 1974; Ortman et al. 2005; Wilson and Blinman 1995).

In addition to these two types of paint for Mesa Verde White Ware pottery, Crow Canyon has defined a third category—mixed paint. The mixed-paint category is used for pottery on which both mineral and carbon paint, each in one or more distinct areas, were used on one vessel. This mixed-paint category is not used for vessels on which a carbon material was employed as the liquid-suspension agent, or binder, for applying mineral paint (Ortman et al. 2005).

The types of paint identified on white ware pottery from Basketmaker Communities Project sites are presented in Table 24.6. Most (67 percent) white ware pottery sherds were painted with mineral paint. The Basketmaker III period white ware pottery is almost exclusively painted with mineral paint. The later temporal components are still dominated by mineral paint, but carbon paint becomes more common for the late Pueblo II/early Pueblo III period in the Basketmaker Communities Project area. There are a couple of glaze-painted sherds, which are likely due to a misfire of a mineral paint, rather than an intentional use of a glaze paint. Glaze paint would be rare in the project area, as Mesa Verde White Ware types are typically not associated with glaze paint.

We conducted a specialized analysis of mineral paint composition in 2011 in conjunction with the *Time Team America* television show filmed about excavations at the Dillard site. We used nondestructive, portable XRF spectroscopic analysis to determine the elemental composition of the paint on each sherd (Schleher 2012). We analyzed 16 sherds from the Dillard site. There was some chemical variation in the sherds tested from the Dillard site, but the highest chemical concentration was for iron on all sherds, suggesting that iron oxide or hematite was used by potters for pottery pigment at the Dillard site.

Shaped Sherds

In Crow Canyon's analysis system, "shaped sherds" are sherds that were modified on all edges, unlike "modified sherds," which were shaped along only one edge. Modified sherds are discussed in the following section on pottery production, because many modified sherds are used as scrapers in the manufacture of pottery (Waterworth and Blinman 1986). Shaped sherds might have been used for any one of various possible functions or for multiple functions; many are inferred to have been pendant blanks, gaming pieces, pot lids, or offertory items (e.g., Hubbell and Traylor 1982; Scheick 2002; Wilson 2009). Their use need not have been strictly utilitarian; therefore, to help identify possible special uses of, or specialization within, different settlements, we present data for shaped sherds by site (Table 24.7).

Although shaped sherds were found at most of the Basketmaker Communities Project sites, the overall count (N = 42) of shaped sherds for these sites is lower than for other, more recent sites in the area. For example, Goodman Point Pueblo, which dates to late in the Pueblo III period (A.D. 1150–1300), had 65 shaped sherds (Schleher 2017). Most shaped sherds were made of local white ware (N = 28, or 66.7 percent), but a few were made from gray ware (N = 10, or 23.8 percent) or local red ware (N = 4, or 9.5 percent). The counts of shaped sherds are presented relative to the weights of gray ware sherds for each site. The Basketmaker Communities Project sites are ranked; the site with the greatest number of items per kilogram of corrugated sherds received a rank of 1. The highest ranked sites, 5MT10686, 5MT10648, 5MT10687, and 5MT2037, are the four sites that are part of the Hatch group and primarily date to the Pueblo II period.

Shaped sherds by temporal phase from all Basketmaker Communities Project sites are presented in Table 24.8. The counts of shaped sherds are very low for all Basketmaker III temporal phases but are much higher for the late Pueblo II/early Pueblo III period. This mirrors the patterns shown in Table 24.7, which shows that sites that date to the more recent Pueblo periods have the higher ratios of shaped sherds to kilograms of gray ware pottery. Because shaped sherds are interpreted as primarily non-utilitarian, the ranking for the late Pueblo II/early Pueblo III sites suggests that these more recent sites contain relatively more special-use pottery artifacts than the Basketmaker III period sites. This likely reflects temporal changes in the activities in which these special-use artifacts were used, with the activities increasing through time, as well as the increased availability of pot sherds on later sites.

Most shaped sherds were found outside of structures (N = 35). Only three shaped sherds were recovered from public architecture contexts and four from permanent housing.

Pottery Production, Design, and Exchange

Evidence of pottery production and exchange is important for interpreting household and community economics and for inferring connections among groups that lived on a landscape. Direct evidence of pottery production at Basketmaker Communities Project sites includes the presence of manufacturing tools, potting clay, unfired or unfinished vessels, and *pukis* (usually partial vessels or vessel bases used to begin the process of coiling potting clay). Direct evidence of pottery production also includes identification of locally available raw clays or temper and connecting these locally available raw materials to the archaeological pottery sherd sample through compositional analyses. Pottery design choice also reflects elements of pottery production, and a detailed design study will be discussed in this section. Pottery exchange is also identified through the analysis of compositional material such as temper and the presence of nonlocal pottery types and wares.

To address the broader research questions of the Basketmaker Communities Project (see Chapter 2, this volume), especially the questions that relate to social integration across the community, we need to have a framework for connecting the material correlates (in this case, pottery) we see archaeologically to social behavior. To move beyond typology alone, we use a communities of practice approach. Many archaeologists use the concept of community of practice to better understand learning in archaeological contexts (e.g., Cordell and Habicht-

Mauche 2012; Eckert 2008; Habicht-Mauche et al. 2006; Larson et al. 2017; Minar and Crown 2001; Neuzil 2008). A community of practice involves "participation in an activity system about which participants share understandings concerning what they are doing and what that means in their lives and for their communities" (Lave and Wenger 1991:98). For pottery production, a community of practice is the social group in which potters learn to make pots.

Pottery is an ideal medium to look at learning choices because it is an additive and complex technology in which there are a wide range of viable choices that can produce an equally successful pot. As archaeologists, we can look at the choices that potters (and at the community level, potters' community of practice) make at each stage in the production process; those choices reflect elements of learned pottery-making traditions. In this section, we outline a number of steps in the production process for pottery from the Basketmaker Communities Project, including materials selection and processing (through studies of temper and paste composition) and decorative design choice.

Pottery-Production Identification through Pottery-Making Artifacts and Raw Materials

The quantity and distribution of pottery-making artifacts can be used to infer how pottery manufacture was structured and where it occurred. Large quantities of manufacturing artifacts or amounts of potting clay in discrete contexts might indicate specialization of pottery production, whereas wide distribution of these artifacts across sites and contexts argues for household-level, nonspecialized production. Previous studies for more recent Pueblo period sites, such as Goodman Point Pueblo (Schleher 2017) and Sand Canyon Pueblo (Till and Ortman 2007), in the central Mesa Verde region have supported the latter of these two possibilities. The results of most such studies suggest that pottery was manufactured at the household level and that this activity was not a specialized craft undertaken by specific corporate groups (Schleher 2017; Till and Ortman 2007). Here we explore the evidence of pottery-making artifacts in the Basketmaker III period to determine whether similar patterns are present.

Table 24.9 displays counts or weights, as appropriate, for artifacts and samples thought to be associated with the manufacture of pottery. Twelve of the 13 Basketmaker Communities Project sites display some evidence of pottery manufacture; the only one that does not is 5MT10718. Excavations at 5MT10718 produced a relatively small amount of gray ware pottery, only 632 g. Thus, it is not surprising that no artifacts associated with pottery manufacture were recovered at this site.

The quantity and diversity of pottery-production artifacts follow closely the weight of gray ware pottery recovered by site. Using the weight of gray ware pottery as a proxy for the volume of area excavated and the overall quantity of artifacts recovered, it appears the number and diversity of pottery-manufacturing tools is largely a function of the volume of area dug at each site and the general richness of the overall assemblage. This suggests that pottery was manufactured at virtually all of the sites tested, and that this activity was probably structured at the household level.

The number of modified sherds per kilogram of gray ware pottery is significantly larger for the sites that are part of the Hatch group: 5MT10684, 5MT10686, 5MT10687, and 5MT2037. Over

90 percent of the 165 modified sherds recovered from the Basketmaker Communities Project sites come from these four sites, which date to the late Pueblo II and early Pueblo III periods. These data indicate that modified sherds are not a significant part of the artifact assemblages in the Basketmaker III period. Because most of the other Basketmaker III period sites excavated do have evidence of pottery manufacture, indicated by the presence of pottery-making materials, tools, and unfired sherds, these data suggest that modified sherds may not have been as important in pottery manufacturing during the Basketmaker III period as they became in the Pueblo II or Pueblo III periods. Other tools were likely used for scraping pottery, perhaps perishable tools such as gourd scrapers, which are no longer present in the archaeological record of the Basketmaker III period artifact assemblages.

A few of the unfired sherds recovered from Basketmaker Communities Project sites require further discussion because they were tempered with plant fibers, unlike all the fired pottery sherds recovered from Basketmaker Communities Project sites. One group of unfired sherds, found on the bench surface of Structure 220 at the Dillard site (5MT10647: PD 627, FS 2 and 3, PL 18), represent one unfired vessel tempered with plant fibers. The form of this vessel appeared to be a large bowl or tray. Unfired sherds from a similar vessel, also with charred plant fibers as temper, were recovered from the roof fall of Structure 101 at the Ridgeline site (5MT10711: PD 55, FS 53, PL 257). These types of vessels have been recovered from many Basketmaker III period sites across the Four Corners region (e.g., Hensler 2019; Morris 1927; Reed 1998; Reed et al. 2000). When first identified by Earl Morris (1927), these bowls or trays were connected to the beginning of pottery production on the Colorado Plateau. Since then, their use has instead been identified as connected to specialized food processing and not connected to pottery making (e.g., Reed et al. 2000). Reed (1998:2–3) suggest that these types of vessels were used to prepare foods that did not involve direct exposure to fire, such as parching seeds or winnowing.

Other artifacts that were fashioned of clay were identified in the assemblage from Basketmaker Communities Project sites and may also relate to pottery production. Table 24.10 provides the locations of recovery for all 33 of these artifacts found at Basketmaker Communities Project sites. These items are not included in Table 24.9, because the uses of many of the artifacts in this category are unclear. Approximately three-fourths of the items could have functioned as clay "tests." These items are probably indicative of pottery production and were found in many of the sites in a variety of contexts. Two pipes, which are classified as "other ceramic artifacts" in the Crow Canyon system (Ortman et al. 2005) are discussed in a section on pipes below.

Pottery Production and Exchange Seen through Composition and Trade Wares

Most evidence of pottery exchange is provided by the composition of vessels or sherds. Vessels made using clay or tempering materials that were not found locally or semi-locally are thought to have been traded or brought into the area from elsewhere. Alternatively, particular types of pottery, such as red ware, are also thought to have been produced in specific areas outside the study area and brought in via trade or population movement.

Pottery Materials Resource Survey

Crow Canyon lab staff, program participants, and interns conducted a pottery resource survey of a 0.8-km^2 area in upper Crow Canyon (Figure 24.1), adjacent to Indian Camp Ranch, collecting clay and temper samples and conducting experiments with the materials collected (Schleher et al. 2013). In total, 32 clay samples were collected (Figure 24.1). Multiple samples were taken from alluvial and geologic deposits to evaluate workability and compositional differences of raw clay materials available to potters in the Basketmaker Communities Project area. Six possible temper sources were located and collected. A seventh temper sample, igneous rock, was collected from outside the survey area. Igneous rock is available locally in the nearby Sleeping Ute Mountain area (Eckren and Houser 1965).

Sixty-four test tiles were made, with varying combinations of anthill sand temper, igneous rock temper, or untempered clay. Approximately two test tiles were made from each of the 32 clay sources collected. Each test tile was fired in an oxidizing electric kiln at 900°C for 30 minutes. To compare the archaeological sherd samples with the clays and tempers collected during the resource survey, a nip was removed from a sample of sherds from the Dillard site and refired to determine the final oxidized color of the archaeological sherd. This final refire color may reflect variation in compositional groups for the pottery sample based on variable amounts of iron in the clay. All rim sherds heavier than 5 g from the Dillard site (5MT10647) had nips removed and refired, resulting in a refire sample of 421 sherds. Munsell color was recorded for all fired test tiles and refired sherd nips (Table 24.11). Munsell colors were grouped to facilitate discussion, and this demonstrates that five refire paste colors are present: red/orange/brown, white/off-white, tan, buff, and gray. All five color groups are present in both the archaeological pottery sherd sample and in the test tile sample, which indicates that clays were available locally to produce all the archaeological pots in the sample from Dillard. Because the refired pottery sherds and test titles are similar in color, this indicates that our resource survey may have located some of the clay sources, or at least the geologic formations of clays, used by potters at the Dillard site. In addition, the five color groups suggest that there may be compositional differences in the clays used by potters at the Dillard site.

Tables 24.12 and 24.13 present colors of the refired sample of pottery rim sherd nips from the Dillard site by time period and by structure function. The four most common refire Munsell color groups, buff, red/orange/brown, tan, and white/off-white/pinkish, are present in all temporal phases at the Dillard site, except for the early Basketmaker III phase. The early Basketmaker III phase is represented by just four sherds, which refire to three of the color groups. These data suggest that multiple clay sources were used throughout the occupation of the Dillard site, although the trend from middle to late Basketmaker III shows a slight increase in the predominance in the use of tan-colored clays (see Table 24.12).

Refire color of pottery sherds recovered from specific structure functional types at the Dillard site (see Table 24.13) shows that the majority of clay colors were found in each structure type. These data suggest that no specialization of pottery production occurred at the Dillard site as no one clay source was used to make vessels found in particular contexts. Different structure functional types show similar patterns seen through time in clay color used, with tan-colored refired sherds most common in all.

The clay resource survey and refiring of archaeological sherds from the Dillard site indicate that a range of local clays were available to residents at the Dillard site and that potters used the wide range of clays available in the local area. In the next sections, we explore the temper materials added to the clays and also the compositional variability illustrated by NAA of the combination of clay and temper used by potters in the Basketmaker Communities Project area.

Temper Analysis

Crow Canyon laboratory staff and volunteers identified the temper in a sample of sherds from Basketmaker Communities Project sites. The methods of temper analysis varied by site within the project. For all of the sites with primarily Basketmaker III period components, a detailed binocular microscope analysis was conducted and verified with petrographic analysis. This detailed analysis was done for all sites in the Basketmaker Communities Project, excluding the Hatch group sites. For the Hatch group sites, which primarily date to the late Pueblo II and early Pueblo III period, only binocular microscopic analysis was conducted, following the same temper analysis methods used in previous Crow Canyon projects (e.g., Schleher 2017; Schleher and Coffey 2018).

For the sites with primarily Basketmaker III period components, which excluded the four Hatch group sites, the temper analysis sample included all rim sherds, regardless of weight. This sample consisted of all 1,175 plain gray ware rims and all 351 white ware rims. The dominant, or most abundant, temper and any secondary temper types were recorded. Because the Basketmaker III period is the first period of pottery production in the central Mesa Verde region and Crow Canyon has not previously evaluated Basketmaker III period pottery in a large-scale project like the Basketmaker Communities Project, a detailed temper analysis that included both identification of temper via binocular examination and confirmation via petrographic analysis was conducted. Table 24.14 lists the detailed temper description and temper codes that were identified in the Basketmaker Communities Project sherds. A sample of 58 rim sherds were also analyzed through petrographic analysis to confirm and refine the binocular analysis temper identification (Britton 2014, 2016).

Table 24.14 presents dominant temper types from all sites, excluding the Hatch group sites, by plain gray ware and white ware. The most dominant temper for both plain gray ware (19 percent, N = 220) and white ware (20 percent, N = 291) is 1A, or mixed igneous rock. If all of the igneous rock temper codes are grouped, it is clear that igneous rock temper is the most common overall, with 61 percent (N = 718) of plain gray ware and 78 percent (N = 275) of white ware. Sand or sandstone temper categories, 2A, 2B, 2C, and 2D, are also prevalent. Over 32 percent (N = 386) of plain gray ware and 14 percent (N = 50) of white ware sherds have sand or sandstone temper.

Table 24.15 presents the dominant temper grouped by Basketmaker III temporal phase for rim sherds from all sites excluding the Hatch group. For plain gray ware rim sherds, the dominant temper changes over time. In the early Basketmaker III phase, sand/sandstone is most common. From the early Basketmaker III phase to the late Basketmaker III phase, the most common temper changes from sand/sandstone to igneous rock temper. For white ware rim sherds, the dominant temper also changes from sand/sandstone to igneous rock over time, but igneous rock temper is more common overall.

This shift from sand/sandstone to igneous rock temper is similar to shifts in pottery types and materials documented in other areas of the broader region, including the La Plata Valley and the Southern Chuska Valley. Wolky Toll and Dean Wilson (1999) identified a shift from sand to igneous rock, likely tied to the shift from brown wares to true gray wares in the La Plata Valley from early to late Basketmaker III. Similar patterns are seen in patterns documented by Reed (1998) and Trowbridge (2014:336) in the Chuska Valley. Closer to home, other archaeologists have seen similar types of temper used, such as at a single pithouse habitation (site 5MT11431) excavated by Woods Canyon near Pleasant View, Colorado. At this late Basketmaker III site (A.D. 675–725), igneous rock temper dominates the pottery assemblage, at 97.1 percent crushed igneous rock temper in the gray ware pottery assemblage (Fetterman and Honeycutt 1995:7–41). At Casa Coyote on White Mesa, Utah, crushed igneous rock is also the most common tempering material for the site (which dates to the late A.D. 600s; Hurst 2004). The preferred temper shifts over time in the Basketmaker Communities Project area in the same way it shifts in nearby regions and sites, with the first potters in the community favoring sand as a tempering agent and later potters preferentially selecting crushed igneous rock. Potters in the Basketmaker III period in the Basketmaker Communities Project area moved in the direction we see in many later Pueblo I and Pueblo II period sites in the area, where crushed igneous rock is a preferred temper (e.g., Errickson 1998).

Table 24.16 presents dominant temper categories for all rim sherds, excluding the Hatch group sites, by Basketmaker III structure function. Igneous rock is the most common temper material used in pottery sherds found in all structure functional types in the Basketmaker Communities Project area, with sand/sandstone as the second most common temper. One notable pattern in this data set is that pottery sherds with igneous temper are even more dominant in public architecture, with sand/sandstone-tempered sherds less common in this structure functional type. This may be connected to use of the great kiva at the Dillard site being focused on the later Basketmaker III phase, when igneous rock temper increases in dominance (see Table 24.14), or it may also be due to amounts of white ware bowls (see Table 24.5), with greater proportions of igneous rock temper, being more common in public architectural spaces.

The temper analysis for the Hatch group sites, 5MT10684, 5MT10686, 5MT687, and 5MT2037, was conducted using methods similar to those used for previous Crow Canyon projects, including Goodman Point Pueblo (Schleher 2017) and the Goodman Point Community Testing Project (Schleher and Coffey 2018). This sample consisted of all 191 rim sherds of corrugated gray ware and all 198 rim sherds of white ware bowls that weighed 5 g or more. The dominant, or most abundant, temper and any secondary temper types were recorded. Only the dominant temper is presented here. The most dominant temper of 12 temper types was recorded and, to facilitate discussion, these 12 types are grouped into four broader categories (Table 24.17). The dominant temper types present in this sample of white ware and corrugated gray ware sherds are presented in Table 24.18. Present in approximately 90 percent of the sherds, crushed igneous rock is the most common temper in the sub-assemblage of corrugated ware rim sherds; sherd temper is also common and is present in 60 percent of the white ware sherds in this sub-assemblage.

The binocular and petrographic temper analysis for the Basketmaker Communities Project sites show a diversity of temper materials selected by potters, especially in the early and mid-Basketmaker III phases. Through time in the Indian Camp Ranch community, potters tended to prefer igneous rock temper over other types, especially for gray ware pottery, as seen in the late Pueblo II and early Pueblo III predominance of igneous rock temper used in the manufacture of corrugated jars at the Hatch group sites. In sum, the clay resource survey, refiring of pottery sherds from the Dillard site, and the evaluation of tempering materials all indicate that potters in the Indian Camp Ranch community used a wide range of materials in their manufacture of pottery. We now turn to an evaluation of these same clay and temper materials through a chemical compositional analysis method, NAA, to determine the chemical variation in the materials used by potters at the Dillard site.

Neutron Activation Analysis

NAA is a bulk elemental chemical compositional technique, meaning that the compositional results from NAA reflect the combination of the clay and temper. NAA was selected as an analysis method for the Basketmaker Communities Project pottery to complement the refiring and temper analyses presented above to evaluate the combination of clay and temper in one analysis method. Because refire color groups are assumed to reflect variation in the chemical composition, at least as it reflects relative amounts of iron in the clay, NAA was used to test the patterns identified in refire clay groups and also in temper variation. NAA for this project was conducted at the Archaeometry Laboratory of the Research Reactor Center at the University of Missouri (Ferguson and Glascock 2017).

NAA was performed on 90 gray ware (Chapin and Indeterminate), 28 white ware (Chapin and Early White), and five brown ware rim sherds (N = 123) from the Dillard site (5MT10647). This sample selected for NAA analysis includes approximately 30 sherds from each of the four major refire color groups (buff, red/orange/brown, tan, and white/off white/pinkish). The gray color group is excluded due to low sample size. Within each color group, both major types of temper (igneous rock or sand/sandstone) are represented. Also, a range of pottery types was selected for each refire color group sample. The most common type is Chapin Gray in all samples, but Chapin Black-on-white and Early White Painted are included in each refire color group sample. A few brown ware sherds, made with alluvial or secondary clays, are also included. Three additional samples of possible unfired sherds are included in the NAA sample. Due to the small size of these unfired (or possibly just very low fired) sherds, they were not refired to determine their refire color. All three have some sort of temper and, due to their unfired state, may help with determining local production at the Dillard site. Each refire paste sample group includes sherds that were recovered from each of the three architectural blocks at the Dillard site. The 100 block includes the Dillard great kiva and other small rooms and features in the area of the great kiva. The 200 block includes pithouses, a small room, storage features, and middens in the block south of the great kiva. The 300 and 500 blocks include pithouses, storage features, and middens north of the great kiva.

NAA results show broad compositional similarities among all the samples regardless of ware, which suggests that potters generally used similar raw materials whether procured from the same source locale or from compositionally similar geologies (Ferguson and Glascock 2017). Yet, subtle intrasite variation is evident. Spatial patterns indicate similarity in pottery from all pit structures, including the great kiva, at the Dillard site (5MT10647). This suggests that either a single pottery-production group experimented with multiple pottery recipes or that there was extensive exchange of vessels within pottery-production groups in the village. Pottery associated with the great kiva is more tightly clustered compositionally, which suggests a narrower range of paste recipes in pottery deposited there (Ferguson and Glascock 2017; Schleher et al. 2018).

NAA concentrations reflect the composition of both the clay and temper. Overall, there is little separation due to temper, though sherds tempered with igneous rock have higher sodium (Na) concentrations than do sand-tempered sherds (Figure 24.2). Elemental concentrations compared with refire color show some variation, largely because of iron (Fe) content, between the red-orange and white color groups (Figure 24.3). The compositions of sherds classified as buff or tan were indistinguishable, and these refire color groups have been combined in Figure 24.3.

These analyses of temper and paste indicate that the community of practice for material selection and processing changes over time, with potters earlier in time selecting local geologic clays (likely from the same source through time) and adding sand and then changing just their temper from sand to crushed igneous rock. Because we have very minuscule amounts of brown ware pottery in the assemblage, which differs from other Basketmaker III period sites across other areas of the Colorado Plateau that date to the pre-A.D. 600s (Hensler 1999; Reed 1998; Toll and Wilson 1999; Trowbridge 2014), perhaps potters in our Basketmaker Communities Project area adopted gray ware technology more quickly than other Basketmaker III period potters. This may be due to the easily accessible nature of nice geologic clays close to the project area (Schleher et al. 2013). However, potters used sand temper in the early and middle periods of occupation in the Basketmaker Communities Project area, which makes these early gray wares more reminiscent of early brown wares, which would have had sand as the natural inclusions in the paste.

Nonlocal Pottery

Thirteen sherds collected from Basketmaker Communities Project sites were typed as nonlocal (Table 24.19). Nonlocal sherds compose less than one percent of the entire assemblage (by count), which suggests that few nonlocal vessels were present at these sites. All but one of these nonlocal sherds were recovered from the Hatch group sites.

Table 24.19 also presents quantities of nonlocal sherds produced per kilogram of gray ware sherds. This can be seen as the prevalence of nonlocal types relative to the total quantity of sherds recovered at each site. This table shows that the greatest ratio of nonlocal sherds per kilogram of corrugated gray ware (0.19) was found at 5MT10686; 5MT10684, 5MT10687, 5MT2037, and 5MT10647 yielded successively lesser quantities. Interestingly, four of these sites (5MT10686, 5MT10684, 5MT10687, and 5MT2037) consist of the Hatch group. The Hatch group sites date to the late Pueblo II and early Pueblo III periods. The only Basketmaker III period site with any nonlocal sherds is the Dillard site (5MT10647), with just one Lino Gray sherd. Together, these data suggest that residents of more recent sites obtained and used more nonlocal vessels than the earlier Basketmaker III phase sites in the Indian Camp Ranch community. This pattern has been documented in other communities, where Pueblo II period sites have higher ratios of nonlocal sherds (e.g., Arakawa and Merewether 2010; Till and Lyle 2015).

Some red ware sherds collected during the Basketmaker Communities Project are not represented in Table 24.19. Large quantities of red ware vessels were produced in southeastern Utah from about A.D. 750 until A.D. 1100 (Breternitz et al. 1974; Hegmon et al. 1997). Though red wares were probably made outside of the Indian Camp Ranch community, they were manufactured inside the central Mesa Verde region and so could be considered "semi-local" rather than nonlocal; this is an important distinction from the pottery types presented in Table 24.18. Among these, Bluff Black-on-red and other types of early red wares that were produced in southeastern Utah were present (see Tables 24.1 and 24.2) in the Indian Camp Ranch community. The presence of these sherds probably indicates trade with, or movement of, people from southeastern Utah between A.D. 750 and 1100 (Ortman et al. 2005).

Three sherds of Rosa Black-on-white were identified in the Basketmaker Communities Project pottery assemblage (see Table 24.1). Like red ware from southeastern Utah, Rosa Black-on-white vessels were likely made outside of the Indian Camp Ranch community but are made within the Mesa Verde region and can also be considered "semi-local." Rosa Black-on-white vessels originate from the Durango area of Colorado and areas to the south, including the Navajo Reservoir area of northern New Mexico (Wilson and Blinman 1993).

The one nonlocal sherd from Basketmaker III period contexts of the Basketmaker Communities Project is a Lino Gray sherd that was recovered from Structure 205-226, a double-chambered pithouse at the Dillard site, which dates to the mid-Basketmaker III phase. Lino Gray, which is similar to Chapin Gray in appearance, is differentiated from local Mesa Verde region gray ware by the presence of quartz sand temper (Colton and Hargrave 1937). Lino Gray was first used to describe early gray ware from the Tusayan region of northern Arizona, but has more recently been used to identify gray ware that comes from an extremely wide area, ranging from the Tusayan region to the Cibola region of northern New Mexico to the northern Rio Grande (Colton 1955; Colton and Hargrave 1937; Dittert and Plog 1980; Peckham 1992; Wilson 2010). Thus, this one sherd does not clearly indicate trade relationships with any specific area but was likely manufactured somewhere to the south of the Indian Camp Ranch community.

In addition to nonlocal and semi-local red ware pottery, potters in the Indian Camp Ranch community added red ochre to the exterior of some gray ware and white ware vessels, likely to make them appear more like red nonlocal or semi-local vessels. This treatment is called fugitive red. There are 239 sherds (0.005 percent) that have red ochre visible on their exterior surface in the pottery assemblage from the Basketmaker Communities Project. The majority of the vessels with fugitive red exterior surfaces are jars (N = 179, 74.9 percent), with bowls making up only 22.6 percent (N = 54) of the fugitive assemblage. Almost all (N = 222, 93 percent) of the sherds with fugitive red exteriors were recovered from contexts that date to the Basketmaker III period. There is an increase in counts of fugitive red sherds from the mid-Basketmaker III phase (N = 23, 9.6 percent) to the late Basketmaker III phase (N = 70, 29.3 percent), suggesting that this treatment of the exterior surface with ochre became more popular through time within the Basketmaker III occupation of the Indian Camp Ranch community.

Pottery Design Analysis

Pottery designs reflect different elements of the pottery-production system than less-visible technological elements like temper and clay discussed above. Because designs can be copied from pots themselves, they are not necessarily reflecting only communities of practice within one community but may reflect a broader shared identity (Larson et al. 2017:91). Building on the work of Linda Honeycutt (2015), we analyzed all local painted pottery in the Basketmaker Communities Project pottery assemblage. Honeycutt analyzed approximately 1,500 black-on-white bowls and bowl sherds from 76 sites in the Four Corners region and has identified nine distinct design motifs on Basketmaker III period pottery throughout the broader region (Honeycutt 2015).

For the Basketmaker Communities Project pottery sherds, we conducted a detailed analysis of every painted sherd for a number of design characteristics, including paint type, paint color, and average line width for painted lines, as well as analyzing for design motifs following Honeycutt's system. Of the 1,145 painted sherds from the Basketmaker Communities Project, 418 of them (37 percent) are painted with at least one of Honeycutt's (2015) identified design motifs. Most of the remaining painted sherds have a simple line of paint, often along the rim (45 percent of the painted sherds, N = 524).

Table 24.20 summarizes the total count and percentage of Honeycutt (2015) design motifs on painted white ware sherds from the Basketmaker Communities Project sites. Figure 24.4 depicts examples of the nine Honeycutt motifs on sherds from the Dillard site (5MT10647). The distribution of these design motifs across the community shows that many sites have all or the majority of motifs present in their pottery assemblage. If we consider the five sites with at least 15 sherds with Honeycutt motifs present, all sites have at least seven of the nine motifs present. These data indicate that the sites in the Indian Camp Ranch community interacted enough to share vessels and ideas about designs. This pattern also suggests that individual families or lineages (the likely residents of an individual pithouse, such as the Muller Little House [5MT10631]) used all of the design motifs themselves or traded with others in the local community for vessels with the whole range of designs.

To compare design use across the broader region, we examined decorated pottery sherds from the Payne site, 5MT12205. This site is a large hamlet site dating from approximately A.D. 600 to 610 (Wilshusen 1999:168), and it is located between Sandstone and Payne Canyons in Montezuma County, Colorado. It was excavated by Wichita State University in 1974–1975 (Rohn 1974). The site is located about 24 km from the Basketmaker Communities Project area. We evaluated all 127 painted sherds from the Payne site (5MT12205) and found that 48 (38 percent) of the sherds were decorated with Honeycutt (2015) motifs. Table 24.21 shows the counts of Honeycutt design motifs on sherds excavated from the Payne site. Eight of the nine motifs are present at the Payne site. This indicates that, like the residents of the Indian Camp Ranch community, potters at the Payne site participated in the same community of practice for pottery design and were a part of the same broad social network across the Basketmaker III communities of the Four Corners region.

In addition to all the Honeycutt design motifs being found across the spatial extent of the community and beyond to the Payne site (5MT12205), the designs are all present for much of the occupation of the community. Table 24.22 present the Honeycutt design motifs by Basketmaker III temporal phase. The data in this table show that the range of design motifs in the mid-Basketmaker III phase and the late Basketmaker III phase are the same. Although there are some changes in the predominance of some of the designs, all nine of the motifs are present in both the middle and late Basketmaker III phase. This indicates that in the Basketmaker Communities Project area, there are not clear temporal trends in the use of particular design motifs.

Table 24.23 depicts the dominant temper for sherds with Honeycutt design motifs from all sites in the Basketmaker Communities Project. The three most common temper materials—igneous rock, sand, and clay pellets—are present in sherds with Honeycutt design motifs. The proportions of these three temper types in the Honeycutt design motif sherds are very similar to the overall percentages of temper in Basketmaker III period white ware pottery from the project area (see Table 24.15), with igneous rock consisting of approximately 79 percent of both sub-assemblages. Because all three of the major temper categories are present in the sherds with Honeycutt design motifs, it is unlikely that just one pottery-production group made painted pottery. In addition, the majority of the nine design motifs are present on sherds with all three temper varieties. This pattern indicates that all potters, regardless of the clay and temper recipe they selected, used all of the design motifs identified by Honeycutt.

Honeycutt (2015) design motifs are found in a wide range of the types of structures across the Basketmaker Communities Project area as well. Table 24.24 presents Honeycutt design motifs by Basketmaker III structure function. All nine motifs are found in permanent housing and public architecture, and most are found in temporary housing and specialized activity spaces as well. It is notable that, even when few motif-painted sherds are present, a range of the design motifs occur. This ubiquity across multiple functional spaces suggests that particular designs are not associated with specific activities.

Discussion of Pottery Production, Design, and Exchange

We identified a range of materials used in vessel manufacture that indicate potters were using a variety of clays from both alluvial and higher-quality geologic sources and different tempering materials, including multi-lithic sand, crushed igneous rock, and sandstone. The variety in raw materials suggests experimentation with different materials, as potters tried to perfect the new technology. We identified many sources of local clay, both alluvial and geologic clays, which may have been used by potters during this experimentation phase.

These analyses of temper and paste indicate that the community of practice for material selection and processing changes over time, with potters earlier in time selecting local geologic clays (likely from the same source through time) and adding sand and then changing just their temper from sand to crushed igneous rock. Because we have very minuscule amounts of brown ware pottery in the assemblage, which differs from other Basketmaker III sites across other areas of the Colorado Plateau that date to the pre-A.D. 600s (Hensler 1999; Reed 1998; Toll and Wilson 1999; Trowbridge 2014), perhaps potters in our Basketmaker Communities Project area adopted gray ware technology more quickly than other Basketmaker III period potters. This may be due to the easily accessible nature of nice geologic clays close to the project area (Schleher et al. 2013). However, potters used sand temper in the early and middle periods of occupation in the Basketmaker III period in the project area, which makes these early gray wares more reminiscent of early brown wares, which would have had sand as the natural inclusions in the paste.

The design motif patterns in the Basketmaker Communities Project area reflect a single community of practice for design execution and use, suggesting close connections among residents of the communities' different sites. There is also no change through time in the design execution community of practice, which differs from the community of practice for tempering materials used, which *does* change from sand to crushed igneous rock over the Basketmaker III period.

For both raw material selection and design execution, all the sites in the Basketmaker Communities Project area are united in a single community of practice for pottery production. This suggests close communication and collaboration across the community. In addition, all of the design motifs used by potters in the project area are the same, limited number of design motifs used by potters throughout the broader Four Corners region (e.g., Honeycutt 2015), suggesting close connections or at least intense enough interactions to create an identical community of practice for designs across the entire region, of which the Basketmaker Communities Project area residents were an active part.

Pottery Vessels

Only seven vessels that meet Crow Canyon's criteria for whole, partial, or reconstructible vessels were recovered from Basketmaker Communities Project sites. Table 24.25 and Table 24.26 list these vessels with their context of recovery and typological and metric data. The greatest quantities of such vessels were found at the Dillard site (5MT10647, N = 3, or 42.9 percent). One vessel each (14.3 percent) were found at 5MT10686, 5MT10687, 5MT10709, and 5MT10711. Only the effigy vessel, in the shape of a duck, from the Badger Den site (5MT10686), is complete.

Most (N = 4) vessels are partial; therefore, not all metric data are available for every vessel. All but two of the vessels (N = 5, or 71 percent) are Chapin Gray or Chapin Black-on-white white wares dating to the Basketmaker III period. Two vessels, from two of the Hatch group sites (5MT10686 and 5MT10687) date to the Pueblo II or Pueblo III period. The most abundant form of vessel is the jar (N = 5, or 71 percent), with a variety of types of jars present, including an olla, a duck effigy jar (Figure 24.5), a standard jar form, and a seed jar. Two bowls (29 percent) and one ladle (14 percent) are also present. One jar, a miniature seed jar (Vessel 1 from 5MT10711; Figure 24.6), is unusual—it has a hole in the side that was created when the vessel was being formed that might have originally been a spout or hollow handle on the side of the vessel similar to a vessel depicted by Breternitz and colleagues (1974:Figure 2d).

The reconstructible vessels were recovered from a wide range of contexts. The Basketmaker III period vessels were recovered from the great kiva at the Dillard site (Vessels 2 and 3 from 5MT10647), earth-walled pit structures (Vessel 1 from 5MT10709 and Vessel 1 from

5MT10647), and a nonmasonry surface room (Vessel 1 from 5MT10711). Figures 24.7 and 24.8 show the two Chapin Black-on-white bowls recovered from the great kiva at the Dillard site (5MT10647). These two bowls were reassembled from a wide area across a surface in the great kiva, which suggests that the vessels were broken and intentionally scattered across the surface (see Chapter 5). Vessel 1 from Portulaca Point (5MT10709; Figure 24.9) was recovered from the floor of an earth-walled pit structure that was burned. This vessel was unique for this project because it was broken, but virtually intact, and was filled almost completely with burned purslane or *Portulaca* seeds (Beresh et al. 2016). The Pueblo II and Pueblo II period vessels were recovered from a masonry surface structure (Vessel 1 from 5MT10686) and a noncultural area (Vessel 1 from 5MT10687).

Vessel form and any use ware on the vessel can assist in the identification of how the vessel was intended to be used and how it was actually used during the vessel's use life (Rice 1987; Shepard 1956). Use ware and vessel form are listed in Table 24.27 for the seven reconstructible vessels from the Basketmaker Communities Project sites. Ollas, with narrow necks, are often identified as storage or carrying containers due to smaller openings allowing for contents to stay more secure than in open forms. The wider openings on bowls and wide-mouth jars allow for easier access but are not useful as storage containers because their contents can spill more readily. The use wear recorded for the reconstructible vessels from the Basketmaker Communities Project yields some insight into vessel use. The one large olla from the Dillard site (Vessel 1) has striations on the shoulder of the vessel, which may indicate tipping of the vessel to access contents, suggesting use as a storage vessel. The two bowls from the Dillard site have different use wear, with Vessel 2 presenting wear on the exterior of the base and Vessel 3 with use wear on the rim. The bowl with rim abrasion suggests that a dipper or ladle was used to remove contents from the bowl and, thus, supports the interpretation of this bowl as a serving vessel. The interpretation of use based on ware on the base of a vessel is less straightforward. This wear could result from any use that involved moving the vessel around on a surface, which could result from serving food from the vessel or storage with frequent access of the vessel that involved moving the vessel to retrieve its contents. This bowl and three of the various types of jar forms exhibit use wear on their exterior bases. The ladle from 5MT10687 has moderate abrasion of the rim, suggesting its use consisted of scooping contents out of another container.

Reconstructible Vessels from 5MT10678

An additional Basketmaker III period habitation site, with one double-chambered pithouse and a small surface storage room, was excavated on Indian Camp Ranch in 2018 and 2019. This site, 5MT10678, was excavated by private landowner Laura Watson, under the direction of Woods Canyon and archaeologist Jason Chuipka (Hampson and Chuipka 2020). Over 26 reconstructible vessels were recovered from the floor of the pit structure at 5MT10678. Because of this great quantity of vessels that could provide greater insight into vessel function, use, and manufacture, Crow Canyon subcontracted with Woods Canyon to analyze these vessels.

Site 5MT10678 is located near the center of Indian Camp Ranch. The site is close to other Basketmaker III period sites excavated by Crow Canyon, including Portulaca Point (5MT10709). All 26 of the reconstructible vessels were recovered from surface contexts and the fill above the floor of the main chamber of the double-chambered pithouse at 5MT10678 (Hampson and

Chuipka 2020:Figure 11). The vessels were recovered from across much of the surface of the pithouse, with many found in two large clusters—one cluster of 10 vessels just to the northeast of the west wing wall and another cluster of six in the northeast corner of the pithouse just outside of a storage feature filled with burned corn.

Morphological and metric data for the reconstructible vessels from 5MT10678 are presented in Table 24.28. Seventeen of the 26 vessels were complete or nearly complete and were reconstructed by landowner Laura Watson. The assemblage consists of 14 seed jars (54 percent), five ollas (19 percent), four bowls (15 percent), and three jars (12 percent). The vessels range in size from miniature, with a total volume of 160 milliliters to large, with the four large ollas having an average total volume of 30,250 milliliters. Most seed jars are classified as medium, and the seven medium seed jars where volume could be measured have an average volume of approximately 4,600 milliliters.

The pottery type for the vast majority of the vessels is Chapin Gray, accounting for 21 (81 percent) of the vessels in the assemblages. One vessel is classified as Indeterminate Gray Ware, Polished. This type is a variant of a Chapin Gray vessel, with this classification used to separate unpolished vessels from highly polished vessels. All seed jars, jars, and ollas are Chapin Gray or Indeterminate Gray Ware, Polished. Three of the four bowls in the assemblage are Chapin Black-on-white, and the remaining bowl is a Basketmaker mud ware vessel.

Table 24.29 outlines the use wear identified on the 26 reconstructible vessels from 5MT10678. Most of the vessels exhibited some type of use wear. More than 60 percent (N = 16) show some evidence of burning of the pit structure that occurred at the end of the use life of the structure. Eight vessels, or 31 percent of the assemblage, show moderate to heavy abrasion, indicating heavy use. Only four vessels (15 percent) have evidence of sooting that appears to be connected to the vessel being used as a cooking vessel. Eight vessels (31 percent of the assemblage) show no evidence of use, although some of these vessels do show evidence of the structure fire.

Evaluating use wear present on different vessel forms recovered from 5MT10678 can shed light on the functions and activities of particular vessels forms. All but one of the bowls in the assemblage show evidence of use in the form of abrasion on both the interior and exterior of the vessels. One of the bowls has evidence of abrasion on the rim. These use ware data for bowls supports the interpretation of bowls as serving vessels, with evidence of use on the interior surface indicating scooping something out of the bowls with hands or other implements, like a gourd or pottery ladle. Wear along the rim could also suggest use as a serving vessel, if the implement to remove food from the vessel touched the rim as food was removed. In addition, it is possible that the bowl with the abraded rim might have been used as a dipper for serving food or water, resulting in wear along the rim, as is present on one bowl in the assemblage (Vessel 26).

Most of the large ollas had moderate use wear, in the form of abrasion on the base, rim, or sides. Two of these large ollas also show an interesting pattern of burning, with a circular shape burned into the side. This burning does not seem to be sooting from use over a hearth, but rather appears to be where a pot rest, made of some organic material, burned out from under the vessel when the pit structure burned. It is also interesting that this burned circle does not occur on the base of the vessel, where a pot rest might be expected, but on the side of the vessel (Figure 24.10). These large ollas, with a range of volume from 25,000 to 36,000 milliliters, would have been very difficult to move or lift when full. The presence of this burn mark on the side of the vessel likely indicates that the vessels were used on their side, so that they could easily be tipped over to remove contents, rather than having to move the vessel completely or lift it to remove the contents (see Figure 24.10). This unique burning pattern on the sides of two of these vessels, their large size, and lack of sooting all point toward an interpretation of large ollas being used as storage for water or food stuff that could be poured out by tipping the vessel.

Seed jars from 5MT10678 range in size from miniature to large, with the majority classified as medium. Seed jar forms exhibit a range of use-wear types, from sooting to heavy abrasion on the base or rim. Seed jar forms can be used for a variety of purposes, but the globular shape works well as a cooking pot because the shape makes the vessel strong when subjected to repeated thermal stress (Skibo and Blinman 1999). The seed jars from 5MT10678 seem to have been used for cooking, as evidenced by exterior sooting and also spalling that might have resulted from repeated heating episodes. They may also have been used for storage, as shown by rim abrasion on one seed jar vessel that might be from the use of a lid over the opening, with repeated opening and closing resulting in abrasion (Vessel 15).

In addition to measuring morphological characteristics and use ware on the reconstructible vessels from 5MT10678, we also conducted temper analysis and refire analysis on the vessels where a fresh break was visible or where a sherd could be removed. For the temper analysis, we used the same temper categories as presented above in Table 24.14. For the refire analysis, a small nip was removed from a sherd from each vessel and was refired to 900 degrees in an oxidizing kiln for 30 minutes to fully oxide the clay. The results of the temper analysis and refire study are presented in Table 24.30. The pots recovered from 5MT10678 are made with the same raw materials used at other sites across the Indian Camp Ranch community, as shown through the temper and clay data. The temper used in the 5MT10678 vessels is primarily igneous rock (N = 19, 83 percent), with some sand/sandstone (N = 3, 13 percent) and one vessel containing plant fiber and sand (4 percent). These proportions of temper are most similar to the pattern documented for other sites across the Indian Camp Ranch community during the late Basketmaker III phase (see Table 24.15). The refire analysis show that most pottery nips from the vessels recovered from 5MT10678 refired to a tan color (N = 14, 67 percent), with red/orange/brown less common (N = 6, 29 percent) and one example of white/off-white/pinkish (5 percent). These refire results are match with the patterns presented above for other Indian Camp Ranch community clay colors and, like the temper data, match very closely with the pattern in refire colors for the late Basketmaker III phase (see Table 24.12).

Vessel 18, a Basketmaker mud ware, basket-impressed bowl, is similar to unfired sherds recovered from the Dillard site and the Ridgeline site discussed above in the section on pottery-production evidence and tools. This vessel was tempered with grass or juniper bark, similar to other vessels found across the Colorado Plateau (e.g., Hensler 2019; Morris 1927; Reed 1998; Reed et al. 2000). As discussed above, these types of vessels were first thought to be tied to the beginnings of pottery making (Morris 1927) but have since been identified as connected to specialized food processing and not connected to pottery making (e.g., Reed et al. 2000). Reed (1998:2–3) suggest that these types of vessels were used to prepare foods that did not involve direct exposure to fire, such as through parching seeds or winnowing. The context of recovery for the bowl from the 5MT10678 site suggests something other than this type of food preparation because it was plastered into a feature and could not have been used for parching or winnowing. It is possible that it was used to form pottery vessels, although the large fillet at the rim of Vessel 18 might have made use as a *puki* unlikely.

In sum, the whole vessels recovered from 5MT10678 yield insight into pottery production and use through analysis of a larger assemblage of Basketmaker III vessels than found at any other site excavated in the Indian Camp Ranch community. The 26 vessels were used for a wide range of activities, from storage, to cooking, to serving, to, perhaps, specialized food processing. Use wear identified on vessels from 5MT10678 match examples of use wear on vessels from other sites excavated across Indian Camp Ranch (see Table 24.27) and suggest similar function and use of pottery vessels across the community. Pottery-production evidence produced by temper and refire analyses indicate potters across Indian Camp Ranch were using similar materials for making their vessels. Design analysis, which was conducted on the three Chapin Black-on-white bowls found at 5MT10647, showed that potters at 5MT10647 used some of the same designs found at other Indian Camp Ranch community sites (Honeycutt design motifs 5, 7, and 8 were present at 5MT10678).

Because of the high number of vessels recovered, it is possible that potters at this small hamlet were making pots for themselves and, perhaps, others in the community. Such pottery-production sites have been identified in other areas of the Colorado Plateau, such as at Chaco Canyon. Within Chaco Canyon, a Basketmaker III period site with clear evidence of pottery production, seen in unfired vessels, caches of raw materials, and pottery-production tools, was recently excavated (Hensler 2019). Other Basketmaker III period sites in Chaco have produced large numbers of whole vessels, with less clear evidence of pottery making, such as pithouse A at 29SJ299, although most Basketmaker III period sites within Chaco Canyon do have some evidence of pottery production (Windes 2015). Most of the sites excavated as part of the Basketmaker Communities Project have evidence of pottery making, with unfired sherds, raw clay, or pottery-making tools present in their assemblages (see Table 24.9). The excavation methods at 5MT10678 were different from methods used at other sites in the Indian Camp Ranch community, and it is not clear whether these materials were present. The clear use wear on a majority of the vessels at 5MT10678 suggests the vessels were in use by the residents of the site, although some without clear use wear could have been recently made and may have been planned for trade to others in the community.

Summary of Pottery Data for the Basketmaker Communities Project

In the preceding sections, pottery has been discussed as a means of dating sites and contexts, understanding local technological change, and assessing patterns of production and exchange at different social and spatial scales. Data for Basketmaker Communities Project sites both support and challenge the findings of previous studies and cumulatively reflect an intensive occupation of the Indian Camp Ranch community in the Basketmaker III period and again in the late Pueblo II and early Pueblo III periods.

Compositional analysis of pottery from Basketmaker Communities Project sites shows that both gray and white ware vessels were made with sand in the earliest periods of production, but temper changed to crushed igneous rock by the end of the Basketmaker III period. Most decorated white ware sherds in this assemblage were decorated with mineral paint and were tempered with either sand or igneous rock temper (in the Basketmaker III period) or sherd temper (in the late Pueblo II and early Pueblo III periods). Clays and temper identified in the sherds are both available locally. Thus, most vessels were probably manufactured locally.

Basketmaker III potters in the Indian Camp Ranch community participated in a single community of practice for material selection, production, and decorative designs of pottery. This suggests close relationships across the community. Although almost no nonlocal pottery was recovered from the Basketmaker III period contexts of the Indian Camp Ranch community, we see connection to the broader Four Corners Basketmaker III period social networks in virtually identical designs being used by potters to decorate their pots. Now we turn to the other major artifact category, chipped-stone artifacts, which show more details of the broader connections the Indian Camp Ranch community residents had across the Pueblo world and beyond.

Chipped-Stone Artifacts

This section summarizes data for chipped-stone tools and associated debris collected during the Basketmaker Communities Project. Chipped-stone artifacts consist of complete and fragmentary stone tools as well as debris from chipped-stone tool manufacture, which is called debitage. Specific types of artifacts discussed here consist of bifaces, projectile points, drills, modified cores, other chipped-stone tools, and debitage. These artifacts were analyzed in accordance with the Crow Canyon Laboratory Manual (Ortman et al. 2005). In addition to the traditional analyses outlined in the laboratory manual, we analyzed additional attributes on cores (Cochran and Lorusso 2015). These data provide information about raw materials used to manufacture stone tools, the types of tools and activities represented by the assemblage, and the exchange of stone resources across broader landscapes.

Lithic Raw Materials

The types of lithic materials recovered during excavation can be grouped into four broad categories: local, semi-local, nonlocal, and unknown types (Tables 24.31 and 24.32). Local types of stones are discussed in more detail elsewhere (Gerhardt 2001; Ortman 2000:par. 92–94), but these types of stones are generally found in bedrock formations in the nearby landscape. Specifically, exposed geological strata in nearby canyons (e.g., Alkali Canyon) provide lithic materials from the Morrison and Dakota Formations. Fine-grained and conglomerate sandstones are also present in these canyon settings, whereas igneous rocks outcrop nearer to, and on, Sleeping Ute Mountain to the south. Slates and shales from the Mancos Formation are also exposed nearby, generally in uplifts or near canyon heads. Though the quality of these local stones varies somewhat by specific source and composition, most of these materials are of average or relatively poor quality for producing stone tools.

Semi-local lithic materials are less evenly distributed on the landscape and can be present at greater distances than local lithic materials. Some semi-local lithic materials, such as agate/chalcedony and petrified wood, are occasionally present in more proximate geologic strata such as the Morrison or Dakota Formations. Brushy Basin chert, a fine-grained banded chert, is found in some portions of the Morrison Formation and has a few quarry sites in southwestern Colorado; one quarry site is documented about 53 km to the southwest of the Basketmaker Communities Project area, near the Four Corners Monument. Burro Canyon chert has at least one documented quarry located on Cannonball Mesa about 29 km west of the Basketmaker Communities Project area, although geologic strata containing this type of stone are also exposed in many nearby canyons.

Nonlocal types of stone were brought into the area from much greater distances. Many Utah, Arizona, and New Mexico materials have a significant presence in the assemblage with a few examples from the Durango, Colorado, area. The nonlocal lithic material amounts to 1 percent of the entire Basketmaker Communities Project chipped-stone assemblage. The nonlocal lithic material types identified from the Basketmaker Communities Project sites include Narbona Pass chert, obsidian, red jasper, Cheese and Raisins chert, Pigeon Blood agate, Honaker Trail chert, Mosca chert, and McDermott metaquartzite.

Narbona Pass chert is a waxy, pale orange-pink or salmon-colored chert from the Chuska Mountains along the border between Arizona and New Mexico (Ortman et al. 2005). This is a very common material type found in Chaco Canyon dating back to the Basketmaker III period (Cameron 2001). This material was moved a great distance (almost 100 mi) from the lithic source to the Basketmaker Communities Project sites. The highest count of Narbona Pass chert artifacts is from 5MT10647 and may indicate a connection between this site and the contemporaneous Basketmaker III populations at the Chuska Mountains and possibly Chaco Canyon.

Obsidian, a type of volcanic glass, is found in many places in the Southwest. Twenty-six pieces of obsidian were sourced using XRF analysis at the Geoarchaeological XRF Lab (Shackley 2013, 2015, 2017). Most of the obsidian from this project originated from sources in northern New Mexico (Jemez Mountains and Mount Taylor), though some obsidian artifacts originated from sources in northern Arizona (Government Mountain, N = 1) and western Utah (Wild Horse Canyon, N = 1). Table 24.33 presents data for all obsidian artifacts from the Basketmaker Communities Project sites that have been sourced to location. These data indicate that most of the obsidian collected from these sites originated from the Jemez Mountains (El Rechuelos N = 11, Valles Rhyolite [Cerro del Medio] N = 4, total N = 15) and Mount Taylor (Grants Ridge N = 4, Horace/La Jara Mesa N = 5, total N = 9) sources.

Most of the obsidian collected from Basketmaker Communities Project sites, and all of the formal obsidian chipped-stone tools, were recovered from 5MT10647. The obsidian assemblage at 5MT10647 shows a higher ratio of finished tools to flaking debris compared to the local material assemblage. The obsidian artifact sample size is small but seems to follow general trends in the transport of finished obsidian tools into the Mesa Verde region during the Basketmaker III (Arakawa et al. 2011).

Jemez Mountains obsidian, particularly the El Rechuelos source, is typical of Basketmaker II and III procurement patterns in the Four Corners region (Arakawa et al. 2011; Shackley 2013, 2015, 2017). Mount Taylor obsidian is a little more unusual during the Basketmaker III in the Mesa Verde region but is a common obsidian type found in Basketmaker III contexts at Chaco Canyon (Tom Windes, personal communication 2019). Government Mountain obsidian is present in the Mesa Verde region during the Basketmaker III period but more uncommon in later Pueblo contexts (Arakawa et al. 2011). The presence of Wild Horse Canyon obsidian from western Utah is rare in the Mesa Verde region. The Government Mountain and Wild Horse Canyon sources are located the farthest from the project area. Samples from both of these sources were found at 5MT10709, a hamlet site dating to the mid-Basketmaker III phase. This could suggest that the population at this site may have had some broader-reaching connections than other small hamlet sites in the Basketmaker Communities Project.

Red jasper, Cheese and Raisins chert, Pigeon Blood agate, and Honaker Trail chert originate from sources located primarily in southeastern Utah. Some of these sources are located approximately 50 to 150 miles from the project area. Cheese and Raisins chert, Pigeon Blood agate, and Honaker Trail chert are less common nonlocal material types and are coded as nonlocal chert/siltstone in the database with each type named in the comments. Red jasper is a nonlocal lithic material coming from the Triassic and Permian formations of the Monument Upwarp and the Elk Ridge Uplift, west of Comb Ridge in southeastern Utah. However, one quarry site (5MT4818) containing red cryptocrystalline material has been located in Cow Canyon, new Lowry Ruins in southwestern Colorado (Arakawa 2015).

Mosca chert and McDermott metaquartzite originate from the Durango, Colorado, area located approximately 50 miles to the east of the project area. These two material types are less common nonlocal material types and are both coded as nonlocal chert/siltstone in the database with each type named in the comments.

The information presented in Tables 24.31 and 24.32 reveals that most of the lithic material used for chipped-stone tools found at Basketmaker Communities Project sites was from local sources. More than 85 percent of the artifacts in this chipped-stone assemblage were made of local types of stone. These local lithic materials were likely transported to sites as raw material or partially processed cores. The use of local materials for cores, core tools, and expedient tools was much more common than for formal tools, especially the use of Morrison Formation stone. Local lithic material makes up 41 percent of the stone used for formal tools. What we see in the local lithic material assemblage for Basketmaker Communities Project sites is a majority of the largest size-class categories and that the majority of the assemblage has over 50 percent cortex. These data are expected from locally harvested lithic material assemblages.

Semi-local stone composes only approximately 12 percent of the total assemblage but was commonly used for formal tools. Approximately 37 percent of formal tools were made from semi-local materials; the most commonly used semi-local material for formal tools was Burro Canyon chert. The most common semi-local material for debitage and expedient tools was Brushy Basin chert.

The nonlocal stone composes less than one percent of the assemblage from Basketmaker Communities Project sites. This nonlocal assemblage contains no pieces of debitage larger than 1 in, and compared to the local materials, has higher percentages of the smaller size classes and much less cortex present. This suggests that smaller pieces of raw material were being imported from farther locations likely either in finished or partially finished tool forms. The nonlocal stone composes approximately 15 percent of formal tools.

Table 24.34 shows the quantities of semi-local and nonlocal artifacts in the “bulk chipped stone” assemblages from Basketmaker Communities Project sites. The bulk chipped-stone analytic category contains debitage, modified flakes, and utilized flakes. Semi-local and nonlocal stone artifacts were most numerous in the assemblages from 5MT10687 and 5MT10647. The relative presence of these material types at these sites can be assessed by quantifying, for each site, semi-local and nonlocal chipped-stone artifacts per the weight of gray ware pottery recovered; this approach controls for differing amounts of excavation at each site. Though few chipped-stone artifacts were found at 5MT10632, this site boasts the highest ratio of extralocal (semi-local and nonlocal artifacts combined) chipped-stone artifacts to gray ware sherds of all Basketmaker Communities Project sites. Given the small quantity of cultural materials recovered, this could be the result of sampling error. Both 5MT10718 and 5MT10719 also have small sample sizes that may skew the ratio.

Aside from the small sample from 5MT10632, 5MT10686 and 5MT10687 yielded the greatest quantity of extralocal chipped-stone artifacts per kilogram of gray ware pottery. The semi-local Brushy Basin chert was the most commonly used extralocal material at both sites. The suggested Pueblo II dating of much of the architecture and pottery at 5MT10686 and 5MT10687 may indicate more widespread exchange of lithic resources later in the occupation of the Basketmaker Communities Project area, and this would be consistent with previous studies that suggest more exchange of lithic materials regionally during the Pueblo II time period (Arakawa 2015). This is contradicted at 5MT10684 and 5MT2037, both of which exhibit a Pueblo II occupation, where relatively small ratios of extralocal chipped-stone artifacts to gray ware sherds are present compared to 5MT10686 and 5MT10687. The most commonly used extralocal material at both 5MT10686 and 5MT10687 was Brushy Basin chert. The high counts of Brushy Basin chert at Pueblo II–component sites could suggest a preference for this material during that time period. Interestingly, the two sites with the smallest ratios of extralocal chipped-stone artifacts per kilogram of gray ware pottery are 5MT10647 and 5MT10711, both Basketmaker III sites with community structures.

Chipped-Stone Tool Production

The early Basketmaker III phase has very little representation in the chipped-stone assemblages; less than one percent of the entire debitage assemblage originates from early contexts. The mid-Basketmaker III includes 35 percent of the chipped-stone assemblage, and the late Basketmaker III includes 65 percent.

The overall amount of debitage and the quantity of cores collected from sites can provide information on the structure of chipped-stone tool production. Table 24.35 shows the counts and percentages of chipped-stone flakes and cores for the Basketmaker Communities Project sites. We also provide the quantities of these artifacts per kilogram of gray ware sherds recovered from each site to enhance intersite comparability. The 5MT10631 assemblage contains the highest ratio of cores per weight of gray ware sherds, and the 5MT3875 assemblage contains the highest ratio of debitage artifacts to gray ware sherds. The largest site assemblage, from 5MT10647, shows a relatively low ranking for the ratio of cores (7 out of 10) and a higher ranking for the ratio of debitage (5 out of 14) relative to the entire assemblage from Basketmaker Communities Project sites.

The smallest chipped-stone debris may be underrepresented in an assemblage because of excavation sampling strategies but can be an important indicator of tool manufacture. Quarter-inch screen is commonly used during Crow Canyon excavations; however, many flotation samples were collected during the Basketmaker Communities Project and analyzed in accordance with the Crow Canyon Laboratory Manual (Ortman et al. 2005). The heavy fraction from the flotation samples was water screened through sixteenth-inch screen and produced a sample of microdebitage. A pilot study that examined microdebitage from 5MT10647 revealed intensive processing of lithic material and cleanup behavior in the great kiva (Wurster et al. 2017).

A core analysis, not outlined in the Crow Canyon Laboratory Manual (Ortman et al. 2005), was conducted on all Basketmaker Communities Project site cores based on a pilot study (Cochran and Lorusso 2015). The analysis examines the directionality of striking platforms as a method for obtaining information about core reduction strategies. Because this analysis compares multiple flake scars on a core, only cores with at least three flake scars were examined for this analysis. According to the Crow Canyon Laboratory Manual (Ortman et al. 2005) a core has at least one flake scar removed. This analysis included approximately 84 percent of all cores recovered from Basketmaker Communities Project sites. See Table 24.36 for the core analysis data.

The analysis found that the majority of cores at Basketmaker Communities Project sites are informal core types (multidirectional and unidirectional) made mainly from local material types and useful for obtaining expedient flake tools rather than for formal tool manufacture. This is reflected in the expedient chipped-stone tool assemblage and suggests that Morrison silicified sandstone and Morrison mudstone were better suited and readily available for expedient tool use than other local lithic material types. Bifacial core types are considered a more formal core type but were an uncommon core type in the Basketmaker Communities Project site assemblages.

We looked at the ratio of bifaces to cores, which can indicate the relative mobility of a population; see Table 24.37 for the biface to core ratio for the Basketmaker Communities Project (adapted from Parry and Kelly 1987). Compared to ratios from the Dolores Archaeological Program and the Black Mesa Archaeological Project (Parry and Kelly 1987:292–293), the Basketmaker Communities Project sites seem to follow the trends for decreased relative mobility during the Basketmaker III (0.91) and Pueblo II (0.36) time periods in the Four Corners region. This suggests that the Basketmaker III population at Basketmaker Communities Project sites were more sedentary and less mobile than the Basketmaker II populations and more similar to the later, more sedentary Pueblo I populations to the north and southwest of the project area.

The majority of bifaces (including partial and complete bifaces, projectile points, and drills) and cores were recovered from 5MT10647. The ratio of bifaces to cores is exactly the same as the overall ratio for the entire project (0.91) during the Basketmaker III time period. This suggests that the population at 5MT10647 is a representative sample of the entire Basketmaker III population at Basketmaker Communities Project sites.

Formal Chipped-Stone Tools

This section provides an overview of the 181 formal bifacial tools collected from Basketmaker Communities Project sites. Included within this category of tools are simple bifacially reduced tools (N = 75), drills (N = 33), and projectile points (N = 73). The criteria used to assign an artifact to one of these categories are detailed in Crow Canyon's Laboratory Manual (Ortman et al. 2005). Table 24.38 quantifies these types of artifacts for the sites tested. In the following sections, we discuss some patterns noted.

In contrast to the intensive use of the Morrison Formation lithic materials for expedient flake tools in both the middle and late Basketmaker III, the formal tools show a different raw material pattern. The formal tools were more often made of lithic materials from the Dakota and Burro Canyon Formations. This seems to reflect a preference for this good quality material for more formalized tools during both the middle and late Basketmaker III phases.

Bifaces and Drills

Data presented in Tables 24.31 and 24.32 indicate that local and semi-local materials were used most often to make bifaces and drills at Basketmaker Communities Project sites, and that Burro Canyon chert and Dakota/Burro Canyon silicified sandstone were the preferred lithic materials. The portions of these artifacts that were recovered affect how they are categorized (e.g., some tool midsections that we categorized as bifaces might be projectile point fragments), and it is possible that some artifacts categorized as bifaces are broken remnants of more specific types of tools.

In all, 108 bifaces and drills were collected from the Basketmaker Communities Project sites (see Table 24.38). Most of these artifacts were recovered from 5MT10647. Though few chipped-stone tools were found at 5MT10718, this site boasts the highest ratio of bifaces per kilogram of gray ware sherds of all Basketmaker Communities Project sites. Given the small quantity of cultural materials recovered, this could be the result of sampling error. The sites with the next highest ratios of bifaces per kilogram of gray ware sherds for all Basketmaker Communities Project sites include 5MT10736, 5MT10647, and 5MT2032.

Drills, a somewhat more formal tool type than bifaces, are generally thought to have been used to create holes or perforations in tools, clothing, or ornaments. Many have a "diamond" cross section and show use wear such as radial flaking or polishing near the tip. The sites that yielded the greatest quantity of drills per kilogram of gray ware sherds include 5MT10711, 5MT2032, and 5MT10647. This suggests that some processing activity that utilized drills might have been more common, or was practiced longer, at these sites.

The late Basketmaker III saw an increase in the use of expedient cores and flake tools and a large increase in the number of drills when compared to the middle Basketmaker III, suggesting more variation in activity during the late Basketmaker III phase. This could be representative of a larger population with a higher demand for these tools and could reflect variation in the community social structure.

Table 24.38 shows the highest ratio of projectile points to gray ware sherds at 5MT3875 and 5MT10647. In the case of 5MT10647, this site has consistently high ratios of projectile points, bifaces, and drills to gray ware sherds and could represent some type of use related to extradomestic or ritual activity.

Projectile Points

Table 24.39 presents, by material type and site, the projectile point types found at Basketmaker Communities Project sites. In all, 73 projectile points were recovered, and the morphologies of, and the production methods for, these artifacts suggest cultural use of the landscape from the Archaic (6000–500 B.C.) until regional depopulation about A.D. 1280 (Justice 2002a; Ortman et al. 2005). Some points that are characteristic of early use of this area could have been collected, curated, and perhaps used by later ancestral Pueblo peoples, a practice suggested by Till and Ortman (2007). Most of these early projectile points were collected from 5MT10647, which could suggest uneven access to, or preference for collecting, early projectile points among the residents of this site (Figure 24.11).

The types of stone used to make the projectile points that were recovered suggest a heavy reliance on local and semi-local stone. Only 12 points were made from nonlocal types of stone: obsidian, Narbona Pass chert, red jasper, and Pigeon Blood agate. However, 21 points were made from semi-local stones, and most of those points were made of Burro Canyon chert or agate/chalcedony. Thirty points were made of local materials, and among those, Dakota/Burro Canyon silicified sandstone (N = 26) was the most commonly used stone. Ten points were made from unknown cherts, siltstones, or silicified sandstones (see Table 24.39).

The contexts in which projectile points were found are also informative. Table 24.40 lists the location of each point by study unit type as well as an interpretation of specific contexts within these broad analytical units (see Crow Canyon Archaeological Center 2001 for information on study units). Most projectile points (N = 45) were found in mixed or secondary deposits. Presumably, these points were broken in the manufacturing process, broken during use, or were discarded for other, unknown, reasons. Twenty-five points were found in cultural deposits such as mixed structure fill or middens with secondary deposits. However, two of these projectile points from cultural deposits were found in primary contexts, and both of these points were found at 5MT10647 in Structure 102, the great kiva. Both of these projectile points are broken; one is made from Mount Taylor obsidian (Grant's Ridge), and one is made from light tan Burro Canyon chert.

Twenty-eight points were found in mostly mixed deposits from collapsed structures or in construction deposits, such as in earthen-walled pit structures or a subterranean kiva. Several points in the uppermost fill of some structures, such as the great kiva at 5MT10647 (N = 6), might have been intentionally placed in or on collapsed structures after their use. Some points could have been deposited during structural collapse. Twenty points were found in post-use life contexts, mostly from natural processes.

The Basketmaker Communities Project sites include some sites that only date to the Basketmaker III time period and some sites with multiple components that have later occupations dating to the Pueblo II or early Pueblo III time periods. Projectile points were collected from both contexts dating to earlier and later occupations at the sites tested for the Basketmaker Communities Project and these temporally defined contexts are also reflected in the temporal association that some projectile point types have. Therefore, it is important to differentiate temporal contexts when discussing the projectile point assemblage. Table 24.41 presents formal tool types by time period.

Basketmaker III–Component Projectile Points

Projectile points collected from Basketmaker Communities Project sites with contexts dating to the Basketmaker III include mostly small and medium corner-notched types and some larger projectile points that date to earlier time periods. Most of the projectile points come from late Basketmaker III contexts with the exception of 5MT10647, which has the majority of projectile points coming from middle Basketmaker III contexts.

The small, corner-notched, expanding-stem type is the most common projectile point type from Basketmaker III contexts (N = 26). Most of these points were made of local Dakota/Burro Canyon silicified sandstone (N = 11), semi-local Burro Canyon chert (N = 4), and semi-local agate/chalcedony (N = 3). Nonlocal materials include Horace-La Jara Mesa (Mount Taylor, New Mexico) obsidian (N = 1) and Pigeon Blood agate (N = 1). These points compose 36 percent of all projectile points recovered (N = 73) from the Basketmaker Communities Project and 48 percent of all projectile points recovered from Basketmaker III contexts (N = 54). The small to medium, corner-notched, straight or expanding-stem type (N = 3) and the medium, corner-notched type (N = 2) are similar to the type outlined above but are less common in the assemblage. Most of the small to medium corner-notched points were collected from 5MT10647 and made from local or semi-local materials; one was made from nonlocal obsidian from the El Rechuelos (Jemez Mountains, New Mexico) source. All three of these point types were manufactured during the same time periods, Basketmaker III through early Pueblo II (A.D. 300–1000). All three of these projectile point types from Basketmaker III contexts are similar to the Rosegate, Dolores, and Hayes and Lancaster “Type A” and “Type B” projectile point types found in this region during that time.

The Rosegate type was manufactured during the Basketmaker III through Pueblo II time periods (A.D. 300–1000). In the Great Basin, this type is thought to represent an early development of the bow and arrow and is associated with many Fremont sites in eastern Utah (Justice 2002b:320–339). Rosegate projectile points typically have a larger neck width than Dolores projectile points and range in size from medium to small (see the Crow Canyon Laboratory Manual for analysis details).

The Dolores type (Justice 2002a:240–246) was manufactured during the Basketmaker III through Pueblo II time periods (A.D. 300–1000). The Dolores type is similar to the Rosegate type and is specific to the northern Southwest and Four Corners region. These small- to medium-sized corner-notched points have both straight- and expanding-stem varieties; the straight stem may be associated with earlier variants of this type. Dolores points typically have more small than medium neck widths.

Hayes and Lancaster (1975:144–146) define three types (A, B, and C) of projectile points observed at the Badger House Community in Mesa Verde National Park, Colorado. "Type A" is a corner-notched, straight-stemmed projectile point that dates from the Basketmaker III through the Pueblo I time periods (A.D. 500–900); "Type B" is a corner-notched, expanding-stemmed projectile point that dates from the Pueblo I through Pueblo II time periods (A.D. 750–1150); and "Type C" is a side-notched projectile point that dates from the Pueblo II through the Pueblo III time periods (A.D. 900–1300). Projectile points similar to Types A and B were recovered from Basketmaker III contexts at Basketmaker Communities Project sites.

Eleven projectile points were assigned types that date to earlier time periods than the contexts in which they were found. These include one Bajada, three Sudden Side-Notched, one Archaic side-notched, four Archaic corner-notched, and two large corner-notched points with convex bases. These older projectile points account for 20 percent of all projectile points recovered from Basketmaker III contexts.

The Bajada projectile point type (N = 1) is an Early to Middle Archaic (8500–3500 B.C.) stemmed dart point type associated with the Bajada phase of the Archaic Oshara tradition (Justice 2002a:122–128). This projectile point type is found mainly on the Colorado Plateau. This projectile point is made from unknown silicified sandstone and collected from the great kiva at 5MT10647. It is the oldest projectile point recovered from Basketmaker Communities Project sites.

The Sudden Side-Notched projectile point type (N = 3) is a Colorado Plateau variant of the Northern Side-Notched projectile point type that is associated with the Middle to Late Archaic (3500–1500 B.C.) (Justice 2002a:162–164). This projectile point type is more localized to the eastern portion of the Great Basin and the northern Southwest, while the Northern Side-Notched projectile point type has a broader range extending throughout the Great Basin. The projectile points recovered from the Basketmaker Communities Project were made from the semi-local Burro Canyon chert, unknown chert/siltstone, and unknown silicified sandstone. Two are from 5MT10647 and one is from 5MT3875.

The Archaic side-notched projectile point type (N = 1) and the Archaic corner-notched projectile point type (N = 4) date generally to the Archaic (8500–1000 B.C.). Most of these projectile points are made from nonlocal materials including El Rechuelos (Jemez Mountains, New Mexico) obsidian, Narbona Pass chert, and red jasper. Most of these points are from 5MT10647, and one comes from 5MT10736. These may be similar to the Northern Side-Notched or Elko projectile point types but have been so heavily retouched that no further type identification was possible. The Elko projectile point type dates to the Late Archaic (1500–1000 B.C.) and is widely distributed throughout the Great Basin (Justice 2002b:298–320).

The large, corner-notched projectile point with convex base type (N = 2) dates from the Basketmaker II to the Basketmaker III time period (1000 B.C.–A.D. 500). These points are similar to the San Pedro projectile point type (Justice 2002a:162–164). San Pedro points generally date from the Late Archaic to the Basketmaker II and are found locally and regionally—usually in primary contexts that predate pottery. The San Pedro points collected from Basketmaker Communities Project sites were all from 5MT10647 and made from nonlocal materials including Narbona Pass chert and Honaker Trail chert.

Twelve projectile points could not be assigned to a type, either because the hafting element of the point was missing or because the extant portion of the hafting element was insufficient to assign the point to a more discrete type. These constituted about 16 percent of all projectile points collected from the Basketmaker Communities Project sites (N = 73) and about 22 percent of the total points collected from Basketmaker III contexts (N = 54).

Post-Basketmaker–Component Projectile Points

Projectile points collected from Basketmaker Communities Project sites with contexts post-dating the Basketmaker III include small corner-notched types, Lancaster Side-Notched points, and one larger projectile point that dates to the Archaic time period. Most of the projectile points were collected from Pueblo II to early Pueblo III contexts.

The small, corner-notched, expanding-stem type is also the most common projectile point type from post-Basketmaker contexts (N = 10). The most common material type for these points is local Dakota/Burro Canyon silicified sandstone (N = 4). Two points were made from nonlocal obsidian, one sourced to El Rechuelos (Jemez Mountains, New Mexico) and the other to Horace-La Jara Mesa (Mount Taylor, New Mexico). Most of these points were recovered from Pueblo II to early Pueblo III contexts at 5MT10647. These points from later contexts compose 14 percent of all projectile points recovered (N = 73) from the Basketmaker Communities Project sites and 53 percent of all projectile points recovered from post-Basketmaker contexts (N = 19). Many small corner-notched points were produced in the region from the Basketmaker III through early Pueblo II periods (A.D. 300–1000). The projectile points of this type collected from post-Basketmaker contexts are most similar to the Chaco-style projectile point types found in this region and in northern New Mexico.

The Chaco cluster (Justice 2002a:246–260) includes a variety of projectile point types originating in Chaco Canyon, New Mexico, and ranging in time of manufacture from the Pueblo I through the Pueblo III time periods (A.D. 750–1250). This type can be found throughout the Colorado Plateau. Varieties similar to those observed in the Basketmaker Communities Project sites include Chaco Corner-Notched (A.D. 750–950), Bonito Notched (A.D. 950–1150), Pueblo Alto Side-Notched (A.D. 1020–1120), and Kin Kletso Side-Notched (A.D. 1120–1250).

The Lancaster Side-Notched projectile point type is also common in the post-Basketmaker context assemblage (N = 8). The most common material for these points is local Dakota/Burro Canyon silicified sandstone (N = 4), and one from 5MT2037 was made from nonlocal Narbona Pass chert. These points compose 11 percent of all points recovered (N = 73) from the Basketmaker Communities Project sites and 42 percent of all projectile points recovered from post-Basketmaker contexts (N = 19). This type of projectile point dates from the Pueblo II through Pueblo III time periods (A.D. 900–1300) and is a local Mesa Verde region projectile point type also called “Type C” by Hayes and Lancaster (1975:144–146) in Mesa Verde National

Park, Colorado. The Lancaster Side-Notched type is also similar to the contemporaneous side-notched varieties of the Chaco cluster defined by Justice (2002a:246–260).

The Archaic side-notched projectile point type (N = 1) dates generally to the Archaic (8500–1000 B.C.). This projectile point is made from local Dakota/Burro Canyon silicified sandstone and was collected from 5MT10647. This is the oldest projectile point type found in post-Basketmaker contexts at Basketmaker Communities Project sites and constitutes 5 percent of the total points collected from post-Basketmaker contexts (N = 19).

Projectile Point Summary

The majority of projectile points recovered from the Basketmaker Communities Project are small corner-notched types and the Lancaster Side-Notched type. These were made mostly from local Dakota/Burro Canyon silicified sandstone. Most of these types were likely manufactured locally and during the time that the sites were occupied. However, a few projectile points of these types in the assemblage were made from nonlocal lithic materials suggesting connections with northern New Mexico and southeastern Utah throughout the occupation of the Basketmaker Communities Project sites. Some of these points exhibited minimal retouching of the blade, likely for reuse.

A number of the projectile point types observed in the Basketmaker Communities Project site assemblages were manufactured during earlier time periods than the main occupations of those sites, many dating from the Archaic to the Basketmaker II. Some of these points were made from local or semi-local materials and some from nonlocal sources in southeastern Utah and northern New Mexico. Many of these points were reused as knives and often heavily retouched. It is possible that the local Basketmaker III populations picked up the older points from the local landscape as useful tools, or their presence could indicate a deeper connection and continuity with the Archaic and Basketmaker II groups that produced these early points. While deep connections with much older populations represented by the presence of much older projectile points could be a stretch, it is more plausible that the Basketmaker III population had some connection with Basketmaker II populations in the area.

Comparative Collection: The Payne Site

The Payne site, 5MT12205, is a large hamlet site dating from approximately A.D. 600–610 (Wilshusen 1999:168). The site is located between Sandstone and Payne Canyons in Montezuma County, Colorado, and was excavated by Wichita State University in 1974–1975 (Rohn 1974). The site is located about 24 km from the Basketmaker Communities Project area. We received the chipped-stone artifact assemblage on loan from Canyons of the Ancients Visitors Center and Museum for use as a comparative collection to Basketmaker Communities Project site chipped-stone artifact assemblages.

Tables 24.42 and 24.43 show the chipped-stone artifact data by lithic material type for the Payne site. Compared to all Basketmaker Communities Project site data (see Tables 24.31 and 24.32), 5MT12205 has an overall higher percentage of local lithic material used (over 95 percent compared to 85 percent at Basketmaker Communities Project sites). Of these local stones, Dakota/Burro Canyon silicified sandstone was most commonly used (62 percent) at 5MT12205; this differs from Basketmaker Communities Project sites where only 11 percent of local stone was Dakota/Burro Canyon silicified sandstone, and Morrison silicified sandstone was the most commonly used local stone (44 percent). This suggests that higher-quality material from the Dakota and Burro Canyon Formations was more accessible to the 5MT12205 population than Morrison Formation lithic materials, whereas the Basketmaker Communities Project populations had greater access to the Morrison Formation. 5MT12205 has less semi-local stone (almost three percent) than Basketmaker Communities Project sites (12 percent) and has a heavier reliance on Burro Canyon chert.

Nonlocal lithic materials are less than one percent of chipped-stone at the Basketmaker Communities Project sites and 5MT12205. Nonlocal chipped-stone artifacts from 5MT12205 include one red jasper biface, one red jasper flake, one Narbona Pass chert flake, three nonlocal chert/siltstone utilized flakes, and one unmodified nonlocal chert/siltstone flake. This nonlocal assemblage is similar to Basketmaker Communities Project sites with the exception of obsidian; no obsidian was identified at 5MT12205.

We conducted core analysis on 82 percent of the cores at 5MT12205, those that had at least three flake scars. See Table 24.44 for the Payne site core analysis data. The analysis found that the majority of cores at 5MT12205, similar to Basketmaker Communities Project sites, are informal core types (multidirectional and unidirectional) made mainly from local material types and useful for obtaining expedient flake tools rather than for formal tool manufacture. This is reflected in the expedient chipped-stone tool assemblage and suggests that Dakota/Burro Canyon silicified sandstone was better suited and readily available for expedient tool use than other local lithic material types available to the 5MT12205 population. Bifacial core types are considered a more formal core type but were an uncommon core type in both the 5MT12205 and the Basketmaker Communities Project site assemblages.

We looked at the ratio of bifaces to cores, which can indicate the relative mobility of a population; see Table 24.37 for the biface to core ratio for 5MT12205 (adapted from Parry and Kelly 1987). Compared to ratios from the Dolores Archaeological Program (Parry and Kelly 1987:293), the Black Mesa Archaeological Project (Parry and Kelly 1987:292), and the Basketmaker Communities Project, 5MT12205 seems to follow the trends for decreased relative mobility during the Basketmaker III (0.82) time period in the Four Corners region, similar to the Basketmaker III populations to the north and southwest of the site. Compared to 5MT10647, the biface to core ratio at 5MT12205 during the Basketmaker III time period is slightly lower but still representative of trends during that time in this region.

Table 24.45 shows data compiled from projectile point analysis from the Payne site. All of the projectile points collected from 5MT12205 were made from local or semi-local stones, and the majority were made from local Dakota/Burro silicified sandstone. The most common projectile point type collected from 5MT12205 is small or medium corner-notched projectile points (N = 9). Only some of these points exhibit use wear or retouch. These projectile points make up 53 percent of the 5MT12205 projectile point assemblage and were likely manufactured at or near the site during the time the site was occupied. The commonality of this projectile point type and the preference for the same lithic material are similar trends seen in the projectile point assemblage from Basketmaker III contexts at Basketmaker Communities Project sites.

Eight projectile points were assigned types that date to earlier time periods than the contexts in which they were found. These include one Jay Stemmed, one Bajada, one Elko Corner-Notched, four San Jose, and one large, corner-notched projectile point. Most of these older projectile point types exhibit use wear or retouch, and they make up 47 percent of the 5MT12205 projectile point assemblage. It is interesting to note the higher percentage of older projectile point types at 5MT12205 compared to Basketmaker Communities Project sites; however, this could be a result of different excavation sampling strategies.

Community Structure Comparison

We looked at community structures for trends relating to social sphere and function. For the Basketmaker Communities Project, two community-oriented structures were intensively occupied during the same 75-year period: the great kiva at 5MT10647 and the oversized pithouse at 5MT10711. These structures are similar in size but appear to have served different functions. The lithic assemblages from these two structures show some interesting similarities and differences. The community using the structures at these different sites may have had varying social spheres based on the nonlocal lithic material assemblage recovered.

Structure 102, the great kiva at 5MT10647, was a round, roofed building measuring over 10 m in diameter. The great kiva was used for community gathering and ritual from the middle to late Basketmaker III phases. The structure has four use surfaces, with only the earliest dating to the middle Basketmaker III.

The lithic material types identified in the great kiva include mostly local or semi-local materials but also some nonlocal materials. These nonlocal materials include Narbona Pass chert, obsidian that sourced to the Mount Taylor (Grants Ridge) area in New Mexico, and a drill that may have been used as a pipe borer (Geib 2011) made of Mosca chert from the Durango, Colorado, area (Carole Graham, personal communication 2019). Formal tools recovered from the great kiva include three small corner-notched projectile points, one Bajada projectile point, three unspecified projectile points (two from primary contexts), six bifaces, and one drill. The great kiva had the highest amount of Narbona Pass chert (N = 16 flakes) compared to all other structure types identified in the Basketmaker Communities Project. Almost a third of the Narbona Pass chert flakes recovered from the great kiva are between 0.5 and 1 in, larger than most flakes of this material recovered from Basketmaker Communities Project sites. The high percentage of flakes in the great kiva could be evidence of the material's intentional use in more specialized activities in communal settings.

The oversized pithouse at 5MT10711 consists of two chambers, a large main chamber (Structure 101) and an antechamber (Structure 103). It is considered to have functioned primarily as permanent housing, but the large size suggests that it may also have served as a community structure. The structure had three identified floors in the main chamber and two in the antechamber. The oldest surface dates to the middle Basketmaker III, and the later surfaces date to the late Basketmaker III—similar to the great kiva at 5MT10647.

Notable nonlocal items found in the oversized pithouse include a utilized flake of El Rechuelos obsidian from the Jemez Mountains in New Mexico and a flake of red jasper from southeastern Utah. Both of these were found in part of the structure dating to the late Basketmaker III. Formal tools include three small corner-notched projectile points, one medium corner-notched projectile point, one undefined projectile point, a biface, and five drills made from local materials. These tools were made primarily of Burro Canyon chert, and all date to late Basketmaker III contexts. Notably, no pre-Basketmaker III projectile points were recovered from the oversized pithouse, and no Narbona Pass chert was recovered from 5MT10711.

Both community structures, the oversized pithouse at 5MT10711 and the great kiva at 5MT10647, have higher amounts of nonlocal materials than other structures in the Basketmaker Communities Project, which supports the idea that these structures were used for communal use. However, the differences in amount and variety of nonlocal materials may indicate differing social spheres at each site. The population at 5MT10711 may have interacted with groups from a closer area than 5MT10647 populations. The community at 5MT10647 may have had a larger social network that extended over a larger area based on the higher amounts of nonlocal materials originating from greater distances. The presence of Narbona Pass chert and obsidian sourced to Mount Taylor could represent a connection with Chuska Mountains populations or, based on similar nonlocal lithic material assemblages, with Basketmaker III Chaco Canyon populations.

Summary of Chipped-Stone Artifacts from the Basketmaker Communities Project

In conclusion, the lithic sample from the Basketmaker Communities Project indicates the community had ties to a variety of groups. The strongest of these connections are with eastern Utah and northern New Mexico, as seen in the amount and variety of nonlocal lithic material from these locations and may represent origin locations for residents moving into the Basketmaker Communities Project area. Community structures, such as Structure 102, the great kiva at 5MT10647, exhibit broader ties than most individual hamlets. Specifically, the community that participated in the activities at the great kiva seems to have had a broader interaction sphere than is apparent at other structures and sites in the Basketmaker Communities Project. This sphere seems to have included the population in the Chuska Mountains and possibly, by association, the Chaco Canyon region. These broad connections with various groups appear to have been present even as early as the mid-Basketmaker III phase, when the Basketmaker Communities Project area was first intensively settled by farming communities.

Ground-Stone Artifacts

Ground-stone tools display use wear associated with grinding activities such as the processing or grinding of food, minerals, or bone. Artifacts such as manos were used to grind materials against other stones such as metates, and both of these types of tools are discussed in the following paragraphs. Types of ground-stone tools and the methods used to analyze those tools are described in Crow Canyon's Laboratory Manual (Ortman et al. 2005). Different artifact types included in this analytic category include manos (not further specified), one-hand manos, two-hand manos, metates (not further specified), basin metates, trough metates, slab metates, abraders, stone mortars, pestles, and indeterminate ground-stone artifacts.

In all, 914 ground-stone tools were recovered from Basketmaker Communities Project sites (Table 24.46a–b). The site with the largest assemblage of ground-stone artifacts is 5MT10647. Two-hand manos and abraders are the most abundant identifiable ground-stone tools in the assemblage; of the metates, slab metates are the most abundant. Artifacts that were categorized as indeterminate ground-stone tools are the most numerous in the assemblage overall.

Approximately 50 percent of ground-stone artifacts recovered were found at 5MT10647, indicating that relatively heavy processing and grinding of foodstuffs and other materials occurred, that occupation was longer, or that the population was larger at this site (Table 24.47a–b). The only stone mortar and pestle recovered were found at 5MT10647, perhaps indicating that either earlier or specialized grinding activities occurred at that site. Not surprisingly, sites that yielded small artifact assemblages overall, such as 5MT10718 and 5MT3875, also yielded few ground-stone tools.

When the ratio of the quantity of ground-stone tools to the weight of gray ware sherds is calculated for each site, the relative intensity of ground-stone tool use can be compared (Table 24.48); the following observations exclude sites from which only one or two ground-stone tools were recovered. The site with the highest ratio of ground-stone tools to the weight of gray ware sherds is 5MT10736, suggesting that the processing of material that required grinding might have occurred more often or with greater intensity at that site. Other sites with a large quantity of ground-stone artifacts per kilogram of gray ware sherds are 5MT10686, 5MT10711, and 5MT10647.

Ground-stone artifacts were found in sizable quantities at almost all Basketmaker Communities Project sites. This suggests that the processing of materials that required grinding occurred at most sites, although this activity might have occurred more often or with greater intensity at the specific sites mentioned above. See Dempsey Alves (2019) for further discussion on comparisons between Basketmaker Communities Project sites and architectural blocks at 5MT10647.

Battered and/or Polished Stone Tools

This section addresses artifacts that were either battered or polished through manufacture or use: axes, single-bitted axes, double-bitted axes, mauls, axe/mauls, tchamahias, polishing stones, polished igneous stones, polishing/hammerstones, hammerstones, and peckingstones as defined in Crow Canyon's Laboratory Manual (Ortman et al. 2005). Data for the 206 battered or polished tools collected from Basketmaker Communities Project sites are presented in Table 24.49. The sites that yielded the most battered or polished tools are 5MT10647 and 5MT10711. Five axe/maul fragments were recovered from 5MT10647, which is the greatest quantity of axes found at any of the Basketmaker Communities Project sites. Two of these axe/mauls were recovered from Structures 220 and 508 at 5MT10647. The highest number of maul fragments was recovered from 5MT10711; most of these were from Structure 103, the antechamber of the oversized pithouse. This high count is misleading due to the fact that many of these maul artifacts from Structure 103 are fragmented and may refit. Tchamahia fragments were collected from two sites—5MT10686 and 5MT10687—suggesting restricted distribution of tchamahias or limited production and use of these artifacts. Interestingly, neither of these tchamahias is made from Brushy Basin chert, a commonly used stone for making tchamahias. The most abundant of the battered and polished artifacts was peckingstones, which were found at most Basketmaker Communities Project sites.

Calculating the quantity of battered or polished stones per number of gray ware sherds recovered from each site (Table 24.50) provides a method for intersite comparisons; the following observations exclude sites from which only one or two battered and/or polished artifacts were recovered. The sites that yielded the fewest of these artifacts per kilogram of gray ware sherds include 5MT2037 and 5MT10687, whereas 5MT10711, 5MT10631, and 5MT10647 yielded the greatest. The remainder of the sites in Table 24.51a–b are at or below the mean for the sites—1.15 artifacts per kilogram of gray ware sherds—suggesting that, overall, the residents of most sites probably produced and used these tools is similar quantities and in similar ways.

Strong patterns can be detected in the types of stone used to produce these artifacts. Table 24.51a–b shows each artifact type and the kinds of stone used to produce those objects. About 36 percent of these types of tools, including most of the peckingstones (69 of 131 artifacts), were made from Morrison silicified sandstone. The next most common materials include Morrison mudstone, other igneous, and Dakota/Burro Canyon silicified sandstone. Both Morrison mudstone and Dakota/Burro Canyon silicified sandstone were commonly used for peckingstones. The other igneous stone was used for a variety of artifact types, most commonly mauls, polishing stones, and axe/mauls. These trends suggest a preference for these lithic material types for the production of specific battered and/or polished stone tools at Basketmaker Communities Project sites.

Other Artifacts

Other Modified Stone and Minerals

Approximately 1,079 modified and unmodified mineral and stone samples were collected from Basketmaker Communities Project sites. Data for these artifacts are presented in Table 24.52 by material type. Note that the numbers in this table represent field specimens, not counts of objects. Some artifacts included in this category are very friable, which makes precise enumeration difficult, so precise counts within each field specimen designation are not recorded in Crow Canyon's database. One example of this is clay, which is very friable; quantifying individual clay fragments would probably not yield significant information. In the following discussion, we discuss occurrences of these artifacts only on the basis of field specimen numbers assigned.

Most of these artifacts are made from local stone found in nearby canyon settings. More than 44 fossils, most of which probably originated from nearby Mancos Shale outcrops, were also found at Basketmaker Communities Project sites. These and other modified stones might have been collected and shaped for personal ornamentation, but because they lack a drill hole or other clear evidence of modification as ornaments, they are not discussed as ornaments here. Other modified stone or mineral samples that were identified as possible ornaments are discussed in the section below on personal adornment and are not included in this section. Pigment samples consist of ochre, iron oxide, and hematite; these materials were commonly used for pigment and were also found at many other area sites (e.g., Schleher 2017; Schleher and Coffey 2018). All stone disks in Table 24.52 were made of sandstone or Morrison silicified sandstone, and it is likely that many of these functioned as pot lids, although some display evidence of grinding, which suggests other processing uses as well.

The semi-local and nonlocal items were found in a variety of contexts and originated from several potential source locations. As a part of the Basketmaker Communities Project, we conducted sourcing analyses on azurite, turquoise, galena, and obsidian items categorized as other modified stone/mineral.

In all, 33 azurite pieces or nodules were recovered from Basketmaker Communities Project sites. Most of these were recovered in Basketmaker III period contexts (N = 19, 57.6 percent). Within Basketmaker III temporal phases, none of the azurite samples were recovered from early Basketmaker III phase contexts, nine were recovered from mid-Basketmaker III contexts, and eight were recovered from late Basketmaker III contexts. Five of the azurite samples were found at 5MT10686 in a masonry surface room (SU 111), with dates for this structure in the late Pueblo II through early Pueblo III periods. Some of the azurite samples are roughly spherical nodules (N= 8, 24.4 percent). Spherical nodules of azurite are common on Basketmaker III period sites across the region. For example, a large number of spherical nodules were identified at Casa Coyote (42SA3775) in southeast Utah (McAndrews 2004). To determine location of origin, lead isotope analysis was conducted on four samples of azurite from the Dillard site by Alyson Thibodeau (Thibodeau 2013b) at the University of Arizona. All four of these samples were sourced to the Lisbon Valley Mine, in San Juan County, Utah.

Turquoise samples were recovered from Basketmaker Communities Project sites in both unmodified and modified form (see Table 24.52). These turquoise samples were recovered from a wide range of contexts in the Indian Camp Ranch community, from the fill of surface features in earth-walled pit structures (5MT10647: PD 776, FS 25; 5MT107011: PD 217, FS 12) to in the fill of roof and wall fall of a subterranean kiva (5MT10711). To determine location of origin, lead isotope analysis was conducted on two samples of turquoise from the Dillard site by Alyson Thibodeau (Thibodeau 2013a) at the University of Arizona. One of these samples did not yield any results, but the second sample did. This sample (PD 188, FS 5) did not match a known turquoise source location, but it did match another sample of turquoise analyzed by Thibodeau for an earlier project (Thibodeau 2013a) from Pueblo Bonito in Chaco Canyon. The isotopic signature of the Dillard turquoise sample closely matched those of turquoise samples from Room 33 in Pueblo Bonito (Thibodeau 2013a). Although these results do not allow us to understand where Dillard residents obtained this sample, we do know that the same source was also used by Pueblo people living to the south in Chaco Canyon.

Three samples of galena, a lead sulfide mineral, were recovered from Basketmaker Communities Project sites. Mineral assemblages from 5MT10647, 5MT2032, and 5MT10631 each contained one sample of galena. The closest galena-bearing mineral deposits to the Basketmaker Communities Project area are over 100 kilometers away, in the western San Juan Mountains near Silverton, Colorado, and a number of other sources are known to the south in New Mexico (Santarelli et al. 2019). To attempt to source the galena found in the project area, lead isotope analysis was conducted by Brunella Santarelli at the University of Arizona (Santarelli et al. 2019) on one sample of galena from the Dillard site. Although the isotopic signature of the

Dillard galena did not match a specific source location, it was isotopically similar to the lead used in manufacturing lead glaze paints used to decorate Durango area Rosa Black-on-white pottery. Both the Dillard galena and the lead glaze paint isotopic ratios are similar to lead deposits associated with the Silverton caldera in the western San Juan Mountains (Santarelli et al. 2019:640), suggesting residents either exploited these mountain areas for minerals or traded with others who did.

One unmodified nodule of obsidian was recovered from the Dillard site in the fill from the roof fall from Pit Structure 220. Through XRF analysis, this nodule was sourced to the Horace-La Jara Mesa obsidian source at Mount Taylor, New Mexico (Shackley 2013, 2015, 2017).

Twenty artifacts from the "other modified stone or mineral" category were identified as possible pendant blanks/fragments, possible ornaments, or possible tesserae. These artifacts are discussed in the following section on objects of personal adornment.

Objects of Personal Adornment

In this section, we discuss items including beads, pendants, and bone tubes found at Basketmaker Communities Project sites that could have been used for personal adornment. Many of these items might have had other functions that are discussed later in this section. We also use material types that were utilized in the manufacture of these possible objects of personal adornment to address production, trade, and exchange. Patterns of distribution of items across sites allow us to explore the functions of different sites as they relate to ornament manufacture and use.

Table 24.53 presents data for ornaments recovered from Basketmaker Communities Project sites. The categories of ornaments identified consist of beads, pendants, and bone tubes, as well as possible pendant or ornament blanks and possible tesserae for mosaic jewelry (Figure 24.12). Bone tubes are considered here to have been objects of personal adornment, although it is possible that some tubes were used in other ways, for example, as bird whistles. Beads were the most numerous type of ornament recovered, followed by, in decreasing order of abundance, pendant blanks or tesserae, bone tubes, and pendants.

Exotic materials were typically used to produce the ornaments found at Basketmaker Communities Project sites; 35 percent of the ornaments recovered were made from semi-local or nonlocal materials, consisting of shell and turquoise. The material used to fashion the greatest quantity of ornaments was shell—27 ornaments (31 percent of all ornaments) were made of this raw material. The majority of these ornaments (N = 22) were made from shell that could not be identified, although five objects were identified as *Olivella*. Shell of this type would have originated in a marine environment, probably the Gulf of California or the Pacific Coast. The presence of the turquoise, which was discussed previously (see "Other Modified Stone or Mineral"), also indicates travel or trade with other communities or source areas. One notable large piece of turquoise (Figure 24.13) was recovered from the Dillard site (5MT10647, PD 1436, FS 1, PL 9). The presence of these various exotic materials indicates that long-distance travel or trade occurred during occupation of the Indian Camp Ranch community. In addition, numerous ornaments in the assemblage were made from unknown stone (N = 6, or 7 percent) and from locally available materials including bone (N = 18, or 20 percent), Morrison mudstone (N = 9, or 10 percent), and slate/shale (N = 4, or 5 percent).

The 87 ornaments recovered were found at 11 of the Basketmaker Communities Project sites. Table 24.53 presents, by site, counts of ornaments as well as ratios of counts to weights of gray ware sherds. In this table, higher-ranked sites are indicated by lower numbers. The highest ranked sites are, in decreasing order, the 5MT10719, 5MT10686, 5MT10647, and 5MT10631. Other than the public architecture present at the Dillard site (5MT10647), these sites appear to have been primarily residential. The contexts of recovered ornaments and drills provide insight into whether the production and use of ornaments occurred differentially at the sites.

Table 24.54 lists, by site, the ratios of number of drills to kilograms of gray ware sherds. The highest ratios, in decreasing order of occurrence, are for 5MT10711, 5MT2032, 5MT10631, and 5MT10647. Although drills are not abundant (N = 33), most were found in areas that appeared to be primarily residential. The Dillard site (5MT10647) and Mueller Little House are the only two sites with a high ratio or ranking for both ornaments and drills, suggesting the production and use of ornaments at sites with public architecture (the Dillard site) and sites that are primarily residential (Mueller Little House). Other than the Dillard site and Mueller Little House, the sites from which the greatest relative quantities of ornaments were recovered are not the same sites where the greatest relative quantities of drills were found. Thus, the data suggest that the production of ornaments and the use of ornaments were not always focused at the same sites.

Effigies

Two possible effigy fragments were found at Basketmaker Communities Project sites—both from the Dillard site (5MT10647). Both are made of clay. One of these possible effigy fragments is small, and the original shape of the effigy is difficult to discern (5MT10647: PD 933, FS 3, PL 9). It is possible that this fragment may be an animal or human leg. The other effigy fragment resembles a person, with punctated decoration in two parallel lines that curve around the front of the figure (Figure 24.14). This effigy is similar to other Basketmaker III period effigies recovered from sites across the Four Corners region, such as examples shown in Guernsey (1931:Plate 51). This figurative effigy was recovered from the Dillard site in a midden deposit that overlays Pit Structure 220-234 (5MT10647: PD 341, FS 6, PL 9). We are using an illustration of this effigy fragment in this report rather than a photograph because of consultation with Crow Canyon's Native American Advisory Group. The Advisory Group recommended that we restrict access to this item and photos of the item due to its possible use in ritual activities.

Pipes

Two clay pipes or cloud blowers were recovered from Basketmaker Communities Project sites. Pipes are included in the Crow Canyon analysis as "other ceramic artifacts" (Ortman et al. 2005) and are included in the table for these items above in Table 24.10. One of the clay pipes was recovered from the modern ground surface above the great kiva at the Dillard site (5MT10647: SU 102, PD 8, FS 4). This pipe is decorated with a design—a shallow row of small circles goes around the pipe about 1 cm from the mouthpiece. It appears that these circles were created by pressing a small hollow stick or reed into the clay before it was fired. The second pipe was also found at the Dillard site, in the fill of a feature within Structure 124 (PD 1433, FS 8). Structure 124 is a small pit room, and its location between two non-domestic structures (Structures 102 and 312-324), its small size, and the presence of a large piece of raw turquoise and this pipe in a dimpled pit in the center of the structure suggest that it may have served as a specialized storage area. The portion present of this pipe was the mouthpiece. The pipe was broken, and the two fragments recovered do not refit but are clearly from the same pipe.

Animal Remains

Eggshell

Ninety-four proveniences at nine Basketmaker Communities Project sites contained eggshell. Most of this assemblage is probably turkey eggshell, which suggests that turkey husbandry was widespread in the Indian Camp Ranch community. Combined with additional evidence such as the presence of gizzard stones and turkey bones (see Chapter 9 for discussion of a turkey burial), eggshell data provide compelling evidence that turkeys were being bred and raised near or within the sites tested. Table 24.55 lists, by site, the weights of eggshell per kilogram of gray ware sherds. This table shows that sites in the Hatch group, 5MT10684 and 5MT2037, which date to the late Pueblo II and early Pueblo III period, yielded the most eggshell by weight and have the highest rank in eggshell per kilogram of gray ware sherds. This suggests that turkey husbandry became intensive in the more recent Pueblo periods within the Indian Camp Ranch community, but that it was clearly present in the Basketmaker III periods of occupation of the community.

Gizzard Stones

Gizzard stones were recovered from 13 Basketmaker Communities Project sites. Altogether, gizzard stones were collected from 564 proveniences—a total of 1,076 individual gizzard stones—at these sites (Table 23.56). Gizzard stones were abundant in some contexts at the Dillard site (5MT10647) and at the Ridgeline site (5MT10711). Four of the five proveniences with the largest quantities of gizzard stones were in structures at the Dillard site (5MT10647). The highest number of gizzard stones from one provenience was in Structure 236 at the Dillard site—114 gizzard stones were found clustered together on the surface in this pit structure. This concentration likely the gizzard of at least one turkey. Another notable concentration of 24 gizzard stones was recovered from the fill of a sipapu on the floor of the great kiva (SU 102) at the Dillard site. This cluster is likely an offering or other ritual deposit. Other contexts with gizzard stones yielded fewer than 18 stones each and averaged 1.6 stones per provenience.

Table 24.56 lists quantities of gizzard stones collected by site per kilogram of gray ware sherds. High-ranking sites are Mueller Little House (5MT10631), Ridgeline (5MT10711), and the Dillard site (5MT10647). These three sites date to the Basketmaker III period. The Hatch group sites, 5MT10684 and 5MT2037, which had the highest ratio of eggshell weight to weight of gray ware sherds are lower ranked for gizzards stones. These data suggest turkeys were certainly being used in the Basketmaker III and Pueblo II periods, but there might be differences in how turkeys were used. The lack of significant eggshell in the Basketmaker III period but prevalence of gizzard stones may indicate less turkey husbandry and more hunting of wild turkey.

Modified Bone

The residents of the Indian Camp Ranch community sites modified and used nonhuman bone for a wide variety of purposes including basket making and sewing. Table 24.57 presents, by site, the four categories of modified-bone artifacts recovered from these sites: awl, gaming piece, bone tube, and "other modified bone." More than 100 modified-bone artifacts were found; artifacts categorized as "other modified bone" are most abundant, awls and bone tubes are less abundant, and gaming pieces are sparsest. The greatest ratios of modified bones to kilogram of gray ware sherds were found at Mueller Little House (5MT10631), Ridgeline (5MT10711), 5MT10709, and the Dillard site (5MT10647). Some bone tools were used in the production of perishable items, so evaluating the spatial distribution of the tools can help identify production areas for materials that are not preserved in the archaeological record. Bone awls were multifunctional, although they are most closely associated with the production of textiles and baskets and with sewing. Awls were found at residential sites and at the Dillard site, which contains public architecture. Two complete almost identical awls were recovered from 5MT10684 (Figure 24.15). These data suggest that the production of perishable items was associated with domestic activities and also occurred in public spaces. Perhaps larger work groups gathered to make items in public areas such as at the great kiva at the Dillard site.

Addressing Basketmaker Communities Project Research Questions with Artifact Data

Data for the artifacts recovered from Basketmaker Communities Project sites are essential for addressing many of the questions presented in the research design for Crow Canyon's Basketmaker Communities Project (Diederichs and Ryan 2014; Ortman et al. 2011). Here we consider aspects of these research questions that can be addressed using artifact data and that relate directly to excavations at these sites, and we compare these data to artifact data for excavations at other Basketmaker III period sites across the region.

The research questions discussed here are grouped into five categories: chronology, origins of the Basketmaker III period population, Basketmaker III community structure and social organization, Basketmaker III and the Neolithic Demographic Transition, and anthropogenic legacy. In the following sections, we highlight how data from individual sites, and cumulative data from the entire project, address these research questions.

Chronology

> <u>How did the momentary population of the Indian Camp Ranch Basketmaker III settlement change through time?</u>

Analysis of quantity changes in artifacts over time provides evidence of changes in population within the Basketmaker Communities Project area sites. Pottery counts increase significantly over the three Basketmaker III temporal phases, with only 146 sherds collected from well-dated early Basketmaker III contexts, 4,747 sherds from mid-Basketmaker III contexts, and 6,654 from late Basketmaker III contexts (see Table 24.2). Similar patterns occur in chipped-stone artifact counts. Chipped-stone artifact counts increase from the middle to late Basketmaker III phases across the Basketmaker Communities Project assemblage. Changes in artifact counts for both pottery and chipped-stone are likely due to population increases in the region from the early to late Basketmaker III temporal phases. The exception to this trend is seen at 5MT10647, where the highest chipped-stone artifact counts were collected from mid-Basketmaker III phase contexts. This exception is due to more extensive excavation from mid-Basketmaker III phase contexts at 5MT10647; the ratio of the weight of gray ware pottery to chipped-stone artifact counts is 24.77 for the middle phase, 28.41 for the late phase, and 19.77 for the early phase.

<u>Can the Basketmaker III period chronology be divided into smaller time ranges based on the surface signature of habitation sites?</u>

A number of changes in pottery can be used to divide the Basketmaker III period into earlier and later phases. Using preliminary artifact data from the Basketmaker Communities Project and other regional sites, Scott Ortman and colleagues (2016) developed a method to divide the Basketmaker III period into early (A.D. 600–650) and late (A.D. 650–725) phases based on pottery form changes. Comparison of 17 Basketmaker III period sites in the area, including preliminary data from the Dillard site, showed that the ratio of painted bowl to seed jar rims doubles from the earlier to the later Basketmaker III phase. The research by Ortman and colleagues (2016) also included new analysis of well-dated sites housed at the University of Colorado at Boulder from the Yellow Jacket area (Sites 5MT1, 5MT3, 5MT9168, and 5MT9387) (Espinosa 2015) as well as additional analysis of collections from the Payne site (5MT12205). The data presented here from the Crow Canyon excavations component of the Basketmaker Communities Project (see Table 24.4) show a similar pattern, but not quite as dramatic a shift as documented by Ortman and colleagues (2016); the ratio of white ware bowl rims to gray ware seed jar rims increases from 0.52 to 0.68 from mid-Basketmaker III to late Basketmaker III. In addition to these changes in pottery vessel form over time, we document changes in gray ware temper over time, with sand/sandstone temper more common earlier in the Basketmaker III period and igneous rock temper dominating gray ware assemblages by the late Basketmaker III phase (see Table 24.15). Both of these pottery characteristics require large assemblages to determine relative time period but could be used together for greater precision in separating earlier from later Basketmaker III phase sites.

Origins of the Central Mesa Verde Basketmaker III Population

<u>What is the source population for the A.D. 600 immigrants into the central Mesa Verde region?</u>

Artifacts recovered from the Basketmaker Communities Project sites indicate possible source areas for the immigrants into the central Mesa Verde region. In particular, styles of projectile points and trade relationships may reflect connections the Indian Camp Ranch residents continued to maintain with source areas.

Some trends in projectile point styles during the Basketmaker II suggest eastern or western origins for Basketmaker III populations (Geib 2014; Matson 1991). The two mostly complete Basketmaker II, or San Pedro, projectile points recovered from the Basketmaker Communities Project sites were all collected from 5MT10647 and are most similar to the Western

Basketmaker Corner-notched projectile point type outlined by Geib (2014:118–120). Both of these points are made from nonlocal lithic materials (including Narbona Pass chert and Honaker Trail chert) suggesting these points were brought into the area from the west and the south and not manufactured locally. Interestingly, the complete Narbona Pass chert San Pedro projectile point appears to have been altered by heat, which resulted in a heavy white patina covering the entire surface of the artifact (Figure 24.16). One Elko Corner-Notched projectile point was collected from 5MT10736 and was made from semi-local lithic material. This Archaic projectile point type is most common in the Great Basin but has been found in some Basketmaker II contexts on the Colorado Plateau (Geib 2014). The presence of this point likely represents collecting practices of the Basketmaker III populations rather than evidence of a source population for the inhabitants of 5MT10736.

Trade Network

The Indian Camp Ranch Basketmaker III population had an extensive trade network for high-value materials, including exotic lithic materials, shell, and pottery. A number of nonlocal artifact types, consisting of ornaments, mineral samples, chipped stone, and pottery, reflect connections among other regions and the residents of the Indian Camp Ranch community. These trade relationships do not necessarily indicate where the residents originated but do reflect connections with other areas. It is possible that these connections are related to ties the Indian Camp Ranch residents continued with source communities, or they may reflect more recent connections.

The nonlocal lithic materials present in the Basketmaker Communities Project assemblage suggest a diverse trade network with the strongest trade connections coming from south and west of the project area. The strong southern connection is represented in the lithic material assemblage by high counts of obsidian and Narbona Pass chert artifacts. Most of the obsidian collected was sourced to the Jemez Mountains and Mount Taylor in New Mexico, and Narbona Pass chert is located on the Arizona and New Mexico border in the Chuska Mountains. Basketmaker III populations in the Four Corners region more commonly used Jemez Mountains obsidian (Arakawa et al. 2011; Shackley 2013, 2015, 2017). Mount Taylor obsidian is less common in the Mesa Verde region but is relatively more common in Basketmaker III contexts in Chaco Canyon (Tom Windes, personal communication 2019). Narbona Pass chert is also a commonly observed nonlocal material in Chaco Canyon dating back to the Basketmaker III time period (Cameron 2001).

Another strong trade connection observed in the Basketmaker Communities Project assemblage is with southeastern Utah, to the west of the project area. The nonlocal lithic materials from southeastern Utah consist of primarily red jasper and a few other identified types such as Cheese and Raisins chert, Honaker Trail chert, and Pigeon Blood agate. One sample of obsidian was sourced to Wild Horse Canyon, which is located in far western Utah. Red ware pottery originates in southeastern Utah and was present in small quantities in the project area.

Two other nonlocal materials observed include Mosca chert and McDermott metaquartzite from the Durango, Colorado, area. Three sherds of Rosa Black-on-white, a type more common in the

Durango area, were recovered from Basketmaker Communities Project sites. These data could suggest limited interaction with Basketmaker III populations to the east of the project area.

A number of mineral samples and ornaments are of nonlocal origins as well. Of the 27 shell items recovered on the project, at least five are *Olivella* shell imported from the Pacific beaches of California or the Gulf of Mexico. Azurite likely originated from areas to the west, including a few samples that were sourced to the Lisbon Valley of southeast Utah. Galena likely originated from the San Juan Mountains, to the west and north of the project area. Though these trade networks do not necessarily indicate direct migration from these far-flung regions, it does attest to the fluid movement of people and materials across the American Southwest.

Is there evidence for a multi-ethnic immigration into the region from a variety of different geographic areas?

The artifacts recovered from the Basketmaker Communities Project sites suggest that the residents were a diverse population. Their knowledge base, social connections, and practices reflect a deep history on the Colorado Plateau and direct connections with a number of nearby regions. This variation suggests that the Indian Camp Ranch community was multi-ethnic, incorporating immigrants from various distances and backgrounds.

If we look at pottery technology through a community of practice approach (e.g., Cordell and Habicht-Mauche 2012; Eckert 2008; Habicht-Mauche et al. 2006; Larson et al. 2017; Minar and Crown 2001; Neuzil 2008), we see that early residents of the Indian Camp Ranch community had a broader community of practice for pottery production than later in the Basketmaker III period. This suggests a diverse origin, possibly representing a multi-ethnic immigration into the region from different geographic areas.

The wide range of nonlocal and exotic materials found in Basketmaker Communities Project sites also suggests possible multi-ethnic origins. Projectile point types and materials appear to have come from areas to the west and south; minerals and stone from areas to the north, south, east, and west; and pottery from areas to the west and east.

What is the case for a Basketmaker III ethnogenesis?

There is evidence that the Indian Camp Ranch inhabitants engaged in a pan-regional community of practice, reflected in both technological and decorative design practices in pottery production. The shift from sand/sandstone to igneous rock temper is similar to shifts in pottery types and materials documented in other areas of the broader region, including the La Plata Valley and the Southern Chuska Valley. Wolky Toll and Dean Wilson (1999) identified a shift from sand to igneous rock in the La Plata Valley from early to late Basketmaker III. Similar patterns are seen in patterns documented by Reed (1998) and Trowbridge (2014: 336) in the Chuska Valley. Closer to home, other archaeologists have seen similar types of temper used, such as at a single pithouse habitation excavated by Woods Canyon near Pleasant View, Colorado, where igneous rock temper dominates the pottery assemblage at this late Basketmaker III (A.D. 675–725) site (5MT11431), at 97.1 percent crushed igneous rock temper in the gray ware pottery assemblage (Fetterman and Honeycutt 1995:7–41). Similarly, at Casa Coyote on White Mesa, Utah, crushed igneous rock is the most common tempering material for the site (which dates to the late A.D. 600s; Hurst 2004). The preferred temper shifts over time in the Basketmaker Communities Project area in the same way it shifts in other nearby regions and sites, with the first potters in the community favoring sand as a tempering agent and later potters preferentially selecting crushed igneous rock. Potters in the Basketmaker III period in the Basketmaker Communities Project area are moving in the direction we see in many later Pueblo I and Pueblo II period sites in the area, where crushed igneous rock is a preferred temper (e.g., Errickson 1998).

Decorative elements in pottery production are shared across a wide area of the Colorado Plateau. Linda Honeycutt analyzed approximately 1,500 black-on-white bowls and bowls sherds from 76 sites in the Four Corners region and has identified nine distinct design motifs on Basketmaker III period–pottery throughout the broader region (Honeycutt 2015). These same designs were used by potters across the Indian Camp Ranch community, as well as at comparative sites such as the Payne site. These data suggest a single community of practice across both the Indian Camp Ranch community and the overall Colorado Plateau for pottery design.

Residents of the Indian Camp Ranch community are connected across the Colorado Plateau by both pottery designs and pottery recipes. Because pottery is such an important item of material culture in ancestral Pueblo culture, this shared adoption of technological and decorative elements of pottery production signals the development over the Basketmaker III period of a cohesive regional identity, or ethnogenesis.

Basketmaker III Community Structure and Social Organization

> <u>Do assemblages from community structures indicate that they functioned to integrate households across a large or small region?</u>

The Dillard site great kiva (Structure 102) was the focal point for the Indian Camp Ranch community for over a century (A.D. 620 to 725), and artifacts associated with the structure clearly indicate it was used to integrate households across the community and, perhaps the larger region.

More bowls are associated with the great kiva than with any other type of structure throughout the Basketmaker III occupation of the community. A high percentage of serving vessels in the great kiva roofing material indicates that a feast was associated with its initial construction. A second feast may be suggested by broken serving bowls scattered across the floor of the great kiva before the structure was burned and collapsed (see Figures 24.7 and 24.8).

The ground-stone assemblage from the overall Dillard site (5MT10647) differs from the smaller hamlet sites in the Indian Camp community during the Basketmaker III time period. Dempsey Alves (2019) argues that greater variation in lithic material type choice and mano cross-section profiles may indicate differing cultural backgrounds between those living at 5MT10647 and at the small hamlet sites. Also, the larger population at 5MT10647 may have created a surplus of ground food that may have been distributed among visitors to the site or used for specialized activities. One specialized activity room adjacent to the great kiva at 5MT10647 may have been used primarily for grinding activities associated with the great kiva.

Both community structures, the oversized pithouse at 5MT10711 and the great kiva at 5MT10647, have higher amounts of nonlocal materials than other structures in the Basketmaker Communities Project, supporting the idea that these structures were used for communal use. However, the differences in amount and variety of nonlocal materials may indicate differing social spheres at each site. The population at 5MT10711 may have interacted with groups from a closer area than 5MT10647 populations. The community at 5MT10647 may have had a larger social network that extended over a larger area based on the higher amounts of nonlocal materials originating from greater distances. The presence of Narbona Pass chert and obsidian sourced to Mount Taylor could represent a connection with Chuska Mountains populations or, based on similar nonlocal lithic material assemblages, with Basketmaker III Chaco Canyon populations.

Is there evidence for community organization change over time?

Artifacts, especially pottery technological change, suggests that the community organization changes over time. Pottery paste and temper recipes become more standardized over time, suggesting the emergence of a single community of practice of pottery production from the early to late Basketmaker III phases across the Indian Camp Ranch community.

How were community structures decommissioned, and does the mode of closure match that of contemporary domestic structures?

Architectural closing practices were tied to structure function within the Indian Camp Ranch community and artifacts reflect both functional and closing practices. Storage structures were not formally closed and were generally left to collapse in place, with artifacts on floors reflecting their use life. Residential pithouses and the Dillard site great kiva were formally closed, and the artifacts found on the floors of these structures reflect closing activities more than use life of the structures.

The great kiva at the Dillard site exhibits a complex closing process. Two large Chapin Black-on-white bowls and at least two gray ware jars were coated with fugitive red pigment on their exterior surfaces and were then broken and scattered across a sand layer, along with chipped-stone tools, beads, and a number of projectile points. A second stage of closing activities resulted in the deposition of chipped-stone tools, pottery sherds, and an Archaic projectile point left on the dismantled adobe lining of the great kiva (Figure 24.17).

Habitation structures were closed with less formality and variation—many of the residential pithouses were cleaned out of most artifacts. In a few structures, such as the pithouse at Portulaca Point, artifact assemblages were intentionally placed on the floor. The oversized pithouse at the Ridgeline site is a rare example of a structure that was left open, which thus allowed refuse to accumulate on the floor surface, after it fell out of use.

Basketmaker III and the Neolithic Demographic Transition

> Is there evidence of a Neolithic Demographic Transition in the northern San Juan during the seventh century?
> AND
> If so, what technological advances made this transition possible?

There is technological evidence in artifacts of the Neolithic Demographic Transition in the Indian Camp Ranch community during the Basketmaker III period, especially in ground-stone, chipped-stone, and pottery technology.

Grinding surface area on manos may be an indicator of similarities or differences in agricultural dependency among communities in different geographical areas through time. We examined the surface area of manos from the Basketmaker Communities Project sites (Dempsey Alves 2019) and compared the data to mano surface area data from the Basketmaker II Falls Creek Rockshelters (Durango, Colorado, area), Rainbow Plateau, and Shonto Plateau (northeastern Arizona and southeastern Utah) (Geib 2014). The data suggest that Basketmaker Communities Project one-hand mano surface areas are more similar to Falls Creek Basketmaker II one-hand manos than those from the Rainbow and Shonto Plateaus; however, the two-hand mano surface area data from Basketmaker Communities Project sites are more similar to the later Pueblo II and III patterns at Rainbow and Shonto Plateaus. These data suggest that residents of the Indian Camp Ranch community, like those later communities on the Rainbow and Shonto Plateaus, were intensifying their processing of agriculture products, reflecting increasing intensity and dependence on domesticated plants.

The ratio of bifaces to cores can indicate the relative mobility of a population (Parry and Kelly 1987). Compared to ratios from the Dolores Archaeological Program and the Black Mesa Archaeological Project (Parry and Kelly 1987:292–293), the Basketmaker Communities Project sites seem to follow the trends for decreased relative mobility during the Basketmaker III in the Four Corners region. This suggests that the Basketmaker III population at Basketmaker Communities Project sites were more sedentary and less mobile than the Basketmaker II populations and more similar to the later, more sedentary Pueblo I populations to the north and southwest of the project area, reflecting increasing dependence of agricultural production that required greater sedentism.

Projectile point styles during the Basketmaker III and Pueblo I time periods across the Colorado Plateau tend to change from the larger dart points of the Archaic and Basketmaker II populations to smaller, corner-notched arrow points. This change is associated with the increased use of bow and arrow technology around A.D. 500 in the western United States and likely represents a change in hunting practices. This smaller arrow point type is prevalent in the Basketmaker Communities Project sites during the middle and late phases of the Basketmaker III time period. Most of these small arrow points were made from local Dakota/Burro Canyon silicified sandstone, making it likely that these points were produced locally and during the time that the sites in the project area were occupied. Smaller points likely reflect an increasing focus on garden hunting of small mammals that would have been prey within agricultural fields, rather than large game that would require more long-distance hunting parties, taking hunters away from agricultural production for longer periods of time.

The Neolithic Demographic Transition in the broader region was also supported by the adoption of beans, which has often been tied to the development of true cooking pottery to allow for the long-term boiling of dried beans (Ortman 2006:102–103). Although studies have suggested that domesticated beans (sp. *Phaseolus vulgaris* L.) may have shown up earlier than gray ware pottery (Cutler and Whitaker 1961; Geib 2011:285) or that beans could have been cooked in hide bags with hot limestone rather than exclusively in pottery (Ellwood et al. 2013), gray ware pottery would have allowed for easy preparation of beans and other agricultural domesticates. Gray ware cooking pottery was present across every site and structure in the Indian Camp Ranch community.

Anthropogenic Legacy

> <u>Is there evidence for environmental change related to land-use patterns of the Basketmaker III–Pueblo II periods?</u>

Although not a lot of information about change in land use from the Basketmaker III period to the Pueblo II period is clear from artifactual evidence within Indian Camp Ranch, there is a change in the materials selected for use in chipped-stone tool production. During the Pueblo II time period in the Indian Camp Ranch community and throughout the Four Corners region, there appears to be a significant increase in the use of the semi-local lithic material Brushy Basin chert. This is a common lithic material used for the manufacture of tchamahias (Shelley 2006), though no tchamahias made from this material were recovered from Basketmaker Communities Project sites.

Summary and Conclusions

Artifact data for Basketmaker Communities Project sites reveal much about the elements of daily life in this community in the central Mesa Verde region. In this section, we briefly summarize the data and major implications presented in this chapter. We focus on pottery, chipped- and ground-stone artifacts, and inferences drawn from these artifacts as they pertain to exchange.

Chronometric dates yielded by radiocarbon, archaeomagnetic, and tree-ring samples (see Chapter 19) are corroborated by dating of the assemblage of unmodified sherds from Basketmaker Communities Project sites—the dominant formal types in this assemblage are Chapin Gray and Chapin Black-on-white for the Basketmaker III period sites and Mancos Black-on-white for the late Pueblo II and early Pueblo III period sites. Pottery dating indicates that the community was occupied from the A.D. 500s to the late A.D. 1100s. The most common vessel forms for Basketmaker Communities Project sites vary with time. In the Basketmaker III period, plain gray seed jars and necked jars are most common. In the late Pueblo II and early Pueblo III periods, white ware bowls and corrugated jars are most common, which is typical of Pueblo II/Pueblo III sites in the region (e.g., Ortman 2000; Till and Ortman 2007). More sherds of white ware bowls are found in contexts associated with the great kiva at the Dillard site than are found in residential or storage rooms in the project area, suggesting that we may be seeing the beginnings of communal feasting occurring in the Basketmaker Communities Project area and that it occurred at the Dillard site great kiva. Evidence of pottery production was found at most of the Basketmaker Communities Project sites, and pottery-production materials were found in both residential and public architectural spaces. A wide range of materials are available locally for pottery manufacture, and the first residents of the Indian Camp Ranch community used a wider range of materials than the later residents. Early residents used various types of sand, sandstone, and igneous rock as tempering materials in their gray ware pottery, but more recent residents used almost exclusively igneous rock in their gray ware pottery.

Most chipped-stone artifacts recovered from Basketmaker Communities Project sites were manufactured from locally available raw materials, especially local Morrison and Dakota Formation outcrops. Semi-local and nonlocal raw materials were not commonly used to produce chipped-stone artifacts, but these lithic materials were used slightly more often to fashion formal tools such as projectile points, bifaces, and drills. Nonlocal materials were found at the majority of Basketmaker Communities Project sites, although 5MT10647 yielded slightly greater quantities of these exotic goods.

Numerous obsidian artifacts from the Basketmaker Communities Project sites were identified to source locations: sources in the Jemez Mountains and from the Mount Taylor Volcanic Field in New Mexico were common, one piece was sourced to the San Francisco Volcanic Field in Arizona, and one piece was sourced to Wild Horse Canyon in western Utah. Tools representing most formal types were found at nearly all Basketmaker Communities Project sites, indicating that activities associated with formal tools were not restricted to specific locations within the community; one exception is the high count of drills present at the 5MT10711 oversized pithouse. The most common projectile points from both Basketmaker III and Pueblo II contexts are small, corner-notched types; the next most common type from Pueblo II contexts is the Lancaster Side-Notched type that dates from the Pueblo II to Pueblo III time periods. The majority of the formal tools collected from Basketmaker Communities Project sites are from 5MT10647 from mid-Basketmaker III phase contexts.

Most nonlocal and semi-local materials recovered from Basketmaker Communities Project sites originated from northern New Mexico (obsidian from the Jemez Mountains and Mount Taylor, Narbona Pass chert) and southeastern Utah (San Juan Red Ware, red jasper, Cheese and Raisins chert, Honaker Trail chert). The social ties reflected in the majority of nonlocal artifacts indicated stronger connections to the south and west of the project area, which may indicate possible origins for the Basketmaker III populations at Indian Camp Ranch.

In summary, the artifacts from Basketmaker Communities Project sites paint a picture of many elements of daily life in the community and interactions with other community groups. Community structures, such as Structure 102, the great kiva at 5MT10647, exhibit broader ties than most individual hamlets. Specifically, the community that participated in the activities at the great kiva seems to have had a broader interaction sphere than is apparent at other structures and sites in the Basketmaker Communities Project. This sphere seems to have included the population in the Chuska Mountains and possibly, by association, the Chaco Canyon region. These broad connections with various groups appear to have been present even as early as the mid-Basketmaker III period, when the Basketmaker Communities Project area was first intensively settled by farming communities.

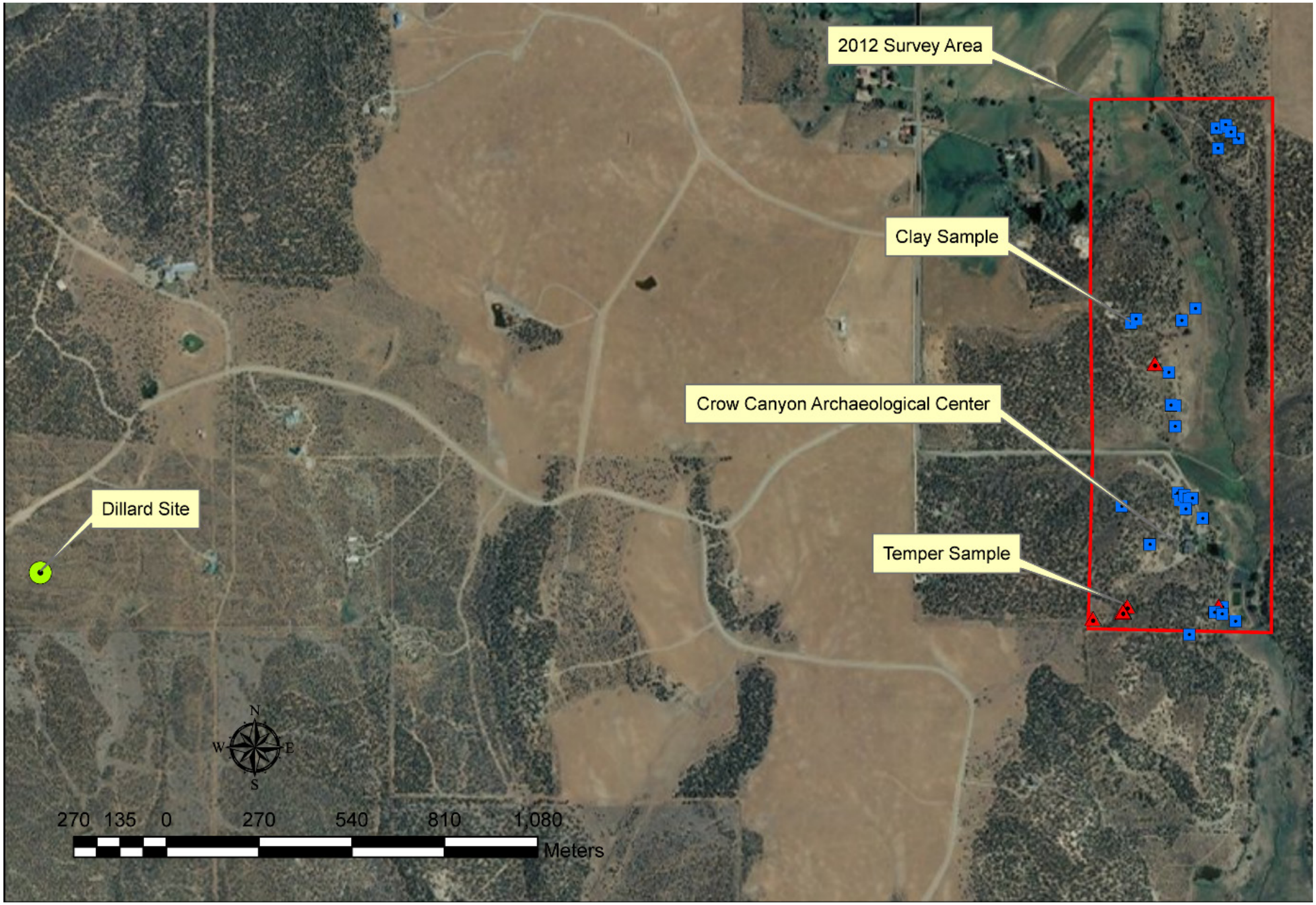

Figure 24.1. Map of clay resource survey area and samples collected.

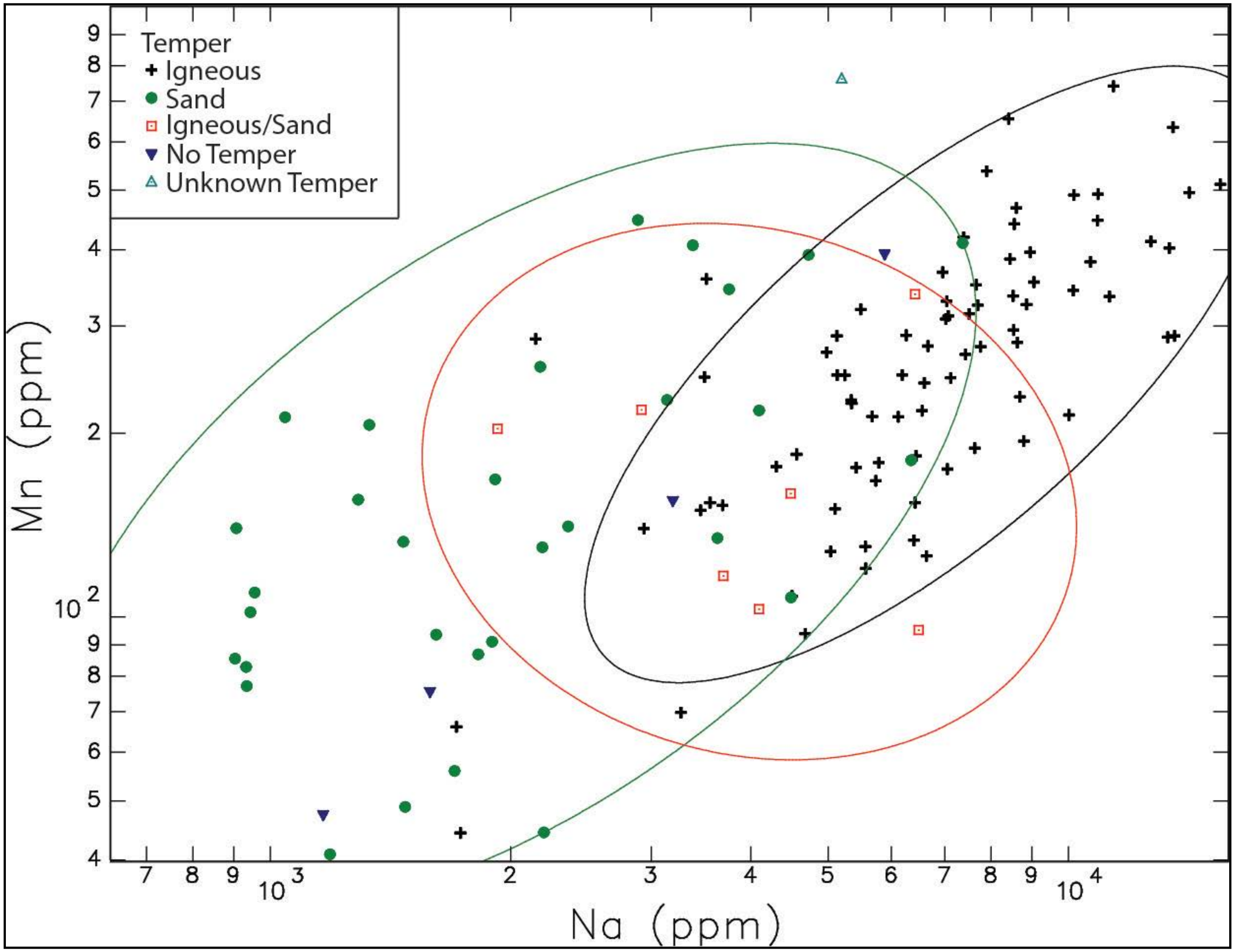

Figure 24.2. Scatterplot of log base-10 concentrations of sodium and manganese for neutron activation analysis sherd sample from the Dillard site distinguished by temper. Ellipses represent 90-percent confidence intervals for membership in the groups. Only ellipses for igneous, sand, and both tempers are shown.

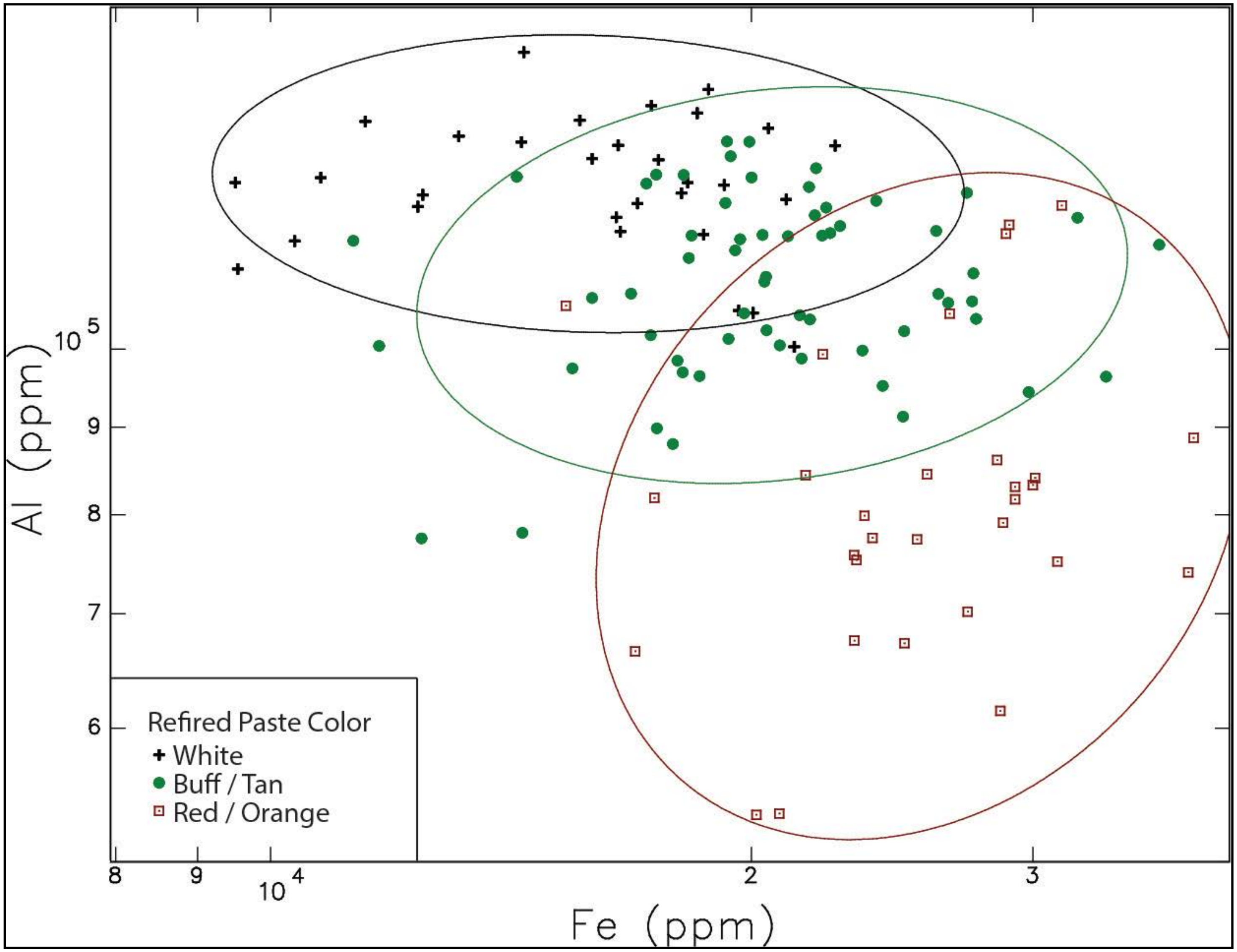

Figure 24.3. Scatterplot of log base-10 concentrations of iron and aluminum for the neutron activation analysis sherd sample from the Dillard site distinguished by refired paste color. Ellipses represent 90-percent confidence intervals for membership in the groups.

Figure 24.4. Design motifs on painted pottery sherds from the Dillard site (5MT10647). Motif numbers refer to the motif identifications outlined in Honeycutt (2015).

Figure 24.5. Mancos Black-on-white effigy jar from the Badger Den (5MT10686).

Figure 24.6. Miniature Chapin Gray seed jar, Vessel 1, from the Ridgeline site (5MT10711) with possible spout attachment.

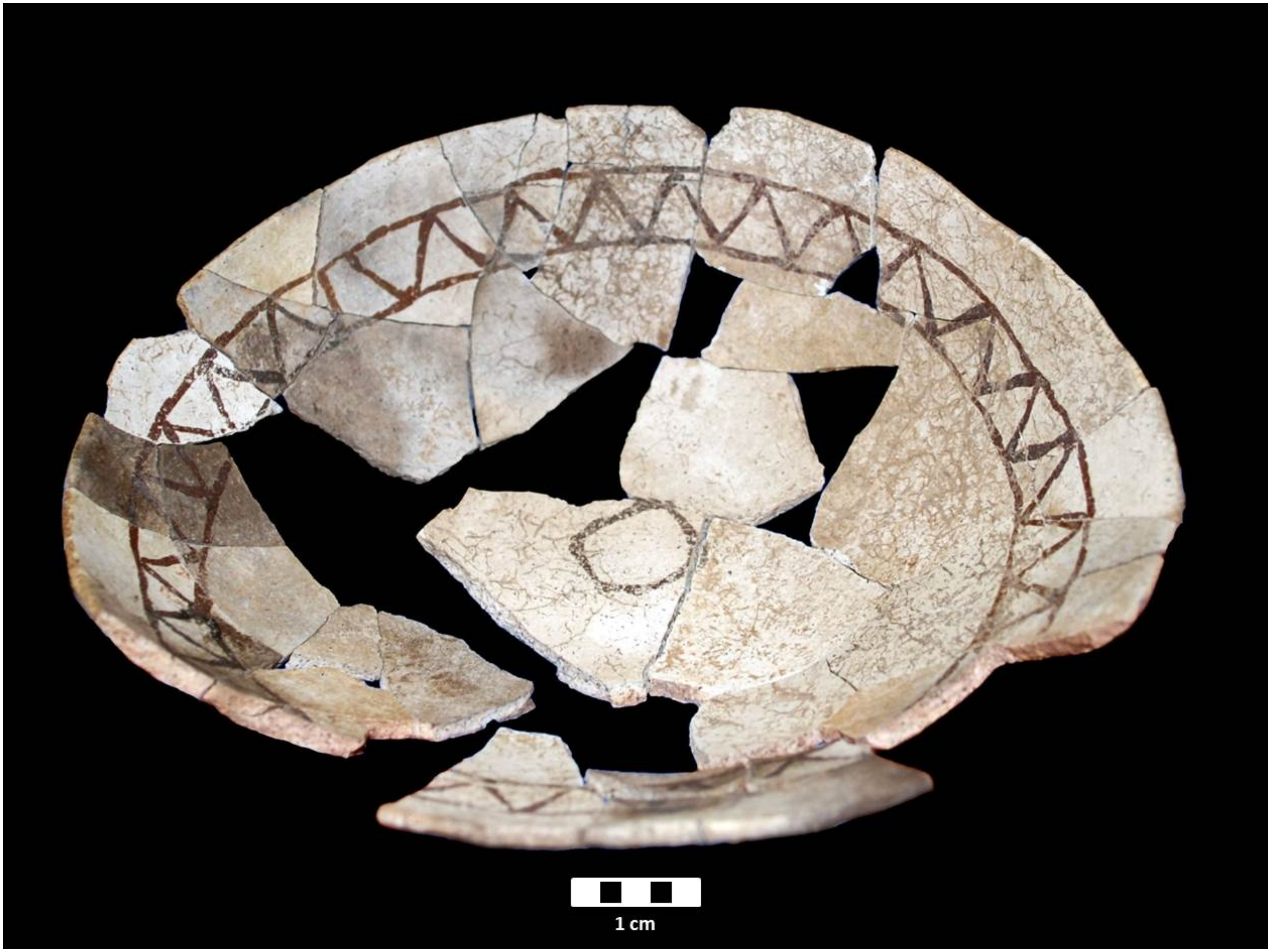

Figure 24.7. Chapin Black-on-white bowl, Vessel 2, recovered from the great kiva at the Dillard site (5MT10647).

Figure 24.8. Chapin Black-on-white bowl, Vessel 3, recovered from the great kiva at the Dillard site (5MT10647).

Figure 24.9. Chapin Gray Jar (Vessel 1) from Portulaca Point (5MT10709).

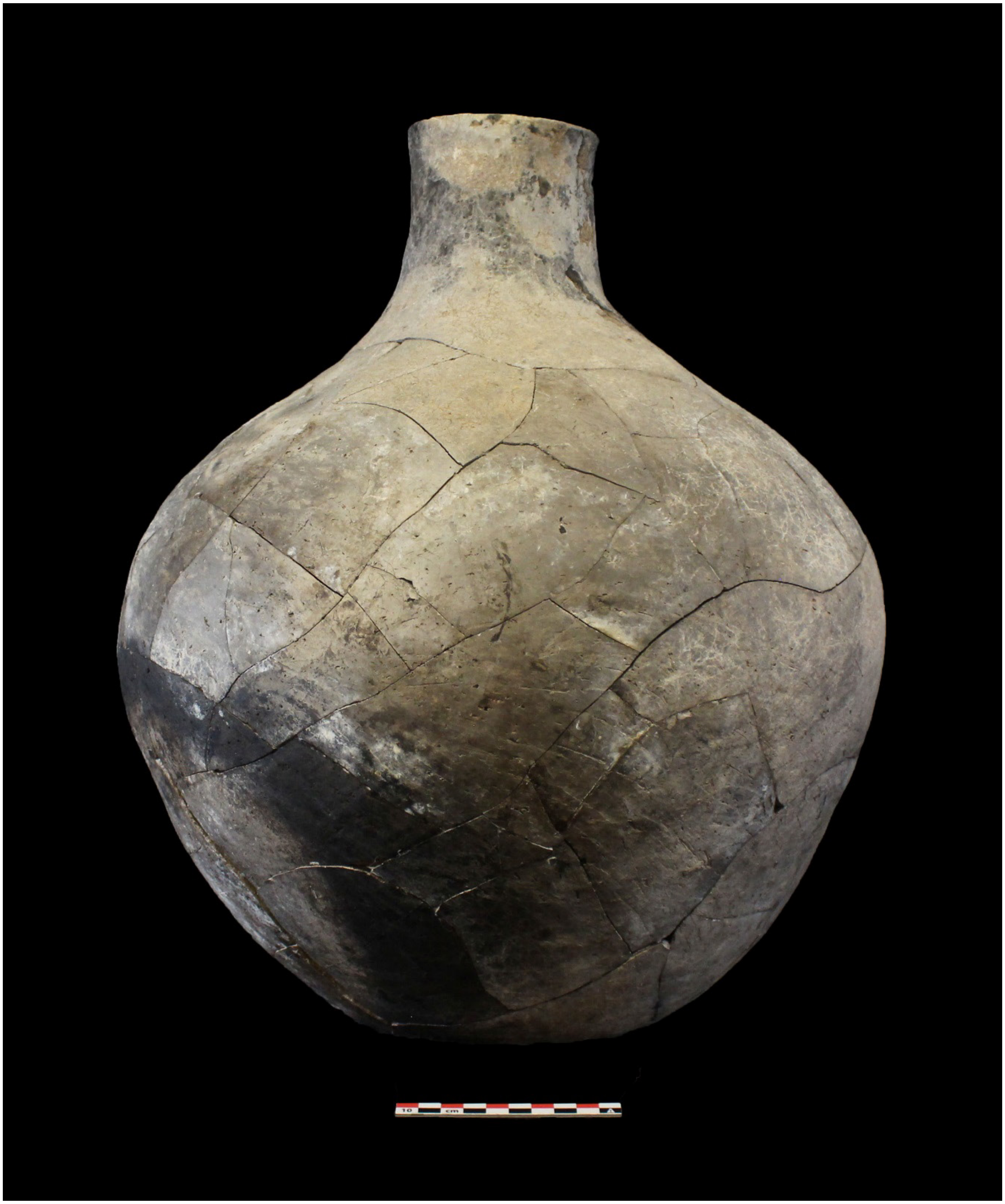

Figure 24.10. Large olla from 5MT10678, the Watson site, Vessel 43. Note circular burned area on left side.

Figure 24.11. Projectile point sample assemblage from 5MT10647, Basketmaker Communities Project.

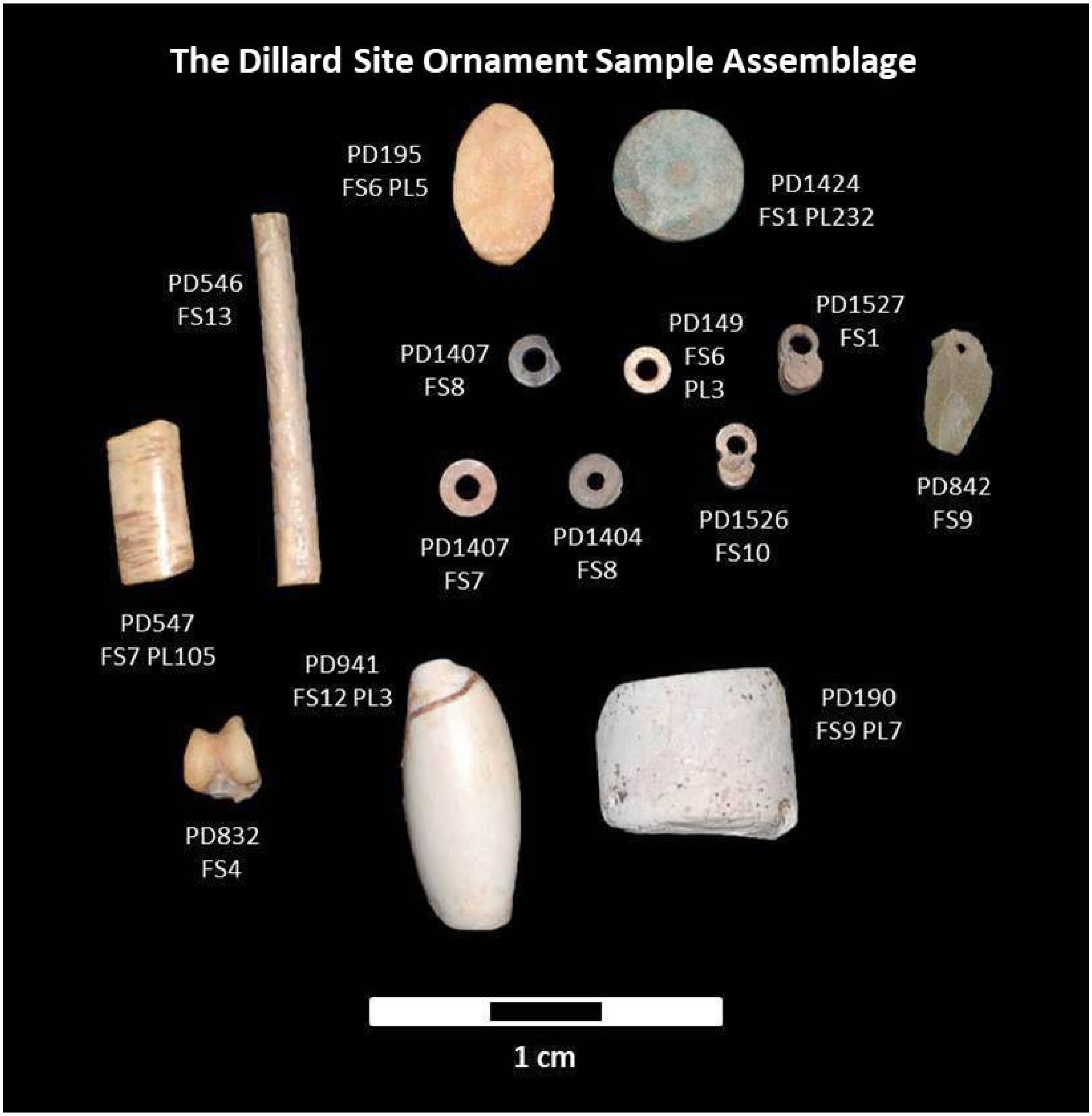

Figure 24.12. Ornament sample assemblage from 5MT10647, Basketmaker Communities Project.

Figure 24.13. Modified turquoise artifact (PD1436, FS1, PL9) from 5MT10647, Basketmaker Communities Project.

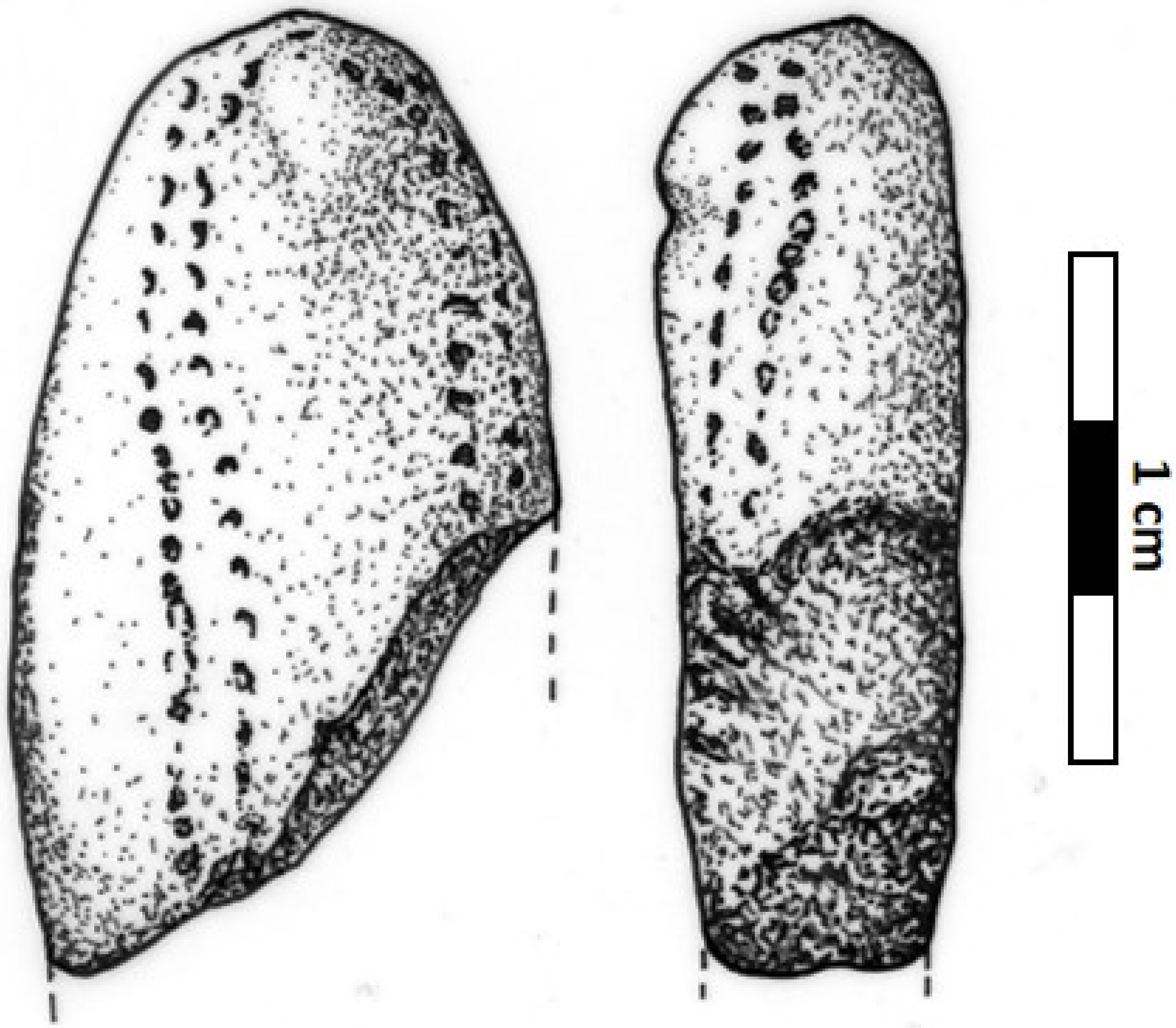

Figure 24.14. Illustration of an effigy fragment recovered from the Dillard site (5MT10647: PD 341, FS 6, PL 9), Basketmaker Communities Project.

Figure 24.15. Two complete bone awls from 5MT10684, Basketmaker Communities Project.

Figure 24.16. Nearly complete Narbona Pass chert San Pedro projectile point with patina from 5MT10647, PD 708, FS 5, PL 7, Basketmaker Communities Project.

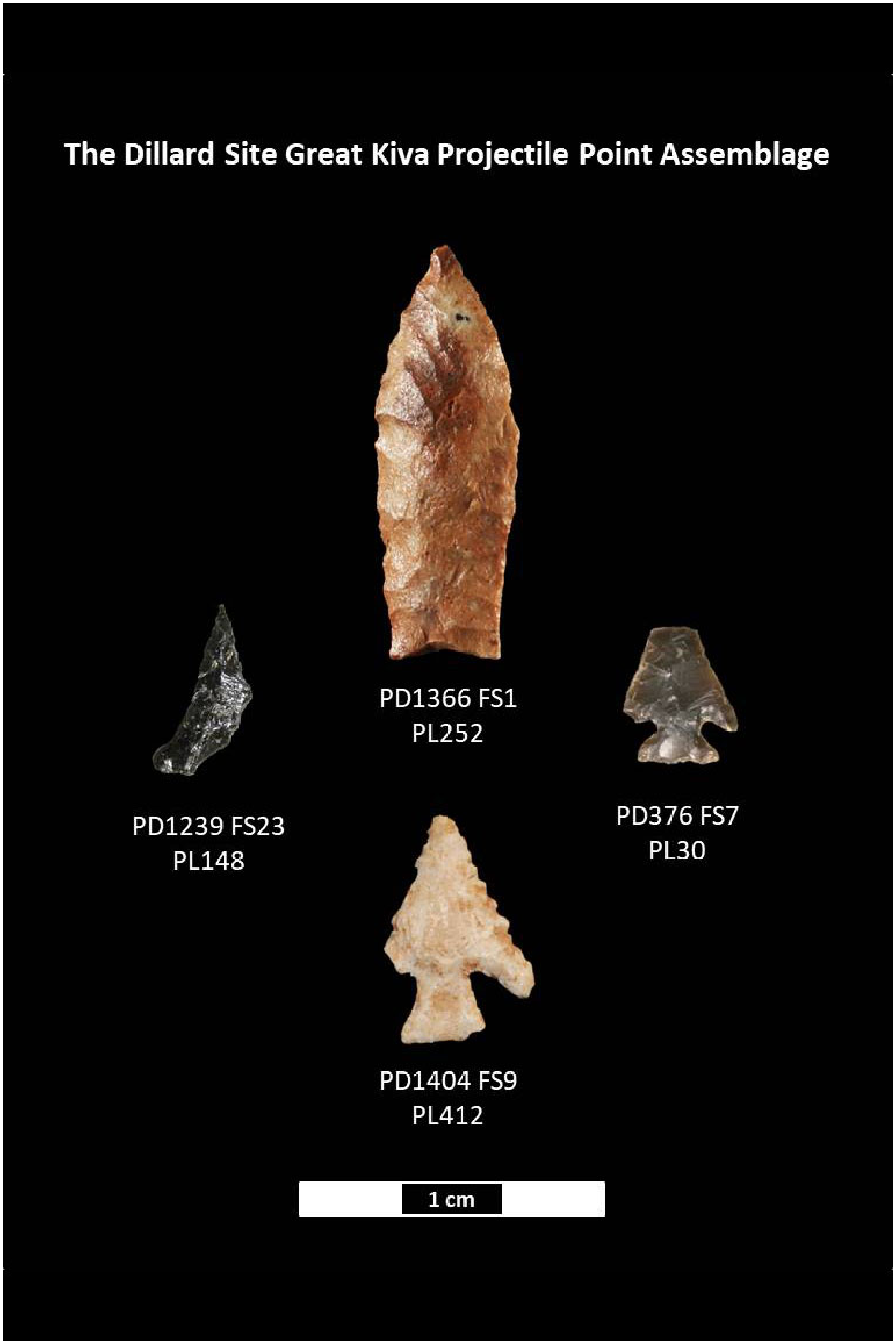

Figure 24.17. Projectile point assemblage from the great kiva at 5MT10647, Basketmaker Communities Project.

Table 24.1. Summary of Unmodified Sherds by Ware and Type, Basketmaker Communities Project.

Ware and Type	Count	% by Count	Weight (g)	% by Weight (g)
Brown Ware				
Basketmaker Mud Ware	20	0.04	86.90	0.04
Obelisk Utility	5	0.01	15.00	0.01
Sambrito Utility	51	0.11	765.70	0.32
Twin Trees Utility	111	0.24	461.36	0.19
Plain Gray Ware				
Chapin Gray	1,245	2.73	9,272.14	3.88
Indeterminate Local Gray	22,473	49.29	119,684.66	50.08
Indeterminate Local Gray, Polished	865	1.90	5,523.66	2.31
Indeterminate Neckbanded Gray	9	0.02	40.40	0.02
Mancos Gray	16	0.04	94.80	0.04
Moccasin Gray	10	0.02	72.40	0.03
Corrugated Gray Ware				
Indeterminate Local Corrugated Gray	9,969	21.87	45,323.78	18.96
Mancos Corrugated Gray	169	0.37	1,558.70	0.65
Mesa Verde Corrugated Gray	32	0.07	395.30	0.17
White Ware				
Chapin Black-on-white	375	0.82	3,357.90	1.41
Cortez Black-on-white	36	0.08	292.30	0.12
Early White Painted	822	1.80	4,107.60	1.72
Early White Unpainted	461	1.01	2,480.87	1.04
Indeterminate Local White Painted	5	0.01	18.40	0.01
Indeterminate Local White Unpainted	2	0.00	10.60	0.00
Late White Painted	3,654	8.01	17,304.79	7.24
Late White Unpainted	3,977	8.72	18,649.70	7.80
Mancos Black-on-white	836	1.83	7,364.00	3.08
McElmo Black-on-white	13	0.03	164.30	0.07
Mesa Verde Black-on-white	7	0.02	60.50	0.03
Piedra Black-on-white	15	0.03	138.90	0.06
Pueblo II White Painted	244	0.54	1,035.70	0.43
Pueblo III White Painted	29	0.06	212.30	0.09
Rosa Black-on-white	3	0.01	11.80	0.00
Tin Cup Polychrome	2	0.00	14.20	0.01
Red Ware				
Abajo Red-on-orange	8	0.02	34.20	0.01
Bluff Black-on-red	8	0.02	24.50	0.01
Deadmans Black-on-red	19	0.04	69.90	0.03
Indeterminate Local Red Painted	37	0.08	108.80	0.05
Indeterminate Local Red Unpainted	43	0.09	139.20	0.06
Nonlocal				
Chuska Gray, Not Further Specified	4	0.01	24.80	0.01
Chuska White, Not Further Specified	1	0.00	6.40	0.00
Cibola White, Not Further Specified	2	0.00	8.20	0.00
Lino Gray	1	0.00	7.50	0.00
Other White Nonlocal	2	0.00	8.60	0.00

Ware and Type	Count	% by Count	Weight (g)	% by Weight (g)
Polychrome	2	0.00	10.10	0.00
Tsegi Orange Ware	1	0.00	18.30	0.01
Unknown				
Unknown Pottery	6	0.01	9.00	0.00
Total	45,590	100.00	238,988.16	100.00

Table 24.2. Summary of Unmodified Sherds by Ware and Type by Temporal Phase, Basketmaker Communities Project.

Ware and Type	Early BMIII		Mid-BMIII		Late BMIII		All Phases BMIII		PI		Late PII/ Early PIII		All Pueblo	
	N	% N	N	% N	N	% N	N	% N	N	% N	N	% N	N	% N
Brown Ware														
Sambrito Utility	1	0.68	24	0.51	4	0.06	18	0.22					4	0.05
Basketmaker Mud Ware			6	0.13	2	0.03	10	0.12			2	0.01		
Obelisk Utility					1	0.02					3	0.02	1	0.01
Twin Trees Utility	1	0.68	38	0.80	20	0.30	41	0.49			3	0.02	8	0.10
Plain Gray Ware														
Chapin Gray	7	4.79	246	5.18	335	5.03	437	5.27	11	5.58	69	0.40	140	1.67
Indeterminate Local Gray	91	62.33	3,811	80.28	5,587	83.96	6,940	83.67	165	83.76	2,464	14.35	3,409	40.75
Indeterminate Local Gray, Polished	32	21.92	303	6.38	159	2.39	250	3.01	1	0.51	42	0.24	78	0.93
Indeterminate Neckbanded Gray							1	0.01			2	0.01	5	0.06
Mancos Gray											7	0.04	9	0.11
Moccasin Gray					2	0.03	3	0.04			3	0.02	2	0.02
Corrugated Gray Ware														
Indeterminate Local Corrugated Gray			16	0.34	24	0.36	56	0.68	3	1.52	7,478	43.56	2,383	28.49
Mancos Corrugated Gray											120	0.70	49	0.59
Mesa Verde Corrugated Gray											28	0.16	4	0.05
White Ware														
Chapin Black-on-white	2	1.37	76	1.60	114	1.71	106	1.28	4	2.03	23	0.13	50	0.60
Cortez Black-on-white											26	0.15	10	0.12
Early White Painted	5	3.42	113	2.38	221	3.32	241	2.91	13	6.60	81	0.47	147	1.76
Early White Unpainted	7	4.79	90	1.90	154	2.31	140	1.69			33	0.19	37	0.44
Indeterminate Local White Painted			1	0.02							4	0.02		
Indeterminate Local White Unpainted					1	0.02					1	0.01		
Late White Painted			6	0.13	6	0.09	14	0.17			2,807	16.35	818	9.78
Late White Unpainted			7	0.15	5	0.08	15	0.18			3,045	17.74	907	10.84
Mancos Black-on-white							5	0.06			631	3.68	199	2.38
McElmo Black-on-white					1	0.02					9	0.05	3	0.04
Mesa Verde Black-on-white			1	0.02							6	0.03		
Piedra Black-on-white			1	0.02	5	0.08	2	0.02			4	0.02	3	0.04
PII White Painted											184	1.07	60	0.72
PIII White Painted											23	0.13	6	0.07

Ware and Type	Early BMIII		Mid-BMIII		Late BMIII		All Phases BMIII		PI		Late PII/ Early PIII		All Pueblo	
	N	% N	N	% N	N	% N	N	% N	N	% N	N	% N	N	% N
Rosa Black-on-white					1	0.02					2	0.01		
Tin Cup Polychrome											2	0.01		
Red Ware														
Abajo Red-on-orange					1	0.02					2	0.01	5	0.06
Bluff Black-on-red					1	0.02	4	0.05					3	0.04
Deadmans Black-on-red											14	0.08	5	0.06
Indeterminate Local Red Painted			1	0.02	2	0.03	2	0.02			24	0.14	8	0.10
Indeterminate Local Red Unpainted			6	0.13	8	0.12	7	0.08			13	0.08	9	0.11
Nonlocal														
Chuska Gray, Not Further Specified											2	0.01	2	0.02
Chuska White, Not Further Specified													1	0.01
Cibola White, Not Further Specified											2	0.01		
Lino Gray			1	0.02										
Other White Nonlocal											2	0.01		
Polychrome											2	0.01		
Tsegi Orange Ware											1	0.01		
Unknown														
Unknown Pottery							2	0.02			4	0.02		
Total	146	100.00	4,747	100.00	6,654	100.00	8,294	100.00	197	100.00	17,168	100.00	8,365	100.00

Note: BM = Basketmaker, PI = Pueblo I, PII = Pueblo II, and PIII = Pueblo III.

Table 24.3. Unmodified Rim Sherds by Ware and Form, Basketmaker Communities Project.

Ware and Form	N	% by Count	Weight (g)	% by Weight (g)
Brown Ware				
Bowl	15	0.48	645.90	2.86
Jar	12	0.38	72.10	0.32
Kiva/Seed Jar	3	0.10	8.40	0.04
Unknown	8	0.25	30.70	0.14
Plain Gray Ware				
Bowl	215	6.84	1,252.80	5.55
Jar	598	19.03	3,879.40	17.18
Kiva/Seed Jar	537	17.09	4,742.10	21.00
Ladle	2	0.06	53.10	0.24
Unknown	119	3.79	270.70	1.20
Corrugated Gray Ware				
Jar	347	11.04	2,617.70	11.59
White Ware				
Bowl	1,010	32.15	6,446.58	28.55
Canteen	1	0.03	12.30	0.05
Jar	135	4.30	795.20	3.52
Kiva/Seed Jar	29	0.92	301.70	1.34
Ladle	55	1.75	861.26	3.81
Other	1	0.03	382.90	1.70
Unknown	27	0.86	65.00	0.29
Red Ware				
Bowl	15	0.48	59.10	0.26
Jar	1	0.03	1.90	0.01
Ladle	1	0.03	10.60	0.05
Unknown	1	0.03	1.20	0.01
Nonlocal				
Bowl	5	0.16	43.40	0.19
Jar	4	0.13	26.70	0.12
Unknown				
Jar	1	0.03	1.80	0.01
Total	3,142	100.00	22,582.54	100.00

Table 24.4. Unmodified White Ware and Gray Ware Rim Sherds by Form by Temporal Phase, Basketmaker Communities Project.

Pottery Ware	Vessel Form	Early Basketmaker III		Mid-Basketmaker III		Late Basketmaker III		All Phases Basketmaker III		Pueblo I		Late Pueblo II/Early Pueblo III		All Pueblo		Total	
		N	% N	N	% N	N	% N	N	% N	N	% N	N	% N	N	% N	N	% N
White Ware	Bowl	3	27.27	57	17.87	106	22.65	119	20.70	4	23.53	531	59.20	189	42.95	1,009	37.00
	Canteen											1	0.11			1	0.04
	Jar			4	1.25	3	0.64	4	0.70			88	9.81	36	8.18	135	4.95
	Kiva/ Seed jar			4	1.25	8	1.71	1	0.17			12	1.34	4	0.91	29	1.06
	Ladle							3	0.52			42	4.68	10	2.27	55	2.02
	Other											1	0.11			1	0.04
	Unknown					3	0.64	3	0.52	1	5.88	15	1.67	5	1.14	27	0.99
Gray Ware	Bowl	2	18.18	40	12.54	48	10.26	73	12.70	6	35.29	16	1.78	30	6.82	215	7.88
	Jar	4	36.36	93	29.15	111	23.72	130	22.61	6	35.29	162	18.06	91	20.68	597	21.89
	Kiva/ Seed jar	2	18.18	110	34.48	157	33.55	193	33.57			16	1.78	59	13.41	537	19.69
	Ladle											1	0.11	1	0.23	2	0.07
	Unknown			11	3.45	32	6.84	49	8.52			12	1.34	15	3.41	119	4.36
	Total	11	100.00	319	100.00	468	100.00	575	100.00	17	100.00	897	100.00	440	100.00	2,727	100.00

Table 24.5. Unmodified Rim Sherds by Structure Functional Type, Basketmaker Communities Project.

Vessel Form	Public Architecture		Permanent Housing		Specialized Activity		Temporary Housing		Total	
	N	% of Count	N	% of Count	N	% of Count	N	% of Count	N	% of Count
Bowl	67	43.51	87	33.59	8	36.36	17	33.33	179	36.83
Jar	42	27.27	83	32.05	5	22.73	11	21.57	141	29.01
Kiva/Seed Jar	45	29.22	89	34.36	9	40.91	23	45.10	166	34.16
Total	154	100.00	259	100.00	22	100.00	51	100.00	486	100.00

Table 24.6. Paint Type for Painted White Ware Sherds by Temporal Phase, Basketmaker Communities Project.

Paint Type	Early Basketmaker III		Mid-Basketmaker III		Late Basketmaker III		All Phases Basketmaker III		Pueblo I		Late Pueblo II/ Early Pueblo III		All Pueblo		Total	
	N	% N	N	% N	N	% N	N	% N	N	% N	N	% N	N	% N	N	% N
Carbon			17	10.90	21	7.81	25	7.76			731	40.05	230	34.59	1,024	31.42
Glaze											1	0.05	1	0.15	2	0.06
Mineral	6	100.00	138	88.46	246	91.45	295	91.61	16	100.00	1,059	58.03	430	64.66	2,190	67.20
Mixed			1	0.64	1	0.37	2	0.62			24	1.32	3	0.45	31	0.95
Indeterminate					1	0.37					10	0.55	1	0.15	12	0.37
Total	6	100.00	156	100.00	269	100.00	322	100.00	16	100.00	1,825	100.00	665	100.00	3,259	100.00

Table 24.7. Shaped Sherds by Site, Basketmaker Communities Project.

Pottery Ware	Pottery Type	5MT10631	5MT10647	5MT10684	5MT10686	5MT10687	5MT10711	5MT10736	5MT2037	Total Count	% of Count
Gray Ware	Indeterminate Local Gray	2	5					1		8	19.05
	Indeterminate Local Corrugated Gray				1				1	2	4.76
White Ware	Chapin Black-on-white		1							1	2.38
	Early White Painted						1			1	2.38
	Mancos Black-on-white			1						1	2.38
	Late White Painted		2	4	2	4			4	16	38.10
	Late White Unpainted			1	4	3			1	9	21.43
Red Ware	Deadmans Black-on-red			1					1	2	4.76
	Indeterminate Local Red Painted			1						1	2.38
	Indeterminate Local Red Unpainted					1				1	2.38
Total		2	8	8	7	8	1	1	7	42	100.00
Total Wt. of Corrugated Gray Pottery (g)		7,048.50	84,114.56	12,413.56	10,601.10	14,859.22	17,375.97	2,999.50	19,561.83	181,927.23	
Shaped Sherds per kg of Corrugated Pottery		0.28	0.10	0.64	0.66	0.54	0.06	0.33	0.36	0.23	
Rank*		6	7	2	1	3	8	5	4		

* Rank 1 = greatest count per kg of corrugated pottery.

Table 24.8. Shaped Sherds by Temporal Phase, Basketmaker Communities Project.

Pottery Ware	Pottery Type	Mid-Basketmaker III	Late Basketmaker III	All Phases Basketmaker III	Late Pueblo II/Early Pueblo III	All Pueblo
Gray Ware	Indeterminate Local Gray	2	3	1		2
	Indeterminate Local Corrugated Gray				2	
White Ware	Chapin Black-on-white			1		
	Early White Painted		1			
	Mancos Black-on-white				1	
	Late White Painted			2	11	3
	Late White Unpainted				8	1
Red Ware	Deadmans Black-on-red				1	1
	Indeterminate Local Red Painted				1	
	Indeterminate Local Red Unpainted				1	
Total		2	4	4	25	7

Table 24.9. Artifacts Associated with Pottery Production by Site, Basketmaker Communities Project.

Site	Modified Sherds (N)	Polishing Stones (N)	Unfired Sherds (Wt. in g)	Clay Sample (Wt. in g)	Igneous Rock Sample (Wt. in g)	Wt. of Gray Ware Pottery (g)	Number of Modified Sherds per kg of Corrugated Gray Pottery	Number of Polishing Stones per kg of Corrugated Gray Pottery	Ratio of Wt. of Unfired Sherds to Wt. of Corrugated Gray Pottery	Ratio of Wt. of Clay to Wt. of Corrugated Gray Pottery
5MT10631	2	2	81.90	106.90	17.60	7,048.50	0.28	0.28	11.62	15.17
5MT10647	9	7	322.90	1,415.85	1,882.70	84,114.56	0.11	0.08	3.84	16.83
5MT10684	17	2		0.10	107.69	12,413.56	1.37	0.16		0.01
5MT10686	43	1	1.10	1.04	2.90	10,601.10	4.06	0.09	0.10	0.10
5MT10687	35	3			176.00	14,859.22	2.36	0.20		
5MT10709		1			0.60	3,443.10		0.29		
5MT10711	1	8	47.40	497.40	27.70	17,375.97	0.06	0.46	2.73	28.63
5MT10719		1		134.40		349.00		2.87		385.10
5MT10736	2		0.90			2,999.50	0.67		0.30	
5MT2032	1	1	1.00	97.30		6,007.80	0.17	0.17	0.17	16.20
5MT2037	55	1		6.00	138.22	19,561.83	2.81	0.05		0.31
5MT3875		1				2,503.50		0.40		
Total	165	28	455.20	2,258.99	2,353.41	181,927.23	0.91	0.15	2.50	12.42

Table 24.10. Other Pottery Artifacts, Basketmaker Communities Project.

Site	Study Unit Number	PD	FS	Fill/Assemblage Position	Fill/Assemblage Type	Item Description
5MT10647	101	234	11	Fill: not further specified	Mixed deposit: recent disturbance	Broken, round fragment, possibly a clay test.
	102	8	4	Surface contact: modern ground surface	Mixed deposit: recent disturbance	Small clay pipe fragment. 1 cm below the mouthpiece is a shallow row of small circles created by pressing a small hollow stick or reed into the clay.
		263	5	Fill: wall fall	Collapsed structure: not further specified	Clay ball, fingerprints and fingernail marks are evident.
		375	7	Fill: wall fall	Collapsed structure: not further specified	Fired clay ball.
		1410	1	Surface contact: ash or other accumulation on a floor	Cultural deposit: secondary refuse	Shaped clay disc with fingerprint impressions.
	108	1038	7	Fill: not further specified	Post-collapse deposit: natural processes	Irregular test of clay.
	123	1268	3	Fill: not further specified	Cultural deposit: mixed refuse	Clay ball or adobe.
		1379	4	Fill: not further specified	Mixed deposit: other	Half of a pottery ball.
	124	1433	8	Fill: surface feature contents	Cultural deposit: secondary refuse	Pipe mouthpiece fragments from same pipe.
	125	886	3	Fill: above wall/roof fall	Collapsed structure: with mixed refuse	Unidentified clay item.
		887	9	Fill: above wall/roof fall	Collapsed structure: with mixed refuse	Adobe or clay coils; one is complete, and one is a fragment.
	202	155	9	Fill: not further specified	Post-collapse deposit: natural processes	Possible effigy figure fragment or clay test.
	205	421	1	Fill: above wall/roof fall	Collapsed structure: with mixed refuse	Semi-spherical object made from clay.
		497	2	Fill: roof fall	Collapsed structure: with de facto refuse	Clay blob.

Site	Study Unit Number	PD	FS	Fill/Assemblage Position	Fill/Assemblage Type	Item Description
	214	410	16	Fill: not further specified	Post-collapse deposit: natural processes	Fired clay ball.
		440	13	Fill: not further specified	Post-collapse deposit: natural processes	Clay coil.
		513	22	Fill: not further specified	Post-collapse deposit: natural processes	End of clay coil.
	215	404	12	Fill: not further specified	Cultural deposit: secondary refuse	Irregular test of clay.
	220	622	13	Fill: roof fall	Collapsed structure: with mixed refuse	Could be adobe or clay.
		624	29	Fill: roof fall	Collapsed structure: with mixed refuse	Clay ball.
		1059	18	Fill: surface feature contents	Collapsed structure: not further specified	Clay balls.
	234	628	13	Fill: roof fall	Collapsed structure: with mixed refuse	Approximately half of a clay ball.
	312	1319	10	Fill: wall and roof fall	Collapsed structure: not further specified	Clay or adobe ball.
5MT10684	108	94	39	Fill: surface feature contents	Cultural deposit: primary refuse	Possibly adobe; coils or crenulations visible.
5MT10686	106	40	10	Fill: not further specified	Mixed deposit: recent disturbance	Spirals from corrugated jar, fresh break.
		106	10	Fill: not further specified	Mixed deposit: recent disturbance	Small cylindrical piece; might be effigy leg fragment or clay test.
		119	5	Fill: not further specified	Mixed deposit: recent disturbance	Spiral appliqué.
5MT10711	101	55	17	Fill: roof fall	Collapsed structure: not further specified	Possible clay test or effigy; temper includes charred vegetal material (juniper bark?), very similar to unfired sherds (PD55 FS53) and the unfired vessel from 5MT10647 (PD627 FS3). May have been lightly fired by structure closing. No other temper was observed.
	103	117	10	Fill: surface feature contents	Cultural deposit: primary refuse	Possible twisted coil of clay.

Site	Study Unit Number	PD	FS	Fill/Assemblage Position	Fill/Assemblage Type	Item Description
5MT10718	110	36	3	Fill: roof fall	Collapsed structure: not further specified	Might be a clay test piece of unfired clay; pieces refit.
5MT10736	111	50	6	Surface contact: and fill above	Cultural deposit: mixed refuse	Small conical object of clay, possible clay test.
5MT2032	110	112	28	Fill: roof fall	Collapsed structure: not further specified	Small, tempered and fired pottery ball.
5MT2037	106	87	6	Fill: not further specified	Mixed deposit: recent disturbance	Possible appliqué or handle end. Fired, straight coil of clay.

Table 24.11. Munsell Color of Clay Resource Survey Test Tiles and Refired Pottery Sherd Nips from the Dillard Site.

Munsell Color	Munsell Color Name	Grouped Color	Count of Refired Archaeological Sherds	Count of Fired Test Tiles
7.5YR 6/4	Light brown	Buff	2	
7.5YR 7/4	Pink		4	
7.5YR 8/3	Pink		15	11
7.5YR 8/4	Pink		27	12
Total Count (Percent) Buff			48 (11.40%)	23 (35.93%)
10YR 7/1	Light gray	Gray	1	
2.5Y 7/1	Light gray			1
Total Count (Percent) Gray			1 (0.23%)	1 (1.56%)
2.5YR 6/6	Light red	Red/ orange/ brown	2	
2.5YR 6/8	Light red		1	
2.5YR 7/6	Light red		1	
5YR 7/4	Pink		1	4
2.5YR 4/6	Red		1	
2.5YR 5/8	Red		4	
5YR 6/6	Reddish yellow		13	1
5YR 6/8	Reddish yellow		19	3
5YR 7/6	Reddish yellow		7	6
5YR 7/8	Reddish yellow			2
7.5YR 6/6	Reddish yellow		3	
7.5YR 8/6	Reddish yellow		9	1
5YR 4/6	Yellowish red			1
5YR 5/6	Yellowish red		4	
5YR 5/8	Yellowish red		17	2
7.5YR 5/4	Brown		1	
10YR 4/2	Dark grayish brown		1	
5YR 5/4	Reddish brown		1	
Total Count (Percent) Red/Orange/Brown			85 (20.19%)	20 (31.25%)
10YR 7/2	Light gray	Tan	1	
10YR 6/3	Pale brown		2	
2.5Y 8/3	Pale brown		1	
10YR 9.5/2	Pale orange yellow		2	
10YR 9/2	Pale orange yellow		8	
7.5YR 7/6	Reddish yellow		25	2
10YR 7/3	Very pale brown		2	1
10YR 7/4	Very pale brown		11	1

Munsell Color	Munsell Color Name	Grouped Color	Count of Refired Archaeological Sherds	Count of Fired Test Tiles
10YR 8.5/2	Very pale brown		31	
10YR 8/2	Very pale brown		26	1
10YR 8/3	Very pale brown		101	
10YR 8/4	Very pale brown		39	
Total Count (Percent) Tan			249 (59.14%)	5 (7.81%)
2.5YR 8/4	Pink	White/ off-white/ pinkish	1	
5YR 8/3	Pink		1	2
5YR 8/4	Pink		2	
7.5YR 4/6	Pink		1	
5YR 8/2	Pinkish white			2
7.5YR 8.5/2	Pinkish white		2	
7.5YR 8/2	Pinkish white			3
10YR 8.5/1	White		15	
10YR 8/1	White		1	
10YR 9/1	White		5	
2.5Y 8.5/1	White		2	
2.5Y 8/1	White		2	
2.5Y 9/1	White		4	
5YR 8/1	White			1
7.5YR 8.5/1	White		1	
7.5YR 8/1	White			7
8.5/N	White		1	
Total Count (Percent) White/Off White/Pinkish			38 (9.03%)	15 (23.44%)
Total Count (Percent)			421 (100%)	64 (100%)

Table 24.12. Munsell Color of Refired Pottery Rim Sherd Nips from the Dillard Site (5MT10647) by Temporal Phase.

Grouped Munsell Color	Early Basketmaker III		Mid-Basketmaker III		Late Basketmaker III		All Phases Basketmaker III		Late Pueblo II/Early Pueblo III		All Pueblo		Total	
	N	% N	N	% N	N	% N	N	% N	N	% N	N	% N	N	% N
Buff			13	9.63	5	7.58	19	11.95	4	18.18	6	17.65	47	11.19
Gray					1	1.52							1	0.24
Red/Orange/Brown	1	25.00	30	22.22	15	22.73	32	20.13	4	18.18	3	8.82	85	20.24
Tan	1	25.00	80	59.26	42	63.64	95	59.75	11	50.00	20	58.82	249	59.29
White/Off White/ Pinkish	2	50.00	12	8.89	3	4.55	13	8.18	3	13.64	5	14.71	38	9.05
Total	4	100.00	135	100.00	66	100.00	159	100.00	22	100.00	34	100.00	420	100.00

Table 24.13. Munsell Color of Refired Sherd Nips from the Dillard Site (5MT10647) by Basketmaker III Structure Function.

Grouped Munsell Color	Temporary Housing		Specialized Activity		Permanent Housing		Public Architecture		Total	
	N	% N	N	% N	N	% N	N	% N	N	% N
Buff	4	17.39	1	12.50	9	7.76	7	15.91	17	10.12
Red/Orange/Brown	6	26.09	1	12.50	27	23.28	6	13.64	34	20.24
Tan	13	56.52	4	50.00	68	58.62	25	56.82	97	57.74
White/Off White/Pinkish			2	25.00	12	10.34	6	13.64	20	11.90
Total	23	100.00	8	100.00	116	100.00	44	100.00	168	100.00

Table 24.14. Dominant Temper for Rim Sherds from All Sites Excluding the Hatch Group, Basketmaker Communities Project.

Temper Code	Plain Gray Ware		White Ware		Total		Temper Description
	N	% of N	N	% of N	N	% of N	
1A	220	18.72	71	20.23	291	19.07	Mixed igneous rock (both diorite porphyry and augite diorite). Abundant, large-sized grains of temper.
1B	83	7.06	70	19.94	153	10.03	Diorite porphyry. Fewer, smaller-sized grains of temper. Some hornblende/pyroxene phenocrysts present.
1C	119	10.13	35	9.97	154	10.09	Diorite porphyry. Abundant, large-sized grains of temper. Abundant, large hornblende/pyroxene phenocrysts.
1D	93	7.91	25	7.12	118	7.73	Diorite porphyry. Abundant, large-sized grains of temper. Fewer, small hornblende/pyroxene phenocrysts.
1E	27	2.30	21	5.98	48	3.15	Indeterminate igneous rock.
1F	23	1.96	4	1.14	27	1.77	Augite diorite. Fewer, smaller-sized grains of temper. With or without mica.
1H	32	2.72	20	5.70	52	3.41	Mixed igneous rock (both diorite porphyry and augite diorite). Fewer, small-sized grains of temper.
1J	17	1.45	8	2.28	25	1.64	Mixed igneous rock (both diorite porphyry and augite diorite). Abundant, large-sized grains of temper. Very sandy paste.
1K	13	1.11	6	1.71	19	1.25	Diorite porphyry. A wide range of particle size for temper. Some hornblende/pyroxene phenocrysts present.
1L	91	7.74	15	4.27	106	6.95	Augite diorite. Abundant, large-sized grains of temper. With or without mica.
2A	119	10.13	11	3.13	130	8.52	Mixed lithic sand. Subrounded to subangular.
2B	150	12.77	29	8.26	179	11.73	Quartz/chert sand. Subrounded to rounded.
2C	113	9.62	9	2.56	122	7.99	Mixed lithic sand and sandstone/other weathered conglomerations. Subrounded to subangular.
2D	4	0.34	1	0.28	5	0.33	Crushed sandstone.
4A	9	0.77	1	0.28	10	0.66	Clay pellets/shale. Small-sized clay pellets/shale.
4C	4	0.34	1	0.28	5	0.33	Clay pellets/shale. Few, large-sized clay pellets/shale.
4E	39	3.32	23	6.55	62	4.06	Clay pellets/shale. Range of size of clay pellets/shale. More numerous clay pellets/shale than temper.
5A	12	1.02	1	0.28	13	0.85	Black, tabular/oval shiny inclusions.
6A	4	0.34			4	0.26	Self-tempered, no temper added.
7A	3	0.26			3	0.20	Sherd temper.
Total	1,175	100.00	351	100.00	1,526	100.00	

Table 24.15. Dominant Temper for Rim Sherds from All Sites Excluding the Hatch Group by Basketmaker III Temporal Phase, Basketmaker Communities Project.

Temper	Early Basketmaker III		Mid-Basketmaker III		Late Basketmaker III		All Phases Basketmaker III		Total	
	N	% of N	N	% of N	N	% of N	N	% of N	N	% of N
Plain Gray Ware										
Igneous Rock	2	25.00	126	52.72	213	71.72	253	57.24	594	60.24
Mixed Lithic or Quartz Sand/Sandstone	5	62.50	99	41.42	73	24.58	160	36.20	337	34.18
Clay Pellets/Shale	1	12.50	8	3.35	9	3.03	22	4.98	40	4.06
Black, Tabular/Oval Shiny Inclusions			4	1.67			4	0.90	8	0.81
Self-Tempered, No Added Temper			2	0.84			2	0.45	4	0.41
Sherd					2	0.67	1	0.23	3	0.30
Total Plain Gray Ware	8	100.00	239	100.00	297	100.00	442	100.00	986	100.00
White Ware										
Igneous Rock	1	33.33	50	81.97	76	82.61	96	76.80	223	79.36
Mixed Lithic or Quartz Sand/Sandstone	2	66.67	9	14.75	11	11.96	17	13.60	39	13.88
Clay Pellets/Shale			2	3.28	5	5.43	11	8.80	18	6.41
Black, Tabular/Oval Shiny Inclusions							1	0.80	1	0.36
Total White Ware	3	100.00	61	100.00	92	100.00	125	100.00	281	100.00

Table 24.16. Dominant Temper Categories for All Rim Sherds by Basketmaker III Structure Function (Excludes the Hatch Group Sites), Basketmaker Communities Project.

Grouped Temper Type	Temporary Housing		Specialized Activity		Permanent Housing		Public Architecture		Total	
	N	% N	N	% N	N	% N	N	% N	N	% N
Igneous Rock	29	67.44	16	66.67	161	60.07	76	76.77	282	66.20
Mixed Lithic or Quartz Sand/Sandstone	13	30.23	7	29.17	91	33.96	17	17.17	128	30.05
Clay Pellets/Shale	1	2.33	1	4.17	8	2.99	6	6.06	16	3.76
Black, Tabular/Oval Shiny Inclusions					4	1.49				
Self-Tempered, No Added Temper					2	0.75				
Sherd					2	0.75				
Total	43	100.00	24	100.00	268	100.00	99	100.00	426	100.00

Table 24.17. Temper Categories Used for Sherds from the Hatch Group Sites, Basketmaker Communities Project.

Temper	Temper Category
Igneous Rock	Igneous rock
Augite Diorite	Igneous rock
Diorite Porphyry	Igneous rock
Trachyte	Igneous rock
Crushed Sandstone	Sand/sandstone
Pink Cemented Sandstone	Sand/sandstone
Weathered Silicified Sandstone	Sand/sandstone
Crushed Silicified Sandstone	Sand/sandstone
Quartz Sand	Sand/sandstone
Multilithic Sand	Sand/sandstone
Sherd	Sherd
Unprocessed Clay	Unprocessed clay

Table 24.18. Dominant Temper Categories for White Ware Bowl Rim Sherds and Corrugated Gray Ware Jar Rim Sherds from the Hatch Group Sites, Basketmaker Communities Project.

Grouped Temper Type	5MT10684		5MT10686		5MT10687		5MT2037		Total Hatch Group	
Corrugated Gray Ware										
	N	% of N	N	% of N	N	% of N	N	% of N	N	% of N
Sand/Sandstone			1	2.78	3	6.12	3	4.00	7	3.66
Igneous Rock	29	93.55	33	91.67	44	89.80	67	89.33	173	90.58
Sherd	2	6.45	2	5.56	2	4.08	3	4.00	9	4.71
Unprocessed Clay							2	2.67	2	1.05
Total Corrugated Gray Ware	31	100.00	36	100.00	49	100.00	75	100.00	191	100.00
White Ware										
Sand/Sandstone	5	11.90	1	2.56	3	6.00	6	8.96	15	7.58
Igneous Rock	16	38.10	21	53.85	13	26.00	14	20.90	64	32.32
Sherd	20	47.62	16	41.03	34	68.00	47	70.15	117	59.09
Unprocessed Clay	1	2.38	1	2.56					2	1.01
Total White Ware	42	100.00	39	100.00	50	100.00	67	100.00	198	100.00

Table 24.19. Nonlocal Pottery Sherds, by Site, Basketmaker Communities Project.

Pottery Type	Site				
	5MT10647	5MT10684	5MT10686	5MT10687	5MT2037
Lino Gray	1				
Cibola White, Not Further Specified		1			1
Chuska White, Not Further Specified					1
Chuska Gray, Not Further Specified					4
Tsegi Orange Ware			1		
Polychrome				1	
Other White Nonlocal			1		1
Gobernador Polychrome				1	
Total	1	1	2	2	7
Weight of Gray Ware Sherds (g)	84,114.56	12,413.56	10,601.10	14,859.22	19,561.83
Nonlocal Sherds per kg of Gray Ware Sherds	0.02	0.16	0.19	0.13	0.10

Table 24.20. Honeycutt (2015) Design Motifs by Site for all Early White Painted, Chapin Black-on-white, and Piedra Black-on-white Sherds, Basketmaker Communities Project.

Site	Motif 1		Motif 2		Motif 3		Motif 4		Motif 5		Motif 6		Motif 7		Motif 8		Motif 9		Total	
	N	% N	N	% N	N	% N	N	% N	N	% N	N	% N	N	% N	N	% N	N	% N	N	% N
5MT10631	1	9.09	2	8.00	8	17.02	3	10.34	7	5.34	7	18.92	4	8.51	7	12.07	3	9.09	42	10.05
5MT10647	9	81.82	20	80.00	27	57.45	21	72.41	98	74.81	7	18.92	25	53.19	28	48.28	26	78.79	261	62.44
5MT10684							1	3.45	1	0.76	2	5.41	1	2.13	3	5.17			8	1.91
5MT10686									1	0.76			1	2.13					2	0.48
5MT10709									3	2.29									3	0.72
5MT10711			1	4.00	5	10.64	1	3.45	12	9.16	8	21.62	8	17.02	16	27.59	2	6.06	53	12.68
5MT10718													1	2.13					1	0.24
5MT10719							1	3.45			2	5.41					2	6.06	5	1.20
5MT10736											1	2.70			1	1.72			2	0.48
5MT2032			2	8.00	4	8.51	1	3.45	3	2.29	7	18.92	3	6.38	2	3.45			22	5.26
5MT2037									4	3.05									4	0.96
5MT3875	1	9.09			3	6.38	1	3.45	2	1.53	3	8.11	4	8.51	1	1.72			15	3.59
Total	11	100.00	25	100.00	47	100.00	29	100.00	131	100.00	37	100.00	47	100.00	58	100.00	33	100.00	418	100.00

Table 24.21. Honeycutt (2015) Motifs on Pottery Sherds from the Payne Site (5MT12205), Basketmaker Communities Project.

Motif Number	N	% N
Motif 1	3	6.25
Motif 2	2	4.17
Motif 3	11	22.92
Motif 4	1	2.08
Motif 5	16	33.33
Motif 6	4	8.33
Motif 7	5	10.42
Motif 8	6	12.50
Motif 9		
Total	48	100.00

Table 24.22. Honeycutt (2015) Design Motifs by Basketmaker III Temporal Phase from All Sites, Basketmaker Communities Project.

Motif Number	Early Basketmaker III		Mid-Basketmaker III		Late Basketmaker III		All Phases Basketmaker III		Total	
	N	% N	N	% N	N	% N	N	% N	N	% N
Motif 1			3	4.41	2	1.48	4	3.74	9	2.88
Motif 2			3	4.41	6	4.44	7	6.54	16	5.13
Motif 3	1	50.00	9	13.24	15	11.11	9	8.41	34	10.90
Motif 4			6	8.82	10	7.41	10	9.35	26	8.33
Motif 5			31	45.59	31	22.96	38	35.51	100	32.05
Motif 6			3	4.41	20	14.81	3	2.80	26	8.33
Motif 7			5	7.35	12	8.89	17	15.89	34	10.90
Motif 8			3	4.41	25	18.52	13	12.15	41	13.14
Motif 9	1	50.00	5	7.35	14	10.37	6	5.61	26	8.33
Total	2	100.00	68	100.00	135	100.00	107	100.00	312	100.00

Table 24.23. Dominant Temper in Sherds with Honeycutt (2015) Design Motifs from All Sites, Basketmaker Communities Project.

Motif Number	Igneous Rock		Sand		Clay Pellets/Shale		Total	
	N	% N	N	% N	N	% N	N	% N
Motif 1	11	5.00			1	2.86	12	4.35
Motif 2	12	5.45	2	9.52	2	5.71	16	5.80
Motif 3	31	14.09	2	9.52	2	5.71	35	12.68
Motif 4	18	8.18	3	14.29	2	5.71	23	8.33
Motif 5	66	30.00	8	38.10	20	57.14	94	34.06
Motif 6	24	10.91	3	14.29			27	9.78
Motif 7	22	10.00	2	9.52	3	8.57	27	9.78
Motif 8	25	11.36			1	2.86	26	9.42
Motif 9	11	5.00	1	4.76	4	11.43	16	5.80
Total	220	100.00	21	100.00	35	100.00	276	100.00

Table 24.24. Honeycutt (2015) Design Motifs on Sherds from All Sites by Basketmaker III Structure Function, Basketmaker Communities Project.

Motif Number	Temporary Housing		Specialized Activity		Permanent Housing		Public Architecture		Total	
	N	% N	N	% N	N	% N	N	% N	N	% N
Motif 1	1	7.69			2	2.33	2	6.06	5	3.57
Motif 2					6	6.98	1	3.03	7	5.00
Motif 3	1	7.69	3	37.50	11	12.79	2	6.06	17	12.14
Motif 4	2	15.38	2	25.00	5	5.81	5	15.15	14	10.00
Motif 5	5	38.46	1	12.50	31	36.05	7	21.21	44	31.43
Motif 6	1	7.69			6	6.98	1	3.03	8	5.71
Motif 7					9	10.47	8	24.24	17	12.14
Motif 8			1	12.50	8	9.30	5	15.15	14	10.00
Motif 9	3	23.08	1	12.50	8	9.30	2	6.06	14	10.00
Total	13	100.00	8	100.00	86	100.00	33	100.00	140	100.00

Table 24.25. Descriptive Information for Numbered Vessels, Basketmaker Communities Project.

Site	Vessel No.	Study Unit No.	Study Unit Description	Fill/Assemblage Position	Fill/ Assemblage Type	Pottery Type	Additional Provenience Information
5MT10647	1	220	Earth-walled pit structure	Surface contact: prepared floor surface	Cultural deposit: de facto refuse	Chapin Gray	PD 625, FS 6, PL 120
	2	102	Subterranean kiva	Surface contact: and fill above, ash or other accumulation on a floor, bench surface; fill: below a cultural surface	Cultural deposit: primary refuse, secondary refuse; construction deposit: other	Chapin Black-on-white	PD 1367: FS 7, PL 263; FS 10, PL 261; PD 1405: FS 18, PL 439; PD 1407: FS 2; PD 1409: FS 4, PL 251; PD 1425: FS 13, PL 545; FS 15, PL 535; FS 28, PL 548; FS 29; FS 33, PL 652; FS 38, PL 544; FS 40, PL 542; FS 41, PL 541; FS 46, PL 309; FS 47, PL 416; PD 1428: FS 5, PL 645; FS 7, PL 636; FS 8, PL 635; FS 22, PL 289; FS 23, PL 293; FS 34, PL 284; PD 1429: FS 8, PL 299; PD 1519: FS 1, PL 528; FS 2, PL 529; FS 3, PL 530; FS 4, PL 532; PD 1521: FS 11, PL 370; FS 17, PL 414; FS 18, PL 417; FS 19, PL 418; FS 20, PL 426; FS 24, PL 424; FS 25, PL 425; FS 26, PL 413; PD 1522: FS 9, PL 367; PD 1525: FS 1
	3	102	Subterranean kiva	Surface contact: and fill above, ash or other accumulation on a floor, bench surface; fill: surface feature contents	Cultural deposit: primary refuse, secondary refuse, other	Chapin Black-on-white	PD 1405: FS 20, PL 436; PD 1410: FS 7; PD 1420: FS 7; PD 1421: FS 4, PL 623; FS 5, PL 622; FS 7, PL 620; PD 1422: FS 5; PD 1423: FS 60, PL 574; FS 72, PL 493; FS 73; FS 75, PL 593; FS 100, PL 336; FS 101, PL 337; FS 102, PL 335; PD 1425: FS 2, PL 657; FS 7, PL 521; FS 9, PL 543; FS 29; FS 36, PL 243; FS 43, PL 518; FS 51, PL 324; FS 53, PL 321; FS 55, PL 311; PD 1428: FS 36, PL 292; PD 1430: FS 1, PL 660; FS 2, PL 659; FS 3, PL 662; FS 4, PL 663; PD 1519: FS 5, PL 527; PD 1521: FS 8, PL 368; PD 1523: FS 4; PD 1592: FS 6; PD 1604: FS 2

Site	Vessel No.	Study Unit No.	Study Unit Description	Fill/Assemblage Position	Fill/ Assemblage Type	Pottery Type	Additional Provenience Information
5MT10686	1	111	Masonry surface structure	Surface contact: prepared floor surface	Cultural deposit: mixed refuse	Mancos Black-on-white	PD 71: FS 10, PL 18
5MT10687	1	102	Noncultural	Fill: wall fall and roof fall	Mixed deposit: recent disturbance	Late White Unpainted	PD 63: FS 16, PL 2
5MT10709	1	106	Earth-walled pit structure	Surface contact: prepared floor surface	Cultural deposit: de facto refuse	Chapin Gray	PD 62: FS 21, PL 27
5MT10711	1	117	Nonmasonry surface room	Fill: wall fall and roof fall	Collapsed structure: with de facto refuse	Chapin Gray	PD 127: FS 10, PL 15

Table 24.26. Morphological and Metric Data for Numbered Vessels, Basketmaker Communities Project.

Site	Vessel No.	Form	Completeness	Max. Diameter (mm)	Max. Diameter Height (mm)	Orifice Diameter (mm)	Orifice Height (mm)	Rim Diameter (mm)	Rim Height (mm)	Rim Thickness (mm)	Body Wall Thickness (mm)	Vessel Size Class	Total Volume (mL)
5MT10647	1	Olla	Partial	300	180	100					6	Large	
	2	Bowl	Partial	230	65	230	65	230	65		3	Medium	1,250
	3	Bowl	Nearly complete	270	90	265	90	270	90	29	41	Medium	
5MT10686	1	Effigy	Complete	90	75	32	135	32	135	4	6	Small	300
5MT10687	1	Ladle	Partial	128	62	128	62	128	62	4	7	Medium	200
5MT10709	1	Jar	Nearly complete	170	75	95	170	123	195	3	5	Small	3,000
5MT10711	1	Seed jar	Partial	69	45	69	45	69	45	5	6	Miniature	150

Table 24.27. Use Ware Data for Numbered Vessels, Basketmaker Communities Project.

Site	Vessel Number	Pottery Type	Form	Vessel Size Class	Use Wear Description
5MT10647	1	Chapin Gray	Olla	Large	Slight degree of striations on the shoulder of vessel
	2	Chapin Black-on-white	Bowl	Medium	Very slight degree of abrasion on the exterior base of the bowl
	3	Chapin Black-on-white	Bowl	Medium	Slight degree of abrasion on the rim of the vessel
5MT10686	1	Manco Black-on-white	Effigy	Small	Moderate degree of abrasion over 75% of the exterior base
5MT10687	1	Late White Unpainted	Ladle	Medium	Moderate degree of abrasion over 75% of the rim
5MT10709	1	Chapin Gray	Jar	Small	Slight degree of striations on approximately 15% of the exterior base
5MT10711	1	Chapin Gray	Seed jar	Miniature	Slight degree of striations on approximately 25% of the exterior base

Table 24.28. Morphological and Metric Data for Vessels from 5MT10678.

Vessel No.	Pottery Type	Form	Completeness	Max. Diam. (mm)	Max. Diam. Height (mm)	Orifice Diam. (mm)	Orifice Height (mm)	Rim Diam. (mm)	Rim Height (mm)	Rim Thick. (mm)	Body Wall Thick. (mm)	Vessel Size Class	Total Vol. (mL)
1	Chapin Gray	Olla	Nearly complete	374	210	65	368	80	419	5	5	Large	25,000
2	Chapin Gray	Olla	Nearly complete	420	200	75	385	85	442	5	7	Large	36,000
3	Chapin Gray	Jar	Nearly complete	225	95	85	199	100	224	6	7	Medium	3,900
4	Chapin Gray	Seed jar	Nearly complete	185	100	99	183	99	183	4	6	Medium	2,800
5	Chapin Gray	Jar	Nearly complete	142	75	715	142	974	142	5	5	Small	1,090
6	Chapin Gray	Seed jar	Nearly complete	280	108	126	214	126	214	9	6	Medium	8,000
7	Chapin Black-on-white	Bowl	Complete reconstructible	214	120	214	120	214	120	6		Large	2,700
8	Chapin Gray	Seed jar	Nearly complete	83	39	50	68	50	68	4	3	Miniature	160
10	Chapin Gray	Olla	Nearly complete	426	165	70	385	75	425	5	7	Large	32,000
14	Chapin Gray	Seed jar	Other refitted sherds	103		63		63		4	4	Small	
15	Chapin Gray	Seed jar	Other refitted sherds	185	85	120	126	120	126	5	6	Medium	2,370
16	Chapin Gray	Jar	Complete reconstructible	157	73	78	135	105	159	4	6	Small	2,000
17	Chapin Gray	Olla	Other refitted sherds	430	170	95	380	100	430	7	6	Large	
18	Basketmaker mud ware	Bowl	Other refitted sherds	720	96	720	96	720	96	12	10	Large	
19	Chapin Gray	Seed jar	Other refitted sherds	200	100	96	202	96	202	5	6	Medium	3,550
22	Chapin Gray	Seed jar	Nearly complete	281	148	121	240	121	240	6	6	Large	10,000

Vessel No.	Pottery Type	Form	Completeness	Max. Diam. (mm)	Max. Diam. Height (mm)	Orifice Diam. (mm)	Orifice Height (mm)	Rim Diam. (mm)	Rim Height (mm)	Rim Thick. (mm)	Body Wall Thick. (mm)	Vessel Size Class	Total Vol. (mL)
23	Chapin Gray	Seed jar	Complete reconstructible	213	100	105	181	105	175	5	6	Medium	3,600
24	Chapin Black-on-white	Bowl	Other refitted sherds	136	71	136	71	136	71	4	7	Small	
25	Chapin Gray	Seed jar	Other refitted sherds		105	108	180	108	180	5	6	Medium	
26	Chapin Black-on-white	Bowl	Nearly complete	165	92			164	92	4	5	Medium	1,150
29	Chapin Gray	Seed jar	Other refitted sherds	197	125	82	188	82	188	6	6	Medium	
30	Chapin Gray	Seed jar	Nearly complete	216	109	119	179	119	179	5	6	Medium	4,000
39	Chapin Gray	Seed jar	Complete reconstructible	118	115	68	115	68	115	5		Small	700
43	Chapin Gray	Olla	Nearly complete	383	215	75	395	90	450	5	7	Large	28,000
44	Indeterminate Gray Ware, Polished	Seed jar	Nearly complete	240	113	107	214	107	214	5	5	Medium	8,000
45	Chapin Gray	Seed jar	Other refitted sherds	990		601		601		6		Small	

Table 24.29. Use Wear for Vessels from 5MT10678.

Vessel Number	Pottery Type	Form	Vessel Size Class	Total Volume (mL)	Use Wear Description
1	Chapin Gray	Olla	Large	25,000	Moderate abrasion on 80% of exterior base; moderate sooting on a 11-cm-diameter circle on side of vessel; light, scattered burning from structure fire.
2	Chapin Gray	Olla	Large	36,000	Moderate abrasion on 100% of exterior base; moderate, scattered burning from structure fire.
3	Chapin Gray	Jar	Medium	3,900	Slight abrasion on 30% of exterior base; slight spalling on base.
4	Chapin Gray	Seed jar	Medium	2,800	Moderate striations on exterior base; moderate, scattered burning from structure fire and possible impact/crushing of vessel during the structure fire.
5	Chapin Gray	Jar	Small	1,090	Moderate to heavy sooting on 80% of exterior base.
6	Chapin Gray	Seed jar	Medium	8,000	Light abrasion on most of exterior base; moderate, scattered burning from structure fire; moderate abrasion on rim.
7	Chapin Black-on-white	Bowl	Large	2,700	Moderate abrasion on 50% of exterior base; moderate sooting on 30% of exterior; possible moderate abrasion on interior base where the painted design is worn off.
8	Chapin Gray	Seed jar	Miniature	160	None identified.
10	Chapin Gray	Olla	Large	32,000	Moderate, scattered burning from structure fire; slight abrasion on 30% of rim.
14	Chapin Gray	Seed jar	Small		Moderate to heavy, scattered burning from structure fire.
15	Chapin Gray	Seed jar	Medium	2,370	Moderate, scattered burning from structure fire; slight abrasion on 20% of rim.
16	Chapin Gray	Jar	Small	2,000	Moderate striations on 40% of exterior base; heavy, scattered burning from structure fire.
17	Chapin Gray	Olla	Large		None identified.
18	Basketmaker mud ware	Bowl	Large		Heavy abrasion on 90% of interior base and 100% of exterior base.
19	Chapin Gray	Seed jar	Medium	3,550	Severe burning on most of exterior and interior base; moderate abrasion on the interior base. Burning is more extensive on sides, as if the vessel had been set in a hearth and sides were exposed to fire more directly than the base of vessel.
22	Chapin Gray	Seed jar	Large	10,000	Moderate, scattered burning from structure fire.
23	Chapin Gray	Seed jar	Medium	3,600	Extensive burning and sooting on 85% of exterior base; light scratching on lower exterior sides of vessels.
24	Chapin Black-on-white	Bowl	Small		Moderate, scattered burning from structure fire.

Vessel Number	Pottery Type	Form	Vessel Size Class	Total Volume (mL)	Use Wear Description
25	Chapin Gray	Seed jar	Medium		Moderate, scattered burning from structure fire.
26	Chapin Black-on-white	Bowl	Medium	1,150	Moderate abrasion on 20–30% of exterior and interior base; heavy polishing/abrasion on all of rim.
29	Chapin Gray	Seed jar	Medium		Slight abrasion on 5% of exterior base; moderate burning from a house fire.
30	Chapin Gray	Seed jar	Medium	4,000	Slight pitting on exterior base; moderate, scattered burning from structure fire.
39	Chapin Gray	Seed jar	Small	700	Moderate, scattered burning from structure fire.
43	Chapin Gray	Olla	Large	28,000	Moderate abrasion on 100% of exterior base; Moderate sooting on a circle on side of vessel; light, scattered burning from structure fire.
44	Indeterminate Gray Ware, Polished	Seed jar	Medium	8,000	Moderate abrasion on ring around the exterior of the base; Moderate, scattered burning from structure fire.
45	Chapin Gray	Seed jar	Small		None identified.

Table 24.30. Temper and Refire Analysis for Vessels from 5MT10678.

Vessel Number	Pottery Type	Form	Temper Code	Temper Description	Refire Color	Refire Color Description
1	Chapin Gray	Olla	1A, 4A	Igneous rock and clay pellets/shale	10YR8/2	Tan
2	Chapin Gray	Olla	1A, 4A	Igneous rock and clay pellets/shale	10YR8/2	Tan
3	Chapin Gray	Jar	1K	Igneous rock		
4	Chapin Gray	Seed jar	1A, 4A	Igneous rock and clay pellets/shale	10YR8/2	Tan
5	Chapin Gray	Jar	1L	Igneous rock	5YR7/4	Red and orange
6	Chapin Gray	Seed jar	1A, 2B	Igneous rock and quartz sand	5YR7/4	Red and orange
7	Chapin Black-on-white	Bowl	1E	Igneous rock		
8	Chapin Gray	Seed jar	2C	Mixed lithic sand and sandstone	5YR6/6	Red and orange
10	Chapin Gray	Olla	1A, 4A	Igneous rock and clay pellets/shale		
14	Chapin Gray	Seed jar	4E, 1J	Clay pellets/shale and igneous rock	7.5YR7/6	Red and orange
15	Chapin Gray	Seed jar	1L	Igneous rock and clay pellets/shale	7.5YR8/4	Tan
16	Chapin Gray	Jar	1A, 4C	Igneous rock and clay pellets/shale	7.5YR7/4	Tan
17	Chapin Gray	Olla	2A, 2D	Mixed lithic sand and crushed sandstone	7.5YR7/3	Tan
18	Basketmaker mud ware	Bowl	Burned plant fibers, a few sand grains	Burned plant fibers, a few sand grains	5YR6/6	Red and orange
19	Chapin Gray	Seed jar	1C	Igneous rock	7.5YR8/4	Tan
22	Chapin Gray	Seed jar	1K	Igneous rock	7.5YR7/3	Tan
23	Chapin Gray	Seed jar	1B	Igneous rock	7.5YR8/1	White/off white/pinkish
24	Chapin Black-on-white	Bowl	1A, 4A	Igneous rock and clay pellets/shale	10YR7/4	Tan
25	Chapin Gray	Seed jar	1B, 4E	Igneous rock and clay pellets/shale	10YR8/4	Tan
26	Chapin Black-on-white	Bowl	1E, 4A	Igneous rock and clay pellets/shale	10YR8/3	Tan
29	Chapin Gray	Seed jar	1E	Igneous rock	10YR8/2	Tan
30	Chapin Gray	Seed jar	1H	Igneous rock	10YR8/3	Tan

Vessel Number	Pottery Type	Form	Temper Code	Temper Description	Refire Color	Refire Color Description
39	Chapin Gray	Seed jar	Could not be determined			
43	Chapin Gray	Olla	1E	Igneous rock		
44	Indeterminate Gray Ware, Polished	Seed jar	1H	Igneous rock	10YR8/2	Tan
45	Chapin Gray	Seed jar	4E, 2C	Clay pellets/shale and mixed lithic sand/sandstone	5YR7/6	Red and orange

Table 24.31. Count of Chipped-Stone Artifacts by Raw Material Type, Basketmaker Communities Project.

Material Category	Raw Material	Formal Tools			Cores and Core Tools			Expedient Tools			Debitage	Total Count
		Biface	Drill	Projectile Point	Core	Modified Core	Pecking-stone	Chipped-Stone Tools	Modified Flake	Utilized Flake		
Local	Concretion									1	2	3
	Conglomerate										1	1
	Dakota/Burro Canyon silicified sandstone	21	7	26	28	1	19	5	25	60	4,214	4,406
	Gypsum/calcite/ barite										3	3
	Igneous						3		2	6	391	402
	Morrison chert	1	2	3	2		3	1	7	22	1,140	1,181
	Morrison mudstone	7	4	1	79	8	33	1	68	167	8,786	9,154
	Morrison silicified sandstone		3		101	6	69	10	93	211	15,822	16,315
	Quartz										7	7
	Porter mudstone								1			1
	Sandstone								1		57	58
	Slate/shale				4				1	3	83	91
	Total	29	16	30	214	15	127	17	198	470	30,506	31,622
Nonlocal	Nonlocal chert/ siltstone	2	4	1					1	2	6	16
	Obsidian	3		7					1	1	16	28
	Red jasper	4		1							45	50
	Narbona Pass chert	2	1	3					1	2	67	76
	Total	11	5	12					3	5	134	170
Semi-local	Agate/chalcedony	8	2	8	4		1		8	2	980	1,013
	Brushy Basin chert	1	2	1	30			3	38	101	2,564	2,740
	Burro Canyon chert	25	8	9	13				6	16	841	918
	Petrified wood			3	2				1	1	29	36
	Total	34	12	21	49		1	3	53	120	4,414	4,707
Unknown	Other mineral										5	5
	Unknown chert/siltstone	1		9	1		3		1	1	272	288
	Unknown quartzite						1					1

Material Category	Raw Material	Formal Tools			Cores and Core Tools			Expedient Tools			Debitage	Total Count
		Biface	Drill	Projectile Point	Core	Modified Core	Pecking-stone	Chipped-Stone Tools	Modified Flake	Utilized Flake		
	Unknown silicified sandstone			1					1		38	40
	Unknown stone										39	39
	Total	1		10	1		4		2	1	354	373
Total		75	33	73	264	15	132	20	256	596	35,408	36,872

Table 24.32. Percent of Chipped-Stone Artifacts by Raw Material Type, Basketmaker Communities Project.

Material Category	Raw Material	Formal Tools			Cores and Core Tools			Expedient Tools			Debitage	Total Percent
		Biface	Drill	Projectile Point	Core	Modified Core	Pecking-stone	Chipped-Stone Tools	Modified Flake	Utilized Flake		
Local	Concretion									0.16	0.00	0.00
	Conglomerate										0.00	0.00
	Dakota/Burro Canyon silicified sandstone	28.00	21.21	35.61	10.60	6.66	14.39	25.00	9.76	10.06	11.90	11.94
	Gypsum/calcite/ barite										0.00	0.00
	Igneous						2.27		0.78	1.00	1.10	1.09
	Morrison chert	1.33	6.06	4.10	0.75		2.27	5.00	2.73	3.69	3.21	3.20
	Morrison mudstone	9.33	12.12	1.36	29.92	53.33	25.00	5.00	26.56	28.02	24.81	24.82
	Morrison silicified sandstone		9.09		38.25	40.00	52.27	50.00	36.32	35.40	44.68	44.24
	Quartz										0.00	0.00
	Porter mudstone								0.39			0.00
	Sandstone								0.39		0.16	0.15
	Slate/shale				1.51				0.39	0.50	0.23	0.24
	Total	38.66	48.48	41.09	81.06	100.00	96.21	85.00	77.34	78.85	86.15	85.76
Nonlocal	Nonlocal chert/siltstone	2.66	12.12	1.36					0.39	0.33	0.00	0.00
	Obsidian	4.00		9.58					0.39	0.16	0.00	0.00
	Red jasper	5.33		1.36							0.12	0.13
	Narbona Pass chert	2.66	3.03	4.10					0.39	0.33	0.18	0.20
	Total	14.66	15.15	16.43					1.17	0.83	0.37	0.46
Semi-local	Agate/chalcedony	10.66	6.06	10.95	1.51		0.75		3.12	0.33	2.76	2.74
	Brushy Basin chert	1.33	6.06	1.36	11.36			15.00	14.84	16.94	7.24	7.43
	Burro Canyon chert	33.33	24.24	12.32	4.92				2.34	2.68	2.37	2.48
	Petrified wood			4.10	0.75				0.39	0.16	0.00	0.00
	Total	45.33	36.36	28.76	18.56		0.75	15.00	20.70	20.13	12.46	12.76
Unknown	Other mineral										0.00	0.00
	Unknown chert/ siltstone	1.33		12.32	0.37		2.27		0.39	0.16	0.76	0.78
	Unknown quartzite						0.75					0.00

Material Category	Raw Material	Formal Tools			Cores and Core Tools			Expedient Tools			Debitage	Total Percent
		Biface	Drill	Projectile Point	Core	Modified Core	Pecking-stone	Chipped-Stone Tools	Modified Flake	Utilized Flake		
	Unknown silicified sandstone			1.36					0.39		0.10	0.10
	Unknown stone										0.11	0.10
	Total	1.33		13.69	0.37		3.03		0.78	0.16	0.99	1.01

Table 24.33. Sourced Obsidian Artifacts, Basketmaker Communities Project.

Site	Artifact Type	Source	General Source Location
5MT10631	Debitage	Grants Ridge, New Mexico	Mt. Taylor Volcanic Field
5MT10647	Projectile point	El Rechuelos, New Mexico	Jemez Mountains
	Projectile point	El Rechuelos, New Mexico	Jemez Mountains
	Projectile point	El Rechuelos, New Mexico	Jemez Mountains
	Projectile point	Grants Ridge, New Mexico	Mt. Taylor Volcanic Field
	Projectile point	Horace/La Jara Mesa, New Mexico	Mt. Taylor Volcanic Field
	Projectile point	Horace/La Jara Mesa, New Mexico	Mt. Taylor Volcanic Field
	Projectile point	Government Mountain, Arizona	San Francisco Volcanic Field
	Biface	El Rechuelos, New Mexico	Jemez Mountains
	Biface	El Rechuelos, New Mexico	Jemez Mountains
	Biface	Valles Rhyolite (Cerro del Medio), New Mexico	Jemez Mountains
	Modified flake	Valles Rhyolite (Cerro del Medio), New Mexico	Jemez Mountains
	Debitage	El Rechuelos, New Mexico	Jemez Mountains
	Debitage	El Rechuelos, New Mexico	Jemez Mountains
	Debitage	El Rechuelos, New Mexico	Jemez Mountains
	Debitage	El Rechuelos, New Mexico	Jemez Mountains
	Debitage	Valles Rhyolite (Cerro del Medio), New Mexico	Jemez Mountains
	Debitage	Valles Rhyolite (Cerro del Medio), New Mexico	Jemez Mountains
	Debitage	Grants Ridge, New Mexico	Mt. Taylor Volcanic Field
	Debitage	Horace/La Jara Mesa, New Mexico	Mt. Taylor Volcanic Field
	Debitage	Horace/La Jara Mesa, New Mexico	Mt. Taylor Volcanic Field
	Mineral sample	Horace/La Jara Mesa, New Mexico	Mt. Taylor Volcanic Field
5MT10709	Debitage	Wild Horse Canyon, Utah	Mineral Mountains
	Debitage	Grants Ridge, New Mexico	Mt. Taylor Volcanic Field
5MT10711	Utilized flake	El Rechuelos, New Mexico	Jemez Mountains
5MT2032	Debitage	El Rechuelos, New Mexico	Jemez Mountains

Table 24.34. Extralocal Chipped-Stone Artifacts per kg of Gray Ware Sherds, by Site, Basketmaker Communities Project.

Site	Semi-local				Nonlocal				Total	Total Wt. of Gray Sherds (g)	Items per kg of Gray Sherds
	Agate/ Chalcedony	Brushy Basin Chert	Burro Canyon Chert	Petrified Wood	Nonlocal Chert/ Siltstone	Obsidian	Red Jasper	Narbona Pass Chert			
5MT10631	5	5	14	2	1	1			28	7,048.50	3.97
5MT10632	1								1	17.40	57.47
5MT10647	55	54	66	8	9	12	5	9	218	84,114.56	2.59
5MT10684	1	54	3	1				2	61	12,413.56	4.91
5MT10686	3	119	8	2					132	10,601.10	12.45
5MT10687	8	131	20	1	2		4	1	167	14,859.22	11.24
5MT10709	3		4			1			8	3,443.10	2.32
5MT10711	7	4	18	1		2	1		33	17,375.97	1.90
5MT10718	1		1						2	632.20	3.16
5MT10719	1		2						3	349.00	8.60
5MT10736	12	3	9				1		25	2,999.50	8.33
5MT2032	4	4	22	1		1	1		33	6,007.80	5.49
5MT2037	10	106	12	1	1		1	2	133	19,561.83	6.80
5MT3875	2	3	8	1			1		15	2,503.50	5.99
Total	113	483	187	18	13	17	14	14	859	181,927.23	4.72

Table 24.35. Debitage and Cores and the Ratio of These Artifacts to the Weight of Gray Ware Sherds, by Site, Basketmaker Communities Project.

Site	Debitage		Cores		Total Wt. of Gray Sherds (g)	Debitage per kg of Gray Sherds	Debitage Rank	Cores per kg of Gray Sherds	Core Rank
	N	%	N	%					
5MT10631	2,063	5.69	21	7.95	7,048.50	292.69	2	2.98	1
5MT10632	5	0.01			17.40	287.36	3	0	
5MT10647	22,423	61.84	105	39.77	84,114.56	266.58	5	1.25	7
5MT10684	1,040	2.87	18	6.82	12,413.56	83.78	13	1.45	6
5MT10686	2,107	5.81	20	7.58	10,601.10	198.75	6	1.89	5
5MT10687	1,448	3.99	14	5.30	14,859.22	97.45	11	0.94	9
5MT10709	233	0.64			3,443.10	67.67	14	0	
5MT10711	1,735	4.78	20	7.58	17,375.97	99.85	10	1.15	8
5MT10718	92	0.25			632.20	145.52	9	0	
5MT10719	100	0.28			349.00	286.53	4	0	
5MT10736	282	0.78			2,999.50	94.02	12	0	
5MT2032	1,054	2.91	17	6.44	6,007.80	175.44	7	2.83	2
5MT2037	2,896	7.99	43	16.29	19,561.83	148.04	8	2.20	4
5MT3875	782	2.16	6	2.27	2,503.50	312.36	1	2.40	3
Total	36,260	100.00	264	100.00	181,927.23	199.31		1.45	

Table 24.36. Core Analysis Summary, by Site, Basketmaker Communities Project.

Site	Core Type	Material Type	Material Group	Count
5MT10631	Bifacial	Morrison mudstone	Local	1
		Morrison silicified sandstone	Local	1
		Brushy Basin chert	Semi-local	1
	Multidirectional	Dakota/Burro Canyon silicified sandstone	Local	2
		Morrison mudstone	Local	2
		Morrison silicified sandstone	Local	8
		Agate/chalcedony	Semi-local	3
		Brushy Basin chert	Semi-local	1
	Unidirectional	Morrison chert	Local	1
		Morrison silicified sandstone	Local	1
5MT10647	Bifacial	Morrison mudstone	Local	1
		Morrison silicified sandstone	Local	4
		Slate/shale	Local	1
	Multidirectional	Dakota/Burro Canyon silicified sandstone	Local	5
		Morrison mudstone	Local	37
		Morrison silicified sandstone	Local	21
		Agate/chalcedony	Semi-local	1
		Burro Canyon chert	Semi-local	2
		Unknown chert/siltstone	Unknown	3
	Unidirectional	Morrison mudstone	Local	2
		Morrison silicified sandstone	Local	7
		Unknown chert/siltstone	Unknown	1
5MT10684	Bifacial	Morrison silicified sandstone	Local	1
		Burro Canyon chert	Semi-local	1
	Multidirectional	Dakota/Burro Canyon silicified sandstone	Local	1
		Morrison chert	Local	1
		Morrison mudstone	Local	2
5MT10684	Multidirectional	Morrison silicified sandstone	Local	3
		Brushy Basin chert	Semi-local	4
		Burro Canyon chert	Semi-local	2
	Unidirectional	Morrison silicified sandstone	Local	2

Site	Core Type	Material Type	Material Group	Count
5MT10686	Multidirectional	Dakota/Burro Canyon silicified sandstone	Local	2
		Morrison chert	Local	1
		Morrison mudstone	Local	1
		Morrison silicified sandstone	Local	6
		Brushy Basin chert	Semi-local	6
		Burro Canyon chert	Semi-local	1
	Unidirectional	Morrison silicified sandstone	Local	1
		Brushy Basin chert	Semi-local	2
5MT10687	Multidirectional	Dakota/Burro Canyon silicified sandstone	Local	3
		Morrison mudstone	Local	1
		Brushy Basin chert	Semi-local	6
		Burro Canyon chert	Semi-local	1
	Unidirectional	Morrison mudstone	Local	1
		Brushy Basin chert	Semi-local	1
5MT10711	Bifacial	Morrison silicified sandstone	Local	3
		Agate/chalcedony	Semi-local	1
	Multidirectional	Dakota/Burro Canyon silicified sandstone	Local	1
		Morrison mudstone	Local	3
		Morrison silicified sandstone	Local	7
		Burro Canyon chert	Semi-local	1
	Unidirectional	Dakota/Burro Canyon silicified sandstone	Local	1
		Morrison mudstone	Local	1
		Morrison silicified sandstone	Local	1
5MT2032	Bifacial	Morrison silicified sandstone	Local	1
	Multidirectional	Morrison mudstone	Local	3
		Morrison silicified sandstone	Local	5
		Nonlocal chert/siltstone	Nonlocal	1
		Burro Canyon chert	Semi-local	1
	Unidirectional	Morrison silicified sandstone	Local	1

Site	Core Type	Material Type	Material Group	Count
5MT2037	Bifacial	Dakota/Burro Canyon silicified sandstone	Local	1
		Morrison mudstone	Local	1
		Morrison silicified sandstone	Local	2
		Slate/shale	Local	1
		Agate/chalcedony	Semi-local	1
		Brushy Basin chert	Semi-local	1
	Multidirectional	Dakota/Burro Canyon silicified sandstone	Local	5
		Morrison chert	Local	2
		Morrison mudstone	Local	10
		Morrison silicified sandstone	Local	7
		Brushy Basin chert	Semi-local	7
	Unidirectional	Dakota/Burro Canyon silicified sandstone	Local	1
		Morrison mudstone	Local	2
		Morrison silicified sandstone	Local	1
5MT3875	Bifacial	Morrison mudstone	Local	2
	Multidirectional	Morrison mudstone	Local	1
		Morrison silicified sandstone	Local	1
		Burro Canyon chert	Semi-local	1

Table 24.37. Biface to Core Ratio, Basketmaker Communities Project (adapted from Parry and Kelly 1987).

Project/Site	Archaic	Basketmaker II	Basketmaker III	Pueblo I	Pueblo II
Dolores Archaeological Program	5.75	2.83	0.71	0.95	0.75
Black Mesa Archaeological Project	5.75	2.83		0.45	0.04
Basketmaker Communities Project			0.91		0.36
5MT10647, the Dillard Site, Basketmaker Communities Project			0.91		
5MT12205, the Payne Site			0.82		

Table 24.38. Formal Tools, by Site, Basketmaker Communities Project.

Site	Biface		Drill		Projectile Points		Total Tools		Weight of Gray Sherds (g)	Bifaces per kg of Gray Sherds	Drills per kg of Gray Sherds	Points per kg of Gray Sherds	Total Tools per kg of Gray Sherds
	N	%	N	%	N	%	N	%					
5MT10631	4	5.33	2	6.06	3	4.11	9	3.61	7,048.50	0.57	0.28	0.43	1.28
5MT10647	50	66.67	18	54.55	50	68.49	118	47.39	84,114.56	0.59	0.21	0.59	1.40
5MT10684	2	2.67		0	3	4.11	5	2.01	12,413.56	0.16	0.00	0.24	0.40
5MT10686	2	2.67	2	6.06	1	1.37	5	2.01	10,601.10	0.19	0.19	0.09	0.47
5MT10687	4	5.33		0		0	4	1.61	14,859.22	0.27	0.00	0.00	0.27
5MT10711	3	4.00	7	21.21	7	9.59	17	6.83	17,375.97	0.17	0.40	0.40	0.98
5MT10718	1	1.33		0		0	1	0.40	632.20	1.58	0.00	0.00	1.58
5MT10736	3	4.00		0	1	1.37	4	1.61	2,999.50	1.00	0.00	0.33	1.33
5MT2032	3	4.00	2	6.06	1	1.37	6	2.41	6,007.80	0.50	0.33	0.17	1.00
5MT2037	3	4.00	2	6.06	5	6.85	10	4.02	19,561.83	0.15	0.10	0.26	0.51
5MT3875		0		0	2	2.74	2	0.80	2,503.50	0.00	0.00	0.80	0.80
Total	75	100.00	33	100.00	73	100.00	249	100.00	178,117.73	0.42	0.19	0.41	1.40

Table 24.39. Projectile Point Type and Material, by Site, Basketmaker Communities Project.

PD	FS	Site	Projectile Point Type	Projectile Point Time Span	Material Type	Material Group	Length (cm) if Complete	Use	Reuse
23	23	5MT10631	Small corner-notched (BMIII–Early PII)	A.D. 300–1000	Dakota/Burro Canyon silicified sandstone	Local	1.60	Arrow	Retouch
24	8		Small corner-notched (BMIII–Early PII)	A.D. 300–1000	Dakota/Burro Canyon silicified sandstone	Local		Arrow	No
52	3		Small corner-notched (BMIII–Early PII)	A.D. 300–1000	Dakota/Burro Canyon silicified sandstone	Local		Arrow	No
128	4	5MT10647	Small corner-notched (BMIII–Early PII)	A.D. 300–1000	Dakota/Burro Canyon silicified sandstone	Local		Arrow	Retouch
212	1		Small corner-notched (BMIII–Early PII)	A.D. 300–1000	Dakota/Burro Canyon silicified sandstone	Local		Arrow	No
334	5		Small corner-notched (BMIII–Early PII)	A.D. 300–1000	Dakota/Burro Canyon silicified sandstone	Local		Arrow	No
392	8		Small corner-notched (BMIII–Early PII)	A.D. 300–1000	Dakota/Burro Canyon silicified sandstone	Local		Arrow	Retouch
397	1		Small corner-notched (BMIII–Early PII)	A.D. 300–1000	Dakota/Burro Canyon silicified sandstone	Local		Arrow	Indeterminate
402	4		Small corner-notched (BMIII–Early PII)	A.D. 300–1000	Dakota/Burro Canyon silicified sandstone	Local	1.79	Arrow	Retouch
546	4		Small corner-notched (BMIII–Early PII)	A.D. 300–1000	Morrison mudstone	Local		Arrow	No
549	22		Small corner-notched (BMIII–Early PII)	A.D. 300–1000	Dakota/Burro Canyon silicified sandstone	Local	1.59	Arrow	Retouch

PD	FS	Site	Projectile Point Type	Projectile Point Time Span	Material Type	Material Group	Length (cm) if Complete	Use	Reuse
766	7		Projectile point, not further specified		Dakota/Burro Canyon silicified sandstone	Local	3.72	Dart	Use wear, retouch, repaired haft
930	8		Projectile point, not further specified		Dakota/Burro Canyon silicified sandstone	Local		Arrow	No
1056	7		Small corner-notched (BMIII–Early PII)	A.D. 300–1000	Dakota/Burro Canyon silicified sandstone	Local		Arrow	No
1057	21	5MT10647	Projectile point, not further specified		Dakota/Burro Canyon silicified sandstone	Local		Arrow	No
1084	8		Rosegate series (BMII–PII)	A.D. 300–1000	Dakota/Burro Canyon silicified sandstone	Local		Arrow	Repaired haft
1095	1		Large side-notched (Archaic)	8500–1000 B.C.	Dakota/Burro Canyon silicified sandstone	Local		Dart	Retouch, repaired haft, use wear
1202	9		Archaic corner-notched, not further specified	8500–1000 B.C.	Dakota/Burro Canyon silicified sandstone	Local		Dart	Retouch
1322	10		Small corner-notched (BMIII–Early PII)	A.D. 300–1000	Dakota/Burro Canyon silicified sandstone	Local		Arrow	Retouch
1366	1		Bajada Stemmed (Early Archaic)	8500–3500 B.C.	Dakota/Burro Canyon silicified sandstone	Local	4.05	Dart	Use wear, retouch
1404	9		Small corner-notched (BMIII–Early PII)	A.D. 300–1000	Dakota/Burro Canyon silicified sandstone	Local		Arrow	Retouch
8	1		Small corner-notched (BMIII–Early PII)	A.D. 300–1000	Agate/chalcedony	Semi-local		Arrow	Retouch
147	4		Small corner-notched (BMIII–Early PII)	A.D. 300–1000	Agate/chalcedony	Semi-local		Arrow	Retouch
236	10		Small corner-notched (BMIII–Early PII)	A.D. 300–1000	Agate/chalcedony	Semi-local		Arrow	No
376	7		Small corner-notched (BMIII–Early PII)	A.D. 300–1000	Petrified wood	Semi-local		Arrow	No

PD	FS	Site	Projectile Point Type	Projectile Point Time Span	Material Type	Material Group	Length (cm) if Complete	Use	Reuse
622	11		Projectile point, not further specified		Burro Canyon chert	Semi-local		Arrow	No
866	1		Small corner-notched (BMIII–Early PII)	A.D. 300–1000	Petrified wood	Semi-local	1.86	Arrow	Retouch
930	9		Rosegate series (BMII–PII)	A.D. 300–1000	Agate/chalcedony	Semi-local		Arrow	No
1135	8		Projectile point, not further specified		Agate/chalcedony	Semi-local		Dart	No
1155	5	5MT10647	Projectile point, not further specified		Agate/chalcedony	Semi-local		Arrow	Retouch
1311	1		Small corner-notched (BMIII–Early PII)	A.D. 300–1000	Burro Canyon chert	Semi-local	2.10	Arrow	Indeterminate
1498	7		Projectile point, not further specified		Burro Canyon chert	Semi-local		Indeterminate	No
149	10		Small corner-notched (BMIII–Early PII)	A.D. 300–1000	Obsidian	Nonlocal	2.10	Arrow	Repaired haft, retouch
319	2		Small corner-notched (BMIII–Early PII)	A.D. 300–1000	Obsidian	Nonlocal	1.40	Arrow	Use wear
379	1		Small corner-notched (BMIII–Early PII)	A.D. 300–1000	Obsidian	Nonlocal		Arrow	Retouch
402	3		Archaic corner-notched, not further specified	8500–1000 B.C.	Red jasper	Nonlocal		Dart	No
477	3		Large side-notched (Archaic)	8500–1000 B.C.	Washington Pass chert	Nonlocal		Dart	Repaired haft
519	15		Projectile point, not further specified		Obsidian	Nonlocal		Arrow	Retouch, repaired haft
708	5		Large corner-notched (BMII)	1000 B.C.–A.D. 500	Washington Pass chert	Nonlocal		Dart	No
942	19		Small corner-notched (BMIII–Early PII)	A.D. 300–1000	Nonlocal chert/siltstone	Nonlocal	1.39	Arrow	No

PD	FS	Site	Projectile Point Type	Projectile Point Time Span	Material Type	Material Group	Length (cm) if Complete	Use	Reuse
1084	4		Rosegate series (BMII–PII)	A.D. 300–1000	Obsidian	Nonlocal	1.67	Arrow	Retouch
1239	23		Projectile point, not further specified		Obsidian	Nonlocal		Arrow	No
1664	18		Archaic corner-notched, not further specified	8500–1000 B.C.	Obsidian	Nonlocal		Dart	No
155	15		Small corner-notched (BMIII–Early PII)	A.D. 300–1000	Unknown chert/siltstone	Unknown		Arrow	Retouch
257	2	5MT10647	Large corner-notched (BMII)	1000 B.C.–A.D. 500	Unknown chert/siltstone	Unknown	3.30	Dart	No
407	8	5MT10647	Sudden Side-Notched (Archaic)	3500–1500 B.C.	Unknown silicified sandstone	Unknown		Dart	Retouch
474	4	5MT10647	Projectile point, not further specified		Unknown chert/siltstone	Unknown		Indeterminate	Repaired haft
604	2	5MT10647	Small corner-notched (BMIII–Early PII)	A.D. 300–1000	Unknown chert/siltstone	Unknown		Arrow	Retouch
633	7	5MT10647	Small corner-notched (BMIII–Early PII)	A.D. 300–1000	Unknown chert/siltstone	Unknown		Arrow	Repaired haft
642	6	5MT10647	Medium corner-notched	A.D. 500–1150	Unknown chert/siltstone	Unknown		Dart	No
719	7	5MT10647	Small corner-notched (BMIII–Early PII)	A.D. 300–1000	Unknown chert/siltstone	Unknown		Arrow	Retouch
1051	14	5MT10647	Sudden Side-Notched (Archaic)	3500–1500 B.C.	Unknown chert/siltstone	Unknown		Dart	Retouch
1085	8	5MT10647	Projectile point, not further specified		Unknown chert/siltstone	Unknown	17.60	Arrow	Repaired haft
54	9	5MT10684	Lancaster Side-Notched (PII–PIII)	A.D. 900–1300	Dakota/Burro Canyon silicified sandstone	Local	2.70	Arrow	No
65	6	5MT10684	Lancaster Side-Notched (PII–PIII)	A.D. 900–1300	Morrison chert	Local	2.80	Dart	Retouch
72	1	5MT10684	Lancaster Side-Notched (PII–PIII)	A.D. 900–1300	Dakota/Burro Canyon silicified sandstone	Local	1.60	Dart	No

PD	FS	Site	Projectile Point Type	Projectile Point Time Span	Material Type	Material Group	Length (cm) if Complete	Use	Reuse
38	3	5MT10686	Lancaster Side-Notched (PII–PIII)	A.D. 900–1300	Petrified wood	Semi-local	1.80	Dart	Retouch
21	13	5MT10711	Small corner-notched (BMIII–Early PII)	A.D. 300–1000	Dakota/Burro Canyon silicified sandstone	Local	2.30	Arrow	Retouch
29	8		Medium corner-notched	A.D. 500–1150	Morrison chert	Local		Dart	Use wear, retouch, repaired haft
56	5	5MT10711	Small corner-notched (BMIII–Early PII)	A.D. 300–1000	Morrison chert	Local	1.60	Arrow	Retouch
14	3		Small corner-notched (BMIII–Early PII)	A.D. 300–1000	Burro Canyon chert	Semi-local	1.70	Arrow	Retouch
20	7		Small corner-notched (BMIII–Early PII)	A.D. 300–1000	Brushy Basin chert	Semi-local	2.00	Arrow	Retouch
30	6		Small corner-notched (BMIII–Early PII)	A.D. 300–1000	Burro Canyon chert	Semi-local		Arrow	Retouch
54	34		Projectile point, not further specified		Agate/chalcedony	Semi-local		Arrow	No
12	13	5MT10736	Archaic corner-notched, not further specified	8500–1000 B.C.	Burro Canyon chert	Semi-local		Dart	Retouch
97	11	5MT2032	Small corner-notched (BMIII–Early PII)	A.D. 300–1000	Burro Canyon chert	Semi-local		Arrow	Use wear
2	2	5MT2037	Lancaster Side-Notched (PII–PIII)	A.D. 900–1300	Dakota/Burro Canyon silicified sandstone	Local	1.60	Dart	No
36	9		Lancaster Side-Notched (PII–PIII)	A.D. 900–1300	Dakota/Burro Canyon silicified sandstone	Local	2.40	Arrow	No
111	7		Small corner-notched (BMIII–Early PII)	A.D. 300–1000	Dakota/Burro Canyon silicified sandstone	Local		Arrow	No
25	5		Lancaster Side-Notched (PII–PIII)	A.D. 900–1300	Burro Canyon chert	Semi-local		Dart	No

PD	FS	Site	Projectile Point Type	Projectile Point Time Span	Material Type	Material Group	Length (cm) if Complete	Use	Reuse
98	8		Lancaster Side-Notched (PII–PIII)	A.D. 900–1300	Washington Pass chert	Nonlocal	2.70	Dart	No
34	3	5MT3875	Sudden Side-Notched (Archaic)	3500–1500 B.C.	Burro Canyon chert	Semi-local		Dart	Use wear
67	3		Small corner-notched (BMIII–Early PII)	A.D. 300–1000	Agate/chalcedony	Semi-local		Arrow	Retouch

Note: BMIII = Basketmaker III, PII = Pueblo II, and PIII = Pueblo III.

Table 24.40. Projectile Point Type by Site and Context, Basketmaker Communities Project.

Site	N	Projectile Point Type	SU Type	SU Number	SU Description	Fill/Assemblage Type
5MT10631	1	Small corner-notched (BMIII–early PII)	Structure	101	Earth-walled pit structure	Collapsed structure: not further specified
	2	Small corner-notched (BMIII–early PII)			Earth-walled pit structure	Mixed deposit: Post-collapse and cultural refuse
5MT10647	1	Small corner-notched (BMIII–early PII)	General site	0	Collections	Post-collapse deposit: not further specified
	1	Small corner-notched (BMIII–early PII)	Arbitrary unit	101	Not further specified	Mixed deposit: recent disturbance
	1	Small corner-notched (BMIII–early PII)	Structure	102	Subterranean kiva	Collapsed structure: not further specified
	1	Small corner-notched (BMIII–early PII)			Subterranean kiva	Construction deposit: other
	2	Projectile point, not further specified			Subterranean kiva	Cultural deposit: primary refuse
	1	Bajada Stemmed (Early Archaic)			Subterranean kiva	Cultural deposit: secondary refuse
	1	Small corner-notched (BMIII–early PII)			Subterranean kiva	Mixed deposit: recent disturbance
	1	Small corner-notched (BMIII–early PII)	Arbitrary unit	103	Not further specified	Post-collapse deposit: natural processes
	1	Projectile point, not further specified	Arbitrary unit	114	Not further specified	Post-collapse deposit: natural processes
	1	Small corner-notched (BMIII–early PII)	Nonstructure	125	Cultural deposit, type unknown	Collapsed structure: with mixed refuse
	1	Small corner-notched (BMIII–early PII)	Arbitrary unit	201	Not further specified	Post-collapse deposit: natural processes
	3	Small corner-notched (BMIII–early PII)	Arbitrary unit	202	Not further specified	Post-collapse deposit: natural processes
	1	Small corner-notched (BMIII–early PII)	Nonstructure	203	Midden	Cultural deposit: secondary refuse
	1	Large side-notched (Archaic)	Structure	205	Earth-walled pit structure	Collapsed structure: with mixed refuse
	1	Projectile point, not further specified				
	1	Small corner-notched (BMIII–early PII)				
	2	Small corner-notched (BMIII–early PII)			Earth-walled pit structure	Cultural deposit: mixed refuse
	1	Projectile point, not further specified		206	Not further specified	

Site	N	Projectile Point Type	SU Type	SU Number	SU Description	Fill/Assemblage Type
	1	Rosegate series (BMII–PII)	Arbitrary unit			Post-collapse deposit: natural processes
	1	Medium corner-notched (middle to late PII)	Nonstructure	212	Midden	Construction deposit: clean fill
	1	Small corner-notched (BMIII–early PII)	Nonstructure	213	Midden	Cultural deposit: secondary refuse
5MT10647 (cont.)	1	Large corner-notched (BMII)	Arbitrary unit	214	Not further specified	Post-collapse deposit: natural processes
	1	Archaic corner-notched, not further specified	Nonstructure	215	Midden	Cultural deposit: secondary refuse
	1	Projectile point, not further specified				
	1	Small corner-notched (BMIII–early PII)				
	1	Sudden Side-Notched (Archaic)				
	1	Small corner-notched (BMIII–early PII)	Nonstructure	216	Extramural surface	Mixed deposit: post-collapse and cultural refuse
	1	Projectile point, not further specified	Structure	220	Earth-walled pit structure	Collapsed structure: not further specified
	1	Small corner-notched (BMIII–early PII)				
	1	Projectile point, not further specified			Earth-walled pit structure	Collapsed structure: with mixed refuse
	1	Sudden Side-Notched (Archaic)				
	1	Small corner-notched (BMIII–early PII)	Nonstructure	230	Midden	Cultural deposit: secondary refuse
	1	Large corner-notched (BMII)	Structure	232	Earth-walled pit structure	Collapsed structure: with mixed refuse
	1	Projectile point, not further specified				
	2	Rosegate series (BMII–PII)				
	1	Small corner-notched (BMIII–early PII)	Structure	239	Earth-walled pit structure	Collapsed structure: with mixed refuse
	1	Small corner-notched (BMIII–early PII)	Arbitrary unit	301	Not further specified	Post-collapse deposit: natural processes
	1	Large side-notched (Archaic)	Arbitrary unit	305	Not further specified	Mixed deposit: post-collapse and cultural refuse
	1	Small corner-notched (BMIII–early PII)				
	1	Projectile point, not further specified	Structure	309	Earth-walled pit structure	Cultural deposit: mixed refuse
	1	Archaic corner-notched, not further specified	Structure	312	Earth-walled pit structure	Collapsed structure: not further specified

Site	N	Projectile Point Type	SU Type	SU Number	SU Description	Fill/Assemblage Type
	1	Small corner-notched (BMIII–early PII)			Earth-walled pit structure	Cultural deposit: mixed refuse
	1	Projectile point, not further specified	Nonstructure	316	Midden	Mixed deposit: post-collapse and cultural refuse
	1	Small corner-notched (BMIII–Early PII)	Structure	324	Earth-walled pit structure	Collapsed structure: with mixed refuse
	1	Archaic corner-notched, not further specified	Structure	330	Earth-walled pit structure	Cultural deposit: secondary refuse
5MT10684	3	Lancaster Side-Notched (PII–PIII)	Structure	108	Subterranean kiva	Collapsed structure: not further specified
5MT10686	1	Lancaster Side-Notched (PII–PIII)	Arbitrary unit	101	Noncultural	Mixed deposit: recent disturbance
5MT10711	1	Medium corner-notched (middle to late PII)	Structure	101	Earth-walled pit structure	Collapsed structure: not further specified
	1	Projectile point, not further specified				
	2	Small corner-notched (BMIII–Early PII)				
	1	Small corner-notched (BMIII–Early PII)			Earth-walled pit structure	Collapsed structure: with mixed refuse
	1	Small corner-notched (BMIII–Early PII)	Arbitrary unit	102	Not further specified	Mixed deposit: recent disturbance
	1	Small corner-notched (BMIII–Early PII)	Nonstructure	108	Extramural surface	Post-collapse deposit: not further specified
5MT10736	1	Archaic corner-notched, not further specified	Arbitrary unit	102	Cultural deposit, type unknown	Mixed deposit: recent disturbance
5MT2032	1	Small corner-notched (BMIII–Early PII)	Structure	110	Earth-walled pit structure	Collapsed structure: with mixed refuse
5MT2037	4	Lancaster Side-Notched (PII–PIII)	Nonstructure	106	Midden	Mixed deposit: recent disturbance
	1	Small corner-notched (BMIII–Early PII)				
5MT3875	1	Sudden Side-Notched (Archaic)	Nonstructure	109	Midden	Mixed deposit: post-collapse and cultural refuse
	1	Small corner-notched (BMIII–Early PII)	Nonstructure	112	Midden	Mixed deposit: post-collapse and cultural refuse

Note: BMIII = Basketmaker III and PII = Pueblo II.

Table 24.41. Count of Formal Tools by Temporal Phase, Basketmaker Communities Project.

Site	Formal Tool Type	Middle Basketmaker III	Late Basketmaker III	All Basketmaker	Pueblo I	Pueblo II/III	All Pueblo	Total
5MT10631	Biface		2				2	4
	Drill		1				1	2
	Projectile point		3					3
5MT10647	Biface	18	7	13		5	7	50
	Drill	4	4	4		1	5	18
	Projectile point	17	8	15		1	9	50
5MT10684	Biface					1	1	2
	Drill							
	Projectile point					3		3
5MT10686	Biface					2		2
	Drill					2		2
	Projectile point					1		1
5MT10687	Biface					4		4
	Drill							
	Projectile point							
5MT10711	Biface		3					3
	Drill		7					7
	Projectile point		7					7
5MT10718	Biface				1			1
	Drill							
	Projectile point							
5MT10736	Biface		2	1				3
	Drill							
	Projectile point			1				1
5MT2032	Biface		3					3
	Drill		2					2
	Projectile point		1					1
5MT2037	Biface					2	1	3
	Drill					1	1	2
	Projectile point					5		5
5MT3875	Biface							
	Drill							
	Projectile point		2					2
Total		39	52	34	1	28	27	181

Table 24.42. Count of Chipped-Stone Artifacts by Raw Material Type, Payne Site.

Material Category	Raw Material	Formal Tools			Cores and Core Tools			Expedient Tools			Debitage	Total Count
		Biface	Drill	Projectile Point	Core	Modified Core	Pecking-stone	Chipped-Stone Tools	Modified Flake	Utilized Flake		
Local	Conglomerate										1	1
	Dakota/Burro Canyon silicified sandstone	6		8	21	1	59	8	158	113	2,907	3,281
	Gypsum/calcite/barite										3	3
	Igneous						1		1		37	39
	Morrison chert	2	1		1		1		3	3	129	140
	Morrison mudstone	3	1		11		12	2	59	32	834	954
	Morrison silicified sandstone				8		17	5	25	14	519	588
	Quartz						2					2
	Sandstone				1		1	1			34	37
	Slate/shale			1					2		19	22
	Total	11	2	9	42	1	93	16	248	162	4,483	5,067
Nonlocal	Nonlocal chert/siltstone									3	6	9
	Red jasper		1								18	19
	Narbona Pass chert										6	6
	Total		1							3	30	34
Semi-local	Agate/chalcedony	2		1					3	1	27	34
	Brushy Basin chert				1		3	1	2		21	28
	Burro Canyon chert	7		3	4		1		7	2	66	90
	Petrified wood			2								2
	Total	9		6	5		4	1	12	3	114	154
Unknown	Composite							1				1
	Other mineral						1					1
	Unknown chert/siltstone			2	1						14	17
Unknown	Unknown silicified sandstone						1		1		7	9
	Total			2	1		2	1	1		21	28
Total		20	3	17	48	1	99	18	261	168	4,648	5,283

Table 24.43. Percent of Chipped-Stone Artifacts by Raw Material Type, Payne Site.

Material Category	Raw Material	Formal Tools			Cores and Core Tools			Expedient Tools			Debitage	Total Count
		Biface	Drill	Projectile Point	Core	Modified Core	Pecking-stone	Chipped-Stone Tools	Modified Flake	Utilized Flake		
Local	Conglomerate										0.00	0.00
	Dakota/Burro Canyon silicified sandstone	30.00		47.05	43.75	100.00	59.59	44.44	60.53	67.26	62.54	62.10
	Gypsum/calcite/barite										0.00	0.00
	Igneous						1.01		0.38		0.79	0.73
	Morrison chert	10.00	33.33		2.08		1.01		1.14	1.78	2.77	2.65
	Morrison mudstone	15.00	33.33		22.91		12.12	11.11	22.60	19.04	17.94	18.05
	Morrison silicified sandstone				16.67		17.17	27.77	9.57	8.33	11.16	11.13
	Quartz						2.02					0.00
	Sandstone				2.08		1.01	5.55			0.73	0.70
	Slate/shale			5.88					0.76		0.40	0.41
	Total	55.00	66.67	52.94	87.50	100.00	93.93	88.88	95.01	96.42	96.45	95.91
Nonlocal	Nonlocal chert/siltstone									1.78	0.12	0.17
	Red jasper		33.33								0.38	0.35
	Narbona Pass chert										0.12	0.11
	Total		33.33							1.78	0.64	0.64
Semi-local	Agate/chalcedony	10.00		5.88					1.14	0.59	0.58	0.64
	Brushy Basin chert				2.08		3.03	5.55	0.76		0.45	0.53
	Burro Canyon chert	35.00		17.64	8.33		1.01		2.68	1.19	1.41	1.70
	Petrified wood			11.76								0.00
	Total	45.00		35.29	10.41		4.04	5.55	4.59	1.78	2.45	2.91
Unknown	Composite							5.55				0.00
	Other mineral						1.01					0.00
	Unknown chert/siltstone			11.76	2.08						0.30	0.32
Unknown	Unknown silicified sandstone						1.01		0.38		0.15	0.17
	Total			11.76	2.08		2.02	5.55	0.38		0.45	0.53

Table 24.44. Core Analysis Summary, Payne Site (5MT12205).

Core Type	Material Type	Material Group	Count
Bifacial	Dakota/Burro Canyon silicified sandstone	Local	2
	Morrison mudstone	Local	1
Multidirectional	Dakota/Burro Canyon silicified sandstone	Local	13
	Morrison chert	Local	1
	Morrison mudstone	Local	8
	Morrison silicified sandstone	Local	6
	Brushy Basin chert	Semi-local	1
	Burro Canyon chert	Semi-local	2
	Unknown chert/siltstone	Unknown	1
Unidirectional	Dakota/Burro Canyon silicified sandstone	Local	2
	Morrison mudstone	Local	2
	Morrison silicified sandstone	Local	1

Table 24.45. Projectile Point Type and Material, Payne Site (5MT12205).

PD	FS	Projectile Point Type	Projectile Point Time Span	Material Type	Material Group	Length (cm) if Complete	Use	Reuse
1	1539	Jay Stemmed (Archaic)	9000–6000 B.C.	Dakota/Burro Canyon silicified sandstone	Local	4.12	Dart	Retouch, repaired haft
1	1559	Small corner-notched (BMIII–early PII)	A.D. 300–1000	Dakota/Burro Canyon silicified sandstone	Local	2.17	Arrow	Use wear
1	1562	San Jose (Late Archaic)	4500–1500 B.C.	Slate/shale	Local		Dart	Repaired haft
76	774	Small corner-notched (BMIII–early PII)	A.D. 300–1000	Dakota/Burro Canyon silicified sandstone	Local		Arrow	Retouch, repaired haft
77	1558	Small corner-notched (BMIII–early PII)	A.D. 300–1000	Dakota/Burro Canyon silicified sandstone	Local	2.10	Arrow	No
126	793	Small corner-notched (BMIII–early PII)	A.D. 300–1000	Dakota/Burro Canyon silicified sandstone	Local		Arrow	Retouch
139	1931	Bajada Stemmed (Early Archaic)	8500–3500 B.C.	Dakota/Burro Canyon silicified sandstone	Local	4.52	Dart	Use wear, retouch
144	1946	San Jose (Late Archaic)	4500–1500 B.C.	Dakota/Burro Canyon silicified sandstone	Local		Dart	Haft resharpened, drill use wear
150	2029	Medium side-notched	A.D. 900–1300	Dakota/Burro Canyon silicified sandstone	Local		Dart	Retouch, haft repaired
1	794	Rosegate series (BMII–PII)	A.D. 300–1000	Burro Canyon chert	Semi-local	2.25	Arrow	Retouch
1	1609	San Jose (Late Archaic)	4500–1500 B.C.	Burro Canyon chert	Semi-local		Dart	Use wear, retouch, repaired haft
2	1573	Medium corner-notched	A.D. 500–1150	Agate/chalcedony	Semi-local		Arrow	No
79	1561	Medium corner-notched	A.D. 500–1150	Burro Canyon chert	Semi-local		Dart	No
151	2030	Elko Corner-Notched (Archaic)	8500–1000 B.C.	Petrified wood	Semi-local	5.70	Dart	Use wear, retouch, repaired haft
151	2031	Large corner-notched (BMII)	1000 B.C.–A.D. 500	Petrified wood	Semi-local		Dart	Retouch, repaired haft
76	773	Small corner-notched (BMIII–early PII)	A.D. 300–1000	Unknown chert/siltstone	Unknown		Arrow	Repaired haft
78	1560	San Jose (Late Archaic)	4500–1500 B.C.	Unknown chert/siltstone	Unknown		Dart	Retouch

Note: BMIII = Basketmaker III and PII = Pueblo II.

Table 24.46a. Counts of Ground-Stone Artifacts, by Site, Basketmaker Communities Project.

Site	Mano NFS		One-Hand Mano		Two-Hand Mano		Metate NFS		Basin Metate		Trough Metate		Slab Metate	
	N	Wt. (g)	N	Wt. (g)	N	Wt. (g)	N	Wt. (g)	N	Wt. (g)	N	Wt. (g)	N	Wt. (g)
5MT10631	2	786	2	3,090	4	3,141	1	1,396			2	37,340	2	20,700
5MT10647	16	3,824	11	7,400	14	14,698	14	43,647	2	1,818	2	32,510	11	65,732
5MT10684	1	387	1	525	3	1,231								
5MT10686	4	741	1	259	2	2,377								
5MT10687	1	289	1	1,493	5	5,985	3	5,074						
5MT10709	1	55							1	10,820				
5MT10711	1	362	4	3,506	4	5,367	4	4,634			1	17,179	15	82,512
5MT10718							1	437						
5MT10736					1	372								
5MT2032	1	36			10	3,693	3	11,270	1	9,900	2	57,480	1	15,350
5MT2037	4	529	1	361	8	8,373	1	904			1	6,800	1	3,382
5MT3875														
Total	31	7,009	21	16,634	51	45,238	27	67,362	4	22,538	8	151,309	30	187,676

Note: NFS = Not further specified.

Table 24.46b. Counts of Ground-Stone Artifacts, by Site, Basketmaker Communities Project (continued).

Site	Abrader		Stone Mortar		Pestle		BIG*		Total Count	Total Weight
	N	Wt. (g)	N	Wt. (g)	N	Wt. (g)	N	Wt. (g)		
5MT10631	9	469					14	7,191	36	74,112
5MT10647	27	12,821	1	2,985	1	1,721	363	43,437	462	230,593
5MT10684	2	160					21	3,042	28	5,346
5MT10686	8	2,912					51	4,627	66	10,918
5MT10687	1	75					61	5,977	72	18,893
5MT10709							5	1,055	7	11,930
5MT10711	1	146					66	2,421	96	116,126
5MT10718									1	437
5MT10736							32	2,785	33	3,157
5MT2032	1	329					13	6,140	32	104,199
5MT2037	1	7					58	2,648	75	23,004
5MT3875							6	1,609	6	1,609
Total	50	16,920	1	2,985	1	1,721	690	80,932	914	600,323

*Bulk indeterminate ground stone.

Table 24.47a. Percent of Ground-Stone Artifacts, by Site, Basketmaker Communities Project.

Site	Mano NFS		One-Hand Mano		Two-Hand Mano		Metate NFS		Basin Metate		Trough Metate		Slab Metate	
	% of N	% of Wt.	% of N	% of Wt.	% of N	% of Wt.	% of N	% of Wt.	% of N	% of Wt.	% of N	% of Wt.	% of N	% of Wt.
5MT10631	6.45	11.21	9.52	18.57	7.84	6.94	3.70	2.07			25.00	24.67	6.66	11.02
5MT10647	51.61	54.55	52.38	4.44	27.45	32.49	51.85	64.79	50.00	8.06	25.00	21.48	36.66	35.02
5MT10684	3.22	5.52	4.76	3.15	5.88	2.72								
5MT10686	12.90	10.57	4.76	1.55	3.92	5.25								
5MT10687	3.22	4.12	4.76	8.97	9.80	13.23	11.11	7.53						
5MT10709	3.22	0.78							25.00	48.00				
5MT10711	3.22	5.16	19.04	21.07	7.84	11.86	14.81	6.87			12.50	11.35	50.00	43.96
5MT10718							3.70	0.64						
5MT10736					1.96	0.82								
5MT2032	3.22	0.51			19.60	8.16	11.11	16.73	25.00	43.92	25.00	37.98	3.33	8.17
5MT2037	12.90	7.54	4.76	2.17	15.68	18.50	3.70	1.34			12.50	4.49	3.33	1.80
5MT3875														
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Note: NFS = Not further specified.

Table 24.47b. Percent of Ground-Stone Artifacts, by Site, Basketmaker Communities Project (continued).

Site	Abrader		Stone Mortar		Pestle		BIG*		Total % of N	Total % of Wt. (g)
	% of N	% of Wt.	% of N	% of Wt.	% of N	% of Wt.	% of N	% of Wt.		
5MT10631	18.00	2.77					2.02	8.88	3.93	12.35
5MT10647	54.00	75.77	100.00	100.00	100.00	100.00	52.60	53.67	50.54	38.41
5MT10684	4.00	0.94					3.04	3.75	3.06	0.89
5MT10686	16.00	17.21					7.39	5.71	7.22	1.82
5MT10687	2.00	0.44					8.84	7.38	7.88	3.15
5MT10709							0.72	1.30	0.77	1.99
5MT10711	2.00	0.86					9.56	2.99	10.50	19.34
5MT10718									0.11	0.00
5MT10736							4.63	3.44	3.61	0.53
5MT2032	2.00	1.94					1.88	7.58	3.50	17.36
5MT2037	2.00	0.00					8.40	3.27	8.21	3.83
5MT3875							0.86	1.98	0.66	0.27
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

*Bulk indeterminate ground stone.

Table 24.48. Ground-Stone Artifacts by Kilogram of Gray Ware Sherds, Basketmaker Communities Project.

Site	All Ground-Stone Artifacts (N)	Total Wt. of Gray Ware Sherds (g)	Ground Stone per kg of Gray Ware Sherds	Ground-Stone Rank
5MT10631	36	7,048.50	5.11	6
5MT10647	461	84,114.56	5.48	4
5MT10684	28	12,413.56	2.26	10
5MT10686	66	10,601.10	6.23	2
5MT10687	72	14,859.22	4.85	7
5MT10709	7	3,443.10	2.03	11
5MT10711	96	17,375.97	5.52	3
5MT10718	1	632.20	1.58	
5MT10736	33	2,999.50	11.00	1
5MT2032	32	6,007.80	5.33	5
5MT2037	75	19,561.83	3.83	8
5MT3875	6	2,503.50	2.40	9
Total	913	181,560.83	5.03	

Table 24.49. Battered or Polished Stone Artifacts, Basketmaker Communities Project.

Site	Axe		Single-Bitted Axe		Axe/Maul		Maul		Peckingstone		Hammerstone		Hammerstone/ Polishing Stone		Polishing Stone		Tchamahia		Total	Total %
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%		
5MT10631									8	6.11					2	7.14			10	4.85
5MT10647					5	71.42	1	5.26	76	58.02	5	38.46	4	100.00	7	25.00			98	47.57
5MT10684					1	14.28			8	6.11	2	15.38			2	7.14			13	6.31
5MT10686									8	6.11	2	15.38			1	3.57	1	50.00	12	5.83
5MT10687									8	6.11					3	10.71	1	50.00	12	5.83
5MT10709					1	14.28					1	7.69			1	3.57			3	1.46
5MT10711							18	94.73	6	4.58	1	7.69			8	28.57			33	16.02
5MT10718									1	0.76									1	0.49
5MT10719											1	7.69			1	3.57			2	0.97
5MT2032									4	3.05					1	3.57			5	2.43
5MT2037	1	100.00	1	100.00					11	8.40	1	7.69			1	3.57			15	7.28
5MT3875									1	0.76					1	3.57			2	0.97
Total	1	100.00	1	100.00	7	100.00	19	100.00	131	100.00	13	100.00	4	100.00	28	100.00	2	100.00	206	100.00

Table 24.50. Battered and/or Polished Artifacts by Weight of Gray Ware Sherds, Basketmaker Communities Project.

Site	Battered and/or Polished Stone Tool Totals	Total Wt. of Gray Ware Sherds (g)	Number of Items per kg of Gray Ware Sherds	Rank
5MT10631	10	7,048.50	1.42	2
5MT10647	98	84,114.56	1.17	3
5MT10684	13	12,413.56	1.05	5
5MT10686	12	10,601.10	1.13	4
5MT10687	12	14,859.22	0.81	8
5MT10709	3	3,443.10	0.87	6
5MT10711	33	17,375.97	1.90	1
5MT10718	1	632.20	1.58	
5MT10719	2	349.00	5.73	
5MT2032	5	6,007.80	0.83	7
5MT2037	15	19,561.83	0.77	9
5MT3875	2	2,503.50	0.80	
Total	206	178,910.33	1.15	

Table 24.51a. Battered and/or Polished Artifacts, by Material Type, Basketmaker Communities Project.

Material Type	Axe		Single-Bitted Axe		Axe/Maul		Maul		Peckingstone	
	N	%	N	%	N	%	N	%	N	%
Agate/Chalcedony									1	0.76
Conglomerate	1	100.00								
Morrison Silicified Sandstone					1	14.29			69	52.67
Dakota/Burro Canyon Silicified Sandstone									19	14.50
Morrison Chert									2	1.53
Morrison Mudstone							1	5.26	33	25.19
Other Igneous			1	100.00	5	71.43	18	94.74	3	2.29
Petrified Wood										
Quartzite										
Slate/Shale										
Sandstone					1	14.29				
Unknown Chert/Siltstone									3	2.29
Unknown Stone										
Unknown Quartzite									1	0.76
Unknown Silicified Sandstone										
Total	1	100.00	1	100.00	7	100.00	19	100.00	131	100.00

Table 24.51b. Battered and/or Polished Artifacts, by Material Type, Basketmaker Communities Project (continued).

Material Type	Hammerstone		Hammerstone/ Polishing Stone		Polishing Stone		Tchamahia		Totals	Percent of Total
	N	%	N	%	N	%	N	%		
Agate/Chalcedony									1	0.49
Conglomerate									1	0.49
Morrison Silicified Sandstone	3	23.08			2	7.14			75	36.41
Dakota/Burro Canyon Silicified Sandstone	4	30.77	1	25.00					24	11.65
Morrison Chert			1	25.00	1	3.57			4	1.94
Morrison Mudstone									34	16.50
Other Igneous	1	7.69			6	21.43			34	16.50
Petrified Wood					1	3.57			1	0.49
Quartzite	1	7.69	2	50.00	6	21.43			9	4.37
Slate/Shale							1	50.00	1	0.49
Sandstone	4	30.77			1	3.57	1	50.00	7	3.40
Unknown Chert/Siltstone					1	3.57			4	1.94
Unknown Stone					3	10.71			3	1.46
Unknown Quartzite					6	21.43			7	3.40
Unknown Silicified Sandstone					1	3.57			1	0.49
Total	13	100.00	4	100.00	28	100.00	2	100.00	206	100.00

Table 24.52. Other Stone Artifacts and Minerals, by Field Specimen Count, Basketmaker Communities Project.

Material Type	Raw Material	Mineral/Stone Sample	Other Modified Stone/Mineral	Stone Disk	Total
Local	Caliche	4			4
	Clay	98			98
	Concretion	37			37
	Conglomerate	40			40
	Dakota/Burro Canyon silicified sandstone		1		1
	Fossil	43	1		44
	Gypsum/calcite/barite	22	8		30
	Igneous	184	6		190
	Morrison chert	1			1
	Morrison mudstone	5	6		11
	Morrison silicified sandstone	12	13	2	27
	Pigment	305	21		326
	Quartz	8	1		9
	Sandstone	58	36	52	146
	Shale	1			1
	Slate/shale	7	5		12
Nonlocal	Azurite	33			33
	Galena	3			3
	Obsidian	1			1
	Turquoise	5	2		7
	Washington Pass chert	1			1
Semi-local	Agate/chalcedony	1	1		2
	Brushy Basin chert				0
	Petrified wood	6			6
	Quartzite		1		1
Unknown	Other mineral	24	2		26
	Unknown chert/siltstone	4	3		7
	Unknown silicified sandstone		2		2
	Unknown stone	4	3		7
	Unknown material	4	2		6
Total		911	114	54	1,079

Table 24.53. Counts of Ornaments, Basketmaker Communities Project, by Site.

Artifact Type	Material	Count	5MT10631	5MT10647	5MT10684	5MT10686	5MT10687	5MT10709	5MT10711	5MT10719	5MT10736	5MT2032	5MT2037
Bead (N = 41 or 47%)	Gypsum/ calcite/ barite	1		1									
	Morrison mudstone	2		1					1				
	Shell	26		25					1				
	Slate/ shale	1		1									
	Unknown bone	3				3							
	Unknown silicified sandstone	4			3	1							
	Unknown stone	4		2	1	1							
OMS/ Mineral (Poss. Pendant or Ornament Blank, Poss. Tesserae) (N = 20 or 23%)	Agate/ chalcedony	1							1				
	Dakota/ Burro Canyon silicified sandstone	1		1									
	Gypsum/ calcite/ barite	3							3				
	Morrison mudstone	5		4								1	
	Morrison silicified sandstone	1											1
	Sandstone	2			1					1			
	Slate/shale	2				1						1	

Artifact Type	Material	Count	5MT10631	5MT10647	5MT10684	5MT10686	5MT10687	5MT10709	5MT10711	5MT10719	5MT10736	5MT2032	5MT2037
	Turquoise	3		3									
	Unknown silicified sandstone	1					1						
	Unknown stone	1	1										
Bone Tube (N = 15 or 17%)	Unknown bone	15	3	10			1		1				
Pendant (N = 11 or 13%)	Pottery	1				1							
	Clay	1											1
	Morrison mudstone	2		1					1				
	Sandstone	1		1									
	Shale	2						1			1		
	Shell	1											1
	Slate/ shale	1		1									
	Turquoise	1											1
	Unknown stone	1		1									
Total		87	4	52	5	7	2	1	8	1	1	2	4
Total Wt. of Gray Ware Sherds (g)		181,927.23	7,048.50	84,114.56	12,413.56	10,601.10	14,859.22	3,443.10	17,375.97	349.00	2,999.50	6,007.80	19,561.83
Items per kg of Gray Ware Sherds		0.48	0.57	0.62	0.40	0.66	0.13	0.29	0.46	2.87	0.33	0.33	0.20
Rank of Ornaments (1 = Highest)			4	3	6	2	11	9	5	1	8	7	10

OMS = other modified stone, poss. = possible.

Table 24.54. Drills by Weight of Gray Ware Sherds, by Site, Basketmaker Communities Project.

Site	Drill		Total Wt. of Gray Ware Sherds (g)	Drills per kg of Gray Ware Sherds	Rank of Ornaments (1 = Highest)
	N	%			
5MT10631	2	6.06	7,048.50	0.28	3
5MT10647	18	54.55	84,114.56	0.21	4
5MT10686	2	6.06	10,601.10	0.19	5
5MT10711	7	21.21	17,375.97	0.40	1
5MT2032	2	6.06	6,007.80	0.33	2
5MT2037	2	6.06	19,561.83	0.10	6
Total	33	100.00	144,709.75	0.23	

Table 24.55. Eggshell by Field Specimen (FS) Count, Weight, and by Weight of Gray Ware Sherds, by Site, Basketmaker Communities Project.

Site	Total of FS	Total Wt. of Eggshell (g)	Total Wt. of Gray Ware Sherds (g)	Eggshell Wt. per kg of Gray Ware Sherds	Rank
5MT10631	5	0.10	7,048.50	0.01	4
5MT10647	15	0.00	84,114.56	0.00	6
5MT10684	28	5.93	12,413.56	0.48	1
5MT10686	11	0.20	10,601.10	0.02	3
5MT10687	11	0.21	14,859.22	0.01	5
5MT10711	8	0.00	17,375.97	0.00	6
5MT2032	1	0.00	6,007.80	0.00	6
5MT2037	14	0.94	19,561.83	0.05	2
5MT3875	1	0.00	2,503.50	0.00	6
Total	94	7.38	181,927.23	0.04	

Table 24.56. Gizzard Stones by Count and by Weight of Gray Ware Sherds, by Site, Basketmaker Communities Project.

Site	Gizzard Stones (N)	Total Wt. of Corrugated Gray Sherds (g)	Gizzard Stones per kg of Corrugated Gray Sherds	Rank
5MT10631	68	7,048.50	9.65	1
5MT10647	666	84,114.56	7.92	3
5MT10684	20	12,413.56	1.61	13
5MT10686	40	10,601.10	3.77	7
5MT10687	28	14,859.22	1.88	12
5MT10709	7	3,443.10	2.03	10
5MT10711	144	17,375.97	8.29	2
5MT10718	4	632.20	6.33	4
5MT10719	2	349.00	5.73	6
5MT10736	6	2,999.50	2.00	11
5MT2032	16	6,007.80	2.66	9
5MT2037	59	19,561.83	3.02	8
5MT3875	15	2,503.50	5.99	5
Total	1,076	181,927.23	5.91	

Table 24.57. Counts of Modified Bone Artifacts, Basketmaker Communities Project.

Site	Artifact Type				Total Count (N)	Total Wt. of Gray Ware Sherds (g)	Modified Bone per kg of Gray Ware Sherds	Rank*
	Awl	Gaming Piece	Other Modified Bone	Bone Tube				
5MT10631	2		3	3	8	7,048.50	1.13	1
5MT10647	14	1	45	10	70	84,114.56	0.83	4
5MT10684	2		1		3	12,413.56	0.24	10
5MT10686			1		1	10,601.10	0.09	11
5MT10687			3	1	4	14,859.22	0.27	9
5MT10709	3				3	3,443.10	0.87	3
5MT10711	7		8	1	16	17,375.97	0.92	2
5MT10736	1				1	2,999.50	0.33	7
5MT2032	1		3		4	6,007.80	0.67	5
5MT2037	2		4		6	19,561.83	0.31	8
5MT3875			1		1	2,503.50	0.40	6
Total	32	1	69	15	117	181,927.23	0.64	

* Rank 1 = greatest count per kg of corrugated pottery.

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Chapter 25

Basketmaker Communities Project Synthesis

by Shanna R. Diederichs

Introduction

The Basketmaker Communities Project was designed to provide insight into the initial expansion of farmers and agricultural lifeways across the northern Southwest. Through a combination of collections research, surface survey, geophysical imaging, and excavation, the project produced a wealth of knowledge regarding this transition and the role it played in ancestral Pueblo history. Specifically, the project provided an opportunity to study the origins, development, and impacts of a single Basketmaker III period (A.D. 500–750) settlement in the central Mesa Verde region. Today, most of this settlement is encapsulated by the Indian Camp Ranch Archaeological District on the Indian Camp Ranch subdivision, and it is this property that served as the primary study area during the Basketmaker Communities Project. The project results confirm seventh-century migration of agriculturalists into the region, a pattern of robust intrinsic growth following the introduction of agriculture or what has been referred to as a Neolithic Demographic Transition, and the development of fundamental Pueblo social institutions.

This chapter addresses the research questions set forward in two related research designs (Ortman et al. 2011; Ryan and Diederichs 2014). For a detailed account of the settlement history in the Indian Camp Ranch study area see Chapter 19 and the interactive *Basketmaker Communities Project Database* (Crow Canyon Archaeological Center 2020). Specifically discussed in this chapter are data that clarify the settlement's history, consider the ethnicity and source of the Basketmaker III people who colonized the region in the seventh century A.D., examine community structure and social organization during the Basketmaker III period, contribute to our understanding of the Neolithic Demographic Transition in the northern Southwest and the technological and social innovations that promoted this demographic shift, and assess the anthropogenic impacts of this first farming population on the landscape and on later farming societies. The following sections highlight how data from individual sites, and cumulative data from the entire project, address these research domains.

Chronology

<u>How large was the initial immigration into the central Mesa Verde region?</u>

Basketmaker III presence in the study area prior to A.D 600 is minimal, seasonal, and possibly even transitory. With just two small shallow pit rooms and one extramural feature dating to this period (5MT10647 and 5MT10736) only short-term activities are evident. Of course, we cannot rule out early Basketmaker III occupation of the 55 unexcavated Basketmaker III components in the study area, but the lack of habitations at tested sites indicates a transitory, rather than settled, pattern. Therefore, the momentary population over the course of the early Basketmaker III phase would likely be less than one. The few households moving through the area during this phase were the first wave of homesteaders into the previously unfarmed central Mesa Verde region frontier. Their light footprint suggests that they may have been testing the agricultural productivity in the vicinity.

Homesteading of the study area began in earnest during the mid-Basketmaker III phase (A.D. 600–660). Multiple dating methods suggest that this occupation was concentrated at the Dillard site, but a few single-household hamlets were also established in the surrounding area. We infer that 17 households were inhabited in the study area during this phase, and that about half of these were concentrated at the Dillard site. These estimates produce a momentary population of five households, or 25 to 30 people.

> <u>How did the momentary population of the Indian Camp Ranch Basketmaker III settlement change through time?</u>

Population rose exponentially during the late Basketmaker III phase to an estimated 95 households and a momentary population of 22 households, or approximately 110 people, at any given time. These estimates indicate that the small initial population roughly quadrupled between the middle and late Basketmaker III phases, with an implied growth rate of about 8 percent per year. Increasing household artifacts, especially pottery, from the early to the middle to the late Basketmaker III phases also support the increases in population over the Basketmaker III period for the Indian Camp Ranch community (see Chapter 24).

> <u>Can the Basketmaker III period chronology be divided into smaller time ranges based on the surface signatures of habitation sites?</u>

Changes in pottery form and temper were found to be strong chronological markers over the Basketmaker III period. Scott Ortman and colleagues (2016) devised a method for subdividing the Basketmaker III habitation in the central Mesa Verde region into two chronological phases, A.D. 600–660 and A.D. 650–750, based on trends in vessel assemblage composition. These trends are related to shifts in corn storage practices and an increase in serving vessels over time (Blinman 1989; Ortman et al. 2016). Analysis of well-dated pottery assemblages from 17 Basketmaker III sites, including preliminary data from the Dillard site, demonstrates that the ratio of painted bowl to seed jar rims gradually increases, and the fraction of seed jar rims gradually decreases, over the course of the Basketmaker III period. Effectively, the ratio of painted bowl to seed jar rims nearly doubles from A.D. 600–660 to A.D. 660–750. Inversely, the percentage of seed jar rims compared to all rim counts drops from about 50 to 25 percent from A.D. 600–660 to A.D. 660–750. The data from the Crow Canyon excavations component of the Basketmaker Communities Project (see Table 24.4) show a similar pattern, but not quite as dramatic a shift as documented by Ortman and colleagues (2016), with the ratio for mid-Basketmaker III to late Basketmaker III white ware bowl rims to gray ware seed jar rims increasing from 0.52 to 0.68. These patterns could be applied to surface assemblages to discern middle versus later Basketmaker III occupations. In addition to changes in pottery vessel form over time, we document changes in gray ware temper over time, with sand/sandstone temper more common earlier in the Basketmaker III period and igneous rock temper dominating gray ware assemblages late in the Basketmaker III period (see Table 24.15). Both of these pottery characteristics require large assemblages to determine relative time period but could be used together for greater precision in separating earlier from later Basketmaker III period sites (see Chapter 24).

Origins of the Central Mesa Verde Basketmaker III Population

What is the source population for the A.D. 600 immigrants into the central Mesa Verde region?

Across the northern Southwest, the sixth century A.D. was characterized by large-scale demographic shifts. Some previously avoided territories, like the central Mesa Verde region, saw dramatic in-migration and population growth (Chuipka et al. 2010:196; Kleidon et al. 2003; Kohler et al. 2008; Wills 2001; Wilshusen and Perry 2008; Wilshusen et al. 2012; Windes 2015; Varien et al. 2007:Table 4). Other long-standing territories, such as Black Mesa and the eastern Mesa Verde region, were emptied out (Chuipka et al. 2010; Smiley et al. 1986), and their populations moved wholesale to other territories. But not every group migrated. Many sub-regions and even specific sites were continuously occupied across the Basketmaker II to Basketmaker III transition such as those associated with Sambrito Phase occupations of northwest New Mexico (Chuipka et al. 2010; Eddy 1972). These indigenous Archaic-derived farmers were not displaced but were swept up into the Basketmaker III cultural horizon in the seventh century.

Given the demographic instability of the sixth century A.D., any of the populations discussed above could have been a source for migrants to the Basketmaker Communities Project study area in the early seventh century A.D. Potential source populations are considered here based on evidence for their connection with the Indian Camp Ranch settlement through trade, shared subsistence, and architectural practices.

Trade Network

The Indian Camp Ranch Basketmaker III populations had an extensive trade network when it came to high-value materials, including exotic lithic materials, shell, minerals, and pottery (see Chapter 24). Most of the obsidian recovered on the project was sourced to formations in New Mexico, specifically the Jemez Mountains in central New Mexico and Mount Taylor in west-central New Mexico. However, two items collected from Portulaca Point (5MT10709) were imported from further afield: Government Mountain in east-central Arizona and Wild Horse Canyon in western Utah. Other exotic lithic materials, such as Narbona Pass chert, red jasper, and Mosca chert, suggest connections to the south, west, and east (see Chapter 24). Of the 27 shell items recovered on the project, at least five are *Olivella* shell imported from the Pacific beaches of California or the Gulf of Mexico. Though this trade network does not necessarily indicate direct migration from these far-flung regions, it does attest to the fluid movement of people and materials across the American Southwest.

Hohokam and Mogollon Connections

Connections to the Hohokam and Mogollon area can be found in the Basketmaker Communities Project plant record and architectural styles. Domesticated little barley grass was discovered in the pithouse hearth at the Switchback site (Graham et al. 2017). Little barley is a "cool-season" grass whose grains ripen in late winter/early spring, providing important nutrition when many other resources are unavailable (Bohrer 1975). Well-known to Hohokam farmers in central and southern Arizona hundreds of miles to the southwest, little barley has never previously been recovered in an ancestral Pueblo site in the central Mesa Verde region.

Charred spiderling (*Boerhavia*) seeds were also recovered from a Basketmaker III pithouse. The closest archaeological records of spiderling seeds are reported from Hohokam and Tonto Basin Salado archaeological sites in Arizona (Huckell and Toll 2004:74–76). *Boerhavia* plants are said to be "widely distributed in tropical and subtropical America," reported from the southern and central Arizona counties of Yavapai, Cochise, Santa Cruz, Pima, and Yuma (Kearney and Peebles 1960:276). The closest modern *Boerhavia* populations to southwestern Colorado are currently some distance to the west in Utah and to the south in Arizona and New Mexico.

Travel or trade from regions far to the south or west are two reasonable explanations for the presence of burned little barley and spiderling seeds in the Indian Camp Ranch Basketmaker III settlement. It is not likely that these plants were imported simply as food; more likely, they were imported as seeds for planting. This scenario suggests that at least some of the Indian Camp Ranch immigrants were familiar with the cultivation and harvesting of these food resources and attempted to grow them in the high-elevation desert of southwest Colorado. In the case of little barley, wild versions of the plant grow in Colorado, opening the possibility that it was domesticated independently by Basketmaker III peoples in the region (Graham et al. 2017). This possibility also suggests knowledge and experience with the domesticated version in the Hohokam area. The scant evidence of either plant from Basketmaker III contexts and their absence from the later ancestral Pueblo record indicate that they were probably difficult to grow on the Colorado Plateau and were abandoned as food resources after a few generations. The presence of little barley and spiderling seeds is palpable evidence that some of the immigrants into the study area likely migrated, directly or within a few generations, from the Mogollon or Hohokam regions along the southern edge of the Colorado Plateau.

The presence of a great kiva at the Dillard site supports the hypothesis that the founding population derived from a source to the south-southwest with connections to the Mogollon culture. The first great kivas were constructed along the Mogollon rim of east-central Arizona in the late 400s (Schachner 2001). Examples of early great kivas dating to the late Basketmaker II period (500 B.C. to A.D. 500) are found in the Puerco and Tularosa Valleys of central New Mexico (Greenwald 2018; Schachner et al. 2012) south of the ancestral Pueblo culture region. Great kivas were adopted into the ancestral Pueblo architectural lexicon at the dawn of the Basketmaker III period in the seventh century A.D. As previously discussed in Chapter 18, only four Basketmaker III great kivas have been excavated: two along Chaco Canyon in the San Juan Basin, one in the Little Colorado region, and one, the Dillard great kiva, in the central Mesa Verde region. Given the consistency among these great kivas, it appears that the knowledge of their construction and function was shared among populations.

Mogollon populations may have introduced the great kiva tradition to the ancestral Pueblo world as they migrated north through the Lukachukai Valley and into the areas around the tributaries of the San Juan River. Numerous probable Basketmaker III great kivas have been recorded as surface features along the canyon systems of this corridor including Chinle Wash, San Juan River, Red Cove Valley, Cottonwood Wash, and Montezuma Creek (Allison et al. 2012; Hurst 2004; Matheny et al. 2013; Spittler 2019). The Dillard site is in the upper reaches of McElmo Creek, a tributary of the San Juan River, at the northeastern edge of this Basketmaker III great kiva architectural tradition. Hence, the great kiva was likely built at the Dillard site by migrants who had direct experience with the construction and use of this type of public architecture in adjacent regions to the southwest.

> <u>Is there evidence for a multi-ethnic immigration into the region from a variety of different geographic areas?</u>

Unfortunately, biometric data were of little use in identifying a source population for the Indian Camp Ranch Basketmaker III community. Few intact burials were found during the project, and of the few analyzed burials, none demonstrated signs of cradleboarding, a practice increasingly utilized by ancestral Pueblo populations between A.D. 500 and 900 (Reed 2002). However, there is other material evidence that the Indian Camp Ranch Basketmaker III settlement was composed of a diverse population.

At least some of the Indian Camp Ranch population had knowledge of high-altitude desert subsistence based in Archaic lifeways on the Colorado Plateau. Faunal and plant remains from the settlement reflect exploitation of a wide variety of local resources. For instance, as many as 35 different wild plant resources were found in the Basketmaker III settlements. There is evidence that households differentially used these plant resources in distinct cuisines. This knowledge of wild resources was likely contributed by long-standing local populations rather by than immigrants to the area. Based on excavated examples of light brush-covered conical structures dating to the A.D. 400s and 500s in the central Mesa Verde region, Silverman and colleagues (2003) have argued that a remnant late Archaic population still lived in the vicinity of the study area at the onset of the Basketmaker III period. These hunters and gatherers would have contributed an immense knowledge base to the community if incorporated into the Indian Camp Ranch settlement.

Architecturally, the Indian Camp Ranch settlement has some connection to the Eastern Basketmaker II cultural tradition. The classic double-chambered pithouse form constructed at habitations throughout the Indian Camp settlement likely originated to the east a century earlier. Eastern Basketmaker II populations in the Navajo Reservoir area began adding entry rooms or antechambers to their pithouses during the Los Pinos phase (A.D. 300–400) and continued constructing double-chambered pithouses throughout the Sambrito phases (A.D. 400–700) (Chuipka et al. 2010; Eddy 1966, 1972; Hovezak and Sesler 2006). This double-chambered architectural tradition was widely adopted across the eastern half of the Basketmaker III cultural area in the seventh century A.D. Although the construction of double-chambered pithouses in the Indian Camp Ranch settlement does not necessarily imply direct migration of Eastern Basketmaker III populations to the settlement, it does attest to the historical integration of

Eastern Basketmaker III people and technologies into a burgeoning Basketmaker III cultural horizon.

Basketmaker III pithouse construction styles have been proven to be learned techniques rooted in specific communities of practice (Miller 2015). Several pithouse construction styles were detected during the Basketmaker Communities Project, and these styles can be traced to specific regional source populations to the south and west. Bench-supported leaner-post construction was the most commonly found roof support system identified during the project and demonstrates that the Indian Camp Ranch community was part of a shared Mesa Verde and north Chuska Mountain architectural tradition. However, a few structures at the Dillard site were built in a vertical jacal style, which developed in the western Mesa Verde region of southeast Utah and northeast Arizona (Allison et al. 2012; Chenault and Motsinger 2000; Chenault et al. 2003; Miller 2015:185; Neily 1982). That the Indian Camp Ranch population came from or visited both the Chuska Mountain area and southeast Utah is supported by a high percentage of imported lithic materials from these regions.

Based on their subsistence practices, culinary practices, communal ritual tradition, and architectural styles, the Indian Camp Ranch settlement appears to have been an ethnically diverse population. A variety of traditions are represented in the community's cultural milieu including Colorado Plateau Archaic, Mogollon, Hohokam, Eastern Basketmaker II, Western Basketmaker II, Chuska region Basketmaker III, central Mesa Verde region Basketmaker III, and western Mesa Verde region Basketmaker III. Some of these ethnic identities were likely in the process of being downplayed and/or absorbed into the broader Basketmaker III cultural horizon. Other ethnic identities, such as those derived from the Chuska, central Mesa Verde, and western Mesa Verde traditions, were more salient and visible in the community. The diversity of practices reflect a deep history both on and south of the Colorado Plateau and direct connections with distinct nearby regions. This variation suggests that the Indian Camp Ranch community was multi-ethnic, incorporating immigrants from various distances and backgrounds.

What is the case for a Basketmaker III ethnogenesis?

There is evidence that the Indian Camp Ranch inhabitants engaged in a pan-regional community of practice, or cultural horizon, which could reflect a Basketmaker III period ethnogenesis. Their pottery production, architecture, and subsistence practices reflect general trends in Basketmaker III societies across the Colorado Plateau.

For example, the community participated in pan-regional pottery production trends. The settlement shifted from sand/sandstone to igneous rock–tempered pottery, which reflects shifts in materials documented in other areas of the broader region (see Chapter 24). Decorative pottery elements were also shared with the larger region. Based on research developed by Linda Honeycutt (2015), we were able to determine that the same designs used across the Colorado Plateau were used by potters across the Indian Camp Ranch community, as well as at comparative sites such as the Payne site. These data suggest a single community of practice across both the Indian Camp Ranch community and the overall Colorado Plateau for pottery design. Because pottery is such an important item of material culture in the ancestral Pueblo culture this shared adoption of technological and decorative elements of pottery production signals the development over the Basketmaker III period of a cohesive regional identity, or ethnogenesis (see Chapter 24).

Cultural horizons often generate new social systems (Diederichs 2015). Innovation, diversity, and growth are all outcomes of cultural horizons, but the tradeoff is often a lack of efficiency alongside an increased potential for conflict. However, adaptive and linked social systems can be developed at different scales so that conservative behavior on one scale can provide parameters and support for diversity and experimentation at another scale (Holling 2002). Layered social institutions adopted during the Basketmaker III period, such as those represented by oversized pithouses, great kivas, and sipapus, may have been fundamental to the success of an expanding agricultural cultural horizon. It has been argued that new architectural forms during a similar Neolithic expansion in Europe served to "socialize" newly colonized territories (Thomas 2001:177). With the Basketmaker Communities Project, we found that architecture and pottery practices connected the Indian Camp Ranch community to pan-regional, settlement, lineage, and household social systems. These shared and layered social institutions likely reflect the foundations of ancestral Pueblo culture, and their adoption signals the emergence of a cohesive regional identity, or ethnogenesis.

Basketmaker III Community Structure and Social Organization

> <u>Can Basketmaker III community(ies) be delineated in the Indian Camp Ranch settlement?</u>

The Basketmaker III settlement on Indian Camp Ranch can be delineated as a cohesive community through a multi-scalar assessment of social organization and communities of practice. More standard settlement distribution studies, such as nearest-neighbor analysis, fail to capture the community's structure beyond the household level. This is because the Indian Camp Ranch settlement follows a pervasive Basketmaker III pattern where small, isolated households are distributed almost evenly across arable lands. Applying cluster analysis to the settlement results in either a community retracted to just the Dillard site and adjacent habitations or a community so expansive and evenly dispersed as to have no boundaries. This dispersed distribution is likely due to subsistence practices and does not fully reflect the social, economic, and cultural ties within the settlement.

To capture the cultural dynamics in the Indian Camp Ranch settlement, we adopted a broader definition of community based on Mac Sweeney's work in Anatolia, Turkey (Sweeney 2012). This approach conceives community as a social identity that is rationalized, created, maintained, manifested, and reformed over time by the people who identify with it. Though individuals may identify with multiple communities, any community identity is more salient in particular social, historical, and physical contexts. Therefore, communities become visible in the archaeological record in the form of contextualized coordinated social behavior.

Ethnographic resources indicate that landscape parameters were historically important to defining concrete communities in the Pueblo world (Fowles 2013; Ortiz 1969); viewsheds, landmarks, canyons, and water sources were often incorporated into a settlement's sense of place and community boundaries. The Indian Camp Ranch Basketmaker III settlement had an extensive viewshed of the La Plata Mountains to the east, the Mesa Verde escarpment to the south, and the Montezuma Valley south to Shiprock, New Mexico. This viewshed places the community squarely in the cultural landscape of the central Mesa Verde area. Most of the population in this larger landscape would have been immigrants, just like the Indian Camp Ranch settlers. This landscape would have little historical context except for referencing distance source populations.

The viewshed might have been imbued with calendrical events important to the agricultural lifeways of Basketmaker III people. One noted phenomenon might explain the location of the Dillard great kiva. The Dillard site has a clear view of the eastern horizon, and on the spring and fall equinox the sun rises over Burnt Mountain, a distant landform in the Durango area, between the La Plata Mountains to the north and the Mesa Verde escarpment to the south (Figure 25.1). This alignment indicates that the location of the Dillard site provided precise calendrical information regarding seasonal changes important to spring planting and fall harvest. More proximal landmarks are the canyons that bound the Indian Camp Ranch study area landform: Alkali Canyon and a deep tributary of Alkali Canyon to the north and west, Crow Canyon to the east, and McElmo Creek and the bedrock shelves exposed around the canyon to the south. These canyon systems encircle 2,000 acres of uplands with high agricultural potential. This area measures 1.3 km east–west, a distance that corresponds with daily face-to-face community interaction distances developed from community cluster analysis of later ancestral Pueblo settlements (Coffey 2014). Lithic and pottery resource and production studies suggest that all households in the study area used the same material sources accessible in and along the edges of this landform, indicating that the entire Indian Camp Ranch settlement participated in a single local resource community of practice.

The presence of a great kiva is the most compelling evidence that the Indian Camp Ranch settlement conceived of itself as a community. The Dillard site great kiva was built as an integrative public space. When first constructed, the great kiva had the capacity to hold the entire population of the Indian Camp Ranch settlement. By the end of the Basketmaker III era, only about a third of the population would have been able to enter the kiva at the same time. Nevertheless, segments of the larger population would have participated in regular ritual inside the structure during this period, and there is evidence that community-scale feasting took place in and around the great kiva during remodeling events and the structure's final closure.

Based on Basketmaker Communities Project findings, the Basketmaker III population in the study area identified with nested communities visible at multiple scales. The settlement signaled their participation in the larger central Mesa Verde Basketmaker III agricultural community through visual landmarks. Their daily interaction community included the farming uplands of the study area and local resources in the bounding canyon systems, which they collectively shared and managed. All, or portions, of the settlement participated in integrative gatherings at the great kiva, further solidifying their identification on the local community scale.

<u>Was Basketmaker III society in the central Mesa Verde already organized around sodalities and if so, what were their functions?</u>
<u>AND</u>

Do assemblages from community structures indicate that they functioned to integrate households across a large or small region?

Social dynamics were in flux in the central Mesa Verde region during the Basketmaker III period. These dynamics are related as much to population growth, subsistence adaptations, hereditary land tenure dynamics, and changing economic foundations as they are to community development through ritual sodalities. However, a consistent thread of non-kin ritual practice in the Dillard great kiva is discernable throughout most of the Basketmaker III occupation of the Indian Camp Ranch study area, and it is this thread that demonstrates the presence and function of sodalities during this tumultuous period.

The Dillard site great kiva (Structure 102) was the focal point of the Indian Camp Ranch community for over a century (A.D. 620 to 725). The structure required a supra-household amount of labor at several junctures: when it was initially constructed, during at least two massive remodeling events, and during its eventual decommissioning. Visitors to the site were likely housed in seasonal pit structures for these events and other gatherings in the great kiva. Each iteration of the building emphasized ritual features and enough floor space for large gatherings of up to 70 people. A high percentage of serving vessels in the great kiva roof material suggests that a feast was associated with its construction. A second feast is evidenced by broken serving vessels scattered across the floor of the great kiva before the structure was burned and collapsed.

The episodic gatherings of people for construction, maintenance, and communal ritual in the great kiva was likely organized and carried out by non-kinship groups or sodalities. Participation in these groups is likely reflected in sipapu symbolism. For about 70 years in the mid-seventh century, the great kiva floor was dominated by a combination of roofed floor vaults, paired sipapus, and rock-lined pits coated with colorful clays. This ritual intensity was matched in some of the surrounding habitation structures. All pithouses occupied during this time included some type of sipapu, but the complexity of ritual floor features varied from single and double simple sipapus to roofed vaults and vaults with internal sipapus, all of which were filled with clean sand or other distinctive sediment. Importantly, the complexity of household ritual features does not track with the size or occupation duration of the associated pithouse. This suggests that individuals from across the community were more invested in sipapu symbolism, and it is these individuals who likely participated in sodalities associated with the great kiva's function.

These sodalities focused on sipapus and the great kiva may have emphasized a collective origin story, further integrating the community. Sipapus are still incorporated today into the plazas and communal structures of Pueblo villages as physical manifestations of the emergence narrative. This origin story is central to several Southwestern Pueblo tribes (Ortman 2012) including the Hopi (Hays-Gilpin and Schaafsma 2010; Wilshusen 1989), Zuni (Ferguson 2008), and Rio Grande Pueblos (Fowles 2013; Ortman 2011a). Based on the consistent presence of sipapu features in sites dating back to the Basketmaker III period, the emergence story may have played a central role in ancestral Pueblo culture as early as the sixth century A.D. (Wilshusen 1989, 1999).

By the late phase of the Basketmaker III period the population of the Indian Camp Ranch settlement had increased dramatically. This expanded population would have no longer fit together inside the great kiva for group ritual, but this does not mean that the great kiva no longer functioned as an integrative structure. The addition of the sand floor in the late seventh century may have actually served as a metaphorical device, converting the great kiva from a communal structure centered on complex sipapus into the community's collective sipapu.

During the late Basketmaker III phase, sodality activity within the great kiva would have been instilled with further import and, for the first time, undertaken by a small segment of the community. Alluvial sand was brought in small batches, likely over an extended period of time, from various sources. The act of depositing the sand was accompanied by the burning of clumps of sagebrush on the sand floor. The inflated presence of maize, Cheno-am, beeweed, cattail, and large grass pollens throughout the sand layer suggests that these plants were brought into the great kiva while in bloom, possibly for ritual purposes. The select few with access to the great kiva during this phase engaged in a near-constant practice of fine lithic reduction, evidenced by tens of thousands of pieces of micro-debitage deposited in the sand layer. Such stone tool production is generally relegated to men in American Indian cultures. The intensity of this activity in the great kiva suggests that sodality activities within the structure were male dominated, at least by the end of the structure's use life.

<u>Are the identified communities organized under a Big Man, Permanent, or Episodic Model?</u>

At the outset of the Basketmaker Communities Project, three empirical models for social organization were proposed: the Episodic Model, the Big Man Model, and the Permanent Model. These models were proposed with the understanding that farming societies shifted from dispersed kinship groups that participated in interband seasonal ceremonies on an episodic basis in the late Archaic and Basketmaker II periods (2000 B.C. to A.D. 500) to large villages organized around community leaders with both hereditary authority and exclusive positions in ritual sodalities in the Pueblo I period (A.D. 750–900). To test the intervening Basketmaker III period social organization using these models, specific data were targeted in categories including public architecture, housing, storage capacity, ritual elaboration, wealth disparities, and feasting. The Basketmaker Communities Project results demonstrate that Basketmaker III society in the central Mesa Verde region was indeed in a state of social transformation set in motion by the adoption of a Neolithic economy. The demographic influx into the region likely spurred these institutional innovations.

During the mid-Basketmaker III phase, which spans about three generations (A.D. 600 to 660), the Indian Ranch community appears to have been organized around episodic integrative ritual with few displays of hereditary power (Table 25.1). The population was small at this time; we infer 17 households, and about half of the settlement, were concentrated at the Dillard site. As discussed above, the amount of labor invested in the great kiva construction and the occupation capacity of the building suggests that it served to integrate the entire dispersed community and not just the inhabitants of the Dillard site. Dispersed households visiting the Dillard site likely resided in temporary pithouses without sipapus for gatherings in the summer and/or fall seasons. Only permanent year-round households incorporated sipapu features into their floors. These ritual features varied in elaboration regardless of pithouse size or proximity to the great kiva. Ritual fauna, in the form of a dog burial, was only found in one year-round pithouse. The habitations of this period were short-lived, not lasting more than a single generation, which approximates the length of time a plot can be continuously farmed in the study area without declining in productivity. Though the fenced "neighborhoods" at the Dillard site suggest some level of hereditary grouping, none of the pithouses were exceedingly large or associated with disparate levels of wealth. The small amount of surplus storage at the Dillard site was collectively shared between clustered households.

The episodic nature of the Indian Camp Ranch community during the initial colonization of the study area reflects a two-thousand-year-old late Archaic/Basketmaker II social structure. This long-standing tradition emphasizes social and economic leveling in order to integrate larger, more nomadic populations. Of course, the leveling and integration in the Indian Camp Ranch settlement took place in a colonized agricultural context. This strategy would likely have attracted new immigrants to the community, rather than pushing them away through displays of resource competition. Growth was likely essential to the community's success; agricultural risk could be better mitigated through resource pooling of many, rather than a few, farmsteads. The emphasis on private and communal ritual during the period likely supported the integration of households into the new community and designated specific ritual responsibilities to individuals joining the settlement. The correlation between Basketmaker III ritual elaboration and colonization was confirmed by a regional study that demonstrated that sipapu features are more ubiquitous and complex in newly colonized territories, like the central Mesa Verde region, than in territories with lengthy settlement histories, such as the western Mesa Verde region (Diederichs 2016).

Is there evidence for community organization change over time?

The social structure of the Indian Camp Ranch community shifted over time, transitioning from a small community focused on integrative ritual with a leveled economy to a layered social organization that still emphasized integrative ritual but was economically dominated by a few wealthy lineages. This new social order retained episodic sodality activities associated with the great kiva, but the economic success of the community appears to have been consolidated into just a few households, a pattern associated with the Big Man Model (Table 25.2).

By the late Basketmaker III phase (A.D. 660-750) the Indian Camp Ranch community had grown in number to 95 households, or a momentary population of approximately 110 people. The great kiva was kept in use and continued to be a focal point for the community, but the Dillard site was no longer conceived of as a residence. In fact, something of a residential buffer developed around the great kiva, and the locale was used almost exclusively for male-dominated sodality activities (see above). Group feasting took place at the great kiva, at least in association with its final decommissioning.

During the late Basketmaker III phase, a view of the great kiva became important. Households living on the ridgetops east and west of the Dillard site accumulated a disproportionate amount of wealth. These families built oversized pithouses and surface roomblocks directly on top of habitations dating to the mid-Basketmaker III phase, emphasizing their unbroken occupation of these locales for as many as 10 generations. Like the great kiva, at least one of the oversized pithouses was remodeled several times, extending its use life to over 75 years. Along with an accumulation of trade goods, cooking vessels, weaving materials, and ritual fauna, the wealth of these households was displayed in large surface roomblocks that could hold many times the amount of corn needed to feed an extended family.

Great kiva sodalities and powerful lineages represent parallel, and possibly symbiotic, late Basketmaker III social institutions in the Indian Camp Ranch community. Eventually these institutions, and the ritual and economic powers associated with them, would be consolidated during the Pueblo I period under individual village leaders. The parallel institutions visible in the late Basketmaker III community at Indian Camp Ranch is a rare glimpse of Pueblo society before that later institutional integration.

It is worth considering how these sodality and lineage institutions may reflect gender relations during a Neolithic transition. There is a growing consensus that women found themselves at the center of household dynamics. As Wilshusen and Perry point out, the early agricultural period was the "juncture in ancestral Puebloan history when a woman's economic, social, and domestic priorities changed forever" (Wilshusen and Perry 2008:188). Osteological data in the Southwest and globally show that women had twice as many children during the Neolithic Demographic Transition, like the one documented in the Indian Camp Ranch settlement, leading to a more sedentary lifestyle tied to the domestic sphere (Bocquet-Appel, J.-P., and O. Bar-Yosef 2008). Ethnographic resources and osteological evidence indicate that during the Basketmaker III period, women likely played a central role in farming, food preparation, and pottery production while caring for more children closer to home (Crown 2000). Wills and colleagues (2012) and Hays-Gilpin (2004) argue that this economic intensification on the part of women resulted in matrilineal household property rights and matrilocal practices.

With the Basketmaker III household sphere dominated by women, community-scale projects, and communal structures might have been the realm of men. Several researchers have argued that male leaders reacted to increased matrilocal power in early ancestral Pueblo society by increasing their control of public ritual knowledge and practice (Hays-Gilpin 2004; Kantner 2012; Ware 2014; Wilshusen and Perry 2008; Wilshusen et al. 2012). The sodalities operating in the Indian Camp Ranch settlement were certainly structured around community-scale labor projects and gatherings at the great kiva. These activities may have increasingly fallen to men in response to the growing control of the household economy and possibly land tenure by women. If the powerful lineages in the Indian Camp Ranch settlement, centered on wealth accumulation at oversized pithouses, were matrilineal and matrilocal, then we must reconceive of them as representing a Big Woman, rather than a Big Man, social institution. Together, great kiva sodalities coupled with powerful lineages likely supported and structured the domestic economy in the Indian Camp Ranch settlement during the late Basketmaker III phase.

<u>Are community structures contemporary with the surrounding households?</u>

Yes, the great kiva was built in conjunction with the surrounding habitations at the Dillard site in the early seventh century A.D. The kiva was kept in use for about a century, about the duration of the community. After the Dillard site occupants moved away, the larger community continued to invest in the structure's upkeep and use for another 30 to 40 years.

Do additional as-yet-unidentified community structures exist in the study area?

The only structure in proximity to the Dillard great kiva during the late Basketmaker III phase was a large shallow double-chambered pithouse (Structure 312-324). Despite its large footprint, the shallow profile of the building indicates that it was not a permanent habitation and was best utilized temporarily in warmer weather. Storage, cooking, and faunal remains in the structure point to food preparation and feasting. This structure may have served as a sodality preparation house (Ware 2014) supporting activities inside the great kiva.

How were community structures decommissioned, and does the mode of closure match that of contemporary domestic structures?

Architectural closing practices were closely tied to structure function in the Indian Camp Ranch settlement. Storage structures were not formally closed and were generally left to collapse in place. Habitation structures and the great kiva were formally closed with the more elaborate processes applied to the longest-lived structures.

The Dillard great kiva experienced the most complex closing process, which was executed in many stages. Two large painted bowls and two gray ware jars were coated with fugitive red pigment, smashed into fragments, and scattered across the final sand floor along with lithic tools, stone beads, and three projectile points. In the next stage, the adobe lining was dismantled, and a basalt slab, additional lithic tools, a few pieces of pottery, and curated late Archaic projectile points were left on this surface. The great kiva was then filled with small-diameter saltbrush and wood and set on fire, which compromised and collapsed the superstructure.

Habitation structures were closed with less formality and some variation. Sand or other clean sediment was generally deposited in features, and in some cases on the floor. Nearly all habitation structures were burned; the exceptions include two probable temporary habitations in the southern portion of the Dillard site. Households had a high degree of latitude when it came to the artifacts they left behind. Many pithouses were completely cleaned out, and in some case, even the fill was removed from the hearth and/or floor features. When artifacts were left behind, they generally consisted of scattered refuse. In a few structures, artifact assemblages were intentionally placed and organized on the floor. Animal burials were placed on two pithouse floors. The oversized pithouse at the Ridgeline site is the only structure to have been kept standing for an extended period after the inhabitants moved out. A 0.5-m-tall mound of refuse accumulated on the floor below the roof hatch of the main chamber before the pithouse was eventually burned.

Structure burning intensity increased from minimal scorching to intense conflagrations over the course of the settlement's history. This change marks the crystallization of a long-standing ancestral Pueblo tradition (Adams and Fladd 2014). This decommissioning tradition would have formally ended a structure's use life, but many of the buildings in the Indian Camp Ranch settlement seem to have lived on in the social memory of the community. These memories were commemorated by burying the dead in the depressions of some collapsed pithouses and with bone, pottery, stone tools, and small shrine deposits in the great kiva depression.

Basketmaker III and the Neolithic Demographic Transition

Is there evidence of a Neolithic Demographic Transition in the central Mesa Verde region during the seventh century?

There is evidence for a Neolithic Demographic Transition in the central Mesa Verde region based on the Basketmaker Communities Project. Population rose exponentially in the study area during the late Basketmaker III phase to an estimated 95 households (85 percent of all Basketmaker III households in the study area) and a momentary population of 22 households, or approximately 110 people, at any given time. These estimates indicate that the small initial population roughly quadrupled between the middle and late Basketmaker III phases, with an implied growth rate of about 8 percent per year.

Researchers have suggested that rapid increase in regional populations between A.D. 600 and 800 was due, at least in part, to robust intrinsic growth calculated from age-at-death distributions of human skeletal samples; specifically, the fraction of individuals at least five years old who died before age 20, often referred to as the juvenility index (Kohler and Reese 2014; Kohler et al. 2008; Wilshusen and Perry 2008). While robust intrinsic population growth is likely in the Indian Camp settlement, it does not fully explain the 8-percent per-year growth rate. We estimated the maximum intrinsic growth rate for the initial mid-Basketmaker III population by combining the juvenility index for the early Pueblo northern San Juan (Kohler and Reese 2014:Table S2) with life table information (Bocquet-Appel 2002:Table 2). The resulting estimate is just 1 percent per year. Even if only one-quarter of settlements were inhabited at any given moment, in-migration must also have contributed to the dramatic rise of population during the late Basketmaker III occupation.

If so, what technological advances made this transition possible?

The Neolithic Demographic Transition in the central Mesa Verde region was likely supported by several improvements in agriculture including the introduction of starchy maize varieties (Kohler and Glaude 2008:97), the adoption of beans, and the development of true cooking pottery to boil beans (Ortman 2006:102–103). The adoption of this full agricultural package resulted in a complete vegetable protein mix within a purely agricultural diet (Ortman et. al 2016:234). This agricultural package was fully evident at Basketmaker III period sites tested during the Basketmaker Communities Project. Gray ware cooking pottery was ubiquitous at all habitations as were the remains and pollen of maize. Beans (*Phaseolus vulgaris*) were also farmed in the settlement based on cotyledon (seed half) remains in the pithouse hearth at Portulaca Point (5MT10709).

Of course, all elements of this subsistence package were in use and available to various farming populations across the Colorado Plateau for one or several centuries before the seventh century A.D. population expansion. Greubel and colleagues (Greubel 2018; Greubel et al. 2015) dated starchy maize from Tabeguache Cave on the northern edge of the central Mesa Verde region to

345 B.C. to A.D. 70. Domesticated beans (sp. *Phaseolus vulgaris* L.) and bean strings from Atlatl Rock Cave, Sand Dune, and Dust Devil caves in southeast Utah date as early as the mid-A.D. 400s (Cutler and Whitaker 1961; Geib 2011), and recent studies demonstrate that these farmers boiled beans in hide bags with hot limestone without the benefit of gray ware pottery (Ellwood et al. 2016). These findings suggest that the timing, scale, and contribution of this starchy maize-beans-cooking-pottery package may not have been as convergent with the demographic expansion in the central Mesa Verde region as previously thought.

There is technological evidence in artifacts of the Neolithic Demographic Transition in the Indian Camp Ranch community during the Basketmaker III period, especially in ground stone, chipped stone, and pottery technology (see Chapter 24). Grinding surface area on manos may be an indicator of similarities or differences in agricultural dependency among communities in different geographical areas through time. The Basketmaker Communities Project mano surface areas increase over time, demonstrating intensification of domesticated plant use, with similarities to Pueblo II and III patterns at Rainbow and Shonto Plateaus (Geib 2011). The ratio of bifaces to cores indicates relative population mobility (Parry and Kelly 1987), and ratios from the Basketmaker Communities Project area suggest more sedentary populations than earlier ratios (see Chapter 24). Smaller projectile points, which become more common in the Basketmaker Communities Project area during the middle and late Basketmaker III phases, suggest an increasing focus on garden hunting of small mammals (see Chapter 24).

More important to the Southwestern Neolithic Demographic Transition may have been innovations in the economic structure of ancestral Pueblo society that shifted from the band to household level. Basketmaker III immigrants into the central Mesa Verde region came from culture groups with deep maize farming traditions (Matson 2006). The agricultural economy of these earlier societies was based in semi-sedentary band-level organization (Charles and Cole 2006; Geib 2011; Pollock 2001). While demographics shifted on a small scale over the course of the previous Basketmaker II period, population territories were surprisingly stable for nearly a thousand years (Charles and Cole 2006; Kearns 2007; Kohler and Reese 2014: Mower 2003; Murrell and Vierra 2014; Silva 2015).

These territories dissolved in the fifth century A.D. leading to dramatic demographic shifts across the northern Colorado Plateau (Allison et al. 2012; Charles and Cole 2006; Diederichs 2016; Hayes: 1964; Herr 2009; Hurst 1992; Lipe 1999; Kantner 2012; Robins 1997; Smiley 1994; Windes 2015; Young and Herr 2012). These pan-regional shifts correspond with a hundred-year-long cold dry drought in the fifth and sixth century A.D. (Kohler and Reese 2014; Peterson 1988; Wills et al. 2012). Based on demographic studies (Chuipka et al. 2010; Geib 2011; Windes 2015), previously stable agricultural societies collapsed under the pressure, and surviving groups retreated to permanent river corridors. Perhaps this moment can be seen as the adaptation threshold for band-level organization in agricultural societies on the Colorado Plateau. By the mid-sixth century A.D. agricultural populations across the northern Colorado Plateau were moving in small household groups, asserting new autonomy to migrate and join communities beyond their traditional territories (Ortman et al. 2011; Wills 2001).

Settlement patterns on Indian Camp Ranch reflect this evolution toward a household-based economy. In the early seventh century, homesteaders founded the Dillard site in two household clusters with shared property. The clusters, north and south of the great kiva, each comprised four permanent households around small courtyards encircled by a perimeter fence. Five to six small storage structures were interspersed among habitations in each cluster but were not directly associated with any particular habitation. Clearly, property was shared among households in each cluster but not beyond, suggesting that these extended household groups saw themselves as economic units.

By the end of the seventh century, it is clear that agricultural wealth had increased for everyone in the Indian Camp Ranch settlement and that individual households had become primary economic units. Most households lived in dispersed single-family hamlets with directly associated storage roomblocks of at least four rooms. Hamlets were delineated by distance and in some cases perimeter fences from other households. We considered the role of private property in this intensification by examining the extramural storage capacities across 84 late Basketmaker III phase households (Ortman et al. 2016). The overall distribution was approximately log-normal indicating that the local economy in the late phase was characterized by secure private property rights in the ownership of agricultural produce and an increase in wealth disparity. In fact, the Gini coefficient for these data is 0.703, a very high value that indicates substantial concentration of storage capacity in relatively few households (Smith et al. 2014).

Oversized pithouses built after A.D. 660 in the study area are clear examples of this wealth disparity. Surface analysis, geophysical imaging, and testing confirmed that the oversized pithouses on the ridgetops directly east (Windrow Ruin) and west (the Ridgeline site and Switchback sites) of the Dillard site were occupied for multiple generations by wealthier households with access to specialized materials and products. These oversized pithouses are up to eight times larger than standard pithouses found across the rest of the Indian Camp Ranch settlement and have ten times the amount of food storage necessary to feed a single extended family (Sommer 2017).

The Basketmaker Communities Project results are consistent with a shift to a domestic mode of production spurred by economic success, population growth, and in-migration over the course of the Basketmaker III period. It has been argued that the concept of private property must have co-evolved with agriculture (Bowles and Choi 2013; Testart et al. 1982). The evolution of that process is visible in the shift toward autonomous household economies in the Indian Camp Ranch settlement.

The development of a household-based economy required the creation of overarching social institutions to mitigate individual household risk and intra-household competition, especially in a settlement like the Indian Camp Ranch study area that had a continuous influx of immigrants and increasing wealth disparity. Institutions with authority over land tenure likely dictated the locations of hamlet sites in the study area, which are statistically evenly dispersed, even gridded, across good farming soils (Diederichs 2016; Schwindt et al. 2016). This follows a similar distribution pattern found across the larger Village Ecodynamics Project study area where Basketmaker III households are significantly more evenly dispersed than randomly simulated households (Fadem and Diederichs 2019; Kohler 2012). The ability to distribute settlements in such a pattern and adhere to this practice across multiple generations is evidence of land tenure mores operating in the Indian Camp Ranch community and social institutions with authority to enforce those mores.

Anthropogenic Legacy

Is there evidence for environmental change related to land-use patterns of the Basketmaker III period?

Basketmaker III land-use practices appear to have impacted farming soils and vegetation in the study area. Impacts to both would have resulted from vegetation clearing for agricultural fields and gardens, from harvesting beams for building construction and wood for fuel, and from the presence of residents using the landscape during much, if not all, of the calendar year.

Animal resources were not notably impacted over the course of the Basketmaker III period, but the plant environment was altered. The relatively high ubiquities of Cheno-ams and other weedy plant seeds and pollen and the abundance of maize cob remains inside structures indicate that the population farmed fields directly adjacent to their homesteads. These areas would have generally been cleared of vegetation and trees and impacted by foot traffic.

A geomorphological analysis of soils on accessible farm soils on or around Basketmaker III period habitations found a pattern of mineral accumulation in soil B horizons. Dryland farming, as was practiced by ancestral Pueblo populations, likely increased soil hardening in the Mesa Verde loess deposits of the study area through increased evapotranspiration rates. This would have physically impacted agricultural sustainability over time by limiting root growth and the movement of water through the soil. As a result, pedogenic mineral accumulation and water stress, rather than nutrient depletion, appear to have been the limiting factors for dryland agriculture in the study area. Further, mineral deposits have accumulated into a hard-pan layer in Mesa Verde loess sediments, and the only remediation is water saturation to dissolve the mineral layer or physically busting through the layer. Without modern irrigation or mechanized equipment at their disposal, Basketmaker III and later ancestral Pueblo populations would have had no way to mitigate decreasing productivity in their fields except to move their plots to unfarmed soils.

How large was the initial A.D. 600s immigration into the central Mesa Verde region and how did this impact the environment?

Homesteading of the study area began in earnest during the mid-Basketmaker III phase (A.D. 600–660). During this phase, the population was concentrated at a single site (Dillard site). We infer that 17 households moved into the area during this time, representing a momentary population of 25 to 50 people. The Dillard site itself was occupied for three generations. Initially, the colonizers may not have been familiar with the factors limiting dryland agriculture in Mesa Verde loess soils and may have intensively farmed level areas on the adjacent ridgetop. Productivity was high and resulted in a 66.4-percent ubiquity of maize fragments in flotation samples and high pollen concentrations of key subsistence taxa. There is a chance that intensive farming contributed to hard-pan development in soils across the Dillard ridgetop to such a degree that farming productivity fell below acceptable levels. Within three generations all residents moved away from the Dillard site, and the ridgetop was never again occupied by ancestral Pueblo peoples.

How did the momentary population of the Indian Camp Ranch Basketmaker III settlement change through time, and is there evidence for this change being linked to environmental degradation?

Regardless of the possible farming failure at the Dillard site in the mid-Basketmaker III phase, the population of the settlement continued to grow in the late Basketmaker III phase to a momentary population of 22 households, or approximately 110 individuals. These estimates indicate that the small initial population roughly quadrupled between the middle and late Basketmaker III phases, with an implied growth rate of about 8 percent per year. This influx was accompanied by changes in settlement, subsistence, and resource procurement.

In the late Basketmaker III phase, the ubiquity of maize fragments in flotation samples declined to 50.6-percent ubiquity. Maize pollen ubiquity also dropped along with the pollen signatures of other cultivated plants. However, cheno-am seed ubiquity, a sign of disturbed soils, declined very little during the late phase, and evidence of wild food plants actually increased. Recent studies (Kearns 2007:2.37–2.43; Kohler and Reed 2011:155) confirm that the climate was conducive (warm and wet) to farming throughout the Basketmaker III period, so the decline in cultivated foods and the rise of weedy plants and wild foods is likely the result of human impacts. These trends suggest that the population doubled down on their investment in maize farming during the late Basketmaker III phase but had to also increase wild plant gathering to counter lowered agricultural productivity. Access to construction and fuelwoods remained fairly constant throughout the Basketmaker III period.

Settlement strategies in the study area appear to have evolved in response to declining productivity associated with soil induration. By the late seventh century the Indian Camp Ranch settlement was dispersed into small, short-lived hamlets across the low-lying mesas with deep eolian soils. A nearest-neighbor analysis of this settlement determined that there is a <1-percent chance these hamlets were randomly situated; instead, hamlets were spaced regularly with 10-acre buffers between them (Fetterman et al. 2014). This distribution parallels patterns found in larger studies across the region in which Basketmaker III households are more evenly dispersed than randomly simulated households (Kohler 2012). The pivotal shift in Basketmaker III settlement—from clustered to systematically dispersed—suggests that Basketmaker III farmers adapted to factors limiting agricultural productivity. Recent experimental farming at Crow Canyon determined that ancestral Pueblo populations likely required 4.7 acres of maize fields per adult or a total of about 7.7 acres to meet the annual needs of a household for one year, and much more to create a several-year stockpile against future yield instability (Ermigiotti et al. 2018). Based on this model, the systematic 10-acre buffer between Basketmaker III hamlet sites would produce a farming strategy allowing each household enough farmable acreage for up to 15 years of adequate maize supply. After that time, a household would need to move their homestead to new territory, clearing a new farm field in the process.

Of course, some locales in the study area (Ridgeline site and Windrow Ruin) were occupied by successful lineages for multiple generations. Fadem and Diederichs (2019) suggest that this occupation longevity could have been sustained if the population did not exacerbate hard-pan development with field clearing but reduced their agricultural impact through agroforestry (agriculture incorporating the conservation of trees). As the Basketmaker Communities Project geomorphology results suggest, farm plots scattered across small openings in old-growth pinyon and juniper woodland would not induce mineral induration and would therefore never see the reduced productivity experienced in cleared farm fields. Further investigation of this hypothesis could be productive in understanding ancestral Pueblo farming adaptations.

Is there evidence for environmental change related to land-use patterns of the Basketmaker III–Pueblo II periods?

Very little information on either settlement or land-use patterns for the Pueblo II period was captured during the Basketmaker Communities Project. Therefore, this research question can only be cursorily addressed at this time.

The Basketmaker II and Pueblo II settlement patterns differ in the study area. Though found in close proximity and on the same upland landforms, Pueblo II populations tended to avoid reoccupying Basketmaker III sites. This could be the result of lower agricultural productivity around Basketmaker III farmsteads due to intensive farming practices that exacerbated soil induration in the form of hard-pan development in the soil B horizons.

Farming productivity during the Pueblo II period in the study area appears to have been lower than in the Basketmaker III period. Pueblo II period flotation samples preserved even lower ubiquities of maize cob/cupule parts, not exceeding 26.7 percent, and lower maize pollen percentages. However, these signatures could also reflect some technology difference in how harvests were handled and processed.

Pine wood was scarce during the Pueblo II occupation of the study area. The inhabitants focused instead on sagebrush shrubs. It is reasonable to assume that nearly four hundred years of gathering wood for fuel, construction timbers, tools, and other daily needs may have reduced the number of trees available to these later Pueblo groups. The fact that sagebrush (*Artemisia*) wood and twigs ranked second in use by Pueblo II and early Pueblo III people suggests a somewhat open landscape with shrubs, rather than a dense juniper/pine woodland. This environmental change likely contributed to the lack of large game animals in the Pueblo II assemblage.

Conclusion

The Basketmaker Communities Project produced important information about the initial transition to farming in the northern Southwest. The project contributes to future Basketmaker III–era studies with a new method for dating occupations based on surface pottery assemblages. Results from the project confirmed rapid migration into the central Mesa Verde region in the seventh century A.D. along with intrinsic population growth reflecting a Neolithic Demographic Transition produced by the transition to a domestic economy and the adoption of private property.

The colonization was multi-ethnic, with migrants arriving with traditions, skills, and materials from across and south of the Colorado Plateau. Even the initial homesteaders of the Dillard site likely hailed from both the northern Chuska Valley and the canyons of northeast Arizona and southeast Utah. Despite their differences, the settlers formed a dispersed but cohesive community centered on episodic communal ritual and sodality activities at a great kiva, a form of public architecture that originated in the Mogollon culture area.

The Basketmaker Communities Project findings suggest that Basketmaker III society was organized around household ritual, great kiva sodalities, and (eventually) hereditary lineages. These parallel social institutions may reflect domestic intensification by women and the inverse control of public ritual knowledge and practice by men, a common dichotomy in sedentary agricultural societies. The combination of these social institutions appears to have been effective at creating a stable community with increased agricultural productivity.

There are signs that the initial immigrants into the region were not familiar with dryland farming in loess soils, which are quickly indurated with minerals when intensively farmed. Within just a few generations, a dispersed land tenure practice was instituted to extend the productivity of farming plots. Despite these efforts, Basketmaker III farming practices may have lowered field productivity; maize crop ubiquity dropped at the end of the Basketmaker III period, and later ancestral Pueblo populations generally avoided living and farming on Basketmaker III habitation sites.

In summary, the Basketmaker Communities Project provides the first cohesive picture of the people and influences in the central Mesa Verde region contributing to the cultural horizon known as the Basketmaker III period. This project provides a foundation for future studies that could refine our understanding of this pivotal moment in Pueblo history.

Figure 25.1. Photograph of the eastern horizon from the Dillard site on the spring equinox annotated with landmarks highlighted at sunrise over the course of the year.

Table 25.1. Archaeological Patterns for the Episodic Model of Community Organization Documented during the Basketmaker Communities Project for the Mid-Basketmaker III Phase Occupation of the Indian Camp Ranch Settlement.

Attribute	Episodic Model*
Location of Great Kiva	Geographically central, good view shed
Ritual Elaboration of Pithouses	Independent of floor areas
Pithouse Size	Independent of distance from great kiva
Distribution of Pithouse Ritual Features	Independent of distance from great kiva
Surplus Storage	**Associated with larger pithouses** (associated with pithouse clusters)
Pithouse Occupation Span	Correlated with agricultural potential
Agricultural Potential of Surrounding Land	**Correlated with pithouse size, independent of ritual elaboration** (n/a: all uplands suitable for agriculture)
Serving Vessel Frequency and Size	Associated with great kiva
Cooking Pot Size	Independent of pithouse size
Trade Goods	**Correlated with pithouse size** (associated with great kiva)
Deer (Feasting) Remains	Associated with great kiva
Ritual Fauna	Associated with ritual elaboration in pithouses

* Bolded text = model expectation not met, text in parentheses = Basketmaker Communities Project pattern variation.

Table 25.2. Expected Archaeological Patterns for the Big Man Model of Community Organization Documented during the Basketmaker Communities Project for the Late Basketmaker III phase Occupation of the Indian Camp Ranch Settlement.

Attribute	Big Man Model*
Location of Great Kiva	Geographically central, good view shed
Ritual Elaboration of Pithouses	Correlated with floor areas (low variation)
Pithouse Size	**Independent of distance from great kiva** (oversized pithouses within site of the great kiva)
Distribution of Pithouse Ritual Features	Independent of distance from great kiva
Surplus Storage	Associated with larger pithouses
Pithouse Occupation Span	Correlated with floor area and agricultural potential
Agricultural Potential of Surrounding Land	**Correlated with pithouse size and elaboration** (n/a: all uplands suitable for agriculture)
Serving Vessel Frequency and Size	**Associated with larger pithouses** (continue to be associated with great kiva)
Cooking Pot Size	Correlated with pithouse size
Trade Goods	Correlated with pithouse size
Deer (Feasting) Remains	Associated with larger pithouses
Ritual Fauna	Associated with larger pithouses

* Bolded text = model expectation not met, text in parentheses = Basketmaker Communities Project pattern variation.

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