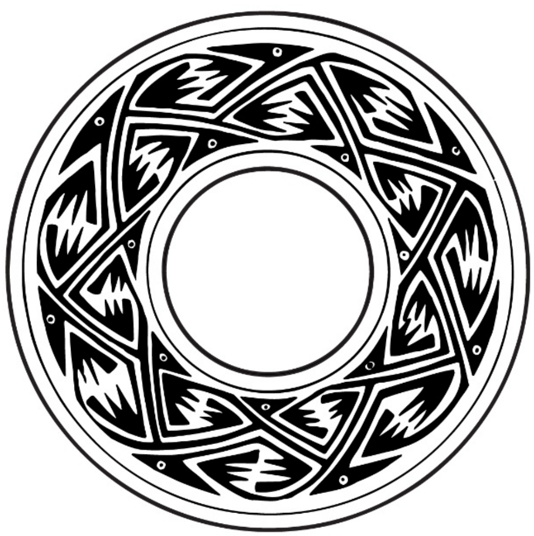
The Archaeology of Albert Porter Pueblo (Site 5MT123):
Excavations at a Great House Community Center in Southwestern Colorado

Edited by
Susan C. Ryan



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Albert Porter Pueblo is located on lands owned by The Archaeological Conservancy, which granted Crow Canyon permission to conduct fieldwork at the site. Special thanks are given to the Conservancy for allowing a large-scale research project to take place on their property and to Sharon and Stewart Porter for their continued support during this project. Thanks also to the Anasazi Heritage Center, the BLM museum and curation facility in Dolores, Colorado, for its support throughout the project—from providing conservation advice in the field and lab to permanently curating all the artifacts, samples, and records associated with Crow Canyon's excavations at the site. Deserving of special recognition are former Manager LouAnn Jacobson, former Museum Curator Susan Thomas, and former Supervisory Interpretive Specialist Victoria Atkins.

From the initial survey conducted by the University of Colorado in 1965 through the production of this report decades later, the study of Albert Porter Pueblo has been a team effort. The sustained support of Crow Canyon's Board of Trustees and the active involvement of the members of the Center's research committee have 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 and thought-provoking comments on the design and implementation of this project; as always, their perspectives enriched our own and made for a better report.

Virtually everyone who worked in Crow Canyon's research and education departments from 2001 through 2004 was involved in some aspect of the Albert Porter Pueblo research project, including excavations and lab work. From the beginning of the project, various researchers conducted special analyses, analyzed field and laboratory data, and prepared the collections for curation. Throughout, the Center was aided in its work by undergraduate and graduate student interns, helpers from the local community, and thousands of student and adult participants in the Center's excavation and laboratory programs. Diverse professional colleagues contributed their special skills and expertise to the analyses and interpretation of materials recovered from the site; some authored chapters in this report. It is impossible to individually recognize every staff member, intern, volunteer, participant, and colleague by name, but their individual and collective contributions to the success of the project cannot be overstated. They made this project possible.

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Chapter 1

Introduction

by Susan C. Ryan

Albert Porter Pueblo (Site 5MT123) is the site of an ancestral Pueblo village located in what is now southwestern Colorado near the modern town of Yellow Jacket (Figure 1.1). Most of the site—including the structural remains that are most clearly visible on the modern ground surface—is contained within an 11.66-acre (47,176 m^2 area) archaeological preserve owned by The Archaeological Conservancy (Figure 1.2). This parcel of land was donated to the Conservancy by members of the Porter family in 1988. Mr. Albert Porter, the site's namesake (Figure 1.3), owned and farmed the property for several decades before ownership was transferred to the Conservancy. Albert Porter Pueblo was nominated to the National Register of Historic Places as an example of a habitation site with public architecture (Lipe 1995) and was placed on the register in 1999.

The types of pottery found at the site suggest that ancestral Pueblo people inhabited the location at least as early as the Basketmaker III (A.D. 600–725) and Pueblo I (A.D. 725–920) periods. However, the site was most intensively occupied during the Pueblo II (A.D. 920–1140) and Pueblo III periods (A.D. 1140–1280). Evidence indicates that the site reached its maximum extent from approximately A.D. 1100 to A.D. 1250.

Albert Porter Pueblo was part of the Woods Canyon community. This community is named for Woods Canyon Pueblo (Churchill 2002), the site of a large village located approximately 1.8 km southwest of Albert Porter Pueblo. Three large village sites are associated with the Woods Canyon community (Figure 1.4): (1) Albert Porter Pueblo, (2) Bass Site complex (Site 5MT136)—located approximately 2.25 km to the west-southwest, and (3) Woods Canyon Pueblo (Site 5MT11842). A fourth site, Woods Canyon Reservoir (Site 5MT12086)—located approximately 1.00 km to the south—was constructed during the Pueblo II period and was presumably used by residents of the Woods Canyon community until the region was depopulated about A.D. 1280. Surface evidence at the Bass Site complex suggests that this settlement was contemporaneous with Albert Porter Pueblo. Pottery types, tree-ring dates, architectural styles, and site layout indicate that Woods Canyon Pueblo succeeded Albert Porter Pueblo as the center of the Woods Canyon community during the mid-to-late A.D. 1200s.

In 2000, The Archaeological Conservancy granted Crow Canyon Archaeological Center permission to conduct a two-year testing project at Albert Porter Pueblo. Testing began in 2001 and continued through 2002. After obtaining permission from the Conservancy, Crow Canyon conducted an additional two years of testing; excavation was completed at the end of the 2004 field season. All fieldwork was conducted under State of Colorado Archaeological Permits 2001-19, 2002-3, 2003-17, and 2004-12. Annual reports summarize each season of research at Albert Porter Pueblo (Ryan 2002, 2003, 2004, 2005). To date, the only professional excavations undertaken at this site have been conducted by the Crow Canyon Archaeological Center.

Research at Albert Porter Pueblo was guided by Crow Canyon's long-term research design, titled "Communities through Time: Cooperation, Conflict, and Migration" (Varien and Thompson 1996). This research design focuses on the development and depopulation of ancestral Pueblo communities in the central Mesa Verde region. The overarching goal of the Albert Porter Pueblo project was to reconstruct the historic development of the village and the associated community. The resulting reconstruction identifies multiple periods of occupation, documents population growth and decline through time, and addresses the emergence of the settlement as a community center. The presence of a Chaco period great house and a dense cluster of associated smaller habitations suggest that Albert Porter Pueblo served as a community center. Crow Canyon's research at Albert Porter Pueblo provides important new insights into the historical development, population dynamics, and human environmental impacts of ancestral Pueblo communities in the central Mesa Verde region.

Crow Canyon archaeologists, educators, interns, volunteers, and hundreds of program participants conducted archaeological research at this site. A total of 406 excavation pits were completed during the four-year project. During excavations, we defined 26 kivas, six pit structures, 28 rooms, 54 midden deposits, 50 areas of extramural surfaces, three miscellaneous cultural deposits, and 58 noncultural deposits (Crow Canyon Archaeological Center 2010). Overall, less than 1 percent of Albert Porter Pueblo was excavated during the project. Artifacts collected in the field were analyzed in Crow Canyon's laboratory; special analyses of artifacts and ecofacts were conducted upon completion of the fieldwork.

This report comprises two components—interpretive chapters and a companion database. Interpretive chapters summarize research conducted at Albert Porter Pueblo and provide interpretations of the material remains collected and analyzed from the site. The companion database contains specific information for each study unit identified through our excavations. All field and laboratory data collected during the project—including maps, photographs, stratigraphic descriptions, feature descriptions, masonry descriptions, and more—are available in the companion database (Crow Canyon Archaeological Center 2010). The user is encouraged to consult this database for detailed information on individual study units, excavation units, features, point-located artifacts, masonry, stratigraphy, structure construction, structure dating, artifacts, and human remains. The companion database also contains 158 maps and 1,738 color photographs—only a small fraction of which are referred to in the interpretive chapters.

In addition, the homepage of the Albert Porter Pueblo Database provides access to background information including a site overview, a history of investigations, site physiography, and field methods. Links to site-wide data including maps, photographs, tree-ring dates, dating arguments, and all excavation units are included as well. These two components of the Albert Porter Pueblo publication were designed to be used in tandem; however, the interpretive report and the database may also be used independently of each other.

Crow Canyon Archaeological Center electronic reports differ from traditional printed site reports in that the primary goal of the interpretive chapters is to provide interpretations and a synthesis of the data as opposed to presenting the data themselves. The Albert Porter Pueblo companion database is the repository for field and laboratory data. This unique electronic format provides several advantages over traditional printed site reports, including the capability to publish a large amount of field documentation and vast quantities of maps and color photographs. In keeping with Crow Canyon's mission, the electronic-report format allows the interpretive chapters and field and laboratory data to be accessible to professional archaeologists and the public alike. Furthermore, the acquisition and use of this information is free to all users who have access to the internet. We encourage users to develop and pursue additional research about Albert Porter Pueblo that has not been addressed within this interpretive report.

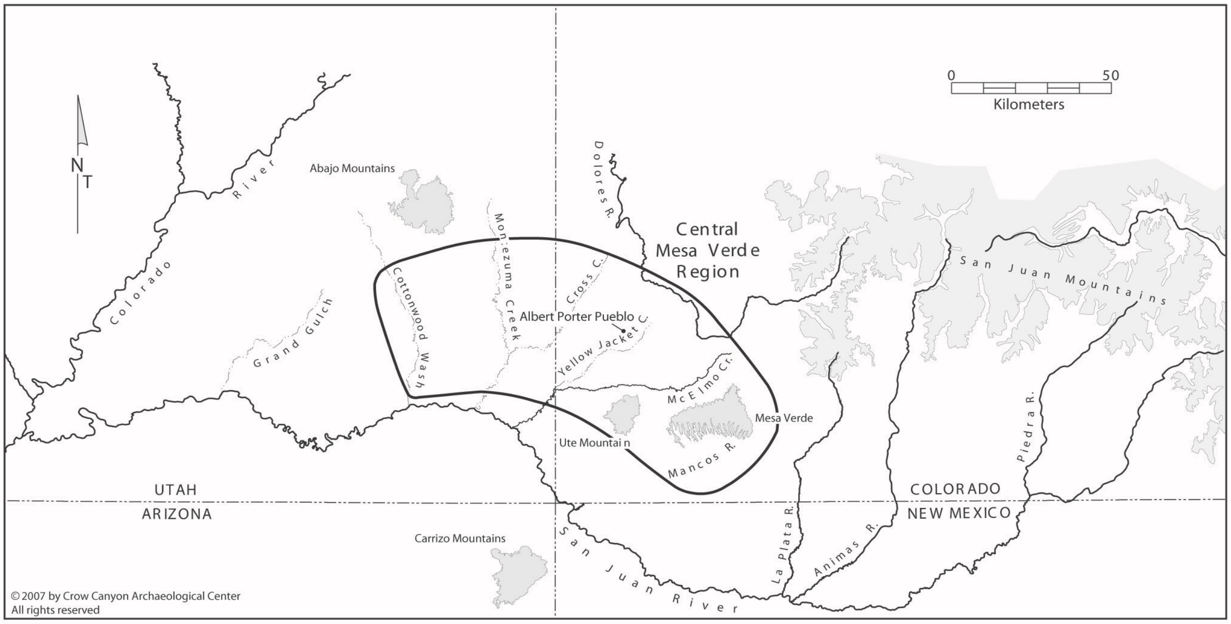

Figure 1.1. The location of Albert Porter Pueblo in the central Mesa Verde region.

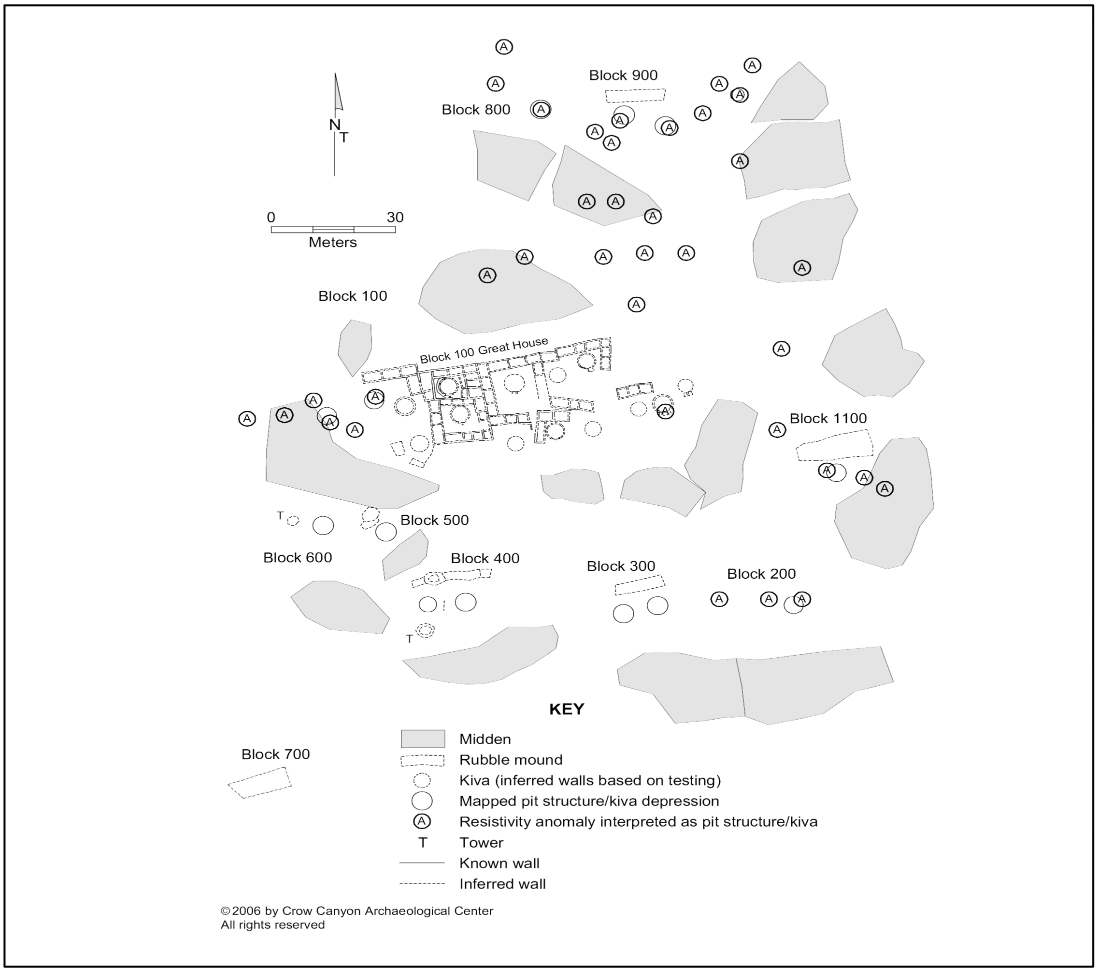

Figure 1.2. Major cultural units within the 11.6-acre parcel owned by The Archaeological Conservancy, Albert Porter Pueblo.

Figure 1.3. Albert Porter.

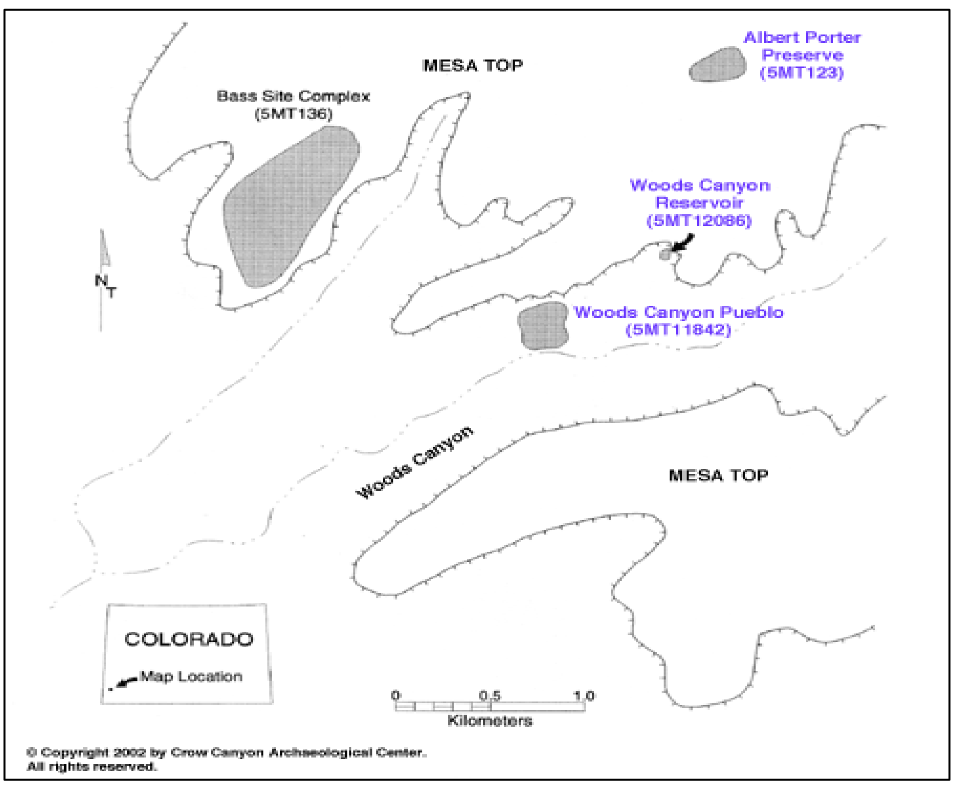

Figure 1.4. The locations of Albert Porter Pueblo, Woods Canyon Reservoir, Woods Canyon Pueblo, and the Bass Site complex in the Woods Canyon community.

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Chapter 2

Research Design and Objectives

by Susan C. Ryan

Introduction

Research at Albert Porter Pueblo was guided by two research strategies: Crow Canyon Archaeological Center's multi-year (1997–2004) research design titled "Communities Through Time: Cooperation, Conflict, and Migration," (Varien and Thompson 1996) and a proposal submitted to The Archaeological Conservancy titled "A Proposal to Conduct Archaeological Testing at the Albert Porter Preserve" (Varien 2000). The first research strategy addressed the development and depopulation of ancestral Pueblo communities in the central Mesa Verde region from A.D. 900 to1300. The latter research design focused specifically on Albert Porter Pueblo to address the issues outlined in the former research design. The goal of this chapter is to summarize the major research issues and strategies proposed in those documents and to outline the field strategies and sampling plan used at the site. The reader is encouraged to refer to the original documents (Varien 2000; Varien and Thompson 1996) for more-detailed information.

At Albert Porter Pueblo, site data were generated by testing each architectural block identified from remains visible on the modern ground surface (Figure 2.1). The overarching goal of the Albert Porter research was to reconstruct the historic development of Albert Porter Pueblo and the associated community. Community centers in the central Mesa Verde region were focal points within their respective communities, and they are recognized archaeologically by the presence of distinctive residential and public architecture (Adler and Varien 1994; Varien 1999). The term "public architecture" is defined by Lipe (2002:221) as structures "that differ from ordinary domestic structures." Researchers infer that public architecture—which includes great kivas, plazas, and great houses—served both as gathering places for community members and locations where ceremonies and information sharing took place (Adler and Wilshusen 1990).

Crow Canyon researchers define ancient communities (after Varien 1999:19) as groups of households that lived near one another, had regular face-to-face interaction, and shared the use of local, social, and natural resources; they define communities archaeologically on the basis of clusters of contemporaneous habitation sites in an area approximately 4 km in diameter. Typically, these settlement clusters include a single site that served as the "community center." Many such centers exhibit a central, focal building surrounded by residences. The form and layout of community centers changed through time. According to the community center succession model discussed by Lipe and Ortman (2000), community centers dating from the A.D. 1050 to 1150 period consisted of large isolated buildings located primarily in upland areas, many of which were associated with a great kiva. Between A.D. 1150 and 1225, community centers included a cluster of buildings, many of which were located in upland areas, and a central building was typically located in the center of the cluster. Finally, between A.D. 1225 and 1300, community centers were large aggregated villages located in canyon-head settings.

The presence of a possible Chaco great house in Architectural Block 100 (see Figure 2.1) that is surrounded by a dense concentration of 10 smaller architectural blocks suggests that Albert Porter Pueblo was a community center. Distinctive in terms of its size, layout, and architectural details, the great house would have served as a central building beginning in the early-to-middle A.D. 1100s. During the late A.D. 1100s and early 1200s, several structures were added to the great house, significantly increasing the size of the building; several structures within this building were used until the village was depopulated in the late A.D. 1200s.

Research Questions

Research conducted as part of "Communities through Time: Migration, Cooperation, and Conflict" was implemented at the scale of the locality as well as that of the region (Varien and Thompson 1996). Early in the project, the title of the research design was altered by switching the order of the terms "Conflict" and "Cooperation." Research questions focused broadly on problems including settlement patterns, community continuity, chronology at the household and site level, regional connectedness, cooperation at the community and regional levels, conflict at the community and regional levels, and access to resources. Lists of specific research questions developed by Varien and Thompson (1996) to structure locality, community, and regional-level research follow.

Locality-Level Research Questions

Locality-level research questions consist of the following:

> Did families within communities move more frequently than the communities themselves? Did the frequency of household movement change over time?
>
> How long were community centers used and did they last longer than residences of individual families?
>
> Did the families living at or near the community centers live in their houses longer than other families in the surrounding community? Did the families that lived at or near the community center become important decision makers within the communities?
>
> Were communities dating from A.D. 1050–1150 part of the Chaco regional system?
>
> Was there a break in community continuity during the A.D. 1130–1180 drought?
>
> Can we identify patterns of cooperation among households within communities in a locality? Did households affiliate with groups that were larger than a single family but smaller than the community?
>
> Can we identify patterns of cooperation between households and the community? For example, how did households cooperate on public-works projects?
>
> Can we identify patterns of cooperation among communities within the locality? For example, did two or more communities form alliances with one another?
>
> Can we identify patterns of conflict among and between all of the above within a locality?

Did all groups have equal access to resources?

Did unequal access to either resources or leadership positions create conflict within and between communities?

Community- and Regional-Level Research Questions

Community- and regional-level research questions consist of the following:

Did community centers persist because they practiced economic and agricultural intensification in the face of population growth?

Did the peripheral communities pursue more extensive economic and agricultural strategies?

Did community centers persist because they had access to better resources (for example, more productive agricultural land)?

Was there cooperation among the community centers?

Was there conflict between the community centers?

What was the role of the individual in the historical development of the ancient Pueblo communities in the Mesa Verde region?

Was the final migration from the region in the late thirteenth century a household and/or community-level decision?

Did the final migration result from household and community conflict?

What social forces or events contributed to the final migration?

In what decades did the final migration take place? What did this process look like? If people migrated about A.D. 1260, did those people set up migration streams for the groups that migrated two decades later?

As noted in "A Proposal to Conduct Archaeological Testing at the Albert Porter Preserve" (Varien 2000), research at Albert Porter Pueblo fit into a larger program of long-term research supported by the Crow Canyon Archaeological Center in which detailed case studies of individual settlements and communities are integrated with regional and macroregional analyses. Research at Albert Porter Pueblo was designed to help address the following interrelated issues (Varien 2000): (1) dating each period of occupation, (2) reconstructing the history of occupation, (3) clarifying the nature of the Chaco to post-Chaco transition, (4) assessing potential Chaco influence, (5) evaluating Albert Porter Pueblo as a community center through time, (6) reconstructing the layout of archaeological features, and (7) linking the ancient history of the central Mesa Verde region with modern Pueblo Indian society. Additionally, research at Albert Porter Pueblo was designed to expand our understanding of prehispanic history in the northern San Juan region and the greater Southwest by addressing topics of general anthropological interest including: (1) community organization and change in middle-range societies; (2) the development of leadership, power, and social inequality in human society; and (3) the importance of public architecture. Each of these problems is stated as a research question below.

Discussions of the following questions are found throughout this report; however, concise discussions can be found in Chapter 12, "Synthesis."

> Was the village continuously occupied between the Chaco and post-Chaco period, or was there a hiatus between these two periods? Did the use of the site change in each of these periods?
>
> Was Chacoan influence at Albert Porter Pueblo the result of direct contact between the inhabitants of Chaco Canyon and Albert Porter Pueblo, or did leaders at Albert Porter Pueblo emulate a Chacoan style?
>
> Who used the great house, and how was it used?
>
> Are community centers differentiated from the rest of the community and, if so, how?
>
> What is the place of community centers in the regional settlement system?
>
> What was the full inventory of architectural features, and does the layout of these features indicate that the village was a Chacoan or post-Chacoan center?
>
> Did community leaders live at Albert Porter Pueblo?
>
> If evidence for leaders is discovered, how were they differentiated from other community members?
>
> Did leaders control the use of public buildings, or were these structures used communally?
>
> How did events in the northern San Juan region shape the development of modern Pueblo society?

History of Research at Albert Porter Pueblo

Little research had been conducted at Albert Porter Pueblo before the Crow Canyon Archaeological Center began testing the site in 2001. Earlier projects focused primarily on surface remains at the site. In 1965, a Colorado State site survey form was completed as part of a University of Colorado survey under the direction of Eric Varney and Doug Bucy. The few artifacts collected during that survey are probably curated at the Anasazi Heritage Center in Dolores, Colorado, or at the University of Colorado Museum in Boulder. In the late 1970s or early 1980s, a sketch map of "Hedrick Ruin," an early name for the site, was compiled by Art Rohn of Wichita State University (Figure 2.2). In the late 1980s, Mark Chenault, then a graduate student at the University of Colorado, used a transit to produce a more detailed map of the site (Figure 2.3). In 1994, a field crew under the direction of William Lipe set in six datums (capped rebar) and targeted the site for aerial photography conducted by Rocky Mountain Aerial Survey of Englewood, Colorado (Figure 2.4). A detailed topographic map was generated from the aerial photographs by Carrera and Associates. In 1995, as part of Crow Canyon's Village Mapping Project, structures visible on the modern ground surface—including masonry walls, rubble mounds, and other cultural features—were mapped by Crow Canyon under the direction of Richard Wilshusen and Neal Morris, with the assistance of four local members of the Colorado Archaeological Society (Lipe and Ortman 2000; Varien and Wilshusen 2002). Neal Morris then drafted a composite map showing topography, rubble mounds, and pit-structure depressions

(Figure 2.5). Because dense vegetation covered the site during the Village Mapping Project, surface middens were not recorded at that time. On September 20, 1995, Albert Porter Pueblo was nominated to the National Register of Historic Places as an example of a "habitation site with public architecture" (Lipe 1995), and the site was placed on the register in 1999.

Field Methods

Field and laboratory methods for excavations at Albert Porter Pueblo are presented in "A Proposal to Conduct Archaeological Testing at the Albert Porter Preserve" (Varien 2000). All fieldwork at this site was conducted using methods consistent with the principles of conservation archaeology (see Lipe 1974). As specified in the research design, less than 1 percent of Albert Porter Pueblo was disturbed through excavation, leaving most of the site intact. Research at this site focused on six distinct archaeological contexts: (1) modern ground surface, (2) extramural middens, (3) interiors of pit structures, (4) exterior faces of the north walls of surface rooms or roomblocks, (5) interiors of surface rooms, and (6) remote-sensing anomalies.

Modern Ground Surface Collections

Artifacts on the modern ground surface were collected within 3-m-radius "dog-leash" units that were placed in the centers of 84 grid units measuring 20-x-20 m each (Table 2.1). The resulting data allowed us to map areas of low, moderate, and high artifact densities across the site. These data guided our choice of excavation units by allowing us to make inferences regarding the locations of subsurface cultural deposits, to identify and locate unique temporal components on the site, and to quantitatively assess the types and abundance of artifacts present on the modern ground surface.

Midden Testing

Extramural middens were tested with randomly selected 1-x-1-m units. The units were selected by first overlaying a 1-m grid on a map of each midden and numbering each 1-x-1-m square consecutively. Excavation units were then selected by a random-number generator. The diversity of artifact types in an archaeological sample is directly correlated with sample size (Jones et al. 1983); thus, at Albert Porter Pueblo, we attempted to sample each midden such that the collected assemblage would adequately represent the contents of the entire midden. For middens smaller than 100 m^2, we excavated 10 percent of the total midden area. Ten 1-x-1-m units were excavated in middens between 100 and 200 m^2 in area. In middens larger than 200 m^2, 15 units were excavated.

Pit-Structure Testing

Pit structures were tested with a judgmentally placed 2-x-2-m unit that was excavated until collapsed roofing debris was exposed. Excavation was then restricted to one-half of that unit and continued to the floor of the structure. This strategy—which exposes approximately 21 percent of a pit structure floor measuring 3.5 m in diameter—was designed to optimally enable researchers to collect data that would address four areas of interest. First, tree-ring samples were collected to reconstruct the chronological history of the structure and the site overall. Previous research indicates that, in the central Mesa Verde region, tree-ring samples are most abundant in burned pit structures (Cameron 1990; Wilshusen 1988). Thus, one of our primary goals in testing pit structures was to retrieve burned wood—especially from roofing timbers—that could be dated by dendrochronology. Second, ash collected from pit-structure hearths provides information on environmental conditions, activities conducted within the structure, diet, and the economic status of those individuals who used the pit structure (Adams 1999). Hearths—standard features in pit structures—are consistently located near the center of the structure. Excavation units were judgmentally placed to take advantage of this predictability. Third, pit-structure testing reveals construction techniques and styles that reflect the time of construction. Furthermore, at Albert Porter Pueblo, pit-structure architecture provided data on the extent of Chaco influence. For example, key architectural features—including pilaster style, masonry type, and ventilator type—may reflect association with Chaco Canyon (also see Chapter 5).

Exterior North-Wall Testing

Ten 1-x-2-m units were located to expose sections of north walls of selected roomblocks across the site. These units were excavated to collect data on the construction and use history of each roomblock area and data regarding the possible nature and extent of Chaco influence at the site. Chaco influence in roomblock construction includes banded masonry, footer trenches, and multistory construction (Hurst 2000). Units placed along the exterior faces of roomblock walls were excavated from the modern ground surface to undisturbed native sediment, which was interpreted as the occupational ground surface when the location was first inhabited. These excavation units enabled us to determine if a footer trench was present, if the foundation rested on undisturbed native sediment, or if the foundation rested on earlier cultural deposits. Where cultural deposits were present below the foundation, we inferred that the types of pottery sherds in those deposits reflected the earliest possible period that the wall could have been constructed.

Roomblock Testing

Ten surface rooms, all within Architectural Block 100, were selected for testing with one 1-x-2-m unit each. This element of our excavation strategy focused on rooms suspected of having special functions and rooms that appeared to have been constructed during a variety of time periods. To expose as many wall faces as possible, the 10 excavation units were each positioned along the inside edge of a structure wall. This strategy enabled us to record construction details, remodeling events, and masonry features, and to investigate the nature and extent of Chaco influence at the site. Evidence of Chaco-influenced architecture in surface rooms includes corner doorways, room-wide platforms, and intramural beams (Bradley 1988; Hurst 2000; Lekson 1984). In addition, roomblock test units allowed us to document structure fills, structure floors, and subfloor deposits. Such data are relevant for assessing postabandonment processes, abandonment style, room use, and use of Architectural Block 100 before construction of the possible Chaco great house.

Remote Sensing

Electrical resistance is the most widely used method of remote sensing in archaeology today and was the method used at Albert Porter Pueblo (Charles and Ball 2001). This method, which was developed in England during the 1950s (Rapp and Hill 2006), measures the distortion of an induced electrical current as it passes between a positive and negative probe that contact the ground surface. The level of resistance varies with the degree of subsurface disturbance. Most disturbances beneath the modern ground surface at an archaeological site were caused by human activity such as the construction of subterranean structures—including pithouses, kivas, and other structures—as well as the use of footpaths or roads and other activities that altered natural subsurface deposits.

From July 23 to July 28, 2001, an electrical-resistance survey was conducted on 40 grid units measuring 20-x-20-m each (16,000 m^2 total) in the east-central, southeastern, north-central, and west-central portions of Albert Porter Pueblo. The survey was performed by four members of the anthropology department from Fort Lewis College, Durango, Colorado, under the direction of Mona Charles and Bill Ball.

Methods

The instrument used in the survey was a portable Geoscan RM15 Resistance Meter with a twin-probe array (Figure 2.6); the RM15 is lightweight and easily transported. To detect subsurface features at depths between 0.25 m and 1.50 m below the modern ground surface, probes were set 0.50 m apart. One data point was collected for each square meter within the survey area; thus, a total of 400 data points were collected for each 20-x-20-m grid. The probes were pushed a few centimeters into the ground at each data point. The survey was guided by placing three ropes marked at 1-m intervals on the modern ground surface—vegetation was removed to facilitate this process. Two of the ropes were placed parallel to each other on the north and south gridlines and the third rope provided a movable line that was perpendicular to the parallel ropes. Data were collected from south to north until the end of each 20-m grid was reached; data collection then proceeded north to south on the line immediately to the east of the preceding line. Data collection began in the southwest corner of each grid and continued until the southeast corner of the grid was reached.

Results

Results of the electrical resistance survey indicated the presence of as many as 36 pit structures that are not visible on the modern ground surface, multiple linear features possibly representing footpaths, numerous possible middens and surface rooms, a natural bedrock formation in the eastern portion of the site, and a CO_2 (carbon dioxide) pipeline along the eastern edge of the survey area (Figure 2.7). The electrical resistance results more than doubled the number of architectural features identified at the modern ground surface (Figure 2.8).

Testing

As a result of this survey, an addendum to the original research proposal was submitted to The Archaeological Conservancy requesting permission to test the 36 locations of possible pit structures. Each electrical resistance anomaly would be cored with a 7-cm-diameter auger to confirm the presence and type of cultural feature. The Archaeological Conservancy granted permission, and auger testing began in 2002. The resulting cores indicated that 33 of the 36 anomalies did indeed represent pit structures; 29 are confirmed structures and four are possible structures (Table 2.2). Several of these structures were further tested during subsequent field seasons.

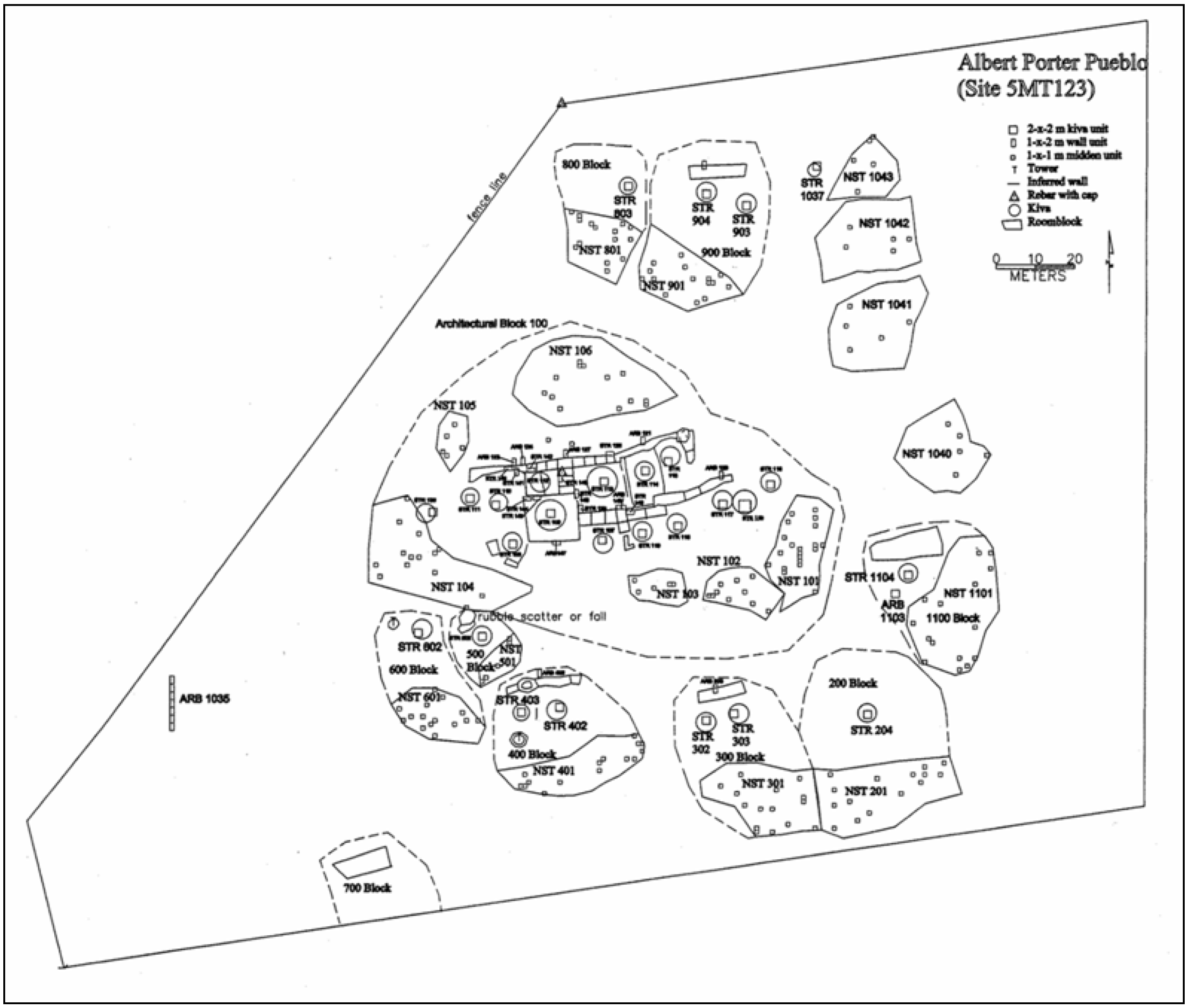

Figure 2.1. Site map showing architectural blocks and excavation units, Albert Porter Pueblo.

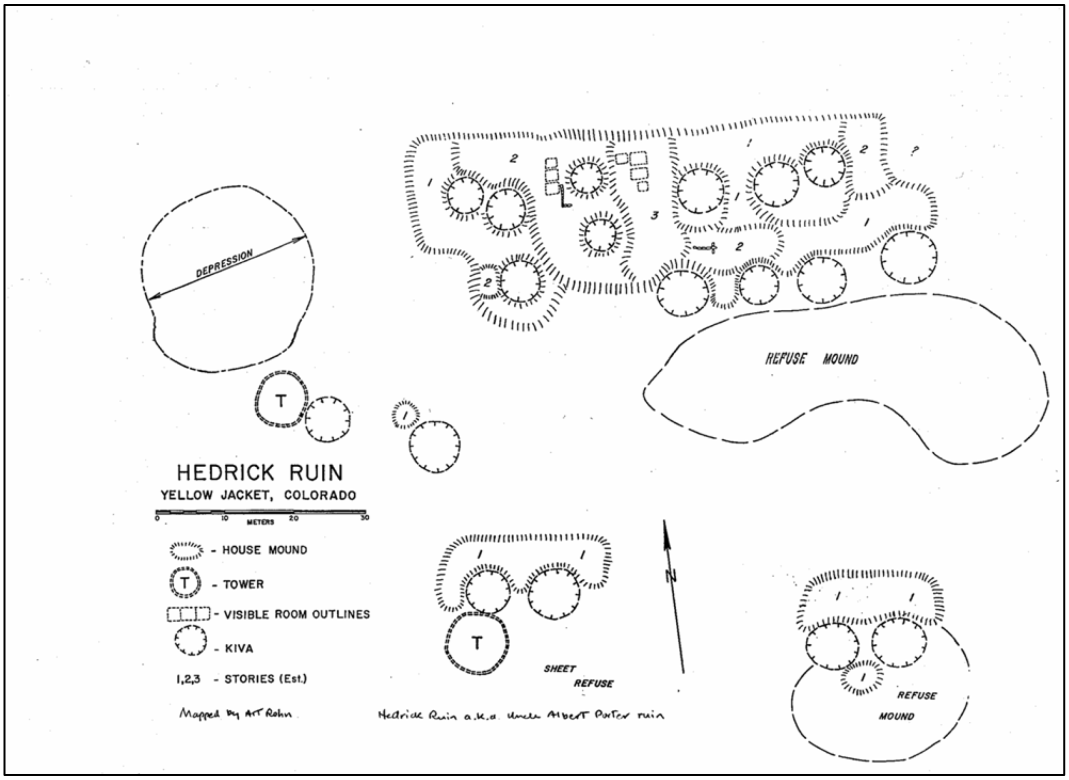

Figure 2.2. Map of Hedrick Ruin, or Albert Porter Pueblo, produced by Art Rohn.

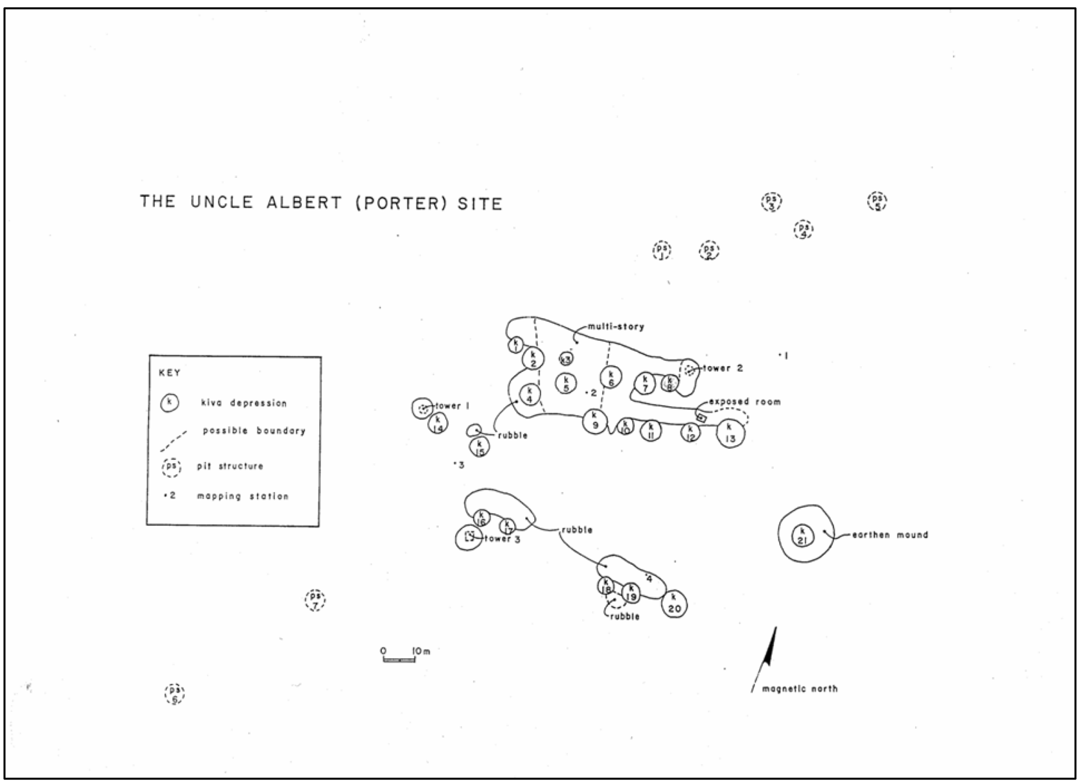

Figure 2.3. Map of the Uncle Albert (Porter) Site, or Albert Porter Pueblo, produced by Mark Chenault.

Figure 2.4. Aerial photograph taken in 1994, Albert Porter Pueblo.

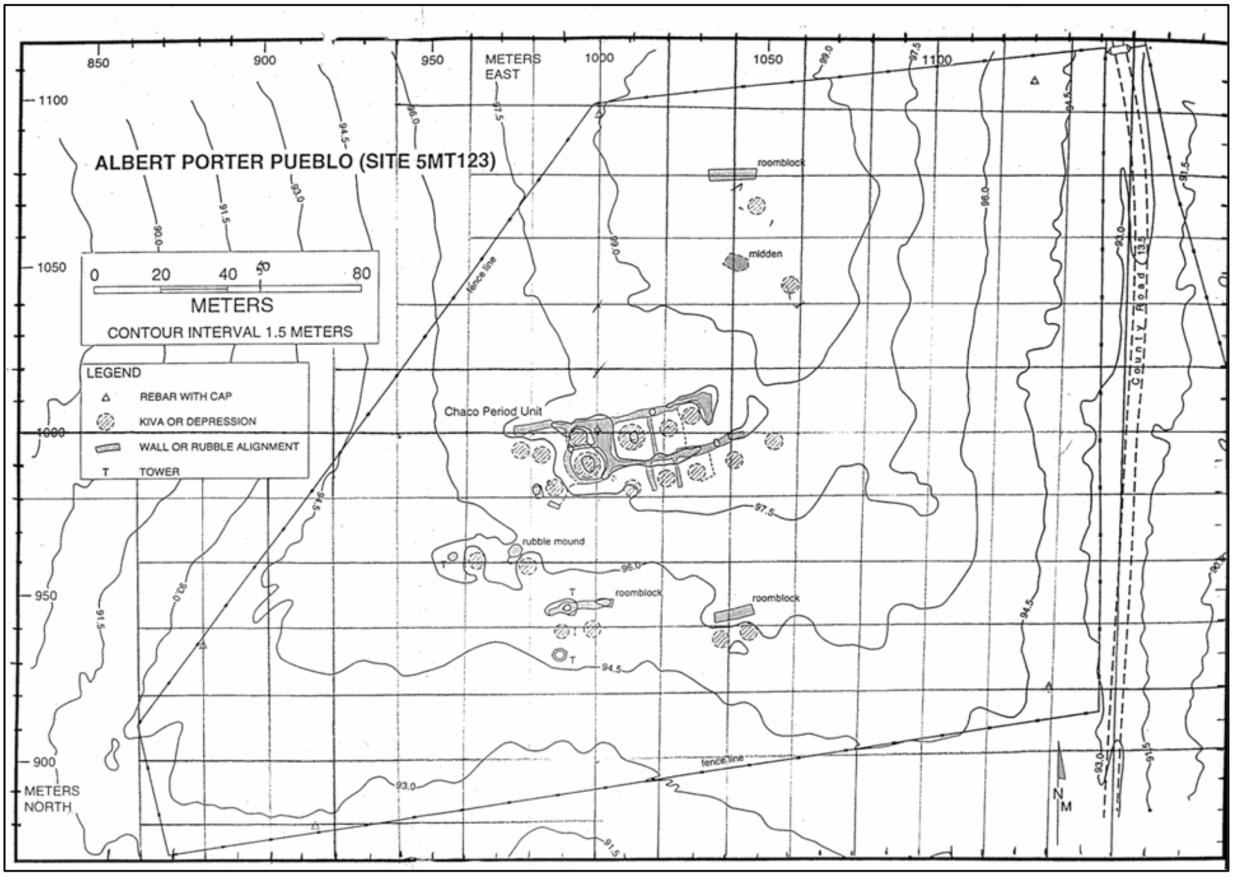

Figure 2.5. Topographic map indicating surface architecture and pit-structure depressions, produced by Neal Morris, Albert Porter Pueblo.

Figure 2.6. The electrical resistance survey being conducted by Fort Lewis College using a Geoscan RM15 resistance meter, Albert Porter Pueblo.

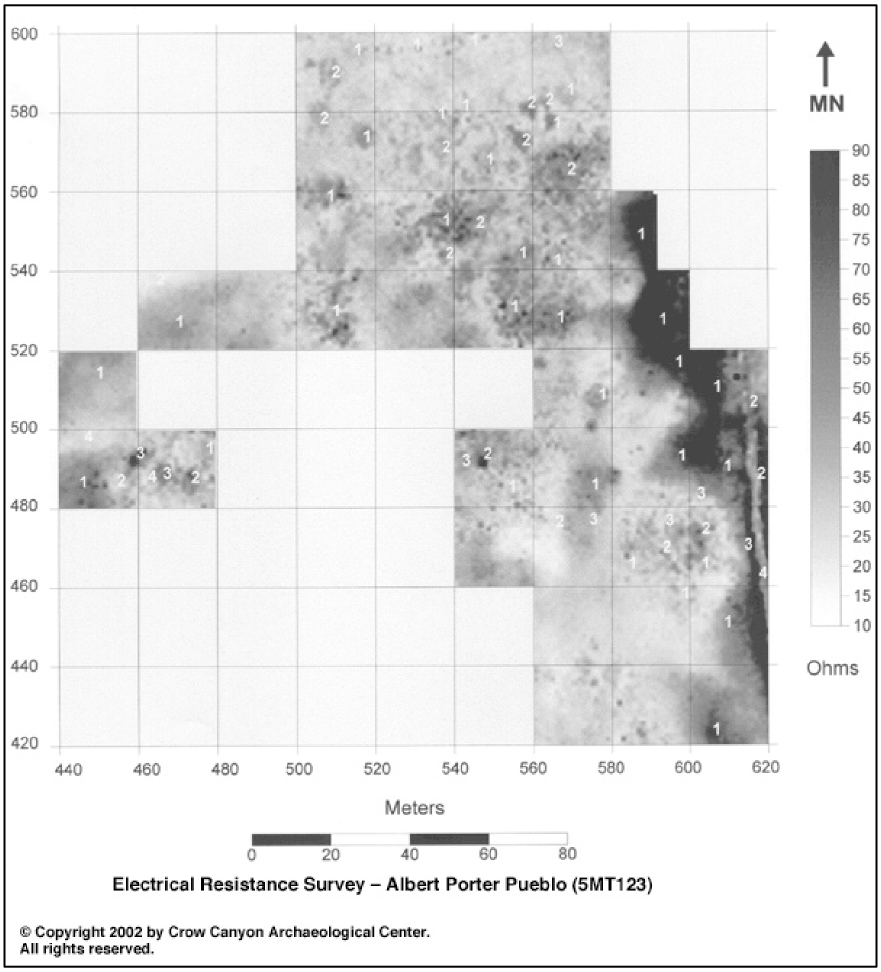

Figure 2.7. Results of electrical resistance survey, Albert Porter Pueblo.

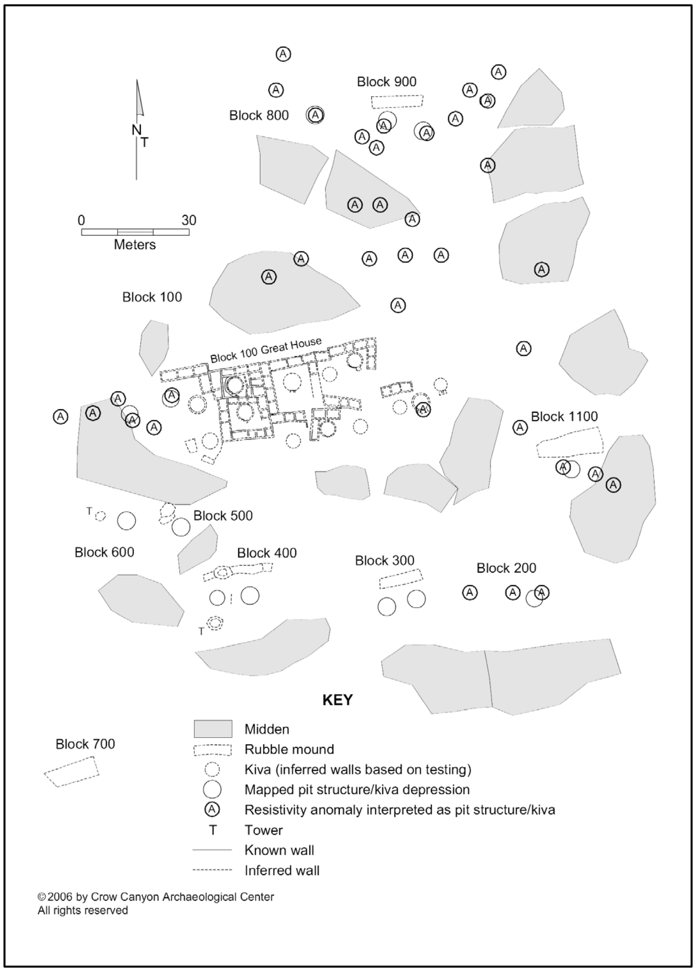

Figure 2.8. Electrical resistance anomalies and major cultural units, Albert Porter Pueblo.

Table 2.1. Modern Ground Surface Collection Units and their Grid Coordinates, Albert Porter Pueblo.

Study Unit Type and Number	Grid Coordinates	
	North	East
Arbitrary Unit 1001	390	390
	390	410
	390	430
	410	390
	410	410
	410	430
	410	450
	410	470
	410	490
	410	510
	410	530
	430	390
	430	410
	430	430
	430	450
	430	470
	430	610
	430	630
	450	430
	450	510
	450	530
	450	550
	450	570
	450	610
	450	630
	470	430
	470	450
	470	470
	470	570
	470	610
	470	630
	490	430
	490	450
	490	570
	490	590
	490	610
	490	630
	510	450
	510	570
	510	590
	510	610
	510	630
	530	470
	530	550

Study Unit Type and Number	Grid Coordinates	
	North	East
Arbitrary Unit 1001, continued	530	570
	530	590
	530	610
	530	630
	550	490
	550	510
	550	530
	550	550
	550	570
	550	590
	550	610
	550	630
	570	490
	570	570
	570	590
	570	610
	570	630
	590	510
	590	530
	590	570
	590	590
	590	610
	590	630
Arbitrary Unit 1105	450	590
	470	590
Arbitrary Unit 202	410	570
	430	570
	430	590
Arbitrary Unit 304	410	550
	430	530
	430	550
Arbitrary Unit 404	430	510
Arbitrary Unit 503	450	490
Arbitrary Unit 603	450	450
	450	470
Arbitrary Unit 703	390	450
Arbitrary Unit 802	570	510
Arbitrary Unit 902	570	530
	570	550
	590	550

Table 2.2. Results of Electrical Resistance Anomaly Testing, Albert Porter Pueblo.

Anomaly Number	Study Unit	Northing/ Easting	Depth of Auger (m)	Fill Types	Midden	Burned	Structure Present
A-1	1002	590/508	0.73	Natural fill w/ponding			X
A-2	1003	580/506	0.77	Natural fill			X
A-3	1004	573/517	1.37	Natural fill; midden at 0.70	X		X
A-4	1005	567/530	1.30	Natural fill; redeposited caliche at 0.60			X
A-5	STR 904			Natural fill			X
A-6	STR 903			Natural fill			X
A-7	1006	572.3/556	0.60	Natural fill; cultural fill; rock at 0.60			?
A-8	1007	580/560	1.66	Natural fill; midden; rock at 1.66	X		X
A-9	1008	577/565	0.80	Natural fill; midden; rock at 0.80	X		X
A-10	1009	585/568	0.98	Natural fill; cultural fill w/charcoal; rock at 0.98		X?	X
A-11	1010	564/534	2.07	Natural fill; redeposited caliche; loess; sterile			X
A-12	1012	544/544	1.18	Natural fill; midden	X		X
A-13	1011	558.5/565	1.40	Natural fill; midden; sterile	X		X
A-14	1013	488/466	2.02	Natural fill; midden; roof fall; ash	X		X
A-15	1014	486/472	1.31	Natural fill; dense midden	X		X
A-16	1015	548.2/528	0.50	Natural fill; hit rock at 0.50			?
A-17	1016	533/532	0.50	Natural fill; hit rock at 0.50 approaching caliche			?
A-18	1017	534/542	1.90	Natural fill; construction fill; powder caliche at 1.90			X
A-19	1018	534/552	2.00	Natural fill; midden; caliche at 1.40	X		X
A-20	1019	520/540	1.75	Natural fill; midden; sterile at 1.25	X		X

Anomaly Number	Study Unit	Northing/ Easting	Depth of Auger (m)	Fill Types	Midden	Burned	Structure Present
A-21	1020	508/575	1.45	Natural fill; cultural fill; rock at 1.45			X
A-22	1021	530/580	0.50	Cultural until 0.23; sterile			–
A-23	1025	491/547	1.50	Natural fill; midden; burned architecture	X	X	X
A-24	1022	475/486	1.02	Natural fill w/adobe and charcoal		X	X
A-25	1023	473/595	0.90	Natural fill w/charcoal flecks; bedrock?			?
A-26	1024	440/580	1.28	Natural fill; midden; construction fill; rock at 1.28	X		X
A-27	1026	548/535	1.93	Natural fill; midden; sterile at 1.20	X		X
A-28	1027	440/560	2.07	Natural fill; midden	X		X
A-29	1028	490/455	1.0	Midden; sterile at 0.80	X		–
A-30	STR 111			Natural fill			X
A-31	1029	428/504	1.40	Natural fill; midden; sterile at 1.20	X		X
A-32	1030	533/513	1.40	Natural fill; midden; sterile at 1.10	X		X
A-33	1031	440/572	0.65	Natural fill w/charcoal; rock at 0.65		X	X
A-34	1032	436/580	0.55	Natural fill; midden; cultural fill; rock at 0.55	X		X
A-35	1033	470/600	2.10	Natural fill; construction fill			X
A-36	1034	487/464	1.10	Natural fill; midden; sterile at 0.90	X		–

Note: STR = Structure; depths given in “Fill Types” column are in meters.

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Chapter 3

Chronology

by Susan C. Ryan

Introduction

The goal of this chapter is to reconstruct the occupational history of Albert Porter Pueblo using multiple lines of evidence including tree-ring data, pottery dating, archaeomagnetic dating, radiocarbon dating, architectural styles, structure context, structure abandonment mode, and stratigraphic sequences. The chapter begins with a discussion of the culture-historical context of the occupation of Albert Porter Pueblo followed by a summary of the dating schemes used in this report. Next, the various techniques used to date individual study units are discussed. Finally, a reconstruction of the overall occupational history of the site is presented.

Pueblo I Period (A.D. 725–920)

The Pueblo I period is defined by several episodes of demographic and organizational changes throughout the northern San Juan region (Kohler 1993; Wilshusen 1999; Wilshusen and Ortman 1999; Wilshusen and Wilson 1995). This period is characterized by the pithouse-to-pueblo transition, population aggregation, village formation, organizational complexity, and a substantial population decline by A.D. 890. These demographic and organizational changes were due, in part, to the adoption of agriculture and the transition to sedentism that occurred during the Basketmaker III period in the central Mesa Verde region.

Agriculture was practiced widely across the Colorado Plateau by the Pueblo I period. Families relied on maize, beans, and squash as their primary means of subsistence; these crops were supplemented by game and wild plants. Turkeys were also a part of the Pueblo diet, but they do not appear to have been relied upon as a stable protein source at this time. With dependence on agriculture came an increasing need to remain near farm fields in order to plant seeds, weed fields, control pests, and harvest crops (Rafferty 1985). Furthermore, additional time was required to process the crops for long-term storage and for daily meal preparation. Archaeologists have applied the word “sedentary” to groups ranging from those who spend most of the year in one location to those who were settled in one location year-round; in the latter use, some apply the term specifically to agricultural groups that practiced permanent-field cultivation (Rafferty 1985:115). Thus, the degree to which sedentism is defined as permanent, year-round residence is disputed (Rafferty 1985:114; Wills and Windes 1989).

Four lines of evidence strongly suggest that residential sites during the Pueblo I period were inhabited year-round for multiple years: (1) archaeobotanical remains, (2) tools and features, (3) architecture, and (4) craft specialization. Archaeobotanical remains, such as macro-fossils, micro-fossils, and pollen, indicate sedentism in the northern San Juan region by the early eighth century A.D. Domesticated plants—such as maize, beans, and squash—are represented by well preserved macrofossils. The presence of reproductive plant parts, such as pollen, indicates that specific plants grew nearby. Tools such as manos and metates, and features such as mealing bins, indicate a reliance on the processing of agricultural plants and products. Rafferty (1985:127, 132–133) notes that sedentary people often develop specialized hard-to-transport technologies. Metates are an example of a hard-to-transport technology used during the Pueblo I period. Changes in architecture accelerated during the Pueblo I period when roomblocks—used for habitation and storage—were constructed for the first time. Lastly, evidence of craft specialization in the form of pottery manufacturing has been detected at sites dating from the Pueblo I period. Analysis of pottery raw materials indicates that production was local and that many vessels were traded, especially San Juan red wares (see Ortman et al. 2005). Surplus agricultural products might have been traded for red ware pottery.

During the Basketmaker III and Pueblo I periods there was a gradual shift throughout the northern Southwest from villages composed of pithouses to villages composed of multi-room surface structures and associated pit structures (Cordell 2007). Basketmaker III sites typically comprised one- or two-household residences; however, hamlets composed of nine or more pithouses, such as Shabik'eshchee Village in Chaco Canyon (Roberts 1929), have been documented (Wills and Windes 1989; Wilshusen 1999). Basketmaker III residences typically included: (1) a generally sub-rectangular pithouse constructed of wood posts and adobe; (2) multiple storage cists constructed below the pithouse floor or in subterranean extramural pits; (3) small, noncontiguous surface structures; and (4) middens. Pithouses—especially those in the eastern portion of the Colorado Plateau—have antechambers that might have functioned as a storage spaces and entryways. By A.D. 750, pithouses were constructed with ventilator systems rather than antechambers, and they had rounded corners (Wilshusen 1999:201). In addition, wing walls functioned to deflect air that entered the structure through the ventilation system away from the hearth and to divide the interior of the structure for special-activity needs and storage. Some eastern Colorado Plateau sites have stockades and rock aprons lining the pithouse. Furthermore, great kivas—public buildings used for periodic group assembly—were constructed at some Basketmaker III sites, reflecting the development of community organization and social integration. Great kivas were constructed until the end of the thirteenth century.

In the northern Southwest, the transition from the Basketmaker III to the Pueblo I period is marked by the "pithouse-to-pueblo transition" (Cordell 2007; Gilman 1987; Hegmon 1992; Lipe and Breternitz 1980; Plog 1974; Wilshusen 1988). During the Pueblo I period, blocks of contiguous aboveground habitation and storage rooms were constructed for the first time. Surface rooms were constructed of wooden posts and adobe, and some incorporated masonry. It was also during the Pueblo I period that residential layouts became formalized. Defined by T. Mitchell Prudden as a "unit-type" pueblo, the layout consists of surface rooms located to the north of the pithouse and midden deposits located south of the pithouse generally along a north-south axis (Prudden 1903, 1914, 1918). The unit-type pueblo remained a consistent construction pattern until the end of the thirteenth century (Lipe 2006).

Villages with 75 to 400 rooms were constructed in several areas in the Mesa Verde region during the Pueblo I period. Examples include Site 2, located in the Ackmen-Lowry area (Martin 1939:360–385), Site 13, located in southeastern Utah (Brew 1946), and Grass Mesa Village, located along the Dolores River (Lipe et al. 1988). Additionally, contemporary hamlets—composed of from three to 20 rooms—were constructed in nearby drainages (Lightfoot 1993; Lightfoot and Etzkorn 1993). Villages and hamlets typically were occupied for 30 to 40 years—or one to two generations—after which people relocated to nearby drainages or migrated from the region (Wilshusen 1999).

Increased aggregation is one of the main ingredients of social complexity, and during the Pueblo I period people lived in groups of 15 to 20 households or more for the first time in Pueblo history (Wilshusen 1999:210; Wilshusen and Blinman 1992). Rafferty (1985:117) notes that there are several advantages to aggregation, including increased security, a chance to accumulate possessions, and an opportunity to develop specialized technologies. Other possibilities noted by Lightfoot and Feinman (1982:66–68) include greater predictability of public ceremonies, stimulus of goods and other kinds of exchange, and the greater opportunity to perform activities that benefit the economy of scale.

Rafferty (1985:141) notes that one consequence of sedentariness is increasingly complex political organization. This may be the result of several factors: (1) the need to reduce conflict by installing permanent leaders; (2) the need to organize and regulate trade in subsistence and luxury goods which, in turn, ties settlements together; (3) increasing population size; and (4) increasing ritual activity (Rafferty 1985:141). An archaeological example of social complexity is provided by Blinman (1989, but also see Orcutt et al. 1990), who infers social hierarchy from architectural and pottery data collected from Pueblo I period villages in the Dolores area of southwestern Colorado. Blinman (1989) argues that oversized pit structures with ritual features (see Wilshusen 1989) constructed within “U-shaped” roomblocks exhibit evidence of feasting. He infers this on the basis of the association of higher proportions of red ware pottery sherds with “U-shaped” roomblocks than with linear-style roomblocks.

By A.D. 860, or during the late Pueblo I period (A.D. 800–920), populations had increased, and an estimated 9,500–10,500 people might have lived in the northern San Juan region (Wilshusen 1999:234; Wilshusen and Ortman 1999:Figure 3). The majority of this population resided in the Dolores River canyon or on the Mesa Verde escarpment. Although some villages might have housed more than 500 residents, most villages supported between 123 and 200 individuals (Wilshusen 1999:232). Wilshusen and Ortman (1999) infer that this population was composed of two distinct ethnic groups.

Environmental stability throughout the Basketmaker III and Pueblo I periods fostered successful agricultural yields and provided ideal conditions for hunting and gathering. This favorable pattern continued until the late Pueblo I period, about A.D. 880, when multiple drought years affected people across the Colorado Plateau (Schlanger and Wilshusen 1993). Data from surface surveys and excavations of Pueblo I sites indicate that population declined across the Mesa Verde region—and much of the northern San Juan region—by the end of the ninth century (Schlanger 1998; Varien 1999:188,190; Wilshusen 1999:228, 253). Wilshusen and Ortman (1999) suggest that the population estimate given above—10,000 people in A.D. 860—declined by approximately two-thirds by A.D. 890. A compilation of all available tree-ring cutting dates from the central Mesa Verde region (Varien et al. 2007:Figure 5F) shows few cutting dates for the early A.D. 900s, indicating that few trees were being harvested for construction during this time. Furthermore, data for more than 50 Pueblo I sites investigated during the Dolores Archaeological Program (DAP) also reflects a decline in population. Noting the lack of Pueblo II settlements in their study area, DAP researchers inferred a large-scale migration from the San Juan region at the end of the ninth century.

However, a recent survey conducted near Dove Creek, Colorado—northwest of the DAP study area—revealed that populations lived in the northern periphery of the San Juan region during the late Pueblo I period (Coffey 2006). Results of this study indicate that population decline was not a uniform process across the region, but rather a more fractionalized process with some groups remaining in particular areas. The sites recorded in this survey ranged from small family farmsteads to large villages, and they were occupied between A.D. 880 and 940 (Coffey 2006:62). The population estimates indicate that a maximum of 750 individuals occupied this area, more than half of whom resided in centralized villages (Coffey 2006:63). The most common pottery types in the Mesa Verde region during the Pueblo I period include Moccasin Gray, Chapin Black-on-white, Piedra Black-on-white, Bluff Black-on-red, and Deadmans Black-on-red (Ortman et al. 2005; Wilson and Blinman 1999).

Pueblo II Period (A.D. 920–1140)

Throughout the Southwest, the Pueblo II period was characterized by increasingly favorable environmental conditions, increased population, increased aggregation, and the florescence of the Chaco regional system (Lipe and Varien 1999). On the basis of reconstructions of rainfall and temperature for the La Plata Mountains and the nearby vicinity, Petersen (1988:93) states that winter precipitation increased beginning in the early A.D. 900s. Precipitation gradually increased throughout the A.D. 1000s and remained constant until the mid-A.D. 1100s—at which time below-normal precipitation affected the Southwest for five consecutive decades (Meko et al. 2007; Van West and Dean 2000). A paleohydrologic reconstruction of the Black Mesa region supports Petersen's reconstruction (Dean et al. 1985). This reconstruction indicates low water tables and alluvial degradation in the A.D. 800s and early 900s followed by high water tables and stream aggradation in the late A.D. 900s and 1000s (Dean et al. 1985).

Favorable environmental conditions probably contributed to a population increase in the northern Southwest during the A.D. 1000s. Lipe and Varien (1999:Table 8-4) infer a conservative average momentary population of more than 5,000 people for the middle Pueblo II period (A.D. 1020–1060) and more than 12,000 people by the end the Pueblo II period (A.D. 1060–1140). Additionally, an increase in tree harvesting is reflected in the quantity of tree-ring dates for the middle Pueblo II period (Varien 1999:Figure 7.17) when the increasing population resulted in widespread house construction.

Throughout the Mesa Verde region, Pueblo II communities were composed of loose clusters of one-to-two-household settlements located in areas suitable for farming (Lipe and Varien 1999a). Although most communities comprised dispersed households, some communities developed a nucleus or center around which several households aggregated. Community centers dating from the Pueblo II period are often identified archaeologically by the presence of a great kiva, a great house, a cluster of households, or some combination of these features (Lipe and Varien 1999a).

During the late Pueblo II period (A.D. 1060–1140), primarily after A.D. 1075, Chaco-influenced great houses were the central structure in many of these communities.

Great houses in the Mesa Verde region exhibited architectural characteristics similar to those found in Chaco Canyon, including the following: preplanned construction; visually imposing, multiple-story buildings; and thick, core-and-veneer walls. Some Chacoan great houses were associated with great kivas, earthen mounds or berms, and roads (Van Dyke 2003:181). Another Chacoan architectural characteristic consists of kivas that were incorporated into roomblocks by enclosing each in a rectangular room; many were constructed aboveground. In addition, these kivas typically have subfloor ventilation systems and eight-pilaster roof support systems (Lekson 1984; Van Dyke 2003).

Great-house construction began in Chaco Canyon in the mid–to–late A.D. 800s (Wilshusen and Van Dyke 2006; Windes and Ford 1996), and it was during this time that great houses began to serve as community centers within the canyon. Great houses outside of Chaco Canyon, or Chacoan outliers, were first constructed during the A.D. 900s south of the canyon (Kantner 1996, 1999). Soon after, outliers were constructed west of Chaco Canyon. The quantity and size of great houses in Chaco Canyon increased until the canyon emerged as the primary center for a larger regional system by about A.D. 1020 (Lipe 2006). About A.D. 1080, the Chaco regional system expanded to its greatest spatial extent and for the first time extended north of the San Juan River. In the late A.D. 1000s and the early 1100s, connections in the north intensified when Aztec and Salmon pueblos, the largest Chacoan outliers, were constructed in the area known today as the Totah region, near the confluence of the Animas, La Plata, and San Juan rivers. Chaco Canyon remained the primary center of the ancestral Pueblo world until the early A.D. 1100s. Construction of Chaco Canyon great houses ended about A.D. 1140, roughly coincident with the onset of a persistent and severe drought in A.D. 1130. The complex of great houses at Aztec became a center—if not the primary center—of the post-Chaco world (Lekson 1999). Approximately 250 outliers have been recorded and associated with the Chaco regional system to date (Sipapu—The Chaco World Great House Database, accessed 3 December 2009). These outliers were much smaller than the great houses at Aztec, Salmon, and Chaco Canyon, but they were larger than the farmsteads and residential units that surrounded them in their local communities. Albert Porter Pueblo was a small Chaco outlier.

Although researchers agree that Chaco Canyon was the center of a larger regional system, there is much debate about the nature and organization of this system. The primary evidence of a regional system is the wide distribution of Chaco-influenced architecture and a network of roads found in an area more than 200 miles in diameter around Chaco Canyon. This area encompasses northwestern New Mexico, southeastern Utah, southwestern Colorado, and northeastern Arizona (Mahoney and Kantner 2000). The Chaco regional system was an intricate structure deriving from social power concentrated in the hands of the occupants of the great houses in Chaco Canyon. Although the exact nature of this power is not well understood, the power probably derived from control over material and ideological resources such as labor, farmland, water resources, material goods (including exotic goods), and ritual knowledge.

The most common pottery types associated with the middle Pueblo II period in the Mesa Verde region include Mancos Corrugated Gray, Cortez Black-on-white, Mancos Black-on-white, and

Deadmans Black-on-red (Wilson and Blinman 1999). Late Pueblo II pottery assemblages are dominated by Mancos Corrugated Gray and Mancos Black-on-white intermixed with McElmo Black-on-white (Wilson and Blinman 1999). Red ware assemblages are dominated by Tsegi Orange Ware intermixed with San Juan Red Ware (Wilson and Blinman 1999).

Pueblo III Period (A.D. 1140–1280)

Throughout the northern Southwest, the Pueblo III period was characterized by the mid–A.D. 1100s drought, an end to the construction of Chaco-influenced architecture, population aggregation that led to the construction of large villages and cliff dwellings, the Great Drought (which began about A.D. 1276), and the depopulation of the region about A.D. 1280. The single greatest megadrought recorded for North America occurred in the western half of the continent from A.D. 1140 to 1162; this period contained 23 consecutive years of negative Palmer Drought Severity Index values (Cook et al. 2007). This megadrought occurred within a period of prolonged moisture deficiency in the Colorado Plateau spanning five decades—from A.D. 1130 to 1180. In a recent study of drought in the northern Southwest, Meko et al. (2007) reconstructed annual Colorado River flows at Lee Ferry, Arizona, for the period A.D. 762–2005 from tree-ring samples and, beginning with the year1906, with stream-flow data. Although this study focused solely on stream flow, which is affected by factors in addition to precipitation, the results clearly indicate that Colorado River flows in the middle A.D. 1100s were the lowest of the past 1,200 years. According to Meko et al. (2007), below-normal flow occurred for the 13 consecutive years between A.D. 1143 and 1155. The mid–A.D. 1100s megadrought almost certainly had environmental and cultural repercussions: depressed water tables, eroded floodplains, decreased climatic variability, reduced precipitation, and reduced agricultural productivity (Van West and Dean 2000). Consequently, the duration, intensity, and persistence of the drought in the mid-A.D. 1100s must have had a significant impact on the occupants of the northern San Juan region (Benson et al. 2007; Van West and Dean 2000).

The mid–A.D. 1100s drought coincided with the collapse of the Chaco regional system. Construction of great houses in Chaco Canyon ceased by A.D. 1125, and Kantner and Kintigh (2006) suggest that the frequency of abandonment was greatest during the first half of the twelfth century, probably as a result of environmental conditions (Kantner and Kintigh 2006:184). In the northern San Juan region, the construction of canyon-style great houses ended about A.D. 1140, during the A.D. 1130–1180 drought. Judge and Cordell (2006) note that structures built in Chaco Canyon after A.D. 1130 seem to have been more domestic than ritual in their use, and they were constructed with loaf-shaped, pecked sandstone blocks characteristic of the McElmo architectural style as opposed to the core-and-veneer styles used in previous centuries (also see Chapter 5). As stated above, the complex of great houses at Aztec became an equal—if not the primary—center of the ancestral Pueblo world during the early Pueblo III period (Lekson 1999).

There are relatively few cutting dates for the A.D. 1150–1170 period in the Mesa Verde region. If regional patterns of tree-ring dates reflect occupational patterns, wood harvesting and construction projects should be evident in the tree-ring dates even when populations were static or decreasing (Berry and Benson 2010). Some researchers have interpreted the apparent decline in tree harvesting during the A.D. 1130–1180 drought as evidence of great house abandonment (Benson et al. 2007), and others suggest that the region was completely depopulated (Berry

1982). Even though few sites excavated in the central Mesa Verde region exhibit evidence of construction during the A.D. 1130–1180 period—Albert Porter Pueblo is one of the few—it seems unlikely that the region was completely depopulated (Lipe 2006; Lipe and Varien 1999; Ryan 2010; Varien 1999). In one study, for example, Varien (1997, 1999) analyzed patterns of beam harvesting in three Mesa Verde communities and found that beam harvesting probably continued at reduced levels during the mid-A.D. 1100s.

It is also important to note that, beginning in the early Pueblo III period (A.D. 1140–1225), people began to construct houses of coursed sandstone masonry, and the average occupation span of unit pueblos increased from about 20 years to an estimated 45 years (Varien 1999; Varien and Ortman 2005). The inference of increased occupation spans resulted from studies of pottery discard that estimate the length of time people resided in a unit pueblo rather than the estimated length of time the roofs of these structures could endure (Ryan 2010). The fact that some roofs resting on masonry walls in cliff dwellings are still functional today, and that a high proportion of timbers from late–A.D. 1200s structures are recycled beams (Bradley 1993), suggests that the roof beams in masonry structures might have lasted much longer than houses were typically occupied. If so, this would have greatly reduced the need to harvest "new" timbers for construction during the Pueblo III period and would challenge the significance of periods of reduced timber harvesting reflected in regional tree-ring data sets (Ryan 2010).

The most famous sites in the Mesa Verde region—including the cliff dwellings of Mesa Verde National Park and the canyon-head structures of Hovenweep National Monument—date from the late Pueblo III period. Settlement organization changed dramatically during that period. First, community centers shifted from mesa-top and upland settings to alcoves and canyon heads, and second, the majority of people began to live in tightly aggregated villages (Lipe and Ortman 2000; Lipe and Varien 1999; Varien 1999).

The shift to highly aggregated canyon-head villages appears to have occurred over a 20–30 year span, and this pattern became the dominant organizational layout during the late Pueblo III period (Lipe and Varien 1999:303). Although some mesa-top and upland community centers—including Albert Porter Pueblo—retained a portion of their population, the majority of households were living in highly aggregated villages by about A.D. 1250. Many of these villages were constructed on a canyon rim—usually at the head of the canyon—and in overhangs and on talus slopes below the rim. Woods Canyon Pueblo (Churchill 2002) was a canyon-head village that succeeded Albert Porter Pueblo as the center of the Woods Canyon community during the late Pueblo III period. It was also during this time that canyon-oriented communities composed of clusters of cliff dwellings developed on the Mesa Verde proper (Lipe and Varien 1999:303).

Most canyon-head community centers contained a suite of common architectural elements including towers, plazas, multi-walled structures, D-shaped structures, and also village-enclosing walls—some of which enclosed springs (Glowacki 2006; Kuckelman 2007; Lipe 2002; Lipe and Ortman 2000; Lipe and Varien 1999:319; Varien et al. 1996:99). Great kivas were constructed in community centers during the late Pueblo III period but through time were increasingly constructed without roofs; this change in construction style might have been an effort to make the activities conducted therein more public (Kintigh et al. 1996). Furthermore, in a study of late Pueblo II and Pueblo III public architecture throughout the Mesa Verde region, Churchill et al.

(1998) noted that the number of communities that contained a great kiva decreased through time, and those with a multi-walled structure increased. Most multi-walled structures were built in the late Pueblo III period (Lipe and Varien 1999:319).

Population in the central Mesa Verde region probably peaked in the early A.D. 1200s and then began a rapid decline by A.D. 1270. Lipe (1994) estimates that post–A.D.1250 community centers—of which there were approximately 60—contained about 8,000 structures; even if all of these structures were occupied at the same time, the northern San Juan population might not have exceeded 10,000 individuals. Other population estimates range from a low of 2,000 to 6,000 individuals (Duff and Wilshusen 1999, 2000:Figure 2) to a high of 30,000 (Rohn 1989:166). However, many researchers infer that 10,000 to 20,000 individuals inhabited the region during the Pueblo III period (Duff and Wilshusen 2000:182; Lipe 2002:214; Lipe and Varien 1999:326; Varien et al. 2007; Wilshusen 2002:120).

A large body of research has focused on the role of the Great Drought—which lasted from A.D. 1276 to 1299 (Douglass 1929)—in the migration of people from the Mesa Verde region near the end of the thirteenth century (Ahlstrom et al. 1995; Benson et al. 2007; Cordell 2007; Dean and Van West 2002; Douglass 1929; Van West and Dean 2000). There is broad consensus that the Great Drought played a role in the final depopulation of the region; however, on the basis of tree-ring dates, some researchers argue that individuals began migrating from the area before the Great Drought. Lipe (1995), for example, argues that migrations began in the A.D. 1250s (also see Lipe and Varien 1999:339). Alternatively, Duff and Wilshusen (2000) argue that individuals began to depart the region as early as the first part of the thirteenth century.

Tree-ring research indicates that the bimodal pattern of annual precipitation in the northern Southwest became capricious from A.D. 1250 to 1450 (Ahlstrom et al. 1995; Dean 1996). However, the annual precipitation patterns for the Rio Grande and upper Little Colorado River basin areas of New Mexico and eastern Arizona remained stable, making these regions attractive to migrating populations (Cordell 2007). Did the Great Drought negatively affect crop production and resource acquisition and lead to mass migration? Van West's (1994) model of soil moisture and crop productivity for southwestern Colorado suggests that the region as a whole could have supported a significant population during the Great Drought, although particular communities might have been affected more than others.

Thus, recent research suggests that neither environmental factors nor resource depletion alone forced populations to migrate from the Mesa Verde region (Van West and Dean 2000:38–39; Varien 1999:216, 2010; Varien et al. 1996:103–105; Wright 2010; but also see Kuckelman 2010a). Researchers are now examining the role that social factors—and social factors in combination with environmental factors (Kohler 2010; Varien 2010)—might have played in decisions to migrate from the region. Factors such as conflict and warfare (Haas and Creamer 1993; Kohler 1993; Kuckelman 2002, 2010a, 2010b; Kuckelman et al. 2002; LeBlanc 1999; Lightfoot and Kuckelman 2001) and organizational collapse (Glowacki 2010) might have been catalysts for the migrations. Regardless of the factors that caused the depopulation, future research would benefit by focusing on how migration occurred as social process (Varien 2010).

The most common white ware pottery types associated with the Pueblo III period in the Mesa Verde region are McElmo Black-on-white and Mesa Verde Black-on-white; the predominance of the latter increased through time (Lipe and Varien 1999:316; Ortman et al. 2005:5–14; Wilson and Blinman 1999). The dominant gray ware type found in Pueblo III contexts is Mesa Verde Corrugated Gray (Ortman et al. 2005:5–6).

Chronological Assignments

In 1927, a group of Southwestern archaeologists gathered in Pecos, New Mexico, to disseminate information on their most recent archaeological findings and interpretations. It was during this conference that Alfred Kidder proposed the adoption of the "Pecos Classification" system—a developmental sequence of eight cultural periods (Table 3.1). This system relied on architectural morphology, pottery designs, and material technology to place archaeological sites within a culture-historical sequence. Because absolute dating techniques had not yet been developed, the cultural periods lacked associated date spans. Chronological date spans were assigned to the Pecos periods two years later following the development of tree-ring dating by A. E. Douglass, an astronomer at the University of Arizona. Because groups of people adopted specific material culture traits at different times, and because there were several cultural groups living in the Southwest (e.g., Anasazi, Mogollon, Hohokam), it soon became clear that the Pecos Classification system was not a good fit for all cultures and areas of the Southwest. Archaeologists solved this problem by modifying the date spans at regional and sub-regional levels. Crow Canyon Archaeological Center uses the Pecos Classification periods to reference organizational developments and material culture patterning.

The chronological assignments used in this report consist of multiple, absolutely dated periods ranging from broad spans of time consisting of a few centuries to short periods of time spanning only a few decades (Table 3.2). The broadest of these time periods reference the Pecos Classification system and are referred to in this report as Pueblo I (A.D. 725–920), Pueblo II (A.D. 920–1140), and Pueblo III (A.D. 1140–1280); subperiods and phases represent subdivisions of the Pecos periods. Because structures, features, and other cultural deposits were utilized for varying spans of time, many study units have been assigned to date ranges that span more than one period or subperiod. The following periods and subperiods are used most often in this report: Basketmaker III (A.D. 600–725), Pueblo I (A.D. 725–920), early Pueblo II (A.D. 920–1060), late Pueblo II (A.D. 1060–1140), early Pueblo III (A.D. 1140–1225), and late Pueblo III (A.D. 1225–1280).

Dating Methods Used at Albert Porter Pueblo

In this section I discuss the various dating methods used to reconstruct the occupational history of Albert Porter Pueblo. The methods used include tree-ring dating, dating with pottery, and archaeomagnetic, architectural, radiocarbon, and stratigraphic dating.

Tree-Ring Dating

Wood from many trees that were harvested and used for construction material, firewood, and other needs has been preserved in the archaeological record of the Southwest. Archaeologists commonly infer the settlement history of sites and regions from prehistoric construction activities. A gap in a chronological series of tree-ring dates may indicate a period of reduced construction or total depopulation of a site or region. Poor wood preservation also limits the number of tree-ring dates for all periods of occupation.

The likelihood that wood will be preserved increases when wood becomes burned or charred, because fungi are not able to decompose charred wood as easily as unburned wood. Ancestral Pueblo people commonly reused wood construction materials. Many unburned roof beams were used to construct new buildings. One example of recycling rates comes from excavations at Sand Canyon Pueblo, a canyon-head village occupied from A.D. 1250 to about 1280. Sixty-eight percent of the 275 "cutting" dates represent recycled beams—30 percent of which were harvested before A.D. 1225 (Varien et al. 2007). Many of the samples that yielded these dates were collected from a single structure, suggesting that beams were recycled from several generations of households in the vicinity (Bradley 1993). Furthermore, it has been demonstrated that when a population is not growing rapidly, most new buildings will be constructed with recycled beams (Dean 1970; Schlanger 1980).

During the four-year field project at Albert Porter Pueblo, 387 tree-ring samples were collected. Most of these samples were collected from primary and secondary roof beams in burned kivas. The remaining samples were collected from structures other than kivas and from midden deposits. Tree-ring samples collected from midden contexts probably originated from fuelwood in structure hearths.

All 387 samples were sent to the Laboratory of Tree-Ring Research at the University of Arizona for analysis, and 175 of those were datable. Table 3.3 presents the results by study unit. Reports on this analysis provided by the Laboratory of Tree-Ring Research identify wood species, calendar year of the innermost and outermost ring present, and symbols that provide additional information for each analyzed sample (adapted from Nash1999:Table 1):

Symbol	Explanation
B	Bark is present.
G	Beetle galleries are present on surface of specimen.
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.

Because tree-ring analysis can yield a "cutting" date—that is, the exact year a tree died—researchers can use those data to reconstruct the construction and occupational history of a site. However, not all tree-ring dates reflect the year of construction. For example, wood might have been harvested for the construction of one structure and then used to construct the roof of a later structure.

Five basic principles (Ahlstrom et al. 1985:39; Dean 1978:148) were used to interpret the tree-ring data for Albert Porter Pueblo: (1) construction activities occur shortly after trees were harvested; (2) the latest cluster of cutting dates—those with "B" or "r "symbols—from a structure indicates those trees were harvested to construct that structure; (3) earlier cutting dates indicate wood was recycled from an earlier structure; (4) non-cutting dates—those with "vv" symbols—result from damage or the lack of preservation to the outside of the wood sample and therefore do not reflect the year of construction; and (5) if there are no clusters of cutting dates for a structure, the latest cutting date most likely reflects when the structure was constructed. In addition, trees with dates with the "v" symbol are interpreted as having died or been harvested within a few years of the outside date and are interpreted as "near-cutting dates."

Tree-ring cutting dates for Albert Porter Pueblo indicate that occupation occurred during the Pueblo II and Pueblo III periods. Of the 387 samples collected, 32 (8.3 percent) yielded cutting dates and another 10 (2.6 percent) yielded near-cutting dates (see Table 3.3). The remaining tree-ring samples were either not datable or yielded dates that do not reflect when the tree died.

Figure 3.1 is a histogram of all tree-ring dates for Albert Porter Pueblo. These dates suggest that habitation at Albert Porter Pueblo began about A.D. 860 and continued until sometime after A.D. 1258. However, the cutting dates, plotted in Figure 3.2, more accurately reflect the span of occupation. The cutting dates suggest that the site was occupied continuously from about A.D. 1110 (late in the Pueblo II period), until about 1260 (late in the Pueblo III period). Although the samples that yielded all the dates were collected from one structure, Structure 150, the year for which there is the greatest number of cutting dates is A.D. 1142 (see Figure 3.2). Surprisingly, this year falls during the A.D. 1130–1180 drought, a period for which there are few cutting dates for the Mesa Verde region (Ryan 2010; Varien 1999:Figure 7.17).

The tree-ring data do not reflect habitation at Albert Porter Pueblo during the Basketmaker III or Pueblo I period nor did excavation expose any structures characteristic of these periods. However, pottery data—which will be discussed below—do provide evidence of limited habitation of this location during the Basketmaker III and Pueblo I periods.

Many contexts at Albert Porter Pueblo were assigned a date range on the basis of their relationship to tree-ring dated contexts. For example, deposits located immediately above and below a tree-ring dated context could be dated relative to the tree-ring dated context. Table 3.4 lists all study units from Albert Porter Pueblo according to type and date range. Study units with accompanying tree-ring dates are bolded.

Pottery Dating

Pottery types were the primary evidence used to reconstruct the occupational history of Albert Porter Pueblo. Pottery of the Mesa Verde region has been studied intensively for nearly a century, resulting in detailed type descriptions and an understanding of ancient pottery manufacturing techniques. Most importantly, the chronological significance of pottery types is well established. Pottery design, form, and manufacturing technology changed through time, and researchers have successfully correlated pottery types with tree-ring dates to establish temporal periods for each type (Ortman et al. 2005).

Most study units at Albert Porter Pueblo were assigned a date range on the basis of the associated pottery. The assemblage from each study unit was compared to the idealized pottery-assemblage profiles for various time periods developed by Wilson and Blinman (1995, 1999) to establish the most likely time span over which the pottery was deposited. This information, along with any associated tree-ring dates and dating evidence from relevant units nearby, was then used to estimate the span of time during which that study unit was used.

As a result of long occupation spans and mixing of deposits, many artifact assemblages contain sherds of pottery types representing multiple periods. To address this problem, Ortman et al. (2007) developed a method to assess the statistical likelihood of the percentage of pottery types that should be present within refined temporal intervals. The following spans were defined: A.D. 1020–1060, 1060–1100, 1100–1140, 1140–1180, 1180–1225, 1225–1260, and 1260–1280. Note that the spans vary in length. This model uses three variables: (1) the probability of the occurrence of various pottery types and design attributes on decorated bowl-rim sherds in precisely dated sites as derived from a calibration dataset, (2) the observed counts of the same types and attributes in the sample of decorated bowl-rim sherds for various precisely dated sites, and (3) the average weight of corrugated gray sherds found in the midden deposits for precisely dated sites. Pottery subassemblages recovered from Albert Porter Pueblo were compared against the calibration dataset developed by Ortman et al. (2007), resulting in the assignment of refined date ranges as applicable.

Table 3.5 provides information on analyzed pottery by count and weight, as well as by count percentage and weight percentage. Some researchers prefer to discuss pottery by weight because sherd count may be affected by natural and cultural processes—for example, stepping on a single sherd may break it into several pieces, skewing the interpretive results. Others prefer to discuss pottery by count, because sherd weight is affected by sherd size; for example, one large sherd may outweigh five smaller ones. Clearly, sherd weight and sherd count are useful for addressing different research problems; thus, both pottery weight and count will be provided for Albert Porter Pueblo.

As seen in Table 3.5, all Pecos Classification periods are represented in pottery analyzed from Albert Porter Pueblo. There are six sherds, or 14.50 g, of pottery dating from the early Basketmaker III period. Because early Basketmaker III period sherds are very sparse within the overall pottery count and weight—0.004 percent and 0.001 percent of the overall sherds, respectively—it can be inferred that there was not an early Basketmaker III period occupation at

Albert Porter Pueblo. It is possible that these sherds or vessels were brought to the site as heirloom pieces by residents of Albert Porter Pueblo during the late Basketmaker III period.

In all, 133 sherds, or 881.27 g of pottery, date from the Basketmaker III period. Although pottery is not well represented for this period—0.080 percent of both count and weight of the overall sherds—it seems likely that there was a small Basketmaker III occupation in this location. Furthermore, it can be inferred that the first permanent residences were constructed here during the Basketmaker III period.

Additionally, 12,298 sherds weighing more than 64,000 g that could date from either the Basketmaker III or Pueblo I period were collected at Albert Porter Pueblo. This subassemblage accounts for more than 7 percent of the sherds by count and more than 5 percent by weight of the overall site assemblage. Most of these sherds consist of plain gray jar sherds that cannot be dated more precisely. These results indicate a substantial occupation of Albert Porter Pueblo sometime during the Basketmaker III period, the Pueblo I period, or both.

There are 902 sherds, or more than 4,474 g of pottery, that date specifically from the Pueblo I period. This accounts for 0.543 percent by count and 0.407 percent of the total assemblage by weight. Fewer sherds could be assigned to the Pueblo I period than to the Basketmaker III/Pueblo I catchall category. This may be because there were fewer residents at Albert Porter Pueblo during the late Pueblo I period, mirroring the regional population trends as described above. Alternatively, it is possible that many sherds that might have been deposited during the Pueblo I occupation could not be dated to that period and therefore were assigned to the broader Basketmaker III/Pueblo I category.

A total of 11,334 sherds, or more than 89,927 g of pottery, dates from the Pueblo II period. This accounts for more than 6 percent of the overall count and more than 8 percent of the overall weight. These results are similar to those for the Basketmaker III/Pueblo I category, and suggest heavy occupation of the pueblo during the Pueblo II period. However, the Pueblo II/Pueblo III category results indicate that, with 129,022 sherds, or more than 788,989 g of pottery, the most populous occupation occurred during this time. This accounts for more than 77 percent of the overall assemblage by count and more than 71 percent by weight.

The Pueblo III period results are similar to those of the Basketmaker III/Pueblo I category and the Pueblo II period with 11,471 sherds, or more than 146,168 g of pottery, dating from this period. This accounts for more than 6 percent of the overall assemblage count and more than 13 percent of the assemblage by weight. Thus, the quantity of pottery dating from the Pueblo III period indicates a considerable occupation of Albert Porter Pueblo during that time.

Other Methods of Dating

Architectural characteristics provided useful chronological information for each tested structure at Albert Porter Pueblo. Dating inferences were drawn from several lines of evidence: type of construction materials; method of construction; construction style—specifically, Chaco or McElmo; construction sequence; and context—specifically, if a structure was constructed on earlier cultural deposits or on undisturbed native sediment. This evidence proved especially valuable in the chronological interpretation of the "great house," located in Architectural Block 100. Chapter 5 of this report is devoted to a discussion of architecture.

Archaeomagnetic Dating

Archaeomagnetic dating relies on variation in the direction and intensity of the earth's magnetic field through time. When soils and sediments containing clay are heated to temperatures exceeding 400–500º F, ferromagnetic minerals within the clay, such as magnetite and hematite, will assume the direction of the magnetic field that surrounds them (Michels 1973:140–141). The age of the archaeological sample can be determined by comparing these alignments to a key developed by Robert DuBois for the American Southwest (Eighmy 1990:33; Michels 1973; Weaver 1967). DuBois developed the polar calendar, or key, by comparing the magnetic alignment of samples collected from archaeological sites with known carbon-14 or tree-ring dates. The key extends back approximately 2,000 years and traces the meandering geomagnetic pole for 8,800 miles during that period (Michels 1973:141). The DuBois Curve is used for segments of the curve dating A.D. 400–650 and A.D. 1450–present (DuBois 1989). Additionally, two other calibration curves are commonly used to date samples from specific periods of time in the Southwest: (1) the Wolfman Curve, used to date the A.D. 1000–1450 segment of the curve (Cox and Blinman 1999); and (2) the SWCV595 Curve, used to date the A.D. 650–1000 segment of the curve (Lengyel and Eighmy 2002).

Archaeomagnetic samples were collected from hearths in Structure 112 (Feature 4) and Structure 150 (Feature 12) and were sent to Statistical Research, Inc. for analysis. These samples were dated using the SWCV595 Curve. Results indicate that the latest, hottest fire in the hearth in Structure 112 occurred sometime between A.D. 1160 and 1290 (Table 3.6). The data indicate that the hearth in Structure 150 was last used sometime during the span A.D. 1010–1165; however, the results suggest a strong likelihood that the feature was last used in the early twelfth century, specifically around A.D. 1125 (see Table 3.6).

Archaeomagnetic samples were also collected from hearths in Structure 107 (Feature 1) and Structure 108 (Feature 1) and were sent to the Office of Archaeological Studies at the Museum of New Mexico for analysis. These samples were dated using the Wolfman Curve. Results indicate that the latest hottest fire in the hearth in Structure 107 occurred between A.D. 1050 and 1250, with a strong likelihood that it occurred between A.D. 1205 and 1305. The data indicate that the last use of the hearth in Structure 108 occurred between A.D. 1200 and 1250.

Radiocarbon Dating

Radiocarbon is the most common absolute dating technique used by archaeologists worldwide. Developed in the 1950s by Willard Libby, radiocarbon dating measures the half-life of carbon-14 atoms. All organic matter, while alive, is in equilibrium with the environment and is constantly absorbing carbon-14 (Michels 1973:149). However, at the time of death this process ceases, because there is no process by which carbon-14 can then enter the organism. At death, carbon-14 atoms begin to decay, turning into nitrogen-14 at a fixed rate or half-life (Michels 1973:150). The remaining carbon-14 atoms in a sample can thus be measured to determine how long ago the parent organism died. All radiocarbon results are calculated from the year A.D. 1950, before atmospheric disturbances caused by nuclear explosions and industrial coal burning (Michels 1973:155) and are reported as "1 Sigma calibrated results" and "2 Sigma calibrated results." The 1 Sigma calibrated results provide a 95 percent probability that the age of the sample falls into the given date range, whereas the 2 Sigma calibrated results provide a 68 percent probability that the age of the sample falls into the given date range.

Three vegetal samples from Albert Porter Pueblo were sent to the Beta Analytic Radiocarbon Dating Laboratory for analysis (Table 3.7). The first radiocarbon sample consisted of a single charred bean collected from the hearth, Feature 4, in Structure 112, an aboveground kiva dating from the late Pueblo II period. Results of the analysis indicate that the bean has a conventional radiocarbon age of 760±40 BP ("BP" is an abbreviation for "before present," or 1950). The 2 Sigma calibrated result provided a 95 percent probability that the associated bean plant died between A.D. 1210 and 1290. The 1 Sigma calibrated result provided a 68 percent probability that the associated bean plant died between A.D. 1250 and 1280. Because the ratio of pottery types found in the roof sediments is 2:2:1 Mancos, McElmo, and Mesa Verde Black-on-white, respectively, it seems likely that use of Structure 112 ended during the early Pueblo III period, and the radiocarbon date span of A.D. 1210–1290 best fits the date of structure abandonment.

The second radiocarbon sample consisted of maize kernels collected from the floor of Structure 150, a masonry-lined kiva that, according to tree-ring dates, was constructed in A.D. 1142 or 1188. Results of the radiocarbon analysis indicate that the maize kernels have a conventional radiocarbon age of 800+60 BP (see Table 3.7). The 2 Sigma calibrated result provided a 95 percent probability that the maize kernels ceased growing either between A.D. 1060 and 1080 or between A.D. 1150 and 1290. The 1 Sigma calibrated result provided a 68 percent probability that the maize kernels ceased growing between A.D. 1190 and 1280 (see Table 3.7). Because Mesa Verde Black-on-white pottery was absent from the floor assemblage, it seems likely that use of Structure 150 ended during the early Pueblo III period, and the radiocarbon date span A.D. 1190–1280 best dates the abandonment of the structure.

The third sample consisted of charred corn kernels collected from a bin (Feature 1) on the floor of Structure 168, a late Pueblo II non-masonry surface room. Results of the analysis indicate that the beans have a conventional radiocarbon age of 880±40 BP (see Table 3.7). The 2 Sigma calibrated result provided a 95 percent probability that the associated bean plants died between A.D. 1030 and 1250. The 1 Sigma calibrated result provided a 68 percent probability that the associated bean plants died either between A.D. 1060 and 1080 or A.D. 1150 and 1210 (see Table 3.7). This 1 Sigma result is consistent with the dating of this structure to A.D. 1060–1080 as indicated by its earthen-walled construction style and stratigraphic location beneath the original great house. Tree-ring dates indicate that the great house was constructed in the early A.D. 1100s.

Dating by Stratigraphy

Excavation provides unique information on the relationships between objects and deposits—both cultural and natural—and the contexts in which they are found. Because archaeologists make inferences on the basis of material traces of past human behavior, they require a theoretical framework relating behavioral, organizational, material, spatial, and environmental variables

(Schiffer 1995). Interpretation of the stratigraphic record draws heavily from behavioral archaeology, a program developed in the 1970s at the University of Arizona, which focuses on the analysis of human behavior in terms of the production and disposal of material culture (Schiffer 1976). Behavioral archaeologists define archaeology as the relationship between human behavior and material culture in all times and places and rely on the following four-strategy approach (Schiffer 1995:69–72): (1) using material culture manufactured in the past to answer questions about the behavioral and organizational properties of past cultural systems, (2) using present material culture in order to acquire laws useful for the study of the past, (3) using past material culture to derive behavioral laws that can be applied to past and present human behavior, and (4) using present material culture to describe and explain present human behavior. At Albert Porter Pueblo, the four-strategy approach of behavioral archaeology guided stratigraphic interpretation.

In addition to reconstructing past human behavior, stratigraphy can be used as an indirect dating technique. The law of superposition—which states that sediment is deposited in a time sequence, with the oldest on the bottom and the youngest on the top—allows archaeologists to infer when a particular stratum was deposited. Furthermore, it allows archaeologists to infer if the occupation of a site or structure was continuous or discontinuous, how much time elapsed between occupations, how many times a particular location or structure was occupied, and the duration of occupation. At Albert Porter Pueblo, it was commonplace to make chronological inferences on the basis of stratigraphic relationships, especially if diagnostic artifacts were not available. Stratigraphic interpretations for specific study units are presented in the database accompanying this report.

Occupational History of Albert Porter Pueblo

Using the dating techniques and data reviewed above, I assigned each study unit identified in the excavations at Albert Porter Pueblo (Crow Canyon Archaeological Center 2010) to one or more date ranges of varying precision on the basis of evidence of the initial and final periods of use. To adequately characterize the dating of each study unit, I defined 23 distinct date ranges (see Table 3.4). Date Ranges 1–13 were derived from the Pecos Classification system; Date Ranges 1–3 represent the Pecos periods and Date Ranges 4–13 represent sub-periods of the Pecos periods. Additionally, Date Ranges 14–19, 21, and 23 span more than one Pecos period or sub-period. Finally, Date Range 22 was assigned to noncultural deposits; these deposits were not assigned a chronological date. Here, I summarize the occupational history of Albert Porter Pueblo.

Excavation data indicate that Albert Porter Pueblo was occupied from the Basketmaker III period until the late Pueblo III period; the population of this settlement declined during the final decades of occupation in the region. This occupation overlapped with the occupations of the Bass Site complex and Woods Canyon Pueblo.

The types of pottery found at Albert Porter Pueblo suggest that people inhabited this location as early as the Basketmaker III period. However, none of the excavation units encountered Basketmaker III deposits; this is probably a consequence of the research design and how excavation units were selected for sampling. For example, structural remains visible on the modern ground surface were more likely to have been tested than a structure that was not visible on the modern ground surface. Although few Basketmaker III sherds were recovered, I infer that a small population resided at this location during Basketmaker III times. Additionally, there is a strong Basketmaker III/Pueblo I pottery signature at Albert Porter.

Fewer sherds date from the Pueblo I period than were assigned to the Basketmaker III/Pueblo I category. As was the case for the Basketmaker III period, none of the excavation units encountered Pueblo I period deposits. It is probable that fewer people resided at Albert Porter Pueblo during the late Pueblo I period, mirroring the regional population trends described above. It is likely that many sherds dating from the Pueblo I period were classified within the broader Basketmaker III/Pueblo I period category.

Population increased at the pueblo in the late Pueblo II period, during the late eleventh century, mirroring a regional trend. The data indicate that approximately 33 residences were constructed during this time at Albert Porter Pueblo (Figure 3.3). A residence, as defined in this report, includes a pit structure and its associated surface rooms. If a household of five to seven people occupied each residence, then between 165 and 231 individuals resided at Albert Porter Pueblo during this time. During the early A.D. 1100s, the great house, located in Architectural Block 100, was constructed. The sparse evidence of construction activity for the period of drought between A.D. 1130 and 1180 suggests that population did not increase during that span. It seems likely that the population of the settlement remained stable or declined during that time.

Approximately 20 new residences were constructed during the early Pueblo III period at Albert Porter Pueblo (Figure 3.4). About 100 to 140 people occupied the new residences. The number of people who resided in pre-existing residences is not known. Thus, the estimate of 100 to 140 individuals is conservative for the settlement as a whole. Furthermore, as stated above, the Pueblo II/Pueblo III period pottery results indicate that the most significant occupation occurred during this period.

The late Pueblo III period witnessed little construction activity at Albert Porter Pueblo; only three new residences were constructed during this time (Figure 3.5). The latest tree-ring cutting date from Albert Porter Pueblo—A.D. 1250r—was yielded by a burned roofing timber in Structure 114, a masonry-lined kiva (see Table 3.3). The same structure also contained a timber that yielded the latest tree-ring date for the entire site, A.D. 1258+vv. If kivas were typically occupied for an average of 45 years (Varien 1999), a small group of people might have resided at Albert Porter Pueblo at least into the A.D. 1260s and possibly later. I estimate that a total of 15 to 21 individuals resided in the three new residences. Additional individuals probably resided in structures built before the late Pueblo III period, but it is difficult estimate the total population of this settlement in the late Pueblo III period. Evidence suggests that the population of the pueblo during this time was significantly reduced from that of the early Pueblo III period.

Two events might have drawn a significant number of residents away from Albert Porter Pueblo during the late thirteenth century: the construction of Woods Canyon Pueblo and regional depopulation. As stated above, the shift to highly aggregated canyon-head villages appears to have occurred over a 20–30 year period, and these large canyon-rim pueblos became the dominant organizational layout during the late Pueblo III period (Lipe and Varien 1999:303).

Although some mesa-top and upland community centers—including Albert Porter Pueblo—retained a small portion of their population, the majority of households had moved to highly aggregated villages by A.D. 1250. Many of these villages were constructed on a canyon rim—usually at the head of the canyon—and in alcoves and on the talus slopes below the rim. Woods Canyon Pueblo succeeded Albert Porter Pueblo as the center of the Woods Canyon community during the late Pueblo III period. The momentary household population estimate for Woods Canyon Pueblo is 70–112 individuals (Churchill 2002); no doubt some of these individuals were born at Albert Porter Pueblo.

As stated earlier, Lipe (1995) argues that the initial migration from the Mesa Verde region to the northern Rio Grande region began in the A.D. 1250s (Lipe and Varien 1999:339). However, Duff and Wilshusen (2000) conclude that individuals began to depart the Mesa Verde region as early as the first part of the thirteenth century. Population estimates for Woods Canyon Pueblo suggest that some individuals might have migrated from the region at the end of the early Pueblo III period.

In sum, the types of pottery found at Albert Porter Pueblo suggest that people were living in this location at least as early as the Basketmaker III period (A.D. 600–750). The most intensive occupation of Albert Porter Pueblo occurred during the Pueblo II period (A.D. 900–1150) and the Pueblo III period (A.D. 1150–1300). Architectural evidence visible on the modern ground surface—which includes the remains of a Chaco-era great house—and the presence of both Pueblo II and Pueblo III pottery types indicate that the settlement reached its maximum extent sometime between A.D. 1100 and 1250. During the mid-to-late A.D. 1200s, most residents departed from Albert Porter Pueblo and probably either resettled at Woods Canyon Pueblo or migrated from the region.

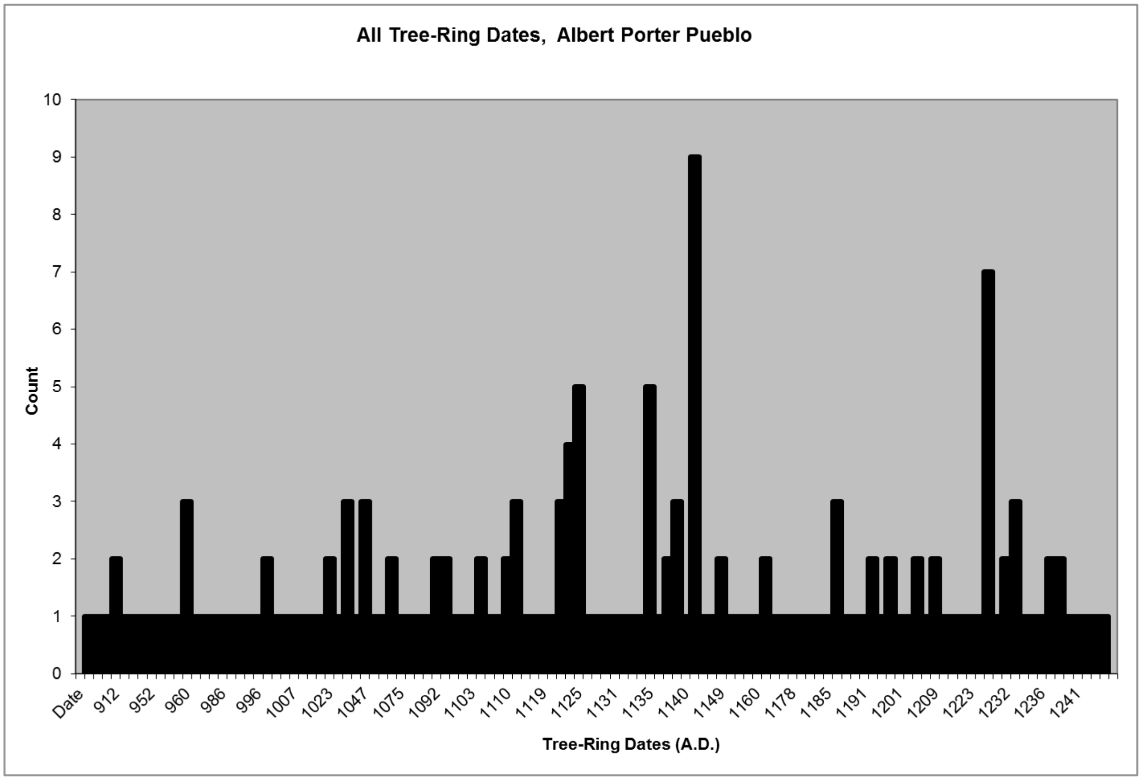

Figure 3.1. Histogram of all tree-ring dates, Albert Porter Pueblo.

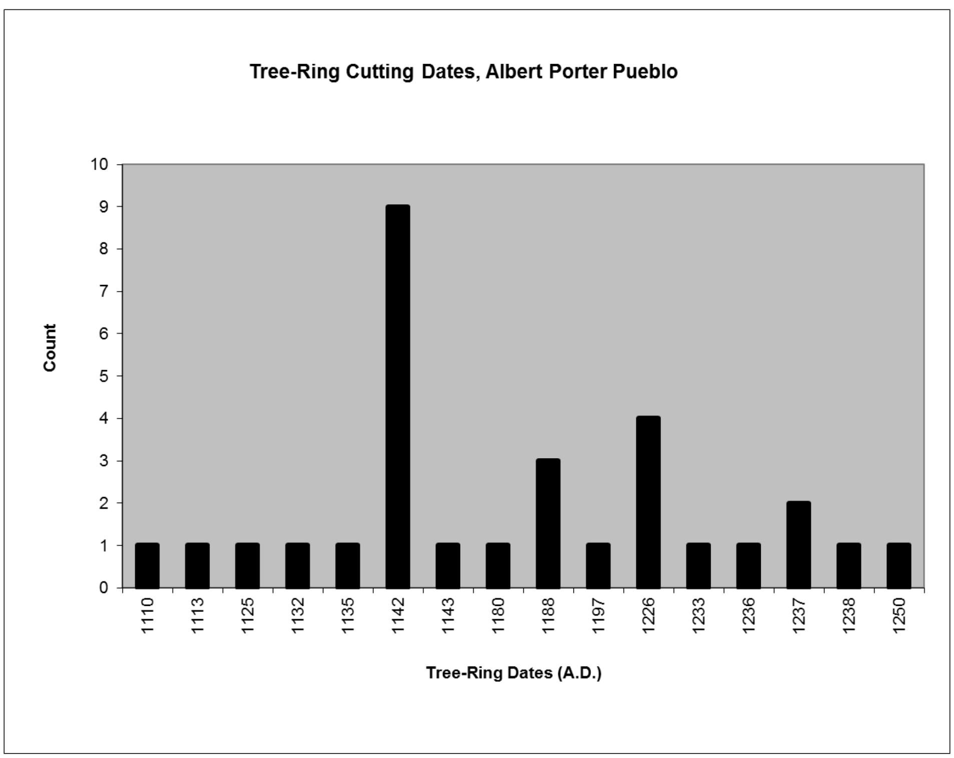

Figure 3.2. Histogram of all tree-ring cutting dates, Albert Porter Pueblo.

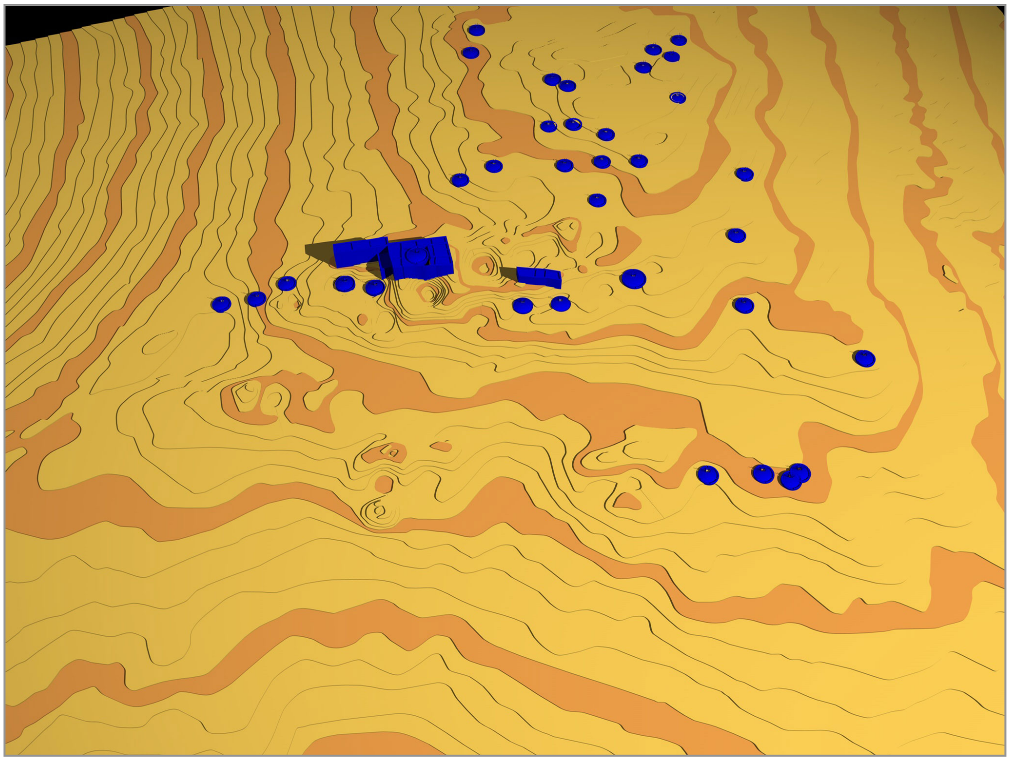

Figure 3.3. Late Pueblo II period occupation, Albert Porter Pueblo.
(Courtesy of Dennis Holloway)

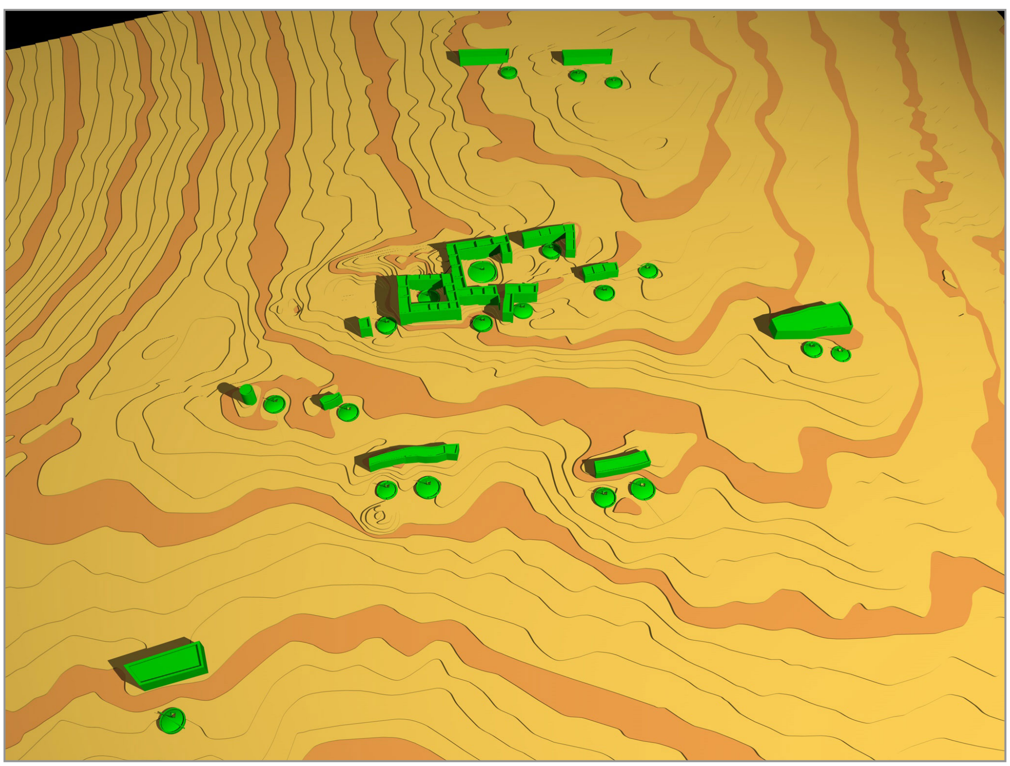

Figure 3.4. Early Pueblo III period occupation, Albert Porter Pueblo.
(Courtesy of Dennis Holloway)

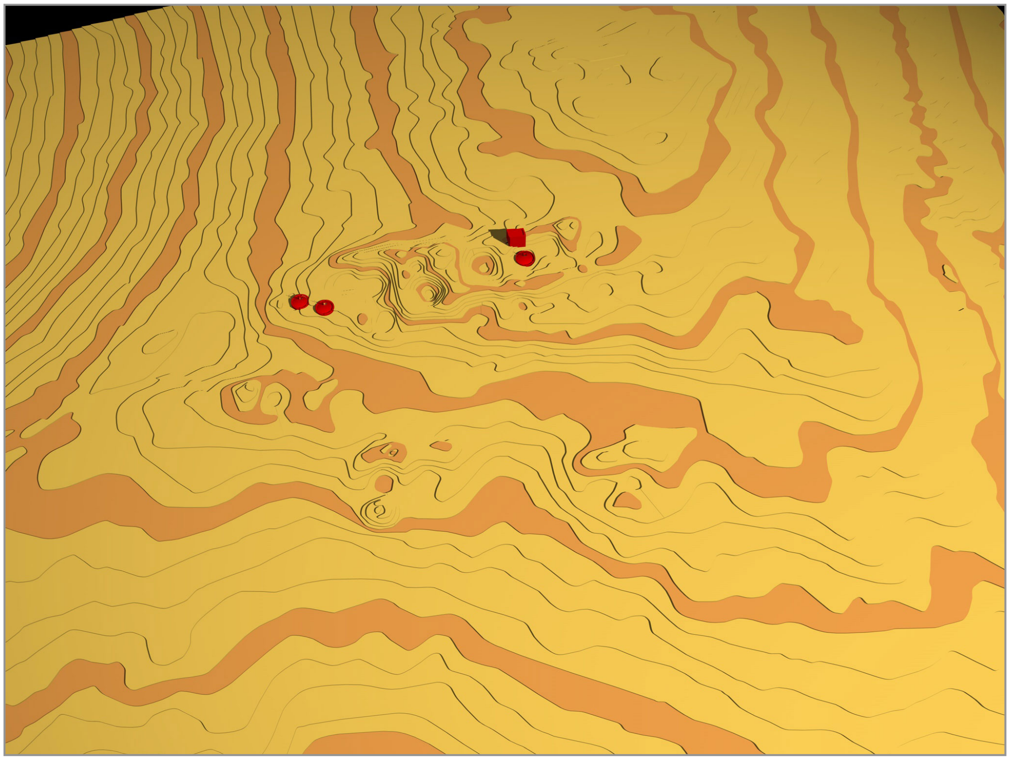

Figure 3.5. Late Pueblo III period occupation, Albert Porter Pueblo.
(Courtesy of Dennis Holloway)

Table 3.1. The Pecos Classification Periods and their Associated Material Culture Traits

Pecos Classification Period	Material Culture Traits
Basketmaker I, or Early Basketmaker	This was a postulated preagricultural stage. The category is no longer used; rather, the developments now relate to the Archaic period.
Basketmaker II, or Basketmaker	Pottery is not present; however, agriculture is known, and the atlatl is used.
Basketmaker III, or Post-Basketmaker	Dwellings are pithouses or slab houses. Pottery is made. The cooking ware is plain, without decoration.
Pueblo I, or Proto-Pueblo	Cranial deformation is practiced. Culinary vessels have coils or bands at the neck. Villages are composed of aboveground, contiguous rectangular rooms.
Pueblo II	Corrugations extend over the exterior surface of cooking vessels. Small villages occur over a large geographic area.
Pueblo III, or Great Pueblo	Large communities appear. Craft specialization occurs.
Pueblo IV, or Proto-Historic	The San Juan region is depopulated. Corrugated wares are no longer produced in favor of plainware.
Pueblo V, or Historic	The final period, from A.D. 1600 to present.

Source: Adapted from Cordell (1984:55–56).

Table 3.2. Time Periods, Subperiods, and Phases Assigned to Study Units, Albert Porter Pueblo.

Year (A.D.)	Period	Subperiod	Phase
600	Basketmaker III	Basketmaker III	A.D. 600–725
725	Pueblo I	Early Pueblo I	A.D. 725–800
800		Late Pueblo I	A.D. 800–840
840			A.D. 840–880
880			A.D. 880–920
920	Pueblo II	Early Pueblo II	A.D. 920–980
980			A.D. 980–1020
1020			A.D. 1020–1060
1060		Late Pueblo II	A.D. 1060–1100
1100			A.D. 1100–1140
1140	Pueblo III	Early Pueblo III	A.D. 1140–1180
1180			A.D. 1180–1225
1225		Late Pueblo III	A.D. 1225–1260
1260			A.D. 1260–1280
1280			

Table 3.3. All Tree-Ring Dates, Albert Porter Pueblo.

Study Unit	Non-Cutting Dates (A.D.)	Cutting and Near-Cutting Dates (A.D.)	Latest Date (A.D.) (from cutting and non-cutting dates)
General Site	986+vv		986+vv
Structure 107	1232+vv, 1226+vv, 1213+vv, 1206++B, 1197+vv, 1168vv, 1149+vv, 1135+vv, 1130vv, 1129+vv, 1124vv, 1124vv, 1098vv, 1075vv, 1024+vv, 1013+vv, 1008+vv, 1007+vv, 1002+vv, 960+vv, 960+vv, 960+vv	1197+rB	1232+vv
Structure 110	1192++vv, 1178vv, 1160+vv, 1122vv, 1122++vv	1180LGB, 1125+B	1192++vv
Structure 114	1258+vv, 1248vv, 1241vv, 1239+vv, 1238vv, 1233+vv, 1229+vv, 1201vv, 1136+vv, 1026++vv	1250r	1258+vv
Structure 115	898+vv		898+vv
Nonstructure 132	1209vv, 1097+vv		1209vv
Structure 136	1218vv, 1205++vv, 1191++vv, 1179++vv, 1175++vv, 975vv		1218vv
Structure 137	1002+vv, 965vv, 955+vv		1002+vv
Nonstructure 139	956vv		956vv
Structure 141	1058vv, 947vv		1058vv
Structure 150	1149++B, 1138++v, 1138++vv, 1138+vv, 1137vv, 1137++B, 1135++r, 1135++v, 1133vv, 1131vv, 1128vv, 1125vv, 1125vv, 1125vv, 1125++rB, 1124+vv, 1122vv, 1120++B, 1119vv, 1118vv, 1116vv, 1110++vv, 1109vv, 1107++vv, 1107++vv, 1103vv, 1095vv, 1095vv, 1092vv, 1092vv, 1089vv, 1084++vv, 1082vv, 1073++vv, 1047vv, 1047vv, 1026vv, 1023vv, 1012vv, 1004vv, 988++vv, 987vv, 945vv, 912vv, 102vv	1188r, 1188v, 1188r, 1143v, 1142r, 1142v, 1142v, 1142v, 1142r, 1142rB, 1142v, 1142v, 1142v, 1135+r, 1132+B, 1113v, 1110r	1188r
Structure 153	1135vv, 920++vv		1135vv
Nonstructure 154	1023vv		1023vv
Nonstructure 159	1192vv		1192vv

Study Unit	Non-Cutting Dates (A.D.)	Cutting and Near-Cutting Dates (A.D.)	Latest Date (A.D.) (from cutting and non-cutting dates)
Structure 170	1044vv		1044vv
Structure 176	1140++vv, 1113vv, 996vv		1140++vv
Structure 305	1026+vv		1026+vv
Structure 402	1226vv, 1226vv, 1225vv, 1223++rB, 1203++rB, 1159vv, 1157vv, 1152vv, 1144vv, 1134++vv, 1124vv, 1113vv, 1108++vv, 1047vv, 1003+vv, 958vv, 912vv, 900vv, 866vv	1226+r, 1226+B	1226B
Structure 403	1235+vv, 1234vv, 1233vv, 1226v, 1222+vv, 1209vv, 1194vv, 1190vv, 1189+vv, 1185++vv, 1169+vv, 1073+vv	1226+r, 1226+v, 1238+v, 1237v, 1237r, 1236rB, 1233+rB, 1226+v, 1226+r	1238+v
Structure 502	1232+vv, 1183vv		1232+vv
Structure 803	1205+vv		1205+vv
Structure 908	991+vv, 974vv, 952vv		991+vv
Structure 1037	1060+vv		1060+vv
Structure 9005	1168++vv		1168++vv

Table 3.4. Chronological Assignments for all Cultural Contexts, Albert Porter Pueblo.

(a) Table 3.4, Date Ranges 1–12

Date Range	1	2	3	4	5	6	7	8	9	10	11	12
Span (Years A.D.)	725–920	920–1140	1140–1280	725–800	1020–1060	1060–1140	1140–1225	1225–1280	1060–1100	1100–1140	1140–1180	1180–1225
Period/ Subperiod Name	PI	PII	PIII	Early PI	Middle PII	Late PII	Early PIII	Late PIII				
Structures							STR 160 **STR 176** STR 906 **STR 9005**					
Subterranean Structure, Type Unknown											STR 183	
Kivas							STR 118 STR 204	**STR 107** STR 108 STR 109 **STR 110** STR 111 STR 113 **STR 115** STR 116 STR 117 STR 119 STR 302 STR 303 **STR 502** STR 602 **STR 803**	**STR 114** **STR 136** **STR 402** **STR 403**	STR 903 STR 904 STR 1104 STR 112 **STR 150**		

Date Range	1	2	3	4	5	6	7	8	9	10	11	12
Span (Years A.D.)	725–920	920–1140	1140–1280	725–800	1020–1060	1060–1140	1140–1225	1225–1280	1060–1100	1100–1140	1140–1180	1180–1225
Period/ Subperiod Name	PI	PII	PIII	Early PI	Middle PII	Late PII	Early PIII	Late PIII				
Masonry Surface Structure					STR 143		STR 142 STR 177 STR 178 STR 909	STR 125 STR 126 STR 128 STR 144 STR 145 STR 146 STR 148 STR 173 STR 184 STR 195 **STR 305** STR 9021	**STR 141**	STR 140		
Nonmasonry Surface Rooms							STR 158 STR 166 STR 168 **STR 170** STR 907 **STR 908**					
Masonry Structure, Type Unknown												
Subterranean Rooms					**STR 153**		**STR 1037**					

Date Range	1	2	3	4	5	6	7	8	9	10	11	12
Span (Years A.D.)	725–920	920–1140	1140–1280	725–800	1020–1060	1060–1140	1140–1225	1225–1280	1060–1100	1100–1140	1140–1180	1180–1225
Period/ Subperiod Name	PI	PII	PIII	Early PI	Middle PII	Late PII	Early PIII	Late PIII				
Middens				NST 131 NST 191	NST 187 NST 401		**NST 154** NST 157 **NST 159** NST 164 NST 169 NST 194 NST 198 NST 201 NST 1039 NST 1040 NST 1041 NST 1042 NST 1043 NST 1101 NST 1103	NST 123 **NST 132** NST 133 NST 134 **NST 139** NST 151 NST 152 NST 155 NST 161 NST 162 NST 188 NST 189 NST 196 NST 203 NST 205 NST 301 NST 501 NST 601 NST 804 NST 9002	NST 130	NST 138 NST 165 NST 192 NST 193 NST 199 NST 801 NST 901	NST 101 NST 102 NST 103 NST 104 NST 105 NST 106	
Cultural Deposits, Type Unknown							NST 163			ARB 1102		

Date Range	1	2	3	4	5	6	7	8	9	10	11	12
Span (Years A.D.)	725–920	920–1140	1140–1280	725–800	1020–1060	1060–1140	1140–1225	1225–1280	1060–1100	1100–1140	1140–1180	1180–1225
Period/ Subperiod Name	PI	PII	PIII	Early PI	Middle PII	Late PII	Early PIII	Late PIII				
Extramural Surface				NST 207 NST 306	NST 156 NST 504 NST 9015 NST 9025		NST 167 NST 181 NST 185 NST 186 NST 206 NST 9003	NST 174 NST 190 NST 197 NST 9018	NST 406	NST 171 NST 172 NST 175 NST 179 NST 180 NST 182 NST 604 NST 605 NST 606 NST 805 NST 806 NST 9019 NST 9020	NST 9004 NST 9007 NST 9008 NST 9009 NST 9010 NST 9011 NST 9012 NST 9013 NST 9014	
Noncultural					ARB 124 ARB 404		ARB 122	ARB 120 ARB 121 ARB 147 ARB 149 ARB 304	ARB 405	ARB 905 ARB 1105		

Note: Bolded Study Units have associated tree-ring dates.
Key: ARB = Arbitrary Unit; STR = Structure; NST = Nonstructure

(b) Table 3.4, Date Ranges 13–23

Date Range	13	14	15	16	17	18	19	20	21	22	23
Span (Years A.D.)	1225–1260	1060–1225	1020–1280	725–1225	920–1280	725–1280	1060–1180	1180–1260	1100–1180	N/A	1100–1225
Period/ Subperiod Name		Late PII–Early PIII	Middle PII–Late PIII	Early PI–Early PIII	PII–PIII	PI–PIII	Late PII–Early PIII	Middle PIII	Terminal PII–Early PIII	N/A	Late PII–end of Early PIII
Earth-walled Pit Structures											
Subterranean Structure, Type Unknown			STR 137								
Kivas											
Masonry Surface Structure											
Nonmasonry Surface Rooms											
Masonry Structure, Type Unknown				STR 1044							
Subterranean Rooms											
Middens			NST 9024								
Cultural Deposits, Type Unknown			NST 9016								
Extramural Surface			NST 135 NST 912 NST 913 NST 914 NST 915 NST 916 NST 917 NST 9001 NST 9017 NST 9023							NST 9006	

Date Range	13	14	15	16	17	18	19	20	21	22	23
Span (Years A.D.)	1225–1260	1060–1225	1020–1280	725–1225	920–1280	725–1280	1060–1180	1180–1260	1100–1180	N/A	1100–1225
Period/ Subperiod Name		Late PII–Early PIII	Middle PII–Late PIII	Early PI–Early PIII	PII–PIII	PI–PIII	Late PII–Early PIII	Middle PIII	Terminal PII–Early PIII	N/A	Late PII–end of Early PIII
Noncultural			ARB 127 ARB 202 ARB 503 ARB 603 ARB 703 ARB 802 ARB 902	ARB 100 ARB 129 ARB 800 ARB 900 ARB 1000 ARB 1001 ARB 1002 ARB 1003 ARB 1004 ARB 1005 ARB 1006 ARB 1007 ARB 1008 ARB 1009 ARB 1010 ARB 1011 ARB 1012 ARB 1013 ARB 1014 ARB 1015 ARB 1016 ARB 1017 ARB 1018 ARB 1019 ARB 1020 ARB 1021 ARB 1022 ARB 1023 ARB 1024 ARB 1025 ARB 1026 ARB 1027						ARB 1035	

Date Range	13	14	15	16	17	18	19	20	21	22	23
Span (Years A.D.)	1225–1260	1060–1225	1020–1280	725–1225	920–1280	725–1280	1060–1180	1180–1260	1100–1180	N/A	1100–1225
Period/ Subperiod Name		Late PII–Early PIII	Middle PII–Late PIII	Early PI–Early PIII	PII–PIII	PI–PIII	Late PII–Early PIII	Middle PIII	Terminal PII–Early PIII	N/A	Late PII–end of Early PIII
				ARB 1028 ARB 1029 ARB 1030 ARB 1031 ARB 1032 ARB 1033 ARB 1034							

Note: Bolded Study Units have associated tree-ring dates.
Key: ARB = Arbitrary Unit; STR = Structure; NST = Nonstructure; N/A = not applicable

Table 3.5. Pottery Counts and Weights and Percentages of Counts and Weights, Albert Porter Pueblo.

Pecos Classification Period	Pottery Count	Pottery Weight (g)	Pottery Count Percentage	Pottery Weight (g) Percentage
Early Basketmaker III	6	14.5	0.004	0.001
Basketmaker III	133	881.3	0.080	0.080
Basketmaker III/Pueblo I	12,298	64,536.3	7.404	5.863
Pueblo I	902	4,474.5	0.543	0.407
Pueblo I/II	228	856.2	0.137	0.078
Pueblo II	11,334	89,927.6	6.824	8.170
Pueblo II/III	129,022	788,989.1	77.676	71.684
Pueblo III	11,471	146,168.7	6.906	13.280
Other	708	4,806.4	0.426	0.437

Table 3.6. Archaeomagnetic Dates from Kiva Hearths, Albert Porter Pueblo.

Structure No.	Feature No.	Date Range	Best Fit	Curve Used
107	1	A.D. 1050–1250 A.D. 1205–1305	A.D. 1205–1305	Wolfman
108	1	A.D. 1200–1250	A.D. 1200–1250	Wolfman
112	4	A.D. 1010–1140 A.D. 1160–1290	A.D. 1025, A.D. 1075 A.D. 1200–1250	SWCV595
150	12	A.D. 1010–1165	A.D. 1025, A.D. 1125	SWCV595

Table 3.7. Radiocarbon Results from Corn and Beans, Albert Porter Pueblo.

Structure No.	Material Analyzed	Conventional Radiocarbon Age	1 Sigma Calibrated Result (68% probability)	2 Sigma Calibrated Result (95% probability)
112	Bean	760±40 BP	A.D. 1250–1280 (700–670 BP)	A.D. 1210–1290 (740–660 BP)
150	Corn kernels	800±60 BP	A.D. 1190–1280 (760–670 BP)	A.D. 1060–1080 (890–860 BP) and A.D. 1150–1290 (800–660 BP)
168	Corn kernels	880±40 BP	A.D. 1060–1080 (890–860 BP) and A.D. 1150–1210 (800–740 BP)	A.D. 1030–1250 (920–700 BP)

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Chapter 4

Albert Porter Pueblo in a Regional Context

by Susan C. Ryan

Introduction

The goal of this chapter is to place Albert Porter Pueblo within a larger regional context. Specifically, I will summarize overarching settlement patterns—or the distribution of archaeological sites on the landscape—for the Pueblo I (A.D. 750–900), Pueblo II (A.D. 900–1150), and Pueblo III (A.D. 1150–1300) periods in the Woods Canyon community. Analyzing settlement patterns through time allows researchers to gain insights into anthropological issues including social structure, social organization, subsistence strategies, demography, migration, and social complexity.

This chapter contains two main sections. The first highlights settlement patterns for three primary sites located in the Woods Canyon community: the Bass Site complex, Woods Canyon Pueblo, and the Woods Canyon Reservoir (see Figure 1.4). In the second section, I discuss the development of Albert Porter Pueblo as a center within the Woods Canyon community. A discussion of the overarching settlement patterns for the northern San Juan region can be found in Chapter 3 of this report.

The Woods Canyon Community

As noted in Chapter 1, Albert Porter Pueblo was part of the Woods Canyon community, which is named after Woods Canyon Pueblo (Churchill 2002), a large village site located approximately 1.8 km southwest of Albert Porter Pueblo. Three large villages were included in the Woods Canyon community (see Figure 1.4): (1) Albert Porter Pueblo; (2) the Bass Site complex (Site 5MT136)—located approximately 2.25 km southwest of Albert Porter Pueblo; and (3) Woods Canyon Pueblo (Site 5MT11842). A fourth site, Woods Canyon Reservoir (Site 5MT12086)—located approximately 1.75 km south of Albert Porter Pueblo—was constructed by residents of the Woods Canyon community during the Pueblo II period and used until regional depopulation about A.D. 1300 (Churchill 2002). Diagnostic artifacts recovered from the modern ground surface at the Bass Site complex suggest that Albert Porter Pueblo and the Bass Site complex were contemporaneous. The results of test excavations at Woods Canyon Pueblo and Albert Porter Pueblo suggest that the former succeeded the latter as the community center for the Woods Canyon community during the mid-to-late A.D. 1200s (Ryan 2005).

Bass Site Complex

Environmental Setting

The Bass Site complex is located at an elevation of approximately 6,650 feet (2,025 m) on a gently sloping mesa top between unnamed tributaries of Sandstone and Woods canyons (see Figure 1.4). The majority of the site rests on a thick deposit of eolian soils; the eastern edge rests on Dakota sandstone bedrock. Water was probably collected from nearby seeps or springs in the Woods Canyon tributary, but specific water sources have not been identified. The main portion of the complex is visible for several kilometers to the northeast, east, and southeast and is especially prominent when viewed from Albert Porter Pueblo. Soil on and around the site is arable; the area north of the complex is under cultivation today. Wooded portions of the complex were chained in the late 1950s or early 1960s to improve grazing conditions; it is believed that chaining did not greatly impact the cultural resources of the complex. Today, vegetation growing on the complex includes sagebrush, four-wing saltbush, pinyon trees, juniper trees, snakeweed, rabbitbrush, mountain mahogany, bitterbrush, cliffrose, cheatgrass, and native and introduced grasses.

History of Investigations

In July 1965, survey crews from the University of Colorado completed Colorado state site forms and assigned the following site numbers to several of the architectural blocks in the complex: 5MT136, 5MT137, 5MT138, 5MT150, 5MT151, 5MT154, and 5MT155. Limited surface collections were conducted at some of these sites; these collections are presumably curated at the Anasazi Heritage Center or the University of Colorado Museum. In the late 1970s or early 1980s, several sketch maps were created by Art Rohn of Wichita State University, specifically of the central portion of the complex (Architectural Units 300, 400, and 500). In the late 1980s, Mark Chenault, then a graduate student at the University of Colorado, mapped the Bass Site complex using a laser transit. In the summer of 1994, Crow Canyon Archaeological Center archaeologists prepared the complex for aerial photography, which was conducted by Rocky Mountain Aerial Survey of Englewood, Colorado. The same researchers also produced several sketch maps of smaller architectural units and conducted in-field analysis of rim-sherd samples from middens (Ortman 1995). Additionally, surface artifacts were collected from judgmental dog-leash units in several middens; these samples are curated at the Anasazi Heritage Center, Dolores, Colorado.

In the winter of 1994/1995, a topographic map of the Bass Site complex was generated from aerial photographs taken by Carrera and Associates of Englewood, Colorado. In the summer of 1995, walls, rubble mounds, and other cultural features—specifically Architectural Units 300, 400, 500, 600, 700, 1200, and 1500—were mapped by researchers from the Crow Canyon Archaeological Center under the direction of William Lipe and Scott Ortman. During the fall of 1995, Neal Morris produced an AutoCAD topographic map using digital mapping data. Finally, several additional rim-sherd samples from the above units were analyzed in situ. On February 22, 1999, the Bass Site complex was placed on the National Register of Historic Places after being nominated by William Lipe in 1995 (Lipe 1995). Today, the complex is within Canyons of the Ancients National Monument.

Architecture

Fifteen architectural roomblock units have been identified in the Bass Site complex (Figure 4.1). These 15 units appear to be approximately contemporaneous, having been constructed in the late A.D. 1100s and early A.D. 1200s (Lipe 1995). The primary architectural blocks in the complex are units 300, 400, and 500—a tight grouping of multiple-household roomblocks (Lipe 1995). Portions of Architectural Unit 400 appear to be distinct in that they were probably two stories tall, are located on the highest portion of the landscape, and include several towers. Additionally, five kivas were enclosed within the roomblock, a characteristic most often associated with a Chacoan architectural style. Smaller roomblocks—Architectural Units 300, 500, and 600—were constructed around Architectural Unit 400, and probably housed one or two families each. It is suspected that additional roomblocks were scattered over the surrounding landscape for distances as great as several kilometers from Architectural Unit 400, but that these have been destroyed by mechanical disturbance.

Chronology

Analysis of pottery collected from the modern ground surface indicates that the Bass Site complex might have been constructed in two stages (Ortman 1995). Architectural Units 1000, 1100, and the western portion of Unit 100 were constructed during the earliest part of the occupation of the complex about A.D. 1075–1150 (see Figure 4.1). The second phase of construction, about A.D. 1150–1225, witnessed the occupation of Architectural Units 300, 400, 500, 600, 800, 1300, and the eastern portion of Architectural Unit 100 (see Figure 4.1). Of these blocks, it appears that Architectural Unit 600 was used the latest. It is important to note that some architectural blocks were excluded from the study by Ortman (1995), either because no samples were collected, or because the samples that were collected contained few or no diagnostic artifacts.

Summary

The Bass Site complex was probably first occupied in the late A.D. 1000s and early A.D. 1100s, and it consisted of only a few small habitations. In the late A.D. 1100s, the central portion of Architectural Unit 400 was constructed and probably housed leaders or a corporate group who organized ritual, political, and economic activities within the complex. The multiple-story construction, thick walls, enclosed kivas, and prominent location would have distinguished Architectural Unit 400 from surrounding structures. It was during this time that the Bass Site complex became a community center. Over the next several generations, multiple residences were constructed; some were built in new areas of the complex, and others were constructed such that they abutted existing structures. The Bass Site complex reached its occupational peak between the late A.D. 1100s and the early A.D. 1200s, perhaps supporting as many as 140–196 people.

Woods Canyon Pueblo

The Crow Canyon Archaeological Center conducted research at Woods Canyon Pueblo (Site 5MT11842), a Pueblo III period canyon-rim village site located in the Woods Canyon community, from 1994 to 1996 (Churchill 2002). Research at Woods Canyon Pueblo was undertaken as part of Crow Canyon's Village Testing Project, designed to further our understanding of community development during the late Pueblo II and the Pueblo III periods (Ortman et al. 2000). Research indicated that Woods Canyon Pueblo contained approximately 50 kivas, 16 towers, and 120–220 surface rooms, as well as middens, water-control features, and a possible plaza (Figure 4.2). Multiple lines of evidence—including tree-ring, stratigraphic, pottery, and architectural-morphology data—indicate that Woods Canyon Pueblo was inhabited for approximately 150 years, from about A.D. 1140 until the late A.D. 1200s (Churchill 2002). Although no structures or features dating from the Pueblo II period were exposed during excavations, the presence of Mancos Black-on-white pottery—the predominant pottery type in the central Mesa Verde region between A.D. 1000 and 1140—has been interpreted as possible evidence of late Pueblo II occupation (Churchill 2002).

Two primary periods of occupation were identified at Woods Canyon Pueblo, A.D. 1140–1225, which occurred primarily in the canyon bottom, and A.D. 1225–1280, which occurred primarily on the canyon rim, the east talus slope, and the upper-west portion of the site (see Figure 4.2). Population during early Pueblo III times is estimated at 70 to 112 individuals. Population during late Pueblo III times is estimated at 130 to 208 residents. The population of Woods Canyon Pueblo might have peaked by the mid-A.D. 1200s and then declined in the late A.D. 1200s. The settlement patterns for Albert Porter Pueblo suggest that the individuals who occupied that settlement during the Pueblo III period were the same individuals who constructed and eventually occupied Woods Canyon Pueblo. This pattern supports a community center succession model in which researchers proposed that community centers shifted from mesa-top locations to canyon-rim or canyon-head locations in the mid-A.D. 1200s (Ortman et al. 2000).

Woods Canyon Reservoir

The Woods Canyon Reservoir (Site 5MT12086) is an earthen-and-masonry dam dating from the Pueblo II–III period that is located in a small tributary of Woods Canyon, approximately 750 m northeast of Woods Canyon Pueblo and 1.25 km south of Albert Porter Pueblo (see Figure 1.4). Excavations at Woods Canyon Reservoir consisted of testing two areas of the site—the dam and the reservoir area behind the dam. Eight 1-x-1-m units were excavated across the dam as a continuous trench, and nine 1-x-1-m units were excavated in the reservoir area southeast of the dam (Wilshusen et al. 1997). Stratigraphic and pottery data provide little evidence of when the dam was constructed. The presence of three Mancos Black-on-white sherds and six McElmo Black-on-white sherds date the construction to about A.D. 1050–1175 (Wilshusen et al. 1997:673). The dates of tree-ring samples collected from trees growing at the site, as well as pottery collected from the modern ground surface, suggest that the reservoir was first used during the late Pueblo II period, or about A.D. 1125–1175 (Wilshusen et al. 1997:678). It seems likely that the reservoir was constructed by the occupants of Albert Porter Pueblo at approximately the same time the great house in Architectural Block 100 was constructed. The reservoir, like other "public" Chaco-period constructions (such as roads, berms, and great kivas), might have been instrumental in attracting members to the Woods Canyon community and in supporting and maintaining them after they settled there.

Community and Community Centers

As noted in Chapter 3, a basic characteristic that defines communities in the northern San Juan region is the spatial proximity of households (Adler and Wilshusen1990; Eddy 1977; Lipe 1992; Varien 1999). During the time span A.D. 900–1300, communities exhibited distinct changes in population size, settlement pattern, and organization (Varien 1999). A community center, as defined by Varien (1999:19), is "many households that live close to one another, have regular face-to-face interaction, and share the use of local, social and natural resources." Crow Canyon archaeologists developed a community center succession model that describes how the form of community centers changed through time (Lipe and Ortman 2000; Varien 1999). During the Chaco period, many community centers in the northern San Juan region were large isolated buildings in mesa-top settings, and some were accompanied by a great kiva. In the early post-Chaco period, community centers consisted of a cluster of buildings, located on the mesa tops, and many contained a larger structure in the center of the cluster. In the late post-Chaco period, community centers were large, aggregated villages located in canyon settings.

In a study of settlement patterns in the central Mesa Verde region, Varien (1999) and Varien and Ortman (2005) note that during the Chaco period most habitations were constructed with wooden posts and adobe and were occupied an average of about 20 years. The occupation span of habitation sites increased to about 45 years during the post-Chaco period when, for the first time in the central Mesa Verde region, habitations were constructed with sandstone masonry. Although typical farmsteads were occupied for these relatively short periods, community centers were occupied for longer periods, and the entire settlement cluster that composed a community persisted for centuries (Varien 1999). The longer occupation spans of these community centers, and the communities they were a part of, made the centers especially important in the social and political landscape of the region.

Excavation data indicate that the most intensive and continuous occupation of Albert Porter Pueblo dates from A.D. 1060 to1280, and it was during this period that Porter served as a center for the surrounding habitations (see Figure 1.4). Architectural Block 100, which contains a "great house," is distinctive in terms of its size, layout, and architectural details. Albert Porter Pueblo is interpreted as a community center on the basis of the presence of the great house, the dense concentration of smaller architectural units surrounding it, and the long occupation span of this settlement as compared to the farmsteads in the surrounding community. Additionally, individuals were part of an "imagined" community. Anderson (2006) distinguishes between an imagined community and an actual community in that an imagined community is not defined on the basis of face-to-face interaction between members; instead, members create a mental affinity based on a perception of shared ideologies. He further notes that the factors that structure this interaction extend well beyond the physical boundaries of the community (Anderson 2006).

Residential, face-to-face communities in the central Mesa Verde region have been shown to have a radius of approximately 2 km (Adler and Varien 1991; Ortman and Varien 2007; Varien 1999:153–155). The area around Albert Porter Pueblo has not been subjected to full-coverage survey, but many sites have been recorded; this record allows us to examine the population dynamics of the community outside Albert Porter Pueblo. Figure 4.3 shows sites that were within

3 km of the Pueblo during the pre-Chaco period (A.D. 1020–1060), the Chaco Period (A.D. 1060–1140), and the post-Chaco period (A.D. 1140–1280).

As shown Figure 4.3, there was settlement in the area of the Woods Canyon community during the pre-Chaco period, but habitations were few and uniformly small. Population increased during the Chaco period, and two large community centers formed—Albert Porter Pueblo and Bass Pueblo. Bass Pueblo is located 2 km southwest of Porter. Great houses were constructed at both centers during the Chaco period, and future research will examine the relationship between these two centers. Population continued to increase during the post-Chaco period, but people consolidated into fewer settlements. Albert Porter and Bass pueblos continued to be large settlements during this period, but most people moved from the mesa tops to the canyon and formed the large village of Woods Canyon Pueblo (Churchill 2002). The shift from mesa-top to canyon settings occurred throughout the central Mesa Verde region during the post-Chaco period (Lipe and Varien 1999:303–312). An important exception to this general trend was that occupation continued at the Chaco-era community centers, such as Albert Porter Pueblo, which were located on mesa tops.

Discussion

Research conducted at Albert Porter Pueblo has contributed significantly to our understanding of the culture history of the central Mesa Verde region. The key contributions of this research are threefold. First, settlement trends at Albert Porter Pueblo follow the community center succession model that describes how the form of community centers changed through time (Lipe and Ortman 2000; Varien 1999). During the Chaco period, community centers in the northern San Juan region were large isolated buildings, many were in mesa-top settings, and some were accompanied by a great kiva. In the early post-Chaco period, community centers were composed of a cluster of buildings located on mesa tops, and many clusters contained a larger central structure. In the late post-Chaco period, community centers were large, aggregated villages located in canyon settings.

Second, our research examined the origin and demise of a community center. Although the site was occupied in the Basketmaker III and Pueblo I periods, it was not until approximately A.D. 1060 that Albert Porter Pueblo witnessed a surge in population, perhaps a result of migrants moving to the northern San Juan region from the south, near Chaco Canyon (Varien et al. 2008:358). At this time, the great house was constructed at Albert Porter Pueblo, and the settlement emerged as a community center. Likewise, the great house at the Bass Site complex was constructed and emerged as a community center. Both settlements reached their maximum extent during the late Pueblo II and early Pueblo III periods but began to decline by A.D. 1250 or at approximately the same time that Woods Canyon Pueblo was constructed on the canyon rim. Albert Porter Pueblo was sparsely occupied during the late Pueblo III period until the region was depopulated about A.D. 1280.

Finally, our research indicates that the Albert Porter Pueblo community center endured for approximately 200 consecutive years or approximately 20 generations. The built environment at Albert Porter Pueblo created a meaningful cultural landscape fundamental to the construction of social identity and the social construction of community. The site was the location of important community activities; it contained two centuries of community social memory. Those specific memories structured the identity of the community and its members.

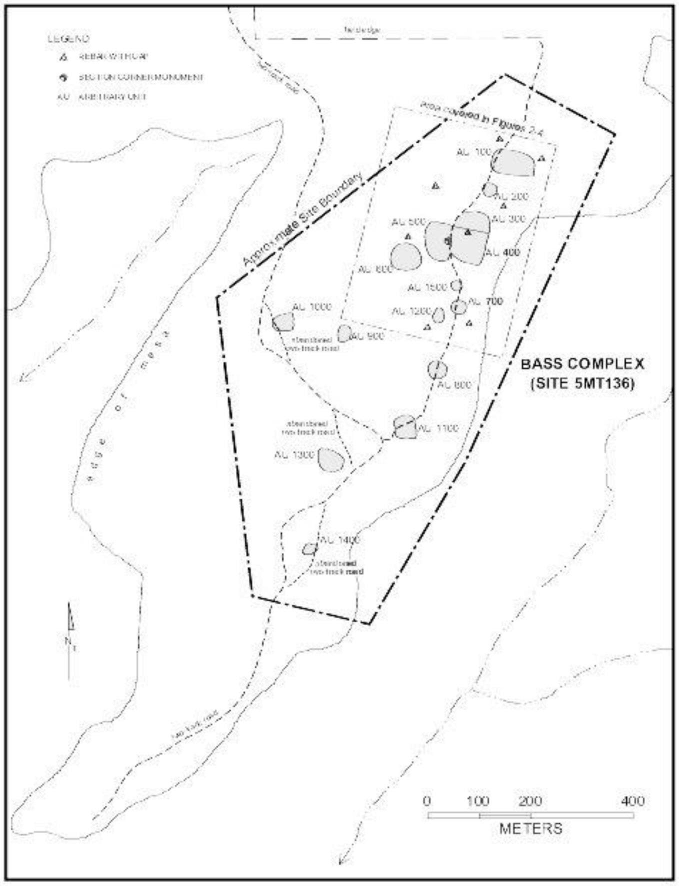

Figure 4.1. Major architectural units, the Bass Site complex.

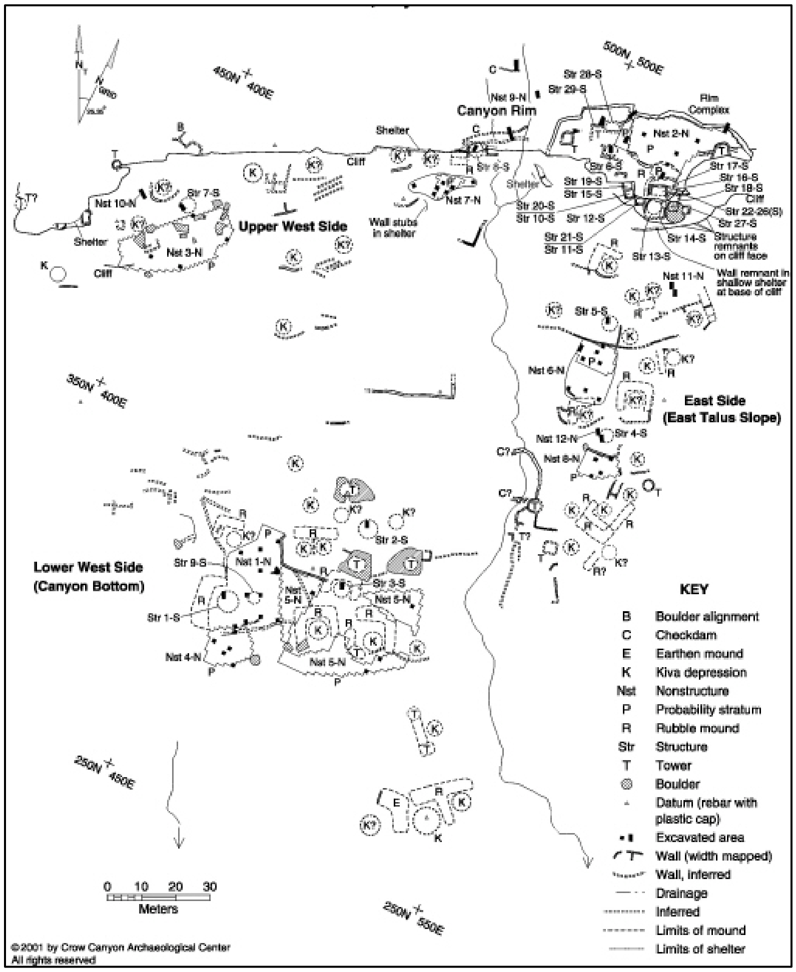

Figure 4.2. Major cultural units, Woods Canyon Pueblo.

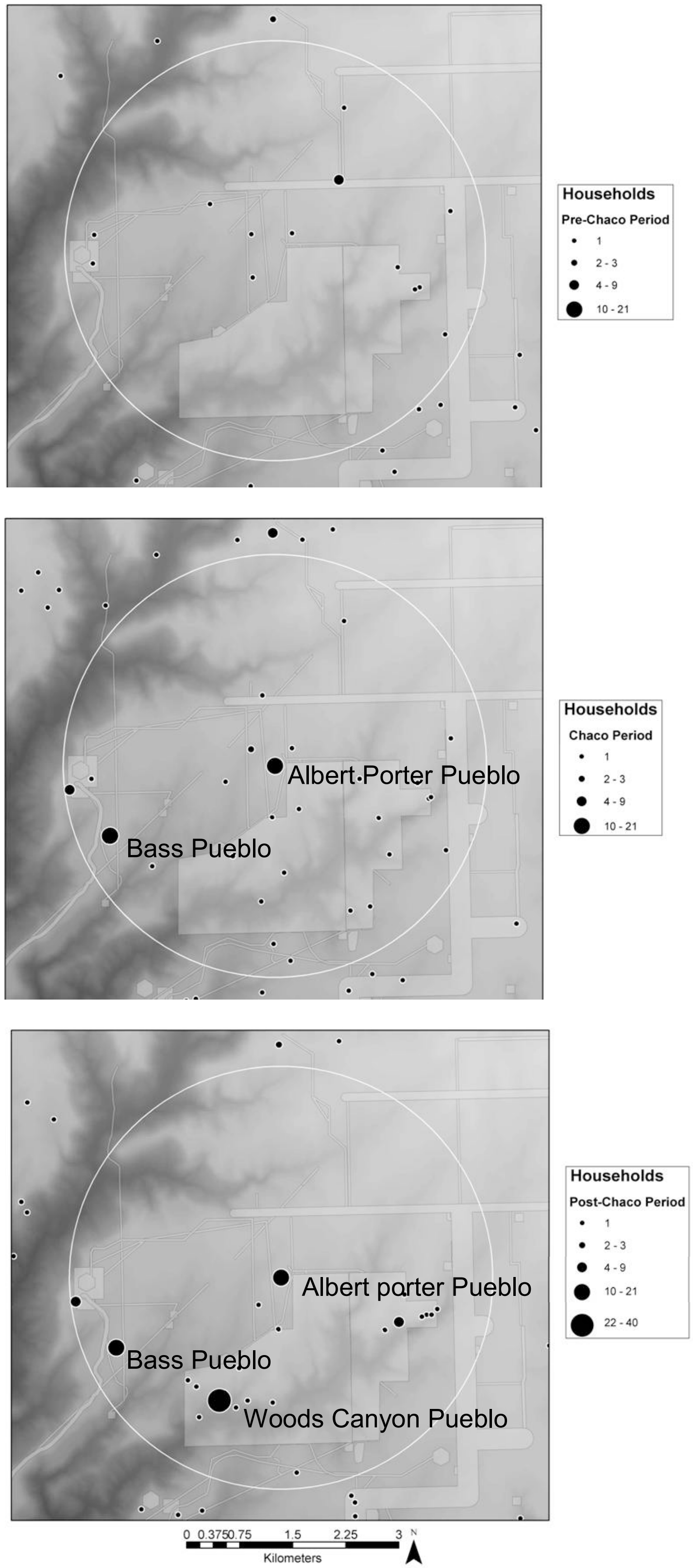

Figure 4.3. Distribution of population of recorded sites near Albert Porter Pueblo. The circle has a 3-km radius and is centered on Albert Porter Pueblo. Gray polygons indicate surveyed areas.

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Chapter 5

Architecture

by Susan C. Ryan

Introduction

There are four primary reasons to examine the relationship between architecture and human behavior (Sanders 1990:47): (1) all of the built environment has and communicates meanings through material and non-material signs; (2) the meanings of signs are established by acceptance of cultural conventions; (3) signs provide cues for expected behavioral responses; and (4) meanings are conveyed by sign systems using redundancies and are dependent on context.

First, and foremost, architecture allows archaeologists an opportunity to reconstruct past social realities. No one with an interest in how the built environment is represented can dismiss an approach that focuses on the process of representation. Architecture is particularly important to archaeologists who spend their entire careers reading and interpreting the material remains of past cultures.

Second, architecture is composed of coded signs—a sign system—that communicates culturally prescribed information to the observer about surroundings, society, and accepted behavior. For example, Swentzell (1990) notes how Pueblo myths, stories, songs, and prayers describe a world in which architecture is not merely an object, but is part of a cosmological world view that recognizes multiplicity, simultaneity, inclusiveness, and interconnectedness. Swentzell (1990:29) notes, "It is an ordered, but flowing, whole that reflects a cosmos strongly biased toward the gentle and inclusive qualities of the universe." Architecture is the place where the ethereal and nonmaterial qualities of the cosmos were interpreted by ancient architects and emphasized in material form. Architecture communicates culturally prescribed, and accepted, information to the observer about Pueblo cosmology.

Third, archaeologists are equally concerned with interpreting "the relationships between human behavior and material culture in all times and all places" (Schiffer 1995:69). Architecture—perhaps more so than other types of material culture—allows archaeologists to reconstruct material culture/human behavior relationships. The term "materiality"—or the ways in which material culture mediates social being—conveys this concept (Preucel 2006:5). Materiality has emerged as a powerful means of understanding the recursive engagement that exists between the physical properties within a particular environment and the social practices that take place within it. The dialectical relationship between humans and architecture is socially complex; these relationships are never static, they are dynamic across time and space and often cue behavior resulting in unconscious action. For example, Bender (1993) examines the relationship between human behavior and architecture at Stonehenge from medieval times through the present day. Bender's diachronic analysis illustrates how Stonehenge has been culturally mediated and interpreted throughout the millennia.

Finally, on a fundamental level, much of anthropology—and increasingly more of archaeology—is concerned with how humans organize the world according to their understanding of it. Lotman (2001:203) notes that the importance of spatial models—of which architecture is a part—lies in the fact that spatial models are constructed not on a verbal scale, but on an iconic continuum. The icons used in architecture are a reflection of how people create, visualize, categorize, and organize the world around them. A well-known example is "The Berber House or the World Reversed" in which Bourdieu (1970) examines household architecture as a microcosm of the universe. He notes that oppositions—for example, male/female, light/dark—are not necessarily the result of the technical imperatives or functional requirements of architecture—but are a material manifestation of the Berber understanding of the cosmos (Bourdieu 1970).

Vernacular Architecture

All ancestral-Pueblo constructions can be described as "vernacular" architecture, or architecture that is constructed by the people who use it. Vernacular architecture is characterized by the use of locally available materials to produce a form that follows traditional ideologies and reflects the local environment (Rapoport 1969:5). Vernacular architecture has been examined from a variety of theoretical and methodological perspectives. These approaches have analyzed architecture in terms of function (Hunter-Anderson 1977; McGuire and Schiffer 1983), proxemics (Hall 1966, 1968, 1972), social organization (Flannery 1972; Hill 1970; Layne 1987; Morgan 1965; Riggs 2001; Whiting and Ayers 1968), household studies (Blanton 1994; Clarke 1972; Wilk and Rathje 1982), symbolism (Bourdieu 1970, 1977; Bradley 2003, 2005; Broadbent 1977; Hieb 1979, 1990; Kus and Raharijaona 2006; Robin 2003; Saile 1977; Sofaer et al. 2006; Swentzell 1990; Uphil 1972), the cultural landscape (Lefebvre 1991; Smith and David 1995), semiotics (Barthes 1979; Broadbent 1977; Fogelin 2006), visual and spatial structure (Higuchi 1983), performance (Moore 1996, 2006; Turnbull 2002), and the role of architecture in the production and reproduction of social structure (Bourdieu 1970; Hillier and Hanson 1984:2; Lawrence and Low 1990:455; Rapoport 1990).

Rapoport (1969:8) distinguishes between two types of vernacular architecture[1], "fixed" and "additive." Fixed architecture is characterized by few building types, a model or framework with few individual variations, and architecture that is built by all members of society. Additive vernacular is characterized by a greater number of building types, greater individual variation of the model or framework, and architecture that is built by tradesmen. Additive vernacular architecture is changeable and open-ended, whereas fixed architecture cannot tolerate change (Rapoport 1969:6). As Rapoport (1969:4–5) notes, the vernacular design process allows for individual variability and differentiation, while the model or framework is held constant. Although additive vernacular architecture has an unchangeable framework, users have the ability to communicate particular meanings through personalization or by adding or subtracting various elements within the model (Rapoport 1990:24). Personalized aspects of architecture may express such things as ethnicity, group identity, and social status. These changes may be interpreted as the priorities of a particular group that is utilizing the structure.

Unit Pueblos as "Fixed Architecture"

The most common architectural form constructed during the Pueblo I–III periods is the "unit pueblo" (Prudden 1903) or "Prudden unit" (Lipe and Varien 1999). Defined by T. Mitchell Prudden as a "unit-type" pueblo, the layout of this form consists of surface rooms located to the north of the pit structure and midden deposits located south of the pit structure, generally along a north-south axis (Prudden 1903). In the San Juan region, the unit pueblo is interpreted as the architectural representation of a single household composed of a nuclear or small, extended family (Lipe 2006:263; Varien 1999:18). The unit-type pueblo remained a consistent architectural pattern from the Pueblo I period until the region was depopulated about A.D. 1300 (Lipe 1989:55, 2006:263; Varien 1999:18). However, it can be argued that the unit pueblo framework, or model, has its origins in pithouses constructed during the Basketmaker period.

As noted above, fixed architecture is characterized by few building types, a model or framework with few individual variations, and architecture that is built by all members of society. I argue that unit pueblos were an example of fixed architecture. Although there was some variation in these habitations, they are often described as "cookie cutter" images of one another. This suggests that there were few "changeable" elements in the unit-pueblo framework.

Great Houses as "Additive Vernacular" Architecture

Lipe (2006) has argued that the basic architectural form of the great house is rooted in a preexisting cultural schema that he terms the "San Juan pattern." Lipe (2006) notes that the San Juan pattern includes the following characteristics: (1) an architectural unit that consists of aboveground roomblocks and subterranean pit structures, or kivas, in front of these roomblocks; (2) pit structures and kivas, which have both domestic and ritual function; (3) a north-south orientation of the overall site layout, with roomblocks on the north, pit structures to the south of the roomblocks, and midden areas to the south of the pit structures; and (4) residential household kivas and community great kivas, which hold various degrees of symbolic significance. It is important to note that the first three characteristics are used by Prudden to define a unit-type pueblo. Following Lipe, I view the San Juan pattern as a fundamental ancestral Pueblo schema because the individuals who built the first great houses successfully transposed the residential-household schema onto great houses (Ryan 2008). This schema may be viewed as the framework or model upon which all architectural variation rests.

Albert Porter Pueblo

Architecture is only a small part of the built environment, which is composed of "systems of activities" performed in "systems of settings" (Rapoport 1990:11). As noted in the Introduction subsection of this chapter, the built environment and the people who inhabit it are in a dialectical relationship; the built environment reflects the overarching ideologies, actions, and behaviors of a group of people, and simultaneously, the built environment influences them (Hillier and Hanson 1984; Lawrence and Low 1990; Rapoport 1969; Steadman 1976). In essence, people manifest concepts of social structure in the built environment, arranging their space according to their worldview and, in return, their worldview is affirmed and perpetuated by the built environment. It this sense, we can examine the architecture of Albert Porter Pueblo to gain insights into ancestral Pueblo ideologies and how those ideologies were maintained, influenced, and/or changed through time.

Site Layout

Albert Porter Pueblo is located on an upland area (Figure 5.1) between Woods and Sandstone canyons. The site is situated at the head of a north-south tributary that drains into Woods Canyon to the south. This layout, with the site constructed near the head of a drainage, may be a prototype for settlements built during the late Pueblo III period that were constructed around a drainage at the head of a canyon.

The most common architectural form found at Albert Porter Pueblo is the unit pueblo (Prudden 1903), "Prudden unit" (Lipe and Varien 1999), or "kiva suite" (Bradley 1992). Unit pueblos are a good example of "fixed vernacular" architecture, as described above, in that they are characterized by few building types, a framework with few individual variations, and architecture that is built by all members of society. Unit pueblos at Albert Porter Pueblo were constructed on a southwest-northeast axis, forming rows of residences. Most of these units appear to be tightly clustered into architectural blocks. Architectural blocks at the site were defined by Crow Canyon researchers on the basis of archaeological remains visible on the modern ground surface, including rubble mounds, pit-structure depressions, and/or midden deposits with distinct boundaries. Each architectural block at Albert Porter Pueblo contains one or more unit pueblos. In some blocks—such as Architectural Block 1000—structural remains were absent from the modern ground surface but were present subsurface, as indicated by the results of a remote sensing survey (also see Chapter 2). Eleven architectural blocks were defined on the basis of surface evidence; however, the results of the remote-sensing survey indicate the presence of numerous additional architectural blocks that are not included on the site map.

On the basis of evidence from the modern ground surface, subsurface testing, and an electrical-resistance survey, we identified 58 pit structures, three towers, dozens of surface rooms, a possible plaza, and one possible shrine. All roomblocks at the site are linear and are oriented east-west. This layout of multiple, tightly spaced, often parallel aggregates of unit pueblos is typical of large villages constructed during the Pueblo II and Pueblo III periods in the central Mesa Verde region (Varien et al. 1996:98). Architectural data—including masonry type, masonry preparation, coursing type, foundation type, mortar characteristics, length, depth, width, observed face, orientation, bonds and abutments, and features—were collected and recorded for each wall exposed in an excavation unit. These data are available in the online, database portion of this report.

Rooms

Mounds of rubble, rubble concentrations, and scatters of rubble were found on the modern ground surface in the following architectural blocks at Albert Porter Pueblo: 100, 300, 400, 500, 700, 900, and 1100 (see Figure 2.1). On the basis of their appearance at the modern ground surface and their locations just north of mapped pit structures, I infer that the areas of dense rubble are the remains of abovegound masonry rooms. The heights of rubble mounds vary from approximately 1 to 3 m. Although in many areas the modern ground surface has been disturbed by historic agricultural activities, it appears that most of the rubble mounds were avoided and remain intact. The heights of the rubble mounds in Architectural Blocks 300, 400, 500, 700, 900, and 1100 suggest that the rooms were one story tall. The tallest rubble mounds are located in the northwestern portion of the great house in Architectural Block 100. On the basis of the heights of these rubble mounds—as well as data collected from the excavation of Structures 143 and 153 (Figure 5.2)—I infer that the northeastern section of the "core" of the great house was a minimum of two stories tall.

Numerous architectural blocks are devoid of rubble on the modern ground surface, suggesting that these blocks were disturbed by either historic plowing or prehistoric and historic "recycling" activities. The recycling of usable sandstone blocks, as well as roof beams, was a common practice throughout the Mesa Verde region in both prehistoric and historic, times.

The quantity of aboveground rooms constructed at Albert Porter Pueblo is difficult to estimate because of prehistoric and historic disturbance. I estimate that the remains of more than 100 rooms are preserved on the site, more than half of which are located in Architectural Block 100. This number would triple or quadruple if aboveground rooms associated with remote-sensing anomalies are added to this count.

Use of Masonry Rooms

Nineteen masonry rooms were tested at Albert Porter Pueblo. Data from excavation units placed in the interior of rooms provided information on how a particular room was used. Specifically, we determined if a room was used as a living room or a storage room on the basis of the presence or absence of features and artifacts. Additionally, rooms were evaluated for the presence of sooting; if present, it was inferred that a hearth was constructed within the structure and that the room was used for domestic activities such as cooking. Moreover, the presence of a doorway suggests that a room was used for domestic activities rather than for storage, because this feature would have facilitated movement between structures or provided exterior access to the structure.

Excavation data suggest that at least eight of the 19 rooms defined were used as living rooms. These rooms contained one or more of the following characteristics: (1) a doorway; (2) de facto refuse on the floor; and (3) a hearth, pit, niche, or other feature. Two rooms, Structures 128 and 141, were constructed with T-shaped doorways (Figure 5.3). One room, Structure 140, contained a niche in the face of the south wall, and one room, Structure 143, contained evidence of a possible collapsed hearth. De facto refuse was found on the floors of Structures 142, 146, and 305 (see Figure 2.1; Figure 5.4).

De facto refuse recovered from floors consisted primarily of pottery sherds and chipped-stone debris. An axe head, olivella shell bead, and portions of a McElmo Black-on-white bowl rested on the floor of Structure 305. The presence of pottery, chipped stone, an axe head, and a bead suggests that domestic activities occurred in Structures 142, 146, and 305, and that these buildings were used as living rooms.

Uses of Nonmasonry Rooms

Six nonmasonry rooms, located in Architectural Blocks 100 and 900, were subjected to test excavations at Albert Porter Pueblo (see Figure 2.1). None of these structures was visible from the modern ground surface, but the rooms were identified when excavations continued below other masonry structures or below deposits of secondary refuse. The presence of de facto refuse and architectural features suggests that four of the six rooms—Structures 158, 168, 170, and 908—were used as living rooms. On the floor of Structure 168, a slab-lined bin (Feature 1) contained numerous burned beans. Structure 907 contained a metate bin (Feature 1) and de facto refuse that included a bead, a peckingstone, and chipped stone; this room might have been a mealing room or a living room. Structure 166 was detected below the west masonry wall of Structure 148 in the "original core" of the great house; the limited exposure of this room precludes an inference regarding use.

Kivas

Kivas were used by pueblo people for multiple activities, most of which were domestic and ritual. The architectural form of the kiva originated with the pithouse during the Basketmaker period and transitioned into a formalized kiva about A.D. 700–900. The kiva form has been a hallmark of Pueblo architecture for approximately 1,500 years (Cordell 2007).

Among modern pueblos, kivas are the center of village religious and social life. The quantity of kivas in modern pueblos range from several, at pueblos such as Hopi and Zuni, to one or two at Keresan and Tanoan-speaking villages (Vivian and Hilpert 2002:147–148). Once initiated into a kiva, men learn ritual knowledge and work together to perform rituals. Although used primarily by men, women (and sometimes outsiders) are invited to attend ritual performances within the structure. Modern kivas have many features in common with ancestral Pueblo kivas. First and foremost, most kivas are oriented on a north-south axis and are bilaterally symmetrical. There is typically an entrance in the roof, an encircling bench, a hearth, a ventilator, a deflector, and a sipapu.

The quantity of kivas present in ancestral Pueblo villages is significantly greater than that found in modern pueblos. It is assumed that, in ancestral Pueblo villages, each kiva housed a single family, or between five and seven individuals (Lipe 1989:54). The average size of a kiva—approximately 3.5 m in diameter—suggests that these structures were used by households, kin-based groups, or small co-residential groups for domestic and ritual activities.

Several lines of archaeological evidence suggest that kivas were used for both domestic and ritual purposes. The presence of features including mealing bins, hearths, and loom anchors suggests that household activities occurred inside these structures (Cater and Chenault 1988). The sipapu—a small floor pit—might have served as symbolic architecture. The term "sipapu" is a Hopi word for the place where people emerged from an underworld into this world (Vivian and Hilpert 2002:222). Some Pueblo people today believe that they emerged from three previous worlds before the one we currently inhabit. Events in each of the former worlds forced some people to move to a new world above, usually by climbing a hollow reed to a hole in the sky (Vivian and Hilpert 2002:222). The sipapu, most of which are located north of the hearth, commemorates this emergence. Likewise, some kivas were constructed with floor vaults (also known as foot drums). Floor vaults are rectangular pits; many are lined with sandstone masonry and adobe and were covered with wood planks. According to Lekson (2007:23–24), three-fourths of all kivas in Chaco Canyon were constructed with floor vaults; however, significantly fewer floor vaults were constructed in the northern San Juan region. Although the exact use of floor vaults is unknown, archaeologists have inferred that they were used in ritual activities as foot resonators, sudatories, or containers for the ritual germination of seeds used in ceremonies (Vivian and Hilpert 2002:107).

Artifacts including pottery, lithic artifacts, and ground-stone tools were found on the majority of kiva floors at Albert Porter Pueblo. Figure 5.5 illustrates the quantity of kiva floors on which various types of artifacts were found. Interestingly, the three types of artifacts found most commonly on kiva floors at Albert Porter Pueblo are pottery, flaked-lithic artifacts, and ground-stone tools, respectively; however, artifacts found on kiva floors at this site include lithic cores, unfired pottery, faunal remains, modified minerals/stones, axes, basketry, pendants, and projectile points.

It is difficult to determine from kiva-floor assemblages whether any household in this pueblo engaged in craft specialization. The strongest case for craft specialization may be the unfired pottery found in Structures 109, 115, and 602. The presence of "green," or unfired, pottery suggests that the residents of these structures manufactured vessels. However, unfired pottery is fragile and is subject to decomposition, thus it is possible that all households produced pottery, and that there was no craft specialization at Albert Porter Pueblo.

Towers

During the Pueblo III period in the San Juan region, towers were constructed on mesa tops, in cliff dwellings, along canyon rims, and in canyon bottoms (Bredthauer 2010; Glowacki 2006:61, Table 3.5; Lipe and Varien 1999; Van Dyke and King 2010). Archaeologists have interpreted towers as defensive strongholds (Ingersoll 1874; Mackey and Green 1979), lookouts (Farmer 1957; Hibben 1948:36; Holmes 1878; Jackson 1878; Lancaster and Pinkley 1954:44–47; Lancaster et al. 1954; Mackey and Green 1979; Riley 1950; Schulman 1950), signaling stations (Mackey and Green 1979), astronomical observatories (Winter 1977:210–211; Wormington 1947:94), storehouses (Mackey and Green 1979), ceremonial facilities (Winter 1977:210–211; Wormington 1947:94), guard towers (Johnson 2003), and as symbolic architecture (Van Dyke and King 2010). Many towers are found on mesa tops and in tributary canyons north of the San Juan River (Glowacki 2006). Researchers have documented towers at Mesa Verde National Park, Hovenweep National Monument, Canyon of the Ancients National Monument, and on private land. In general, towers can be one or multiple stories, attached to other structures or isolated, and round or square. Because of a lack of consistent internal features and de facto refuse, archaeologists have had great difficulty in inferring the uses of these buildings. Van Dyke and King (2010:360) note that no single functional explanation fits the diverse characteristics of towers, and one reason that archaeologists have difficulty drawing inferences regarding use is that our analyses have focused on assigning a single practical use to these buildings. Moreover, towers were not constructed in the Southwest after A.D. 1300, making it impossible to draw on historic ethnographies.

At Albert Porter Pueblo, three structures were identified as towers; however, none was tested. One tower is located just south of Structure 403, a masonry-lined kiva in Architectural Block 400 (see Figure 2.1) that dates from the Pueblo III period. The tower and this kiva are less than 5 m apart; thus, an underground tunnel may connect them. The shape of its associated rubble mound suggests that the tower is circular. A different tower is located just west of Structure 602, a masonry-lined kiva in Architectural Block 600 (see Figure 2.1) that dates from the Pueblo III period. This tower also appears to be circular. It is unclear whether this tower and Structure 602 are connected by a tunnel. A third possible tower is located in the northeastern portion of Block 100, just northeast of Structure 115 (see Figure 5.4). It is not known whether this structure is a tower or an aboveground room, but it appears to have been significantly taller than the surrounding rooms. Because no towers at Albert Porter Pueblo were tested, no data are available regarding their architectural characteristics or artifact assemblages.

Public Architecture

For the purposes of this report, I define "public architecture" as nondomestic structures and features constructed and used by more than one household or social group. Group rituals are an important element of creating and maintaining social integration in societies that lack strong political institutions. Public architecture allows for social integration in that it provides a space for social activities to occur. The size and form of public architecture will dictate the number of people who can participate, the kinds of activities that can be performed within a space, the seasonality of specific activities, and will create ideological and physical boundaries between sacred and domestic space (Hegmon 1989:7). Moreover, architecture promotes the persistence and repetition of activities by fixing them in space and providing a context for symbolically charged actions. In doing so, architecture transmits and validates social rules or schemas which, in turn, create and perpetuate social identity and integration.

Types of public architecture found in the central Mesa Verde region include great kivas, plazas, D-shaped structures, bi-wall structures, and tri-wall structures. Great houses provided a space for both domestic and ritual activities and therefore do not fit the "nondomestic" criterion of public architecture. However, great houses were constructed to look unlike a common residence, displaying prominence, grandeur, and symbolism that was unmatched within the surrounding community. Great-house architects successfully transposed a schema associated with domestic architecture and produced a new, "public" building. Being the focal point of the community, great houses no doubt were used by more than one household and were important places for activities that created and maintained social cohesion.

At Albert Porter Pueblo, the topographic signature of Architectural Block 1100 (see Figure 2.1), a large, circular mound with a depression in the center, as well as possible adjacent footpaths detected by the resistivity survey, suggest the presence of a great kiva. However, testing of this mound revealed Structure 1104, an average-size kiva. To date, the great kiva known to be nearest to Albert Porter Pueblo is that at Lowry Ruin, located approximately 15 km to the northwest. No bi-wall, tri-wall, or D-shaped structures were identified at Albert Porter Pueblo. Thus, the only public architecture identified at Albert Porter Pueblo is a possible plaza.

A plaza can be defined as a large, open space that may be enclosed on two or more sides by buildings. Although no formal plaza was identified at Albert Porter Pueblo, it is possible that the space in the south-central portion of Architectural Block 100—just south of Structures 107, 109, and 195—served as a plaza (see Figure 5.4). This area appears to lack structures and midden deposits, and, before being sealed, a T-shaped doorway in the south wall of Structure 128 allowed access to this exterior space. Additionally, a prepared adobe surface, Nonstructure 9018, was exposed along the exterior face of the south masonry wall of Structure 195. This surface could have been constructed as a plaza.

The Great House

Similar to the unit pueblo, the great house can be viewed as an exaggerated version of the household residence. Unlike the unit pueblo, the great house probably housed numerous families or kin-based groups. Levi-Strauss (1982) was one of the first scholars to discuss house architecture as a place of symbolic investment by key social units that define and symbolize important social, political, and cosmological relationships through house affiliation. House societies tend to form during periods of social transformation, particularly when new forms of social inequality and hierarchy emerge.

Five principles underlie the concept of the house society (Beck 2007; Gillespie 2007; Heitman 2007; Mills 2010). First, material and immaterial property are heritable—this includes the house proper. Second, house societies occur in areas where there are like structures—houses are found in societies with other houses. Third, the house itself is considered a "moral person" and is often viewed as a living being. Fourth, houses are neither social nor spatial units. And finally, houses may be identified on the basis of architectural permanence, ancestors, origins or primacy, and inalienable heirlooms.

The house-society model has recently been used to investigate social organization in Chaco Canyon (Heitman 2007; Heitman and Plog 2005; Mills 2010; Plog and Heitman 2010). The inference that house societies were present at Chaco rests on several types of data (Mills 2010). The most compelling is the presence of burials and other human remains that are clustered in the oldest sections of Pueblo Bonito and the association of these remains with abundant material objects (Plog and Heitman 2010). The burials and associated objects were deposited over several generations into what are referred to as family "crypts." The second argument for the presence of house societies at Chaco Canyon is shared symbolism and cosmology, which includes the importance of wood as well as resurfacings and rituals of renewal (for "renewal" see Crown and Wills 2003).

Thus, the construction of the great house at Albert Porter Pueblo can be interpreted as an effort to integrate distinct social groups, probably kin-based, into one oversized "house." The integration of multiple kin-based groups served the social, political, and ceremonial needs of the village as a whole, and perhaps even the larger community. The architecture of this great house—which was preserved and conserved over multiple generations—embodies the principles that underlie the concept of the house society, namely, that structures within the great house were heritable, were in an area with other houses, were decommissioned with offerings of food and useable objects in a manner similar to human burials (Ryan 2010), and displayed references of origin through the use of symbolic architecture (Ryan 2008).

Construction Techniques

The following subsections will focus on three categories of construction techniques most relevant to architecture at Albert Porter Pueblo. These techniques were observed primarily in two structure types—surface rooms and round rooms, or kivas. These include: (1) wall-construction techniques; (2) roof-construction techniques; and (3) finishing techniques. The wall-construction subsection includes discussion of wall foundations and leveling, masonry, mortar, coursing, dressing, masonry style, the use of intramural beams, bonding, doorway types and placement, and wall decoration, or petroglyphs. The roof-construction subsection includes discussion of roofing techniques used in surface rooms and round rooms, or kivas, as well as the types of roofing materials found during excavation. The final subsection includes discussion of finishing techniques, specifically floor and plastering construction techniques.

Wall Construction

Because portions of Albert Porter Pueblo were occupied during several centuries, construction fill—composed of secondary refuse, caliche, adobe, and/or spall stones—was deposited before the construction of many new walls to level an uneven construction surface. Exceptions to this include walls constructed in a previously unused area, in which case the wall footing was constructed on undisturbed sediment or bedrock.

In general, basal stones—or the lowest stones in the continuous face of a wall—were placed on masonry footings—a wall section composed of one to several courses of large, unshaped sandstone blocks. Masonry walls were typically recessed or set back, from the face of the footing. In one excavation unit, a layer of clean adobe was deposited over the top course of the footing and was then sloped away from the exterior wall in an apparent attempt to divert precipitation away from the building. No evidence of footer trenches was found in the excavation units at Albert Porter Pueblo. However, possible evidence of pre-planned layout was observed in the presence of several circular postholes located along the exterior face of the north wall of the great house; posts thus might have marked the location and alignment of the great house before it was constructed.

Construction of the great house appears to have begun with the creation of a platform 50 cm thick composed of secondary refuse and construction deposits. The wall footings on the north side of the great house were constructed directly on this platform. The purpose of the platform was twofold: first, it leveled the surface for construction; and second, it elevated the great house.

Masonry

Masonry construction is an architectural technique that uses stones and can be (1) dry-laid—stones laid without mortar; (2) dry-laid/daubed—stones laid without mortar but with daub pressed into the joints; and (3) wet-laid—stones laid onto wet mortar. All masonry recorded at Albert Porter Pueblo—including that for aboveground rooms, kivas, and enclosing walls—was constructed using the wet-laid technique, with one exception. Structure 1044, a possible shrine located in the southeastern portion of the site (see Figure 2.1), which appears to have been constructed using a dry-laid technique.

Although the locations of sandstone quarries have not been documented, the sandstone used in wall construction at Albert Porter Pueblo was probably procured in the immediate vicinity of the settlement. Sandstone was readily available along the eastern edge of the pueblo as well as in outcrops in Sandstone and Woods canyons. This sandstone, known as Dakota Sandstone, originated in the lower Cretaceous formation during the Mesozoic era, a period from 250 to 67 million years ago. Dakota sandstone is a sedimentary rock consisting primarily of shallow, sandy-marine deposits.

Mortar

Mortar is defined as a bonding material used to join masonry, wood, or other materials into a unified mass. Most walls documented at Albert Porter Pueblo were constructed using a wet-laid masonry technique. The mortar was composed of reddish-brown silty clay loam and typically lacked inclusions. This type of sediment is generally found in alluvial deposits. These deposits were probably procured near springs or possibly at the Woods Canyon Reservoir (also see Chapter 12). Mortar was applied as either extruded or flush with the masonry face in joints 1 to 6 cm wide. In general, walls constructed with tabular stone—with edges that are at least three times as long as they are high—tended to have mortar joints of 2 cm or less. As noted by Lekson (1987:11), using less mortar allows for stone-to-stone contact which, in turn, increases the strength of the wall and reduces the possibility of structural failure resulting from the weathering of mortar joints.

Coursing

Coursing—or the degree of consistency with which masonry courses were laid—varied at Albert Porter Pueblo. Two types of coursing were found most commonly: (1) fully coursed, in which stones are laid in distinct rows and tend to overlap the joints of the adjacent courses, virtually eliminating running joints; and (2) semicoursed, in which stones are laid in somewhat distinct rows but lack consistency. In general, room walls, and kiva benches, pilasters, and deflectors were fully coursed, whereas kiva upper-lining walls were generally semicoursed. Another coursing type, coursed-patterned—or fully coursed walls in which the stones have been sorted by size and/or shape—was observed on the exterior face of the east wall of Structure 140. This is the only coursed-patterned wall recorded at the site; this style might reflect Chaco influence.

Dressing

Masonry blocks were either well-dressed or partly shaped on at least one face to provide a uniform edge for construction. Sandstone blocks used in wall construction were dressed, or shaped, by methods including flaking, pecking, grooving-and-snapping, and/or grinding. Flaking, also referred to spalling (Lekson 1987:11) or scabbling (Hayes 1964:73), involves the removal of stone through direct percussion. The same is true of pecking; however, pecking tends to be localized and removes a smaller fragment of stone than flaking, which may remove an entire face. Pecking often leaves a dimpled appearance on the stone face, possibly a means of ensuring that plaster would stick to the wall (Vivian and Hilpert 2002:161). Grooving-and-snapping is similar to flaking except that the stone has been prepared with a groove around the intended margins of the rock face to guide the fracture (Lekson 1987:11). Grinding involves rubbing a block against another stone to produce a smooth face. The majority of blocks recorded at Albert Porter Pueblo were dressed primarily by flaking, grinding, and pecking methods.

Masonry Style

Most styles of masonry can be classified using Lekson's (1987:17) typology that was originally developed by Neil Judd for Pueblo Bonito in Chaco Canyon (Judd 1964). This typology describes four styles—Types I–IV—of surface patterning or "veneers." In addition to these styles, Lekson (1987:17) includes the "McElmo" style that was first described by Vivian and Mathews (1965). As noted above, the McElmo style is considered by many researchers to be intrusive to Chaco Canyon, because its origins are assumed to be in the Mesa Verde region. However, the origin of the McElmo style is currently being debated, because it appears in the architecture of Chaco Canyon and some outliers as early as the late A.D. 1000s and early A.D. 1100s (see Vivian and Hilpert 2002:160;Wills 2009). Great houses constructed with McElmo-style masonry are strikingly different from great houses constructed with Types I–IV styles. Many McElmo-style buildings consist of one or two square, compact units containing one or two aboveground kivas and surrounded by several rows of rooms. Many McElmo-style great houses lack great kivas and enclosed plazas, and there is less terracing of rooms, because many are only one or two stories tall (Vivian and Hilpert 2002:160).

Four types of facing styles were documented at Albert Porter Pueblo. These types were discerned from aboveground rooms. Of the four types present, three represent exterior faces, and one represents an interior face. The predominant facing is the McElmo style, characterized by rectangular, brick-shaped stones with abraded or pecked faces, mortar joints between 2 and 6 cm thick, and sparse spall or tabular chinking stones in the mortar joints. At Albert Porter Pueblo, this "classic" style is most common in structures dating from the Pueblo III period, particularly those that postdate A.D. 1225. The second style may be considered a McElmo style, which I label "McElmo Style A." This style shares all of the characteristics of classic McElmo facing minus the abraded finish. This facing type appears most often at Albert Porter Pueblo in structures dating from the early-to-middle A.D. 1100s. The third facing style may be considered a nonconforming McElmo style, which I label "nonconforming McElmo style A," because it appears to be a mix of types consistent with "Type III" masonry associated with a Chacoan construction technique and a McElmo style. Type III masonry is characterized by tabular and rectangular stones, thin mortar joints, and some chinking (Lekson 1987:17). Additionally, alternating bands of large brick-shaped stones and smaller, thinner tabular stones are common in the Type III masonry style (Lekson 1987:17).

At Albert Porter Pueblo, only one wall, the exterior face of the east wall of Structure 140, exhibited "nonconforming McElmo style A" (Figure 5.6). This wall was constructed as part of the great house "core," constructed during the Pueblo II period. The fourth facing type which I label "nonconforming McElmo style B," may also be considered a nonconforming McElmo style. This style is composed of both tabular and rectangular flaked blocks, most of which were not pecked or abraded, and contains moderate-to-dense chinking in the horizontal mortar beds. This style of masonry is associated with the construction of the core of the great house, which was built during the Pueblo II period.

Abutting and Bonding

New walls are commonly abutted to, or built against, the face of a standing wall in order to add to or expand a building. This process typically occurs when new rooms are under construction or when an addition to an existing building is constructed. Analyzing the bonding and abutting of walls allows researchers to infer the construction sequence of a building through time.

At Albert Porter Pueblo, unit pueblos appear to have been constructed in a single building phase, whereas the great house, located in Architectural Block 100, was constructed during several building episodes over a period of two centuries. The original great house consisted of an aboveground, blocked-in kiva (Structure 112), and approximately 14 rooms. The first addition to the great house was constructed about A.D. 1140. A kiva, Structure 108 (see Figure 5.4), and several rooms were added to the south of Structure 112. Structure 108 was constructed mostly in the local (Mesa Verde) masonry and architectural style, with the exception of a subfloor ventilation system, a feature not common in the Mesa Verde region before the period of Chaco influence. The structure also contained a subfloor vault, which indicates the kiva was used for important ritual activity (Wilshusen 1989). During the period of Chaco influence, space around the great house was restricted, and no other buildings were constructed in proximity to the great house. But beginning in the middle-to-late A.D. 1100s and continuing until the 1250s, a minimum of nine roomblocks were constructed adjacent to, or near, the original great house. By the mid-A.D. 1200s, approximately 11 kivas and 55 rooms had been constructed in the expanded, post-Chaco, great house (see Figure 5.4).

Doorways

Lekson (1987:25–28) found four types of doorways in aboveground rooms in Chaco Canyon: (1) small doorways with sills high above the floor; (2) large doorways with the sills just above the floor; (3) T-shaped doorways; and (4) corner doorways. Of these types, the first three were the most common and, of these, small doorways were the most prevalent. In Chaco Canyon, corner doorways are the least numerous; seven are present at Pueblo Bonito, three were recorded at Chetro Ketl, and one is present Pueblo Pintado. Aztec Ruins, located in the middle San Juan region, has three corner doorways.

Many T-shaped doorways at Pueblo Bonito and in other Chacoan buildings open into a plaza or onto a roof terrace of elevated kivas (Judd 1964:28; Lekson 1987:28). In general, T-shaped doorways are sparse in the Southwest, but are reported in greater numbers in Chaco Canyon, Mesa Verde National Park, and Casas Grandes in Chihuahua (Cameron 2009:92; Love 1974). The functional and symbolic nature of T-shaped doorways is unknown, but they may index clouds, rain, or fertility—all of which continue to be significant for Pueblo people today.

Only two doorways were found during excavations at Albert Porter Pueblo. A T-shaped doorway located in the southern wall of Structure 128 was sealed when a row of rooms was abutted to the exterior face of the southern wall of Structure 128. It seems likely that this doorway accessed an exterior plaza, because there is no surface indication of an elevated kiva just south of this doorway. The other doorway is located in the west wall of Structure 141. This possible T-shaped doorway connected Structure 141 to the room adjacent to the west. Because T-shaped doorways are known to connect structures to exterior spaces, it is more probable that this doorway once served as an exterior entrance on the west exterior wall of the great house before the construction of the room to the west.

Petroglyphs

Four architectural petroglyphs were found in Architectural Block 100 at Albert Porter Pueblo. Two of the petroglyphs (Features 15 and 16) are located in the exterior face of the south wall of Structure 112, an aboveground, blocked-in masonry kiva constructed in the great house in the early A.D. 1100s. One of these petroglyphs (Feature 16) consists of three concentric circles, and the other (Feature 15) is a spiral that loops three times. An additional architectural petroglyph was found in collapsed wall debris on the modern ground surface just north of Structure 113 and also consists of a spiral that loops three times. Given its context and morphology, and its similarity to the first two petroglyphs described, this petroglyph was probably incorporated into an exterior wall, possibly the east exterior wall of the core of the great house. The fourth petroglyph was found in collapsed roofing material in Structure 150. This petroglyph was pecked into a sandstone slab and does not appear to have been incorporated into a masonry wall. This petroglyph also consists of a spiral that loops three times.

Architectural petroglyphs have been reported from numerous other sites in the central Mesa Verde region (Fewkes 1911:67, 1917:472, 1919:12; Hayes and Lancaster 1975:166, Figure 215; Reed et al. 1979:301–306) and from northeastern Arizona (Kidder and Guernsey 1919:196, Figure 97; Woodbury 1954:162). Five architectural petroglyphs were recorded at Escalante Ruin, a great house dating from the Pueblo II period and located southeast of Albert Porter Pueblo, and two such petroglyphs were recorded at Dominguez Ruin (Reed 1979:98–100) also located in the Escalante community. At Escalante Ruin, three of the petroglyphs consist of spirals. Two are concentric circles found in the wall-collapse debris along the exterior face of the north wall of the pueblo. Two of the spiral petroglyphs were also recovered from wall debris along the exterior face of the north wall.

Chaco-Influenced Architectural Features

In this subsection, I discuss types of features associated with Chaco-influenced architecture including ventilator tunnels, pilasters, floor vaults, and deflectors. I also summarize intramural beams and footer trenches.

Ventilator Tunnels

Ventilator tunnels are the horizontal portion of a ventilation system, which is a specialized construction for allowing the intake of fresh air into a structure. Most ventilation systems are in pithouses and kivas, but a few are found in rooms. In the Mesa Verde region, most ventilator tunnels open in one of two locations—the south bench face at floor level or the floor just south of the hearth. The latter type is most often associated with aboveground kivas constructed during the Pueblo II period, but some are present in structures dating from the Pueblo III period.

Ventilator tunnels were exposed in six kivas at Albert Porter Pueblo (Structures 108, 112, 113, 115, 116, and 150). Two of these, Structures 108 and 112, were constructed with subfloor ventilator tunnels. Structure 112, an aboveground, blocked-in kiva, was the sole kiva constructed within the original core of the great house sometime in the early A.D. 1100s. Located just south of Structure 112, a subterranean kiva, Structure 108, was constructed with a subfloor ventilator tunnel about A.D. 1140. This ventilator tunnel was filled with refuse—from which a Chaco Black-on-white sherd and multiple fish bones were recovered—and sealed when a new floor was constructed just above the first floor. During this remodeling event, a floor-level ventilator tunnel was constructed through the bench face below the southern recess.

Pilasters

As noted above, most subterranean kivas in the central Mesa Verde region were constructed with six "pier" pilasters—or tall masonry columns without wood, whereas many aboveground kivas were constructed with eight radial-beam pilasters. Radial-beam pilasters consist of short masonry columns constructed around one to four wood beams (although most contain a single large beam) seated horizontally in the upper-lining wall behind the pilaster (Windes 2008). Many of the wood beams in the masonry casing were cut flat, producing a "sawed" appearance near the interior face of the pilaster. Windes and McKenna (2001) note that the flattening of beam ends was common in the architecture of Chaco great houses and should be considered a strong hallmark of Chaco craftsmanship. Both the masonry and beam ends were plastered so that none of the materials used in construction was visible.

Seventeen pilasters in 12 structures were exposed during excavations at Albert Porter Pueblo. As noted above, all except those found in Structure 112 were of the pier variety—tall masonry columns lacking wood. The kivas with pier pilasters were apparently constructed with a cribbed roof. Structure 112, an aboveground, blocked-in kiva, was also constructed with masonry pilasters that lacked wood; however, the pilasters were "squat," or smaller than pier pilasters. This suggests that, although the roof of Structure 112 was cribbed, the weight of the roof was probably supported by beams set into sockets in the upper walls of the room that enclosed the kiva. Furthermore, four pilasters were exposed in the western half of the kiva, suggesting that Structure 112 was constructed with a total of eight pilasters.

The quantity of pilasters constructed within a kiva varies—kivas without pilasters, and those with four, six, or eight pilasters, are the most common. Some researchers believe that the quantity of pilasters corresponds to the size of the structure. For example, Structure 112 is approximately 4.64 m in diameter and contains eight pilasters, whereas Structure 109 is approximately 3.5 m in diameter and contains six pilasters. However, a preliminary analysis of the correlation between the quantity of pilasters and structure size does not support this conclusion (Ryan 2011). Alternatively, the quantity of pilasters in a kiva may reference an ideological perception of the cosmos. For example, four pilasters may reference the cardinal directions, six pilasters may represent the cardinal directions plus zenith and nadir, and eight pilasters may reference the cardinal and ordinal directions.

Floor Vaults

A floor vault is defined as a large, formally constructed, rectangular pit excavated into the floor of a pit structure or kiva. Beginning in the Pueblo I period, many great kivas were constructed with floor vaults, a practice that continued until the late A.D. 1200s in the northern San Juan region. Floor vaults were typically constructed in pairs and were located east and west of the hearth box in great kivas; yet, a single vault, located in the western portion of the structure, is typically present in residential pit structures and kivas,. During the Pueblo I period, some floor vaults were constructed north of the hearth. Wilshusen (1989) argues that floor vaults constructed north of the hearth functioned as the sipapu. The interior of a floor vault may be earthen, masonry-lined, or some combination of these. It is thought that most floor vaults were covered with a wooden plank.

Lekson (2007:23–24) notes that approximately three-fourths of round rooms in Chaco Canyon were constructed with floor vaults west of the hearth. Because many of these features were covered during remodeling events, Lekson notes that the quantity of round rooms constructed with floor vaults might have been considerably greater. A preliminary analysis of architecture dating from the Pueblo II and Pueblo III periods in the northern San Juan region suggests that floor vaults are common in kivas constructed during the Pueblo II period and are less common in kivas dating from the Pueblo III period (Ryan 2011).

Two floor vaults were exposed during excavations at Albert Porter Pueblo. Both vaults were constructed in subterranean kivas, Structures 108 and 150, during the early to mid-A.D. 1100s. Interestingly, these kivas shared northing coordinates, but were approximately 50 m apart east-west. Both floor vaults were constructed by lining with coursed masonry a rectangular pit that had been excavated into the floor (in Structure 150, vertical slabs were also used). Both vaults were lined with adobe that covered this masonry. No evidence of a roof or wooden plank was observed in either of the vaults; however, sockets preserved in both features indicate that the features were roofed. The floor vault in Structure 108 was in use until the kiva was abandoned in the Pueblo III period; however, the floor vault in Structure 150 was decommissioned by filling the vault with secondary refuse and covering the entire feature with an adobe floor. Interestingly, fish bones—a rare occurrence at Albert Porter Pueblo—were recovered from the floor vault in Structure 108.

Deflectors

A deflector is defined as an upright slab or short segment of masonry or jacal wall between a hearth and the opening of a ventilator tunnel. Deflectors are most common in pit structures but can be present in surface rooms. It is thought that deflectors served two functions: to shield the fire from air entering the structure and to disperse and circulate fresh air throughout the structure. A third possibility exists that deflectors—as well as their corresponding wing walls—divided interior space.

Nine deflectors were exposed during excavations at Albert Porter Pueblo. The only kiva that did not contain a deflector was Structure 112—this is probably due to the presence of a subfloor ventilator. Three types of deflectors were documented at this site: (1) slab (n=4); (2) masonry (n=4); and (3) masonry with wing walls (n=1). The slab deflectors were composed of a single piece of shaped sandstone and were anchored vertically into the kiva floor. The masonry deflectors were composed of several courses of sandstone blocks with mortar joints. One kiva, Structure 114, was constructed with a coursed-masonry deflector and wing walls that curved to meet the southern bench face. Two deflectors, located in Structures 111 and 114, were constructed with niches.

Intramural Beams

The use of intramural beams—or beams located horizontally in the core of a masonry wall—is a hallmark of Chacoan architecture. In Chaco Canyon, intramural beams range from about 15 to 20 cm in diameter, as much as 2.25 m long, and are occasionally found in pairs (Lekson 1987:24). As Lekson (1987:24) notes, the frequency of intramural-beam use is unknown; however, more than 200 such beams were exposed after a flood in 1947 that destroyed the standing walls of six rooms at Chetro Ketl. Although intramural beams have been noted in great houses located near Albert Porter Pueblo, including Lowry Ruin (Martin 1936), none was identified at Albert Porter Pueblo. However, this may be a consequence of our excavation strategy; the cores of masonry walls were not examined at this site.

Footer Trenches

No evidence of footer trenches was found in the excavation units at Albert Porter Pueblo. However, pre-planned layout may be evidenced by the presence of several postholes along the exterior face of the north wall of the great house, constructed during Pueblo II period, possibly marking the location and alignment of the great house before construction.

Roof Construction

Roofing of Square Rooms

Intact roofs are found primarily in cliff dwellings or sites that are protected from weathering, and in massive, open-air sites such as the great houses in Chaco Canyon. Archaeologists can infer how the roof of a particular structure was built by observing intact roofs. Most roofs were constructed using the following materials: (1) vigas or primary beams, which were the main roof supports that spanned the length or width of a structure; (2) latillas or secondary beams, which were beams that rested on the vigas and spanned the distance between primary beams or between a primary beam and a wall of a structure; (3) shakes, or long, narrow pieces of wood that were split from a larger piece of wood and were frequently layered on top of secondary beams; (4) closing material, or vegetal material that rested on the secondary beams and/or shakes and was beneath the fill layer; and (5) fill, composed of loose dirt, adobe, rock, and/or caliche and that covered the shakes and provided a flat exterior surface.

Two techniques were used to seat primary beams in a wall (Lekson 1987:30). Most often, the primary beams were placed on top of the wall, and the ends of the beams were encased in masonry. Less often, masonry walls were constructed with a gap or socket in which primary beams would be fitted after the masonry construction was complete. Afterwards, the area surrounding the primary beams was filled with masonry that was heavily chinked.

At Albert Porter Pueblo, the only remaining evidence of primary-beam construction was found in Structure 143/153, a two-story masonry room located in the northeastern portion of the core of the great house. Three primary-beam sockets were exposed in the interior face of the west wall, the locations of which indicate the elevation of the roof of Structure 153 and the floor of Structure 143. The construction method used in Structure 143/153 is a common type in which the primary beams were placed on top of the wall and were subsequently encased with masonry. Some of the masonry surrounding the primary beams was shaped to accommodate the round intrusion. Rotted wood was recovered from all three sockets but was too decomposed to yield tree-ring dates for the construction of these rooms.

Roofing of Circular Rooms

Kivas, whether constructed below ground or above ground within a rectangular enclosing structure, had a flat roof that served not only as the access route into the structure but as a surface for courtyard activities such as drying food and making tools. In great houses, kiva roofs also served as terraces for second-story rooms. Additionally, in historic and modern pueblos—and probably in pre-Hispanic pueblos—rooftops were gathering places for the observation of plaza activities.

Roof construction techniques vary, and there is much debate about the exact methods of construction, especially for structures built during the Pueblo II period. The typical method used to construct a kiva roof was a framework of wood beams, also known as "cribbing" (Judd 1964; Lekson 1987:32; Morris 1921). For cribbed roofs, beams were placed horizontally directly on top of masonry pilasters, or coursed-masonry columns, that were constructed at equal intervals on the bench surface. Kivas were constructed with approximately four to 10 pilasters.

Some archaeologists assume that cribbing was load-bearing and supported the weight of beams and fill; however, others believe that much of the weight of the roof was supported by horizontally-placed beams that rested on the tops of enclosing walls (Hovezak 1992:41; Reiter 1946). The latter was probably true for kivas constructed with radial-beam or squat pilasters. Additionally, Lekson (1987:34) argues that some kivas had an internal wattle-work framework—often referred to as wainscoting—that formed an artificial domed ceiling within the structure without using cribbing. The domed ceiling itself was not load-bearing, but was made so by the resting of horizontally-placed primary beams across the tops of the enclosing walls.

Roofing Materials

As noted in Chapter 8, most primary and secondary roof beams, called vigas and latillas, respectively, were of juniper (*Juniperus*) wood, which composed 92 percent of the identified specimens were submitted to the Laboratory of Tree-Ring Research from this site. Pinyon (*Pinus edulis*) wood composed 6.4 percent of the identified specimens, and the remaining elements were identified as ponderosa pine (*Pinus ponderosa*), spruce/fir (*Picea/Abies*), or as non-coniferous elements.

Interestingly, Structure 110, a masonry-lined kiva associated with the core of the great house, was constructed during the Pueblo II period with spruce/fir and non-coniferous wood, as well as with juniper. Additionally, Structure 908, a non-masonry aboveground room in Architectural Block 900, was constructed with ponderosa pine wood as well as with juniper. The nearest sources of spruce/fir and ponderosa pine would have been in high-elevation areas, such as on Ute Mountain, on Mesa Verde, or in the canyons along the Dolores River, and procuring and transporting these beams to Albert Porter would have required a major labor investment.

The incorporation of high-elevation construction wood is common in great houses in Chaco Canyon and in outliers constructed during the Pueblo II period (Betancourt et al. 1986; Reynolds et al. 2005; Windes and McKenna 2001). For example, an estimated 200,000 high-elevation trees, including 26,000 for Chetro Ketl, 50,000 for Pueblo Bonito, and 18,000 for Pueblo del Arroyo, were harvested and transported to Chaco Canyon for construction (Windes and McKenna 2001:123). High-elevation trees have a greater circumference and are taller and straighter than trees growing near Chaco Canyon, making them functionally superior construction elements. For this reason—and perhaps reasons rooted in symbolism (high-elevation trees index areas that receive increased precipitation)—high-elevation trees were a sought-after commodity.

Unfortunately, no intact roofs were found during excavation at Albert Porter Pueblo. However, collapsed roofing material was present on or near structure floors. Roofing material—composed of some combination of the architectural elements listed above—contained fill dirt, adobe, caliche, wall-fall debris, pieces of charred and uncharred vigas and latillas, and remnants of closing material. When present, wood samples were collected and sent to the Laboratory of Tree-Ring Research for dating (also see Chapter 3). Additionally, 1-liter samples of roof sediments were analyzed for microscopic and macroscopic fossil plant remains. As noted in Chapter 8, closing material was composed primarily of sagebrush (*Artemisia tridentata/Artemisia*). Used in lesser quantities were numerous other trees and shrubs, including service berry (*Amelanchier/Peraphyllum*), mountain mahogany (*Cercocarpus montanus*), Mormon tea (*Ephedra viridis*), cottonwood/willow (*Populus/Salix*), and Gamble oak (*Quercus gambelii*). All of the roof-closing resources listed here would have been available in the immediate vicinity of the settlement.

Finishing

Floors

Interestingly, floor-construction techniques were similar during all periods of occupation at Albert Porter Pueblo. Most floors were constructed by depositing 2 to 4 cm of adobe directly on a prepared caliche (calcium carbonate) construction surface. The caliche construction surface varied from 2 to 7 cm thick, depending on the nature and condition of fill below the room. The adobe was evenly distributed across the caliche base and was typically lipped up at the interface with interior masonry walls. Some structures contained multiple floor surfaces, indicating a remodeling event or a long use-life, or both. Only one structure, Structure 403, used bedrock as a floor; an adobe coping was used to construct the hearth collar in that structure.

Plastering

After a building was walled and roofed, the interior was finished by covering the masonry with plaster. Although there is no evidence of plaster on the exterior faces of walls at Albert Porter Pueblo, it seems likely that exterior walls were plastered to prevent weathering and erosion of the mortar joints. Preserved plaster was found only in kivas, specifically on pilasters and benches. In most instances, plaster appeared to have been composed of ground caliche, or calcium carbonate, and water—although chemical analysis is needed to verify this. This mixture would have created a "whitewash" when applied to a masonry face. Kivas that had long use lives exhibited several layers of plaster. For example, Structure 112, the aboveground, blocked-in masonry kiva located in the great house in Architectural Block 100, exhibited a minimum of seven layers of plaster that had been applied over the course of two centuries of use.

Decorated plaster is commonly found in kivas located in the Mesa Verde region. A pilaster in Structure 112 (Feature 1) at Albert Porter Pueblo was coated with light green plaster. A second pilaster (Feature 11) exhibited several white dots; these dots appeared to have been made by pressing fingertips coated with white plaster onto a soot-covered background. The associated bench face might also have been decorated.

Note

1. I altered Rapoport's (1969) terminology from "primitive vernacular" to "fixed" and "preindustrial vernacular" to "additive" in order to avoid connotations of cultural evolution.

Figure 5.1. Aerial photograph, Albert Porter Pueblo.

Figure 5.2. Viga sockets in Structures 143 and 153 indicating multiple-story construction.

Figure 5.3. T-shaped doorway (sealed), Structure 128, Albert Porter Pueblo.

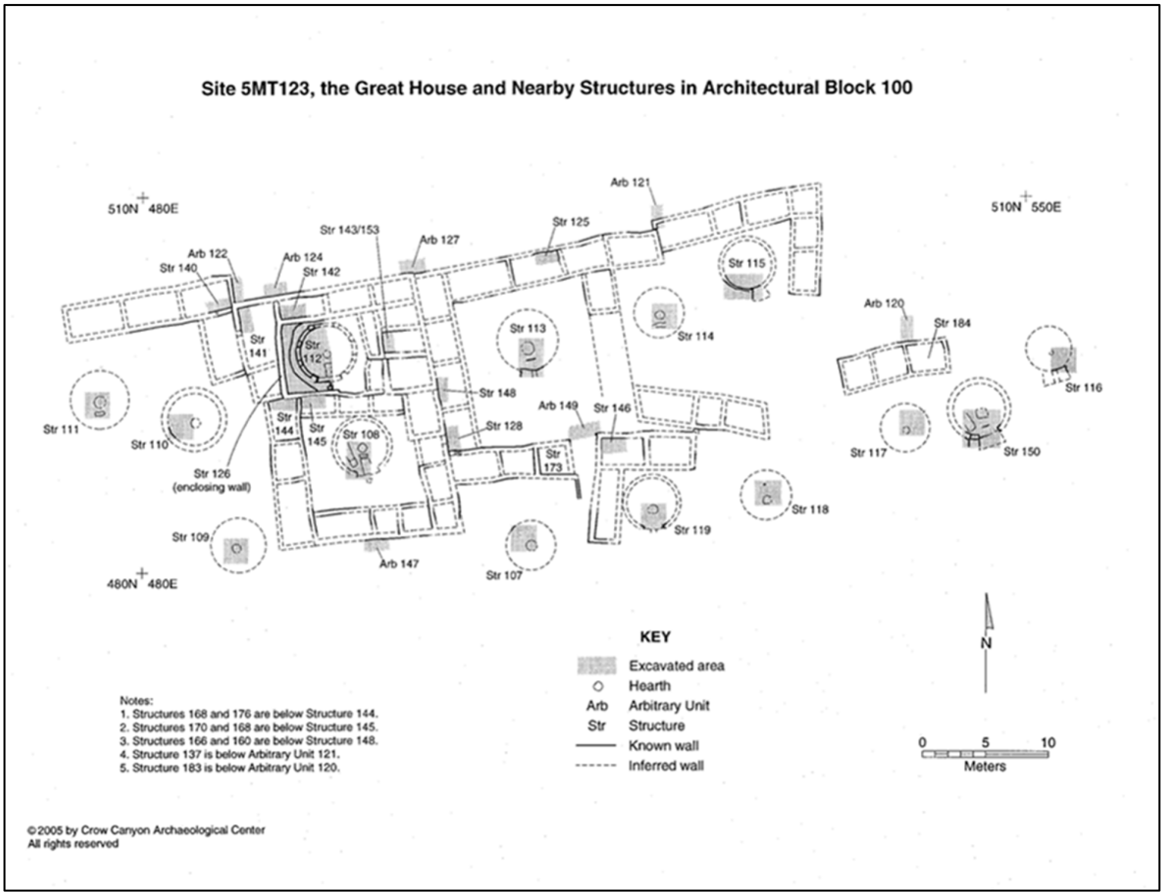

Figure 5.4. Architectural Block 100 plan map, including great house, Albert Porter Pueblo. The great house "core" is composed of Structure 112 and the surrounding rooms, including the four rooms immediately west of Structure 112.

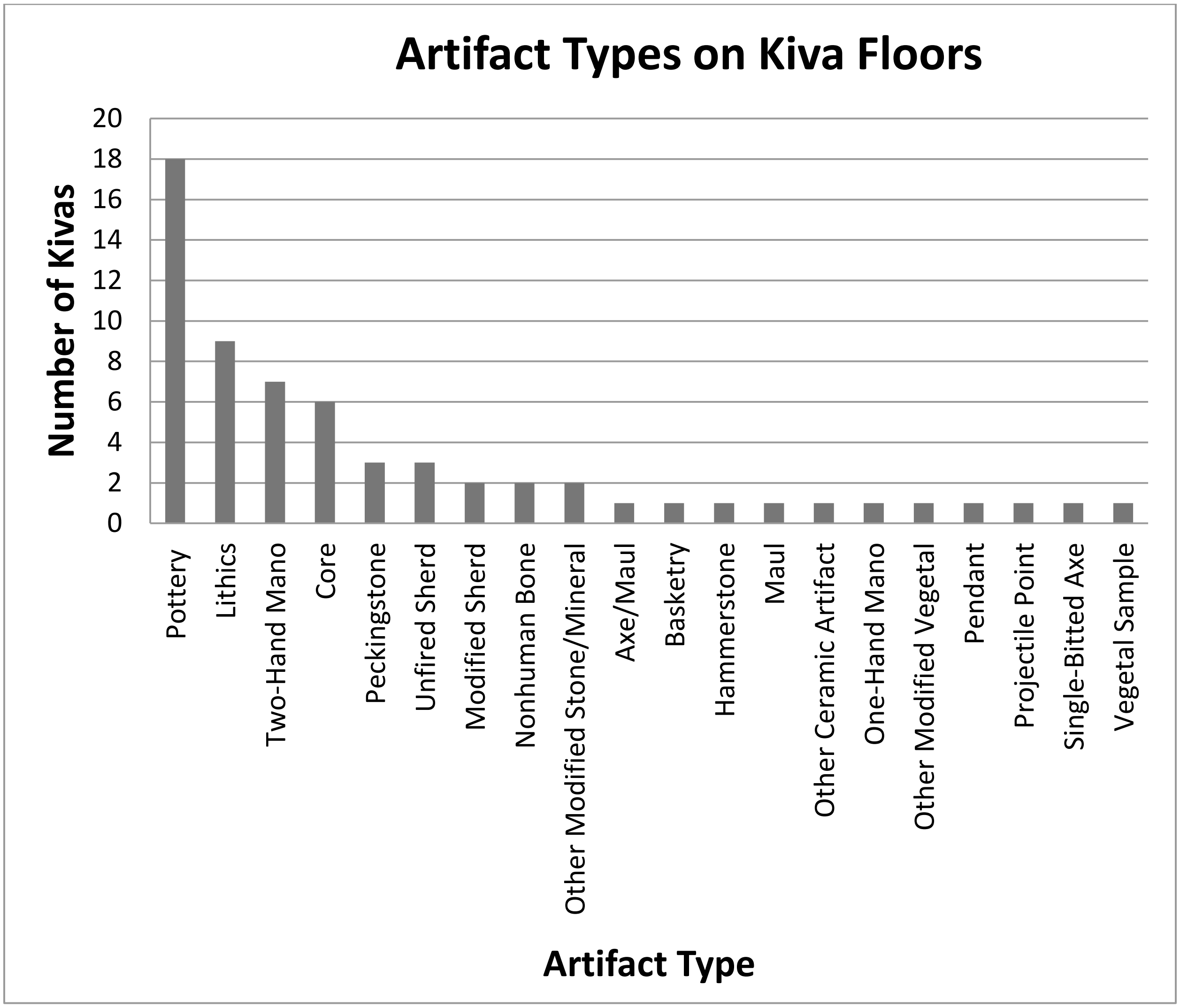

Figure 5.5. Types of artifacts found on kiva floors, Albert Porter Pueblo.

Figure 5.6. Core-and-veneer-like masonry with chinking stones, Structure 140 east exterior wall, Albert Porter Pueblo.

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Chapter 6

Artifacts

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Introduction

This chapter synthesizes information on portable artifacts collected during excavations at Albert Porter Pueblo. The tables and figures in this chapter were produced using data as they existed in August 2010. I am not aware of any provenience changes that have been made since that time, but slight discrepancies between the data discussed in this report and those contained in the database may develop over time if errors in the database are found and corrected. However, it is likely that any such changes will be minor and will not affect any of the conclusions presented in this chapter.

All items collected during excavations at Albert Porter Pueblo were processed according to the standard laboratory procedures of the Crow Canyon Archaeological Center, which are described in detail in Crow Canyon's online laboratory manual (Ortman et al. 2007). All objects were classified into various stone, bone, pottery, vegetal, and other categories, as defined in the laboratory manual.

With the exception of wood samples submitted for tree-ring dating, all artifacts, ecofacts, and other samples recovered from Albert Porter Pueblo, as well as original field and laboratory documentation, are curated at the Anasazi Heritage Center, Dolores, Colorado. The collections are indexed to artifact databases, which are curated at both Crow Canyon and the Anasazi Heritage Center and are accessible online in Crow Canyon's research database. Materials are available for study with permission from the Anasazi Heritage Center. Dated tree-ring samples, and additional wood samples that might be datable in the future, are stored at the Laboratory of Tree-Ring Research, University of Arizona, Tucson.

Numerous artifacts were subjected to destructive analysis. Small portions of 20 rim sherds from both white ware bowls and corrugated gray jars were destroyed to facilitate temper identification. These items were subjected to Instrumental Neutron Activation Analysis (INAA) by the University of Missouri, Columbia, and petrographic analysis was conducted by Fort Lewis College, Durango, Colorado. In addition, the Laboratory of Tree-Ring Research discarded tree-ring samples that possessed little dating potential.

In addition to the analyses reported here, several other studies of artifacts from Albert Porter Pueblo have been conducted or are in progress. Arakawa and Merewether (2010) have investigated the frequency of nonlocal items dating from the Chaco (A.D. 1050–1150) and post-Chaco (A.D. 1150–1280) periods at Albert Porter Pueblo. Arakawa and Gonzales (2010) have studied the sourcing of temper using INAA, petrographic, and microprobe analyses. Copeland et al. (2011) have investigated the chemical signature of prehistoric copper collected from Albert Porter Pueblo as well as other sites in southwestern Colorado.

Definitions of Artifact-Assemblage Groupings for Analysis

This research summarizes the analyses of artifacts from Albert Porter Pueblo in two aggregate units—one spatial and the other temporal. Eleven architectural blocks were identified and mapped at the site (also see Chapter 2). These blocks, numbered 100 through 1100, were defined on the basis of artifact, rubble scatters, and rubble mounds that were visible on the modern ground surface. Within each architectural block, study units such as "structure" (e.g., kivas), "nonstructure" (e.g., middens), and "arbitrary unit" were each assigned a unique number within that series; see Crow Canyon's online field manual for further descriptions of these study unit types. The assignment of temporal components to study units was completed with the aid of multiple lines of evidence including tree-ring and pottery data; these data are presented and discussed in the Albert Porter Pueblo online database.

Spatial Analysis: Study-Unit Groupings

To understand the spatial distributions of various types of artifacts, two groupings of study units were used—artifacts collected from Architectural Block 100 vs. those collected from Architectural Blocks 200–1100. These groupings were employed in order to address specific research questions for the excavations at Albert Porter Pueblo that included determining whether the material culture of the residents of the "great house" in Architectural Block 100 differed from that of the residents of the other areas of the settlement.

Temporal Assignment

For base-line dating assignments, the Pecos Classification System (Kidder 1927) was used for temporal comparisons of artifacts collected from Albert Porter Pueblo (Table 6.1). For a detailed analysis of the general trend of artifact distributions within the site, artifact deposition was separated into three different subperiods—late Pueblo II (A.D. 1060–1140), early Pueblo III (A.D. 1140–1225), and late Pueblo III (A.D. 1225–1280); a category labeled "others" was used for contexts with mixed assemblages or for which dates could not be assigned (Table 6.2).

Three different time periods were assigned to facilitate discussions of the construction of the great house in Block 100 and the deposition of artifacts through time: pre-A.D. 1060, A.D. 1060–1140, and A.D. 1140–1280. These dates differ somewhat from the traditional Pecos Classification System (Kidder 1927), because the assignments of these periods were derived from assessments of diagnostic pottery types and tree-ring-dated assemblages from the central Mesa Verde region (Ortman et al. 2007); these dating assignments provide for more precise and detailed dating of the construction and occupation of the great house in Block 100 (Table 6.3). Artifacts collected from the pre-A.D. 1060 context are associated with activities that were conducted before the construction of the great house. The A.D. 1060–1140 context indicates artifacts that reflect activities conducted by people who probably resided in the great house. The A.D. 1140–1280 context refers to activities by residents of Albert Porter Pueblo who used, remodeled, and added structures to the great house. For artifact comparisons between the Pueblo

II and Pueblo III periods, the Pueblo II artifact category includes materials from both the pre-A.D. 1060 and 1060–1140 periods, whereas the Pueblo III category includes materials from the A.D. 1140–1280 period only.

In addition, for investigations of the general trend of artifact distributions through time, nine different categories were assigned (Table 6.4), and for investigating pottery-ware forms, Early (Basketmaker III and Pueblo I periods), Late (Pueblo II and Pueblo III periods), and Pueblo I/Pueblo II categories were used. The lumped category contains pottery that could not be identified as diagnostic of either the Pueblo I or Pueblo II period.

Accumulation Study: Weight of Gray Ware Sherds

To compare quantities of artifacts collected from different excavation units, the weights of gray ware sherds were used as a measure of sampling intensity across study units and architectural blocks. Essentially, this standardizes artifact recovery against a measure of total material excavated, on the assumption that gray ware pottery accumulated at a consistent rate per person and year and is thus a good standard against which to compare other artifact types (Varien and Mills 1997; Varien and Ortman 2005). In all analyses, the ratio between the count of each artifact type and the weight of gray ware sherds recovered from various areas was used to control for sample size and to standardize the abundance of each type of artifact against cooking-vessel sherds. Gray ware weight is specifically used, because it has been found to be a good measure of site occupation intensity (Kohler 1978; Varien and Mills 1997; Varien and Potter 1997; Varien and Ortman 2005). In addition, previous studies indicate that weight is the best estimator of pottery accumulation, because it controls for the degree of pottery fragmentation across depositional contexts and post-depositional disturbances (Ortman 2000). In Table 6.5, the counts and weights of gray ware sherds are presented for the pre-A.D. 1060, A.D. 1060–1140, and A.D. 1140–1280 periods of great house use. In addition, Table 6.6 presents the weight of gray ware collected from each architectural block at Albert Porter Pueblo. Table 6.7 shows the weight of gray ware sherds collected from Architectural Block 100 vs. the weight of gray ware sherds from Architectural Blocks 200–1100.

Standard Errors of Proportion Analysis

The standard errors of proportion were conducted for various pottery and chipped-stone tool analyses. In general, the standard errors of proportion help us understand the accuracy of sample sizes. In other words, this analysis evaluates whether samples are of sufficient abundance for the purpose of comparing one artifact type with another. When sample size is small, errors in comparisons can result, thus creating errors for the whole population. To alleviate this problem, two confidence intervals were applied to the standard errors of proportion calculations for the artifacts from Albert Porter Pueblo.

Albert Porter Pueblo Research Design

In this section, I will briefly summarize the spatial and temporal framework used to interpret artifacts from Albert Porter Pueblo and introduce three major research topics related to the village—settlement patterns, sociopolitical organization, and trade. Albert Porter Pueblo is the remains of an ancestral Pueblo village located in southwestern Colorado in a study area defined by Crow Canyon researchers as the Woods Canyon community. Other large sites within this community include the Bass Site complex and Woods Canyon Pueblo. On the basis of the initial survey, Albert Porter Pueblo showed characteristics of Chaco influence (Lipe and Ortman 2000; Lipe and Varien 1999a:288–289, 1999b:349–352). In the eleventh and twelfth centuries, Albert Porter Pueblo was a community center surrounded by more than 50 structures (Glowacki 2006; Ryan 2002, 2003, 2004, 2005, 2008, 2010; Varien 1999). Use of Albert Porter Pueblo appears to have declined during the final decades of the thirteenth century (also see Chapter 3). During these final decades, some residents might have migrated from the Mesa Verde region, and others could have relocated to Woods Canyon Pueblo. Woods Canyon Pueblo might have replaced Albert Porter Pueblo as a community center about A.D. 1250.

At the center of Albert Porter Pueblo, and located in Architectural Block 100, is a great house that was constructed in the early-to-mid A.D. 1100s and occupied until the mid-to-late A.D. 1200s. Multiple unit pueblos dating from the Pueblo II and Pueblo III periods surround the great house. Comparisons of artifacts collected from Architectural Block 100 to those from Architectural Blocks 200–1100 may illuminate social and economic differentiation within the community. In addition, artifact comparisons will determine whether the residents of the village had connections with communities outside the central Mesa Verde region, particularly those in Chaco Canyon, the southern San Juan region, and the middle San Juan region.

Because Albert Porter Pueblo is considered a community center, we are interested in using artifact data to investigate whether the center was organized and controlled by elites. Elites can be defined as religious or ceremonial leaders that might have controlled rituals but not held economic and political power (Schachner 2001, 2011). In addition, artifact data can yield evidence of the development of, or resistance to, social inequality. Such evidence has been obtained by researchers who have investigated social inequality using pottery data to identify evidence of communal or competitive feasting (Blinman 1989; Robinson 2005). Communal feasting generally takes place when people gather and exchange food and resources on a fairly equitable basis in a particular area within a community. In contrast, competitive feasting takes place when aspiring elites attempt to accumulate exotic goods or occupy ceremonial structures or an important space; by doing so, they increase their social and ceremonial status.

Finally, artifacts from Albert Porter Pueblo inform us on the nature of interaction between residents of the village and those living in the southern and middle San Juan regions. Some archaeologists argue that great house construction in the northern San Juan region was influenced by events in Chaco Canyon, suggesting that great houses were strongly affiliated with the Chaco regional system (Earle 2001; Mills 2002; P. Reed 2008). This issue was investigated using igneous temper and is discussed in the "Pottery" section of this chapter.

In sum, the analyses of the artifact assemblages recovered from Albert Porter Pueblo address several important topics: the nature of leadership; decision-making and authority in human society; the development of, or resistance to, social inequality; and the role of public architecture in the development of social complexity. In addition, the data help to examine external relationships and influences at the village during the Pueblo II and Pueblo III periods.

Pottery

Pottery was by far the most abundant type of artifact recovered from excavations at Albert Porter Pueblo. More than 166,000 sherds, weighing more than 1,100 kg, were collected. The process of pottery analysis initially separated the sherds into two categories—Bulk Sherds, Large (BSL) and Bulk Sherds, Small (BSS). The former category includes pottery sherds that are larger than ½-inch mesh, whereas the latter category contains sherds that are smaller than ½-inch mesh but are captured by ¼-inch mesh. Because the BSS category contained less than 10 percent (120,765 g) of the total weight of unmodified sherds (1,285,973 g), we focused primarily on the category BSL to investigate the nature of the Albert Porter Pueblo pottery assemblage.

The following sections focus on three major topics: (1) general descriptions of pottery forms, types, and attributes; (2) detailed analyses of pottery types with regard to spatial and temporal components; and (3) in-situ pottery production and intra-regional pottery trade, emphasizing changes in assemblage composition among the subassemblage of sherds that predate the construction of the great house (pre-A.D. 1060), sherds dating from the initial use of the great house (A.D. 1060–1140), and sherds that date from the final use of the great house (A.D. 1140–1280) in Architectural Block 100.

General Description of Pottery

Bulk Sherds, Large

The pottery sherds collected from Albert Porter Pueblo are categorized into 43 different pottery types according to the pottery-classification scheme used by the Crow Canyon Archaeological Center (Ortman et al. 2007). Table 6.8 shows the counts and weights of all unmodified sherds in the Albert Porter Pueblo assemblage by ware and type. These data indicate that the most abundant type of sherd in the assemblage is Indeterminate Local Corrugated Gray (about 50 percent by count and about 45 percent by weight), followed by Late White Unpainted (nearly 19 percent by count and weight). The percentages by count and weight of seven pottery types—Late White Painted, Indeterminate Local Gray, Mancos Black-on-white, Pueblo III White Painted, McElmo Black-on-white, Mesa Verde Corrugated Gray, and Mesa Verde Black-on-white—vary from approximately 1 to 8 percent of the total assemblage. These data indicate that the most abundant types of pottery sherds collected from Albert Porter Pueblo are local utility and serving wares, as well as white wares dating from the tenth through thirteenth centuries A.D. It is also important to note that the assemblage derives from long-term occupation and includes types dating from several distinct time periods between A.D. 600 and 1280.

Of all of pottery types identified, a subset of 30 types was selected to investigate the time spans of occupation at Albert Porter Pueblo. These pottery types were chosen because they correlate to Pecos Classification periods[1] (Kidder 1927). Table 6.9 shows the count, weight, and percentage by count and weight of the total assemblage of sherds of these selected types by time period. This table shows that about 70 percent of the total pottery assemblage, by count and weight, consists of sherds that date from the Pueblo II or the Pueblo III period (A.D. 900–1300). Sherds that clearly date from the Pueblo II period (A.D. 920–1140) represent 7 percent (by count) to 8 percent (by weight) of the assemblage, and sherds that clearly date from the Pueblo III period

(A.D. 1140–1280) make up another 7 percent (by count) to 13 percent (by weight). An additional small percentage (approximately 7 percent by count and 6 percent by weight) of pottery sherds date from the Basketmaker III (A.D. 600–725) or Pueblo I (A.D. 725–920) period. The majority of pottery sherds collected from Albert Porter Pueblo date from the Pueblo II or Pueblo III period.

Table 6.10 shows the percentage by count and weight of pottery sherds by ware and vessel form. These data offer many insights into the relative abundance of various functional forms in household assemblages, the use life of various forms, and the relative frequency with which the activities for which these vessels were designed took place. For example, these data show that about 50 percent of the assemblage consists of corrugated gray jar sherds, and that plain gray jar sherds are also relatively frequent (about 7 percent by count and 6 percent by weight). Because corrugated and plain gray jars were large and were used on a daily basis for multiple purposes—cooking food, carrying water, and storing liquids and seeds—it is not surprising that they compose a relatively large proportion of the assemblage. White ware jars and bowls each compose approximately 20 percent of the total pottery assemblage. White ware bowls were used for serving food, whereas white ware jars were used primarily for the storage of liquids and seeds. The high frequency of white ware bowls and jars suggests that residents of Albert Porter Pueblo conducted the activities associated with these vessel forms on a regular basis, and that the use lives of these forms were relatively short. Other pottery forms—canteens, kiva/seed jars, ladles, and mugs—occur in lesser quantities, suggesting that these vessel forms were used less often and had longer use lives than vessels of other wares and forms.

Comparison of Pottery Ware Forms: The Early and Late Pueblo Periods

Table 6.11 shows the pottery ware forms grouped by Early (Basketmaker III and Pueblo I periods), Late (Pueblo II and Pueblo III periods), and the sherds of vessels that could have been produced either during the Pueblo II or the Pueblo III period. This table indicates changes in the ware-form data for each period. For example, during the Early period, residents of Albert Porter Pueblo produced and used a high percentage (about 96 percent) of jars, whereas during the Late period, people continued to make jars but increased the percentage of bowls, ladles, and mugs. In other words, residents of Albert Porter Pueblo produced a wider variety of vessel forms during later periods.

Table 6.12 presents a tabulation of sherds assigned to painted white ware vessels by the type of pigment used to paint the designs. These data indicate that carbon paint and mineral paint occur equally (about 50 percent) among painted white ware sherds in the Albert Porter Pueblo assemblage. The majority of the white ware vessels produced during the Basketmaker III and Pueblo I periods—Chapin and Piedra Black-on-white—were decorated with mineral paint. More than half of the white ware vessels produced during the Pueblo II and Early Pueblo III periods—Cortez, Mancos, and McElmo Black-on-white—were also decorated with mineral paint. In contrast, about 55 percent of Mesa Verde Black-on-white pottery was decorated with carbon paint. The majority of Early White Painted (about 60 percent) and Pueblo II White Painted (about 90 percent) sherds were decorated with mineral paint; in contrast, about 60 percent by count of Pueblo III White Painted and about 56 percent of Late White Painted were finished with carbon paint.

Table 6.13 indicates the relative weights of painted white ware sherds by type and finish. These results are similar to the percentages by count (see Table 6.12), but Chapin and Mesa Verde Black-on-white compose slightly larger percentages by weight than by count. The total percentage of painted pottery types by weight indicates more mineral-painted sherds (about 50 percent) than carbon-painted sherds (about 48 percent).

The presence of significant quantities of sherds exhibiting carbon and mineral paint in the Albert Porter Pueblo subassemblage of painted white ware is consistent with previous pottery studies for the central Mesa Verde region. For example, assemblages of painted white ware sherds from Yellow Jacket, Woods Canyon, and Shields Pueblos all illustrate that the majority of white ware sherds dating from the Late Pueblo II (A.D. 1060–1140) or Pueblo III (A.D. 1140–1280) period were carbon painted (Ortman 2000, 2002, 2003; Till 2007). However, these studies have also identified a clinal, southeast-to-northwest trend in areas near the southern boundary between the Colorado and Utah today in the replacement of mineral paint by carbon paint; mineral paint continued to be used regularly into the Pueblo III period in the northwest part of that area. The Albert Porter Pueblo assemblage follows this trend, and thus supports the results of previous studies (Ortman 2000, 2002, 2003; Till 2007).

To investigate the temporal trend of white ware vessels finished with mineral paint for Albert Porter Pueblo, I compared subassemblages for two time spans—A.D. 1060–1225 and 1225–1280. Tables 6.14 and 6.15 show the count and weight as well as the count percentage and weight percentage for structures with associated tree-ring dates (also see Chapter 3). A total of 10 (about 3 percent) of the 387 tree-ring samples yielded near-cutting dates. Comparisons of percentages by count and weight of white wares show a relatively similar pattern. However, three contexts—Structure 110, Structure 150, and Structure 402—indicate a higher percentage by weight of McElmo Black-on-white than Mancos Black-on-white. In general, the majority of pottery sherds collected from these contexts contains a higher percentage of Mancos Black-on-white than McElmo and Mesa Verde Black-on-white. On the basis of the percentage by count of Mancos, McElmo, and Mesa Verde Black-on-white, the wood samples dating from the A.D. 1200s are associated with Mancos Black-on-white pottery. This is unexpected, because Mancos Black-on-white vessels were produced between A.D. 1060 and 1140 (i.e., the late Pueblo II period). There are three possible reasons for this anomaly. First, post-deposition processes caused earlier objects (Mancos Black-on-white) to be deposited with these late-dating tree-ring samples. Second, a fairly high percentage of mineral paint, which is an excellent marker for Early White Painted, could have caused analysts to misclassify the Pueblo III (McElmo and Mesa Verde Black-on-white) sherds. Third, residents of Albert Porter Pueblo could have continued to produce or use Mancos Black-on-white vessels from the Pueblo II into the Pueblo III period. Additionally, a comparison of the percentage by count and weight of Pueblo II and Pueblo III white painted sherds reveals a higher percentage of Pueblo III white painted sherds. This is, in fact, what was expected from the assemblage data, because many tree-ring cutting dates for Albert Porter Pueblo are for the early A.D. 1200s.

To understand the nature of spatial and temporal distributions of mineral paint in the central Mesa Verde region, I compared, for numerous sites, the ratio of sherds with mineral paint to the total number of sherds analyzed (adapted from Ortman 2003, Table 12). Table 6.16 shows several diagnostic pottery types with the best context of pottery subassemblages associated with tree-ring dates for sites in the central Mesa Verde region. In this table, seven phases—Phase 1 (A.D. 1020–1060), Phase 2 (A.D. 1060–1100), Phase 3 (A.D. 1100–1140), Phase 4 (A.D. 1140–1180), Phase 5 (A.D. 1180–1225), Phase 6 (A.D. 1225–1260), and Phase 7 (A.D. 1225–1280)—are analyzed for their pottery paint types. In addition, the ratio of sherds with mineral paint to the number of gray ware sherds analyzed was calculated. A high ratio indicates that people in the village used more mineral paints. To visualize the difference between these ratios, I separated these phases into two broad periods: A.D. 1060–1225 and A.D. 1225–1280. Figure 6.1 shows the result of these comparisons. It is apparent that between A.D. 1060 and 1225 the residents of many Mesa Verde villages used mineral paint to decorate many of their white ware vessels. However, there were some exceptions. Sites in the Sand Canyon locality sites, such as Roy's Ruin and Lillian's Site, show a fairly low ratio when compared to other sites, indicating less use of mineral paint. In addition, from A.D. 1225 to 1280, the residents of most sites did not use mineral paint on a large number of vessels. Some of the larger villages, such as Castle Rock, Sand Canyon, Woods Canyon, and Albert Porter pueblos, used more mineral paint than small- or medium-size villages in the Sand Canyon locality. The data for Albert Porter Pueblo indicate that residents continued to use mineral paint until the A.D. 1200s. It is, however, important to note that the site was occupied until the late 1200s, which might have resulted in a higher ratio of mineral paint from A.D. 1225 to 1280 than at other late Pueblo III sites.

Rim sherds provide another means of assessing variation in the relative quantities of vessels of different forms in pottery assemblages. One major advantage of rim-sherd analysis is that many rim sherds preserve more diagnostic attributes of pottery types than do body sherds and therefore tend to be classified to type more precisely. The data for Albert Porter Pueblo indicate that sherds of white ware bowls compose the highest percentage (about 50 percent) of the rim-sherd assemblage, and corrugated jars form a moderately high percentage (about 30 percent).The percentage of rims from white ware jars by count and weight is also relatively high (both about 10 percent) as is the percentage by count and weight of plain gray jar rims (3 percent and 1 percent, respectively) as compared to other types of pottery. Specific vessel forms—white ware bowls and corrugated jars—are the most common and frequent among rim-sherd forms, presumably because of the sizes and shapes of the rims of these vessels; more rim sherds tend to be generated from the breakage of a large-diameter vessel than a smaller vessel.

The rim-sherd data for Albert Porter Pueblo, by pottery type, indicate that the percentages of rim sherds differ by count and weight. For example, the percentage of Mesa Verde Corrugated Gray sherds by count is about 10 percent, whereas the percentage by weight is about 16 percent, revealing that rim sherds of this pottery type are larger than average for the assemblage of rim sherds. The same appears to be true for McElmo Black-on-white and Mesa Verde Black-on-white rim sherds. In contrast, rim sherds of Indeterminate Local Corrugated Gray, Mancos Black-on-white, Pueblo III White Painted, Late White Painted, and Late White Unpainted pottery show a higher percentage by count rather than weight. This suggests that the rim sherds of these vessels are relatively small. This further suggests that larger sherds were more likely to be assigned to specific pottery types during analysis, and that smaller sherds were more likely to be assigned to more general types.

Spatial and Temporal Variation

In this section, I focus on the temporal and spatial distributions of pottery types from Albert Porter Pueblo. Tables 6.17 and 6.18 summarize the pottery assemblage from study units assigned to one of the three subperiods by count and weight, respectively—Late Pueblo II, Early Pueblo III, Late Pueblo III—or to the "Other" category. Study units were assigned to these periods on the basis of tree-ring dates, other methods of absolute dating, stratigraphy and construction-sequence data, and the pottery assemblages themselves (also see Chapter 3). The trends through time and relative percentages of Mancos, McElmo, and Mesa Verde Black-on-white ware for Albert Porter Pueblo are consistent with idealized pottery assemblages developed to assist in dating sites in the central Mesa Verde region (Wilson and Blinman 1991, 1995). It is important to note, however, that few deposits at Albert Porter Pueblo were sealed and, as a result, small quantities of intrusive sherds are apparent in these subassemblages.

Counts and weights of pottery types by architectural block show consistent spatial distribution across the site. About 50 percent of sherds were identified as Indeterminate Local Corrugated Gray, followed by Late White Unpainted (about 20–30 percent) and Indeterminate Local Gray (about 10 percent). No major variations are apparent among the types of pottery sherds collected from these 11 architectural blocks. This suggests that residents throughout Albert Porter Pueblo produced and used similar types of pottery, and their daily activities and behaviors were similar.

The counts and weights of rim sherds typed as various wares and forms in these chronological subassemblages were assessed. The data show relatively little change in the percentage of rims from white ware bowls, corrugated jars, white ware jars, and white ware ladles through time. However, the percentage of rims of white ware mugs does appear to have increased through time. I evaluated this increase by calculating standard errors of the proportions. In general, the standard errors of proportions help us understand the accuracy of sample sizes. The data show that the proportions of painted sherds of white ware mugs increased from the Late Pueblo II to the Late Pueblo III periods, and that the confidence intervals do not overlap among these time periods. This suggests that the sample size is adequate, and that the frequency of rim sherds from painted white ware vessels increased through time. The relatively frequent occurrence of white ware mugs in contexts dating from the Late Pueblo III period has been reported for other pottery assemblages in the central Mesa Verde region (Ortman 2000, 2002, 2003; Till 2007). It is therefore reasonable to infer that white ware mugs were produced with increasing frequency between A.D. 1200 and 1280 at Albert Porter Pueblo.

Rims from red ware bowls represent less than 1 percent of rim sherds in assemblages from the Late Pueblo II through Late Pueblo III periods. However, it appears that the percentage by count and weight of sherds from red ware bowls decreased (0.7 percent to 0.6 percent in counts; 0.4 percent to 0.2 percent in weights) from the Late Pueblo II to the Early Pueblo III period. Because most red ware vessels were produced in southeast Utah (Allison 2008; Hegmon et al. 1997; Oppelt 1998), these data suggest that the production and trade of these vessels was greatest between A.D. 1050 and 1150, and that at least trade declined during the Pueblo III period (also see "Trade," below).

Rim Sherds and Temporal Components

Rim sherds from painted white ware vessels present the greatest quantity of diagnostic attributes for classifying pottery into specific, named types. For example, rim sherds from Mesa Verde Black-on-white vessels generally show a flat profile, white slip with carbon-painted designs, a high degree of polish, and ticked decorations on the rim. The percentages by count and weight of rim sherds from white ware vessels assigned to the three subperiods defined for Albert Porter Pueblo were analyzed. Previous studies of well dated assemblages (Ortman et al. 2007; Wilson and Blinman 1991) indicate that a high frequency of Mancos Black-on-white is associated with the Late Pueblo II subperiod, whereas McElmo Black-on-white is most strongly associated with the Early Pueblo III subperiod, and Mesa Verde Black-on-white reflects production during the Late Pueblo III subperiod. Data indicate that Mancos Black-on-white rims are most common in the Late Pueblo II subassemblage, and that carbon and mineral paint are co-dominant on these rims. Also, McElmo Black-on-white rims are associated with the Early Pueblo III subperiod, and on these sherds carbon paint is slightly more frequent than mineral paint. Lastly, Mesa Verde Black-on-white rims, which display either carbon or mineral paint, are strongly associated with the Late Pueblo III subperiod.

As discussed for all sherds, the percentages of types among rim sherds vary depending on the method of quantification used. For example, although Mesa Verde Black-on-white rims sherds with carbon paint compose less than 20 percent of the Late Pueblo III subassemblage by count, these same sherds compose more than 50 percent of the subassemblage by weight. This suggests that rim sherds assigned to the Mesa Verde Black-on-white type are larger than those assigned to other types. In the assemblage for the Late Pueblo III subperiod, most of the represented Mesa Verde Black-on-white vessels were finished with carbon paint, but a relatively high percentage of McElmo Black-on-white rims exhibited mineral-painted designs. The relatively frequent occurrence of mineral paint on rim sherds dating from the Pueblo III period is consistent with pottery assemblages for other Pueblo III sites investigated by the Crow Canyon Archaeological Center (Ortman 2000, 2002, 2003; Till 2007). These results demonstrate that paint type cannot be used to reliably distinguish sherds of Late Pueblo II pottery (i.e., Mancos Black-on-white) from Pueblo III pottery (i.e., McElmo and Mesa Verde Black-on-white).

Middens and Temporal and Spatial Components

Middens are the accumulation of refuse generated by a wide variety of activities at a habitation; thus, the study of middens generally provides insight into human behaviors and activities in different temporal and spatial contexts. Most middens at Albert Porter Pueblo were located to the south of residences. Tables 6.19 and 6.20 show the percentage by count and weight of the pottery from midden contexts at Albert Porter Pueblo. These tables indicate that Indeterminate Local Corrugated Gray compose the majority of pottery sherds (about 40–50 percent), followed by Late White Unpainted sherds (about 20 percent). The percentage by count and weight of Indeterminate Local Gray is greater for the Late Pueblo II period than for the Late Pueblo III period, although a moderately high percentage of this pottery type was not assigned to type. In midden contexts, Mancos Black-on-white sherds, which date from the Late Pueblo II period, formed the highest percentage by count and weight, whereas the highest percentage for Mesa Verde Black-on-white is from Late Pueblo III contexts. The highest percentage of McElmo

Black-on-white by count is from Late Pueblo III contexts; in contrast, the percentage by weight is slightly higher for the Early Pueblo III period. Similar to the temporal trends of pottery types discussed in the previous section, the percentages by count and weight of Mancos Black-on-white, McElmo Black-on-white, and Mesa Verde Black-on-white are typical of temporal trends noted at other sites in the central Mesa Verde region (Ortman 2000, 2002, 2003; Till 2007; Wilson and Blinman 1991). It is interesting to note that Tsegi Orange Ware sherds, by count and weight, were found in relatively high frequencies in both Late Pueblo II and Late Pueblo III contexts compared to other pottery types for this assemblage through time.

Percentages by count and weight of the spatial distribution of pottery types for middens in each architectural block reveal a similar pattern. More than 50 percent of sherds recovered from each architectural block was Indeterminate Local Corrugated Gray (Table 6.6), followed by about 20 percent of Late White Unpainted sherds. A relatively higher percentage by count and weight of two diagnostic pottery types—McElmo Black-on-white and Mesa Verde Black-on-white—were collected from Architectural Block 400 than from other architectural blocks. This might indicate that residents of Architectural Block 400 occupied this location beginning in the A.D. 1100s, despite tree-ring data suggesting that this block was constructed in the early A.D. 1200s. In addition, stratigraphic data reflect no previous occupation below pit structures in Architectural Block 400. Thus, it is possible that these early pottery sherds are secondary refuse from Architectural Block 100—located just north of Architectural Block 400—during the A.D. 1100s.

Floor Contexts

Artifact assemblages recovered from floor contexts offer crucial information on the final activities that occurred in structures at Albert Porter Pueblo. Tables 6.21 and 6.22 show the percentages by count and weight of pottery types from both kiva and room floors assigned to the three temporal components. It is interesting that percentages by count differ from percentages by weight. For instance, the percentage by count of Mesa Verde Black-on-white (Late Pueblo III) sherds is 5 percent, whereas the percentage by weight is more than 50 percent. The percentage by count of Indeterminate Local Corrugated Gray is about 60 percent, whereas that by weight is about 10 percent. These results suggest that most diagnostic white ware types—Mancos, McElmo, and Mesa Verde Black-on-white—represent a higher percentage in weight; inversely, many indeterminate pottery types show a lower percentage by weight but a higher percentage by count. This suggests that decorated sherds recovered from floor contexts are larger than those of other pottery types.

It is worthwhile to compare the types of wares in floor assemblages to those in midden assemblages to see whether floor assemblages are representative of activities that occurred on a daily basis during the occupation of the settlement. This investigation is also an important means of assessing the manner of use of Architectural Block 100. For this comparison, Tables 6.19 and 6.20 present pottery types, by count and weight, collected from the middens, whereas Tables 6.21 and 6.22 present pottery types, by count and weight, recovered from floor contexts. Sherds of 13 pottery types were collected from floor contexts compared to sherds of 44 types from middens. The percentages by count listed in Tables 6.19 and 6.21 indicate that 30 to 60 percent of Indeterminate Local Corrugated Gray was identified from floor contexts. The percentage of sherds placed in this category is about 30 percent greater from Late Pueblo III middens than from

Late Pueblo II middens, although sample size might have skewed these results. About 50 percent of pottery sherds from both Late Pueblo II and Late Pueblo III midden contexts were classified as Indeterminate Local Corrugated Gray. A comparison of floor and midden contexts indicates that three diagnostic pottery types—Mancos, McElmo, and Mesa Verde Black-on-white—reveal chronological components common to the central Mesa Verde region, except that McElmo Black-on-white sherds were associated with the Late Pueblo III period component rather than the Early Pueblo III component. Although sample size is fairly small for the floor assemblages, the pottery types by count as well as by weight indicate that the activities that generated pottery found in the middens were similar to those found in floor contexts.

Great House Construction

In this section, I investigate the pottery assemblage from the great house, located in Architectural Block 100, in order to detect periods of occupation. Although some structures in Architectural Block 100 have been dated using tree-ring data, none of these structures is in the great house portion of the block. Therefore, I use pottery data to reconstruct the occupation sequence of the great house. Table 6.23 summarizes the count, as well as the percentage by count, of pottery sherds from sealed contexts beneath the floor of the great house. As shown in Table 6.23, a high frequency of Mancos Black-on-white sherds (7 to 13 percent), a type produced in the Late Pueblo II period, was deposited in Nonstructures 154 and 157, and in Structure 158. These study units also contained a low frequency of McElmo Black-on-white sherds (0 to 2 percent). The frequencies of these two types of sherds suggest that the initial construction of the great house occurred between A.D. 1060 and 1100. In addition, the very low frequency of McElmo Black-on-white sherds suggests that the great house was built before A.D. 1100. However, it is important to note that the presence of earthen architecture just below the foundation of the great house reveals that this area of the site was inhabited before the great house was constructed (Ryan 2008, 2010).

I separated pottery sherds collected from refuse fill from the great house by time period: those pre-dating construction of the great house, those deposited during the initial use of the great house, and those associated with the final use of the great house. Most of the refuse was deposited during the use of the great house, from the late A.D. 1000s to the mid-A.D. 1250s, except for the refuse from Structure 142. The floor of Structure 142 was heavily disturbed by weathering and rodent damage; thus, it is possible that the assemblage from this context was mixed.

The percentages by count and weight of pottery assemblages in refuse in the great house illustrate that the majority of sherds are Indeterminate Local Corrugated Gray, and the next most abundant are Late White Unpainted sherds. Mancos Black-on-white (Early Pueblo II) sherds constitute approximately 8 percent by count and 12 percent by weight of sherds; about 2 percent by count and 4 percent by weight are McElmo Black-on white sherds (Early Pueblo III); and about 1 percent by count and 3 percent by weight are Mesa Verde Black-on-white sherds (Late Pueblo III). The high percentage of Mesa Verde Corrugated Gray in contexts dating from the initial use of the great house was presumably a result of the refuse fill in Structure 142 (including Nonstructures 152 and 161), which was heavily disturbed by weathering and rodent activity.

Great House vs. Surrounding Areas

One research goal for Albert Porter Pueblo excavations was to investigate the extent to which residents of the pueblo participated in the Chaco regional system and to examine the possibility of differentiation in resource acquisition between the residents of Architectural Block 100 vs. those of Architectural Blocks 200–1100. A potential indicator of both phenomena is a more diverse or exotic, or both, pottery assemblage from Architectural Block 100 than from other areas of the site.

The relative abundance of nonlocal pottery is similar for all blocks. This suggests that residents of Architectural Block 100 were not substantially better connected to long-distance exchange networks than the residents of other blocks. Thus, there is no evidence in the pottery assemblage to suggest significant economic differentiation among residents of Albert Porter Pueblo during the Pueblo II and Pueblo III periods. In addition, this suggests that the residents of Architectural Block 100 did not have strong ties with people in Chaco Canyon, further suggesting that the Chaco regional system (Lekson 2006; L. Reed 2008) did not strongly affect the residents of Albert Porter Pueblo.

Pueblo II Period vs. Pueblo III Period Contexts

Pottery assemblages from contexts dating from the Pueblo II period and those dating from the Pueblo III period within Architectural Block 100 were analyzed. Pueblo II contexts were "sealed" by the later construction of a structure floor or wall. In other words, these sealed contexts were beneath the floors or walls of rooms in the great house; no sealed contexts were excavated outside the great house at this site. Pottery assemblages dating from the Pueblo III period were created by residents who inhabited the pueblo after the great house was constructed but before regional depopulation about A.D. 1280 (also see the "Introduction" section of this chapter).

Data indicate a slightly higher percentage by count and weight of Mancos corrugated and Mancos Black-on-white sherds in contexts dating from the Pueblo II period than from contexts dating from the Pueblo III period. Also, the percentage by count and weight indicates that in Architectural Block 100, deposition of Late White Painted and Indeterminate Local Corrugated Gray sherds decreased from the Pueblo II period to the Pueblo III period. In contrast, the percentage by count and weight of Late White Unpainted and McElmo Black-on-white sherds reflects increased deposition from the Pueblo II to the Pueblo III period.

Pottery Rim Analysis

In this section, I examine the spatial distribution of rim sherds collected from Albert Porter Pueblo to evaluate differential use of serving bowls across the village. I will also, by analyzing the size distributions of serving bowls and the frequency of exterior designs in the same manner as other researchers (Blinman 1989; Potter 1997, 2000; Wilshusen 1989), investigate whether residents of the pueblo regularly participated in feasting. Feasting means that people gather for inter-community food consumption, and feasting serves to facilitate community integration as well as differentiation of the group (Potter 1997).

Temporal Distributions of Serving-Bowl Rims

I randomly selected 840 sherds for bowl-rim analysis. I compared, by count and weight, the temporal distribution of these sherds from Pueblo II and Pueblo III contexts. A comparative ratio was calculated from the count and weight of rim sherds and divided by the weight of corrugated gray ware sherds collected from these two contexts. The weight of corrugated sherds was used to standardize the deposition of bowl sherds against the accumulation of cooking pottery; many studies have shown that the sherds of cooking pots accumulated at consistent rates per household-year of occupation at ancestral Pueblo sites (Varien 1999; Varien and Mills 1997; Varien and Ortman 2005). Interestingly, the data for sherd counts suggest that the sherds of serving bowls accumulated more slowly than the sherds of cooking vessels during the Pueblo II period as opposed to the Pueblo III period. In contrast, the ratio between the weight of the sherds of serving bowls and the weight of the sherds of corrugated gray wares suggests that more bowl sherds than cooking jar sherds were deposited during the Pueblo II period. These comparisons suggest that the sherds of serving bowls recovered from contexts dating from the Pueblo II period were larger than those collected from contexts dating from the Pueblo III period. The standard error of proportion indicates that the ratios are significantly different between the contexts dating from these two periods. These data are difficult to interpret, but may indicate that during the Pueblo II period, food was more often prepared elsewhere and brought to Albert Porter Pueblo in serving bowls as opposed to being prepared within the settlement.

Pottery Rim-Arc Analysis

In this section, I examine the size distributions of bowl rims to explore variation in food-consumption practices through time and space at Albert Porter Pueblo. Several studies of pottery assemblages dating from the late Pueblo III period (Ortman 2000, 2002, 2003; Robinson 2005; Till and Ortman 2007) have noted that bowl sizes exhibit a bimodal distribution consisting of small (16–20 cm in diameter) and large (24–32 cm in diameter), with few bowls exhibiting diameters between 20 and 24 cm. These studies have also found that many serving bowls in villages occupied during the Late Pueblo III period were painted on their exteriors as well as their interiors. Exterior designs may reflect the active signaling of group identities (Mills 2007; Robinson 2005). This interpretation was drawn from proxemic distance analysis, a method developed by Hall (1966, 1968) that examines the relationship between objects and the distances at which the objects were typically viewed during use (see also Bowser 2000; Mills 2007; Moore 1996). For example, the typical diameter of a kiva is 3.5 m, and this distance falls within the categories Hall (1966, 1968) labels “social” or “public near.” At this distance, viewers are able to distinguish the distance between attendees and performers during activities contained within particular architectural settings. The distance provides crucial information about the types of interaction associated with communication (Hall 1968:Table 1; Moore 1996:Table 1), including “intimate personal” (0–1 m), “social” (1–3 m), “public near” (4–7 m), and “public far” (8–11+ m). Both Robinson (2005) and Ortman (2000) argue that the bimodal-size distribution of bowls, combined with a high frequency of exterior designs, reflects the development of communal feasting in villages occupied during the Late Pueblo III period. Ortman (2000) suggests that the volumes of bowls of varying size indicate that small bowls were used for individual servings, whereas large bowls were used for serving a batch of food to household-size or larger groups. These studies raise the question of whether communal feasting was also frequent in Pueblo II period communities, and whether bowls dating from this period also exhibit bimodal-size distribution as well as exterior designs. Ortman (2003) found that bowl rims from Yellow Jacket Pueblo, most of which predate A.D. 1250, do not exhibit a bimodal-size pattern or exhibit exterior designs. He interpreted these patterns to suggest that the inhabitants of that village did not regularly participate in communal feasting.

To test for the possible existence of communal or competitive feasting at Albert Porter Pueblo, I analyzed the size of bowl-rim sherds and the frequency of exterior designs on bowls. A high frequency of large bowls suggests that residents of the village participated in communal gatherings. In addition, ethnographic records suggest that exterior-bowl designs are most likely a representation of ethnic or group identities (Mills 2007). Thus, a high frequency of bowls with exterior designs indicates that people participated in public social gatherings.

Pierce and Varien (1999) have discussed methods used to collect these data and several possible sources of analytical bias in rim-arc analysis. Several procedures have been used to help control for these biases. First, comparisons of estimates of rim-arc diameters with vessel diameters are within 2 cm of the true radius of the parent vessel approximately 80 percent of the time for sherds that display at least 20 degrees of arc. Thus, only sherds displaying 20 degrees of arc or more are considered and the radius estimates for these sherds have been grouped into 2-cm-radius classes. Second, the total degrees of arc assigned to each radius class have been used as the measure of abundance, rather than the count or weight of sherds. This was done to compensate for the tendency for smaller-diameter vessels, upon fracturing, to yield fewer rim sherds that would display more degrees of arc than sherds of larger-diameter vessels.

The percentages of rim-radius estimates drawn from rim sherds of Mancos Black-on-white bowls and the percentage of rim-radius estimates for both McElmo Black-on-white and Mesa Verde Black-on-white bowls in the assemblage were analyzed. For this analysis, I only used only those three pottery types, because they are the Pueblo II and Pueblo III temporal markers in the rim-sherd assemblage. Data indicate that the highest percentage of bowl rim sherds typed as Mancos Black-on-white are within the 10-cm-radius class, and the next highest percentage is in the 8-cm-radius class. These results indicate that people living at Albert Porter Pueblo during the Pueblo II period produced and used relatively small Mancos Black-on-white bowls. In contrast, although the relative percentages of radius estimates for bowl rims of McElmo and Mesa Verde Black-on-white indicate a pattern similar to that for Mancos Black-on-white sherds, sherds from the later time period have relatively higher percentages of estimates measuring 12 to 14 cm. This suggests that people produced and utilized more large painted bowls during the Pueblo III period than during the Pueblo II period.

Rim-radius estimates from rim sherds of Mancos vs. Mesa Verde corrugated jars in the Albert Porter Pueblo assemblage were analyzed. These utility wares were selected because they are Pueblo II and Pueblo III, respectively, temporal markers in the assemblage. The percentages of rim-radius estimates for Mancos Corrugated sherds indicate that the highest percent of rim sherds is within the10-cm-radius class, and the second-highest percent of sherds is in the 8-cm-radius class. In contrast, the percentages of rim-radius estimates of Mesa Verde Corrugated sherds are greatest for the 8-cm-radius class. In addition, a comparison of the black-on-white vs.

corrugated rim-radius indicates that Mancos Corrugated rim sherds occur in higher percentages in the 12- and 14-cm-radius class than do Mesa Verde Corrugated sherds.

Estimates of the rim radius of sherds of white ware bowls and corrugated jars both display unimodal distributions and suggest the same interpretation; namely, that residents of Albert Porter Pueblo generally used similar-size white ware bowls and corrugated jars for their daily life. Unlike the "bimodal" distributions of rim-radius estimates for white ware bowls and corrugated jars for sites dating from the late Pueblo III period—Woods Canyon Pueblo (Ortman 2002), Castle Rock Pueblo (Ortman 2000), and Sand Canyon Pueblo (Till and Ortman 2007)—the results for Albert Porter Pueblo show unimodal distributions for both white ware bowls and corrugated jars. This suggests that regular communal feasting did not occur at Albert Porter Pueblo.

Pottery Production and Exchange

In this section, I summarize direct and indirect evidence of pottery production at Albert Porter Pueblo and examine intra-regional networks of pottery exchange in which the inhabitants of this pueblo participated. Evidence of long-distance pottery exchange, as well as other nonlocal exchange, will be discussed in the "Trade" section later in this chapter.

Direct Evidence of Production

Direct evidence of pottery production comes in many forms, including mineral samples, other artifacts made from pottery clay, sherds from unfired vessels, and polishing stones. In the spatial distribution of pottery types within the site, I discuss how residents of Albert Porter Pueblo used and produced similar types of pottery. Table 6.24 presents the counts and weights, by architectural block, of other artifacts that might provide important information about pottery production. In order to compare the quantity of these artifacts by architectural block, I standardized these counts against the weight of gray ware sherds recovered from each block. These results indicate that direct evidence of pottery production is especially abundant in Architectural Block 600. In contrast, little direct evidence of pottery production was recovered from Architectural Blocks 200 and 1000. These data suggest that the amount of pottery produced varied across households in the settlement and that evidence of pottery production or possible part-time craft specialization is more abundant for the houses around the periphery of Architectural Block 100 dating from the Early Pueblo III period.

Indirect Evidence of Production and Evidence of Exchange

An important issue in the archaeology of the Southwest is how social and economic ties between groups changed through time. One way researchers have examined these interaction networks is through comparisons of the raw materials used to make pottery with the spatial distribution of these materials on the landscape (L. Reed 2008). In this section, I summarize research on the sourcing of pottery-production materials conducted as part of the Albert Porter Pueblo project. I first summarize information on the tempers that were identified using a binocular microscope on a sample of corrugated jars and of bowl rims from white ware vessels from Albert Porter Pueblo. Then I discuss recent research to clarify the sources of specific igneous tempers found in pottery sherds recovered from sites in the Mesa Verde region. Finally, I discuss the results of petrographic analysis and Instrumental Neutron Activation Analysis (INAA) performed on a subsample of the temper-analysis sample from Albert Porter Pueblo.

Temper Analysis

Using a binocular microscope, Crow Canyon laboratory staff, interns, and volunteers identified the tempers present in 1,976 rim sherds of white wares and 1,425 rim sherds of corrugated gray wares. A minimum of 25 sherds were selected randomly from each architectural block at the site. Crow Canyon researchers assigned the dominant, non-plastic inclusions in the clay bodies of these sherds to one of 14 temper-material codes (Ortman 2002:23). It is apparent that about half of these sherds came from vessels produced using sherd temper; the next most frequent temper was crushed white-matrix sandstone, followed by igneous rock.

To better understand the general trend of temper preferences by residents of Albert Porter Pueblo, I grouped these 14 temper codes into seven different categories: igneous (crushed quartz, igneous rock, and trachyte), sedimentary (crushed sandstone, crushed silicified sandstone, crushed white-matrix sandstone, shale, and weathered silicified sandstone), sand (multi-lithic sand and quartz sand), metamorphic (crushed metamorphic rock), sherd, indeterminate, and other. The counts by percentage for white ware bowls are as follows: sherd temper composes about 50 percent of the preferred materials, sedimentary temper composes about 30 percent, igneous rock composes about 10 percent, and sand composes about 5 percent of the preferred materials.

The counts by percentage for corrugated rim sherds show that the greatest quantity (about 45 percent) of sherds contain crushed white-matrix sandstone temper, igneous rocks were found in 25 percent, weathered silicified sandstone was used in about 10 percent, multi-lithic sand was used in less than 10 percent, and crushed silicified sandstone was found in slightly more than 5 percent. Sherds containing these 14 tempers were then grouped into seven larger categories. The greatest percentage of corrugated gray sherds contained temper of sedimentary rock, and lower percentages of sherds contained igneous or sand temper.

Comparison of Tempers in White Ware vs. Corrugated Gray Ware Sherds

There are many differences in the tempers used in white ware vessels as opposed to corrugated gray ware vessels. Comparing tempers in the two vessel types reveals interesting patterns. First, although more than 30 percent of both white ware and corrugated gray ware sherds contain temper of sedimentary rock, the frequencies of sherd temper vary widely between the two types of wares. Second, the percentage of corrugated gray sherds with igneous temper is twice that of white ware sherds with that type of temper. Finally, sand temper is present in about twice as many corrugated gray ware sherds as white ware sherds.
These differences in temper use between corrugated gray and white ware vessels are probably related to differences in the ways these vessels were used. Corrugated gray ware vessels were cooking pots that were routinely subjected to thermal stress by being placed over open fires, which created marked temperature variation along the vessel walls and between the interior and exterior surfaces (Pierce 1999a:1). Tempering agents that resisted thermal expansion

counteracted the tendency of fired clay to expand when heated and helped corrugated vessels withstand thermal stress without cracking or breaking (West 1992:1). In addition, larger particles of temper in cooking pots help diffuse microfractures that develop during use and therefore were used more commonly in the production of corrugated gray ware vessels than in white ware vessels. In contrast, white ware vessels were used for serving and storage and were not exposed to significant thermal stress after firing. As a result, temper in white ware pastes functioned primarily to keep unfired vessels from cracking as they dried. Thus, smaller and softer temper particles (e.g., sherd fragments) were used for serving and storage vessels.

Next, to investigate the spatial distribution of sherds by temper type across the site, I separated the temper data into two groups—that for Architectural Block 100, and that for Architectural Blocks 200–1100. Figure 6.2 presents the results of the count by percentage of white ware sherds on the basis of 14 temper codes. Most of the sherds from both contexts were tempered with sherds, crushed white-matrix sandstone, or igneous rock. These three tempers are found in many locally produced Mesa Verde white ware sherds and could have been procured locally, except that the source areas of igneous materials—Sleeping Ute Mountain and the La Plata Mountains—are more than 15 km from the site. Only sherds from Architectural Block 100 contain trachyte, a temper that outcrops primarily in the Chuska Mountains south of the Mesa Verde region and in many diatremes and dikes in the Navajo Volcanic Field in the greater Southwest (Arakawa and Gonzales 2010; Gerhardt and Arakawa 2009). This suggests two possible interpretations: residents of Architectural Block 100 might have participated in more spatially-extensive interaction networks than the inhabitants of other blocks in the pueblo, or the residents of Albert Porter Pueblo procured trachyte locally, such as at diatremes and dikes located in and around Mesa Verde National Park and Ute Mountain Ute Tribal Park.

Figure 6.3 shows percentages of white ware bowl sherds by temper materials for seven out of 17 temper categories. Sherd and igneous temper were found in slightly greater percentages of sherds in Architectural Block 100 than in other blocks, but sedimentary rock temper was more common in other areas of the site. Overall, these results suggest that local pottery production and exchange networks were not significantly different in Block 100 than in other blocks in the pueblo.

Percentages by count of corrugated gray ware sherds were analyzed on the basis of 14 temper codes and were grouped by seven temper materials. Data indicate that two temper materials—crushed white-matrix sandstone and igneous rocks—were found in higher frequencies of sherds in Architectural Block 100; in contrast, crushed sandstone, multi-lithic sand, and weathered silicified sandstone were found in greater percentages of sherds in other areas of the site. Moreover, more vessels were produced with igneous temper in Architectural Block 100; in contrast, sand temper particles were found in more sherds in other areas of the site. As discussed in the previous section, the higher percentage of sherds with igneous temper found in Architectural Block 100 might suggest that these residents obtained igneous temper or finished vessels containing igneous temper from a location about 15 km distant, a relatively long distance, such as Sleeping Ute Mountain, the La Plata Mountains, or the Chuska Mountains. I discuss trade and the detailed analysis and interpretations of igneous temper in the "Trade" section of this chapter.

Comparison of White Ware and Corrugated Gray Ware: Pueblo II and Pueblo III Periods

In this section, temper preferences during the Pueblo II and Pueblo III periods are reported. The results of counts by percentage of rim sherds from white ware vessels shows that about 50 percent of temper particles used in the Pueblo II period were sherd temper compared to about 45 percent of temper particles used during the Pueblo III period. In addition, 20 percent of sherds dating from the Pueblo II period were tempered with igneous rock compared to about 10 percent of sherds dating from the Pueblo III period. About 30 percent of sherds dating from both periods contain temper of crushed white-matrix sandstone. Seventeen temper materials were grouped into seven categories and analyzed. Data indicate different percentages of sherds with sherd and igneous temper including a higher percentage of sherds with igneous rock temper but a lower percentage of sherds with sherd temper dating from Pueblo II period contexts. The slightly higher percentage of sherds with igneous temper dating from the Pueblo II period suggests that residents participated in more exchange or trade with people who lived more than 15 km away.

A comparison of the frequency of temper types in rims of corrugated gray ware sherds shows a relatively similar pattern between sherds found in Pueblo II vs. Pueblo III contexts. The results of the count of corrugated gray ware by percent for 17 temper types show that a relatively higher frequency of sherds found in contexts dating from the Pueblo II period contained crushed white-matrix sandstone and multi-lithic sand; in contrast, a relatively higher frequency of sherds contained temper of weathered silicified sandstone in contexts dating from the Pueblo III period. Temper preferences as revealed using seven broad temper types reflect slight differences in temper preferences from the Pueblo II to the Pueblo III periods. Igneous particles and sand were found in more sherds dating from the Pueblo II period, but temper of sedimentary rock was found in more sherds dating from the Pueblo III period. Overall, the data reveal slight differences in temper preferences for the Pueblo II vs. the Pueblo III period.

Comparison of White Ware and Corrugated Gray Ware from Albert Porter and Woods Canyon Pueblos

To better understand temporal differences in temper types between the Late Pueblo II/Early Pueblo III vs. Late Pueblo III period, 972 rim sherds from white ware vessels in the Albert Porter Pueblo assemblage were compared with 104 sherds from similar vessels from Woods Canyon Pueblo, and 679 rims sherds from corrugated gray vessels from Albert Porter Pueblo were compared with 92 sherds from similar vessels from Woods Canyon Pueblo. The Woods Canyon Pueblo assemblage was chosen for these comparisons for two reasons. First, the population of Albert Porter Pueblo diminished during the Late Pueblo III period, and residents of this settlement might have relocated to Woods Canyon Pueblo (Lipe and Ortman 2000). Second, assemblages from these sites were analyzed in a comparable manner by Crow Canyon researchers. The results show that residents of Albert Porter Pueblo used various types of tempers, whereas residents of Woods Canyon Pueblo used sherd temper in most of their white ware vessels. Also, igneous temper was not present in rim sherds found at Woods Canyon Pueblo, whereas more than 10 percent of rim sherds collected from Albert Porter Pueblo contained igneous temper. This might indicate that residents of the latter travelled (i.e., more than 15 km) to obtain igneous rock, or they participated in trade with others who lived closer to an igneous source (Arakawa 2006; Arakawa and Merewether 2010, 2011). Another interesting finding is that, in the Woods Canyon Pueblo assemblage, about 90 percentage of rim sherds from white ware vessels contained sherd temper. Previous research suggests that during the Late Pueblo III period, people in the central Mesa Verde region preferred sherd temper for their white ware vessels (Ortman 2000; Till 2007).

The counts and percentages of five types of temper material found in sherds from corrugated jars in assemblages from Albert Porter and Woods Canyon pueblos reveal significant differences in the two assemblages. First, the frequency of sherds with igneous temper is lower for Albert Porter Pueblo than for Woods Canyon Pueblo, which was occupied primarily late in the Pueblo III period. Second, there is a much higher percentage of metamorphic rock temper in the assemblage from Woods Canyon Pueblo; in contrast, a higher percentage of sherds containing temper of sedimentary rock was identified in the Albert Porter Pueblo assemblage. Third, a higher percentage of sherds from Albert Porter Pueblo than from Woods Canyon Pueblo contained sand temper. This comparison reveals a very different pattern of raw material procurement through time; the majority of the residents of Albert Porter Pueblo during the Late Pueblo II and Early Pueblo III periods procured relatively more igneous temper than did the Late Pueblo III residents of Woods Canyon Pueblo. This finding is similar to the results of other researchers (Arakawa and Duff 2002; Arakawa, Merewether, and Nicholson 2011; Neily 1983). This further indicates that residents during the Late Pueblo II/Early Pueblo III period procured relatively long-distance igneous materials through interaction or trade.

Recent Research on Trachyte/Trachybasalt and Nonlocal Temper Sources

The study of pottery production and exchange depends not only upon the accurate characterization of the raw materials found in specific pottery vessels but also upon knowledge of the distribution of these raw materials on the landscape. Several studies of clay resource distributions have been conducted for the Mesa Verde region (Glowacki et al. 2002; Hegmon et al. 1997), but little research has addressed distributions of rocks and minerals used as temper. To address this problem, Arakawa (2006) and Gerhardt and Arakawa (2007, 2009) conducted several surveys of lithic resources in the McElmo drainage and in several areas of the Mancos River basin, including Mesa Verde National Park (MVNP), the Ute Mountain Ute Tribal Park (UMTP), and the Ute Mountain Ute Reservation. In addition to this work, MVNP staff and students from Fort Lewis College (Burgess and Gonzales 2005; Gonzales et al. 2006; Turner and Gonzales 2006) documented numerous small, extrusive igneous centers (diatremes and minette dikes) in MVNP and UMTP.

An unexpected finding of these surveys casts doubt upon a long-standing inference in pottery-sourcing studies—that the presence of trachybasalt (also called sanidine basalt and trachyte in the literature) in pottery indicates that the vessels were produced along the eastern foothills of the Chuska Mountains (Lucius and Blinman 1981; Shepard 1956:166). Thus, when this temper is identified in pottery assemblages from the Mesa Verde region, it has generally been interpreted as evidence of long-distance exchange with people residing in the Chuska Mountains. Because many resources, such as construction timbers, maize, and lithic materials (e.g., Narbona Pass chert) were exported from the southern San Juan region (Benson et al. 2003; Ward 2004) to Chaco Canyon, archaeologists have come to associate these materials with the Chaco regional system. As a result, some archaeologists have interpreted the presence of trachybasalt in assemblages from the Mesa Verde region not only as evidence of interaction with the southern San Juan region, but of participation in the Chaco regional system (e.g., Errickson 1993; Lekson 2006).

This series of inferences rests upon the assumption that trachybasalt does not occur naturally in the Mesa Verde region. The recent surveys of resource distribution cited above indicate that this assumption is false. Specifically, the diatremes and minette dikes recently identified in MVNP and UMTP have been found to contain aphanitic minette and trachybasalt, both of which have long been thought to outcrop only in the Chuska Mountains. These new data lead Gerhardt and Arakawa (2009) to argue that it is no longer possible to assume that pottery vessels containing these temper materials were necessarily produced in the Chuska Mountains. Thus, the presence of these materials in pottery assemblages does not necessarily indicate interaction with the southern San Juan region.

I also use pottery temper data to gain knowledge on interaction and affiliation between Albert Porter Pueblo and Aztec Ruins, located in northwestern New Mexico. Lekson (2006) and P. Reed (2008) assert that, before Chaco Canyon was depopulated, outlying great houses were more closely affiliated with Aztec Ruins than with Chaco Canyon itself. If this was the case, one should find exchange goods indicating interaction between residents of Albert Porter Pueblo and residents of the middle San Juan region. I investigate this issue with the use of petrographic and neutron-activation analyses to examine the frequencies of pottery tempers.

To test our hypothesis of local procurement, Arakawa and Gerhardt obtained research permits from MVNP, UMTP, and the Ute Mountain Ute Tribe to search for geologic sources and associated quarry sites of trachybasalt and aphanitic minette. We found both geological sources and quarry sites, leading us to conclude that people in the central Mesa Verde region probably procured weathered trachybasalt for pottery temper and aphanitic minette for stone tools from these local sources, rather than, or in addition to, trading with ancestral Pueblo populations in the middle San Juan region. Gonzales et al. (2006) have conducted further reconnaissance of dikes and diatremes in the Navajo Volcanic Field to collect samples of these potential sources of extrusive rocks and minerals.

Pottery Sourcing Analyses

Given the research by Gerhardt and Arakawa (2009), one of the goals of INAA and petrographic (or thin-section) analyses for the Albert Porter Pueblo project was to determine whether trachyte-tempered sherds from Albert Porter Pueblo were necessarily from vessels produced in the Chuska Mountains. Twenty sherds from Albert Porter Pueblo were selected for INAA and petrographic analyses. All 20 exhibit evidence of nonlocal manufacture in the form of igneous tempers that include trachyte or trachybasalt, olivine, biotite, augite diorite, and diorite porphyry. Trachyte or trachybasalt has typically been associated with the eastern slope of the Chuska Mountains, and specifically the northern portion of Beautiful Mountain (Errickson 1993; Mills et al. 1997). Olivine and biotite minerals are also mainly extrusive and occur in diatremes and dikes of the Navajo Volcanic Field across the Four Corners region. Augite diorite, in which augite is a prominent mafic mineral, and can be found in areas around the Carrizo Mountains in New Mexico, in the La Plata Mountains, or on river terraces south of the San Juan Mountains. Diorite is a type of rock between granite and gabbro, and porphyry is a rock *texture* type that may contain any of the other igneous rocks. Diorite is common in La Plata Mountains, and diorite porphyry is a major constituent of Sleeping Ute Mountain and Abajo Mountain. One-half of each sample was sent for INAA at the Archaeometry Laboratory Research Reactor Center at the University of Missouri (MURR), and the other sherds were made into thin sections for petrographic analysis at Fort Lewis College.

Instrumental Neutron Activation Analysis

Instrumental Neutron Activation Analysis (INAA) is a method that identifies the elemental composition of a sample. Ferguson and Glascock describe the sample-preparation procedures used by MURR as follows:

> Fragments of about 1 cm^2 were removed from each sample and abraded using a silicon carbide burr in order to remove glaze, slip, paint, and adhering soil, thereby reducing the risk of measuring contamination. The samples were washed in deionized water and allowed to dry in the laboratory. Once dry, the individual sherds were ground to powder in an agate mortar to homogenize the samples. Archival samples were retained from each sherd (when possible) for future research (Ferguson and Glascock 2009:2).

When MURR researchers prepared the samples from Albert Porter Pueblo for INAA, one sample (Provenience Designation Number [PD] 1812, Field Specimen Number [FS] 1) was misplaced; thus, only 19 samples were analyzed (Ferguson and Glascock 2009). The small number of samples constrains intrasite comparisons, but MURR maintains a database of elemental concentrations for more than 55,000 INAA samples, including items from the Chuska Mountains (Mills et al. 1997) the middle San Juan region (Glowacki 2006; L. Reed 2008), Mesa Verde proper (Glowacki 2006), and the McElmo/Monument area of the central Mesa Verde region (Glowacki 2006). It is possible to compare each of the 19 samples from Albert Porter Pueblo with other samples in this database to determine whether their overall compositions are consistent with production using materials available in each of these areas.

The Albert Porter samples were compared to the entire MURR pottery INAA database using principal-components analysis and a variety of bivariate elemental concentration plots. Figure 6.4 compares the elemental concentrations of chromium and ytterbium in the Albert Porter samples with their concentrations in previously analyzed samples from the Chuska Mountains. The figure shows that 11 of the Albert Porter Pueblo samples match the Chuska Mountains samples (Mills et al. 1997). In addition, five items matched the concentrations of these two elements in previously analyzed samples from the middle San Juan (Glowacki 2006; L. Reed 2008), two pieces matched concentrations in samples from Mesa Verde proper (Glowacki 2006), and one item matched the elemental concentrations of samples from the McElmo/Monument area (Glowacki 2006).

Figure 6.5 shows a bivariate plot of chromium and dysprosium concentrations in the samples from Albert Porter Pueblo, the Chuska Mountains, Mesa Verde and McElmo/Monument, and

Aztec and Salmon Ruins in the middle San Juan region. This chart confirms that the five sherds from Albert Porter Pueblo identified as middle San Juan white ware during temper analysis overlap with the main cluster of samples from Aztec and Salmon Ruins (Ferguson and Glascock 2009). According to Ferguson and Glascock (2009:8), this interpretation should be approached with some caution: "The distinction between the Mesa Verde Proper and McElmo-Monument regional chemical signatures is quite subtle and not easy to differentiate using bivariate plots or multivariate statistics."

Finally, Figure 6.6 displays the concentrations of chromium and lutetium in the Albert Porter Pueblo samples and in previously analyzed samples from the northern Southwest. This figure nicely separates the Chuska Mountains, middle San Juan region, Mesa Verde proper, and McElmo-Monument compositional groups.

The INAA results show that the overall elemental composition of a majority of the samples submitted matched those of sherds collected from the Chuska Mountains. This result is not unexpected, because we selectively chose samples containing trachybasalt for analysis. However, it is important to remember that INAA is a bulk-sample analysis method, and that the composition of the clays and the tempers are combined using this method. Thus, if temper compositions drive the analysis more so than clay compositions, and potters in the Mesa Verde region used the local sources of aphanitic minette and trachybasalt mentioned earlier, sherds from vessels produced in the Mesa Verde region using these resources may be indistinguishable from sherds of vessels produced using resources from the Chuska Mountains. An alternative means of assessing the possibility of local production would be to assess the composition of the clays used to make the trachybasalt-tempered vessels from Albert Porter Pueblo and the Chuska Mountains and then assess the tempers of those vessels separately. However, to definitively demonstrate local production would require finding unfired sherds containing trachybasalt and made using local clays at sites near the local sources of trachybasalt identified in recent resource surveys. I will interpret the results of the INAA in conjunction with the results of the petrographic analysis below.

Petrographic Analysis

The other halves of the 20 sherds submitted for INAA were sent to Mark Mercer at Petrographic Service in Montrose, Colorado for analysis. Because two of the samples we submitted were too small for thin sectioning, he created a total of 18 thin-section slides. These thin-section samples were then analyzed by David Gonzales at Fort Lewis College in Durango, Colorado.

Some archaeologists and geologists (Mills et al. 1997; Shepard 1939) have previously conducted petrographic studies of pottery sherds in the Southwest. The most characteristic feature of extrusive igneous ceramic tempers from the Chuska Mountains is the presence of microlithic inclusions of magnetite and pyroxene within crystals of potassium feldspar, forming a "poikilitic texture" (Mills et al. 1997; Shepard 1939; Warren 1967). Micas, pyroxene, and olivine (often altered to hematite) are also present. According to Shepard (1939), Warren (1967), and Mills et al. (1997), the only sources of rocks containing this mineralogy are thought to be Beautiful Mountain and the basalt flows at Narbona Pass. These flows are late-stage plugs that occurred after formation of the main diatremes, possibly infilling the topographic low created by earlier phreatic explosions at Narbona Pass (Lucas et al. 2003). They are slightly more felsic (richer in potassium feldspar) than the older minette dikes. Mills et al. (1997) further investigated the trachybasalt at Narbona Pass to better understand the production and distribution of Chuska pottery. They concluded that vessels found at sites near Narbona Pass displayed a chemical composition distinct from areas of East Sonsela Butte, Shiprock, and Beautiful Mountain in the Navajo Volcanic Field because of the abundant use of trachybasalt and sanidine in the former area. Gerhardt and Arakawa (2009) challenged the hypothesis that tempers containing this lithology are available only at Narbona Pass and proposed that igneous centers of the Navajo Volcanic Field near Mesa Verde National Park could have also served as a source of this material.

The following descriptions are of pottery sherds examined by Gonzales (2009). Two dominant types of igneous temper material were identified in this investigation. Nine sherds contain sanidine-rich minette and the remaining nine contain other intrusive rock. The sanidine-rich minette consists primarily of fragments and disaggregated fragments of minette dominated by laths and blades of sanidine with variable proportion of clinopyroxene, phlogopite, and opaque minerals +/- apatite +/- rutile. These sherds also contain variable amounts of quartz, perthitic alkali feldspar, plagioclase, and sedimentary rock fragments. The minette fragments in these samples are holocrystalline (no glass) and vary from fine grained to medium grained. In some samples the sanidine occurs as massive bladed crystals that envelop subhedral to eudedral crystals of clinopyroxene and phlogophite, producing a poikilitic texture. In other samples the sanidine forms in clusters of lath-shaped crystals. In either case, however, the sanidine occurs late in the crystallization and makes up more than 30 percent of the total material in the samples (Gonzales 2009).

The temper in the remaining nine thin sections consists primarily of perthitic alkali feldspar-plagioclase-quartz-rich intrusive rock (or plutonic) fragments and disaggregated fragments. The dominant constituents in the plutonic fragments are clinopyroxene, microcline or orthoclase (some are perthitic), plagioclase, and opaque minerals +/- apatite +/- sphene (titanite) along with minor amounts of other minerals (e.g., hornblende) and metamorphic or sedimentary rock fragments. In at least some samples, polygranular metamorphosed quart-rich fragments are very abundant. The plutonic fragments in these samples are holocrystalline hypidiomorphic to allotriomorphic and medium to coarse grained. Most crystals are anhedral to subhedral, with quartz crystallizing last in most samples. The feldspar crystals in most of these samples are altered to clays and sericite. This alteration varies from minor to extensive (Gonzales 2009).

The paste of the pottery sherds examined varies from shades of brown to gray and is very fine grained to fine grained. Most paste materials contain high proportions of angular to subangular fragments that are too small to be identified with a petrographic microscope. In some samples some fragments might have been derived from reworked pottery (Gonzales 2009).

Possible Sources of Igneous Temper

The Navajo Volcanic Field covers approximately 20,000 km^2 in the Four Corners area of the American Southwest. It consists of many diatremes, tuff pipes, and dikes. These volcanoes erupted from about 25 to 30 million years ago (Thornbury 1965:413). Since then, erosion has lowered the surface hundreds of meters, exposing deeper levels of these extinct volcanoes. Shiprock, near the town of Shiprock, New Mexico, is an excellent example of a volcanic neck or plug with surrounding dikes. The abundance of fragmented volcanic rock suggests the explosive eruption of highly gas-charged magma. In the Four Corners area, 36 diatremes have been recorded in the Chuska Mountains, and more than five additional diatremes have been identified within Mesa Verde National Park, Ute Mountain Ute Tribal Park, and the Ute Mountain Ute Reservation. Along these diatremes, dozens of dikes and sills are also deposited. The relationship between these diatremes and dikes is not clear, but both types were possibly created at the same time, about 25 to 30 million years ago.

To understand the sources of igneous-temper minerals in pottery collected from Albert Porter Pueblo, David Gonzales, Kim Gerhardt, and I initially conducted reconnaissance surveys around and in MVNP and UMTP (Gerhardt and Arakawa 2009). We visited five major areas of diatremes and dikes, including Weber Mountain diatremes, Chapin Mesa dike, Wetherill Mesa diatremes and dikes, northern Mancos Canyon diatremes, and Johnson Canyon diatremes and dikes. Since 2009, we have continued to visit and collect extrusive minerals from other areas around and within MVNP and UMTP. The detailed petrographic analysis of these collected samples was conducted by David Gonzales at Fort Lewis College.

In addition, Gonzales (2009) has conducted collection surveys at dozens of diatremes, dikes, and plugs in the Navajo Volcanic Field in Arizona, New Mexico, Utah, and Colorado. He has visited more than 20 diatremes and dikes to collect representative samples. Gonzales undertook petrographic and microprobe analyses from 2010 through 2012 (Gonzales 2009).

On the basis of field survey and microscopic analysis, David Gonzales (personal communication 2009) suggests that minerals deposited in and around MVNP and UMTP are more sodic-rich than areas of Narbona Pass and Beautiful Mountain, where explosive flows were late-stage plugs after formation of the main diatremes, possibly infilling the topographic low created by earlier phreatic explosions. In contrast, minerals collected from Narbona Pass and Beautiful Mountain are more felsic (richer in potassium feldspar) than the older minette dikes. Gonzales also notes that minerals collected from diatremes and dikes in the Chuska Mountains contain large sanidine crystals, which are also frequent in mineral samples from MVNP and UMTP. According to Gonzales, the abundance of sanidine may help to separate igneous temper from the Chuska Mountains and MVNP and UMTP areas in the future.

Comparison of Results from INAA and Petrographic Analyses

The results of both INAA and petrographic analyses for 17 sherds from Albert Porter Pueblo indicate that nine pieces containing sanidine-rich temper were, through petrography, also identified as Chuskan in origin (through INAA). The petrographic analysis suggests eight pieces contain other rock-rich minerals, and INAA traced these sherds to three different areas—the middle San Juan region, Mesa Verde proper, and the McElmo/Monument area (Glowacki 2006). Overall, the results of these analyses indicate that the binocular microscopic analysis was highly successful in separating sanidine-rich igneous tempers from other igneous tempers, and relatively successful in identifying sherds from vessels manufactured in the middle San Juan region as opposed to the central Mesa Verde region. These results thus suggest that it is possible, using a binocular microscope, to distinguish pottery vessels with sanidine-rich temper from vessels made using resources from the middle San Juan and central Mesa Verde region. Whether the sanidine-rich tempers derived from the Chuska Mountains in all cases is not yet known, and a definitive answer will require further study. Refiring and microprobe analyses of the clays used to make vessels with sanidine-rich temper found at sites in the central Mesa Verde region may be needed to resolve the questions raised by Gerhardt and Arakawa (2009) as a result of their discovery of aphanitic minette and trachyte sources in southwest Colorado.

Chipped-Stone Artifacts

In this section, I summarize and discuss the chipped-stone artifacts recovered from Albert Porter Pueblo. The first subsection provides background information for the types of lithic raw materials present in the assemblage. The chipped-stone tools from Albert Porter Pueblo are then considered, both by architectural block and by temporal component, in light of these material types. The section then turns to the analysis of "bulk" chipped stone, which is also discussed by architectural block and by component. Formal and informal chipped-stone tools include bifaces, drills, projectile points, cores, peckingstones, and utilized and modified flakes. The section concludes with a discussion of chipped-stone debitage recovered from the site.

Lithic Raw-Material Types

The classification system used for lithic raw materials by the Crow Canyon Archaeological Center was first created for the analysis of the lithic assemblage from the Duckfoot site, 5MT3806 (Lightfoot and Etzkorn 1993), and was later modified by Gerhardt (2001). This subsection covers mostly descriptions and classifications by Gerhardt (2001) of lithic raw-material types in the central Mesa Verde region. Gerhardt (2001) developed a flow chart of raw-material classification on the basis of three major rock types—sedimentary, igneous, and metamorphic. Igneous rocks can be classified as either intrusive or extrusive rocks, depending on their mineral composition (i.e., cooling of molten rock either slowly or quickly by volcanic activities). In the central Mesa Verde region, intrusive rocks such as granite, diorite, and gabbro can be found in the La Plata Mountains, on Sleeping Ute Mountain, and in many Pleistocene gravel deposits along the Mancos River drainage and along McElmo creek. Extrusive rocks such as aphanitic minette, obsidian, and basalt were deposited in dikes and diatremes of the Navajo Volcanic Field, Jemez Mountains, Mount Taylor, and the San Francisco Peaks in the American Southwest. As discussed in the "Pottery" section of this chapter, some extrusive rocks were also used for pottery temper in the Mesa Verde region.

Sedimentary rocks were made from either the consolidation of solid fragments or by precipitation of minerals from solution. According to Gerhardt's (2001) lithic flowchart, sedimentary rocks are first classified as either silicified sedimentary rock, precipitation of silica, or unsilicified sedimentary rock. In silicified sedimentary categories, rocks are further classified by color: (1) tan-white, light brown, and light gray; (2) purple, green, or dark gray; or (3) other. The first category includes Cretaceous-period Dakota or Burro Canyon Formation silicified sandstone (hereafter called Dakota/Burro Canyon silicified sandstone). The second category includes Jurassic-period Morrison Formation Brushy Basin Member silicified sandstone (hereafter called Morrison silicified sandstone). Other sedimentary rocks include silicified sandstone, which is referred to as quartzite in the original lithic classification system used by Crow Canyon[2], and mudstone. In the precipitate of silica category, rocks that contain inclusions such as chalcedony are classified as Cretaceous period Dakota or Burro Canyon Formation chert (hereafter called Burro Canyon chert/siltstone), whereas rocks that contain no inclusions can be identified as Morrison Formation Brushy Basin Member chert (hereafter called Brushy Basin chert). Rocks of a specific color can be identified as particular types of rock. For example, translucent rocks are classified as chalcedony. Red rocks are identified as red jasper. Rocks that are salmon red are Narbona Pass chert.

Metamorphic rocks include quartzite, metaquartzite, slate, and shale. In the past, Crow Canyon categorized Dakota quartzite as metamorphic (Ortman 2003), but this is sedimentary rock that contains microcrystalline quartz precipitated between sand grains. Thus, Crow Canyon now refers to this material as Dakota/Burro Canyon silicified sandstone.

Historical Geology and Lithology in the Four Corners Area

Historical geology and lithology help us understand what kind of rock was available to the inhabitants of Albert Porter Pueblo for the production of chipped-stone tools. Three important geological formations—Morrison, Burro Canyon, and Dakota—are particularly relevant when addressing this topic. In this subsection, I briefly discuss the historical geology and lithology of these three formations in the central Mesa Verde region.

The following discussion follows Gerhardt (2001). During the Jurassic period, approximately 144–206 million years ago, an offshore trench west of California was created by subduction (the movement of one tectonic plate under another tectonic plate) of oceanic crust beneath continental North America. Inland from the subduction zone was an active volcanic arc of the Sierra Nevada spewing out ash, and this ash was carried eastward into the area of Morrison Formation deposition. Erosion of the volcanic mountain belt provided sediments that were carried eastward by rivers depositing river gravels and sands as well as floodplain shales in the Four Corners area. Sediments in the area of southeastern Utah and southwestern Colorado were dominated by sandy deposits. Material sources in the Salt Wash Member include silica-cemented sandstone and petrified wood. In the Brushy Basin Member of the Morrison Formation, the tectonic setting was identical to the Salt Wash Member (i.e., subduction of ocean crust and active volcanic arc and ash fall), but the depositional environment changed from predominantly river sands and gravels to floodplain mudstones and lake deposits.

One large lake, T'oo'dichi', occupied much of the area of southeastern Utah and southwestern Colorado during Brushy Basin time, 152–150 million years ago (Fassett et al. 2010). During this period, ash from volcanic eruptions in the Sierra Nevada was carried eastward over the Four Corners area and fell into Lake T'oo'dichi', forming a layer of sediment on the bottom of the lake. The chemistry of the lake and sedimentary pore waters (the water filling the spaces between grains of sediments) is unusual in two ways. First, the lake is highly alkaline, more so toward the center than the edges; this is because there was inflow but no outlet, and the climate was hot, causing evaporation and concentration of ions. Second, the ash deposits contained an abundance of mobile, reactive silica as a result of the dissolution of volcanic glass. In this environment, the ash layer altered into a series of secondary minerals that were concentrically zoned by position toward the center. From the margin to the center, four minerals were exposed, including smectite, clinoptilolite, analcime, and albite. With the exception of smectite (used for clay), these minerals were used by ancestral Pueblo people to make chipped-stone tools. The color of Brushy Basin silica-cemented sandstones is typically purple to brown, gray-red, or green.

In the Cretaceous period, the subduction and volcanism from the Jurassic period continued to be active, but a new feature was created by a syncline, resulting in the deformation of eastern Nevada and western Utah and forming thrust faults. This overthrust belt, “Sevier Orogenic Belt,” formed the Wasatch Mountains. Erosion of the mountain belt proceeded simultaneously with tectonic movement, and vast quantities of gravel, sand, silt, and clay were carried by river systems from the northeast to the Pacific Ocean. The thickness of the sediments deposited by these fluvial systems was color coded from purple to red. The thickest layers of gravelly sediments were deposited adjacent to the thrust belt, and the thinner shale layers were deposited farther eastward from the Four Corners area. Southeastern Utah and southwestern Colorado were in the zone of thinner deposits. From the western Dolores River valley, the lower Cretaceous section thickened and became more gravelly. The formation name changes from Burro Canyon to Cedar Mountain to the Buckhorn Conglomerate across the area. The Burro Canyon Formation was deposited first, regionally thick and extensive above the smooth-weathering, shaley Brushy Basin Member. These thick, fluvial-channel sandstones of the Burro Canyon Formation became silicified and were a material source for ancestral Pueblo chipped-stone tools. Most silica-cemented sandstone is light gray, light brown, tan, or white. These silica-cemented sandstones might have undergone repeated dissolution of the original quartz grains and precipitation of microcrystalline quartz (chert and chalcedony). The end product is a light-colored chert that was used for chipped-stone tools by individuals in the central Mesa Verde region.

The finer-grained interbeds between Burro Canyon sandstones closely resemble the Brushy Basin Member in the Morrison Formation in that they are green, purple, reddish, and tan. Silicified ash layers similar to those in the Brushy Basin Member also occurred in the shale interbeds of the Burro Canyon Formation and were material sources for chipped-stone tools. Sea level had been rising steadily throughout the Mesozoic, culminating in the middle-to-upper Cretaceous period. Oceanic embayment spread northward from the Gulf coast and south from the Arctic, eventually forming the continuous “Western Interior Seaway.” Southwestern Colorado and southeastern Utah were located on the margin of the seaway.

When the Dakota Formation was deposited, it was actually a time-transgressive unit that represented shoreline deposits. Sediments from laterally-linked sandy beaches, coaly coastal swamps, and sandy river-channel sub-environments were all included in the Dakota Formation. Offshore, the muddy ocean-bottom sediments then became the Mancos Shale Member. As sea level rose, the Dakota Formation shoreline retreated westward while the former land was covered with oceanic shale (i.e., Mancos shale). At any one location today, Mancos shale is always above Dakota sandstone, but these units are different ages from east to west. For example, the Dakota sandstone and Mancos shale in Durango, Colorado, is older than the Dakota sandstone and Mancos shale in Cortez, Colorado. The back-stepping of the Dakota sub-environments with rising sea level resulted in the typical vertical succession of thick-bedded fluvial sandstones overlain by coaly shale, and overlain by thin beach sandstones. River-channel sandstones and coaly shale are typical lithologies in the Dakota Formation. The fluvial sandstones of the lower

Dakota Formation closely resemble those of the underlying Burro Canyon Formation, but the shale interbeds of the Dakota Formation were coaly, whereas those of the Burro Canyon look like the green and purple Brushy Basin materials. This difference in the lithology of mudstones is the only way to detect the contact between the Burro Canyon and Dakota formations in outcrop. It would be impossible to differentiate a sandstone sample originating from the lower Dakota Formation from one from the Burro Canyon Formation. The middle-to-upper Dakota sandstone is more thinly-bedded and frequently contains imprints of plant debris. Because plant imprints are very rare in the Burro Canyon Formation, the upper Dakota sandstones are identifiable by this characteristic.

Local vs. Nonlocal Materials

Previous studies of lithic raw materials from archaeological sites in the central Mesa Verde region (Arakawa 2000, 2006; Ortman 2000, 2002, 2003; Till and Ortman 2007) suggest that the majority of these materials were procured locally, and that less than 2 percent of debitage assemblages consist of nonlocal materials. Obsidian and Narbona Pass chert (this material was previously called “Washington Pass chert”) are two important raw materials that were procured from outside the central Mesa Verde region. Arakawa et al. (2011) summarize obsidian tool-stone procurement patterns in the central Mesa Verde region. They conclude that early residents (A.D. 600–900) obtained obsidian from various areas, including Government Mountain in northern Arizona, Mount Taylor in west-central New Mexico, and the Jemez Mountains in north-central New Mexico. In contrast, later residents (A.D. 900–1280) procured obsidian almost exclusively from the Jemez Mountains. Arakawa et al. (2011) argue that the increasing focus through time on the Jemez Mountains for obsidian procurement reflects the development of a migration stream from the central Mesa Verde region to northern Rio Grande region.

Narbona Pass chert is another nonlocal material that is important for understanding and reconstructing exchange networks between the Mesa Verde region and the southern San Juan region during the late Pueblo II period (A.D. 1050–1150). The only known quarry for Narbona Pass chert is located in the Chuska Mountains of New Mexico, approximately 60 miles south of the central Mesa Verde region. Stone from this quarry is quite distinct from other cryptocrystalline (very fine-grained) materials because of its distinctive color and purity. From about A.D. 1000 to 1140, when the Chaco regional system was at its peak, many goods and resources—including Narbona Pass chert—were imported from the Chuska Mountains, not only to Chaco Canyon itself, but to Chaco outliers throughout the San Juan basin (Cameron 2001). Although Crow Canyon staff members and program participants have conducted excavations at more than 20 archaeological sites in the central Mesa Verde region, few artifacts made of Narbona Pass chert have been recovered—a total of six projectile points (from Lester’s Site, Sand Canyon Pueblo, and Yellow Jacket Pueblo), three cores (from Albert Porter, Shields, and Yellow Jacket pueblos), and 45 pieces of debitage from various sites.

Red jasper has been classified as nonlocal by previous researchers as a result of its common occurrence in Triassic-age rocks in southeastern Utah (Ortman 2003; Till 2007). However, Arakawa (2006) found a quarry site (Site 5MT4818) containing red cryptocrystalline material (i.e., red jasper) in Cow Canyon, located near Lowry Ruins in southwestern Colorado. Although the deposition of red jasper at the quarry was not extensive, a projectile point made of this material was identified at Albert Porter Pueblo. Thus, at least some of the red jasper found at Albert Porter Pueblo might have been procured locally.

Raw-Material Qualities

For the manufacture of formal chipped-stone tools such as projectile points and bifaces, lithic raw materials should be capable of forming conchoidal ("shell-like") fractures (also called Hertzian cones). According to Whittaker (1994:12–14), stones that produce conchoidal fractures have three important properties—they are homogeneous, brittle, and elastic. Homogeneous means "…they are the same throughout, lacking differences in texture, cracks, planes, flaws, and irregularities"; brittle means "the rock breaks relatively easily and cannot be deformed (bent, compressed) very much without breaking"; and elasticity means "that if not deformed too much (to the breaking point) a material will return to its original shape." Burro Canyon chert/siltstone, chalcedony, red jasper, petrified wood, Brushy Basin chert, Narbona Pass chert, and obsidian are all considered high-quality materials because they possess these three properties and were commonly used by ancestral Pueblo people to make formal chipped-stone tools. In contrast, most Morrison Formation rocks—Morrison mudstone and Morrison silicified sandstone—are not ideal for manufacturing formal tools because they do not possess these properties. Morrison rocks are hard and coarse and were typically used to make peckingstones and ground-stone tools. Dakota mudstone is slightly silicified yellow or red sandstone that appears to outcrop just west of Albert Porter Pueblo. This material was also of low quality and was used to make expedient tools.

The Albert Porter Lithic Assemblage

Table 6.25 presents, by material type, the quantities of bifaces, cores, other chipped-stone tools, modified cores, peckingstones, projectile points, single-bitted axes, and debris in the Albert Porter Pueblo assemblage. Most of the lithic artifacts (about 98 percent) are debitage, and cores and peckingstones each compose about 1 percent of the assemblage. An examination of the lithic assemblage by weight (Table 6.26) yields similar results: more than 60 percent is debris, whereas peckingstones compose 15 percent and cores compose 17 percent of the total assemblage. Tables 6.25 and 6.26 illustrate interesting patterns in the preference of raw materials for specific tool types. More than 40 percent of formal tools, such as projectile points and bifaces, were made of Dakota/Burro Canyon silicified sandstone. In contrast, more than 35 percent of expedient tools such as cores and peckingstones were made of Morrison mudstone or silicified sandstone, and about 35 percent of modified cores were of Dakota mudstone. These correlations between raw materials and tool types have been noted in previous studies of ancestral Pueblo assemblages (Ortman 2003; Till 2007) and appear to derive from the properties of various raw materials, as stated above.

Projectile Points

Projectile points were typically used for hunting large game (Ellis 1997). Projectile points differ from bifaces in that most of the former are notched at the distal end so that the point can be hafted onto an arrow shaft. In all, 222 projectile points were recovered at Albert Porter Pueblo (Table 6.27). Most of these are small corner- or side-notched points. The average size of these points is 2.22 cm long, 1.29 cm wide, and 0.35 cm thick. The average weight is about 1 g. Most are complete points or points that were discarded during the final stages of manufacture (see Whittaker 1994), but 16 of the 222 points were either incomplete or were discarded at an indeterminate stage in the reduction process.

More than 40 percent of these points were made of Dakota/Burro Canyon silicified sandstone, 12 percent were fashioned from Burro Canyon chert, 11 percent are agate/chalcedony, and 11 percent are of unknown chert. Analyzing these objects by weight produces similar patterns. Because projectile points are rarely represented by multiple fragments from the same object, I will focus on counts for the remainder of this subsection.

The majority of projectile points were recovered from fill inside structures—which includes middens, roof-fall debris, and naturally deposited sediments—and the remainder were recovered from the modern ground surface. More than half were recovered from Architectural Block 100; many were also found in Architectural Blocks 900 and 1000. In order to assess the relative densities of projectile points from different areas of the site, it is necessary to standardize projectile-point recovery rates against the total amount of excavation in each area. Utility wares have been found to be a good measure of site-occupation intensity (Kohler 1978; Varien and Mills 1997; Varien and Ortman 2005; Varien and Potter 1997) and thus can serve as a means of standardizing data for comparisons. For the analyses that follow, I use the ratio of tool counts to the weights of gray ware sherds for various excavated areas within Albert Porter Pueblo in order to compare the relative incidence of projectile points. Because sherd size varies across sampling strata as a result of depositional and post-depositional processes, weights rather than counts are better estimators of pottery deposition. In contrast, counts are a more interpretable measure of stone-artifact deposition because, unlike pottery vessels, stone artifacts do not fragment.

The results indicate that, although projectile points occur at relatively comparable rates in all architectural blocks, the incidence is greater in Architectural Blocks 400, 1100, 1000, and 900 (Table 6.28). Projectile points appear to be slightly less abundant in Architectural Block 100 (115/300,003 = 0.00038) than in other areas (107/272,634 = 0.00039).

The incidence of projectile points in three temporal contexts within Block 100—pre–A.D. 1060, A.D. 1060–1140, and A.D. 1140–1280—was investigated; these three time spans predate the great house, coincide with initial use of the great house, and coincide with final use of the great house, respectively. The results show a higher ratio of projectile points for the pre–A.D. 1060 context; in contrast, the ratio for the A.D. 1060–1140 context was relatively low. This suggests that the initial residents of Architectural Block 100 (before A.D. 1060) produced and used more projectile points than later residents. Finally, a comparison between contexts dating from the Pueblo II period (4/16,418=.0002) vs. the Pueblo III period (113/305,243 = 0.0003) indicates that projectile points were less common in Pueblo II-period contexts than in Pueblo III-period contexts. The standard errors of proportion indicate that sample sizes are fairly similar for comparisons of projectile points recovered from Architectural Block 100 and other areas, whereas sample sizes of the Pueblo II period and Pueblo III period suggest that the comparisons are significantly different and comparable.

A recent study by Arakawa et al. (2013) suggests that this temporal trend was widespread and was probably associated with changes in hunting roles in ancestral Pueblo subsistence strategies through time. Arakawa et al. (2013) compiled data on the frequencies of projectile points for 123 sites in the Mesa Verde region to investigate the ways in which increasing population affected subsistence patterns as revealed by the frequency of projectile points. We calculated ratios of projectile points to counts of gray ware sherds and then compared these ratios to local population densities across the Mesa Verde region. We focused only on sites dating from the Pueblo II to the Pueblo III periods in the central Mesa Verde region. The index for Albert Porter Pueblo is 0.0023 (222/98,105), whereas the average ratio in the selected samples is 0.0020. This suggests that residents of Albert Porter Pueblo discarded a relatively greater quantity of projectile points than residents of other settlements. This may indicate that inhabitants of Albert Porter Pueblo hunted big game (i.e., deer) more frequently than did inhabitants of adjacent areas (see also Chapter 10).

Bifaces

A biface is defined as "a tool that has two surfaces (faces) that meet to form a single edge that circumscribes the tool" (Andrefsky 1998:21). On most bifaces, both faces exhibit flake scars that extend at least halfway across the face of the tool. In hunting-and-gathering societies, bifaces were commonly used as knives; most bifaces from ancestral Pueblo sites are either preforms or fragments of finished or nearly-finished projectile points.

The Albert Porter Pueblo assemblage contains 130 bifaces. The average size of these bifaces is 2.3 cm long, 1.7 cm wide, and 0.5 cm thick. The average weight is 2.4 g. The average size of these bifaces is comparable to that of the projectile points in the assemblage, but the average weight of the bifaces (2.4 g) is more than twice the average weight of the projectile points (1 g). This suggests that some bifaces were significantly heavier than other bifaces. These heavier bifaces are probably projectile-point preforms.

The counts, weights, and percentages of bifaces from Albert Porter Pueblo by raw-material type were examined. Because there is no substantial difference between percentages by count and weight, I focus on the percentage by count in the following discussion. Bifaces shared similar material types as projectile points. More than 45 percent of bifaces were made from Dakota/Burro Canyon silicified sandstone, about 15 percent from Burro Canyon chert, 10 percent from unknown chert, and about 7 percent from agate/chalcedony. These patterns of raw-material use are mirrored in other assemblages from the central Mesa Verde region that date from the Pueblo II and Pueblo III periods (Ortman 2003; Till 2007). Bifacial tools made of Dakota/Burro Canyon silicified sandstone, Burro Canyon chert, and agate/chalcedony are common in these collections, because sources of these raw materials are abundant and widely distributed in the central Mesa Verde region.

The Crow Canyon laboratory subscribes to Whittaker's (1994:199–206) bifacial reduction categories: primary thinned preforms, bifacial-edged blanks, refined bifaces, finished bifaces, and indeterminate. About one-third of the bifaces from Albert Porter Pueblo were deposited at an indeterminate stage in the reduction process, about 30 percent were primary thinned preforms, and 16 percent were finished bifaces. The large percentage of primary thinned preforms indicates that most bifaces were flakes that were subsequently thinned bifacially to create a knife or were discarded at one of various stages in the process of producing a projectile point.

The quantity of bifaces and the ratio of the count of bifaces to the weight of gray ware sherds collected from each architectural block were calculated. Although 40 percent of the bifaces in the assemblage were recovered in Architectural Block 100, the results of this ratio analysis indicate that the largest incidence of bifaces is for Architectural Blocks 400 and 500. This uneven distribution suggests that some residents of those blocks might have participated in lithic-reduction activities. This issue will be further investigated in the discussion of the debitage assemblage, below.

To gain more information about bifacial reduction activities in Architecture Block 100, I compared the ratio of biface counts to the weights of gray ware sherds for areas inside Architectural Block 100 to the ratios for all other blocks. The results indicate that bifaces are slightly more abundant in other blocks (75/272,634=.00027) than in Block 100 (55/300,003=.00018), but the differences are relatively small. To evaluate whether sample sizes are sufficient for this comparison, I calculated the standard errors of the proportion of the counts of bifaces to gray ware sherds collected from all architectural blocks at the site. The results suggest that the incidence of bifaces recovered from these two areas is significantly different, and that standard errors do not overlap. These data suggest that bifacial-reduction activities might have occurred more frequently in blocks other than Architectural Block 100.

In the previous section, I investigated ratios of projectile-point counts to the weights of gray ware sherds for three specific temporal contexts as well as for contexts dating from the Pueblo II and Pueblo III periods. I conducted the same analysis for bifaces. It appears that bifaces were more common before the great house was constructed and during the final use of the great house. The analysis of bifaces dating from the Pueblo II period vs. Pueblo III period indicates that bifaces were more abundant in contexts dating from the Pueblo III period (55/305,243=.00012) than in those dating from the Pueblo II period (2/16,418=.00018). The result of the standard errors of the proportion for the counts of bifaces and gray wares sherds collected from those contexts suggests that bifaces recovered from these two types of contexts are significantly different and the standard errors do not overlap. Thus, these results are meaningful and interpretable. Although only two bifaces were recovered from contexts dating from the Pueblo II period, the ratio data suggest that, relative to sherds of cooking wares, fewer bifaces were produced and used during the Pueblo II period than during the Pueblo III period.

Drills

Drills take one of three forms: (1) formally shaped tools (generally shaped through bifacial reduction) with pointed projections, (2) flakes with ad hoc projections that show distinctive rotational wear on the tips, and (3) projectile points that were recycled into drills and show distinctive drill wear on their tips (Pierce 1999b). A total of 27 drills were recovered from Albert Porter Pueblo. Thirteen drills (48 percent) were made of Dakota/Burro silicified sandstone and four pieces (11 percent) were fashioned of agate/chalcedony. The distribution of drills across depositional contexts is as follows: 17 (63 percent) were discovered in midden contexts, eight (30 percent) were from kiva contexts (i.e., roof fills and floors), and two (7 percent) were from the modern ground surface. More than half (52 percent) were collected from Architectural Block 100, and one or two (3 or 7 percent) were collected from each of the following Blocks: 200, 300, 400, 600, 800, 900, 1000, and 1100. The widespread spatial distribution of drills suggests that people throughout the pueblo used drills to make holes in hides, jewelry, and other objects.

The ratios of the counts of drills to the weights of gray ware sherds from Architectural Block 100 vs. Blocks 200–1100 is similar (14/30,003=.00004 and 13/272,634=.00004, respectively). On the basis of the standard errors of proportion, the difference is not significant. In addition, sample sizes are insufficient to compare the incidence of drills from contexts dating from the Pueblo II vs. Pueblo III period. In short, the spatial distribution of drills suggests that residents throughout Albert Porter Pueblo produced and used drills.

Cores

Cores are rocks with more than two flake scars on a ventral (exterior) surface and display evidence of intentional modification related to flake production. Seven hundred cores were collected from Albert Porter Pueblo. More than 25 percent of cores were of Morrison Formation rocks—Morrison mudstone (31 percent), Morrison silicified sandstone (26 percent), and Dakota mudstone (19 percent). All of these materials outcrop in deposits less than 7 km from Albert Porter Pueblo (Arakawa 2000). It is clear from percentages of raw materials of projectile points and bifaces that most cores did not result from the production of formal tools. The majority of cores (63 percent) were collected from middens, and about 20 percent were found in the fills of subterranean kivas. The spatial distribution of cores indicates that 50 percent were collected from Architectural Block 100, 10 percent were found in Architectural Block 900, and 10 percent were found in Block 1000. However, the results of a comparison of the ratios of core counts to weights of gray ware sherds suggest that cores were more abundant in Architectural Block 400, 1000, and 200, in decreasing order of abundance. In addition, I examined whether there was a higher incidence of cores in Architectural Block 100 than in other blocks; however, this ratio is similar for Architectural Block 100 (359/300,003=.001) and Architectural Blocks 200–1100 (341/272,634=.001), and the standard errors of the proportion indicate that the differences are not significant. Thus, cores appear to have been discarded at similar rates throughout the village.

The rates of the deposition of cores during three time spans reveal that cores were discarded at a slightly greater rate before the great house was constructed than during either of the later time spans, although the three ratios are relatively similar. A comparison of Pueblo II and Pueblo III contexts indicates that cores might have been produced and discarded with greater relative frequency during the Pueblo II period (22/16,418=.00013) than during the Pueblo III period (338/305,243=.0011), and the standard errors of the proportion indicate that these differences are significant.

Peckingstones

Peckingstones are tools that originally had sharp edges but were subsequently used for battering and cutting activities. As a result, the edges appear dulled, blunted, or damaged, or some combination of these three characteristics. The activities for which peckingstones were used are difficult to specify and, as a result, artifacts exhibiting battered edges have been, in many analysis systems, classified as “other” tool types. For example, artifacts classified as peckingstones by laboratory analysts at Crow Canyon have, in other systems, been categorized as hammerstones (Mobley-Tanaka 1997). In my opinion, the major difference between peckingstones and hammerstones is that the former were used to shape rocks through pecking and battering, whereas the latter were used to produce flakes or to shape rocks through flake removal. In addition, more force is applied to a metate or a building stone when it is being shaped or the surface is being roughened by a peckingstone than is the case when a hammerstone is used to remove flakes from a core. Flaking can be done using antler, whereas pecking cannot, which suggests that one difference between peckingstones and hammerstones is how force is applied to a target object. In other words, a peckingstone is used more like a chisel, directing force directly into an object, whereas a hammerstone is used to direct force along the edge of an object.

When considering the production stages of peckingstones, some archaeologists (Adams 2002; Etzkorn 1993) have assumed that cores were a byproduct of the manufacture of other tools, and that cores were subsequently used for pecking and battering other objects. Thus, peckingstones are cores that were used for pecking and battering. When assessing the utilization of peckingstones, archaeologists have tended to assume that this tool type was mainly used for "resharpening," or roughening the surfaces of, ground-stone tools. According to Etzkorn (1993:166–167), some peckingstones "may have been used to shape building stones or large stone tools such as metates; others may have been used to roughen the surfaces of manos and metates that had become too worn to grind corn effectively." Adams (2002:153) agrees that peckingstones were used primarily for roughening the surfaces of manos and metates. In fact, there has been very little study of the production and use of peckingstones; therefore, we decided to investigate both behaviors using the chipped-stone assemblage from Albert Porter Pueblo.

More than 500 peckingstones were collected and analyzed from Albert Porter Pueblo. The data reveal that approximately 75 percent of the peckingstones are made of Morrison rocks—Morrison silicified sandstone and mudstone. Significantly, these rocks would be locally available in abundance. More than half of the peckingstones in this assemblage are of hard, coarse-grained Morrison silicified sandstone. About 20 percent are made of Morrison mudstone. Of the remaining, non-local stones, about 12 percent are Dakota/Burro Canyon silicified sandstone and another 8 percent are Dakota mudstone.

About 60 percent of peckingstones were collected from midden contexts, 22 percent were from subterranean kiva contexts, and 7 percent were found in noncultural contexts. The high percentage of peckingstones from midden contexts indicates that residents of the settlement probably discarded peckingstones in trash areas after usable sharp edges had become dull through use. I expected peckingstones to be more abundant in architectural contexts, because I think maize-grinding activities typically occurred indoors, and peckingstones were probably used to roughen the surfaces of manos and metates. However, only 10 peckingstones (2 percent) were collected from the interiors of structures. This pattern suggests either that excavations did not expose the types of intramural spaces where maize-grinding activities occurred, or that the inhabitants of Albert Porter Pueblo left little de facto refuse when they depopulated the settlement.

The data indicate that about 50 percent of peckingstones were collected from Architectural Block 100, and, in order of decreasing relative abundance, from Blocks 1000, 900, and 800. The ratios of the quantity of peckingstones to the weight of gray ware sherds were calculated for each architectural block, and the results indicate that relatively more peckingstones were discarded in Architectural Blocks 200 and 1000 than in other blocks. The ratios also indicate that peckingstones accumulated at relatively constant rates in Architectural 100 (255/300,003=.0008) and in all other blocks (254/272,634=.0009); the standard errors of the proportion indicate no significant difference. This suggests that peckingstones were used and discarded at similar rates throughout the settlement.

Although peckingstones were found throughout the site and in all temporal contexts, relative to gray ware sherds, fewer peckingstones were discarded in Architectural Block 100 before the great house was constructed than during the initial and final uses of the great house. However, it appears that peckingstones were discarded with the same relative frequency in Pueblo II contexts (13/16,418=.0008) and Pueblo III contexts (242/305,243=.0008); the standard errors of the proportion indicate no significant difference. This suggests that peckingstones were used with about the same frequency during the Pueblo II and Pueblo III periods.

These results raise several questions about the use of peckingstones. Were these tools used to shape building stones during the A.D. 1140–1225 period? Was maize grinding frequent in the great house during both the Pueblo II and the Pueblo III periods? To address these questions, Crow Canyon laboratory analysts conducted an experimental-archaeology program in October 2009. Five lay participants and three Crow Canyon staff members participated in this program. We used Morrison silicified sandstone to manufacture cores with sharp edges; this material is common on archaeological sites. During this experiment, we recognized that a much harder stone, such as a river cobble or chunk of quartzite, was necessary to produce sharp edges on Morrison silicified sandstone. Thus, it is unlikely that ancestral Pueblo people created cores by striking two rocks of the same material against each other. Instead, it appears that the artifacts we classify as hammerstones were used to create cores.

Our second experiment investigated how peckingstones were manufactured. Using the cores we had made, we pecked and battered many different materials that ancestral Pueblo people would have modified, including timber, hides, animal bones, and pieces of sandstone. We found that the edges of peckingstones readily became dull when struck against sandstone but not when modifying other materials. Through these experiments, we determined that peckingstones were almost certainly made by battering cores against sandstone, presumably to shape building stones or to shape or roughen maize-grinding tools, including manos. We could not determine how often peckingstones were used for each activity. This is an important question, because these activities reflect very different aspects of ancestral Pueblo economy: the shaping of building stone relates to new construction, whereas the shaping and roughening of maize-grinding tools relates to food preparation.

Most peckingstones were probably a byproduct of food preparation rather than construction activities. This inference results from several assumptions. First, building stones were only shaped once even though many were reused repeatedly, whereas maize-grinding tools required frequent roughening. The ratios of the counts of peckingstones to gray ware sherds collected from archaeological sites excavated by Crow Canyon, and that date from the Pueblo II and Pueblo III periods, were analyzed. The data show that peckingstones are just as abundant at the

Duckfoot site, where the architecture did not include pecked-block masonry, as they are at later sites (e.g., Yellow Jacket, Woods Canyon, Castle Rock, and Sand Canyon pueblos) where pecked-block masonry was used. If this hypothesis is correct, and the grinding of maize was primarily women's activity, as it is in Pueblo society today, it suggests that peckingstones and the byproducts of their production and use reflect the activities of ancestral Pueblo women. This is a striking thought, because many archaeologists have assumed that chipped-stone tools and debris reflect men's activities. Our studies suggest that, even if projectile points were made and used by men, most of the stone artifacts recovered from ancestral Pueblo sites reflect women's activities. This inference provides many new opportunities for research on gender and the sexual division of labor in ancestral Pueblo society.

Utilized Flakes

During the analysis of bulk-chipped-stone artifacts, Crow Canyon analysts separated utilized flakes from angular shatter and unutilized flakes. Through this process, 914 pieces weighing more than 20 kg were identified as utilized flakes. Both the percentages by count and by weight show that the greatest percentage of utilized flakes, in order of decreasing incidence, were Morrison silicified sandstone, Dakota mudstone, and Morrison mudstone. These rocks were procured from local deposits that are abundant within 7 km of Albert Porter Pueblo (Arakawa 2006; Gerhardt and Arakawa 2007, 2009). Thus, the procurement of these types of raw materials could be considered an activity requiring low-energy expenditure.

In the past, Crow Canyon analysts have encountered difficulty identifying utilized flakes consistently. A major reason for the difficulty is that, although many utilized flakes exhibit serrated edges, it is fairly difficult to ascertain whether the serration was the result of deliberate human activity, was created as a result of the grain of the raw material, or was the result of some other, possibly natural, process. In order to improve our ability to identify utilized flakes, Crow Canyon laboratory analysts conducted several experiments in 2009. First, we visited a quarry site of Burro Canyon chert/siltstone on Cannonball Mesa in the Mesa Verde region. At this ancestral Pueblo quarry, five Crow Canyon program participants and two Crow Canyon researchers recorded several attributes of flakes lying on the modern ground surface. Several units measuring 1-x-1-m were placed within the scatter of quarry debris, and all debitage inside this unit was identified and counted. In the first unit, 10 of 85 flakes of Burro Canyon chert/siltstone exhibited serrated edges and were identified as utilized flakes. In the second unit, four of 50 flakes were classified as utilized. These were surprising results given the likelihood that all artifacts at the quarry reflect quarrying activities as opposed to cutting, scraping, or slicing activities.

There are several possibilities for the high percentage of utilized flakes at this quarry. First, these flakes could have been used for processing faunal remains. However, this is unlikely, because we observed no faunal remains, bifaces, or projectile points at the site, suggesting that animal carcasses were not processed there. Second, flakes might have been used to cut brush at the quarry. This is unlikely, because vegetation is not abundant at the site today, and the past environment was probably similar. Third, serrated edges could have been produced during a generalized lithic-reduction process rather than through usage of these flakes. However, we did not produce many flakes similar to the utilized flakes encountered at the quarry site when we performed our core-reduction process for manufacturing cores and flakes during our experiments in 2009; therefore, this scenario is also unlikely.

To further address the issue of the high percentage of utilized flakes at the quarry, we conducted an additional experiment with utilized flakes. Local Morrison silicified sandstone was obtained from an outcrop in Yellow Jacket Canyon, and many flakes of various shapes and sizes were produced with this material. Participants in the study were supplied with numerous flakes 5–10 cm long, 5 cm wide, and 2–3 cm thick, and were asked to perform several cutting, slicing, and scraping activities on yucca leaves, bark, wood, or bones. After one hour, staff members collected the utilized flakes from each individual.

The results of this experiment indicate that producing serrated edges on flakes of Morrison silicified sandstone is a fairly laborious and time-consuming process. Participants could not easily produce serrated edges by cutting or scraping soft materials (e.g., yucca and branches of pinyon and juniper). In contrast, edges of flakes became dull and sometimes serrated when hard objects (e.g., wood from a cottonwood tree) were processed. Nevertheless, only two of the 20 flakes in the experiment bore any resemblance to the utilized flakes identified at the archaeological sites.

In a third experiment, 50 flakes were randomly placed on the modern ground surface, were walked on three times, and were then analyzed. An average of seven of 50 flakes (with a range of four to nine pieces) were identified as utilized. These results suggest perhaps the strongest theory for the presence of a high percentage of utilized flakes at the quarry site. The modification of these flakes was probably created unintentionally by human traffic during quarrying activities. These experiments indicate that additional research should be conducted on the morphology and function of utilized flakes.

Modified Flakes

During analysis of bulk chipped stone, Crow Canyon analysts record data on individual modified flakes. A modified flake is defined as a flake “that has been deliberately modified prior to use but that does not fall into one of the other more formal tool categories; it is a very general category that encompasses a wide range of possible functions” (Etzkorn 1993:174). In the Crow Canyon system, flakes are identified as being modified if they exhibit evidence of intentional modification of the flake edge as a result of percussion and pressure-flaking actions. The appearance of these flakes is distinct from the serrated edges of utilized flakes, because the former displays a continuous, thin, and sharp edge, whereas many of the serrated edges of utilized flakes appear dull or have varying sharpness.

For Albert Porter Pueblo, 702 flakes weighing a total of 15,110 g were identified as modified. Similar to utilized flakes, the greatest percentage of modified flakes are of, in order of decreasing percentages, local Morrison silicified sandstone, Morrison mudstone, and Dakota mudstone. It is interesting that some high-quality materials such as Burro Canyon chert/siltstone and Morrison chert compose a relatively higher percentage by count than by weight. In contrast, Dakota mudstone occurs in a higher percentage by weight than by count. These results suggest that small, high-quality pieces of Burro Canyon chert/siltstone and Morrison chert were used for many modified flakes, but that larger pieces of Dakota mudstone were also used by residents of Albert Porter Pueblo.

Debitage

Crow Canyon researchers have conducted "mass analyses" of lithic assemblages since 1997 (Ahler 1989; Arakawa 2000; Ortman 2003; Till 2007). We performed this analysis for the chipped-stone artifacts from Albert Porter Pueblo as well. This method was developed by Ahler (1989) and was designed to make the analysis of large chipped-stone assemblages more efficient and less time consuming. With this method, debitage is first segregated by size or weight, and then a few attributes of flakes, such as raw-material type and the presence or absence of cortex (i.e., chemical or mechanical weathered surface of rocks [Andrefsky 1998:xxii]), are recorded. Interpretation of the results rests on three critical assumptions. First, large flakes were produced early in the reduction process, whereas a greater quantity of smaller flakes was produced as reduction proceeded. Second, the amount of cortex decreased over the course of the reduction process and was absent during the late stages of bifacial reduction. Third, the size distributions of flakes and angular shatter by raw material can help us understand correlations between tool types and patterns of raw-material procurement on the basis of energy expenditure (Arakawa 2000).

Crow Canyon staff, volunteers, and interns analyzed 74,896 pieces of debitage weighing a total of 405,684 g from Albert Porter Pueblo. Comparisons of raw-material percentages by count and weight reveal that some materials make up a higher percentage by count than by weight. These materials include agate/chalcedony, Morrison chert, Morrison silicified sandstone, Burro Canyon chert, Burro/Dakota silicified sandstone, and Morrison mudstone. In contrast, several categories of debitage, including conglomerate, other igneous rocks, Dakota mudstone, sandstone, and unknown silicified sandstone occur in higher percentages by weight than by count. The latter group of materials was typically used for ground-stone tools and expedient tools (e.g., peckingstones and modified flakes) and is coarser and heavier than the raw-material types that were typically used for other types of chipped-stone tools.

About 50 percent of the assemblage was identified as, in decreasing order of incidence, Morrison silicified sandstone, Morrison mudstone, and Dakota mudstone. Together, these three materials compose more than 80 percent of the total assemblage by both count and weight. These materials are available within 7 km of Albert Porter Pueblo (Arakawa 2000) and would have been easy to procure. These materials were also heavily used for the manufacture of peckingstones and modified flakes, as discussed earlier. In contrast, the percentages by count and weight of raw materials typically used for bifaces and projectile points are fairly low. For example, less than 6 percent of the debitage is of Burro/Dakota silicified sandstone, and less than 1 percent is Burro Canyon chert or agate/chalcedony. In short, the percentage by count and weight of the entire debitage assemblage indicates that the majority of the debitage assemblage derives from the production of expedient and ground-stone tools.

To investigate the spatial distribution of debitage at the site, I tabulated the percentage by count and weight of debitage collected from midden contexts in each architectural block. Because chipped-stone specialists (e.g., Ammerman and Andrefsky 1982; Andrefsky 1998) argue that weights provide more reliable data for the interpretation of debitage assemblages than do counts, I use weights in the following discussion of abundance. As previously mentioned, specific types of raw materials were used for particular tool types; most expedient tools were produced from local raw materials, whereas formal tools (bifaces and projectile points) were made of raw materials that required relatively high expenditure of energy to procure.

First, three types of raw material—agate/chalcedony, Burro Canyon chert, and Dakota/Burro Canyon silicified sandstone—that were commonly used to manufacture bifaces and projectile points were examined. Among these materials, the greatest percentage of agate/chalcedony was deposited in Architectural Blocks 400 and 600, the greatest percentage of Burro Canyon chert was deposited in Architectural Blocks 300 and 900, and the greatest percentage of Dakota/Burro Canyon silicified sandstone was deposited in Architectural Block 500. In contrast, among raw-material types emphasized in the production of expedient tools, Morrison silicified sandstone occurred with the greatest frequency in Architectural Block 800, whereas Dakota mudstone occurred most frequently in Architectural Block 1100. These differences in the spatial distributions of manufacturing debris associated with different tool types suggest that residents of Albert Porter Pueblo produced different types of chipped-stone tools in different areas. This may reflect the development of incipient task or craft specialization across households in the community.

In contrast to the distributions of raw materials, I could detect no pattern in the abundance of debitage, relative to gray ware pottery, from Architectural Block 100 vs. the other blocks at the site. For example, the ratio of debitage counts to the weights of gray ware sherds is nearly identical for Architectural Block 100 (36,175/300,003=.12) and for Architectural Blocks 200–1100 (36,819/272,634=.13). The similarities of these ratios suggest that gray ware sherds and chipped-stone debitage accumulated at consistent rates throughout the occupation of the settlement (see Varien and Ortman 2005).

I also compared debitage collected from three temporal contexts in Architectural Block 100—those pre-dating the great house, those deposited during the initial use of the great house, and those dating from the final use of the great house. The incidence of debitage in contexts that predate the great house is lower (0.06) than in contexts dating from the initial use of the great house (0.10). But a comparison of this same ratio between contexts dating from the Pueblo II vs. the Pueblo III periods indicates that less debitage accumulated during the Pueblo II period (1,569/16,418=.095) than during the Pueblo III period (36,488/305,243=.119). The debitage dating from the Pueblo II period was recovered from Architectural Block 100. The standard errors of the proportion suggest that the results of these two analyses are significantly different and comparable. Thus, these results may indicate a change in the mix of activities that occurred in Architectural Block 100 through time. Perhaps the deposits dating from the Pueblo II period resulted from activities associated with construction of the great house, whereas the deposits dating from the Pueblo III period resulted from domestic activities that occurred in the great house.

In this and the following paragraphs, I investigate whether residents of Albert Porter Pueblo participated in intensive lithic-reduction activities in specific areas within the village. More than 40 percent of projectile points from the site were made of Dakota/Burro Canyon silicified sandstone. The preference of this material type for manufacturing projectile points was also evident in the assemblages from Yellow Jacket Pueblo (Ortman 2003), Shields Pueblo (Till 2007), and Sand Canyon Pueblo (Till and Ortman 2007). In the central Mesa Verde region, 53 of the 94 (56 percent) quarries identified to date are sources of Dakota/Burro Canyon silicified sandstone (Arakawa 2006:360–365). Numerous pieces of debitage, in addition to cores, tested cobbles, and bifacial thinning flakes, are visible on the modern ground surface, suggesting that residents of the central Mesa Verde region exploited these quarries, tested this material while they were at the quarries, and obtained the raw material through direct procurement. The nearest quarries of Dakota/Burro Canyon silicified sandstone are about 10 km from Albert Porter Pueblo. Thus, to procure this preferred material for the production of projectile points, residents of the pueblo were compelled to travel some distance from the settlement. Characteristics of the lithic assemblage from the site indicates that the villagers rarely reduced cores of Dakota/Burro Canyon silicified sandstone within the village; the percentage of cores of this material is very low (10 percent) compared to the percentage of projectile points of Dakota/Burro Canyon silicified sandstone (40 percent) in the assemblage.

To evaluate the possibility that residents of Albert Porter Pueblo engaged in bifacial-reduction processes to manufacture projectile points within the village, I, following Patterson's (1990) approach, analyzed the size distribution of the chipped-stone debitage of Dakota/Burro Canyon silicified sandstone. Patterson proposed that characteristics of flake-size distribution are useful indicators of bifacial-reduction activities and offered a simple analytical technique generated using archaeological and experimental data. Graphed results showing an exponential curve with a high frequency of small flakes indicate bifacial manufacturing, whereas a graph displaying a relatively irregular curve reflects core reduction or other modes of lithic reduction.

Some archaeologists have criticized Patterson's (1990) analytical technique. Shott (1994:92–94), for example, argues that not all experimental cobble- and core-reduction processes show an ideal exponential curve as assumed by Patterson's model. Andrefsky (2001:3; 2007) also evaluated the mass-analysis technique and concluded that the results often lead to erroneous interpretations because of variation in individual flintknapping styles and methods, the properties of various raw-material types, and the mixing of multiple episodes or multiple forms of reduction.

Despite these important caveats regarding mass analysis, I argue that small thinning flakes are generally more abundant in assemblages resulting from the production of bifacial tools than in assemblages produced as a result of core reduction, because soft-hammer percussion and pressure flaking characterize bifacial-tool production, whereas hard-hammer percussion, which is less precise, characterizes bipolar and generalized core-reduction activities. Moreover, Stahle and Dunn's (1984) experimental analysis of debitage from the bifacial-reduction process demonstrated that the size of waste flakes decreased from earlier to later reduction stages. The analysis of the production of Clovis points and the associated debris by Morrow (1997; also see Andrefsky 2007:398) also shows that the mean weight of flakes gradually decreases as the manufacturing process approaches end products. Focusing on only one type of raw material (Dakota/Burro Canyon silicified sandstone) also minimizes errors that arise from the mixing of lithic-reduction methods correlated with various types of raw materials, as pointed out by Andrefsky (2001, 2007). Thus, examining flake-size distributions within rather than across categories of raw material to ascertain the dominant modes of reduction reflected in the debris of that material should provide superior results.

The mass-analysis method employed by Crow Canyon analysts involves sorting debitage into three size grades: pieces captured by 1-in mesh (size 1), pieces that fall through 1-in mesh but are captured by 1/2-in mesh (size 2), and pieces that fall through 1/2-in mesh but are captured by 1/4-in mesh (size 4). For the dependent valuable, I used the percentage of debris by count in each size category. Contrary to the expectations of an idealized bifacial-reduction curve, the debitage assemblage from Albert Porter Pueblo shows that the size grade with the greatest percentage (40 percent) of Dakota/Burro Canyon silicified sandstone debitage fragments is size 2, suggesting that this type of debitage in the assemblage is not primarily the result of bifacial reduction. Thus, the villagers probably did not routinely conduct bifacial-reduction activities at the pueblo. Similar results have been obtained for other lithic assemblages from the central Mesa Verde region, suggesting that we still have much to learn about the production of projectile points.

Ground-Stone and Polished-Stone Tools

In this section, I summarize the ground-stone and polished-stone tools from Albert Porter Pueblo. For information regarding these artifact categories, and for definitions of the tool types within these categories, the reader is referred to Crow Canyon's laboratory manual (Ortman et al. 2007).

Ground-stone artifacts consist primarily of objects that are associated with food processing (e.g., manos and metates). In addition, at least one type of artifact, abraders, was used in the manufacture or processing of materials other than food (e.g., arrow-shaft shaping, pigment processing, and pendant manufacture). A total of 639 ground-stone items was collected from Albert Porter Pueblo (Table 6.29). The following paragraphs summarize the types of ground-stone tools and raw materials present in this assemblage and consider the distribution of ground-stone tools by architectural block and by component.

Many ground-stone tools—abraders, basin metates, manos, metates, one-hand manos, pestles, slab metates, stone mortars, trough metates, and two-hand manos—were made of sandstone. The majority of two-hand manos, as well as slab and trough metates, were also made of sandstone, but 17 percent of these tools were made of conglomerate. It is interesting to note that residents of Albert Porter Pueblo used igneous materials (about 23 percent), which were procured more than 7 km away, for one-hand manos. As discussed in the chipped-stone section, one-hand manos might have been used not only for grinding agricultural products and gathered foods but also for sharpening the surfaces of peckingstones or for roughening the surfaces of metates.

Table 6.30 summarizes the distribution of ground-stone tools by architectural block and reveals that ground-stone tools were recovered from various architectural blocks. Ratios of counts of ground-stone artifacts to weights of gray ware sherds, by architectural block, however, indicate that many ground-stone tools of various types—abraders, manos, metates, trough metates, and two-hand manos—occur in higher densities in blocks other than Architectural Block 100. These data may indicate that villagers who lived in Architectural Blocks 200–1100 devoted more time and energy to food-processing activities than did the occupants of Architectural Block 100.

Ground-Stone Tools by Condition

Table 6.31 presents the ground-stone artifacts from Albert Porter Pueblo by condition. Approximately half of the complete ground-stone artifacts were classified as abraders, stone mortars, or one-hand manos. The other half of manos, metates, slab metates, two-hand manos, and trough metates were fragmentary; fragmentation might have resulted from preservation conditions (e.g., broken by roofing falling on the tools), or from usage.

Ground-Stone Tools by Provenience

Table 6.32 provides the provenience category of each ground-stone tool. The provenience categories reflect four different contexts, including “architectural deposit,” “fill” (excludes roof fall and below, when those strata were present), “other,” and “surface contact.” On the basis of this analysis, I infer that the majority of ground-stone tools were deposited in fill, although some were also left on surfaces.

Battered or Polished Tools

The battered or polished stone-tool assemblage includes axes, axe/mauls, hammerstones, mauls, peckingstones, polishing stones, polishing stone/hammerstones, single-bitted axes, and tchamahias (Table 6.33). More than 50 percent of axes, axes/mauls, peckingstones, and single-bitted axes were made of Morrison silicified sandstone. In this subsection, I summarize this assemblage.

Eleven axes were collected from Albert Porter Pueblo. Seven of these (63 percent) were made of Morrison silicified sandstone; one axe each (9 percent) was made of Morrison chert, Morrison mudstone, other igneous rock, and unknown silicified sandstone. Nineteen fragments of axes or mauls (axe/mauls) were also collected, and 74 percent were made of Morrison silicified sandstone. Fifty hammerstones of a variety of materials were recovered. Thirty percent of these were made of Morrison silicified sandstone, 16 percent were made of Dakota/Burro Canyon silicified sandstone, and 14 percent were fashioned of other igneous rock. As discussed in the chipped-stone subsection, hammerstones should be made of hard, coarse-grained stone; thus, Morrison silicified sandstone, Dakota/Burro Canyon silicified sandstone, and other igneous rock materials are well suited for battering other objects. Six mauls were collected, three of which were made of Morrison silicified sandstone, two of which were made of Dakota mudstone, and one of which was made of sandstone. A comparison of the raw materials used to make mauls and axes indicates that the residents used porous and fragile rocks (Dakota mudstone) more frequently for making mauls than for making axes.

As discussed in the previous chapter, 509 peckingstones were collected from Albert Porter Pueblo; the majority were made of Morrison silicified sandstone (54 percent), about 20 percent were made from Morrison mudstone, and about 12 percent were fashioned of Dakota/Burro Canyon silicified sandstone. Fifty-nine polishing stones were recovered; these were typically used for smoothing the surfaces of pottery vessels during manufacture. Quartz was the most commonly (about 13 percent) used raw material, about 10 percent were made of unknown chert or siltstone, and about 27 percent were of unknown stone. Ten polishing/hammerstones were collected from the site; at 40 percent, igneous materials were most common. This tool type is unusual relative to other battered/polished tools because polishing/hammerstones exhibit evidence of both rubbing and striking against other objects. Five single-bitted axes were identified, all of which were made of Morrison silicified sandstone. Lastly, 21 flat, elongated stone artifacts were identified as tchamahias. Although this type of tool might have been used for digging, planting, hoeing, or chopping, or any combination of these activities (Osborne 2004:200), some archaeologists (Brew 1946:241–242; Voth 1903:286) have argued that tchamahias were primarily ceremonial objects. Sixty-two percent of the tchamahias from Albert Porter Pueblo were made of Brushy Basin chert. The sources of Brushy Basin chert are mostly in the southwestern portion of the central Mesa Verde region, near the Four Corners National Monument.

The distribution of battered/polished stone tools is presented in Table 6.33, which shows the counts and percentages by count of battered/polished stone tools collected from each architectural block at Albert Porter Pueblo. The majority of battered/polished tools were recovered from Architectural Block 100, probably because of the intensive excavation of this portion of the site. In order to conduct comparative temporal and spatial distributions, ratios of ground-stone tools to weights of gray ware sherds were calculated. The results show that hammerstones were relatively more abundant in Architectural Block 100, whereas axe/mauls and peckingstones were relatively more abundant in Architectural Block 1000. In addition, relatively higher frequencies of axes, peckingstones, and tchamahias were recovered from Architectural Block 800. The spatial distribution of tchamahias in Architectural Block 800 may indicate that the villagers who used and occupied the area just south of the great house had a ceremonial role in the pueblo. Finally, polishing stones, polishing/hammerstones, and single-bitted axes were relatively more abundant in Architectural Block 800.

Table 6.34 summarizes the quantity of battered/polished items from Architectural Block 100 vs. all other blocks. Peckingstones and tchamahias were more frequently discovered in other blocks, whereas axes/mauls, hammerstones, and polishing stones were more abundant in Architectural Block 100. The abundance of battered/polished tools in Architectural Block 100 suggests that residents who occupied and used the great house, as well as nearby structures, actively participated in the manufacture and use of chipped-stone tools, ground-stone tools, or pottery technology, or some combination of these activities. Another possibility is that this trend could reflect construction activity. Table 6.35 summarizes the depositional context of each battered/polished stone tool.

Other Artifacts and Objects of Adornment

In this section, I focus on artifacts that are not discussed in other sections, including stone disks, other stone artifacts, gizzard stones, mineral samples, “other” artifacts, bone artifacts, historic artifacts, and objects of personal adornment (e.g., pendants and beads). Readers should refer to Crow Canyon’s laboratory manual (Ortman et al. 2007) for more specific information regarding the definitions and identifications these types of artifacts.

Stone Disks

Stone disks have been found covering the mouths of corrugated jars set into floors and other surfaces of Mug House in Mesa Verde National Park, and in proximity to corrugated jars (Rohn 1971:198). Thus, the stone disks collected from Albert Porter Pueblo might have been used as jar lids or other types of covers. Table 6.36 shows the count, weight, and context of the 24 stone disks collected from Albert Porter Pueblo. Most of these stone disks were collected from fill in "nonstructure" contexts. Thirteen stone disks were recovered from the intensive excavations in Architectural Block 100; the remainder was collected from other areas—one piece each from Architectural Blocks 200 and 300, three pieces from Architectural Block 400, and two pieces each from Architectural Blocks 800, 900, and 1100. The average weight of these artifacts is about 55 g.

Other Stone Artifacts

The category "other stone artifacts" includes many different artifacts that do not fit the definitions of any previously described type of stone artifact. These objects have been categorized as "other modified stone/mineral." Table 6.37 provides provenience and analytic data for each artifact in this category. Of 204 total items, 119 are fragmentary, 57 are complete, 15 are incomplete, and the conditions of the remaining 13 are recorded as "not applicable." The average weight of these artifacts is about 105 grams (the range is 0.1 to 2,938.0 grams). Most (194 of 204) of these objects were collected from fill contexts at the site. Many (87 of 204) were made of sandstone, 19 were fashioned of unknown stone, and 14 are of unknown chert or siltstone. By weight, sandstone and Dakota mudstone are the dominant types of raw materials. The intensive excavations in Architectural Block 100 yielded more than half of the artifacts in this category, but an additional one-third of these objects were collected from Architectural Block 1000. Every architectural block yielded at least one artifact in this category; this suggests that these artifacts were used throughout the pueblo.

Gizzard Stones

A total of 1,188 gizzard stones, weighing a total of 579.41 grams, was collected from Albert Porter Pueblo. No detailed study was conducted to identify the raw materials from which the gizzard stones were formed. The majority of these stones appear to derive from small chipped-stone artifacts and small, evenly worn pebbles without cement. Because gizzard stones are not normally passed by living birds until they are too small to identify as such, the common occurrence of gizzard stones indicates that turkeys were butchered at the settlement. In addition, the common occurrence of gizzard stones that derived from chipped-stone artifacts indicates that turkeys regularly foraged at the pueblo. Both patterns generally support the inference that domesticated turkeys were raised as a source of food at Albert Porter Pueblo (also see Chapter 10; Rawlings and Driver 2006; Speller et al. 2010). Unfortunately, it is difficult to use gizzard stones to estimate the size of turkey flocks because individual stones are small and mobile (Till 2007). The spatial distributions of gizzard stones found at Albert Porter Pueblo, as well as the ratio of the counts of gizzard stones to the weights of gray ware sherds were assessed. The data indicate that Architectural Block 300 contained the highest ratio of gizzard stones to gray ware sherds (0.0036); in contrast, Architectural Block 600 has the lowest ratio (0.0010). The range of ratios (from 0 to 0.003) suggests that some residents of Albert Porter Pueblo raised more turkeys, or butchered more turkeys, than others.

Contexts dating from three different time periods were assigned to gizzard stones to facilitate discussions of the construction of the great house and the deposition of artifacts through time: those pre-dating the great house (pre-A.D. 1060), those deposited during the initial use of the great house (A.D. 1060–1140), and those deposited during the final use of the great house (A.D. 1140–1280). The ratios indicate that more gizzard stones were associated with the final use of the great house, a result similar to results of previous studies (Driver 2000).

Mineral Samples

Excavations at Albert Porter Pueblo yielded 341 mineral samples weighing 3,244 g. Most abundant are conglomerate (40 percent by count, 51 percent by weight), sandstone (21 percent by count, 14 percent by weight), and unfired clay (12 percent by both count and weight), all of which were probably associated with the production of pottery. Several types of conglomerate and sandstone were used for temper; the unfired clay was probably also associated with the production of pottery vessels. Much of the unfired clay that was found was in the form of "green," or unfired, vessels. I investigated the spatial distribution of unfired clay found in seven architectural blocks (100, 200, 300, 600, 800, 900, and 1100). In decreasing order of abundance, the highest ratios of the count of unfired clay pieces to gray ware sherds was for Architectural Blocks 600, 800, and 900, which might indicate that relatively more pottery was produced in these blocks than in other blocks at the pueblo. However, it is important to note that unfired clay decays readily and could have been broken into many pieces. Therefore, associated inferences should be considered tentative.

Twenty six pigment samples were collected from the site. Hematite and azurite were presumably used as pigment for painting pottery vessels, pictographs, and kiva murals (Smith 1952). Various shades of red may be produced from hematite, whereas malachite can be a source for green pigment, and azurite for bright blue pigment. Although the source of hematite is local, further research is necessary to identify sources of malachite and azurite in the American Southwest.

Other Artifacts

The artifact assemblage from Albert Porter Pueblo includes eight basketry fragments, one textile fragment, four cylinder concretions, 16 effigies, and five gaming pieces (Table 6.38). The eight basketry items were all collected from the floor of Structure 136, a kiva that dates from the Pueblo III period and is located west of the great house in Architectural Block 100. Additionally, one charred textile fragment, possibly of a sandal, was collected from the fill of Structure 110, located in the northwestern portion of Architectural Block 100. These vegetal objects are described in further detail in Chapter 8.

Table 6.39 shows the counts, material types, and descriptions of effigy items, almost all fragmentary, collected from Albert Porter Pueblo. Eight effigy items were made of pottery or fired clay, seven effigy items were made of unfired clay, and one possible effigy or pendant blank was made of unidentified stone. Six effigy fragments were recorded as possible effigy legs.

All effigies and effigy fragments were collected from structure and midden fill; two or more effigies each were recovered from Architectural Blocks 100, 800, and 400. One item (Architectural Block 100, Study Unit 151, PD 1711, FS 20) was identified as an insect (possibly a dragonfly nymph) effigy on a mug handle. Additionally, one bird-head pottery effigy was recovered (Architectural Block 100, Study Unit 106, PD 1526, FS 7).

Five complete gaming pieces were collected from the site. Three are made of bone, one is made of Morrison chert or siltstone, and one is turquoise. The turquoise gaming piece is tubular, tapered at both ends, and was recovered from the fill of Structure 502.

Bone Artifacts

Species and element identifications for bone artifacts other than gaming pieces were made by Shaw Badenhorst (also see Chapter 10), following methods described by Driver (2000). Most of the bone artifacts are fragmentary, and many are unidentifiable. Seventy-five bone tubes were collected—45 were discovered in fill contexts in Architectural Block 100, one was collected from Architectural Block 200, one was collected from Architectural Block 400, two were recovered from Architectural Block 500, nine were recovered from Architectural Block 800, eight were recovered from Architectural Block 900, six were recovered from Architectural Block 1000, and three were recovered from Architectural Block 1100.

Table 6.40 summarizes bone objects by artifact type, count, and percentage by count. The most abundant worked-bone items are awls (about 40 percent) and items categorized as "other modified bone" (also about 40 percent). The "other modified bone" category contains primarily indeterminate bone artifacts. Although good preservation of organic materials is rare at this site, a deer antler was recovered from the fill of Structure 113, a masonry-lined kiva located in the north-central portion of Architectural Block 100.

Bone artifacts were more abundant in Architectural Block 100 than in the other blocks. In addition, it appears that residents of the settlement during the Pueblo III period manufactured and used relatively more bone artifacts than did residents during the Pueblo II period. Bone artifacts recovered from contexts dating from the Pueblo II period include seven artifacts categorized as "other modified bone," 10 awls, and seven tubes. The lower ratio of bone artifacts from the Pueblo II contexts suggests that these residents engaged in less hide processing, ornament manufacture, or both, than did residents during the Pueblo III period.

Historic Artifacts

The landscape surrounding Albert Porter Pueblo has been modified by agricultural activities since the tenth century. The recovery of numerous historic or modern artifacts reflects such use in recent times. Ten historic artifacts consisting of metal, ceramic, aluminum, leather, glass, or plastic were found at the site. Eight of the 10 historic artifacts were collected from nonstructural contexts, and, interestingly, six were collected from secondary refuse deposits. The discovery of historic items in secondary refuse suggests that recent looting activities churned these midden deposits.

Objects of Personal Adornment

A total of 118 items of personal adornment was collected from Albert Porter Pueblo. These items consist of beads, pendants, and rings. Among these objects, beads are most plentiful (63 count, 53 percent); however, many pendants (52 count, 44 percent) were also recovered. In the following paragraphs, the spatial and temporal distributions of these objects are examined to determine whether there is evidence of craft specialization or evidence for the accumulation of these items by residents of specific blocks within the settlement. Evidence of craft specialization could suggest social and economic stratification of the residents at Albert Porter Pueblo.

General Descriptions of Beads and Pendants

Table 6.41 presents data for beads recovered from Albert Porter Pueblo and shows that the average maximum diameter of beads is 0.4 cm, and the average maximum thickness is 0.15 cm. In addition, the average drill-hole diameter is 0.17 cm. Forty-seven (75 percent) beads are complete, 10 (16 percent) are incomplete, and four (6 percent) are fragmentary (condition of two beads [3 percent] was unrecorded). Forty-eight beads (about 76 percent) are disk shaped, nine (14 percent) are cylindrical, five (about 8 percent) are of other or unknown shape, and one bead (about 2 percent) is tear-drop shaped.

Fifty-two pendants were collected from Albert Porter Pueblo. The average length of pendants is 1.8 cm, the average width is 1.6 cm, and the average thickness is 0.7 cm; 22 pendants (about 42 percent) are fragmentary, 22 (about 42 percent) are complete, and eight (about 15 percent) are incomplete.

Spatial Distribution of Objects of Personal Adornment

Table 6.41 summarizes the distribution of 63 beads by study unit. Not surprisingly, about half of all beads were collected from Architectural Block 100, where the most intensive excavations took place. It is interesting to note that five beads made of unidentified quartzite and three of slate or shale were discovered in one midden deposit (PD 498). Additionally, four beads made of unidentified quartzite were collected from Architectural Block 1000, and two beads of unidentified stone were collected from Architectural Block 1100. This clustering of beads in specific proveniences suggests that beads were manufactured by craft specialists in the pueblo. Murphy (1997), for example, suggests that more than 100 beads tend to be deposited in areas where craft specialists produce such items. Only two beads were made from nonlocal jet; the majority of beads at Albert Porter were made of an unknown type of quartzite, unknown chert or siltstone, unknown silicified sandstone, or unknown stone. Thus, it is difficult to infer whether the beads were imported from other areas or if they were manufactured locally.

In total, 52 pendants were recovered from Albert Porter Pueblo. Thirty-two (about 61 percent) of pendants were discovered in Architectural Block 100, and six pendants were found in Architectural Block 800. All pendants were identified by raw-material type. These include nine pendants of unknown stone, five of unidentified chert or siltstone, eight of slate or shale, three of unknown siltstone or sandstone, one of Brushy Basin chert, four of Morrison materials, one of jet, one of turquoise, one of bone, three of sandstone, four of clay, one of pottery, one of quartz, one of red jasper, one of shell, three of Dakota/Burro Canyon silicified sandstone, and five of unknown material. If, at Albert Porter Pueblo, pendants were manufactured by craft specialists, one might expect pendants or evidence of pendant production to be clustered in specific areas. Although pendants were recovered from all architectural blocks with the exception of Architectural Blocks 700 and 1100, over 60 percent of pendants were recovered from Architectural Block 100, indicating that this area of the village was a possible location for pendant production.

Temporal Distribution of Objects of Personal Adornment

The data indicate that 19 beads were recovered from contexts dating to the Pueblo II period and 44 beads were recovered from contexts dating to the Pueblo III period.

Two of the three rings recovered from Albert Porter Pueblo were found in contexts that dated from the early Pueblo III period, and the other ring dated from the late Pueblo III period. The temporal distribution of beads suggests that they, like other forms of personal adornment, including pendants, bone tubes, and rings, were more commonly made during the Pueblo III period.

Trade

In this section, I focus on trade items acquired by the residents of Albert Porter Pueblo through inter-regional exchange during the Pueblo I through Pueblo III periods. Previous studies of long-distance exchange in the northern Southwest have typically found that such exchange was relatively frequent during the Chaco period (A.D. 1050–1150) and then declined after A.D. 1150 (Arakawa and Duff 2002; Arakawa et al. 2011; Lipe 2002, 2006; Neily 1983). The increased frequency of long-distance exchange was associated with the development of the cultural, political, and religious center in Chaco Canyon, New Mexico, between A.D. 900 and 1150. The Chaco regional system reached its height about A.D. 1050–1150, and its influence was felt throughout the northern Southwest (Cameron and Duff 2008; Lekson 2006; Lipe 2006).

Chaco influence dates from about A.D. 1080 in the northern San Juan region (Cameron and Duff 2008; Cordell 1997:324; Lekson 2006). During this period, exchange between residents of Chaco Canyon, the Chuska Mountains, and the central Mesa Verde region increased (Arakawa and Duff 2002; Lipe 1995, 2006; Neily 1983), and many Chaco-style great houses and great kivas were constructed.

Research conducted on the Village Ecodynamics Project (VEP)[3] study area indicates that population levels were low during the tenth and early eleventh centuries A.D. until A.D. 1060–1100 when the first Chaco-style great houses appeared (Varien et al. 2007). The population increase at this time might have been a result of emigration from the southern San Juan Basin that coincided with the expansion of the Chaco regional system (Cordell 1997). During this period, Salmon and Aztec Ruins also became important central places in the middle San Juan region (Lekson 1999; P. Reed 2008). These were by far the largest great houses outside of Chaco Canyon (Lekson 1999; Lipe 2006; Lipe and Varien 1999a:258; P. Reed 2008) and might have facilitated migration into the central Mesa Verde region during the late A.D. 1000s and early A.D. 1100s (Lekson 1999).

About A.D. 1140, the regional system centered on Chaco Canyon appears to have shifted (Cameron and Duff 2008; LeBlanc 1999:183–186; Lekson 2006; Wilcox and Haas 1994), when Chaco-style political organization might have moved north to Aztec Ruins (Lekson 1999; P. Reed 2008). During the post-Chaco period (A.D. 1140–1280), population levels continued to increase in the northern San Juan region as communities like Albert Porter Pueblo expanded around earlier, Chaco-period great houses. In the mid-A.D. 1100s, these demographic trends shifted as new villages were constructed in alcoves, as exemplified by Cliff Palace in Mesa Verde National Park, and in canyon-rim settings, as exemplified by Sand Canyon Pueblo (Kuckelman 2007). Previous studies have noted that evidence of long-distance exchange is much sparser in these cliff dwellings and canyon-rim villages than in earlier, Chaco-period great house communities (Lipe 1995; Lipe and Varien 1999b). What is not clear is whether the decrease in trading activity coincided with the decline of Chaco Canyon, or whether it is associated with the settlement changes during the late A.D. 1200s. Albert Porter Pueblo provides an opportunity to investigate this question, because it was occupied continuously from the A.D. 900s until the mid-A.D. 1200s.

To reconstruct the frequency of trade, interaction, and exchange between residents of Albert Porter Pueblo and people in other areas, such as the Chuska Mountains and Chaco Canyon, I focus on four major artifact categories: nonlocal pottery, nonlocal lithic raw materials, ornaments, and shell. Drawing on results of earlier studies, I begin with the working hypothesis that exotic materials are relatively more abundant in subassemblages dating from the Pueblo II period than from the Pueblo III period. In addition, because the majority of the residents of Albert Porter Pueblo probably moved to Woods Canyon Pueblo during the mid-A.D. 1200s (Lipe and Ortman 2000; Lipe and Varien 1999b; Ryan 2008), I compare the nonlocal materials from Albert Porter Pueblo with those from Woods Canyon Pueblo to assess changes in inter-regional exchange during the late Pueblo III period.

Pottery

In the pottery assemblage from Albert Porter Pueblo, 642 sherds were identified as nonlocal (Table 6.42). These include Abajo Red-on-orange, Bluff Black-on-red, Deadmans Black-on-red, and less specific types: Indeterminate Local Painted and Unpainted Red, Other Nonlocal Gray, Other Nonlocal White, Other Nonlocal Red, and Polychrome. Although the term "local" appears in the type name, the types "Indeterminate Local Red Unpainted" and "Indeterminate Local Red Painted" are considered nonlocal here, because these types refer to varieties of San Juan Red ware that were produced in southeastern Utah as opposed to the area in proximity to Albert Porter Pueblo.

Of the total nonlocal pottery sherds, 170 were classified as Deadmans Black-on-red. This type of pottery was produced between A.D. 900 and 1100 and was probably traded from southeastern Utah, where it and other varieties of San Juan Red Ware were produced (Hegmon et al. 1997). In addition, 173 nonlocal sherds were identified as "Indeterminate Local Red Painted." The sherds of San Juan Red Ware also probably originated from southeastern Utah. The incidence of San

Juan Red Ware at Albert Porter Pueblo indicates that residents interacted with people who lived in southeastern Utah.

A relatively high percentage (11 percent by count and 19 percent by weight) of the pottery assemblage from Albert Porter Pueblo consists of "Other White Nonlocal" sherds. The Crow Canyon laboratory staff recorded the nonlocal ware and type, if known, during pottery analysis. The resulting data suggest that several sherds contained nonlocal, extrusive temper materials such as biotite, mica, and trachyte. In addition, more-detailed analysis indicates that some of the nonlocal sherds could be identified as specific pottery types. For example, four nonlocal sherds were identified as Chaco Black-on-white, two sherds as Chuska Black-on-white, one sherd as Flagstaff Black-on-white, and one sherd as Gallup Black-on-white. Additional petrographic and chemical analysis is needed to understand trading behavior associated with Other White Nonlocal items.

The temporal distribution of nonlocal sherds at Albert Porter Pueblo was investigated. Three different time periods were assigned to facilitate discussions of the construction of great house and deposition of artifacts through time: deposits that predate construction of the great house (pre-A.D. 1060), deposits dating from the initial use of the great house (A.D. 1060–1140), and deposits dating from the final use of the great house (A.D. 1140–1280). Table 6.43 presents the counts, weights, and ratios of nonlocal sherds for these time periods and comparable data for Pueblo II vs. Pueblo III contexts. Nonlocal sherds are more common in the deposits associated with the great house; however, the ratios are about the same as for the Pueblo II and Pueblo III periods.

Next, I will compare the ratios for the counts of red ware sherds to the weights of gray ware sherds for Architectural Block 100 vs. Architectural Blocks 200-1100. Most of the sherds of San Juan Red Ware—Abajo Red-on-orange, Deadmans Black-on-red, Indeterminate Local Unpainted Red, and Indeterminate Local Painted Red —were collected from Architectural Block 100. However, the ratios for Other White Nonlocal, Other Gray Nonlocal, and Other Red Nonlocal sherds indicate that these types were relatively more abundant in blocks other than Block 100. Overall, these results suggest that relatively more sherds of nonlocal pottery from areas other than southeastern Utah were deposited in Architectural Block 100.

The contexts of nonlocal pottery found at Albert Porter Pueblo are also important. A complete Chaco-McElmo Black-on-white pitcher was associated with a burial in Architectural Block 900, and a Tusayan polychrome bowl was collected from Structure 136 within Architectural Block 100.

Chipped-Stone Artifacts

Only eight of the 130 bifaces and seven of the 222 projectile points found at the site were made of nonlocal materials. One biface manufactured from Narbona Pass chert was collected from Architectural Block 100; the other seven bifaces were collected from Architecture 900. X-ray fluorescence (XRF) analysis was conducted to discover the sources of the obsidian used to produce the four obsidian projectile points and one of the obsidian bifaces (Table 6.44). Three of these projectile points were recovered from Architectural Block 100, and the fourth was recovered from Block 900. The results of this analysis indicate that three of the projectile points were made of obsidian from the El Rechuelos source in the northeastern part of the Jemez Mountains, and the other projectile point and the biface were made of obsidian from Mount Taylor in west-central New Mexico (Arakawa et al. 2011). Although the sourced items from Albert Porter Pueblo probably post-date A.D. 900, procurement patterns appear to reflect earlier (A.D. 600–920) patterns of obsidian procurement in which obsidian from all major sources was brought into the central Mesa Verde region, and most of the Jemez obsidian originated from the El Rechuelos source, which is nearest geographically to the central Mesa Verde region (Arakawa et al. 2011).

A total of 27 pieces of nonlocal debitage were collected from Albert Porter Pueblo. These include seven pieces of "Nonlocal Chert/Siltstone" for which specific source areas are unspecified, three pieces of obsidian, and 17 pieces of Narbona Pass chert. The nonlocal chert/siltstone debitage was collected from Architectural Block 100. Additionally, two of the three pieces of obsidian were collected from Architectural Block 100. Interestingly, two of the obsidian pieces derive from Mount Taylor, and the third derives from the Valle Grande source in the center of the Jemez Mountains. The relatively high frequency of Mount Taylor obsidian at Albert Porter Pueblo contrasts with the general pattern of obsidian procurement suggested by XRF analyses of obsidian from other sites in the central Mesa Verde region (Arakawa et al. 2011). Several possible scenarios might account for this difference. First, the obsidian-sourcing data for Albert Porter Pueblo may be skewed by the small size of the sample. Second, the obsidian from this site might date primarily from the Pueblo II period, during which time exchange with the San Juan Basin (including the Mount Taylor area) was relatively frequent. Third, the inhabitants of Albert Porter Pueblo might have maintained long-distance exchange relationships with the southern San Juan Basin during the Pueblo III period despite an overall shift in obsidian procurement southeast toward the Jemez Mountains.

Excavations at Albert Porter Pueblo yielded 17 pieces (55.5 g total weight) of Narbona Pass chert. Of these, eight pieces were recovered in the eastern portion of Architectural Block 100, two were recovered from the southern portion of Block 100, one was found in the central portion of Block 100, and five were found in blocks other than Block 100. Debitage of Narbona Pass chert was distributed across the village, which suggests that the residents of Albert Porter Pueblo had equal access to nonlocal lithic resources.

Narbona Pass chert is extremely rare in artifact assemblages from the central Mesa Verde region. For example, at a sample of sites excavated by Crow Canyon, the total amount of debitage of this material (Table 6.45) consists of one piece from the Hedley Site complex (Site 42SA22760), two pieces from the Harlan Great Kiva site (Site 5MT16805), eight pieces from Shields Pueblo (Site 5MT3807), and 13 pieces from Yellow Jacket Pueblo (Site 5MT5).

One reason Narbona Pass chert is important in the assessment of long-distance exchange is that the only known quarry of this material is located in the Chuska Mountains in northeastern New Mexico, approximately 90 miles south of Albert Porter Pueblo. Stone from this quarry is different from other cryptocrystalline materials in its purity and distinctive pinkish-orange color. From about A.D. 1050 to 1140, when the Chaco regional system was at its peak, many goods and resources—including Narbona Pass chert—were imported from the Chuska Mountains not only to Chaco Canyon itself, but also to great-house settlements throughout the regional system. Thus, the presence of this material at Albert Porter Pueblo suggests that residents of this village were active participants in the Chaco regional system.

Ornaments

Ten ornaments made of nonlocal materials were collected from Albert Porter Pueblo: (1) two beads made of jet and one bead made of nonlocal chert/siltstone, (2) one turquoise gaming piece, (3) one jet ornament classified as "other modified stone/mineral," (4) one pendant made of jet and one made of turquoise, and (5) one copper fragment. The turquoise probably derives from the Cerrillos source in New Mexico, located more than 200 miles southeast of Albert Porter Pueblo. Although the source areas of jet are as yet unknown, we do know that this material is not available locally—the nearest possible source is more than 20 miles from the site. The best assessment of the copper fragment is that the object originated from a copper ornament manufactured in Mexico (Copeland et al. 2011).

Few ornaments of nonlocal material were found at Albert Porter Pueblo. The importation of these items can be accounted for in two possible ways. First, these items or the raw materials might have been carried directly from the source areas to Albert Porter Pueblo by residents of that settlement. Alternatively, these objects might have been procured through down-the-line exchange in which the items were carried and exchanged by multiple individuals before reaching Albert Porter Pueblo. Additional research on long-distance exchange is necessary to differentiate between these two procurement patterns and to understand the nature of the interactions between residents, such as those at Albert Porter Pueblo, and the individuals who managed source areas.

Lastly, two shell items were collected from Albert Porter Pueblo. One shell fragment was found in the eastern portion of Architectural Block 100, and the other was recovered in Block 300. The shell recovered from Structure 109 was identified as olivella and was probably procured near the Pacific Ocean or the Gulf of Mexico. This shell might have been obtained by either a direct or indirect (down-the-line) exchange.

Comparison with Woods Canyon Pueblo

Because nonlocal objects are relatively rare, and most of the artifact assemblage from Albert Porter Pueblo derives from deposits dating from multiple time periods, it is not possible to examine long-distance exchange practices through time using solely this assemblage. However, it is possible to examine change in procurement behavior through time by comparing nonlocal materials from Albert Porter Pueblo with those from Woods Canyon Pueblo. The latter site is located about 1.5 km southwest of Albert Porter Pueblo. Previous researchers (e.g., Lipe and Ortman 2000) have argued that, during the middle A.D. 1200s, Woods Canyon Pueblo replaced Albert Porter Pueblo as the community center of the Woods Canyon community. Because the assemblage from Albert Porter Pueblo represents primarily activities dating between A.D. 1050 and 1225, whereas the assemblage from Woods Canyon Pueblo represents primarily activities dating between A.D. 1225 and 1280, it may be possible to reconstruct temporal trends in long-distance exchange by comparing the assemblages from these two sites. To do this, a simple equation (Equation 1) that summarizes overall levels of long-distance exchange was created.

In this equation, the total quantity of sherds classified as "bulk sherds, large" is divided by the quantity of nonlocal sherds; the total quantity of projectile points is divided by the quantity of nonlocal points; the total quantity of tools made of "other modified stone" is divided by the quantity of nonlocal objects made of "other modified stone"; the total quantity of pendants is divided by the quantity of nonlocal pendants; these ratios are then summed and divided by the total weight of gray ware sherds collected from that site. The lower the resulting number, the higher the incidence of trade goods. It is important to note that this treats the entire assemblage as a random sample of the total quantity of artifacts deposited at a site.

Equation 1:

$$\text{Level of trade} = \frac{\text{BSL/nonlocal BSL} + \text{pop/nonlocal pop} + \text{oms/nonlocal oms} + \text{pen/nonlocal pen}}{\text{Total weight of grayware sherds (BSL)}}$$

Note: BSL – bulk sherds, large; pop – projectile point; oms – other modified stone; pen – pendant

The results indicate that residents of Albert Porter Pueblo participated in relatively more (0.00063) long-distance exchange than did residents of Woods Canyon Pueblo (0.00533)[4]. The results also suggest that the reduction in long-distance exchange during the Pueblo III period occurred primarily during the late portion of that period. Also, because the resident population of Albert Porter Pueblo peaked during the late A.D. 1100s and early 1200s, and most of the material recovered from the excavations dates from this period, the relatively high levels of long-distance exchange reflected in the overall artifact assemblage suggest that trade relationships did not atrophy immediately following the collapse of the Chaco regional system, but instead continued into the early decades of the A.D. 1200s. Additional research is needed to determine if this trend was true for other community centers in the central Mesa Verde region.

Conclusions

In this section, I summarize the major findings of various analyses performed on the artifact assemblage from Albert Porter Pueblo from an intrasite perspective as well as in the context of the broader region. I begin with an evaluation of activities that occurred within Architectural Block 100 vs. those that occurred in other blocks, as well as activities that occurred during the Pueblo II vs. the Pueblo III period. Then I summarize evidence for inter-regional interaction between A.D. 900 and 1300. Finally, I conclude this section with an evaluation of social inequality at Albert Porter Pueblo and examine evidence for feasting and social differentiation.

I briefly summarize each artifact type, beginning with a discussion of pottery sherds, followed by a discussion of chipped-stone tools, and then ground-stone tools. Material from Architectural Block 100 is compared to material from Architectural Blocks 200–1100. To better understand the temporal distributions of each artifact type, I also compare material from contexts that date from the Pueblo II period (A.D. 900–1140) with material from contexts dating from the Pueblo III period (A.D. 1140–1280). In addition, to better understand the use of the great house through time, material from sealed contexts beneath great house was analyzed; I infer that this material is representative of activities that predate the construction of the great house, and that material from the interior of the great house is representative of activities associated with the use of the great house.

Activities in Architectural Block 100 vs. Other Blocks

In this subsection, I use pottery data to summarize evidence of activities at Albert Porter Pueblo. In the pottery section of this chapter, I emphasized that most of the pottery assemblage from this site derives from mixed contexts that cannot be dated more precisely than A.D. 900–1280. In the overall assemblage, about 50 percent of the sherds were identified as deriving from corrugated jars, and sherds from white ware jars and bowls each constitute about 20 percent of the total. The relatively high percentage by count and weight of Mancos and McElmo Black-on-white pottery indicates that the densest occupation of Albert Porter Pueblo dates from the late Pueblo II to the early Pueblo III periods (A.D. 1050–1225). Another important pattern is that sherds with carbon paint and those with mineral paint occur about equally in white wares by count and weight. This result is consistent with previous studies (Breternitz et al. 1974), which have found a general, southeast-to-northwest gradient in the use of carbon paint in sites dating from the late Pueblo II and Pueblo III periods in the central Mesa Verde region.

To better understand the daily activities of residents in Architectural Block 100, the artifact assemblage from this block was compared with artifacts collected from Architectural Blocks 200–1100. The typological profiles of these two subassemblages suggest that residents of all architectural blocks engaged in similar activities. Specifically, the percentages by count and weight of types of pottery that are characteristic of the Pueblo II and Pueblo III periods suggest that there was no significant difference in the activities in which the residents of these two areas engaged. Among trade wares, San Juan Red Ware was more abundant in other blocks than in Architectural Block 100, whereas other nonlocal wares were more abundant in Architectural Block 100. The relative greater abundance of San Juan Red Ware in Architectural Blocks 200–1100 suggests that the settlement was occupied during the Pueblo I period, and that most of the excavation units were located in middens from which sherds dating from this period were more likely to be recovered. However, the greater relative abundance of other nonlocal wares within Architectural Block 100 suggests that the residents of that block enjoyed social networks that were more spatially extensive or had easier access to resources than did other community members. The standardized error test indicates that the sample size from each architectural block was comparable for this analysis.

In the section on chipped-stone artifacts, I compared the frequencies of six types of chipped-stone tools—projectile points, bifaces, drills, cores, peckingstones, and debitage—collected from Architectural Block 100 vs. those from Architectural Blocks 200–1100. The result suggests that residents of Architectural Block 100 used and discarded a greater quantity of projectile points and bifaces than did other residents of the village. The ratios of drills, cores, peckingstones, and debitage are approximately the same for all architectural blocks at the site, which suggests that fewer formal chipped-stone tools were produced, used, and discarded in Architectural Block 100 than in other blocks in the settlement. In addition, the presence of peckingstones and debitage in all architectural blocks at Albert Porter Pueblo suggests that seeds and nuts were ground into meal, or that pecked-block masonry was produced throughout the pueblo.

In the section on ground-stone tools, I found that about one-half of the ground-stone artifacts—abraders, metates, one-hand manos, slab metates, stone mortars, and two-hand manos—were collected from Architectural Blocks 200–1100, and that ground-stone tools were relatively sparse in Block 100. This suggests that, in Block 100, food-processing tasks occurred less frequently, relative to other activities. These patterns suggest that the activities that occurred in Block 100 were different from the activities that occurred elsewhere in the pueblo. More activities in Block 100 were associated with construction and the production of formal chipped-stone tools, and fewer were associated with food preparation.

Temporal Comparisons

To examine the activities that occurred in Architectural Block 100 through time, I compared artifact assemblages from three temporal contexts: (1) those pre-dating the great house (pre-A.D. 1060), (2) those associated with the initial use of the great house (A.D. 1060–1140), and (3) those deposited during the final use of the great house (A.D. 1140–1280). The ratios of tool counts to the weights of gray ware sherds indicate that projectile points, bifaces, cores, and nonlocal tools were relatively more abundant before the great house was constructed, although the ratios of these tools were very small. Peckingstones were relatively more abundant in deposits dating from the initial use of the great house, and debitage was relatively more abundant in contexts dating from the final use of the great house. Overall, although many chipped-stone tools were recovered from deposits that predated great house construction, the differences in the ratios were small.

Trade at Albert Porter Pueblo

One of the major goals of the excavations at Albert Porter Pueblo was to better understand the extent of trade, interaction, and exchange between residents of this settlement and the inhabitants of other regions and to examine change through time in long-distance exchange behaviors. I expected that nonlocal materials would be relatively more abundant in the subassemblage dating from the Pueblo II period than that dating from the Pueblo III period, and that residents of Albert Porter Pueblo obtained more nonlocal items from the southern San Juan region than from elsewhere. To evaluate these hypotheses for Albert Porter Pueblo, I investigated three types of artifacts—nonlocal pottery, nonlocal lithic materials, and ornaments of nonlocal materials.

The assemblage of nonlocal-pottery items indicates that residents of Albert Porter Pueblo obtained a significant quantity of San Juan Red Ware vessels from producers in southeastern Utah. In addition, sherds from these vessels were relatively most abundant in Blocks 200–1100. This pattern may reflect differences in sampling strategies of different architectural blocks, as well as differences in the relative intensity of occupation during various periods in Architectural Block 100 vs. other blocks.

Nineteen pottery sherds containing nonlocal tempers were analyzed by petrographic analysis and neutron activation analysis (INAA). The results of petrographic analysis indicated that these sherds contained two distinct tempers: a sanidine-rich temper that is traceable to dikes and diatremes in the Navajo Volcanic Field of the Four Corners area and an intrusive igneous rock-rich temper of unknown provenance that might have derived from the middle San Juan region

(L. Reed 2011). Improving our understanding of the source areas of these tempers is an important topic for future research.

INAA identified the clay and temper sources that were used in the manufacture of the vessels from which the sampled sherds derived. The INAA data for Albert Porter Pueblo were compared to the pottery database for the Archaeometry Laboratory Research Reactor Center at the University of Missouri (MURR). Four source areas were recognized—Mesa Verde proper, the McElmo-Monument area, the middle San Juan region, and the southern San Juan region. These results indicate that residents of Albert Porter Pueblo engaged in interactions with residents of these areas. Because the analyzed samples included some sherds collected through judgmental selection and others that were collected through random selection, we could not determine the level of interaction of the Porter residents with the inhabitants of the southern and middle San Juan regions through time. The answer to this question is important because the southern San Juan region, particularly the Chuska Mountains, was an important source area for timber, pottery temper, lithic raw material, and maize during the height of the Pueblo occupation of Chaco Canyon (Lekson 2006). Thus, defining long-distance exchange relationships between these two areas is crucial for determining the extent to which inhabitants of Albert Porter Pueblo participated in the Chaco regional system.

Additionally, the participation of Albert Porter Pueblo in well-developed trade networks is supported by the presence of obsidian, jet, turquoise, copper, and shell. Three projectile points, as well as debitage, of obsidian from Mount Taylor in northwestern New Mexico were collected from Architectural Block 100. This suggests that residents of Albert Porter Pueblo either interacted with residents of the Mount Taylor area or obtained these obsidian materials by down-the-line trading. A few nonlocal ornaments made of turquoise, jet, or copper were also collected from the site. The fragment of pure copper, which appears to be from an object produced in Mexico, was discovered in Architectural Block 1000. Finally, two olivella shells were discovered at the site, indicating that residents of Albert Porter Pueblo maintained long-distance contacts with the Pacific Ocean or the Gulf of Mexico. In sum, residents of Albert Porter Pueblo participated in trade networks that connected people in the central Mesa Verde region with those in southeastern Utah, the middle and southern San Juan regions, and the Northern Rio Grande, as well as either the Pacific Ocean or the Gulf of Mexico, or both.

Additionally, data indicate that nonlocal items are relatively more abundant in Architectural Block 100 than in other blocks, which suggests that the residents of Block 100 accumulated more nonlocal items than did the occupants of other architectural blocks in the settlement. The implications for evidence of social stratification in the Woods Canyon community are discussed below.

To examine changes in the quantity of long-distance exchange through time, a measure of the abundance of nonlocal items was created and applied to the assemblages for Albert Porter and Woods Canyon pueblos. The occupations of these two villages overlap temporally, although the major occupation of Albert Porter Pueblo dated between A.D. 1060 and 1225, and the major occupation of Woods Canyon Pueblo dated from A.D. 1225 to 1280. The results of this comparison suggest that residents of Albert Porter Pueblo participated in more long-distance exchange than did the residents of Woods Canyon Pueblo, and indicate that the frequency of long-distance exchange remained high at Albert Porter Pueblo even after the collapse of the Chaco regional system. As seen in the data for Wood Canyon Pueblo, this pattern declines during the final decades of the ancestral Pueblo occupation of the Mesa Verde region.

Evidence of Social Differentiation

Researchers interested in the dynamics of social power in ancestral Pueblo societies have focused on mechanisms through which social power is either consolidated or distributed (Bernardini 1996; Blanton et al. 1996; Johnson 1989; Schwartz and Nichols 2006). Feinman (2000:214) notes that corporate organizational strategies characterize more egalitarian systems, in which wealth is broadly distributed and power arrangements are shared, with power embedded in the group. In contrast, network organizational strategies characterize more hierarchical systems, in which wealth is concentrated, individuals attain positions of power, and social differentiation—as reflected in ostentatious material culture—is valued (Feinman 2000). Network strategies commonly emerge when aggrandizing individuals develop strong affiliations and interactions with other ethnic groups and control access to precious trade goods.

In the central Mesa Verde region, population increased and aggregated communities developed in the late A.D. 1000s, and both trends intensified into the A.D. 1200s. Previous research has suggested that incipient social hierarchy developed in the central Mesa Verde region during this period (see Lipe 2002:227–230, 2010). For example, several researchers have argued that powerful political and religious leaders were present and that they lived in special houses—including the D-shaped structure and the kiva suites in Block 100 at Sand Canyon Pueblo—just before the depopulation of the Mesa Verde region (Huber 1993; Lipe 2002:223–224; Lipe and Varien 1999b; Ortman and Bradley 2002:54–62). An important issue raised by these arguments is whether specific individuals at Albert Porter Pueblo, following network strategies, accumulated social, economic, and political power. I address this question by investigating evidence of feasting, craft specialization, and the accumulation of precious goods by the residents of Albert Porter Pueblo.

To identify possible evidence of feasting, the spatial distribution of the rims of serving bowls and the size, shape, and decorative treatments of white ware bowls were investigated. The ratios of the counts of bowl-rim sherds to the weights of gray ware sherds indicate that residents of Architectural Block 100 used serving bowls, or at least deposited more sherds of serving bowls, relative to the sherds of cooking vessels, than did the residents of other blocks in the village. Additionally, the relative abundance of the sherds of bowl rims by count and weight in contexts that date from the Pueblo II vs. the Pueblo III periods was investigated. When examined by count, there is no difference in the relative abundance of sherds of bowl rims from Pueblo II vs. Pueblo III contexts; however, when tabulated by weight, sherds of bowl rims are twice as abundant in contexts dating from the Pueblo III period. These patterns suggest that residents of the village used larger, thicker, and heavier serving bowls during the Pueblo III period. Because most of the artifacts that date from the Pueblo III period were recovered from Architectural Block 100, these patterns suggest that feasting activities occurred in that block.

To further investigate this possibility, data for the arcs of vessel rims were examined. Previous research suggests that active participation in feasting, as the host or the provider, is one way that aggrandizing individuals accumulate social and political power (Potter 1997). Communal feasting has been inferred in previous studies of artifacts from late Pueblo III canyon-rim villages on the basis of the common occurrence of painted designs on the exteriors of serving bowls and on the basis of a bimodal distribution of bowl size as revealed by rim-arc data and measurements of diameters of complete vessels (Mills 2007; Ortman 2000, 2002, 2003; Robinson 2005; Till and Ortman 2007). These studies have interpreted the presence of designs on bowl exteriors as a reflection of the public presentation of food, and the bimodal size distribution as a reflection of using vessels for individual servings versus serving large batches of food. Both patterns might reflect feasting.

The results suggest that feasting was not as prevalent at Albert Porter Pueblo as it was at Woods Canyon Pueblo and at other late Pueblo III canyon-rim villages. Specifically, the distribution of the diameters of serving bowls as indicated by rim-arc data does not suggest a bimodal size distribution in the Albert Porter assemblage but instead presents a single mode that is intermediate between the large (24–32 cm) and small (16–20 cm) modes observed in late Pueblo III assemblages. Also, exterior designs are rare (35 of 1,989 sherds of painted white ware bowl rims) in the assemblage from Albert Porter Pueblo even among rims classified as Mesa Verde Black-on-white, a late Pueblo III type. This study of exterior designs on bowl-rim sherds suggests that feasting was not a common activity in community centers of the central Mesa Verde region until the final decades of ancestral Pueblo occupation. However, it is important to note that, because most bowl sherds with exterior designs date later than A.D. 1250 (Robinson 2005), we should not expect many such sherds at Albert Porter Pueblo, because only a few households were present in that settlement during that time. Thus, we should be cautious when interpreting the possibility of feasting at Albert Porter Pueblo on the basis of the diameters of serving bowls and the presence of exterior designs on sherds from the rims of white ware bowls.

When craft specialization is apparent in the archaeological record, it is reasonable to infer the existence of different social and economic status among residents of a settlement that result from the development of balanced reciprocity associated with economic exchange of craft products (Brumfiel 1987; Costin 1991; Sahlins 1968). To examine the possibility that craft specialization existed in the Woods Canyon community, I calculated the density of objects of personal adornment for each architectural block at Albert Porter Pueblo. In terms of absolute counts, most items of personal adornment were collected from Architectural Block 100; however, the incidence of these objects in all architectural blocks is relatively low. Thus, it appears unlikely that any residents of Albert Porter Pueblo were full-time or part-time specialists in the production of beads, pendants, or other objects of personal adornment (see Murphy 1997).

To address the possibility of the specialized production of other types of artifacts, evidence of the production of pottery vessels, chipped-stone tools, and ground-stone tools was examined. A variety of materials—mineral samples, other pottery artifacts, unfired sherds, and polishing stones—might be related to pottery production. However, none of these types of artifacts was especially prevalent in any particular architectural block, and this suggests that pottery production was not localized in specific households, but that pottery was produced throughout the settlement.

The flake-size distribution of Dakota/Burro Canyon silicified sandstone also argues against intensive production of projectile points at Albert Porter Pueblo, because the distribution does not exhibit the expected pattern—that is, a negative exponential slope (Patterson 1990)—for an assemblage produced primarily through bifacial reduction, even though the majority of projectile points in the site assemblage was made of this material. Thus, it appears that many of the projectile points in the Albert Porter Pueblo assemblage were manufactured elsewhere, perhaps in agricultural fields or at quarries.

Lastly, the spatial distribution of ground-stone tools indicates that these tools were also distributed evenly across the site. In short, although there is evidence of craft specialization elsewhere during this time period, the artifact data for Albert Porter Pueblo do not indicate that part-time or full-time craft specialization was practiced in the Woods Canyon community. However, the temporal mixing of artifacts might be masking such evidence.

Discussions and Future Research

In addition to providing dating estimates for various contexts, the artifact assemblage from Albert Porter Pueblo provides insights into several important topics—interaction and trade during the Pueblo II and Pueblo III periods, the changing role of great houses in community organization, the development of craft specialization, and the emergence of social inequality. Although this chapter has provided significant information about the Woods Canyon community, additional topics—such as migration, gender, social inequality, and trade—remain to be explored. Investigating these topics on three different scales—the great house, community, and regional levels—are especially key.

Future Great-House Research

The great house at Albert Porter Pueblo was built on a deposit containing artifacts dating from the middle portion of the Pueblo II period; thus, the great house was constructed within an existing settlement. The great house was expanded over time, and the artifacts from few contexts within the great house can confidently be dated to the initial period of use during the Pueblo II period. As a result, the artifact assemblage from the site informs us primarily about the manner of the later use of the great house, which occurred during the Pueblo III period. The data suggest that during this period, the great house was a residence for several kin-based household groups (Ryan 2008). The mix of daily activities performed by these residents does appear to have differed somewhat from that performed in other houses within the settlement, but the differences are quantitative rather than qualitative. Thus, the inhabitants of the great house might have been relatively prestigious and influential within the community, but there is no evidence that they were of a separate social class than the remainder of the community.

The artifact assemblage from this site does not contain abundant evidence of Chaco influence. However, it does contain rare objects of turquoise and copper that might have come to the settlement through Chaco Canyon, and the incidence of nonlocal items is greater at Albert Porter Pueblo than at other late Pueblo III sites in the Mesa Verde region. The findings reported here suggest that an important topic for future research would be to clarify whether the people who constructed great houses in the central Mesa Verde region were immigrants who were already part of the Chaco regional system, local people wishing to emulate Chaco architecture, local people wishing to participate in the system, or some combination of these possible scenarios. Another important issue is determining whether great houses were initially designed as residences, ceremonial structures, council chambers, or some combination of these structure types. The long use-life of, and resulting complexity of deposits within, the great house at Albert Porter Pueblo complicates inferences regarding these issues.

Another topic that deserves further exploration is social inequality. Artifact data from Albert Porter Pueblo suggest that aspiring elites did not accumulate social, political, and economic power. This pattern contrasts with the architectural signature, which suggests that the great house, a large and relatively ostentatious building, was at least in part residential, and was probably the residence of influential or prestigious individuals. This disjunction between architectural and artifactual evidence raises the issue of what role great houses played in communities in the central Mesa Verde region, and how much social differentiation existed in these communities.

Future Community and Regional Research

In a community-level study, it is important to explore the gendered use of activity spaces using pottery, chipped-stone, and ground-stone data. The results of chipped-stone analysis revealed that bifacial reduction activities did not occur frequently within Albert Porter Pueblo. A strong cross-cultural pattern identifies men as the primary manufacturers and users of projectile points. If this was the case at Albert Porter Pueblo, projectile-point and biface manufacture might have been performed by men when they were away from the village. In contrast, women's economic roles, such as food preparation, were performed within the settlement as reflected in the abundance of cooking pottery, ground-stone tools, peckingstones, and debitage from peckingstone manufacture found at the site. These patterns suggest that future research on the gendered division of labor should operate at the landscape level as opposed to the intrasite level.

Additionally, researchers should further explore the topic of trade in the central Mesa Verde region. The petrographic and neutron activation analyses reported here indicate that some pottery sherds recovered from Albert Porter Pueblo were from vessels made in the southern and middle San Juan regions of New Mexico. However, recent research in the Navajo Volcanic Field has revealed that there may be sources of trachyte or sanidine-rich tempers in southwest Colorado. Thus, to better understand ancestral Pueblo exchange networks during the Pueblo II period, we must increase the quantity of both geological and archaeological samples from relevant sites.

Arakawa and Gonzales (2010) are working on geological surveys in the Navajo Volcanic Field and developing comparative data for petrographic and microprobe analyses of archaeological samples. Thus, in the future, we hope to be able to determine where pottery vessels containing trachyte or sanidine-rich tempers were produced. It is also important to improve our ability to identify vessels produced in the middle San Juan region so that we can address the extent to which the residents of Aztec Ruins influenced society in the central Mesa Verde region during the Pueblo III period. The petrographic and INAA studies reported here indicate that analysts can reliably identify vessels produced in the middle San Juan region and can identify sherds containing trachyte or sanidine-rich tempers using a binocular microscope. These same techniques need to be applied to larger samples and to assemblages from additional sites.

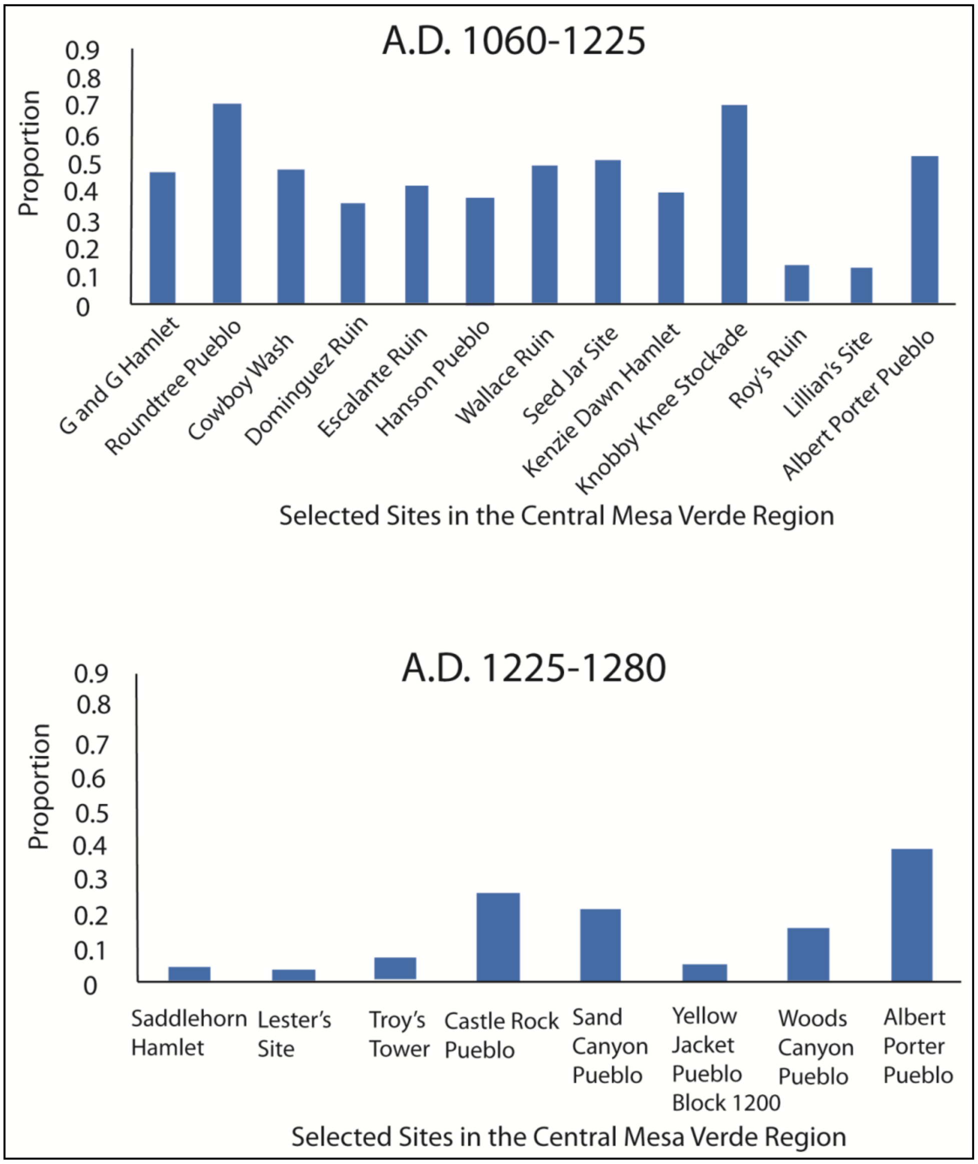

Figure 6.1. Ratios of mineral painted sherd count to gray ware sherd count for selected sites in the central Mesa Verde region.

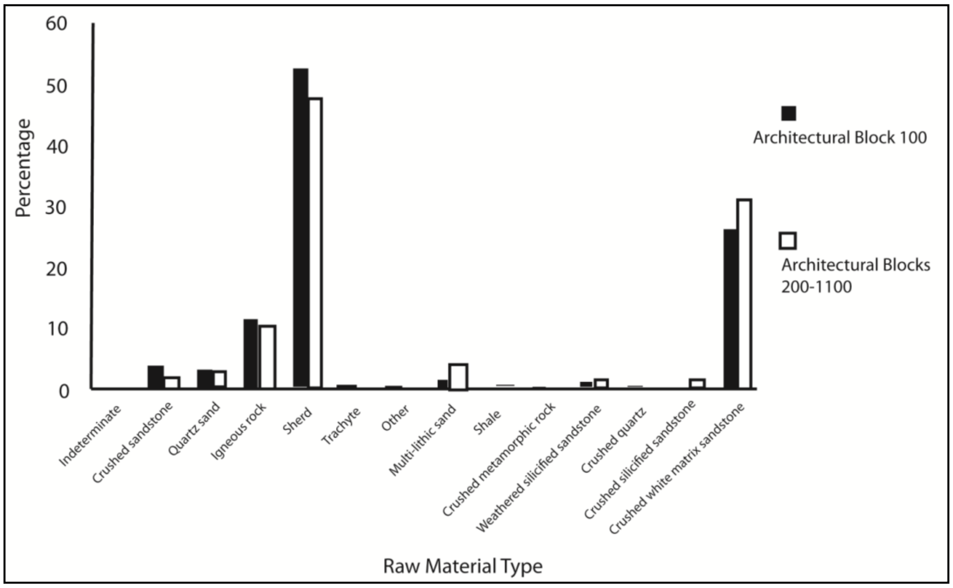

Figure 6.2. Percentage of white ware bowl temper distribution, Architectural Block 100 vs. Architectural Blocks 200–1100, Albert Porter Pueblo.

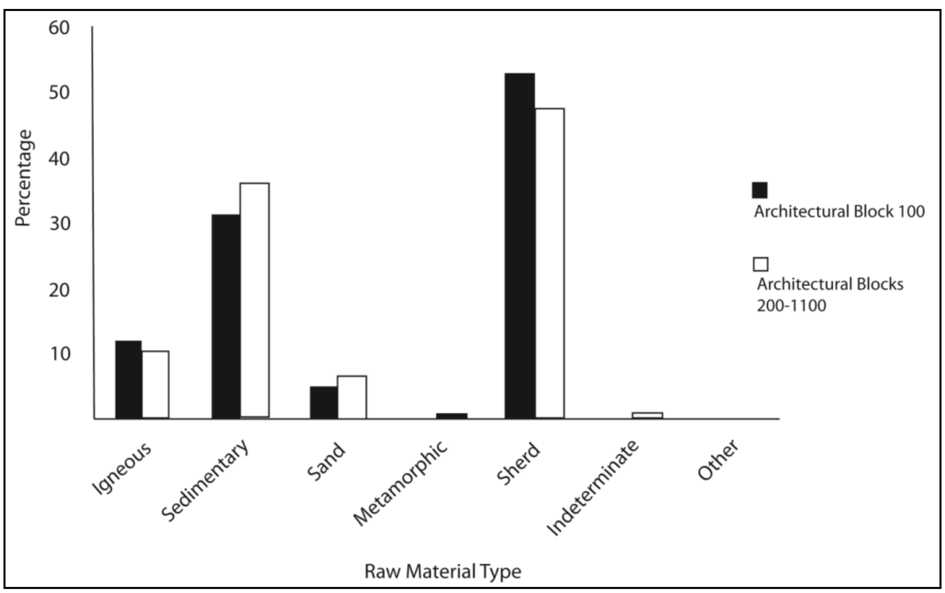

Figure 6.3. Percentage of white ware bowl counts by temper category, Architectural Block 100 vs. Architectural Blocks 200–1100, Albert Porter Pueblo.

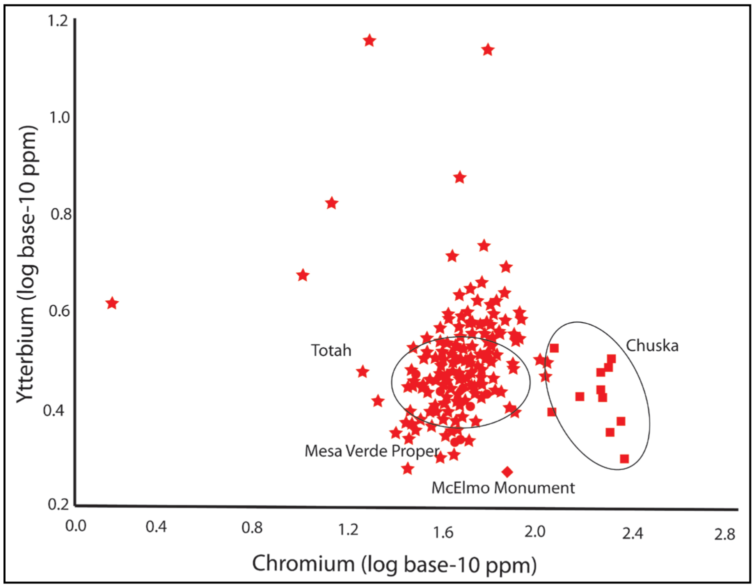

Figure 6.4. INAA results: bivariate plot of chromium and ytterbium, Albert Porter Pueblo.

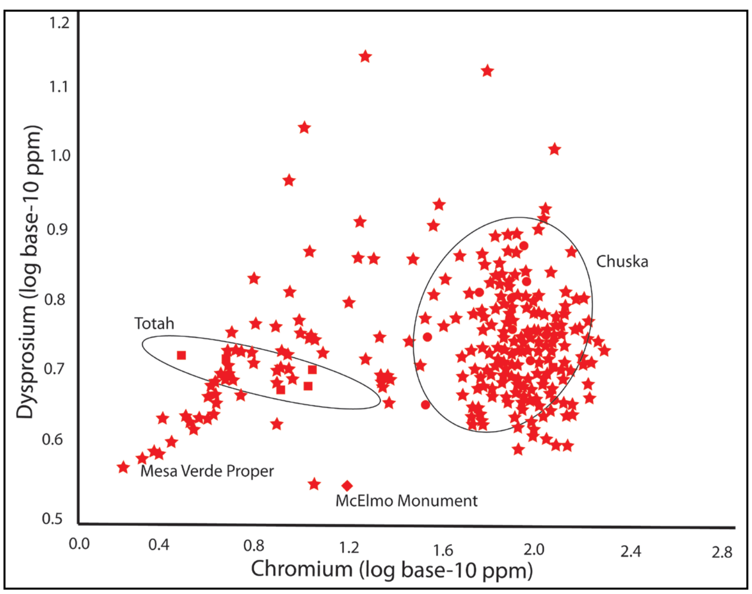

Figure 6.5. INAA results: bivariate plot of chromium and dysprosium, Albert Porter Pueblo.

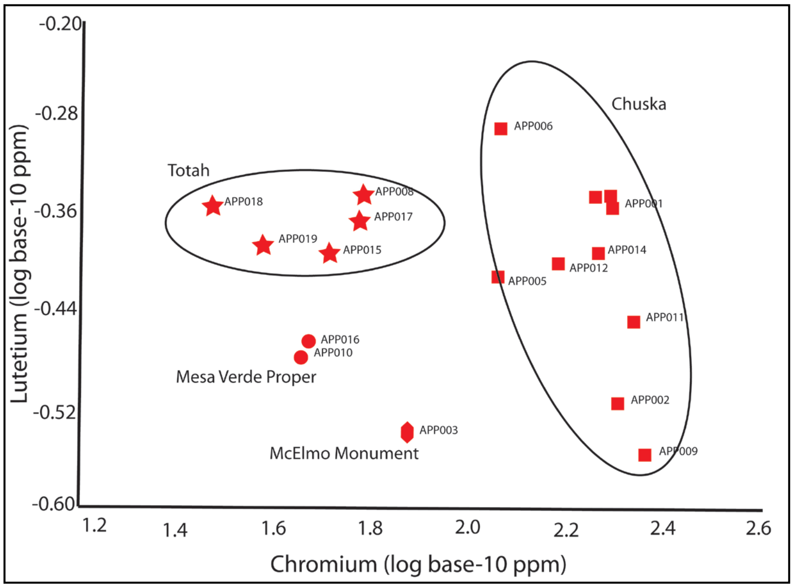

Figure 6.6. INAA results: bivariate plot of chromium and lutetium, Albert Porter Pueblo.

Table 6.1. Pecos Classification Terms and Associated Time Periods.

Pecos Classification Terms	Time Period
Basketmaker II	1000 B.C.–A.D. 600
Basketmaker III	A.D. 500–750
Pueblo I	A.D. 750–900
Pueblo II	A.D. 900–1150
Pueblo III	A.D. 1150–1300

Table 6.2. Subperiods and Date Ranges.

Subperiod	Date Range
Late Pueblo II	A.D. 1060–1140
Early Pueblo III	A.D. 1140–1225
Late Pueblo III	A.D. 1225–1280
Others	Mixed or unassigned dates

Table 6.3. Three Temporal Periods.

Time Period	Date Range
Predating Great House Construction	Prior to A.D. 1060
Initial Use of Great House	A.D. 1060–1140
Final Use of Great House	A.D. 1140–1280

Source: Adapted from Ortman et al. 2007:Table 4.

Table 6.4. Nine Subperiods Used for Pottery Analysis, Albert Porter Pueblo.

Subperiod
Middle Pueblo II (A.D. 1020–1060)
Late Pueblo II (A.D. 1060–1140)
Early Pueblo III (A.D. 1140–1225)
Late Pueblo III (A.D. 1225–1280)
Late Pueblo II through Early Pueblo III (A.D. 1060–1225)
Middle Pueblo II through Late Pueblo III (A.D. 1020–1280)
Early Pueblo I through Early Pueblo III (A.D. 725–1225)
Terminal Pueblo II through Initial Pueblo III (A.D. 1100–1180)
Unassigned

Table 6.5. Count and Weight of Gray Ware, Albert Porter Pueblo.

Time Period	Count	Weight (g)
Predating Great House	733	4,897.2
Initial Use of Great House	1,539	11,520.9
Final Use of Great House	46,974	305,243.2

Table 6.6. Weights of Gray Ware from All Architectural Blocks, Albert Porter Pueblo.

Architectural Block	Weight (g)
100	300,003.0
200	24,484.4
300	16,917.5
400	19,289.0
500	19,630.8
600	13,629.6
700	53.1
800	56,602.5
900	56,495.5
1000	45,827.8
1100	19,703.9

Table 6.7. Weights of Gray Ware from Architectural Block 100 and Other Architectural Blocks (200–1100), Albert Porter Pueblo.

	Weight (g)
Architectural Block 100	300,003
Other Architectural Blocks	272,634

Table 6.8. Bulk Sherds, Large, by Type, Albert Porter Pueblo.

Ware Form	Type	Count	Weight (g)	Percent by Count	Percent by Weight
Mudware	Basketmaker Mudware	6	14.5	0.0	0.0
Gray Ware	Chapin Gray	106	699.1	0.1	0.1
Gray Ware	Moccasin Gray	10	82.8	0.0	0.0
Gray Ware	Mancos Gray	19	188.5	0.0	0.0
Gray Ware	Indeterminate Neckbanded Gray	10	36.8	0.0	0.0
Gray Ware	Indeterminate Local Gray	12,298	64,536.2	7.4	5.9
Corrugated	Mancos Corrugated Gray	826	8,500.1	0.5	0.8
Corrugated	Mesa Verde Corrugated Gray	1,467	25,385.3	0.9	2.3
Corrugated	Mummy Lake Gray	11	1,081.9	0.0	0.1
Corrugated	Indeterminate Local Corrugated Gray	83,685	493,780.5	50.4	44.9
White Ware	Chapin Black-on-white	27	182.1	0.0	0.0
White Ware	Piedra Black-on-white	42	285.9	0.0	0.0
White Ware	Cortez Black-on-white	198	1,513.6	0.1	0.1
White Ware	Mancos Black-on-white	9,021	73,664.6	5.4	6.7
White Ware	McElmo Black-on-white	4,222	60,788.1	2.5	5.5
White Ware	Mesa Verde Black-on-white	1,282	23,613.1	0.8	2.1
White Ware	Early White Painted	96	416.1	0.1	0.0
White Ware	Early White Unpainted	691	3,324.3	0.4	0.3
White Ware	Pueblo II White Painted	1,119	5,595.6	0.7	0.5
White Ware	Pueblo III White Painted	4,500	36,382.0	2.7	3.3
White Ware	Late White Painted	13,961	82,424.6	8.4	7.5

Ware Form	Type	Count	Weight (g)	Percent by Count	Percent by Weight
White Ware	Late White Unpainted	31,365	211,702.1	18.9	19.2
White Ware	Indeterminate Local White Painted	78	326	0.0	0.0
White Ware	Indeterminate Local White Unpainted	234	1,006.1	0.1	0.1
Red Ware	Abajo Red-on-orange	32	129.9	0.0	0.0
Red Ware	Bluff Black-on-red	2	10	0.0	0.0
Red Ware	Deadmans Black-on-red	170	653.4	0.1	0.1
Red Ware	Indeterminate Local Red Painted	55	189.8	0.0	0.0
Red Ware	Indeterminate Local Red Unpainted	173	666.4	0.1	0.1
Nonlocal	Chuska Corrugated, not further specified	1	7.1	0.0	0.0
Nonlocal	Chuska Gray, not further specified	1	3.9	0.0	0.0
Nonlocal	Chuska White, not further specified	3	14.8	0.0	0.0
Nonlocal	Middle San Juan Gray Ware	4	28.9	0.0	0.0
Nonlocal	Middle San Juan White Ware	1	3.3	0.0	0.0
Nonlocal	Tsegi Orange Ware	119	547.2	0.1	0.0
Nonlocal	White Mountain Red Ware	24	206.3	0.0	0.0
Nonlocal	Other Gray Nonlocal	40	398.8	0.0	0.0
Nonlocal	Other Red Nonlocal	15	55.6	0.0	0.0
Nonlocal	Other White Nonlocal	91	733.6	0.1	0.1
Nonlocal	Polychrome	21	971.8	0.0	0.1
Ware unknown	Unknown Gray	37	288.3	0.0	0.0
Ware unknown	Unknown White	5	18.6	0.0	0.0
Ware unknown	Unknown Pottery	34	196	0.0	0.0
TOTAL		166,102	1,100,654	100.0	100.0

Note: Percentages shown as totals may not add up to exactly 100% due to rounding.

Table 6.9. Bulk Sherds, Large, by Time Period, Albert Porter Pueblo.

Pecos Period	Count	Weight (g)	Percent by Count	Percent by Weight
Others	708	4,806.4	0.4	0.4
Basketmaker II	6	14.5	0.0	0.0
Basketmaker III	133	881.3	0.1	0.1
Basketmaker III/ Pueblo I	12,298	64,536.3	7.4	5.9
Pueblo I	902	4,474.5	0.5	0.4
Pueblo I/II	228	856.2	0.1	0.1
Pueblo II	11,334	89,927.6	6.8	8.2
Pueblo II/III	129,022	788,989.1	77.7	71.7
Pueblo III	11,471	146,168.7	6.9	13.3
TOTAL	166,102	1,100,654.6	100%	100%

Note: Percentages shown as totals may not add up to exactly 100% due to rounding.

Table 6.10. Pottery Sherds by Ware and Form, Albert Porter Pueblo.

Ware Form	Vessel Form	Count	Weight (g)	Percent by Count	Percent by Weight
Mudware	Jar	4	6.8	0.0	0.0
	Unknown	2	7.7	0.0	0.0
Gray Ware	Bowl	5	26.4	0.0	0.0
	Canteen	3	7.3	0.0	0.0
	Jar	12,338	65,008.6	7.4	5.9
	Kiva/Seed Jar	12	146.3	0.0	0.0
	Unknown	85	354.9	0.1	0.0
Corrugated	Bowl	1	7.1	0.0	0.0
	Jar	85,988	528,740.8	51.8	48.0
White Ware	Bowl	30,795	236,211.2	18.5	21.5
	Canteen	24	122.3	0.0	0.0

Ware Form	Vessel Form	Count	Weight (g)	Percent by Count	Percent by Weight
	Jar	31,985	235,231.4	19.3	21.4
	Kiva/Seed Jar	58	543.7	0.0	0.0
	Ladle	1,619	20,100.6	1.0	1.8
	Mug	159	1,919.3	0.1	0.2
	Other	26	410.8	0.0	0.0
	Unknown	2,170	6,685.4	1.3	0.6
Red Ware	Bowl	325	1,159.6	0.2	0.1
	Jar	96	439.2	0.1	0.0
	Kiva/Seed Jar	4	28.9	0.0	0.0
	Ladle	3	12.6	0.0	0.0
	Unknown	4	9.3	0.0	0.0
Nonlocal	Bowl	209	2,097.1	0.1	0.2
	Canteen	1	4.8	0.0	0.0
	Jar	99	809.1	0.1	0.1
	Ladle	6	19.0	0.0	0.0
	Mug	3	31.4	0.0	0.0
	Other	1	7.8	0.0	0.0
	Unknown	1	2.1	0.0	0.0
Unknown	Bowl	6	86.4	0.0	0.0
	Canteen	1	4.6	0.0	0.0
	Jar	46	351.6	0.0	0.0
	Ladle	1	3.8	0.0	0.0
	Unknown	22	56.5	0.0	0.0
TOTAL		166,102	1,100,654.4	100%	100%

Note: Percentages shown as totals may not add up to exactly 100% due to rounding.

Table 6.11. Pottery Ware and Form by Time Period, Albert Porter Pueblo.

	Ware Form	Count	Weight (g)	Percent by Count	Percent by Weight
Early (Basketmaker III–Pueblo I)	Bowl	326	1,599.4	2.4	2.3
	Canteen	5	12.8	0.0	0.0
	Jar	12,878	67,735.2	96.5	96.7
	Ladle	5	26.3	0.0	0.0
	Mug	0	0.0	–	–
	Kiva/Seed Jar	17	185.6	0.1	0.3
	Unknown	117	462.7	0.9	0.7
	Other	0	0.0	–	–
	Early Total	*13,348*	*70,022.0*	*100.0*	*100.0*
Late (Pueblo II–Pueblo III)	Bowl	30,603	235,107.4	20.2	22.9
	Canteen	22	116.81	0.0	0.0
	Jar	117,332	761,073.6	77.3	74.2
	Ladle	1,614	20,047.36	1.1	2.0
	Mug	159	1,921.39	0.1	0.2
	Kiva/Seed Jar	57	533.31	0.0	0.1
	Unknown	2,061	6,423.09	1.4	0.6
	Other	27	418.57	0.0	0.0
	Late Total	*151,875*	*1,025,642*	*100.0*	*100.0*
Pueblo I/Pueblo II	Bowl	156	498.5	68.4	58.2
	Jar	68	348.4	29.8	40.7
	Unknown	4	9.3	1.8	1.1
	PI/PII Total	*228*	*856.2*	*100.0*	*100.0*

Note: Percentages shown as totals may not add up to exactly 100% due to rounding.

Table 6.12. Pottery Sherds by Count, Type, and Finish, Albert Porter Pueblo.

	Count					Percentage				
Pottery Type	Carbon Paint	Mineral Paint	Mixed Paint	Indeterminate Painted	TOTAL	Carbon Paint	Mineral Paint	Mixed Paint	Indeterminate Painted	TOTAL
Chapin Black-on-white	7	20			27	25.9	74.1			100.0
Piedra Black-on-white	11	31			42	26.2	73.8			100.0
Cortez Black-on-white	7	191			198	3.5	96.5			100.0
Mancos Black-on-white	3,855	5,100	50	1	9,006	42.8	56.6	0.6	0.0	100.0
McElmo Black-on-white	1,989	2,199	28	2	4,218	47.2	52.1	0.7	0.0	100.0
Mesa Verde Black-on-white	711	558	11		1,280	55.5	43.6	0.9		100.0
Early White Painted	33	60		2	95	34.7	63.2		2.1	100.0
Early White Unpainted					0					–
Pueblo II White Painted	124	987	2	4	1,117	11.1	88.4	0.2	0.4	100.0
Pueblo III White Painted	2,640	1,814	20	14	4,488	58.8	40.4	0.4	0.3	100.0
Late White Painted	7,808	5,996	37	70	13,911	56.1	43.1	0.3	0.5	100.0
Late White Unpainted	4	2		1	7	57.1	28.6		14.3	100.0
Indeterminate Local White Painted	24	40		13	77	31.2	51.9		16.9	100.0
Indeterminate Local White Unpainted				1	1				100.0	100.0
TOTAL	17,213	16,998	148	108	34,467	49.9	49.3	0.4	0.3	100.0

Note: Percentages shown as totals may not add up to exactly 100% due to rounding.

Table 6.13. Pottery Sherds by Weight, Type, and Finish, Albert Porter Pueblo.

	Weight (g)					Percentage				
Pottery Type	Carbon Paint	Mineral Paint	Mixed Paint	Indeterminate Painted	TOTAL	Carbon Paint	Mineral Paint	Mixed Paint	Indeterminate Painted	TOTAL
Chapin Black-on-white	20.7	161.4			182.1	11.4	88.6			100.0
Piedra Black-on-white	70.8	215.2			286.0	24.8	75.2			100.0
Cortez Black-on-white	39.8	1,473.8			1,513.7	2.6	97.4			100.0
Mancos Black-on-white	30,048.2	43,095.8	430.2	2.2	73,576.3	40.8	58.6	0.6	0.0	100.0
McElmo Black-on-white	28,089.2	32,314.4	326.6	10.0	60,740.2	46.2	53.2	0.5	0.0	100.0
Mesa Verde Black-on-white	14,492.9	8,927.1	181.5		23,601.5	61.4	37.8	0.8		100.0
Early White Painted	166.5	240.6		2.7	409.8	40.6	58.7		0.7	100.0
Early White Unpainted										-
Pueblo II White Painted	865.3	4,659.7	7.8	58.0	5,590.8	15.5	83.3	0.1	1.0	100.0
Pueblo III White Painted	20,802.7	15,176.6	153.7	122.4	36,255.5	57.4	41.9	0.4	0.3	100.0
Late White Painted	44,192.0	37,237.2	312.0	464.9	82,206.0	53.8	45.3	0.4	0.6	100.0
Late White Unpainted	21.1	23.1		5.3	49.5	42.6	46.7		10.7	100.0
Indeterminate Local White Painted	143.7	122.8		55.8	322.3	44.6	38.1		17.3	100.0
Indeterminate Local White Unpainted				2.5	2.5				100.0	100.0
TOTAL	138,952.9	143,647.7	1,411.8	723.8	284,736.1	48.8	50.4	0.5	0.3	100.0

Table 6.14. White Ware Counts and Percentage from Selected Study Units, Albert Porter Pueblo.

(a) Table 6.14, White Ware Counts

	Count					
	A.D. 1060–1225	A.D. 1060–1225	A.D. 1060–1225	A.D. 1225–1280	A.D. 1225–1280	A.D. 1225–1280
	STR 107	STR 110	STR 150	STR 114	STR 402	STR 403
Pottery Type	1232+vv	1192++vv	1188r	1258+vv	1226b	1238+v
Piedra Black-on-white		1				
Cortez Black-on-white	2		7	6		
Mancos Black-on-white	123	73	153	62	16	11
McElmo Black-on-white	28	42	92	21	10	12
Mesa Verde Black-on-white	11	13	13	11	6	2
Early White Painted		1	1	1		
Early White Unpainted	11	2	9	8		
Pueblo II White Painted	20	2	20	7	1	
Pueblo III White Painted	65	29	40	42	21	20
Late White Painted	155	124	133	111	69	30
Late White Unpainted	468	233	317	311	92	105
Indeterminate Local White Painted			2			
Indeterminate Local White Unpainted	5	1				
TOTAL	888	521	787	580	215	180

(b) Table 6.14, White Ware Percent

	Percent					
	A.D. 1060–1225 STR 107	A.D. 1060–1225 STR 110	A.D. 1060–1225 STR 150	A.D. 1225–1280 STR 114	A.D. 1225–1280 STR 402	A.D. 1225–1280 STR 403
Type	1232+vv	1192++vv	1188r	1258+vv	1226b	1238+v
Piedra Black-on-white	-	0.2	-	-	-	-
Cortez Black-on-white	0.2	-	0.9	1.0	-	-
Mancos Black-on-white	13.9	14.0	19.4	10.7	7.4	6.1
McElmo Black-on-white	3.2	8.1	11.7	3.6	4.7	6.7
Mesa Verde Black-on-white	1.2	2.5	1.7	1.9	2.8	1.1
Early White Painted	-	0.2	0.1	0.2	-	-
Early White Unpainted	1.2	0.4	1.1	1.4	-	-
Pueblo II White Painted	2.3	0.4	2.5	1.2	0.5	-
Pueblo III White Painted	7.3	5.6	5.1	7.2	9.8	11.1
Late White Painted	17.5	23.8	16.9	19.1	32.1	16.7
Late White Unpainted	52.7	44.7	40.3	53.6	42.8	58.3
Indeterminate Local White Painted	-	-	0.3	-	-	-
Indeterminate Local White Unpainted	0.6	0.2	-	-	-	-
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0

Note: Percentages shown as totals may not add up to exactly 100% due to rounding.

Table 6.15. White Ware Weights and Percentage from Selected Study Units, Albert Porter Pueblo.

(a) Table 6.15, White Ware Weights

	Weight (g)					
	A.D. 1060–1225 STR 107	A.D. 1060–1225 STR 110	A.D. 1060–1225 STR 150	A.D. 1225–1280 STR 114	A.D. 1225–1280 STR 402	A.D. 1225–1280 STR 403
Type	1232+vv	1192++vv	1188r	1258+vv	1226b	1238+v
Piedra Black-on-white		2.60				
Cortez Black-on-white	12.50		70.60	68.47		
Mancos Black-on-white	875.93	654.40	1,289.40	499.26	102.10	88.20
McElmo Black-on-white	392.92	800.39	2,226.48	290.35	136.90	236.40
Mesa Verde Black-on-white	202.71	244.80	377.30	118.20	104	24.40
Early White Painted		3.40	1.70	1.70		
Early White Unpainted	72.09	22.70	40.70	38.36		
Pueblo II White Painted	65.40	5.60	106	50.61	2.30	
Pueblo III White Painted	464.36	218.30	317.30	415.68	154.90	214.60
Late White Painted	749.60	715.60	1,390.20	628.62	507.40	122.10
Late White Unpainted	2,774.60	1,393.75	3,214.33	2,438.78	796.30	755.45
Indeterminate Local White Painted			13.70			
Indeterminate Local White Unpainted	29.90	16.50				
TOTAL	5,640.01	4,078.04	9,047.71	4,550.03	1,803.90	1,441.15

(b) Table 6.15, White Ware Percent

Type	Percent					
	A.D. 1060–1225	A.D. 1060–1225	A.D. 1060–1225	A.D. 1225–1280	A.D. 1225–1280	A.D. 1225–1280
	STR 107	STR 110	STR 150	STR 114	STR 402	STR 403
	1232+vv	1192++vv	1188r	1258+vv	1226b	1238+v
Piedra Black-on-white	-	0.1	-	-	-	-
Cortez Black-on-white	0.2	-	0.8	1.5	-	-
Mancos Black-on-white	15.5	16.0	14.3	11.0	5.7	6.1
McElmo Black-on-white	7.0	19.6	24.6	6.4	7.6	16.4
Mesa Verde Black-on-white	3.6	6.0	4.2	2.6	5.8	1.7
Early White Painted	-	0.1	0.0	0.0	-	-
Early White Unpainted	1.3	0.6	0.4	0.8	-	-
Pueblo II White Painted	1.2	0.1	1.2	1.1	0.1	-
Pueblo III White Painted	8.2	5.4	3.5	9.1	8.6	14.9
Late White Painted	13.3	17.5	15.4	13.8	28.1	8.5
Late White Unpainted	49.2	34.2	35.5	53.6	44.1	52.4
Indeterminate Local White Painted	-	-	0.2	-	-	-
Indeterminate Local White Unpainted	0.5	0.4	-	-	-	-
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0

Note: Percentages shown as totals may not add up to exactly 100% due to rounding.

Table 6.16. White Ware Data from Well-Dated Components in Southwest Colorado.

				Pottery Types								
Site Number	Site Name	Phase*	Latest Tree-Ring Date (A.D.)	Cortez B/W and Pueblo II White Painted	Mancos B/W	McElmo B/W	Mesa Verde B/W	Pueblo III White Painted	Late White Painted	Mineral Paint	Number of Sherds Analyzed	Ratio of Mineral Paint to Number of Sherds Analyzed
5MT11338	G and G Hamlet	2, 4	1083	5	22	19	9	7	2	31	66	0.47
5MT2544	Roundtree Pueblo	2, 5	1078	13	108	44	28	22	47	193	278	0.69
5MT10010	Cowboy Wash	3	1114	2	62	4	3	2	30	48	103	0.47
5MT2148	Dominguez Ruin	3	1123	3	15	5		1	4	11	32	0.34
5MT2149	Escalante Ruin	3	1138	2	82	40		2	8	61	146	0.42
5MT3876	Hanson Pueblo	3	1134	3	40	4			13	28	76	0.37
5MT6970	Wallace Ruin	3	1108	33	273	31	12	15	56	218	448	0.49
5MT3892	Seed Jar Site	4	1148	7	77	13	1	1	7	61	119	0.51
5MT5152	Kenzie Dawn Hamlet	4, 5	1142		26	14	11	9	4	26	67	0.39
5MT2525	Knobby Knee Stockade	5	1201		1	19	4	10	13	33	47	0.70
5MT3930	Roy's Ruin	5	1223		4	26	28	38	11	14	107	0.13
5MT3936	Lillian's Site	5	1214		3	20	23	25	8	10	80	0.13
5MT123	Albert Porter Pueblo	3, 4, 5		51	349	162	37	134	412	594	1,145	0.52

				Pottery Types								
Site Number	Site Name	Phase*	Latest Tree-Ring Date (A.D.)	Cortez B/W and Pueblo II White Painted	Mancos B/W	McElmo B/W	Mesa Verde B/W	Pueblo III White Painted	Late White Painted	Mineral Paint	Number of Sherds Analyzed	Ratio of Mineral Paint to Number of Sherds Analyzed
5MT262	Saddlehorn Hamlet	6	1256			11	18	13		2	42	0.05
5MT10246	Lester's Site	7	1271		2	22	58	25	4	4	111	0.04
5MT3951	Troy's Tower	7	1271	1	2	4	19	23	7	4	58	0.07
5MT1825	Castle Rock Pueblo	7	1274		1	25	85	73	12	51	197	0.26
5MT765	Sand Canyon Pueblo	6, 7	1274	0	6	59	355	334	55	177	813	0.22
5MT5	Yellow Jacket Pueblo (Block 1200)	7	1254	1	2	31	96	68	8	11	206	0.05
5MT11842	Woods Canyon Pueblo	6, 7	1276	0	2	5	16	9	0	5	32	0.16
5MT123	Albert Porter Pueblo	6	1258	14	89	43	19	83	210	176	458	0.38

Notes: * Phase 1 = A.D. 1020–1060; Phase 2 = A.D. 1060–1100; Phase 3 = A.D. 1100–1140; Phase 4 = A.D. 1140–1180; Phase 5 = A.D. 1180–1225; Phase 6 = A.D. 1225–1260; Phase 7 = A.D. 1260–1280.
B/W = Black-on-white.

Table 6.17. Count of Pottery Types by Temporal Component, Albert Porter Pueblo.

Pottery Type	Count				Percent			
	Late Pueblo II (A.D. 1060–1140)	Early Pueblo III (A.D. 1140–1225)	Late Pueblo III (A.D. 1225–1280)	Others	Late Pueblo II (A.D. 1060–1140)	Early Pueblo III (A.D. 1140–1225)	Late Pueblo III (A.D. 1225–1280)	Others
Basketmaker Mudware		3		3	-	0.0	-	0.0
Chapin Gray	17	32	7	50	0.1	0.1	0.1	0.1
Moccasin Gray	1	4		5	0.0	0.0	-	0.0
Mancos Gray	6	2		11	0.0	0.0	-	0.0
Indeterminate Neckbanded Gray	2	4		4	0.0	0.0	-	0.0
Indeterminate Local Gray	2,744	4,128	313	5,116	8.9	6.7	4.6	7.6
Mancos Corrugated Gray	194	271	45	316	0.6	0.4	0.7	0.5
Mesa Verde Corrugated Gray	268	649	69	483	0.9	1.0	1.0	0.7
Mummy Lake Gray		9		2	-	0.0	-	0.0
Indeterminate Local Corrugated Gray	15,742	30,933	3,668	33,648	51.1	50.0	53.4	49.9
Chapin Black-on-white	5	5	3	14	0.0	0.0	0.0	0.0
Piedra Black-on-white	12	12		18	0.0	0.0	-	0.0
Cortez Black-on-white	59	46	10	83	0.2	0.1	0.1	0.1
Mancos Black-on-white	2,310	3,093	214	3,487	7.5	5.0	3.1	5.2
McElmo Black-on-white	635	1,931	211	1,494	2.1	3.1	3.1	2.2
Mesa Verde Black-on-white	42	644	153	463	0.1	1.0	2.2	0.7
Early White Painted	23	25	2	47	0.1	0.0	0.0	0.1
Early White Unpainted	142	185	14	351	0.5	0.3	0.2	0.5
Pueblo II White Painted	259	360	37	472	0.8	0.6	0.5	0.7
Pueblo III White Painted	460	1,967	273	1,857	1.5	3.2	4.0	2.8
Late White Painted	2,335	5,081	509	6,123	7.6	8.2	7.4	9.1
Late White Unpainted	5,320	12,106	1,322	12,815	17.3	19.6	19.2	19.0
Indeterminate Local White Painted	5	18		55	0.0	0.0	-	0.1

	Count				Percent			
Pottery Type	Late Pueblo II (A.D. 1060–1140)	Early Pueblo III (A.D. 1140–1225)	Late Pueblo III (A.D. 1225–1280)	Others	Late Pueblo II (A.D. 1060–1140)	Early Pueblo III (A.D. 1140–1225)	Late Pueblo III (A.D. 1225–1280)	Others
Indeterminate Local White Unpainted	41	37	2	154	0.1	0.1	0.0	0.2
Abajo Red-on-orange	7	11	1	13	0.0	0.0	0.0	0.0
Bluff Black-on-red		2			-	0.0	-	-
Deadmans Black-on-red	38	70	4	77	0.1	0.1	0.1	0.1
Indeterminate Local Red Painted	6	31	1	18	0.0	0.1	0.0	0.0
Indeterminate Local Red Unpainted	40	72	4	65	0.1	0.1	0.1	0.1
Chuska Corrugated, not further specified				1	-	-	-	0.0
Chuska Gray, not further specified				1	-	-	-	0.0
Chuska White, not further specified				3	-	-	-	0.0
Middle San Juan Gray Ware		3		1	-	0.0	-	0.0
Middle San Juan White Ware		1			-	0.0	-	-
Tsegi Orange Ware	29	38	4	49	0.1	0.1	0.1	0.1
White Mountain Red Ware		17	1	7	-	0.0	0.0	0.0
Other Gray Nonlocal	7	7	1	25	0.0	0.0	0.0	0.0
Other Red Nonlocal	7	3		7	0.0	0.0	-	0.0
Other White Nonlocal	24	26	1	40	0.1	0.0	0.0	0.1
Polychrome	6	7	2	6	0.0	0.0	0.0	0.0
Unknown Gray	1	31		5	0.0	0.1	-	0.0
Unknown White	1	3		1	0.0	0.0	-	0.0
Unknown Pottery	2	21	2	9	0.0	0.0	0.0	0.0
TOTAL	30,788	61,867	6,871	67,390	100.0	100.0	100.0	100.0

Note: Percentages shown as totals may not add up to exactly 100% due to rounding.

Table 6.18. Weight of Pottery Sherds by Type and by Temporal Component, Albert Porter Pueblo.

	Weight (g)				Percent			
Pottery Type	Late Pueblo II (A.D. 1060–1140)	Early Pueblo III (A.D. 1140–1225)	Late Pueblo III (A.D. 1225–1280)	Other	Late Pueblo II (A.D. 1060–1140)	Early Pueblo III (A.D. 1140–1225)	Late Pueblo III (A.D. 1225–1280)	Other
Basketmaker Mudware		4.3		10.2	-	0.0	-	0.0
Chapin Gray	110.4	198.0	42.8	347.98	0.1	0.0	0.1	0.1
Moccasin Gray	4.8	42.0		36	0.0	0.0	-	0.0
Mancos Gray	48.2	51.8		88.5	0.0	0.0	-	0.0
Indeterminate Neckbanded Gray	6.5	20.8		9.5	0.0	0.0	-	0.0
Indeterminate Local Gray	13,778.25	23,086.1	1,560.0	26,089.04	7.8	5.1	2.3	6.4
Mancos Corrugated Gray	1,897.99	3,047.0	609.0	2,946.13	1.1	0.7	0.9	0.7
Mesa Verde Corrugated Gray	3,947.6	12,891.3	1,510.9	7,035.55	2.2	2.9	2.3	1.7
Mummy Lake Gray		298.2		783.7	-	0.1	-	0.2
Indeterminate Local Corrugated Gray	79,419.77	199,868.1	30,766.5	183,543.8	45.1	44.4	46.3	45.1
Chapin Black-on-white	23	27.4	49.8	81.9	0.0	0.0	0.1	0.0
Piedra Black-on-white	106.99	58.1		120.9	0.1	0.0	-	0.0
Cortez Black-on-white	507	292.9	87.7	626.12	0.3	0.1	0.1	0.2
Mancos Black-on-white	19,059	25,874.9	2,003.8	26,713.37	10.8	5.7	3.0	6.6
McElmo Black-on-white	6,901.97	31,828.0	3,821.6	18,139.88	3.9	7.1	5.7	4.5
Mesa Verde Black-on-white	352.3	11,294.9	5,157.7	6,775.92	0.2	2.5	7.8	1.7
Early White Painted	84.51	101.8	8.3	221.5	0.0	0.0	0.0	0.1
Early White Unpainted	629.5	1,061.8	71.0	1,562.08	0.4	0.2	0.1	0.4
Pueblo II White Painted	1,193.04	1,744.0	199.6	2,458.93	0.7	0.4	0.3	0.6
Pueblo III White Painted	3,136.34	16,933.9	2,686.9	13,608.07	1.8	3.8	4.0	3.3
Late White Painted	13,347.47	30,896.7	4,083.0	34,071.84	7.6	6.9	6.1	8.4
Late White Unpainted	30,473.17	88,969.1	12,808.9	79,301.71	17.3	19.7	19.3	19.5
Indeterminate Local White Painted	13.5	57.8		254.7	0.0	0.0	-	0.1
Indeterminate Local White Unpainted	149.85	180.0	11.3	664.93	0.1	0.0	0.0	0.2

	Weight (g)				Percent			
Pottery Type	Late Pueblo II (A.D. 1060–1140)	Early Pueblo III (A.D. 1140–1225)	Late Pueblo III (A.D. 1225–1280)	Other	Late Pueblo II (A.D. 1060–1140)	Early Pueblo III (A.D. 1140–1225)	Late Pueblo III (A.D. 1225–1280)	Other
Abajo Red-on-orange	25.2	35.3	1.4	68	0.0	0.0	0.0	0.0
Bluff Black-on-red		10.0			-	0.0	-	-
Deadmans Black-on-red	174.81	210.6	7.7	260.39	0.1	0.0	0.0	0.1
Indeterminate Local Red Painted	19.5	116.8	2.2	51.3	0.0	0.0	0.0	0.0
Indeterminate Local Red Unpainted	109.5	326.3	15.1	215.48	0.1	0.1	0.0	0.1
Chuska Corrugated, not further specified				7.1	-	-	-	0.0
Chuska Gray, not further specified				3.9	-	-	-	0.0
Chuska White, not further specified				14.8	-	-	-	0.0
Middle San Juan Gray Ware		19.1		9.8	-	0.0	-	0.0
Middle San Juan White Ware		3.3			-	0.0	-	-
Tsegi Orange Ware	114.7	176.2	62.7	193.6	0.1	0.0	0.1	0.0
White Mountain Red Ware		131.1	2.7	72.5	-	0.0	0.0	0.0
Other Gray Nonlocal	31.2	127.1	11.1	229.4	0.0	0.0	0.0	0.1
Other Red Nonlocal	21.5	14.9		19.2	0.0	0.0	-	0.0
Other White Nonlocal	192.6	172.1	7.0	361.9	0.1	0.0	0.0	0.1
Polychrome	30.8	29.0	830.0	82	0.0	0.0	1.2	0.0
Unknown Gray	15.4	227.6		45.3	0.0	0.1	-	0.0
Unknown White	1.8	8.6		8.2	0.0	0.0	-	0.0
Unknown Pottery	16.5	43.8	101.0	34.7	0.0	0.0	0.2	0.0
TOTAL	175,944.7	450,480.7	66,519.7	407,169.8	100.0	100.0	100.0	100.0

Note: Percentages shown as totals may not add up to exactly 100% due to rounding.

Table 6.19. Count and Percent of Pottery Sherds from Middens, by Type and Temporal Component, Albert Porter Pueblo.

	Count				Percent			
Pottery Type	Late Pueblo II	Early Pueblo III	Late Pueblo III	Other	Late Pueblo II	Early Pueblo III	Late Pueblo III	Other
Cibola White, not further specified				1	-	-	-	0.0
Basketmaker Mudware		2		2	-	0.0	-	0.0
Chapin Gray	10	15		39	0.0	0.1	-	0.1
Moccasin Gray				4	-	-	-	0.0
Mancos Gray	3	2		10	0.0	0.0	-	0.0
Indeterminate Neckbanded Gray	2	1		3	0.0	0.0	-	0.0
Indeterminate Local Gray	2,041	1,778	108	4,069	9.0	6.4	3.5	7.5
Mancos Corrugated Gray	155	139	20	264	0.7	0.5	0.6	0.5
Mesa Verde Corrugated Gray	184	333	30	355	0.8	1.2	1.0	0.7
Mummy Lake Gray				1	-	-	-	0.0
Indeterminate Local Corrugated Gray	11,516	13,569	1,621	27,267	51.0	48.9	52.6	50.2
Chapin Black-on-white	4	1	3	11	0.0	0.0	0.1	0.0
Piedra Black-on-white	8	6		11	0.0	0.0	-	0.0
Cortez Black-on-white	37	25		57	0.2	0.1	-	0.1
Mancos Black-on-white	1,796	1,454	80	2,768	8.0	5.2	2.6	5.1
McElmo Black-on-white	435	951	124	1,153	1.9	3.4	4.0	2.1
Mesa Verde Black-on-white	28	324	107	382	0.1	1.2	3.5	0.7
Early White Painted	17	11	1	34	0.1	0.0	0.0	0.1
Early White Unpainted	80	92	4	281	0.4	0.3	0.1	0.5
Pueblo II White Painted	178	141	24	362	0.8	0.5	0.8	0.7
Pueblo III White Painted	331	899	158	1,525	1.5	3.2	5.1	2.8
Late White Painted	1,712	2,395	188	4,916	7.6	8.6	6.1	9.1
Late White Unpainted	3,885	5,425	599	10,372	17.2	19.6	19.5	19.1
Indeterminate Local White Painted	4	5		44	0.0	0.0	-	0.1
Indeterminate Local White Unpainted	37	14	2	110	0.2	0.1	0.1	0.2

	Count				Percent			
Pottery Type	Late Pueblo II	Early Pueblo III	Late Pueblo III	Other	Late Pueblo II	Early Pueblo III	Late Pueblo III	Other
Abajo Red-on-orange	1	3	1	10	0.0	0.0	0.0	0.0
Bluff Black-on-red		1			-	0.0	-	-
Deadmans Black-on-red	22	27	1	65	0.1	0.1	0.0	0.1
Indeterminate Local Red Painted	6	12	1	11	0.0	0.0	0.0	0.0
Indeterminate Local Red Unpainted	22	29	2	52	0.1	0.1	0.1	0.1
Chuska Corrugated, not further specified				1	-	-	-	0.0
Chuska Gray, not further specified	2			1	0.0	-	-	0.0
Chuska White, not further specified	2			4	0.0	-	-	0.0
Middle San Juan Gray Ware		1		5	-	0.0	-	0.0
Middle San Juan White Ware	3	1		1	0.0	0.0	-	0.0
Tsegi Orange Ware	22	19	3	37	0.1	0.1	0.1	0.1
White Mountain Red Ware		8	1	6	-	0.0	0.0	0.0
Other Gray Nonlocal	5	2		10	0.0	0.0	-	0.0
Other Red Nonlocal	6	3		7	0.0	0.0	-	0.0
Other White Nonlocal	11	6		23	0.0	0.0	-	0.0
Polychrome	5	5		6	0.0	0.0	-	0.0
Unknown Gray	1	13		4	0.0	0.0	-	0.0
Unknown White	1	1		1	0.0	0.0	-	0.0
Unknown Pottery	1	8	1	8	0.0	0.0	0.0	0.0
TOTAL	22,573	27,721	3,079	54,293	100.0	100.0	100.0	100.0

Note: Percentages shown as totals may not add up to exactly 100% due to rounding.

Table 6.20. Weight and Percent of Pottery Sherds from Middens, by Type and Temporal Component, Albert Porter Pueblo.

	Weight (g)				Percent			
Pottery Type	Late Pueblo II Period	Early Pueblo III Period	Late Pueblo III Period	Other	Late Pueblo II Period	Early Pueblo III Period	Late Pueblo III Period	Other
Cibola White, not further specified				9.4	-	-	-	0.0
Basketmaker Mudware		2.7		7.7	-	0.0	-	0.0
Chapin Gray	50.1	105.8		217.08	0.0	0.0	-	0.1
Moccasin Gray				30.8	-	-	-	0.0
Mancos Gray	16.6	51.8		84.8	0.0	0.0	-	0.0
Indeterminate Neckbanded Gray	6.5	2.6		3.9	0.0	0.0	-	0.0
Indeterminate Local Gray	9,877.1	10,606.4	585.8	20,212.8	7.8	4.9	1.8	6.3
Mancos Corrugated Gray	1,530.3	1,551.9	318.9	3,168.7	1.2	0.7	1.0	1.0
Mesa Verde Corrugated Gray	2,764.1	5,955.8	823.6	4,721.8	2.2	2.8	2.5	1.5
Mummy Lake Gray				6.7	-	-	-	0.0
Indeterminate Local Corrugated Gray	56,135.4	91,486.4	15,507.7	143,644.5	44.2	42.5	46.9	45.0
Chapin Black-on-white	16.2	4.5	49.8	68.0	0.0	0.0	0.2	0.0
Piedra Black-on-white	45.1	29.9		74.7	0.0	0.0	-	0.0
Cortez Black-on-white	361.6	174.9		422.1	0.3	0.1	-	0.1
Mancos Black-on-white	13,671.3	13,023.8	973.9	21,316.1	10.8	6.1	2.9	6.7
McElmo Black-on-white	4,326.3	15,459.4	1,872.4	13,023.3	3.4	7.2	5.7	4.1
Mesa Verde Black-on-white	198.8	6,397.8	1,937.6	5,504.3	0.2	3.0	5.9	1.7
Early White Painted	64.6	54.6	6.6	179.4	0.1	0.0	0.0	0.1
Early White Unpainted	347.5	596.1	24.9	1,176.2	0.3	0.3	0.1	0.4
Pueblo II White Painted	819.3	825.3	115.2	1,798.2	0.6	0.4	0.3	0.6
Pueblo III White Painted	2,051.6	8,617.9	1,664.7	11,315.8	1.6	4.0	5.0	3.5
Late White Painted	9,473.9	15,268.1	2,025.8	26,728.2	7.5	7.1	6.1	8.4
Late White Unpainted	24,497.5	44,152.0	7,108.9	63,605.4	19.3	20.5	21.5	19.9
Indeterminate Local White Painted	7.1	9.6		174.6	0.0	0.0	-	0.1
Indeterminate Local White Unpainted	134.0	56.3	11.3	421.4	0.1	0.0	0.0	0.1
Abajo Red-on-orange	2.8	8.2	1.4	53.7	0.0	0.0	0.0	0.0
Bluff Black-on-red		2.9			-	0.0	-	-
Deadmans Black-on-red	111.3	94.3	3.4	222.7	0.1	0.0	0.0	0.1
Indeterminate Local Red Painted	19.5	49.6	2.2	32.1	0.0	0.0	0.0	0.0

	Weight (g)				Percent			
Pottery Type	Late Pueblo II Period	Early Pueblo III Period	Late Pueblo III Period	Other	Late Pueblo II Period	Early Pueblo III Period	Late Pueblo III Period	Other
Indeterminate Local Red Unpainted	77.1	176.9	9.7	183.7	0.1	0.1	0.0	0.1
Chuska Corrugated, not further specified				7.1	-	-	-	0.0
Chuska Gray, not further specified	5.4			3.9	0.0	-	-	0.0
Chuska White, not further specified	11.5			21.2	0.0	-	-	0.0
Middle San Juan Gray Ware		9.3		25.3	-	0.0	-	0.0
Middle San Juan White Ware	19.6	3.2		13.8	0.0	0.0	-	0.0
Tsegi Orange Ware	74.5	70.3	18.8	141.0	0.1	0.0	0.1	0.0
White Mountain Red Ware		46.6	2.7	61.0	-	0.0	0.0	0.0
Other Gray Nonlocal	25.8	7.8		124.0	0.0	0.0	-	0.0
Other Red Nonlocal	16.1	17.0		19.9	0.0	0.0	-	0.0
Other White Nonlocal	105.7	58.1		201.7	0.1	0.0	-	0.1
Polychrome	24.5	24.6		82.0	0.0	0.0	-	0.0
Unknown Gray	15.4	190.0		41.7	0.0	0.1	-	0.0
Unknown White	1.8	2.1		8.2	0.0	0.0	-	0.0
Unknown Pottery	6.7	16.2	31.1	33.6	0.0	0.0	0.1	0.0
TOTAL	126,912.6	215,210.7	33,096.5	319,192.5	100.0	100.0	100.0	100.0

Note: Percentages shown as totals may not add up to exactly 100% due to rounding.

Table 6.21. Count of Pottery Sherds from Floors, by Type and Temporal Component, Albert Porter Pueblo.

Pottery Type	Count				Percent			
	Late Pueblo II Period	Early Pueblo III Period	Late Pueblo III Period	Other	Late Pueblo II Period	Early Pueblo III Period	Late Pueblo III Period	Other
Indeterminate Local Gray		3		2	-	1.7	-	0.3
Mancos Corrugated Gray		3			-	1.7	-	-
Mesa Verde Corrugated Gray		3	4	36	-	1.7	10.3	6.1
Indeterminate Local Corrugated Gray	4	61	23	446	26.7	33.9	59.0	76.0
Mancos Black-on-white	2	5		17	13.3	2.8	-	2.9
McElmo Black-on-white	1	31	7	22	6.7	17.2	17.9	3.7
Mesa Verde Black-on-white		3	2		-	1.7	5.1	-
Early White Unpainted		1			-	0.6	-	-
Pueblo II White Painted				1	-	-	-	0.2
Pueblo III White Painted		9		2	-	5.0	-	0.3
Late White Painted		9		29	-	5.0	-	4.9
Late White Unpainted	8	52	2	32	53.3	28.9	5.1	5.5
Tsegi Orange Ware			1		-	-	2.6	-
TOTAL	15	180	39	587	100.0	100.0	100.0	100.0

Note: Percentages shown as totals may not add up to exactly 100% due to rounding.

Table 6.22. Weight of Pottery Sherds from Floors, by Type and Temporal Component, Albert Porter Pueblo.

	Weight (g)				Percent			
Pottery Type	Late Pueblo II Period	Early Pueblo III Period	Late Pueblo III Period	Other	Late Pueblo II Period	Early Pueblo III Period	Late Pueblo III Period	Other
Indeterminate Local Gray		13.05		12.5	-	0.5	-	0.2
Mancos Corrugated Gray		28.3			-	1.0	-	-
Mesa Verde Corrugated Gray		72.7	208.3	782.1	-	2.7	4.8	11.6
Indeterminate Local Corrugated Gray	40.2	665.26	409.5	3,805.8	31.5	24.3	9.4	56.6
Mancos Black-on-white	23	271.5		200.1	18.0	9.9	-	3.0
McElmo Black-on-white	5.5	801.6	564.2	939.4	4.3	29.3	12.9	14.0
Mesa Verde Black-on-white		41.09	2,368.3		-	1.5	54.3	-
Early White Unpainted		1.9			-	0.1	-	-
Pueblo II White Painted				2.8	-	-	-	0.0
Pueblo III White Painted		179.1		67.5	-	6.6	-	1.0
Late White Painted		126.7		546.4	-	4.6	-	8.1
Late White Unpainted	58.9	533.05	13.7	370.8	46.2	19.5	0.3	5.5
Tsegi Orange Ware			794.1		-	-	18.2	-
TOTAL	127.6	2,734.25	4,358.1	6,727.4	100.0	100.0	100.0	100.0

Table 6.23. Count of Pottery Sherds by Ware and Type from Selected Great House Contexts, Albert Porter Pueblo.

		Count							
Ware Form	Type	NST 123	NST 133	NST 152	NST 154	NST 157	STR 158	NST 161	NST 174
Gray Ware	Chapin Gray	1	1				1		
Gray Ware	Indeterminate Local Gray	48	101	21	30	21	59	33	9
Corrugated	Mancos Corrugated Gray	3	3	8	5	5	2	2	1
Corrugated	Mesa Verde Corrugated Gray	4	11	120	4		4	6	2
Corrugated	Indeterminate Local Corrugated Gray	473	523	322	132	147	323	282	48
White Ware	Cortez Black-on-white						4		
White Ware	Mancos Black-on-white	37	47	36	34	15	46	41	5
White Ware	McElmo Black-on-white	23	19	29	1	2	11	18	4
White Ware	Mesa Verde Black-on-white	10	7	26				3	
White Ware	Early White Unpainted		1	1			13	2	1
White Ware	Pueblo II White Painted	2	5	1	2		1	1	
White Ware	Pueblo III White Painted	16	34	26	8	4	4	10	1
White	Late White	72	79	43	8	9	69	31	5

	Percent							
Pottery Types	NST 123	NST 133	NST 152	NST 154	NST 157	STR 158	NST 161	NST 174
Chapin Gray	0.1	0.1	-	-	-	0.2	-	-
Indeterminate Local Gray	5.8	10.4	2.9	11.6	9.3	9.0	6.3	10.2
Mancos Corrugated Gray	0.4	0.3	1.1	1.9	2.2	0.3	0.4	1.1
Mesa Verde Corrugated Gray	0.5	1.1	16.3	1.6	-	0.6	1.1	2.3
Indeterminate Local Corrugated Gray	57.5	53.9	43.8	51.2	65.0	49.5	53.6	54.5
Cortez Black-on-white	-	-	-	-	-	0.6	-	-
Mancos Black-on-white	4.5	4.8	4.9	13.2	6.6	7.1	7.8	5.7
McElmo Black-on-white	2.8	2.0	3.9	0.4	0.9	1.7	3.4	4.5
Mesa Verde Black-on-white	1.2	0.7	3.5	-	-	-	0.6	-
Early White Unpainted	-	0.1	0.1	-	-	2.0	0.4	1.1
Pueblo II White Painted	0.2	0.5	0.1	0.8	-	0.2	0.2	-
Pueblo III White Painted	1.9	3.5	3.5	3.1	1.8	0.6	1.9	1.1
Late White	8.8	8.1	5.8	3.1	4.0	10.6	5.9	5.7

		Count							
Ware Form	Type	NST 123	NST 133	NST 152	NST 154	NST 157	STR 158	NST 161	NST 174
Ware	Painted								
White Ware	Late White Unpainted	121	136	101	33	22	110	94	11
White Ware	Indeterminate Local White Painted							1	
Red Ware	Abajo Red-on-orange						1		
Red Ware	Deadmans Black-on-red						2		
Red Ware	Indeterminate Local Red Painted					1		1	
Red Ware	Indeterminate Local Red Unpainted		1	2			1	1	
Nonlocal	Tsegi Orange Ware		1				1		
Nonlocal	White Mountain Red Ware		1						
Nonlocal	Other White Nonlocal								1
Nonlocal	Polychrome	1			1				
Ware unknown	Unknown Gray	11							
TOTAL		822	970	736	258	226	652	526	88

	Percent							
Pottery Types	NST 123	NST 133	NST 152	NST 154	NST 157	STR 158	NST 161	NST 174
Painted								
Late White Unpainted	14.7	14.0	13.7	12.8	9.7	16.9	17.9	12.5
Indeterminate Local White Painted	-	-	-	-	-	-	0.2	-
Abajo Red-on-orange	-	-	-	-	-	0.2	-	-
Deadmans Black-on-red	-	-	-	-	-	0.3	-	-
Indeterminate Local Red Painted	-	-	-	-	0.4	-	0.2	-
Indeterminate Local Red Unpainted	-	0.1	0.3	-	-	0.2	0.2	-
Tsegi Orange Ware	-	0.1	-	-	-	0.2	-	-
White Mountain Red Ware	-	0.1	-	-	-	-	-	-
Other White Nonlocal	-	-	-	-	-	-	-	1.1
Polychrome	0.1	-	-	0.4	-	-	-	-
Unknown Gray	1.3	-	-	-	-	-	-	-
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Note: Percentages shown as totals may not add up to exactly 100% due to rounding. NST = Nonstructure; STR = Structure.

Table 6.24. Direct Evidence of Pottery Production by Architectural Block, Albert Porter Pueblo.

	Mineral		Other Ceramic		Polishing Stone		Unfired Clay		Corrugated					
Architectural Block	Count	Weight (g)	Count	Weight (g)	Count	Weight (g)	Count	Weight (g)	Count	Weight (g)	Total Count*	Total Weight* (g)	Ratio Count	Ratio Weight
100	98	566.1	48	178.5	32	933.4	0	0	43,489	290,039.4	178	1,678.0	244.3	172.9
200	5	6.9	2	12.4	0	0	0	0	4,195	20,553	7	19.3	599.3	1,064.9
300	4	7	4	5.5	1	16.7	0	0	3,105	15,086.4	9	29.2	345.0	516.7
400	1	4.1	2	2.9	3	85.3	0	0	2,690	17,982.2	6	92.3	448.3	194.8
500	4	6.7	1	2.2	2	29.9	0	0	3,533	17,327.8	7	38.8	504.7	446.6
600	3	83.65	0	0	1	21.3	90	272.1	2,001	12,475.9	94	377.05	21.3	33.1
800	7	71	14	63.3	9	265.1	1	0.3	7,811	50,693.2	31	399.7	252.0	126.8
900	14	34.1	2	10.4	6	161.5	0	0	8,249	48,339.9	22	206	375.0	234.7
1000	3	9.9	4	21.2	3	21.7	0	0	7,180	38,734.1	10	52.8	718.0	733.6
1100	6	34.8	4	5.2	1	21.8	0	0	3,704	17,292.1	11	61.8	336.7	279.8

* Not including corrugated.

Table 6.25. Chipped-Stone Tool Count and Percentage by Raw Material, Albert Porter Pueblo.

(a) Counts

Type	Agate/ Chalcedony	Brushy Basin Chert	Burro Canyon Chert	Caliche	Conglomerate	Fossil	Gypsum/ Calcite/Barite	Morrison Silicified Sandstone	Dakota/ Burro Canyon Silicified Sandstone	Morrison Chert	Morrison Mudstone	Nonlocal Chert/ Siltstone
Biface	10	1	23		1			4	55	9	4	2
Core		27	3					184	73	43	220	
Other Chipped-stone Tool								6	4	2	4	1
Modified Core								11	2	1	5	
Peckingstone			1		2			275	63	10	105	
Projectile Point	28	4	21					4	98	13	2	3
Single-bitted Axe								5				
Bulk Chipped Stone	315	1,608	495	1	56	12	2	36,757	4,396	3,762	16,451	7
TOTAL	353	1,640	543	1	59	12	2	37,246	4,691	3,840	16,791	13

(a) Counts, continued

Type	Obsidian	Igneous	Petrified Wood	Dakota Mudstone	Quartz	Red Jasper	Slate/Shale	Sandstone	Unknown Chert/ Siltstone	Unknown Stone	Unknown Silicified Sandstone	Narbona Pass Chert	TOTAL
Biface	1		1			8			13				132
Core		1		135				2	9	1	3		701
Other Chipped-stone Tool				1									18
Modified Core				11					1				31
Peckingstone		3		40					3	2	5		509
Projectile Point	4		4		1	8			28	3	1		222
Single-bitted Axe													5
Bulk Chipped Stone	3	23	11	10,385	14	40	27	370	92	19	31	17	74,894
TOTAL	8	27	16	10,572	15	56	27	372	146	25	40	17	76,512

(b) Percent of counts

Type	Agate/ Chalcedony	Brushy Basin Chert	Burro Canyon Chert	Caliche	Conglomerate	Fossil	Gypsum/ Calcite/Barite	Morrison Silicified Sandstone	Dakota/ Burro Canyon Silicified Sandstone	Morrison Chert	Morrison Mudstone	Nonlocal Chert/ Siltstone
Biface	2.8	0.1	4.2	-	1.7	-	-	0.0	1.2	0.2	0.0	15.4
Core	-	1.6	0.6	-	-	-	-	0.5	1.6	1.1	1.3	-
Other Chipped-stone Tool	-	-	-	-	-	-	-	0.0	0.1	0.1	0.0	7.7
Modified Core	-	-	-	-	-	-	-	0.0	0.0	0.0	0.0	-
Peckingstone	-	-	0.2	-	3.4	-	-	0.7	1.3	0.3	0.6	-
Projectile Point	7.9	0.2	3.9	-	-	-	-	0.0	2.1	0.3	0.0	23.1
Single-bitted Axe	-	-	-	-	-	-	-	0.0	-	-	-	-
Bulk Chipped Stone	89.2	98.0	91.2	100.0	94.9	100.0	100.0	98.7	93.7	98.0	98.0	53.8
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

(b) Percent of counts, continued

Type	Obsidian	Igneous	Petrified Wood	Dakota Mudstone	Quartz	Red Jasper	Slate/Shale	Sandstone	Unknown Chert/ Siltstone	Unknown Stone	Unknown Silicified Sandstone	Narbona Pass Chert	TOTAL
Biface	12.5	-	6.3	-	-	14.3	-	-	8.9	-	-	-	0.2
Core	-	3.7	-	1.3	-	-	-	0.5	6.2	4.0	7.5	-	0.9
Other Chipped-stone Tool	-	-	-	0.0	-	-	-	-	-	-	-	-	0.0
Modified Core	-	-	-	0.1	-	-	-	-	0.7	-	-	-	0.0
Peckingstone	-	11.1	-	0.4	-	-	-	-	2.1	8.0	12.5	-	0.7
Projectile Point	50.0	-	25.0	-	6.7	14.3	-	-	19.2	12.0	2.5	-	0.3
Single-bitted Axe	-	-	-	-	-	-	-	-	-	-	-	-	0.0
Bulk Chipped Stone	37.5	85.2	68.8	98.2	93.3	71.4	100.0	99.5	63.0	76.0	77.5	100.0	97.9
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 6.26. Chipped-Stone Tool Weight by Raw Material, Albert Porter Pueblo.

(a) Weight

Type	Agate/ Chalcedony	Brushy Basin Chert	Burro Canyon Chert	Caliche	Conglomerate	Fossil	Gypsum/ Calcite/Barite	Morrison Silicified Sandstone	Dakota/ Burro Canyon Silicified Sandstone	Morrison Chert	Morrison Mudstone	Nonlocal Chert/ Siltstone
Biface	14.9	0.7	51.8		3.7			8.3	142.7	37.2	7.0	4.6
Core		861.7	319.1					19,926.7	6,940.8	1,664.7	16,798.0	
Other Chipped-stone Tool								440.8	101.1	29.4	90.1	5.5
Modified Core		65.8						833.2	151.1	83.0	387.3	
Peckingstone			174.4		542.4			52,415.2	12,278.2	954.6	12,717.5	
Projectile Point	20.4	6.0	21.3					7.6	93.5	11.5	2.2	7.7
Single-bitted Axe								1,712.9				
Bulk Chipped Stone	472.6	7,675.3	1,615.0	5.2	452.5	49.7	1.5	197,682.6	21,778.8	11,509.8	84,345.7	9.6
TOTAL	507.8	8,609.5	2,181.6	5.2	998.6	49.7	1.5	273,027.3	41,486.2	14,290.2	114,347.8	27.4

(a) Weight, continued

Type	Obsidian	Igneous	Petrified Wood	Dakota Mudstone	Quartz	Red Jasper	Slate/Shale	Sandstone	Unknown Chert/ Siltstone	Unknown Stone	Unknown Silicified Sandstone	Narbona Pass Chert	TOTAL
Biface	0.2		7.3			15.8			19.7				313.9
Core		280.6		56,460.2				145.5	1,229.5	77.8	337.6		105,042.2
Other Chipped-stone Tool				256.3									923.2
Modified Core				2,188.1					64.2				3,772.7
Peckingstone		1,578.4		11,663.1					181.7	338.0	577.6		93,421.0
Projectile Point	4.2		2.5		0.3	5.2			33.5	6.8	0.8		223.5
Single-bitted Axe													1,712.9
Bulk Chipped Stone	9.2	235.7	11.0	75,164.5	63.1	47.9	71.8	3,361.2	288.7	88.0	630.4	55.5	405,625.3
TOTAL	13.6	2,094.7	20.8	145,732.2	63.4	68.9	71.8	3,506.7	1,817.3	510.5	1,546.4	55.5	611,034.8

(b) Percent of weight

Type	Agate/ Chalcedony	Brushy Basin Chert	Burro Canyon Chert	Caliche	Conglomerate	Fossil	Gypsum/ Calcite/Barite	Morrison Silicified Sandstone	Dakota/ Burro Canyon Silicified Sandstone	Morrison Chert	Morrison Mudstone	Nonlocal Chert/ Siltstone
Biface	2.9	0.0	2.4	-	0.4	-	-	0.0	0.3	0.3	0.0	16.8
Core	-	10.0	14.6	-	-	-	-	7.3	16.7	11.6	14.7	-
Other Chipped-stone Tool	-	-	-	-	-	-	-	0.2	0.2	0.2	0.1	20.1
Modified Core	-	0.8	-	-	-	-	-	0.3	0.4	0.6	0.3	-
Peckingstone	-	-	8.0	-	54.3	-	-	19.2	29.6	6.7	11.1	-
Projectile Point	4.0	0.1	1.0	-	-	-	-	0.0	0.2	0.1	0.0	28.1
Single-bitted Axe	-	-	-	-	-	-	-	0.6	-	-	-	-
Bulk Chipped Stone	93.1	89.1	74.0	100.0	45.3	100.0	100.0	72.4	52.5	80.5	73.8	35.0
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

(b) Percent of weight, continued

Type	Obsidian	Igneous	Petrified Wood	Dakota Mudstone	Quartz	Red Jasper	Slate/Shale	Sandstone	Unknown Chert/ Siltstone	Unknown Stone	Unknown Silicified Sandstone	Narbona Pass Chert	TOTAL
Biface	1.5	-	35.1	-	-	22.9	-	-	1.1	-	-	-	0.1
Core	-	13.4	-	38.7	-	-	-	4.1	67.7	15.2	21.8	-	17.2
Other Chipped-stone Tool	-	-	-	0.2	-	-	-	-	-	-	-	-	0.2
Modified Core	-	-	-	1.5	-	-	-	-	3.5	-	-	-	0.6
Peckingstone	-	75.4	-	8.0	-	-	-	-	10.0	66.2	37.4	-	15.3
Projectile Point	30.9	-	12.0	-	0.5	7.5	-	-	1.8	1.3	0.1	-	0.0
Single-bitted Axe	-	-	-	-	-	-	-	-	-	-	-	-	0.3
Bulk Chipped Stone	67.6	11.3	52.9	51.6	99.5	69.5	100.0	95.9	15.9	17.2	40.8	100.0	66.4
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Note: Percentages shown as totals may not add up to exactly 100% due to rounding.

Table 6.27. Projectile Point Data, Albert Porter Pueblo.

Provenience Designation Number	Field Specimen Number	Length (cm)	Width (cm)	Thick (cm)	Material Type	Reduction Description	Count	Weight (g)	Fill/ Assemblage Position	Fill/ Assemblage Type	Study Unit Number
17	14	2.69	1.58	0.22	Agate/chalcedony	Finished biface	1	0.7	fill	postabandonment deposit	502
160	18	1.85	0.95	0.23	Agate/chalcedony	Finished biface	1	0.4	fill	cultural deposit	502
162	4	2.30	1.59	0.33	Agate/chalcedony	Finished biface	1	0.9	fill	postabandonment deposit	107
215	7	2.91	1.50	0.32	Agate/chalcedony	Finished biface	1	1.0	fill	collapsed structure	502
282	7	1.60	1.24	0.8	Agate/chalcedony	Finished biface	1	0.4	fill	postabandonment deposit	119
352	19	2.35	1.08	0.31	Agate/chalcedony	Indeterminate reduction stage	1	0.6	fill	cultural deposit	139
360	9	2.55	1.55	0.35	Agate/chalcedony	Finished biface	1	1.1	fill	postabandonment deposit	118
635	5	1.80	0.99	0.22	Agate/chalcedony	Finished biface	1	0.3	fill	mixed deposit	117
964	11	2.60	1.05	0.21	Agate/chalcedony	Finished biface	1	0.6	fill	mixed deposit	111
1091	10	2.20	1.02	0.20	Agate/chalcedony	Finished biface	1	0.5	fill	mixed deposit	101
1137	6	1.84	1.09	0.23	Agate/chalcedony	Finished biface	1	0.4	fill	mixed deposit	101
1182	7	1.51	0.90	0.24	Agate/chalcedony	Indeterminate reduction stage	1	0.2	fill	mixed deposit	803
1192	5	2.61	1.22	0.38	Agate/chalcedony	Finished biface	1	0.9	fill	mixed deposit	1102
1192	7	1.38	1.02	0.21	Agate/chalcedony	Finished biface	1	0.3	fill	mixed deposit	1102

Provenience Designation Number	Field Specimen Number	Length (cm)	Width (cm)	Thick (cm)	Material Type	Reduction Description	Count	Weight (g)	Fill/ Assemblage Position	Fill/ Assemblage Type	Study Unit Number
1197	15	1.94	1.15	0.26	Agate/chalcedony	Finished biface	1	0.6	fill	cultural deposit	1103
1329	9	1.94	0.91	0.26	Agate/chalcedony	Finished biface	1	0.4	fill	collapsed structure	903
1481	22	2.37	1.09	0.30	Agate/chalcedony	Indeterminate reduction stage	1	0.9	fill	collapsed structure	115
1636	6	2.35	1.25	0.21	Agate/chalcedony	Finished biface	1	0.75	fill	mixed deposit	1042
1655	5	1.75	1.18	0.26	Agate/chalcedony	Finished biface	1	2.2	fill	mixed deposit	1041
1770	5	2.47	1.14	0.25	Agate/chalcedony	Finished biface	1	0.8	fill	cultural deposit	152
1931	6	2.10	1.2	0.23	Agate/chalcedony	Finished biface	1	0.6	fill	cultural deposit	141
2008	33	3.08	1.75	0.68	Agate/chalcedony	Finished biface	1	3.5	fill	cultural deposit	151
2054	7	2.55	1.45	0.24	Agate/chalcedony	Finished biface	1	0.9	fill	mixed deposit	170
2092	4	0.70	1.84	0.17	Agate/chalcedony	Indeterminate reduction stage	1	0.2	fill	collapsed structure	158
1183	2	5.30	2.37	0.55	Fossil	Finished biface	1	6.0	surface contact	postabandonment deposit	800
858	6	2.92	1.22	0.29	Brushy Basin Chert	Finished biface	1	0.7	fill	cultural deposit	901
881	8	2.34	0.79	0.24	Brushy Basin Chert	Finished biface	1	4.7	fill	mixed deposit	901
987	6	2.25	1.18	0.22	Brushy Basin Chert	Finished biface	1	0.4	fill	mixed deposit	801

Provenience Designation Number	Field Specimen Number	Length (cm)	Width (cm)	Thick (cm)	Material Type	Reduction Description	Count	Weight (g)	Fill/ Assemblage Position	Fill/ Assemblage Type	Study Unit Number
1289	7	0.93	1.38	0.33	Brushy Basin Chert	Finished biface	1	0.4	fill	mixed deposit	113
2008	34	No data	1.99	0.55	Morrison Silicified Sandstone	Finished biface	1	4.7	fill	cultural deposit	151
16	18	1.45	1.18	0.24	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.5	fill	cultural deposit	502
36	11	1.46	0.85	0.27	Burro Canyon Chert	Finished biface	1	0.4	fill	mixed deposit	201
74	6	2.84	1.51	0.33	Burro Canyon Chert	Finished biface	1	1.1	fill	cultural deposit	301
148	6	2.37	1.54	0.32	Burro Canyon Chert	Finished biface	1	1.0	fill	cultural deposit	401
160	17	2.77	1.21	0.27	Burro Canyon Chert	Finished biface	1	0.8	fill	cultural deposit	502
294	12	1.84	1.22	0.22	Burro Canyon Chert	Indeterminate reduction stage	1	0.5	fill	cultural deposit	103
295	6	0.91	1.26	0.20	Burro Canyon Chert	Finished biface	1	0.3	fill	postabandonment deposit	108
295	7	1.33	1.16	0.33	Burro Canyon Chert	Finished biface	1	0.6	fill	postabandonment deposit	108
472	7	5.15	1.30	0.25	Burro Canyon Chert	Finished biface	1	2.2	surface contact	mixed deposit	129
499	1	2.12	1.21	0.31	Burro Canyon Chert	Finished biface	1	0.5	surface contact	mixed deposit	1043
517	6	4.23	2.19	0.65	Burro Canyon Chert	Finished biface	1	5.9	fill	mixed deposit	801
632	4	0.86	1.39	0.25	Burro Canyon Chert	Finished biface	1	4.0	fill	collapsed structure	107
743	10	1.96	0.73	0.21	Burro Canyon Chert	Finished biface	1	0.32	fill	cultural deposit	901

Provenience Designation Number	Field Specimen Number	Length (cm)	Width (cm)	Thick (cm)	Material Type	Reduction Description	Count	Weight (g)	Fill/ Assemblage Position	Fill/ Assemblage Type	Study Unit Number
777	10	2.45	1.05	0.3	Burro Canyon Chert	Finished biface	1	0.8	fill	mixed deposit	102
981	7	2.10	1.34	0.32	Burro Canyon Chert	Finished biface	1	0.7	fill	mixed deposit	801
1127	13	2.35	1.22	0.24	Burro Canyon Chert	Finished biface	1	0.6	fill	cultural deposit	132
1157	6	1.60	0.99	0.23	Burro Canyon Chert	Finished biface	1	0.3	fill	collapsed structure	108
1393	1	2.04	1.30	0.31	Burro Canyon Chert	Finished biface	1	0.7	fill	collapsed structure	1104
1422	5	1.12	1.13	2.2	Burro Canyon Chert	Finished biface	1	0.32	fill	cultural deposit	106
1600	10	2.18	1.14	0.2	Burro Canyon Chert	Finished biface	1	0.6	fill	mixed deposit	104
1614	3	1.98	1.13	0.22	Burro Canyon Chert	Finished biface	1	0.5	fill	mixed deposit	1040
1640	6	2.64	1.26	0.44	Burro Canyon Chert	Finished biface	1	1.1	fill	mixed deposit	1042
1673	5	2.10	1.10	0.2	Burro Canyon Chert	Finished biface	1	0.5	fill	mixed deposit	1040
1689	10	1.79	1.46	0.27	Burro Canyon Chert	Finished biface	1	0.6	fill	mixed deposit	1042
1860	14	7.30	1.10	0.2	Burro Canyon Chert	Finished biface	1	0.2	fill	cultural deposit	155
1988	7	2.29	1.11	0.23	Burro Canyon Chert	Finished biface	1	0.6	fill	mixed deposit	104
2010	16	2.15	1.18	0.31	Burro Canyon Chert	Finished biface	1	0.8	fill	cultural deposit	151
2013	5	2.94	1.42	0.34	Burro Canyon Chert	Finished biface	1	1.2	fill	mixed deposit	1101
2036	4	2.09	1.29	0.27	Burro Canyon Chert	Finished biface	1	0.6	fill	cultural deposit	157

Provenience Designation Number	Field Specimen Number	Length (cm)	Width (cm)	Thick (cm)	Material Type	Reduction Description	Count	Weight (g)	Fill/ Assemblage Position	Fill/ Assemblage Type	Study Unit Number
32	5	2.25	1.28	0.21	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.7	fill	mixed deposit	201
40	4	2.41	1.43	0.30	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.8	fill	mixed deposit	201
44	7	2.08	1.41	0.32	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.6	fill	cultural deposit	401
44	10	1.42	1.40	0.28	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.6	fill	cultural deposit	401
60	8	1.23	1.05	0.27	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.4	fill	mixed deposit	401
88	5	1.59	0.95	0.26	Dakota/Burro Canyon Silicified Sandstone	Indeterminate reduction stage	1	0.3	fill	cultural deposit	401
135	6	2.00	1.16	0.26	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.8	fill	cultural deposit	401
150	1	2.81	1.01	0.27	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.7	fill	mixed deposit	402
185	5	1.80	1.26	0.31	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.6	fill	cultural deposit	401
189	4	1.56	1.22	0.28	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.5	fill	cultural deposit	401
191	6	0.74	0.75	0.19	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.2	fill	cultural deposit	103

Provenience Designation Number	Field Specimen Number	Length (cm)	Width (cm)	Thick (cm)	Material Type	Reduction Description	Count	Weight (g)	Fill/ Assemblage Position	Fill/ Assemblage Type	Study Unit Number
229	4	2.33	1.24	0.32	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.7	fill	postabandonment deposit	403
241	2	2.73	1.00	0.29	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.65	fill	postabandonment deposit	114
243	7	1.50	0.95	0.26	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.4	fill	postabandonment deposit	115
247	7	2.70	1.43	0.27	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.9	fill	postabandonment deposit	118
255	10	1.81	1.38	0.35	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.8	fill	postabandonment deposit	139
257	12	2.30	1.48	0.27	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	1.1	fill	postabandonment deposit	119
282	14	3.58	0.91	0.31	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	1.0	fill	postabandonment deposit	119
282	15	2.69	1.36	0.45	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	1.1	fill	postabandonment deposit	119
303	9	1.66	1.17	0.24	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.5	fill	cultural deposit	301
331	8	1.43	1.25	0.22	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.5	fill	collapsed structure	114
337	4	3.59	1.85	0.38	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	2.85	fill	cultural deposit	9002

Provenience Designation Number	Field Specimen Number	Length (cm)	Width (cm)	Thick (cm)	Material Type	Reduction Description	Count	Weight (g)	Fill/ Assemblage Position	Fill/ Assemblage Type	Study Unit Number
351	17	2.38	1.50	0.39	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	1.1	fill	collapsed structure	107
358	6	1.68	1.38	0.3	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.6	fill	collapsed structure	114
383	16	2.05	1.00	0.28	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.6	fill	cultural deposit	502
420	5	1.93	1.15	0.31	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.6	surface contact	mixed deposit	404
463	5	2.20	1.34	0.3	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.8	surface contact	mixed deposit	1001
472	8	2.40	1.35	0.25	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.7	surface contact	mixed deposit	129
478	4	5.53	2.27	0.56	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	6.6	surface contact	mixed deposit	1001
517	8	2.16	1.24	0.26	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.7	fill	mixed deposit	801
518	8	2.24	1.55	0.36	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	1.2	fill	mixed deposit	801
522	6	3.68	1.56	0.61	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	3.7	fill	cultural deposit	901
526	2	1.57	1.28	0.28	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.7	fill	cultural deposit	901

Provenience Designation Number	Field Specimen Number	Length (cm)	Width (cm)	Thick (cm)	Material Type	Reduction Description	Count	Weight (g)	Fill/ Assemblage Position	Fill/ Assemblage Type	Study Unit Number
538	12	1.10	1.30	0.25	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.4	fill	cultural deposit	901
542	8	2.71	1.14	0.26	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.6	fill	mixed deposit	801
552	8	1.80	1.38	0.29	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.7	fill	mixed deposit	901
586	6	1.50	0.90	0.25	Dakota/Burro Canyon Silicified Sandstone	Indeterminate reduction stage	1	0.2	fill	cultural deposit	601
592	4	1.23	1.10	0.2	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	1.4	fill	mixed deposit	601
623	11	3.98	1.56	0.53	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	2.61	fill	postabandonment deposit	116
623	12	4.82	2.25	5.2	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	6.6	fill	postabandonment deposit	116
629	4	1.75	1.45	0.38	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.8	fill	mixed deposit	112
631	10	2.23	1.12	0.31	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.7	fill	collapsed structure	118
635	3	1.48	1.98	0.41	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	1.2	fill	mixed deposit	117
678	14	3.44	1.30	0.28	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	1.3	fill	collapsed structure	115

Provenience Designation Number	Field Specimen Number	Length (cm)	Width (cm)	Thick (cm)	Material Type	Reduction Description	Count	Weight (g)	Fill/ Assemblage Position	Fill/ Assemblage Type	Study Unit Number
687	5	3.28	1.54	0.3	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	1.4	fill	postabandonment deposit	305
714	3	3.00	1.40	0.3	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.8	fill	mixed deposit	201
763	13	2.34	1.90	0.43	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	2.1	fill	mixed deposit	903
766	8	1.86	1.42	0.35	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.8	fill	cultural deposit	901
775	6	1.84	1.24	0.34	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.9	fill	cultural deposit	102
783	7	1.64	1.29	0.26	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.52	fill	mixed deposit	102
785	5	2.20	1.20	0.3	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.8	fill	cultural deposit	102
856	3	1.53	1.09	0.27	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.3	fill	mixed deposit	901
872	58	1.71	0.89	0.22	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.3	fill	collapsed structure	115
884	8	1.66	1.26	0.22	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.6	fill	mixed deposit	901
903	10	1.62	1.11	0.27	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.4	fill	mixed deposit	101

Provenience Designation Number	Field Specimen Number	Length (cm)	Width (cm)	Thick (cm)	Material Type	Reduction Description	Count	Weight (g)	Fill/ Assemblage Position	Fill/ Assemblage Type	Study Unit Number
921	9	1.25	1.17	0.29	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.4	fill	mixed deposit	101
949	10	0.30	0.61	0.14	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	No data	fill	cultural deposit	901
964	12	1.21	0.96	0.23	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.3	fill	mixed deposit	111
1022	8	2.64	1.26	0.24	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.8	fill	mixed deposit	801
1037	17	1.40	0.90	0.25	Dakota/Burro Canyon Silicified Sandstone	Indeterminate reduction stage	1	0.4	fill	mixed deposit	904
1076	2	3.08	1.53	0.47	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	2.4	surface contact	postabandonment deposit	900
1160	9	1.25	0.91	0.22	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.3	fill	cultural deposit	130
1192	2	1.85	1.16	0.21	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.4	fill	mixed deposit	1102
1192	6	2.00	1.31	0.26	Dakota/Burro Canyon Silicified Sandstone	Analysis not applicable	1	0.6	fill	mixed deposit	1102
1197	23	1.25	1.24	0.3	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.4	fill	cultural deposit	1103
1222	22	2.06	1.20	0.34	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.7	fill	mixed deposit	203

Provenience Designation Number	Field Specimen Number	Length (cm)	Width (cm)	Thick (cm)	Material Type	Reduction Description	Count	Weight (g)	Fill/ Assemblage Position	Fill/ Assemblage Type	Study Unit Number
1227	7	1.84	0.92	0.30	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.5	fill	collapsed structure	204
1253	7	1.79	1.22	0.25	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.5	fill	mixed deposit	124
1277	19	2.00	1.20	0.29	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.8	fill	cultural deposit	130
1279	9	1.97	2.47	0.58	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	2.7	fill	cultural deposit	134
1281	57	2.26	1.01	0.24	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.6	fill	collapsed structure	110
1289	6	2.45	2.00	0.47	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	2.6	fill	mixed deposit	113
1305	46	2.06	1.44	0.35	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.9	fill	cultural deposit	1039
1305	53	2.50	0.90	0.32	Dakota/Burro Canyon Silicified Sandstone	Primary thinned preform (flake scars to centerline)	1	0.7	fill	cultural deposit	1039
1386	4	3.03	1.31	0.32	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	1.3	surface contact	cultural deposit	904
1391	8	1.82	1.46	0.24	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.6	fill	mixed deposit	1037

Provenience Designation Number	Field Specimen Number	Length (cm)	Width (cm)	Thick (cm)	Material Type	Reduction Description	Count	Weight (g)	Fill/ Assemblage Position	Fill/ Assemblage Type	Study Unit Number
1414	4	2.16	0.79	0.34	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.7	fill	mixed deposit	106
1422	4	3.16	1.25	0.28	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	1.01	fill	cultural deposit	106
1426	6	3.20	1.68	0.25	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	1.5	fill	mixed deposit	106
1426	7		0.89	0.39	Dakota/Burro Canyon Silicified Sandstone	Indeterminate reduction stage	1	0.7	fill	mixed deposit	106
1435	8	2.82	1.05	0.28	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.8	fill	collapsed structure	113
1467	6	2.12	1.31	0.44	Dakota/Burro Canyon Silicified Sandstone	Indeterminate reduction stage	1	1.2	fill	cultural deposit	106
1560	4	2.10	1.80	0.35	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.7	fill	mixed deposit	142
1560	5	1.68	1.10	0.25	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.4	fill	mixed deposit	142
1594	5	1.74	0.86	0.25	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.3	fill	mixed deposit	104
1600	11	2.09	1.31	0.28	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.6	fill	mixed deposit	104
1604	5	2.12	1.20	0.32	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.8	fill	mixed deposit	104

Provenience Designation Number	Field Specimen Number	Length (cm)	Width (cm)	Thick (cm)	Material Type	Reduction Description	Count	Weight (g)	Fill/ Assemblage Position	Fill/ Assemblage Type	Study Unit Number
1635	5	0.85	1.09	0.16	Dakota/Burro Canyon Silicified Sandstone	Indeterminate reduction stage	1	0.2	surface contact	mixed deposit	1042
1688	6	2.38	1.12	0.3	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.9	fill	mixed deposit	1042
1689	9	2.50	1.50	0.35	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	1.5	fill	mixed deposit	1042
1700	8	2.45	1.30	0.33	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.9	fill	mixed deposit	1043
1719	8	1.64	1.42	0.23	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.5	fill	cultural deposit	151
1730	8	3.21	1.36	0.51	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	2.1	fill	mixed deposit	149
1766	1	1.87	1.07	0.22	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.4	fill	construction deposit	9018
1799	7	2.04	1.28	0.27	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.7	fill	mixed deposit	104
1880	7	2.35	1.50	0.37	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.9	fill	mixed deposit	1101
1900	7	2.00	1.20	0.4	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	1.2	fill	mixed deposit	1101
1991	9	1.8	1.70	0.23	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	2.2	fill	mixed deposit	144

Provenience Designation Number	Field Specimen Number	Length (cm)	Width (cm)	Thick (cm)	Material Type	Reduction Description	Count	Weight (g)	Fill/ Assemblage Position	Fill/ Assemblage Type	Study Unit Number
2000	8	2.71	1.10	0.29	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.8	fill	cultural deposit	152
2000	9	2.21	1.19	0.30	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.7	fill	cultural deposit	152
2006	23	1.62	1.26	0.23	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.4	fill	cultural deposit	151
2008	35	3.79	1.66	0.42	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	1.9	fill	cultural deposit	151
2010	29	1.55	1.21	0.25	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.6	fill	cultural deposit	151
2155	8	1.86	0.83	0.24	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.3	fill	mixed deposit	104
2185	11	2.43	1.32	0.23	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.7	fill	cultural deposit	162
2187	4	2.24	1.08	0.31	Dakota/Burro Canyon Silicified Sandstone	Finished biface	1	0.6	surface contact	mixed deposit	1000
60	5	4.00	1.40	0.41	Morrison Chert	Finished biface	1	1.8	fill	mixed deposit	401
289	14	2.24	1.16	0.25	Morrison Chert	Finished biface	1	0.7	fill	postabandonment deposit	113
340	12	1.8	1.08	0.35	Morrison Chert	Finished biface	1	0.6	fill	mixed deposit	118
447	4	1.81	1.29	0.30	Morrison Chert	Finished biface	1	0.6	surface contact	mixed deposit	1001

Provenience Designation Number	Field Specimen Number	Length (cm)	Width (cm)	Thick (cm)	Material Type	Reduction Description	Count	Weight (g)	Fill/ Assemblage Position	Fill/ Assemblage Type	Study Unit Number
562	11	2.35	1.22	0.20	Morrison Chert	Finished biface	1	0.6	fill	mixed deposit	904
637	4	1.69	1.02	0.25	Morrison Chert	Finished biface	1	0.4	fill	mixed deposit	110
1222	10	2.15	1.11	0.22	Morrison Chert	Finished biface	1	0.5	fill	mixed deposit	203
1355	7	2.00	1.50	0.25	Morrison Chert	Finished biface	1	0.6	fill	cultural deposit	106
1522	5	2.15	1.32	0.38	Morrison Chert	Primary thinned preform (flake scars to centerline)	1	0.9	fill	mixed deposit	106
1640	7	0.84	1.29	0.24	Morrison Chert	Finished biface	1	0.3	fill	mixed deposit	1042
1693	7	2.34	1.54	0.32	Morrison Chert	Finished biface	1	0.9	fill	cultural deposit	1043
1864	6	2.56	1.19	0.26	Morrison Chert	Finished biface	1	0.8	fill	mixed deposit	1101
2010	17	2.40	1.31	0.28	Morrison Chert	Finished biface	1	0.9	fill	cultural deposit	151
245	11	1.82	1.24	0.29	Morrison Mudstone	Finished biface	1	0.6	fill	postabandonment deposit	119
1391	7	2.45	1.50	0.30	Morrison Mudstone	Finished biface	1	1.0	fill	mixed deposit	1037
1656	7	2.06	1.08	0.37	Morrison Mudstone	Finished biface	1	0.7	fill	mixed deposit	1041
333	17	2.58	1.82	0.54	Nonlocal Chert/siltstone	Finished biface	1	2.4	fill	cultural deposit	139
915	13	1.80	2.47	0.56	Nonlocal Chert/siltstone	Finished biface	1	2.7	fill	mixed deposit	101

Provenience Designation Number	Field Specimen Number	Length (cm)	Width (cm)	Thick (cm)	Material Type	Reduction Description	Count	Weight (g)	Fill/ Assemblage Position	Fill/ Assemblage Type	Study Unit Number
322	9	1.60	1.00	0.20	Obsidian	Finished biface	1	0.2	fill	postabandonment deposit	119
771	10	1.60	1.00	0.25	Obsidian	Finished biface	1	0.4	fill	cultural deposit	102
854	6	1.90	0.64	0.21	Obsidian	Finished biface	1	0.1	fill	mixed deposit	901
133	5	2.30	1.20	0.24	Red Jasper	Finished biface	1	0.4	fill	cultural deposit	401
256	5	1.20	0.91	0.19	Red Jasper	Finished biface	1	0.2	fill	postabandonment deposit	118
743	8	1.97	0.92	0.30	Red Jasper	Unfinished biface (pressure flaking, notching)	1	0.4	fill	cultural deposit	901
1185	2	2.40	1.24	0.28	Red Jasper	Finished biface	1	0.7	fill	cultural deposit	804
1558	11	2.50	1.12	2.50	Red Jasper	Finished biface	1	0.6	fill	cultural deposit	151
2006	21	4.08	1.47	0.38	Red Jasper	Finished biface	1	1.9	fill	cultural deposit	151
2006	22	2.40	1.16	0.21	Red Jasper	Finished biface	1	0.6	fill	cultural deposit	151
2132	20	2.33	1.48	0.24	Red Jasper	Finished biface	1	0.7	fill	mixed deposit	151
2184	10	2.17	1.34	0.30	Red Jasper	Finished biface	1	0.7	fill	cultural deposit	162
281	8	1.84	0.93	0.25	Unknown Chert/siltstone	Finished biface	1	0.3	fill	postabandonment deposit	118
281	11	1.98	1.06	0.38	Unknown Chert/siltstone	Finished biface	1	0.4	fill	postabandonment deposit	118

Provenience Designation Number	Field Specimen Number	Length (cm)	Width (cm)	Thick (cm)	Material Type	Reduction Description	Count	Weight (g)	Fill/ Assemblage Position	Fill/ Assemblage Type	Study Unit Number
340	11	3.09	1.06	0.23	Unknown Chert/siltstone	Finished biface	1	0.5	fill	mixed deposit	118
543	8	2.90	1.35	0.34	Unknown Chert/siltstone	Finished biface	1	1.2	fill	mixed deposit	801
575	3	0.90	1.25	0.20	Unknown Chert/siltstone	Finished biface	1	0.27	fill	mixed deposit	801
648	22	1.60	1.00	0.30	Unknown Chert/siltstone	Finished biface	1	0.4	fill	mixed deposit	602
678	15	2.22	1.28	0.35	Unknown Chert/siltstone	Finished biface	1	0.7	fill	collapsed structure	115
744	6	1.93	1.19	0.28	Unknown Chert/siltstone	Finished biface	1	0.6	fill	cultural deposit	901
840	15	3.78	1.90	0.38	Unknown Chert/siltstone	Finished biface	1	2.0	fill	collapsed structure	115
855	8	1.60	1.50	0.25	Unknown Chert/siltstone	Finished biface	1	0.5	fill	cultural deposit	901
944	9	2.50	2.10	0.70	Unknown Chert/siltstone	Finished biface	1	6.1	fill	mixed deposit	901
947	2	3.09	1.97	0.52	Unknown Chert/siltstone	Finished biface	1	2.6	fill	mixed deposit	901
966	9	2.58	2.59	0.43	Unknown Chert/siltstone	Finished biface	1	2.7	fill	mixed deposit	110
995	6	1.64	1.05	0.23	Unknown Chert/siltstone	Finished biface	1	0.4	fill	cultural deposit	912
1026	8	2.11	1.10	0.20	Unknown Chert/siltstone	Finished biface	1	0.5	fill	mixed deposit	801
1183	3	4.83	1.50	0.83	Unknown Chert/siltstone	Finished biface	1	5.5	surface contact	postabandonment deposit	800
1281	5	1.69	1.32	0.16	Unknown Chert/siltstone	Finished biface	1	0.4	fill	collapsed structure	110
1323	5	2.90	1.57	0.30	Unknown Chert/siltstone	Finished biface	1	0.6	fill	collapsed structure	904

Provenience Designation Number	Field Specimen Number	Length (cm)	Width (cm)	Thick (cm)	Material Type	Reduction Description	Count	Weight (g)	Fill/ Assemblage Position	Fill/ Assemblage Type	Study Unit Number
1359	4	1.58	1.11	0.39	Unknown Chert/siltstone	Finished biface	1	0.7	fill	cultural deposit	106
1428	9	1.10	1.50	0.28	Unknown Chert/siltstone	Finished biface	1	0.4	fill	cultural deposit	106
2006	46	2.09	1.30	0.32	Unknown Chert/siltstone	Finished biface	1	0.9	fill	cultural deposit	151
2008	21	2.95	1.20	0.27	Unknown Chert/siltstone	Finished biface	1	0.85	fill	cultural deposit	151
250	7	2.54	1.23	0.29	Unknown Stone	Finished biface	1	0.77	fill	collapsed structure	109
1319	22	1.98	1.27	0.25	Unknown Stone	Finished biface	1	0.5	fill	cultural deposit	130
1076	1	2.45	1.17	0.25	Unknown Silicified Sandstone	Finished biface	1	0.8	surface contact	postabandonment deposit	900
2204	5	2.00	1.38	0.27	Unknown Silicified Sandstone	No data	1	0.7	fill	cultural deposit	1043
743	9	1.7	1.21	0.27	Narbona Pass Chert	Finished biface	1	0.5	fill	cultural deposit	901

Table 6.28. Ratios of Projectile Point Counts to Gray Ware Weights, by Architectural Block, Albert Porter Pueblo.

Architectural Block	Count	Percent	Gray Ware (g)	Ratio
100	115	51.8	300,003	0.0004
200	7	3.2	24,484	0.0003
300	3	1.4	16,917	0.0002
400	13	5.9	19,289	0.0007
500	6	2.7	19,630	0.0003
600	3	1.4	13,629	0.0002
700	0	0	53	-
800	14	6.3	56,602	0.0002
900	27	12.2	56,495	0.0005
1000	23	10.4	45,827	0.0005
1100	11	5.0	19,703	0.0006
TOTAL	222	100.0		

Note: Percentage shown as total may not add up to exactly 100% due to rounding.

Table 6.29. Ground-Stone Tools, Albert Porter Pueblo.

Category	Count	Percent by Count
Abrader	99	15.5
Basin Metate	2	0.3
Mano	79	12.4
Metate	36	5.6
Stone Mortar	4	0.6
One-hand Mano	14	2.2
Pestle	1	0.2
Slab Metate	32	5.0
Two-hand Mano	363	56.8
Trough Metate	9	1.4
TOTAL	639	100.0

Table 6.30. Ground-Stone Tools, by Architectural Block, Albert Porter Pueblo.

(a) Count

Architectural Block	Abrader	Basin Metate	Mano	Metate	One-hand Mano	Pestle	Slab Metate	Stone Mortar	Trough Metate	Two-hand Mano
100	36	2	38	17	9	1	20	3	4	179
200	5		2	2	2			1	2	12
300	6		2	3			1			9
400	2		2	2	1					13
500	1									4
600			2				1			12
700	1									
800	10		8	2			2			34
900	19		5	6	1		6		1	41
1000	14		14	4	1		2		2	41
1100	2		4							17
TOTAL	96	2	77	36	14	1	32	4	9	362

(b) Percent

Architectural Block	Abrader	Basin Metate	Mano	Metate	One-hand Mano	Pestle	Slab Metate	Stone Mortar	Trough Metate	Two-hand Mano
100	37.5	100.0	49.4	47.2	64.3	100.0	62.5	75.0	44.4	49.4
200	5.2	-	2.6	5.6	14.3	-	-	25.0	22.2	3.3
300	6.2	-	2.6	8.3	-	-	3.1	-	-	2.5
400	2.1	-	2.6	5.6	7.1	-	-	-	-	3.6
500	1.0	-	-	-	-	-	-	-	-	1.1
600	-	-	2.6	-	-	-	3.1	-	-	3.3
700	1.0	-	-	-	-	-	-	-	-	-
800	10.4	-	10.4	5.6	-	-	6.2	-	-	9.4
900	19.8	-	6.5	16.6	7.1	-	18.8	-	11.1	11.3
1000	14.6	-	18.2	11.1	7.1	-	6.2	-	22.2	11.3
1100	2.1	-	5.2	-	-	-	-	-	-	4.7
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Note: Percentages shown as totals may not add up to exactly 100% due to rounding.

Table 6.31. Ground-Stone Tools by Condition, Albert Porter Pueblo.

(a) Count

Artifact Category	Complete	Fragment	Incomplete	TOTAL
Abrader	54	38	3	95
Basin metate		2		2
Mano	2	70		72
Metate		35		35
Stone mortar	2		2	4
One-hand mano	7	6	1	14
Pestle		1		1
Slab metate	6	23	3	32
Two-hand mano	22	318	10	350
Trough metate		9		9
TOTAL	93	502	19	614

(b) Percent

Artifact Category	Complete	Fragment	Incomplete	TOTAL
Abrader	56.8	40.0	3.2	100.0
Basin metate	-	100.0	-	100.0
Mano	2.8	97.2	-	100.0
Metate	-	100.0	-	100.0
Stone mortar	50.0	-	50.0	100.0
One-hand mano	50.0	42.9	7.1	100.0
Pestle	-	100.0	-	100.0
Slab metate	18.8	71.9	9.4	100.0
Two-hand mano	6.3	90.9	2.9	100.0
Trough metate	-	100.0	-	100.0

Table 6.32. Ground-Stone Tools by Provenience, Albert Porter Pueblo.

(a) Count

Provenience	Abrader	Basin Metate	Mano	Metate	Stone Mortar	One-hand Mano	Pestle	Slab Metate	Two-hand Mano	Trough Metate
Architectural Deposit								1		
Fill	92	2	65	28	4	10	1	27	311	8
Other			1						2	
Surface Contact	6		13	8		5		4	49	1
TOTAL	98	2	79	36	4	15	1	32	362	9

(b) Percent

Provenience	Abrader	Basin Metate	Mano	Metate	Stone Mortar	One-hand Mano	Pestle	Slab Metate	Two-hand Mano	Trough Metate
Architectural Deposit	-	-	-	-	-	-	-	3.1	-	-
Fill	93.9	100.0	82.3	77.8	100.0	66.7	100.0	84.4	85.9	88.9
Other	-	-	1.3	-	-	-	-	-	0.6	-
Surface Contact	6.1	-	16.5	22.2	-	33.3	-	12.5	13.5	11.1
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 6.33. Battered and Polished Tools by Architectural Block, Albert Porter Pueblo.

(a) Count

Architectural Block	Axe	Axe/Maul	Hammerstone	Maul	Peckingstone	Polishing Stone	Polishing/ Hammerstone	Single-bitted Axe	Tchamahia
100	6	11	34	5	255	33	7	2	10
200	2		1		28				3
300			1		14	2		1	2
400		1	1		18	3	1	2	
500		1	1		11	2			1
600			1		10	1			
800	1	1	3		41	9	1		3
900		2	2		46	5			
1000	1	3	4	1	68	3	1		2
1100	1		2		18	1			
TOTAL	11	19	50	6	509	59	10	5	21

(b) Percent

Architectural Block	Axe	Axe/Maul	Hammerstone	Maul	Peckingstone	Polishing Stone	Polishing/ Hammerstone	Single-bitted Axe	Tchamahia
100	54.5	57.9	68.0	83.3	50.1	55.9	70.0	40.0	47.6
200	18.2	-	2.0	-	5.5		-	-	14.3
300	-	-	2.0	-	2.8	3.4	-	20.0	9.5
400	-	5.2	2.0	-	3.5	5.1	10.0	40.0	-
500	-	5.2	2.0	-	2.2	3.4	-	-	4.8
600	-	-	2.0	-	2.0	0.2	-	-	-
800	9.1	5.2	6.0	-	8.1	16.4	10.0	-	14.3
900	-	10.5	4.0	-	9.0	9.1	-	-	-
1000	9.1	15.8	8.0	16.7	13.4	5.1	10.0	-	9.5
1100	9.1	-	4.0	-	3.5	0.2	-	-	-
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Note: Percentages shown as totals may not add up to exactly 100% due to rounding.

Table 6.34. Ratios of Battered/Polished Tools to Gray Ware Weights from Architectural Block 100 and Architectural Blocks 200–1100.

	Axe	Axe/Maul	Hammerstone	Maul	Peckingstone	Polishing Stone	Polishing/ Hammerstone	Single-bitted Axe	Tchamahia
Architectural Block 100	0.00002	0.00004	0.00011	0.00002	0.00085	0.00011	0.00002	0.00001	0.00003
Architectural Blocks 200–1100	0.00002	0.00003	0.00006	0	0.00093	0.0001	0.00001	0.00001	0.00004

Table 6.35. Battered/Polished Tools by Depositional Context, Albert Porter Pueblo.

	Count				Percent			
Provenience	Hammerstone	Maul	Polishing Stone	Polishing/ Hammerstone	Hammerstone	Maul	Polishing Stone	Polishing/ Hammerstone
Fill (excludes roof fall and below, when present)	20	3	25	4	0.21	0.20	0.17	0.22
Midden	12	2	23	2	0.13	0.13	0.16	0.11
Roof fall and Below	32	5	48	6	0.33	0.33	0.33	0.33
Surface	32	5	48	6	0.33	0.33	0.33	0.33
TOTAL	96	15	144	18	1.00	1.00	1.00	1.00

Table 6.36. Stone Disks Collected from Albert Porter Pueblo.

Study Unit	Provenience Designation Number	Field Specimen Number	Count	Weight (g)	Study Unit Type	Fill Assemblage Position (General)	Fill Assemblage Position (Specific)	Fill Assemblage Type (General)	Fill Assemblage Type (Specific)
401	134	5	1	33.7	Nonstructure	Fill	Upper	Cultural Deposit	Secondary Refuse
402	228	6	1	85.1	Structure	Fill	Above Wall/roof Fall	Mixed Deposit	Not Further Specified
139	333	16	1	4.2	Nonstructure	Fill	Above Wall/roof Fall	Cultural Deposit	Secondary Refuse
303	372	7	1	10.3	Structure	Fill	Above Wall/roof Fall	Postabandonment Deposit	Natural Processes
404	420	6	1	27.5	Arbitrary	Surface Contact	Modern Ground Surface	Mixed Deposit	Recent Disturbance
801	578	8	1	11.4	Nonstructure	Fill	Upper	Mixed Deposit	Postabandonment and Cultural Refuse
201	615	5	1	45.7	Nonstructure	Fill	Upper	Mixed Deposit	Postabandonment and Cultural Refuse
903	763	14	1	60.9	Structure	Fill	Upper	Mixed Deposit	Postabandonment and Cultural Refuse
102	775	25	1	55.2	Nonstructure	Fill	Upper	Cultural Deposit	Secondary Refuse
115	840	5	1	245.6	Structure	Fill	Roof Fall	Collapsed Structure	With Mixed Refuse
901	885	3	1	1.3	Nonstructure	Fill	Upper	Mixed Deposit	Postabandonment and Cultural Refuse
101	901	4	1	103.3	Nonstructure	Fill	Upper	Mixed Deposit	Postabandonment and Cultural Refuse

Study Unit	Provenience Designation Number	Field Specimen Number	Count	Weight (g)	Study Unit Type	Fill Assemblage Position (General)	Fill Assemblage Position (Specific)	Fill Assemblage Type (General)	Fill Assemblage Type (Specific)
101	909	11	1	122.4	Nonstructure	Fill	Upper	Mixed Deposit	Postabandonment and Cultural Refuse
801	1014	1	2	1.7	Nonstructure	Fill	Lower	Mixed Deposit	Postabandonment and Cultural Refuse
132	1127	6	1	89.8	Nonstructure	Fill	Above Wall/roof Fall	Cultural Deposit	Mixed Refuse
110	1281	11	1	85	Structure	Fill	Roof Fall	Collapsed Structure	With Mixed Refuse
113	1285	11	1	66.8	Structure	Fill	Wall Fall	Mixed Deposit	Postabandonment and Cultural Refuse
151	1711	18	1	73.2	Nonstructure	Fill	Above Wall/roof Fall	Cultural Deposit	Secondary Refuse
1101	1890	6	1	11.9	Nonstructure	Fill	Upper	Mixed Deposit	Postabandonment and Cultural Refuse
151	2006	55	1	41.1	Nonstructure	Fill	Above Wall/roof Fall	Cultural Deposit	Secondary Refuse
151	2008	61	1	68.5	Nonstructure	Fill	Above Wall/roof Fall	Cultural Deposit	Secondary Refuse
151	2010	31	1	6.9	Nonstructure	Fill	Above Wall/roof Fall	Cultural Deposit	Secondary Refuse
151	2010	49	1	44.6	Nonstructure	Fill	Above Wall/roof Fall	Cultural Deposit	Secondary Refuse
1101	2072	5	1	28.8	Nonstructure	Fill	Lower	Mixed Deposit	Postabandonment and Cultural Refuse

Table 6.37. Other Stone Artifacts, Albert Porter Pueblo.

PD No.	FS No.	Point Location No.	Material Type	Condition	Count	Weight (g)	Comment	Study Unit Type	Study Unit No.	Fill Assemblage (General)
0	0		Morrison Silicified Sandstone	Fragmentary	1	0.9	Denticulate object–ornament? Derives from a subsurface context in Nonstructure 801, Stratum 1.	General Site	0000	Not Applicable
16	36		Unknown Stone	Fragmentary	1	0.5	Originally entered as PD 56, FS 5	Structure	502	Fill
28	3		Morrison Chert	Fragmentary	1	0.3		Structure	302	Fill
61	4		Clay	Complete	1	6.9		Nonstructure	201	Surface Contact
72	5		Pigment	Complete	1	1.7		Nonstructure	301	Fill
74	12		Unknown Stone	Fragmentary	1	0.6	Possibly modified bullet-shaped rock	Nonstructure	301	Fill
76	4		Morrison Silicified Sandstone	Fragmentary	1	10.0		Nonstructure	301	Fill
94	5		Unknown Chert/ siltstone	Fragmentary	1	45.7	Possible lightning stone	Nonstructure	301	Fill
100	7		Sandstone	Complete	1	7.1		Nonstructure	301	Fill
107	4		Sandstone	Complete	1	21.3		Nonstructure	301	Fill
108	7		Sandstone	Complete	1	2.5	Sandstone ball	Structure	302	Fill
110	6		Unknown Chert/ siltstone	Fragmentary	1	1.2		Nonstructure	301	Fill
122	5		Dakota Mudstone	Fragmentary	1	92.7	Ground into cydrillic shape	Nonstructure	201	Fill
126	6		Unknown Stone	Fragmentary	1	10.8		Nonstructure	201	Fill
144	5		Not Applicable	Not Applicable	1	12.8		Nonstructure	401	Fill
162	9		Sandstone	Complete	1	73.1	Shaft sharpener	Structure	107	Fill

PD No.	FS No.	Point Location No.	Material Type	Condition	Count	Weight (g)	Comment	Study Unit Type	Study Unit No.	Fill Assemblage (General)
162	16		Dakota Mudstone	Incomplete	1	1.5	Possibly ground/shaped; triangular	Structure	107	Fill
166	4		Morrison Silicified Sandstone	Fragmentary	1	0.5		Structure	109	Fill
170	4		Igneous	Fragmentary	1	119.2		Nonstructure	103	Fill
176	10		Sandstone	Fragmentary	1	2.5		Nonstructure	103	Fill
217	21		Unknown Stone	Fragmentary	1	10.9	Edge modification	Structure	502	Fill
219	11		Unknown Stone	Fragmentary	1	4.8	Red, harder than pigment	Structure	502	Fill
234	4		Slate/shale	Fragmentary	1	2.7		Nonstructure	301	Fill
243	11		Quartz	Fragmentary	1	6.2		Structure	115	Fill
245	5		Unknown Chert/ siltstone	Fragmentary	1	0.7		Structure	119	Fill
247	26		Not Applicable	Not Applicable	1	18.4		Structure	118	Fill
250	3		Slate/shale	Fragmentary	1	63.0		Structure	109	Fill
258	8		Unknown Chert/ siltstone	Incomplete	1	1.2		Structure	107	Fill
281	5		Sandstone	Fragmentary	1	8.0		Structure	118	Fill
285	43		Slate	Incomplete	1	13.1		Nonstructure	139	Fill
289	22		Morrison Mudstone	Fragmentary	1	2.9	Possible tchamahia fragment	Structure	113	Fill
304	4		Sandstone	Fragmentary	1	87.9		Structure	302	Fill
322	5		Pigment	Incomplete	1	5.1	Possible Morrison Siltstone	Structure	119	Fill
331	7		Unknown Chert/ siltstone	Fragmentary	1	0.8		Structure	114	Fill
334	4		Sandstone	Complete	1	492.9		Nonstructure	9002	Fill

PD No.	FS No.	Point Location No.	Material Type	Condition	Count	Weight (g)	Comment	Study Unit Type	Study Unit No.	Fill Assemblage (General)
334	14		Slate/shale	Fragmentary	1	0.5		Nonstructure	9002	Fill
334	15		Slate/shale	Fragmentary	1	0.5		Nonstructure	9002	Fill
337	24		Unknown Stone	Fragmentary	1	2.0		Nonstructure	9002	Fill
351	25	11	Obsidian	Complete	1	2.0	Rectangular, worked obsidian	Structure	107	Fill
353	25		Sandstone	Complete	1	26,600.0	This object had at least two uses/functions; however, a determination as to which was used last cannot be made, hence its designation as "OMS." This is a large slab of sandstone, one side of which was used as a slab metate, while the other side has several pecked cupules. The stone measures 50 (length) × 32 (width) × 10 (thickness) cm. The lateral margins of the object are well shaped by flaking, pecking, and grinding, while the ends are edge flaked. The metate side is slightly concave (~0.9 cm deep in the middle) and the ground surface covers an area of about 36 (length) × 20 (width) cm. The other side of the slab has five pecked cupules that measure about 5 cm in diameter and range in depth from 0.8 to 1.2 cm. The surface into which the holes are pecked has also been slightly ground.	Structure	119	Fill
356	7		Slate/shale	Fragmentary	1	0.4		Structure	119	Fill
361	3		Brushy Basin Chert	Complete	1	3.9		Structure	118	Fill
366	1		Sandstone	Complete	1	8.8	Small sandstone square	Structure	119	Fill
373	11		Not Applicable	Not Applicable	1	1.7		Structure	302	Fill
468	6		Morrison Mudstone	Incomplete	1	43.2	Has strange lines plough or prehistoric	Arbitrary Unit	1001	Surface Contact
473	15		Not Applicable	Not Applicable	1	3.0	Possible pendant fragment	Arbitrary Unit	129	Surface Contact

PD No.	FS No.	Point Location No.	Material Type	Condition	Count	Weight (g)	Comment	Study Unit Type	Study Unit No.	Fill Assemblage (General)
477	9		Dakota/ Burro Canyon Silicified Sandstone	Fragmentary	1	3.1		Arbitrary Unit	1001	Surface Contact
519	4		Unknown Chert/ siltstone	Fragmentary	1	0.2	Ground—possible pendant? Appears to be made from a white chert.	Nonstructure	801	Fill
554	4		Igneous	Not Applicable	1	1.9		Nonstructure	901	Fill
560	8		Sandstone	Incomplete	1	2.9		Nonstructure	901	Fill
569	12		Caliche	Complete	1	1.0	Lacks drilled hole	Nonstructure	901	Fill
570	7		Morrison Mudstone	Fragmentary	1	51.0		Nonstructure	901	Fill
586	5		Petrified Wood	Incomplete	1	1.9	Three margins slightly ground—pendant blank?	Nonstructure	601	Fill
614	7		Morrison Mudstone	Fragmentary	1	3.8	Ground and polished on two edges and both sides	Nonstructure	201	Fill
615	15		slate/shale	Complete	1	522.8	Broken; ground and flaked edges, possible hoe, possibly made from a broken tchamahia	Nonstructure	201	Fill
625	14		Morrison Silicified Sandstone	Fragmentary	1	15.2		Structure	117	Fill
632	8		Igneous	Fragmentary	1	58.3		Structure	107	Fill
635	12		Brushy Basin Chert	Fragmentary	1	5.2		Structure	117	Fill
659	6		Unknown Chert/ siltstone	Fragmentary	1	2.3	Ground edges, unpolished side	Nonstructure	201	Fill
721	7		Clay	Fragmentary	1	2.1		Nonstructure	801	Fill
724	8		Slate/shale	Complete	1	53.7		Nonstructure	801	Fill
724	9		Slate/shale	Fragmentary	1	20.1		Nonstructure	801	Fill

PD No.	FS No.	Point Location No.	Material Type	Condition	Count	Weight (g)	Comment	Study Unit Type	Study Unit No.	Fill Assemblage (General)
728	7		Not Applicable	Fragmentary	1	13.9		Nonstructure	801	Fill
743	11		Morrison Mudstone	Fragmentary	1	0.5		Nonstructure	901	Fill
767	8		Sandstone	Fragmentary	1	4.7	Shaped and ground	Nonstructure	901	Fill
775	3		Burro Canyon Chert	Fragmentary	1	496.0		Nonstructure	102	Fill
799	10		Unknown Quartzite	Fragmentary	1	3.1		Structure	110	Fill
817	7		Unknown Chert/ siltstone	Fragmentary	1	1.4	Flaked, polished, tabular shaped	Nonstructure	101	Fill
819	10		Sandstone	Fragmentary	1	6.8	Fragment has two ground edges	Nonstructure	101	Fill
844	7		Brushy Basin Chert	Fragmentary	1	5.3	Possible tchamahia fragment	Nonstructure	601	Fill
853	15		Quartz	Fragmentary	1	4.3		Nonstructure	901	Fill
853	16		Dakota Mudstone	Fragmentary	1	19.0		Nonstructure	901	Fill
860	9		Sandstone	Fragmentary	1	26.1		Nonstructure	901	Fill
871	19		Morrison Mudstone	Fragmentary	1	0.9		Structure	117	Fill
871	20		Morrison Mudstone	Fragmentary	1	2.0		Structure	117	Fill
885	4		Unknown Material	Complete	1	2.0	Sphere about 1 cm in diameter	Nonstructure	901	Fill
901	9		Dakota Mudstone	Complete	1	5.5		Nonstructure	101	Fill
904	6		Clay	Fragmentary	1	1.4		Nonstructure	101	Surface Contact
911	13		Unknown Stone	Complete	1	786.0	Two flakes from cobble; ground surface possible.	Nonstructure	101	Fill

PD No.	FS No.	Point Location No.	Material Type	Condition	Count	Weight (g)	Comment	Study Unit Type	Study Unit No.	Fill Assemblage (General)
950	10		Pigment	Not Applicable	1	0.5	Hematite?	Nonstructure	901	Fill
960	8		Morrison Silicified Sandstone	Fragmentary	1	11.0		Structure	602	Fill
977	3		Unknown Stone	Fragmentary	1	0.2	Shaped and polished?	Nonstructure	917	Fill
987	4		Pigment	Complete	2	2.0		Nonstructure	801	Fill
997	3		Sandstone	Fragmentary	1	31.1	Possible hematite pigment on surface	Nonstructure	901	Fill
1017	8		Unknown Stone	Complete	1	0.9	Argillite?	Nonstructure	801	Fill
1036	8		Igneous	Not Applicable	1	181.4		Structure	906	Fill
1111	4		Sandstone	Complete	1	8.6		Nonstructure	101	Fill
1127	26		Igneous	Fragmentary	1	91.6		Nonstructure	132	Fill
1133	7		Sandstone	Fragmentary	1	34.2	Fragment is ground and polished on both sides	Nonstructure	101	Fill
1149	17		Dakota Mudstone	Fragmentary	1	11.5	Striations	Nonstructure	130	Fill
1184	8		Unknown Stone	Fragmentary	1	2.9		Structure	803	Fill
1185	12		Sandstone	Not Applicable	1	14.4		Nonstructure	804	Fill
1187	35		Sandstone	Fragmentary	1	0.4		Nonstructure	804	Fill
1188	5		Dakota/ Burro Canyon Silicified Sandstone	Fragmentary	1	26.9		Nonstructure	804	Fill
1189	24		Morrison Silicified Sandstone	Fragmentary	1	69.7		Nonstructure	804	Fill

PD No.	FS No.	Point Location No.	Material Type	Condition	Count	Weight (g)	Comment	Study Unit Type	Study Unit No.	Fill Assemblage (General)
1192	28		Morrison Silicified Sandstone	Fragmentary	1	7.7		Arbitrary Unit	1102	Fill
1196	12		Not Applicable	Fragmentary	1	1.3		Structure	1104	Fill
1205	4		Pigment	Complete	1	2.4		Nonstructure	101	Fill
1224	11		Sandstone	Fragmentary	1	10.6	Possible pendant blank	Nonstructure	203	Fill
1228	1		Sandstone	Complete	1	27.6	28-mm sphere	Structure	204	Fill
1240	9		Sandstone	Fragmentary	1	3.0	Slightly ground	Nonstructure	132	Fill
1242	15		Sandstone	Fragmentary	1	0.8		Structure	117	Fill
1252	12	6	Brushy Basin Chert	Complete	1	6.5	Edges modified; pendant blank?	Structure	112	Fill
1256	9		Morrison Silicified Sandstone	Fragmentary	1	2.8	Ground/polished axe fragment?	Nonstructure	133	Fill
1288	9		Pigment	Fragmentary	1	0.6		Structure	115	Fill
1291	11		Morrison Silicified Sandstone	Complete	1	60.1		Nonstructure	130	Fill
1304	14		Sandstone	Complete	1	3.3		Nonstructure	1039	Fill
1304	34		Slate/shale	Complete	1	4.5		Nonstructure	1039	Fill
1305	33		Unknown Stone	Complete	1	27.5	Red stone with beveled use wear around the edges. Possible polishing stone.	Nonstructure	1039	Fill
1305	48		Unknown Silicified Sandstone	Fragmentary	1	695.2		Nonstructure	1039	Fill
1324	2		Unknown Chert/siltst one	Complete	1	0.7		Structure	904	Fill
1338	8		Sandstone	Complete	1	347.1		Structure	110	Fill
1358	12		Dakota Mudstone	Complete	1	2,938.0		Nonstructure	106	Surface Contact

PD No.	FS No.	Point Location No.	Material Type	Condition	Count	Weight (g)	Comment	Study Unit Type	Study Unit No.	Fill Assemblage (General)
1360	7		Sandstone	Complete	1	7.3		Nonstructure	106	Fill
1377	7	9	Sandstone	Incomplete	1	2,317.0	Mano-shaped ground stone with concave ground surface	Structure	136	Surface Contact
1391	18		Sandstone	Fragmentary	1	25.2		Structure	1037	Fill
1408	5		Sandstone	Complete	1	39.5	Ground on one surface	Nonstructure	106	Fill
1412	5		Sandstone	Complete	1	29.2		Nonstructure	106	Fill
1414	2		Unknown stone	Fragmentary	1	46.9	River cobble, possibly quartzite	Nonstructure	106	Fill
1433	13	2	Sandstone	Fragmentary	1	1,084.0		Structure	111	Fill
1452	7		Sandstone	Complete	1	107.1	Edge appears to be ground	Nonstructure	106	Fill
1456	6		Sandstone	Fragmentary	1	0.9	Possible pendant blank	Nonstructure	106	Fill
1458	2		Morrison Silicified Sandstone	Fragmentary	1	73.1		Nonstructure	9012	Fill
1465	5		Sandstone	Fragmentary	1	1.9		Nonstructure	106	Fill
1470	6		unknown Silicified Sandstone	Incomplete	1	50.7		Nonstructure	106	Fill
1600	8		Dakota Mudstone	Fragmentary	1	1.7		Nonstructure	104	Fill
1602	8		Jet	Complete	1	2.1		Nonstructure	104	Fill
1612	4		Unknown Chert/ siltstone	Complete	1	0.8	Pendant blank. Broken at drill hole. Drilled surface subsequently ground.	Nonstructure	1040	Fill
1622	4		Unknown Chert/ siltstone	Fragmentary	1	1.1	Ground and polished on one surface	Nonstructure	1041	Fill
1622	10		Unknown Chert/ siltstone	Fragmentary	1	1.0	Ground and polished on one surface	Nonstructure	1041	Fill
1628	4		Morrison Mudstone	Fragmentary	1	0.5		Nonstructure	1041	Fill

PD No.	FS No.	Point Location No.	Material Type	Condition	Count	Weight (g)	Comment	Study Unit Type	Study Unit No.	Fill Assemblage (General)
1640	5		Morrison Silicified Sandstone	Fragmentary	1	22.9		Nonstructure	1042	Fill
1640	12		Morrison Silicified Sandstone	Fragmentary	1	3.0		Nonstructure	1042	Fill
1653	11		Not Applicable	Fragmentary	1	0.1	Less than 0.5 cm thick. Ground on one edge.	Nonstructure	1041	Fill
1655	3		Unknown Chert/ siltstone	Fragmentary	3	3.9	Three fragments which refit. One surface has been smoothed and polished.	Nonstructure	1041	Fill
1681	10		Sandstone	Complete	1	4.6	Probable pendant blank, no drill hole	Nonstructure	1042	Fill
1691	6		Dakota/ Burro Canyon Silicified Sandstone	Complete	1	69.2		Nonstructure	1043	Fill
1693	6		Unknown Stone	Fragmentary	1	13.1	Possible tchamahia fragment	Nonstructure	1043	Fill
1697	8		Unknown Chert/ siltstone	Fragmentary	1	0.5	Possible pendant or pendant blank	Nonstructure	1042	Fill
1701	14		Brushy Basin Chert	Fragmentary	1	1.3	Believed to be a part of FS 13	Nonstructure	804	Fill
1753	6		Conglomer ate	Fragmentary	1	1,280.7	Abraded groove on ground facet. Ground on one side.	Structure	150	Fill
1784	4		Unknown Stone	Complete	1	2.4	Possible hematite pigment or polishing stone	Nonstructure	9018	Fill
1802	7		Sandstone	Complete	1	2,205.0	Cracked	Structure	143	Fill
1803	4		Unknown Stone	Fragmentary	1	0.7	Possible pendant incised on both sides	Structure	141	Fill
1810	34		Igneous	Complete	2	121.1		Structure	112	Fill
1824	5		Not Applicable	Not Applicable	1	0.3		Nonstructure	152	Fill

PD No.	FS No.	Point Location No.	Material Type	Condition	Count	Weight (g)	Comment	Study Unit Type	Study Unit No.	Fill Assemblage (General)
1836	7		Unknown Stone	Fragmentary	1	1.2		Nonstructure	104	Fill
1841	7		Igneous	Fragmentary	1	166.6	Found near FS 6 and FS 8	Structure	150	Fill
1841	19		Sandstone	Complete	2	1.5	Split in two	Structure	150	Fill
1850	21	20	Sandstone	Fragmentary	3	1,413.3	3 pieces refit, burned, "lapstone"	Structure	150	Surface Contact
1872	9		Sandstone	Complete	1	3.1		Nonstructure	1101	Fill
1872	19		Morrison Mudstone	Fragmentary	1	0.3		Nonstructure	1101	Fill
1874	8		Brushy Basin Chert	Fragmentary	1	1.1		Nonstructure	1101	Fill
1878	6		Slate/shale	Fragmentary	1	3.1	Possible pendant fragment	Nonstructure	1101	Fill
1878	8		Slate/shale	Fragmentary	1	32.4		Nonstructure	1101	Fill
1892	6		Slate/shale	Incomplete	1	2.0		Nonstructure	1101	Fill
1900	4		Not Applicable	Not Applicable	1	0.9		Nonstructure	1101	Fill
1907	9		Dakota Mudstone	Fragmentary	1	0.6	Possible pendant blank	Nonstructure	101	Fill
1911	4		Igneous	Fragmentary	1	81.3	Alluvial cobble. Faint striations apparent.	Nonstructure	1042	Fill
1931	17		Brushy Basin Chert	Incomplete	1	2.3		Structure	141	Fill
1935	12		Morrison Silicified Sandstone	Fragmentary	1	1.0	Highly polished	Nonstructure	155	Fill
1936	7		Unknown Stone	Fragmentary	1	3.6		Nonstructure	155	Fill
1936	16		Unknown Stone	Fragmentary	1	0.3	Possible pendant or gaming piece	Nonstructure	155	Fill
1943	8		Not Applicable	Not Applicable	1	0.3		Nonstructure	101	Fill
1953	5		Unknown Stone	Fragmentary	1	0.6	Refits PD 1707, FS 11, PL 11 pendant from Structure 803, Surface 1.	Structure	204	Fill

PD No.	FS No.	Point Location No.	Material Type	Condition	Count	Weight (g)	Comment	Study Unit Type	Study Unit No.	Fill Assemblage (General)
1953	9		Jet	Complete	1	0.9	Possible pendant blank	Structure	204	Fill
2006	10		Sandstone	Fragmentary	1	2.1		Nonstructure	151	Fill
2006	45		Morrison Silicified Sandstone	Incomplete	1	5.5		Nonstructure	151	Fill
2008	3		Concretion	Complete	1	34.1		Nonstructure	151	Fill
2008	30		Sandstone	Incomplete	1	207.9		Nonstructure	151	Fill
2010	34		Not Applicable	Fragmentary	1	1.9		Nonstructure	151	Fill
2010	52		Sandstone	Fragmentary	1	32.4	Soft sandstone	Nonstructure	151	Fill
2010	53		Sandstone	Fragmentary	1	17.1	May be part of FS 52	Nonstructure	151	Fill
2027	4		Sandstone	Fragmentary	1	752.2		Nonstructure	152	Fill
2069	2		Agate/ chalcedony	Complete	1	3.6		Structure	153	Fill
2097	11		Unknown Stone	Complete	1	1.8		Nonstructure	162	Fill
2165	7		Morrison Silicified Sandstone	Fragmentary	1	201.0	One face is well ground. Two edges are well-packed and make a corner. The slab is about 1 cm thick. Could be a pallet fragment or perhaps a cover or lid for another artifact or feature.	Structure	160	Fill
2170	15		Slate/shale	Fragmentary	1	10.8		Structure	176	Fill
2170	16		Igneous	Fragmentary	1	357.2		Structure	176	Fill
2206	5		Igneous	Complete	1	4.0		Nonstructure	1043	Fill
134	5		Sandstone	Fragmentary	1	33.7		Nonstructure	401	Fill
228	6		Sandstone	Complete	1	85.1		Structure	402	Fill
333	16		Sandstone	Complete	1	4.2		Nonstructure	139	Fill
372	7		Sandstone	Fragmentary	1	10.3		Structure	303	Fill
420	6		Sandstone	Complete	1	27.5		Arbitrary Unit	404	Surface Contact
578	8		Sandstone	Complete	1	11.4		Nonstructure	801	Fill

PD No.	FS No.	Point Location No.	Material Type	Condition	Count	Weight (g)	Comment	Study Unit Type	Study Unit No.	Fill Assemblage (General)
615	5		Sandstone	Complete	1	45.7		Nonstructure	201	Fill
763	14		Sandstone	Complete	1	60.9		Structure	903	Fill
775	25		Sandstone	Fragmentary	1	55.2	Single ground face	Nonstructure	102	Fill
840	5		Unknown Silicified Sandstone	Fragmentary	1	245.6		Structure	115	Fill
885	3		Sandstone	Incomplete	1	1.3		Nonstructure	901	Fill
901	4		Sandstone	Fragmentary	1	103.3		Nonstructure	101	Fill
909	11		Sandstone	Fragmentary	1	122.4		Nonstructure	101	Fill
1014	1		Sandstone	Incomplete	2	1.7		Nonstructure	801	Fill
1127	6		Sandstone	Fragmentary	1	89.8		Nonstructure	132	Fill
1281	11		Sandstone	Fragmentary	1	85.0		Structure	110	Fill
1285	11		Sandstone	Not Applicable	1	66.8		Structure	113	Fill
1711	18		Sandstone	Complete	1	73.2		Nonstructure	151	Fill
1890	6		Sandstone	Fragmentary	1	11.9		Nonstructure	1101	Fill
2006	55		Not Applicable	Not Applicable	1	41.1		Nonstructure	151	Fill
2008	61		Sandstone	Complete	1	68.5		Nonstructure	151	Fill
2010	31		Sandstone	Fragmentary	1	6.9		Nonstructure	151	Fill
2010	49		Sandstone	Complete	1	44.6		Nonstructure	151	Fill
2072	5		Sandstone	Fragmentary	1	28.8		Nonstructure	1101	Fill

Table 6.38. Miscellaneous Other Artifacts, Albert Porter Pueblo.

PD No.	FS No.	Artifact Type	Material Type	Condition	Weight (g)	Comment	Study Unit Type	Study Unit No.	Fill Assemblage Position (General)	Fill Assemblage Position (Specific)	Fill Assemblage Type (General)	Fill Assemblage Type (Specific)
1377	15	Basketry					STR	136	Surface Contact	Prepared Floor Surface	Cultural Deposit	Primary Refuse
1377	16	Basketry					STR	136	Surface Contact	Prepared Floor Surface	Cultural Deposit	Primary Refuse
1377	17	Basketry					STR	136	Surface Contact	Prepared Floor Surface	Cultural Deposit	Primary Refuse
1377	18	Basketry					STR	136	Surface Contact	Prepared Floor Surface	Cultural Deposit	Primary Refuse
1377	26	Basketry				Basket was not weighed	STR	136	Surface Contact	Prepared Floor Surface	Cultural Deposit	Primary Refuse
1377	28	Basketry				Plaited basket fragments	STR	136	Surface Contact	Prepared Floor Surface	Cultural Deposit	Primary Refuse
1377	32	Basketry					STR	136	Surface Contact	Prepared Floor Surface	Cultural Deposit	Primary Refuse
1377	33	Basketry					STR	136	Surface Contact	Prepared Floor Surface	Cultural Deposit	Primary Refuse
225	4	Cylinder	Sandstone	Frag	2.60	Broken into two pieces	STR	402	Fill	Above Wall/roof Fall	Mixed Deposit	Not Further Specified
534	8	Cylinder	Pigment	Frag	4.20		NST	901	Fill	Upper	Mixed Deposit	Postabandonment and Cultural Refuse
741	9	Cylinder	Sandstone		12.50	Cylinder	NST	901	Fill	Upper	Cultural Deposit	Secondary Refuse

PD No.	FS No.	Artifact Type	Material Type	Condition	Weight (g)	Comment	Study Unit Type	Study Unit No.	Fill Assemblage Position (General)	Fill Assemblage Position (Specific)	Fill Assemblage Type (General)	Fill Assemblage Type (Specific)
1186	25	Cylinder	Sandstone	Frag	2.60	Minimal shaping	NST	804	Fill	Above Wall/roof Fall	Cultural Deposit	Secondary Refuse
215	6	Effigy	Clay	Frag	2.30	Cylinder shape with pointed end and bent like effigy arm	STR	502	Fill	Roof Fall	Collapsed Structure	With Mixed Refuse
237	4	Effigy	Clay	Frag	2.80	Cylindrical piece, fired	NST	301	Fill	Lower	Cultural Deposit	Secondary Refuse
548	7	Effigy	Clay	Frag	2.20		NST	801	Fill	Upper	Collapsed Structure	Postabandonment and Cultural Refuse
570	16	Effigy	Clay	Frag	3.80		NST	901	Fill	Upper	Cultural Deposit	Secondary Refuse
648	4	Effigy	Clay	Frag	146.20	Molded unfired clay	STR	602	Fill	Above Wall/roof Fall	Mixed Deposit	Postabandonment and Cultural Refuse
726	7	Effigy	Clay	Frag	5.50	Fired clay object – possible effigy leg?	NST	801	Fill	Lower	Mixed Deposit	Postabandonment and Cultural Refuse
773	4	Effigy	Unknown Stone	C	2.60	Possible effigy	NST	102	Fill	Upper	Cultural Deposit	Secondary Refuse
851	7	Effigy	Clay	Frag	4.30		NST	901	Fill	Upper	Cultural Deposit	Secondary Refuse
885	12	Effigy	Clay	Inc	9.40		NST	901	Fill	Upper	Mixed Deposit	Postabandonment and Cultural Refuse
943	7	Effigy	Clay	Frag	1.10	Unfired clay leg or horn	NST	901	Fill	Lower	Mixed Deposit	Postabandonment and Cultural Refuse
973	8	Effigy	Pottery	Inc	20.30		NST	901	Fill	Lower	Cultural Deposit	Secondary Refuse

PD No.	FS No.	Artifact Type	Material Type	Condition	Weight (g)	Comment	Study Unit Type	Study Unit No.	Fill Assemblage Position (General)	Fill Assemblage Position (Specific)	Fill Assemblage Type (General)	Fill Assemblage Type (Specific)
1526	7	Effigy	Pottery	Frag	6.60	Bird head effigy	NST	106	Fill	Upper	Cultural Deposit	Secondary Refuse
1703	35	Effigy	Clay	Frag	2.80		STR	803	Fill	Roof Fall	Collapsed Structure	With Mixed Refuse
1711	20	Effigy	Pottery	C	25.2	Insect effigy on mug handle	NST	151	Fill	Above Wall/roof Fall	Cultural Deposit	Secondary Refuse
1890	7	Effigy	Clay	Frag	3.20	Pinched tube with two side holes	NST	1101	Fill	Upper	Collapsed Structure	Postabandonment and Cultural Refuse
2008	86	Effigy	Clay	Frag	2.50	Refit	NST	151	Fill	Above Wall/roof Fall	Cultural Deposit	Secondary Refuse
160	16	Gaming Piece	Morrison Chert/ siltstone	C	9.00	Shaped, ground small stone	STR	502	Fill	Above Wall/roof Fall	Cultural Deposit	Secondary Refuse
160	19	Gaming Piece	Turquoise	C	1.20	Small tubular shaped piece pointed at both ends	STR	502	Fill	Above Wall/roof Fall	Cultural Deposit	Secondary Refuse
322	10	Gaming Piece	Unknown Bone	C	0.40		STR	119	Fill	Above Wall/roof Fall	Postabandonment Deposit	Natural Processes
980	8	Gaming Piece	Unknown Bone	C	0.30		NST	901	Fill	Lower	Mixed Deposit	Postabandonment and Cultural Refuse
980	9	Gaming Piece	Unknown Bone	C	0.40		NST	901	Fill	Lower	Mixed Deposit	Postabandonment and Cultural Refuse
1281	61	Textile	Other Vegetal	Frag	3.90	Possible charred sandal fragment	STR	110	Fill	Roof Fall	Collapsed Structure	With Mixed Refuse

Note: Condition: C = Complete; Inc = Incomplete; Frag = Fragmentary
Study Unit Type: NST = Nonstructure; STR = Structure

Table 6.39. Counts and Weights of Effigies, Albert Porter Pueblo.

Study Unit	PD No.	FS No.	Count	Weight (g)	Material Type	Comment
901	973	8	1	20.3	Pottery	
106	1526	7	1	6.6	Pottery	Bird head effigy.
151	1711	20	1	25.2	Pottery	Insect effigy on pottery handle.
502	215	6	1	2.3	Clay	Probably effigy limb; has temper and is fired.
301	237	4	1	2.8	Clay	Squared cylinder. Likely effigy leg. Possible mineral paint. Fired.
801	548	7	1	2.2	Clay	Tempered, lightly fired. Probably an effigy leg.
901	570	16	1	3.8	Clay	Twisted, shaped, and flattened coil, with impressions. Possibly burned adobe.
602	648	4	1	146.2	Clay	Molded unfired clay
801	726	7	1	5.5	Clay	Fired clay object, likely an effigy leg, well-shaped, conical with a rounded end.
901	851	7	1	4.4	Clay	Fired, charred on tip; probably an effigy leg similar to PD 726 FS 7.
901	885	12	1	9.4	Clay	
901	943	7	1	1.1	Clay	Unfired clay leg or horn.
803	1703	35	1	2.8	Clay	Fragment of clay tube, unfired; possibly an effigy leg.
1101	1890	7	1	3.2	Clay	Pinched tube with two side holes.
151	2008	86	1	2.5	Clay	Refit.
102	773	4	1	2.6	Unknown Stone	Possible effigy or pendant blank. Has two small grooves around the object, one near the top (head) and one near the bottom (body).

Table 6.40. Bone Artifacts by Artifact Type, Albert Porter Pueblo.

Artifact Category	Count	Percent
Antler Tool	1	0.2
Awl	177	39.9
Bead	3	0.7
Gaming Piece	3	0.7
Other Modified Bone	183	41.2
Pendant	1	0.2
Scraper	1	0.2
Tube	75	16.9
TOTAL	444	100.0

Table 6.41. Beads, Albert Porter Pueblo.

Study Unit No.	PD No.	FS No.	Max. Diam. (cm)	Max. Thickness (cm)	Max. Length (cm)	Max. Width (cm)	Bead Type	Condition	Material Type	Drill Hole Diam. (cm)	Drill Hole Description	Comments
101	498	1	0.45	0.10	–	–	Disk	Complete	Unknown quartzite	0.17	Cylindrical	White, probably Dakota silicified sandstone
101	498	2	0.52	0.21	–	–	Disk	Complete	Unknown quartzite	0.15	Cylindrical	White
101	498	3	0.47	0.25	–	–	Disk	Complete	Slate/shale	0.19	Biconical	Dark gray
101	498	4	0.50	0.18	–	–	Disk	Complete	Slate/shale	0.19	Cylindrical	Dark gray
101	498	5	0.33	0.16	–	–	Disk	Complete	Slate/shale	0.20	Cylindrical	Dark gray
101	498	6	0.47	0.22	–	–	Disk	Complete	Unknown quartzite	0.15	Cylindrical	Light gray
101	498	7	0.31	0.13	–	–	Disk	Complete	Unknown quartzite	0.15	Cylindrical	Light gray
101	498	8	0.57	0.21	–	–	Disk	Complete	Unknown quartzite	0.15	Cylindrical	Light gray
101	911	14	0.60	0.48	–	–	Disk	Incomplete	Unknown stone	0.21	Cylindrical	Dark gray, broken on one edge
101	919	7	0.48	0.21	–	–	Disk	Complete	Unknown stone	0.11	Cylindrical	Light gray
101	921	2	0.53	0.16	–	–	Disk	Incomplete	Shell	0.20	Cylindrical	White, surface spall
101	1112	5	0.66	0.22	–	–	Disk	Complete	Unknown silicified sandstone	0.23	Cylindrical	Gray
101	1114	5	0.45	0.21	–	–	Disk	Complete	Unknown stone	0.24	Cylindrical	Black
101	1138	4	0.47	0.16	–	–	Disk	Fragmentary	Unknown stone	0.18	Cylindrical	Gray
101	1213	18	0.45	0.21	–	–	Disk	Incomplete	Unknown stone	0.16	Cylindrical	Gray
101	1907	7	0.46	0.15	–	–	Disk	Complete	Unknown quartzite	0.17	Cylindrical	White, probably Dakota silicified sandstone
101	1907	8	No data	No data	No data	No data	No data	No data	Unidentified bone	No data	No data	No data

Study Unit No.	PD No.	FS No.	Max. Diam. (cm)	Max. Thickness (cm)	Max. Length (cm)	Max. Width (cm)	Bead Type	Condition	Material Type	Drill Hole Diam. (cm)	Drill Hole Description	Comments
101	1909	7	0.53	0.29	–	–	Cylindrical	Complete	Unknown stone	0.25	Cylindrical	Black
101	1909	8	0.33	0.12	–	–	Disk	Complete	Unknown stone	0.16	Cylindrical	Light gray
101	1941	9	0.24	0.09	–	–	Disk	Fragmentary	Unknown stone	0.09	Cylindrical	Very small stone bead, broken in half
101	1943	7	0.44	0.15	–	–	Disk	Complete	Slate/shale	0.12	Cylindrical	Dark gray
102	779	10	–	–	1.45	1.53	Cylindrical	Incomplete	Clay	0.25	Cylindrical	Gray, poorly fired clay, almost round
106	1418	5	–	–	1.85	0.18	Other	Incomplete	Adobe	0.80	Other	Adobe reedgrass casting impression, almost a circular shape, gray in color
106	1463	4	–	–	0.63	0.58	Cylindrical	Complete	Shell	–	Uniconical	White, olivella shell, intentionally worn ends
108	295	9	0.51	0.23	–	–	Disk	Complete	Unknown silicified sandstone	0.22	Cylindrical	Black, thickness is uneven from one side to the other
108	329	3	0.56	0.13	–	–	Disk	Complete	Morrison silicified sandstone	0.16	Uniconical	White
113	1300	11	0.49	0.20	–	–	Disk	Complete	Unknown stone	0.24	Cylindrical	Black
114	241	11	No data	No data	0.59	0.56	Cylindrical	Complete	Unidentified bone	0.22	Cylindrical	Black in color, burned bone
114	391	25	No data	No data	No data	No data	No data	Complete	Nonlocal chert	No data	No data	Found in heavy fraction of flotation sample
129	472	6	0.44	0.20	–	–	Disk	Complete	Unknown silicified sandstone	0.17	Cylindrical	Dark gray
150	1848	19	0.27	0.14	–	–	Disk	Complete	Unknown stone	0.12	Cylindrical	Black
203	1222	11	0.59	0.32	–	–	Disk	Complete	Unknown stone	0.20	Cylindrical	Black

Study Unit No.	PD No.	FS No.	Max. Diam. (cm)	Max. Thickness (cm)	Max. Length (cm)	Max. Width (cm)	Bead Type	Condition	Material Type	Drill Hole Diam. (cm)	Drill Hole Description	Comments
305	690	3	–	–	1.39	0.60	Other	Incomplete	Shell	0.10	Cylindrical	White, olivella shell, chip missing by the hole
501	14	6	0.47	0.14	–	–	Disk	Complete	Unknown silicified sandstone	0.20	Cylindrical	Light gray
800	1183	1	0.60	0.14	–	–	Disk	Complete	Shell	0.21	Uniconical	White
800	1183	4	0.59	0.23	–	–	Disk	Complete	Slate/shale	0.20	Biconical	Dark gray, hole is drilled off-center and bead is not perfectly circular
801	1025	7	0.51	0.18	–	–	Disk	Incomplete	Unknown stone	0.18	Cylindrical	White, surface spall
804	1185	1	–	–	1.31	0.6	Cylindrical	Incomplete	Pottery	0.12	Cylindrical	Light gray, made to look like an olivella shell
900	1076	3	0.52	0.35	–	–	Disk	Complete	Unknown silicified sandstone	0.19	Cylindrical	Light gray, very smooth
901	526	4	0.49	0.22	–	–	Disk	Complete	Unknown stone	0.12	Cylindrical	Black
901	570	11	0.78	0.22	–	–	Disk	Incomplete	Dakota/Burro Canyon silicified sandstone	0.30	Biconical	Light gray, Dakota silicified sandstone, small chip missing on one side
901	885	13	0.48	0.16	–	–	Disk	Complete	Unknown stone	0.16	Biconical	Light gray
901	890	10	–	–	0.81	0.64	Cylindrical	Complete	Shell	–	Uniconical	White, olivella shell bead, edges are ground; no drill hole present
903	1325	9	1.46	–	1.74	–	Tear-drop/ bilobe	Complete	Pottery	0.12	Cylindrical	Gray; gray ware clay made into bead, hole made before firing
1000	2187	5	0.57	0.09	0	0	Disk	Complete	Shell	0.24	Cylindrical	White
1037	1309	37	0.68	0.25	0	0	Disk	Complete	Jet	0.22	Cylindrical	Black

Study Unit No.	PD No.	FS No.	Max. Diam. (cm)	Max. Thickness (cm)	Max. Length (cm)	Max. Width (cm)	Bead Type	Condition	Material Type	Drill Hole Diam. (cm)	Drill Hole Description	Comments
1042	1911	9	0.24	0.09	–	–	Disk	Fragmentary	Unknown stone	0.09	Cylindrical	Very small, looks polished at both ends, it is broken in half
1043	499	2	0.56	0.15	0	0	Cylindrical	Complete	Unknown quartzite	0.20	Cylindrical	White, possibly Dakota silicified sandstone
1043	499	3	0.51	0.15	No data	–	Disk	Complete	Unknown quartzite	0.17	Cylindrical	White, probably Dakota silicified sandstone, found approximately 10 meters south of Structure 1037
1043	499	4	0.36	0.09	–	–	Disk	Complete	Unknown quartzite	0.12	Cylindrical	White
1043	499	5	0.51	0.14	–	–	Cylindrical	Incomplete	Unknown quartzite	0.23	Cylindrical	White, probably Dakota silicified sandstone
1043	499	6	0.50	0.23	–	–	Disk	Complete	Unknown quartzite	0.19	Cylindrical	Light gray, probably Dakota silicified sandstone
1043	499	7	0.47	0.17	–	–	Disk	Complete	Slate/shale	0.20	Cylindrical	Black
1043	1648	5	0.50	0.15	–	–	Disk	Complete	Unknown stone	0.20	Cylindrical	Black, polished, even in cross-section, edges are rounded
1043	1648	6	0.80	0.07	–	–	Cylindrical	Complete	Unknown stone	0.50	Uniconical	Light gray, grooved around the edge and spirals down outside, also grooved in hole, mimics olivella
1043	1693	8	0.46	0.21	–	–	Disk	Complete	Unknown stone	0.17	Cylindrical	Black, material might be silicified sandstone or mudstone
1101	1899	1	0.25	0.10	–	–	Disk	Complete	Unknown stone	0.15	Cylindrical	White, very tiny
1101	1961	6	0.45	0.12	–	–	Disk	Complete	Unknown quartzite	0.18	Cylindrical	Gray, probably Dakota silicified sandstone
1101	1961	7	0.55	0.29	–	–	Disk	Complete	Jet	0.08	Cylindrical	Black

Study Unit No.	PD No.	FS No.	Max. Diam. (cm)	Max. Thickness (cm)	Max. Length (cm)	Max. Width (cm)	Bead Type	Condition	Material Type	Drill Hole Diam. (cm)	Drill Hole Description	Comments
1101	1961	8	0.49	0.13	–	–	Disk	Complete	Unknown quartzite	0.15	Cylindrical	Dark gray, probably silicified sandstone
1101	2012	4	No data	No data	No data	No data	No data	No data	Unidentified bone	No data	No data	No data
1101	2077	9	0.69	0.23	–	–	Disk	Complete	Brushy Basin chert	0.20	Cylindrical	Red
9019	1518	6	No data	No data	No data	No data	Disk	Fragmentary	Slate/Shale	No data	No data	Found in heavy fraction of flotation sample

Table 6.42. Nonlocal Pottery from Albert Porter Pueblo.

Pottery Type	Count	Weight (g)	Percent by Count	Percent by Weight
Abajo Red-on-orange	32	129.9	5.0	4.1
Unknown Gray	37	288.3	5.8	9.0
Bluff Black-on-red	2	10.0	0.3	0.3
Other Gray, Nonlocal	29	246.7	4.5	7.7
Deadmans Black-on-red	170	653.5	26.5	20.4
Other Red, Nonlocal	15	55.6	2.3	1.7
Unknown White	5	18.6	0.8	0.6
Other White, Nonlocal	71	609.8	11.1	19.0
Indeterminate Local Red, Painted	55	189.8	8.6	5.9
Indeterminate Local Red, Unpainted	173	666.4	26.9	20.8
Polychrome	19	141.8	3.0	4.4
Unknown Pottery	34	196.0	5.3	6.1
TOTAL	642	3,206.4	100.0	100.0

Table 6.43. Nonlocal Pottery by Context within the Great House.

Time Period	Count	Weight (g)	Gray Ware (g)	Ratio
Predating Great House	2	13.0	4,897	0.000408
Initial Use of Great House	3	6.4	11,520	0.00026
Final Use of Great House	121	1,657.3	305,243	0.000396
	Count	Weight (g)	Gray Ware (g)	Ratio
Pueblo II	5	19.4	16,418	0.000305
Pueblo III	121	1,657.3	305,243	0.000396

Table 6.44. Obsidian Bifaces, Proveniences and Sources, Albert Porter Pueblo.

Provenience Designation Number	Field Specimen Number	Artifact Type	Count	Weight (g)	Source
322	9	Projectile Point	1	0.2	El Rechuelos
771	10	Projectile Point	1	0.4	El Rechuelos
854	6	Projectile Point	1	0.1	Mount Taylor
2008	33	Projectile Point	1	3.5	El Rechuelos
1391	22	Biface	1	0.2	Mount Taylor

Table 6.45. Narbona Pass Chert from Selected Sites in the Central Mesa Verde Region.

Site Number	Site Name	Count	Weight (g)
42SA22760	Hedley Site Complex	1	0.6
5MT16805	Harlan Great Kiva	2	0.8
5MT3807	Shields Pueblo	8	15.2
5MT5	Yellow Jacket Pueblo	13	17.8

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Notes

1. Basketmaker Mudware generally predates A.D. 600, the beginning of the Basketmaker III period in the central Mesa Verde region. I used Chapin Black-on-white and Chapin Gray as indicators of the Pueblo I period, and Indeterminate Local Gray as an indicator of either the Basketmaker III or Pueblo I period. I used Mancos Gray, Abajo Red-on-orange, Bluff Black-on-red, Early White Unpainted, Indeterminate Neckbanded Gray, Moccasin Gray, Piedra Black-on-white, and Early White Painted as indicators of the Pueblo I period. I used Indeterminate Local Red Unpainted, Indeterminate Local Red Painted, and San Juan Red Ware as indicating either the Pueblo I or Pueblo II period. Deadmans Black-on-red, Early Local Corrugated, Mancos Black-on-white, Mancos Corrugated Gray, Partial Corrugated, Pueblo II White Painted, and Cortez Black-on-white are indicators of the Pueblo II period. Indeterminate Local Corrugated Gray, Late White Painted, Late White Unpainted, and Mummy Lake Gray are indicative of either the Pueblo II or Pueblo III periods. Finally, McElmo Black-on-white, Pueblo III White Painted, Mesa Verde Black-on-white, and Mesa Verde Corrugated Gray are indicators of the Pueblo III period.

2. According to Kim Gerhardt (personal communication 2009), the term “quartzite” was retained because the term was so ingrained in lithic raw-material classifications at the Anasazi Heritage Center that it was not feasible to delete it entirely. Gerhardt used the term “metaquartzite” for metamorphic rocks to differentiate it from “quartzite,” or silica-cemented sandstones.

3. The goal of the Village Ecodynamics Project is to understand long-term interactions between ancestral Pueblo people and their environments (Kohler et al. 2010; Kohler et al. 2008).

4. It is important to note that people lived at Albert Porter Pueblo for centuries, but people lived at Woods Canyon Pueblo for no longer than three generations. This difference may contribute to this result.

Chapter 7

Pollen Analysis

by Karen R. Adams

Introduction

Objectives of This Study

Botanical remains recovered systematically from Albert Porter Pueblo provide an opportunity to examine the roles of plant resources in the subsistence economy of Pueblo Indians during portions of three centuries—more specifically, during the late Pueblo II (A.D. 1060–1140) and the late Pueblo III (A.D. 1225–1280) periods. This report presents the analytic results of pollen samples collected from selected contexts to investigate the following: (1) ancient patterns of food use through time, (2) activities that took place within pit structures and kivas at Albert Porter Pueblo, and (3) environmental change and human impacts to the local environment.

The goal of collecting pollen samples from Albert Porter Pueblo was that the analytic results would provide insight into the varied uses of pit structures and kivas. The uses of these structures can be inferred from the features and artifacts they contain, from large plant materials including seeds and charred wood left in situ, and from pollen deposited through plant usage. Pollen data lend insight into the extent to which domestic activities such as the preparation, cooking, and consumption of foods occurred in these structures.

Additionally, the pollen record might reveal changes in the composition of the surrounding plant communities during the Pueblo II–Pueblo III occupation of Albert Porter Pueblo. Human impacts and climatic shifts were two potential sources of landscape change. To distinguish between these two sources, economic plants will be identified, changes in plant use will be presented, and responses to anthropogenic—or human-caused —impacts will be assessed.

Finally, pollen data complement data from larger plant remains recovered via flotation samples and as macrofossils collected individually by archaeologists (also see Chapter 7). Some patterns in the pollen data reinforce patterns observed in the larger plant remains, and others reveal unique aspects of past plant use. Together, the data for pollen and larger plant remains from Albert Porter Pueblo form a detailed record of past plant use and provide an enhanced means to reconstruct plant communities in the vicinity of the settlement.

Nature of the Sample Set

Twenty pollen samples from Albert Porter Pueblo were analyzed. Eleven samples were collected from sealed contexts on pit structure and kiva floors, seven were collected from naturally deposited sediments just above roof-fall debris in pit structures and kivas, and two were collected from the modern ground surface. The samples were obtained from contexts dating from four time periods (see Chronology chapter): late Pueblo II (A.D. 1060–1140), terminal Pueblo II through initial Pueblo III (A.D. 1100–1180), early Pueblo III (A.D. 1140–1225), and late Pueblo III (A.D. 1225–1280). In addition, two samples from recently disturbed vegetation on the modern ground surface constitute control samples against which the ancient samples can be compared.

Analytic Methods

Pollen was extracted from the samples and analyzed by John G. Jones, who was then affiliated with Texas A&M University. The methods used to process these samples are reported by Jones (1995). All pollen samples discussed here have a minimum count of 200 pollen grains, with the exception of a sample collected from a late Pueblo III occupation surface (PD 370, FS 5) that will not be discussed further in this chapter. In the full-count samples, a small percentage of pollen grains (fewer than 5 percent) were labeled "indeterminate" and thus provide no insight into past plant use.

Methods for Interpreting Pollen Data

Pollen data are difficult to interpret, because pollen is naturally transported by various means, primarily by wind and insects, and also because, in archaeological contexts, culturally deposited pollen can be difficult to distinguish from naturally deposited pollen. To interpret the pollen data for Albert Porter Pueblo, I use an analytical framework that focuses on identifying the mode of deposition (natural vs. cultural) and then on defining a set of source areas (local, restricted-local, regional) for the pollen. This framework was developed to interpret pollen recovered from pit structure floors and fill at Shields Pueblo (Adams 2015). Also see Adams (2015) for a review of the natural processes that are likely to have affected pollen deposition at Shields Pueblo, because similar processes probably affected pollen deposition at Albert Porter Pueblo. Adams (2015) also discusses approaches for recognizing cultural origin of pollen types.

Pollen Interpretive Categories

The interpretation of pollen data is aided by defining pollen interpretive categories. Three source-area categories (local, restricted-local, and regional) reflect differential distances from Albert Porter Pueblo, and each category includes a limited quantity of representative plants (Table 7.1). Although most of the plants from these source areas have been gathered and used by people in both modern and ancient times, the presence of pollen from some plants can also provide perspective on the changing natural environment immediately surrounding Albert Porter Pueblo through time. A fourth category of plants includes many resources considered to be economic or potentially economic (Table 7.2) and is utilized to help recognize cultural use of plants within structures at Albert Porter Pueblo through time.

Local Plants

Pollen types categorized here as "local" are from plants that are abundant in the area immediately surrounding Albert Porter Pueblo: (1) plants in the pinyon pine/juniper (*Pinus edulis/Juniperus*) woodland; (2) shrubs such as sagebrush (*Artemisia*) typical of open patches in the woodland and of fallow agricultural fields; (3) plants of disturbed habitats such as members of the goosefoot family (*Chenopodiaceae*) and pigweed (*Amaranthus*), which are referred to in this report as cheno-ams; and (4) oaks (*Quercus*) that occupy canyon slopes and are especially abundant following wildfires. All of these local plants produce pollen carried primarily on wind currents.

Restricted-Local Plants

Plants in the "restricted-local" category are local plants whose habitats are restricted to damp or wet locations. Examples include willow (*Salix*), cattail (*Typha*), and greasewood (*Sarcobatus*). Willow is insect pollinated, and cattail pollen occurs naturally in tetrads (clumps of four adhering pollen grains), which restricts its ability to travel far from parent plants. Greasewood is wind pollinated.

Regional Plants

Plants in the "regional" category grow primarily in the higher elevations of the region, and some are found a great distance from Albert Porter Pueblo. Examples include ponderosa pine (*Pinus ponderosa*), Douglas fir (*Pseudotsuga*), spruce (*Picea*), and alder (*Alnus*). Plants within this group are all wind pollinated, and their pollen grains can be carried long distances on air currents.

Economic and Potentially Economic Plants

Plants within the "economic" category either have known ethnographic use(s), or the presence of their remains in other archaeological sites in the Southwest has been interpreted to reflect cultural use. Economic plants share pollination via insects or have heavy pollen grains that cannot be transported far on wind currents. "Potentially economic plants" are all wind pollinated and have recorded pre-Hispanic or historical-cultural use. The wide diversity of ethnographic American Indian uses for economic and potentially economic plants as construction elements, food, fuel, medicine, and for serving ritual needs and many other purposes can be viewed in an ethnographic compendium (Rainey and Adams 2004) that is searchable by both scientific and common names.

Other Analytical Issues

Analytical conventions affect how pollen data are interpreted. Because these data are traditionally presented as a percentage of the total pollen grain count within a sample, the representation of each taxon is affected by the relative presence (expressed as a percentage of the total number of grains) of all other taxa in that sample. If, for example, the pollen of a particular taxon is especially abundant, the percentages of other taxa in the sample are automatically reduced. Despite this limitation, pollen percentages are discussed in this report. Palynologists sometimes report the concentration of pollen grains of a particular taxon as pollen grains per cubic centimeter or pollen grains per gram of sediment examined. However, interpretations of concentration values are hampered by differences among samples in, for example, the length of time represented by each sample, which varies by archaeological context or other circumstances.

Pollen Sampling at Albert Porter Pueblo

The strategy for collecting pollen samples at Albert Porter Pueblo (Table 7.3) follows methods developed during excavation projects conducted by the Crow Canyon Archaeological Center (Ortman et al. 2005). This strategy is designed to enhance the ability to interpret pollen data by focusing sampling on contexts in which both the mode of pollen deposition can be inferred and the period of deposition can be specified. Restricting sampling to locations where pollen deposition is likely to have been either primarily cultural or primarily natural and determining the most likely time of deposition of the pollen in each sample lead to the most interpretable data regarding the human uses of plants. Important to this sampling strategy are modern control samples—samples from naturally deposited sediment located just above roof-fall debris in pit structures and kivas as well as sealed contexts associated with the floors of pit structures and kivas.

Modern Control Samples

Control samples from the modern ground surface (hereafter referred to as “modern samples”) contain pollen deposited by natural processes, primarily by wind. The pollen in these modern samples derives from known plant communities. The data from these samples can provide a broad understanding of the relationship between particular vegetation communities and the pollen signatures they produce. The presence of insect-carried pollen probably reflects sampling locations in proximity to insect-pollinated plants.

Modern samples serve as a proxy record for the natural deposition of pollen in a given location in the past, although there are some limitations to this approach. Pollen in modern samples derives from biotic communities affected by modern disturbances such as grazing, fire suppression, land development, and new agricultural technologies, and the pollen of plants introduced historically from other continents may be present. Also, modern samples are usually collected during the summer growing season, but ancient pollen was deposited during multiple seasons; thus, the presence and abundance of specific types of pollen might reflect this difference. In addition, the spectrum of taxa in ancient samples may be biased by differential preservation, which could then affect comparisons of ancient vs. modern taxa. Nevertheless, such comparisons provide a systematic way to identify anomalous pollen percentages in ancient samples, which can be inferred to represent cultural use of plants in the past.

Two modern samples examined for this study of the pollen at Albert Porter Pueblo were acquired during summer growing seasons when many plants were pollinating or had just finished pollination. Both samples were collected from an area of Albert Porter Pueblo (Arbitrary Unit 1000) that had recently been disturbed by excavation activities.

Samples from the Fills of Pit Structures

The seven pollen samples obtained from the fills of pit structures and kivas at Albert Porter Pueblo contain pollen deposited during three different time spans (see Table 7.3). Samples collected from sediment above roof-fall debris in pit structures or kivas are assumed to contain sediments that were deposited naturally above roofing debris that was deposited culturally. Fill began to enter structures soon after the structures ceased to be occupied; many of the roofs were either deliberately burned or dismantled. The deposition of pollen in these sediments is assumed to have occurred within a year or two of structure abandonment (Kilby 1998). The presence of pollen from cultivated plants or other economic plants in fill samples is considered evidence of the continued use of these plants near, but not inside, the abandoned structures.

By controlling for time and the mode of deposition, data from fill samples can be used to reconstruct vegetation in the environment during the four time spans, providing a record of how the environment might have changed through time. Pollen in the sample that was collected from the fill of a structure that dated from the late Pueblo III period (A.D. 1225–1260) provides a record of the surrounding environment during the decades leading up to regional depopulation. Comparison of pollen data for the fills of pit structures and kivas dating from the late Pueblo II and early Pueblo III period vs. those dating from the late Pueblo III period may reveal how the 250-year occupation of Albert Porter Pueblo might have altered local plant communities as well as the degree to which human impacts could have contributed to the depopulation of both the pueblo and the region.

Finally, when grouped by time period, samples from structure fills serve as controls that aid in the interpretation of samples from the floors of pit structures and kivas. Because the pollen in the fill samples was probably deposited shortly after the pit structures and kivas were abandoned, I assume that this pollen was deposited during the same general time period as the pollen associated with the structure floors. Therefore, differences between the types of pollen in fill vs. floor samples that date from one time period are unlikely to have resulted from changes in the environment through time. Rather, the differences might have resulted from natural vs. cultural processes such that the pollen in fill was naturally deposited by wind and water, whereas pollen on floors was deposited via economic utilization of plants when the structures were occupied. Any economic pollen recovered from fill samples is assumed to have been deposited as a result of the continued use of those plants in the vicinity of the abandoned structures or from refuse on the prehistoric ground surface that was carried by wind or water into the structure depressions.

Samples from the Floors of Pit Structures

The pollen contained in the 11 samples that were collected from the floors of pit structures or kivas at Albert Porter Pueblo date from four time periods (see Table 7.3). Two samples contain pollen from the late Pueblo II period, one contains pollen from the terminal Pueblo II through initial Pueblo III span, six contain pollen from the early Pueblo III period, and two contain pollen from the late Pueblo III period.

Floor pollen samples were collected from beneath stone slabs that rested directly on floors. Sediments associated with floors of many structures were discolored from structure use. All pollen samples taken from floors were collected from thin lenses of discolored floor sediments lying directly beneath stone slabs.

Pollen recovered from the floors of pit structures and kivas probably includes some grains that were deposited naturally. Wind-carried pollen probably entered structures through the roof hatchway or through the ventilation system. The likelihood of insects depositing pollen on the floors of pit structures and kivas seems slight; thus, pollen from insect-pollinated plants was probably introduced when people brought plants into the structures.

Pollen in samples collected from sealed contexts on the floors of pit structures and kivas can be very informative. First, it can reflect cultural actions within a structure during use, and because the locations of these samples are protected, most such samples do not contain pollen deposited after structure abandonment. Second, the pollen in these protected samples offers insight into plants available in the region during the period of structure use, if the residents were drawing resources from plant communities within the region. Finally, samples of pollen from different time periods provide an opportunity to examine changes in cultural plant choice through time.

Results

The pollen samples analyzed from Albert Porter Pueblo will first be discussed by context: modern controls, samples from the fills of pit structures and kivas, and samples from the floors of pit structures and kivas. This discussion will be followed by an evaluation of changes through time in economic pollen that was deposited. Finally, environmental changes and human impacts on vegetation communities through time will be assessed. In the following sections, only general-use categories (e.g., construction, food, fuel, medicine, ritual, and other) are listed for plants considered economic or potentially economic.

Modern Control Samples

The pollen types within two modern samples represent recent disturbance at Albert Porter Pueblo (Table 7.4). The disturbed context and small sample size necessitate cautious interpretation.

Local Pollen

The two modern samples contain an average of 24.6 percent juniper pollen and 14.1 percent pinyon pine pollen; these percentages are comparable to pollen from modern open settings around Shields Pueblo (Adams 2015). Sagebrush pollen (19.1 percent) and Cheno-am pollen (29.5 percent) averages are also similar to those of modern open settings. Oaks (*Quercus*) contributed only a small amount of background pollen to these recently disturbed locations.

Because pollen grains of locally common saltbush (*Atriplex*) are indistinguishable from other Cheno-am pollen grains, and the pollen grains of rabbitbrush (*Chrysothamnus*) are grouped with those of high-spine Asteraceae (members of the sunflower family), the representation of these two common local shrubs in the pollen record cannot be assessed.

Restricted-Local Pollen

Local plants that require access to ground moisture are not well represented in the modern samples (see Table 7.4). Willow and greasewood contributed only single pollen grains to each modern sample.

Regional Pollen

Negligible quantities of pollen grains from ponderosa pine trees, which grow at higher elevations, were contained in the modern samples. No pollen grains from other regional trees, such as spruce, fir, or Douglas fir, were contained in the two modern samples from Albert Porter Pueblo (see Table 7.4).

Economic and Potentially Economic Plants

Modern pollen samples include low frequencies of pollen grains from plants classified previously in this document as economic or potentially economic (see Table 7.4). The pollen of no single economic type occurs naturally in percentages above 4.3 percent, which is consistent with plants dropping small quantities of pollen grains to the ground. Higher percentages of pollen grains from these plants in cultural contexts could indicate that these plants were used by occupants of Albert Porter Pueblo. As for potentially economic plants, wind-pollinated members of the sunflower family (low-spine Asteraceae) compose an average of 3.1 percent of pollen grains in modern samples. Likewise, the mean percentage of grass (Poaceae) pollen is 2.2 percent. These natural levels of pollen can be compared to pollen recovered from cultural contexts to help recognize significant departures suggestive of cultural plant use or environmental shifts.

Overview of Modern Samples

Although the two modern samples from Albert Porter Pueblo were collected from the same area of the site (Arbitrary Unit 1000), their pollen spectra differ notably. One sample (PD 2187, FS 1) contains abundant sagebrush and juniper pollen, and the other (PD 2187, FS 2) contains a relatively high proportion of pollen grains from weedy plants in the cheno-am group. These differences may reflect a higher level of, or more recent, disturbance in the vicinity of the latter sample. Despite these differences, both modern samples contained pollen from surrounding trees and shrubs and from locally available plants. Few pollen grains from restricted-local and regional plants were present in these two samples, indicating that pollen grains from plants in these categories do not travel great distances naturally. Pollen grains of plants categorized here as "economic" or "potentially economic" are also present in relatively low quantities, which provides a threshold for evaluating the cultural use of those plants at Albert Porter Pueblo.

Samples from the Fills of Pit Structures and Kivas

The pollen in samples collected from the fills of seven pit structures and kivas is assumed to have been deposited naturally into the fills after the structures were abandoned. The resulting data reveal types of pollen deposited during the late Pueblo II, early Pueblo III, and late Pueblo III periods. As in the modern samples, the pollen grains in the samples from structure fills are assumed to reflect primarily the environment during the period of deposition.

Local Pollen

The types of local pollen within the single fill sample that dates from the late Pueblo II period are similar to those in the modern samples (Table 7.5). However, the lower frequency of juniper pollen in the fill sample may reflect a reduction of juniper forest in the region by late Pueblo II times. Samples from the fills of five structures that date from the early Pueblo III period contain notably higher percentages of Cheno-am pollen and lower percentages of the pollen of other woody plants such as pinyon pine and sagebrush. At nearly 50 percent, the higher incidence of Cheno-am pollen may be related to the reduction in percentages of other pollen taxa. Percentages of juniper pollen in fill samples that date from the early Pueblo III period are lower than those in the modern pollen samples. The types of pollen in a single fill sample dating from a late Pueblo III context suggest that use of cheno-ams continued to rise by that time, as did use of pinyon and oak. Pollen data indicate that downward trends in the use of both juniper and sagebrush that began in the early Pueblo III period continued into the late Pueblo III period. A small background rain of oak pollen is present in pollen samples that date from all periods of the occupation of Albert Porter Pueblo. The pollen data for the fills of structures dating from these three time periods suggest that the vegetation around this settlement during the late Pueblo II period was similar to that of the present day, and through the early and late Pueblo III periods the vegetation began to shift notably to a more open and disturbed landscape with fewer juniper trees and sagebrush shrubs and relatively more weedy plants that thrive in disturbed habitats. The abundance of oak and pinyon trees in the surrounding region might have declined slightly.

Restricted-Local Pollen

Willow (*Salix*) pollen is much more abundant in samples from structure fills than in modern samples from Albert Porter Pueblo (see Table 7.5). The incidence of willow pollen is slightly lower in samples dating from the early Pueblo III period (3.6 percent) than from the late Pueblo II period (5.2 percent); incidence is highest in samples dating from the late Pueblo III period (6.8 percent). This abundance of willow pollen in samples from the final period of occupation could represent increased willow growth in the region or increased utilization of willow parts by pueblo occupants, or both.

Regional Pollen

The only type of regional pollen present in samples from structure fills is ponderosa pine; however, the percentage of this pollen in fill samples is the same as the percentage in modern samples, or 0.9 percent (see Table 7.5). These pollen grains were probably carried to the pueblo on wind currents and entered the fill naturally.

Economic and Potentially Economic Plants

Pollen grains from numerous economic plants have been identified in samples collected from the fills of pit structures and kivas that date from the late Pueblo II through the late Pueblo III periods (Tables 7.6, 7.7, and 7.8). The percentage of some types of pollen in fills is greater than that in the modern samples (Table 7.9). I assume that, because these types of pollen were absent from the modern samples, the pollen of many plants (Apiaceae, Caryophyllaceae, Centaurea, high-spine Asteraceae, *Echinocereus*, *Eriogonum*, *Erodium*, Fabaceae, Liguliflorae, Liliaceae, *Rhus*, Solanaceae, *Yucca* and the domesticate *Zea mays*) entered structure fills via cultural actions. Economic plants represented by pollen in fills of structures dating from the late Pueblo II period include Liliaceae, Solanaceae, and *Zea mays*. Pollen grains from Caryophyllaceae, high-spine Asteraceae, *Echinocereus*, *Eriogonum*, Fabaceae, Liguliflorae, *Yucca*, and *Zea mays* were found in samples from structures dating from the early Pueblo III period. Pollen grains of *Echinocereus* and *Zea mays* were found in samples from structures dating from the late Pueblo III period. Thus, maize was processed or consumed in the vicinity of the sampled structures as these structures filled with sediment. Uses of plants as food and for medicinal and ritual needs could explain how the other economic plants left pollen grains in percentages greater than those in the modern samples. Pollen grains from the remaining plants were probably deposited naturally; they also occur in low percentages in the modern samples.

Pollen from plants that were potentially economic was found in samples from structures that date from the late Pueblo II period; pollen grains of wind-pollinated members of the sunflower (low-spine Asteraceae) and the grass (Poaceae) family occur in percentages similar to, or greater than, those in modern samples. Low-spine Asteraceae pollen grains are more numerous in samples from structures dating from the early Pueblo III period than in the modern samples. Achenes (fruit) of wind-pollinated Asteraceae plants such as sumpweed (*Iva xanthifolia*) can be harvested when ripe, and grasses produce abundant pollen grains over the course of a growing season. Some of these resources might have been utilized in the vicinity of the structures at Albert Porter Pueblo as the buildings filled with sediment.

Samples from the Floors of Pit Structures and Kivas

Pollen grains that were protected beneath artifacts or sandstone rocks on the floors of pit structures and kivas were probably carried into the structures through the cultural use of plants as well as from natural entry through roof openings, ventilator shafts, and possibly from transport on footwear or clothing. Ten samples from sealed floor contexts represent four time periods (see Tables 7.6, 7.7, and 7.8; Table 7.10).

To help isolate the economic uses of plants at Albert Porter Pueblo, the types of pollen contained in floor samples can be compared to those in fill samples and modern samples (see Tables 7.5 and 7.9). Plants represented by a greater percentage of pollen grains in floor samples than in modern or fill samples might have been intentionally brought into pit structures and kivas during use of the structures.

Late Pueblo II Period

Average percentages of sagebrush, pinyon pine, oak, and juniper pollen on the floors of pit structures and kivas that date from the late Pueblo II period are generally similar to those in structure fills of the same time period, as well as to pollen in modern samples (see Table 7.5). Only the percentage of Cheno-am pollen was greater in samples from floors (30.7 percent) than in those from fills (22.7 percent), but it was not greater than that in modern samples (28.6 percent). These results suggest that the floor samples might include wind-borne pollen of weedy local plants. However, the occupants of Albert Porter Pueblo also used these plant resources as food—these plants are represented in the archaeobotanical record of larger plant parts recovered from the pueblo (see Chapter 8), and they were consumed by other Ancestral Pueblo residents in the immediate area (Adams and Bowyer 2002) and more widely (Huckell and Toll 2004).

The percentage of willow pollen, a restricted-local plant, on the floors of pit structures and kivas dating from the late Pueblo II period (1.8 percent), as compared to the percentage (0.4 percent) in modern samples, suggests cultural use (see Table 7.5). The inference of cultural use is supported by the percentage of willow pollen (5.2 percent) in the fill of a different structure. The percentage of greasewood pollen in samples from floors (0.7 percent) exceeds the percentage in fill and modern samples (0.4 percent), which suggests cultural use of greasewood. The presence of regional ponderosa pine pollen on floors in quantities similar to those in fill and in modern samples suggests natural transport.

Pollen from some types of economic and potentially economic plants that was absent from modern samples was found in samples from floors of structures that date from the late Pueblo II period (see Table 7.9). This pollen was from plants that include the carrot, lily, sunflower, and potato/tomato families, as well as maize. The presence of pollen grains from these plants is considered evidence of foods or of materials for household or other needs met when the structures were occupied and later as structures filled with sediment. Pollen percentages of wind-pollinated members of the sunflower (low-spine Asteraceae) and grass families are also higher in samples from floors than in modern samples, suggesting that they were gathered for food, medicinal, or other household needs. The presence of maize pollen on the floors and in the fills of structures dating from the late Pueblo II period clearly indicates cultural deposition. One “indeterminate” pollen grain from the floor of Kiva 119 (PD 367, FS 7) was tentatively identified by palynologist John Jones as cotton (*Gossypium*); the presence of this pollen would be very unusual for southwestern Colorado, where cotton seeds and pollen are generally lacking. Pollen grains of other plant taxa were either present in lower percentages in samples from floors than in those from fill or were recovered in modern samples and are not considered indicative of plant use during the late Pueblo II period.

Early Pueblo III Period

Pollen recovered from the six samples collected from the floors of structures that date from the early Pueblo III period provides the best basis for inferring plant use within structures (see Table 7.7). The five pollen samples collected from the fills of structures that date from this time period are useful for comparison. The types of local pollen in samples from the floors of structures that date from the early Pueblo III period suggest continued use of sagebrush, pinyon pine, oak, juniper, and of weedy plants in the cheno-am group. The differences in the percentages of local pollen in samples from the floors of structures that date from the late Pueblo II period vs. the early Pueblo III period are negligible, suggesting similarities in the intensity of plant usage during those two periods. Compared with modern samples, there are more similarities than differences in the percentages of these local plant pollen grains. The pollen in samples from the fills of structures dating from the early Pueblo III period differs from the patterns of pollen in samples from floor surfaces dating from that period; pollen from sagebrush, juniper, and pinyon occurs in higher percentages, and Cheno-am pollen occurs in lower percentages on floors than in fills. The data indicate that most local plants continued to be available during the early Pueblo III period, and by the time structures were filling with sediment, the landscape was vegetated by notable numbers of weedy plants in the cheno-am group.

The presence of pollen from one type of restricted-local resource—willow (*Salix*)—on the floors of structures dating from early Pueblo III times probably represents use, because willow pollen occurs in a higher mean percentage on floors than in modern samples (see Table 7.5). As with late Pueblo II floors, the minimal presence of greasewood and ponderosa pine pollen on the floors of structures dating from the early Pueblo III period suggests natural deposition.

The criteria defined above to recognize the cultural use of economic and potentially economic pollen suggest that floors of structures dating from the early Pueblo III period contained numerous types of culturally deposited pollen. These include members of the pink, legume, lily, and sunflower families, along with wild buckwheat and lemonade berry; all of these plants provided food or raw materials for other needs, or both. The presence of maize pollen on the floors of structures that date from the early Pueblo III period is also considered cultural. None of the other types of pollen on these floors occurs in frequencies suggestive of plant use in the past.

Terminal Pueblo II through Initial Pueblo III Period

A single floor sample from deposits dating from terminal Pueblo II through initial Pueblo III times provides additional information on plant use at Albert Porter Pueblo (see Table 7.10). This sample is similar to samples from late Pueblo II and early Pueblo III floors in terms of the frequency of sagebrush pollen (see Table 7.5). However, the percentages of juniper and pinyon pollen are lower, and those of oak and Cheno-ams are greater. When contrasted with the modern samples, pollen from the disturbed-ground plants in the Cheno-am group appear to be the only type of pollen from economic plants present on this floor that represent locally available plants. The pollen of no restricted-local or regional plants is present in percentages indicative of use in the past.

The presence of pollen from two economic or potentially economic resources suggests that these plants served food, medicinal, and other needs in this transitional terminal Pueblo II through initial Pueblo II period (see Table 7.9). These resources include maize and plants in the Asteraceae (low-spine) group, and their pollen constitutes 13.4 percent of the pollen in the floor sample. These pollen types occur in the modern samples at a much lower rate (3.1 percent). Sumpweed (*Iva xanthifolia*) grows in the region and is represented in this pollen group.

Late Pueblo III Period

A single pollen sample was collected from the floor of a kiva that dates from the late Pueblo III period (see Table 7.8). The resulting data contain no clear evidence of utilization of any local wild plants (see Table 7.5). Nor do these data indicate use of restricted-local or regional plants. Pollen from only a single economic plant—maize—was preserved on this floor; however, at 54.9 percent, it is the highest content of maize pollen of any pollen sample collected from Albert Porter Pueblo (see Table 7.8). The presence of this pollen resulted from either the storage of maize or a blessing that included maize pollen.

As with other structures in earlier periods, pollen grains from plants being used in the vicinity of this structure entered this abandoned building with naturally deposited sediment. The single sample obtained from this fill indicates an influx of both Cheno-am pollen and willow pollen in percentages unlike those in modern samples (see Table 7.5), which suggests a fairly disturbed environment that continued to include willow trees in damp locations within the general area. This suggests that there was enough moisture available for people as well as these water-loving trees even during the “great drought” (Van West and Dean 2000). In addition, the presence of a single maize pollen grain reflects use of maize nearby as the structure filled.

Plant Use through Time at Albert Porter Pueblo

An examination of the pollen data for plants that were locally available through time reveals patterns of plant use for Albert Porter Pueblo. The data for floor surfaces (Figure 7.1) and structure fills (Figure 7.2) suggest that use of sagebrush and juniper decreased through time. Residents during late Pueblo II through late Pueblo III times used sagebrush and juniper for construction material and fuel, and it is reasonable to assume that the local availability of these plants decreased through time. The percentage of pinyon pine pollen is similar in samples collected from contexts dating from different time periods, possibly because the wood was not often used for construction. These trees might have been spared because they are capable of producing occasional abundant nut crops. The Cheno-am pollen data for floors suggest that use of pinyon decreased during the Pueblo III period; however, the percentage of pinyon pollen grains in the fill of a kiva dating from the late Pueblo III period is 50 percent. These contrasting trends suggest that use of weedy cheno-am plants as food decreased as a locally disturbed environment hosted greater plant populations. The pollen data generally reflect an increasingly open landscape and eventual abandonment of agricultural fields, which allowed weedy species to encroach on Albert Porter Pueblo as occupation of the pueblo declined. As a restricted-local resource, willow also served various needs of Albert Porter Pueblo occupants. The availability and use of willow increased during the Pueblo III period.

The residents of Albert Porter Pueblo gathered numerous other economic and potentially economic plants. They grew maize throughout the occupation of the settlement and collected grasses and wind-pollinated members of the sunflower family for food or other household needs. The data for three pollen samples indicate that, during the late Pueblo II period at Albert Porter Pueblo, occupants utilized 12 different plants. During the early Pueblo III period, occupants procured at least 16 different plants whose pollen grains were preserved in 11 samples. Data for two pollen samples collected from late Pueblo III contexts suggest use of nine plants. Because sample size may affect these results, the main conclusion is that pollen data suggest a fairly steady and regular use of plants through time.

Types of Activities Conducted in Pit Structures

The presence of pollen from economic plants in sealed contexts on the floors of pit structures and kivas indicates that the plants were processed within these structures. Maize and wild plants were routinely carried into these dwellings. The structures clearly served domestic purposes including activities associated with preparing, cooking, and consuming foods. Pit structures and kivas were probably used for ritual purposes as well, especially during the late Pueblo III period, when maize pollen might have been sprinkled on the floor of Kiva 403 as a blessing.

Environmental Change and Human Impact on the Environment

The recovery of pollen of many of the same plant taxa from both ancestral Pueblo and modern samples suggests general similarities between past and present plant communities. However, the types of pollen within samples from the fills of pit structures and kivas also reflect changes in specific taxa in the immediate environment around Albert Porter Pueblo during its 200-year occupation.

The pollen data for local plants indicate a decrease in juniper trees and sagebrush shrubs from the earliest to the latest contexts sampled (Figures 7.1 and 7.2). The percentage of pinyon pollen is lower in samples collected from the floors of kivas that date from the late Pueblo III period. In contrast, the percentage of pollen from cheno-ams—representative of plants that thrive in disturbed settings—increases in samples from fills that were deposited in successively later periods; the greatest relative abundance (50 percent) of Cheno-am pollen occurs in samples from structures that date from the late Pueblo III period. Together these data suggest that, during the occupation of Albert Porter Pueblo, a general decline occurred in the local pinyon pine/juniper woodland that was accompanied by an increasingly open and disturbed landscape. The data reflect a continuous decline in sagebrush, which suggests that the landscape, though increasingly open, was not progressing routinely through a successional process that can include an invasive growth of sagebrush in abandoned fields within a few years. Such an anomalous pattern might have been produced by the residents of Albert Porter Pueblo clearing increasingly larger areas of woodland for farming coupled with reduced field-fallow intervals during the later periods of the pueblo occupation.

Modern pollen samples from disturbed ground contain higher percentages of pinyon pine and juniper pollen than any of the samples from structure fills at Albert Porter Pueblo (see Table 7.5), indicating that there was less woodland in the vicinity of the pueblo than is present today. The percentages of sagebrush pollen in the modern samples are greater than those in late Pueblo II/early Pueblo III samples and less than those in late Pueblo III samples; the data suggest decreasing availability of sagebrush through time. Finally, average percentages of Cheno-am pollen in modern samples are similar to those in samples from contexts dating from the late Pueblo II period but are much lower than those in samples from fill contexts dating from the Pueblo III period. These data suggest that, as the occupation of Albert Porter Pueblo came to an end, the presence of weedy plants in the area was considerably greater than in the modern disturbed landscape. Pollen from willow, a restricted-local plant, occurs at fairly high percentages in structure fills (5.2–6.8 percent) and exceeds the level in modern samples (0.4 percent). This suggests that damp locations for willow trees persisted through time, and that the gathering of willow stems with pollen attached might have increased through time.

Summary

Twenty pollen samples from Albert Porter Pueblo were analyzed. These samples were collected from three contexts: sealed floor contexts, structure fills, and the modern ground surface. The resulting data provide insights into the uses of plants within pit structures and kivas and the effects of long-term occupation of the landscape surrounding the settlement. Modern control samples were used to establish a baseline for natural pollen deposition in open, recently disturbed modern settings. These samples established levels of pinyon pine/juniper, sagebrush, and other types of local pollen as well as the presence or absence of pollen from many plants recognized as useful historically. The types of pollen within seven samples from structure fills suggest that from the late Pueblo II to the late Pueblo III periods, the landscape surrounding Albert Porter Pueblo experienced a reduction in pinyon pine/juniper woodland and sagebrush parkland, and that substantially more weedy annual plants grew than at present.

Numerous plant resources were intentionally carried into pit structures and kivas. Pollen data indicate that the following resources were brought into structures: maize and other food plants, plant resources that served as construction materials, plants used for ritual and medicinal purposes, and plant resources used for a wide variety of other household needs. Domestic activities included food preparation, cooking, and consumption. Data indicate that the pattern of plant use varied through time but generally reveal a consistent utilization of numerous plants that deposited pollen grains.

Human impact on the environment during five centuries is reflected in patterns of pollen deposition in the fills of pit structures and kivas. Human activities resulted in increased pressure on woodlands and decreased availability of juniper trees. As lands were cleared for agricultural fields, the quantity of sagebrush plants decreased; some new sagebrush shrubs became established when fields were left fallow. Likewise, an increase in the quantity of weedy plants (cheno-ams) through time reflects an increasingly open and disturbed landscape. An increase in the percentage of Cheno-am pollen in samples from contexts dating from the late Pueblo III period suggests that the last tended agricultural fields were beginning the process of plant succession. These congruent patterns of pollen deposition are more likely to have resulted from human activities affecting landscapes than from natural environmental shifts.

It is unlikely that human alterations of the environment ended the occupation of Albert Porter Pueblo, but it is likely that these actions were a factor. Acquisition of fuelwood and construction beams required increasingly longer trips from the settlement. Maize was grown in all periods, but productivity could have declined as a result of overuse of fields and depletion of soil nutrients. Amidst environmental difficulties in the A.D. 1270–1300 period (Van West and Dean 2000) and possible social tensions, Albert Porter Pueblo experienced a complete depopulation similar to that of all other regional communities near the end of the thirteenth century.

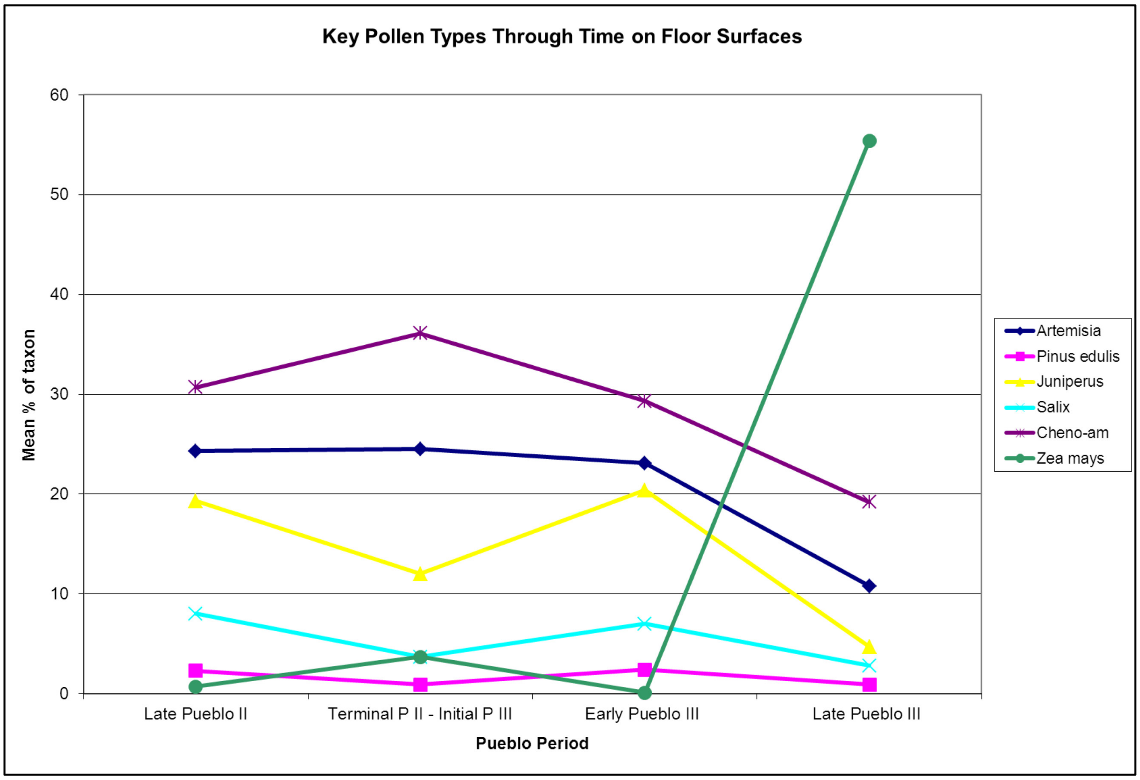

Figure 7.1. Key pollen types through time on floor surfaces, Albert Porter Pueblo.

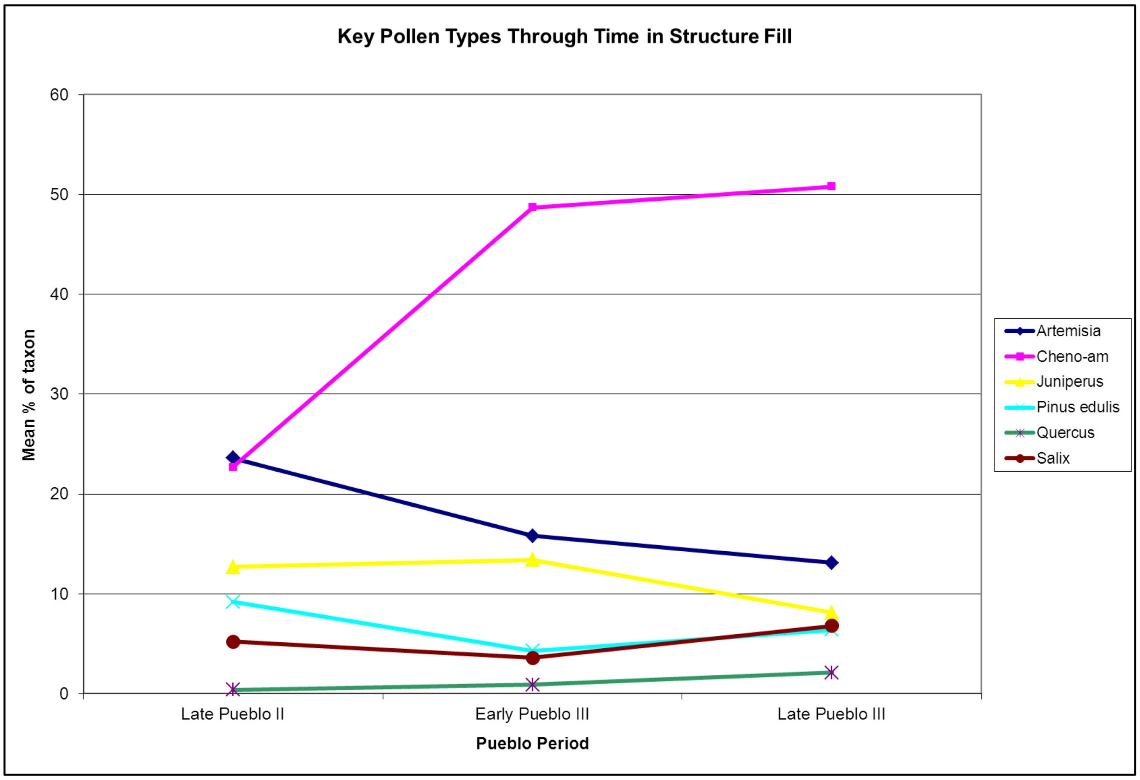

Figure 7.2. Key pollen types through time in structure fills, Albert Porter Pueblo.

Table 7.1. Plant Communities and Selected Members that Make Up Local, Restricted-Local, and Regional Pollen Source Categories.

Type	Common Name	Significance
Local		
Artemisia	sagebrush	Dominant shrub, indicative of fallow, formerly disturbed land
Juniperus and *Pinus edulis*	juniper and pinyon pine	Dominant woodland trees
Quercus	oak	Dominant shrub, especially in steep terrain, and following fire
Cheno-ams (Chenopodiaceae and/or *Amaranthus*)	cheno-ams; goosefoot family members, and pigweed	Dominated by annuals, indicative of disturbed lands
Restricted-local		
Salix sarcobatus	willow/greasewood	Trees and shrubs in the area that require some access to water
Regional		
Pinus ponderosa	ponderosa pine	Higher-elevation pine present in the region

Table 7.2. Economic and Potentially Economic Plants Represented in Pollen Samples, Albert Porter Pueblo.

Type	Common Name or Description
Economic Types	
Apiaceae	umbel family
Brassicaceae (Cruciferae)	mustard family
Caryophyllaceae	pink family
Centaurea	thistle (some species are not native)
Asteraceae (Compositae), high-spine	showy-flowered members of the sunflower family
Echinocereus	hedgehog cactus
Eriogonum	member of the buckwheat family
Erodium	some species are not native
Fabaceae (Leguminosae)	legume family
Liguliflorae	showy-flowered members of the sunflower family
Liliaceae	lily family
Polygonaceae	buckwheat family
Rhus	lemonade berry
Rosaceae	rose family
Solanaceae	potato/tomato family (includes *Physalis*)
Sphaeralcea	globemallow
Yucca	yucca
Zea mays	maize (corn)
Potentially Economic Types	
Asteraceae (Compositae), low-spine	wind-pollinated members of the sunflower family
Ephedra nevadensis; E. torreyana	Mormon tea (ephedra)
Poaceae (Gramineae)	grass family

Note: Many of these are included in the ethnographic compendium of historic plant uses by American Indians (Rainey and Adams 2004). Names in parentheses are alternate family names commonly reported in the ethnographic and archaeobotanical literature.

Table 7.3. Number of Pollen Samples by Context and Time Period, Albert Porter Pueblo.

Time Period	Pit Structure and Kiva Floors[a] (N)	Pit Structure and Kiva Fills[b] (N)	Modern Controls[c] (N)	TOTAL
Late Pueblo II (A.D. 1060–1140)	2	1		3
Terminal Pueblo II through Initial Pueblo III (A.D. 1100–1180)	1			1
Early Pueblo III (A.D. 1140–1225)	6	5		11
Late Pueblo III (A.D. 1225–1260)	2[d]	1		3
Present Day (A.D. 1990/2000)			2	2
TOTAL	11	7	2	20

[a] Kiva or pit structure floor samples were collected from beneath objects, usually a sandstone rock or other large artifact, resting directly on the floor; the sediments for the sample were scraped from the floor surface.
[b] Kiva or pit structure fill samples were collected from naturally deposited sediment above roof-fall deposits in kivas and pit structures; these deposits probably accumulated a few years after the abandonment of the structure (Kilby 1998).
[c] Two modern control samples were collected from disturbed modern ground surface in the area of Arbitrary Unit 1000.
[d] One late Pueblo III surface sample (PD 370, FS 5) contained only four pollen grains and will not be discussed further.

Table 7.4. Modern Pollen Control Samples.

Time Period:	Present Day (A.D. 2000+)			
Sample No.	19		20	
Setting	Recent Disturbance, Albert Porter Site		Recent Disturbance, Albert Porter Site	
Study Unit	ARB 1000		ARB 1000	
PD	2187		2187	
FS	1		2	
Grains Counted	234		217	
Concentration	117,393		24,742	
	N=	%	N=	%
Local				
Artemisia	70	29.9	18	8.3
Juniperus	72	30.8	40	18.4
Pinus edulis	38	16.2	26	12.0
Quercus	5	2.1	1	0.5
Cheno-am	18	7.7	111	51.2
Restricted-local				
Salix	1	0.4	1	0.5
Sarcobatus	1	0.4	1	0.5
Regional				
Pinus ponderosa	1	0.4	3	1.4
Economic				
Brassicaceae	1	0.4		
Centaurea-type			1	0.5
Erodium			2	0.9
Polygonaceae	3	1.3	2	0.9
Rosaceae	2	0.9		
Sphaeralcea			1	0.5
Potentially Economic				
Low Spine, Asteraceae	10	4.3	4	1.8
Ephedra nevadensis	2	0.9	1	0.5
Ephedra torreyana			1	0.5
Poaceae	7	3.0	3	1.4
Indeterminate	3	1.3	1	0.5

Note: N = number of grains identified; % = percentage of the total grains identified within the sample.
ARB = Arbitrary Unit.

Table 7.5. Mean Percentage of Local, Restricted-Local, and Regional Pollen Types in Floor and Fill Samples, Grouped by Time Period, in Comparison to Presence of Pollen from these Taxa in Modern Surface Samples, Albert Porter Pueblo.

Category of Plant				Local Plants					Restricted Local Plants		Regional Plants
Time Period	Context	No. of Samples	Total Pollen Grains in Samples	*Artemisia*	*Juniperus*	*Pinus edulis*	*Quercus*	Cheno-am	*Salix*	*Sarcobatus*	*Pinus ponderosa*
Late Pueblo II (A.D. 1060–1140)	floor	2	440	24.3	19.3	8.0	0.9	30.7	1.8	0.7	0.5
Late Pueblo II (A.D. 1060–1140)	fill	1	229	23.6	12.7	9.2	0.4	22.7	5.2	0.4	0.9
Terminal Pueblo II through Initial Pueblo III (A.D. 1100–1180)	floor	1	216	24.5	12.0	3.7	1.4	36.1	0.5		0.5
Early Pueblo III (A.D. 1140–1225)	floor	6	1,336	23.1	20.4	7.0	0.7	29.3	2.4	0.4	0.5
Early Pueblo III (A.D. 1140–1225)	fill	5	1,127	15.8	13.4	4.3	0.9	48.7	3.6	0.1	0.2
Late Pueblo III (A.D. 1225–1280)	floor	1	213	10.8	4.7	2.8	1.4	19.2			
Late Pueblo III (A.D. 1225–1280)	fill	1	236	13.1	8.1	6.4	2.1	50.8	6.8		1.3
Modern surface samples	control	2	451	19.5	24.8	14.2	1.3	28.6	0.4	0.4	0.9

Table 7.6. Pollen on Surfaces and within Fill Samples from the Late Pueblo II Period, Albert Porter Pueblo.

Time Period	Late Pueblo II (A.D. 1060–1140)					
Sample No.	14		18		16	
Study Unit	Structure 906		Structure 176		Structure 176	
Context	Surface		Surface		Fill	
PD	1058		1915		1744	
FS	9		1		2	
PL						
Grains Counted	213		227		229	
Concentration	19,788		13,125		10,078	
	N=	%	N=	%	N=	%
Local						
Artemisia	48	22.5	59	26.0	54	23.6
Juniperus	62	29.1	23	10.1	29	12.7
Pinus edulis	22	10.3	13	5.7	21	9.2
Quercus	1	0.5	3	1.3	1	0.4
Cheno-am	48	22.5	87	38.3	52	22.7
Restricted-local						
Salix	2	0.9	6	2.6	12	5.2
Sarcobatus	2	0.9	1	0.4	1	0.4
Regional						
Pinus ponderosa	1	0.5	1	0.4	2	0.9
Economic						
Apiaceae			1	0.4		
Brassicaceae	1	0.5				
High Spine, Asteraceae	1	0.5				
Liliaceae					1	0.4
Polygonaceae			3	1.3	1	0.4
Solanaceae					1	0.4
Sphaeralcea			1	0.4	1	0.4
Zea mays			3	1.3	8	3.5
Potentially Economic						
Low Spine, Asteraceae	11	5.2	15	6.6	21	9.2
Ephedra nevadensis	1	0.5			2	0.9
Ephedra torreyana	1	0.5				
Poaceae	7	3.3	3	1.3	15	6.6
Indeterminate	5	2.3	6	2.6	9	3.9

Note: N = number of grains identified; % = percentage of the total grains identified within the sample.

Table 7.7. Pollen from Pit Structure and Kiva Surface and Fill Samples from the Early Pueblo III Period, Albert Porter Pueblo.

Time Period	Early Pueblo III (A.D. 1140–1225)																					
	Surface Samples												Fill Samples									
Sample No.	1		5		8		9		12		13		2		3		7		10		11	
Study Unit	Structure 109		Structure 119		Structure 502		Structure 302		Structure 107		Structure 108		Structure 108		Structure 107		Structure 302		Structure 100		Structure 116	
PD	270		367		382		684		1041		1046		321		338		379		799			
FS	18		7		12		4		1		6		11		9		1		11		963	
Grains Counted	217		220		215		225		235		224		217		234		215		225		236	
Concentration	8,640		32,462		11,475		13,766		13,099		17,027		17,559		22,576		15,409		24,539		16,444	
	N=	%	N=	%	N=	%	N=	%	N=	%	N=	%	N=	%	N=	%	N=	%	N=	%	N=	%
Local																						
Artemisia	48	22.1	54	24.5	62	28.8	55	24.4	40	17.0	49	21.9	32	14.7	49	20.9	37	17.2	36	16.0	24	10.2
Juniperus	54	24.9	46	20.9	34	15.8	50	22.2	40	17.0	48	21.4	12	5.5	50	21.4	33	15.3	41	18.2	15	6.4
Pinus edulis	12	5.5	24	10.9	16	7.4	14	6.2	13	5.5	14	6.3	8	3.7	10	4.3	6	2.8	9	4.0	15	6.4
Quercus	1	0.5	1	0.5			4	1.8	1	0.4	2	0.9	3	1.4	3	1.3	1	0.5	2	0.9	1	0.4
Cheno-am	67	30.9	55	25.0	81	37.7	46	20.4	87	37.0	55	24.6	139	64.1	85	36.3	104	48.4	96	42.7	125	53.0
Restricted-local																						
Salix	4	1.8	1	0.5			2	0.9	7	3.0	18	8.0	5	2.3	11	4.7			8	3.6	17	7.2
Sarcobatus	1	0.5			2	0.9	2	0.9													1	0.4
Regional																						
Pinus ponderosa			3	1.4					3	1.3	1	0.4	1	0.5					1	0.4		
Economic																						
Brassicaceae	1	0.5					1	0.4									1	0.5			1	0.4
Caryophyllaceae									1	0.4											1	0.4
High Spine, Asteraceae	1	0.5	3	1.4			1	0.4	1	0.4	1	0.4	1	0.5			1	0.5			1	0.4
Echinocereus																					1	0.4

Time Period	Early Pueblo III (A.D. 1140–1225)																					
	Surface Samples												Fill Samples									
Sample No.	1		5		8		9		12		13		2		3		7		10		11	
Study Unit	Structure 109		Structure 119		Structure 502		Structure 302		Structure 107		Structure 108		Structure 108		Structure 107		Structure 302		Structure 100		Structure 116	
PD	270		367		382		684		1041		1046		321		338		379		799			
FS	18		7		12		4		1		6		11		9		1		11		963	
Grains Counted	217		220		215		225		235		224		217		234		215		225		236	
Concentration	8,640		32,462		11,475		13,766		13,099		17,027		17,559		22,576		15,409		24,539		16,444	
	N=	%	N=	%	N=	%	N=	%	N=	%	N=	%	N=	%	N=	%	N=	%	N=	%	N=	%
Eriogonum			1	0.5			1	0.4													2	0.8
Fabaceae			1	0.5	1	0.5	1	0.4							1	0.4						
Liguliflorae	1	0.5	1	0.5							1	0.4	1	0.5								
Liliaceae									1	0.4												
Polygonaceae	2	0.9			1	0.5			1	0.4	2	0.9			1	0.4	1	0.5	1	0.4	1	0.4
Rhus									2	0.9												
Rosaceae							1	0.4	1	0.4	1	0.4	1	0.5								
Sphaeralcea			1	0.5			3	1.3			1	0.4										
Yucca																					1	0.4
Zea mays					1	0.5			1	0.4									1	0.4		
Potentially Economic																						
Low Spine, Asteraceae	17	7.8	16	7.3	8	3.7	30	13.3	13	5.5	12	5.4	8	3.7	12	5.1	20	9.3	17	7.6	12	5.1
Ephedra nevadensis	1	0.5	5	2.3	2	0.9	3	1.3	3	1.3	2	0.9	1	0.5	1	0.4	3	1.4	3	1.3	2	0.8
Ephedra torreyana							1	0.4	1	0.4	1	0.4									1	0.4
Poaceae	4	1.8	6	2.7	3	1.4	5	2.2	7	3.0	7	3.1	1	0.5	1	0.4	6	2.8	1	0.4	9	3.8
Indeterminate	4	1.8	6	2.7	4	1.9	7	3.1	11	4.7	9	4.0	5	2.3	10	4.3	3	1.4	9	4.0	6	2.5

Note: N = number of grains identified; % = percentage of the total grains identified within the sample.

Table 7.8. Pollen from Pit Structure and Kiva Surface and Fill Samples from the Late Pueblo III Period, Albert Porter Pueblo.

Time Period	Late Pueblo III (A.D. 1225–1260)			
Sample No.	4		15	
Study Unit	Structure 403		Structure 136	
Context	Surface		Fill	
PD	344		1347	
FS	1		25	
PL				
Grains Counted	213		236	
Concentration	16,439		21,925	
	N=	**%**	N=	**%**
Local				
Artemisia	23	10.8	31	13.1
Juniperus	9	4.2	19	8.1
Pinus edulis	6	2.8	15	6.4
Quercus	3	1.4	5	2.1
Cheno-am	41	19.2	120	50.8
Restricted-local				
Salix			16	6.8
Regional				
Pinus ponderosa			3	1.3
Economic				
Echinocereus			1	0.4
Polygonaceae	1	0.5	1	0.4
Sphaeralcea			1	0.4
Zea mays	117	54.9	1	0.4
Potentially Economic				
Low Spine, Asteraceae	8	3.8	8	3.4
Ephedra nevadensis	1	0.5	3	1.3
Poaceae	2	0.9	7	3.0
Indeterminate	2	0.9		5

Note: N = number of grains identified; % = percentage of the total grains identified within the sample.

Table 7.9. Mean Percentage of Economic and Potentially Economic Pollen Types Present in Surface and Fill Samples, Grouped by Time Period, in Comparison to Presence of Pollen from these Taxa in Modern Surface Samples, Albert Porter Pueblo.

Category of Plant	Economic Plants							Potentially Economic Plants			
Time Period	Context	No. of Samples	Total Pollen Grains in Samples	Brassicaceae	Polygonaceae	Rosaceae	Sphaeralcea	Asteraceae, Low-Spine	*Ephedra nevadensis*	*Ephedra torreyana*	Poaceae
Late Pueblo II (A.D. 1060–1140)	Surface	2	440	0.2	0.7		0.2	5.9	0.2	0.2	2.3
Late Pueblo II (A.D. 1060–1140)	Fill	1	229		0.4		0.4	9.2	0.9		6.6
Terminal Pueblo II through Initial Pueblo III (A.D. 1100–1180)	Surface	1	216		0.0	0.5		13.4	0.5		0.9
Early Pueblo III (A.D. 1140–1225)	Surface	6	1,336	0.1	0.4	0.2	0.4	7.2	1.2	0.2	2.4
Early Pueblo III (A.D. 1140–1225)	Fill	5	1,127	0.2	0.4	0.1		6.1	0.9	0.1	1.6
Late Pueblo III (A.D. 1225–1280)	Surface	1*	213		0.5			3.8	0.5	0.5	0.9
Late Pueblo III (A.D. 1225–1280)	Fill	1	236		0.4		0.4	3.4	1.3		3.0
Modern surface samples	Control	2	451	0.2	1.1	0.4	0.2	3.1	0.7	0.2	2.2

* One surface sample (PD370, FS5) omitted from discussion.

Note: Numerous other economic plants listed in Table 7.2 were not included in this table, as their pollen was not identified in the modern surface samples, and hence they are automatically considered indicative of use in the past.

Table 7.10. Pollen on Surfaces from the Terminal Pueblo II through Initial Pueblo III Period.

Time Period	Terminal Pueblo II through Initial Pueblo III (A.D. 1100-1180)	
Sample No.	17	
Study Unit	Structure 150	
Context	Surface	
PD	1850	
FS	1	
PL		
Grains Counted	216	
Concentration	18,060	
	N=	%
Local		
Artemisia	53	24.5
Juniperus	26	12.0
Pinus edulis	8	3.7
Quercus	3	1.4
Cheno-am	78	36.1
Restricted-local		
Salix	1	0.5
Regional		
Pinus ponderosa	1	0.5
Economic		
Rosaceae	1	0.5
Zea mays	8	3.7
Potentially Economic		
Low Spine, Asteraceae	29	13.4
Ephedra nevadensis	1	0.5
Poaceae	2	0.9
Indeterminate	5	2.3

Note: N = number of grains identified; % = percentage of the total grains identified within the sample.

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Chapter 8

Plant Use

by Karen R. Adams

Introduction

Objectives of the Study

Archaeobotanical data contributed to the achievement of numerous research objectives for excavations at Albert Porter Pueblo. A major interest has been to reconstruct plant use through time, focusing on plants exploited by the occupants of this settlement for food, fuel, construction, and other material needs. Albert Porter Pueblo is a multi-component site to which various dating schemes have been applied. Major occupations date from the following time spans: (a) middle Pueblo II through late Pueblo III (A.D. 1020–1280), (b) late Pueblo II (A.D. 1060–1140), (c) late Pueblo II through early Pueblo III (A.D. 1060–1225), (d) terminal Pueblo II through initial Pueblo III (A.D. 1100–1180), (e) early Pueblo III (A.D. 1140–1225), and (f) late Pueblo III (A.D. 1225–1280). Archaeobotanical samples from the site enable the evaluation of changes in plant use over the course of 250 years. Particular attention focuses on the late Pueblo II (A.D. 1060–1140) subperiod, which coincides with Chaco influence in the region, on the early Pueblo III (A.D. 1140–1225) post-Chaco transition subperiod, and on the late Pueblo III (A.D. 1225–1280) subperiod, which occurred just before the depopulation of both Albert Porter Pueblo and the region. Another important goal of this research is to understand the extent to which domestic activities occurred within the kivas in this pueblo. Finally, the archaeobotanical samples provide a record useful for reconstructing the surrounding environment through time and for assessing the condition of the woodland near the pueblo near the time of regional depopulation.

Types of Samples

The archaeobotanical specimens discussed in this report were recovered primarily from flotation samples and macrofossil samples. Flotation samples are 2-liter sediment samples from which plant remains are extracted in the laboratory using a water-separation technique. Of the 657 flotation samples collected at Albert Porter Pueblo, 219 samples (33 percent) were processed and analyzed for this report. Macrofossil samples are larger pieces of plant remains collected during excavation. These include charred wood fragments, pieces of maize (*Zea mays*), and other types of plant tissue. Of the 1,488 total macrofossil samples collected at Albert Porter Pueblo, 247 (17 percent) were analyzed for this report. In addition, several modified vegetal materials, including basketry and textile fragments, were identified and are reported here. A detailed discussion of flotation and macrofossil samples and field collection strategies is presented by Adams (2004).

Resources

Two documents pertaining to Albert Porter Pueblo and other sites excavated by the Crow Canyon Archaeological Center support the interpretations provided here. One is an ethnographic compendium (Rainey and Adams 2004) that reports historical uses of plants by American Indian groups; this compendium represents the results of a thorough review of Southwestern ethnographic literature on the uses of all plants recovered from sites excavated by Crow Canyon. A second document (Adams and Murray 2004) presents identification criteria for the plant parts recovered. This document includes metric and nonmetric observations on all archaeobotanical wood and non-wood plant parts that were collected from these sites. To the extent possible, the scientific terminology used in those documents and in this report conforms to that used by Welsh et al. (1987).

Methods

Sample Collection

Wood provided fuels for cooking, heating, and lighting. Archaeologists systematically collected flotation samples from thermal features and midden deposits. The contents of thermal features such as hearths and firepits, and of ashpits, have the potential to illuminate plant use during short periods of time. Midden samples document trash accumulated over longer periods of time, providing a longer-term perspective of plant use by a household or larger group.

The contents of thermal features, ashpits, and middens have been the focus of previous Crow Canyon research, providing a comparable archaeobotanical record from a variety of archaeological sites. These contexts are also locations where archaeobotanical materials are typically well preserved. Field decisions to acquire flotation samples emphasized those features, especially hearths, that appeared to contain concentrations of plant remains. One bias of this sampling strategy is that foods prepared by fire are over-represented and plants used without fire are under-represented and are also less likely to be preserved. This sampling strategy may also result in the under-representation of plants associated with other feature types. The recovery of plant parts from middens reduces these biases as do macrofossil samples collected from a wide variety of archaeological contexts.

Macrofossils are collected from any field context in which archaeologists notice plant materials. These items provide a subjective sample of the larger plant materials at Albert Porter Pueblo. Macrofossil samples are considered most useful for their role in representing plants not present in flotation samples and in providing information on contexts not sampled by flotation, such as roof-fall debris, where construction beams and roof-closing layers may be preserved.

Sample Selection

The tables in this report were developed with contextual data current as of September 2009. All plant remains analyzed from Albert Porter Pueblo derive from one of four contextual categories (Table 8.1): (a) thermal features and ashpits, (b) midden deposits, (c) roof-fall debris, and (d) other. Thermal features such as hearths and firepits contain ash and botanical remains deposited during the last use(s) of the features. Ashpits contain ash and botanical remains that were removed from a nearby thermal feature. Refuse formed midden deposits during occupation of the settlement and represents a variety of activities involving plants. Roof-fall samples exclude wall-collapse debris and primarily contain wood used as roof-construction elements and smaller plant materials used as "closing" layers. Items stored on rooftops or suspended from roof beams may also be included in these samples. Archaeobotanical samples in the "other" category include all remaining Albert Porter contexts, including floor and bench surfaces, from which plant remains have been recovered and analyzed.

Flotation Samples

Multiple criteria were used to select the subset of 219 flotation samples for analysis (Table 8.1). The first goal was to choose a suite of samples that together would represent the entire occupational span of Albert Porter Pueblo (A.D. 1020–1280). The second goal was to provide spatial representation across the site. Third, samples were chosen for their high contextual integrity and visible charred plant remains.

Despite the large quantity of flotation samples, the record is uneven in some respects. For example, the early Pueblo III subperiod, considered the most robust occupation of the pueblo, is well represented by flotation samples (n=87), with more than twice the quantity obtained for any other subperiod. In contrast, the late Pueblo III subperiod is relatively poorly represented by flotation samples (n=18) and has a scarcity of midden samples; historic plowing probably destroyed many refuse deposits dating from this time period. Such uneven sample distribution affects the strength of interpretations related to long-term patterns of plant use and environmental change.

Many thermal features and ashpits from which flotation samples were collected (n=70) were located inside kivas; numerous surface structures were probably destroyed by historic land-use activities. Because most kivas and thus their thermal features can be dated, and the period when the materials were deposited can be reasonably estimated, the interpretive potential of these samples is enhanced. These samples are used to examine change in plant use and activities within kivas through time.

Flotation samples from middens (n=67) provide information on the general use of plants for food, fuel, and possibly other purposes. Most midden samples were collected from refuse deposited in depressions of abandoned kivas; much of the refuse that had been discarded on the prehistoric ground surface (especially during the late Pueblo III subperiod) has apparently been disturbed by historic plowing. Middens were probably deposited over the course of a few years or as much as several decades and are likely to reflect activities associated with kivas and surface rooms, courtyards, and other activity areas used by a household or group of households. Some of these structures and use areas have been damaged in recent times and others have probably been destroyed. Because refuse can be dated via other material culture, especially pottery, changes in plant use through time may be detected from midden samples.

Flotation samples collected from roof-fall strata (n=26) and "other" (n=56) contexts constitute the remaining subset of samples. Roof-fall samples augment the record of structural timber selection provided by Laboratory of Tree-Ring Research identification of the various species represented in the specimens submitted for tree-ring dating. Roof-fall samples also offer insights into materials that were used to form "closing" layers of roofs and reveal types of plant materials associated with roofs that burned. Flotation samples from "other" contexts include materials collected from kiva bench surfaces and floors, bins, postholes, ventilator tunnels, floor vaults, and various extramural contexts.

Macrofossil Samples

Macrofossil samples were analyzed during a brief period of time by a small number of analysts and their assistants; the resulting data are presented in Table 8.1. The 247 macrofossil samples analyzed reflect the spatial, temporal, and contextual variability at Albert Porter Pueblo within roof-fall debris (n=63), middens (n=95), thermal features and ashpits (n=3), and other contexts (n=86). Most macrofossil samples (n=241) were assigned to a temporal subperiod.

Modified Plant Materials

Modification of plant materials in the form of cutting, knotting, or other intentional manipulation is often preserved in the archaeobotanical record. Plant specimens were examined for modification during analysis of both flotation and macrofossil samples. In addition, numerous modified vegetal items, including basketry fragments and other specimens, were recovered from a few locations at Albert Porter Pueblo (see Table 8.1).

Sample Size

The large size of the Albert Porter archaeobotanical sample enhances the ability to interpret patterns of plant use. With 219 analyzed flotation samples and 247 analyzed macrofossil samples, Albert Porter is one of the most intensively studied pueblos in the region in terms of plant remains. By increasing the opportunities for rarer items to be found, the large size of this sample potentially increases the diversity of plant taxa and parts identified. This, in turn, provides a better approximation of the total range of plants used by the occupants of this settlement. Despite the uneven sampling for some of the subperiods of occupation at Albert Porter Pueblo, this large archaeobotanical sample contributes to both intrasite and intersite comparative studies.

Processing and Analysis

Crow Canyon has adopted a set of standardized laboratory procedures for flotation and macrofossil sample processing, analysis, and recording (Ortman et al. 2005). Along with explanations of sample types and general field-collection strategies, a description of these procedures is available (Adams 2004).

The Data Set

The archaeobotanical samples analyzed from Albert Porter Pueblo represent multiple occupation spans; a few samples could not be dated (see Table 8.1). As stated above, the early Pueblo III subperiod was sampled most heavily (n=185), followed by materials deposited during late Pueblo II times (n=78). The remaining subperiods are represented by 58 or fewer total samples. Eighteen samples could not be assigned to a subperiod. More samples from middens (n=162) were analyzed than from any other single context, followed by samples from “other” contexts (n=150), roof fall (n=90), and thermal features and ashpits (n=73).

Many different plant taxa and plant parts were represented in deposits at Albert Porter Pueblo, including three domesticates (*Zea mays*, *Cucurbita moschata*, and *Phaseolus vulgaris*), at least 59 wild plants, and numerous specimens that could not be identified (Table 8.2). More than 27,600 individual plant specimens have been tallied from the archaeobotanical samples analyzed from this site, and numerous taxa/parts were represented in both flotation and macrofossil samples. Most of the smaller seeds and parts were unique to flotation samples. Uncharred plant specimens (n=1,914) recovered from this site cannot be clearly attributed to ancient plant use. The remainder of this report focuses on charred plant materials; most uncharred remains probably entered the site via soil cracking and the activity of rodents and thus might be noncultural in origin.

Food Use

Charred plant specimens considered representative of foods at Albert Porter Pueblo includes both domesticates and wild plants. Table 8.3 includes all flotation and macrofossil samples. With the exception of maize shanks (a stem on which the ear rests), only reproductive plant parts such as seeds and fruit are considered indicative of food use.

Flotation samples contained nearly all of the food plants recovered. Macrofossil samples contained some larger maize and bean specimens, a concentration of pigweed seeds, and a few other specimens that had probably been used as foods. Ancient foods are well represented in samples from all four major spatial contexts (Table 8.4), possibly because foods often spilled into fires during parching or as they were added to cooking pots set over burning coals, and these charred specimens were then transferred to middens when ashes in the thermal features were removed and discarded. Foods were also processed on roofs, stored temporarily on roofs, and suspended from roof timbers inside structures. Some foods were deposited as refuse into collapsing roof debris in abandoned kivas.

Domesticated Foods

Maize (*Zea mays*), common beans (*Phaseolus vulgaris*), and squash (*Cucurbita moschata*, *Cucurbita*, Cucurbitaceae) were all recovered from Albert Porter Pueblo. The widespread presence of maize parts in deposits dating from all periods of occupation attests to the importance of this domesticate (see Table 8.3). Use of maize cobs as a tinder and fuel source increased opportunities for the preservation of cobs.

Numerous maize specimens from Albert Porter Pueblo are preserved well enough that they can be measured and described (Table 8.5). Twenty-four incomplete maize cob segments represent both round and elliptical ears; the ears averaged 10–12 kernel rows. Eighty-seven whole or nearly whole kernels appear to contain either flint or pop endosperm. In addition, two shank segments from Nonstructure 151 measure 35–47 mm in length, 12–15 mm in diameter, and have two to four nodes (locations where husks arise).

These specimens of maize recovered from Albert Porter Pueblo compare well with unburned maize specimens found at other sites in the Mesa Verde region that date from Basketmaker II/III through Pueblo III periods (Cutler and Meyer 1965). Regional evidence suggests that most of this maize belonged to a widespread and variable race called "Pima-Papago," which includes medium-sized ears with 10–16 rows of flint kernels and smaller ears with 12–14 rows of pop or flint kernels (Adams 1994:277). The maize found at Albert Porter Pueblo fits this general regional description.

In numerous contexts at Albert Porter Pueblo, concentrations of 50 or more maize specimens were preserved (Table 8.6). Most of these contexts, including three middens, two extramural surfaces, and fill inside one non-masonry surface room, probably represent routine discard of household debris through time. However, Structures 136 and 150 contained maize on prepared floors and in roof-fall debris. In both structures, the maize charred when the roofs burned. In Kiva 136, many fragments of maize kernels were recovered within an open-weave, plaited yucca-leaf (*Yucca*) basket, as well as within a coiled, lemonade berry (*Rhus aromatica*) stem basket placed beneath the plaited basket. A pottery bowl had been inverted over the two baskets, possibly to protect them. This arrangement suggests that maize kernels were in the process of being ground and passed through the plaited basket to sort the kernel fragments by size before additional grinding, and then the bowl was placed over both baskets. Before the processing was completed, Kiva 136 burned, apparently during the late Pueblo III subperiod. Earlier, sometime during the terminal Pueblo II or early Pueblo III subperiod, stored maize was present on the floor and roof of Kiva 150 when that structure burned.

Maize parts are present in all flotation samples; however, the ubiquity (presence) of maize varied through time (Table 8.7). The presence of waste products such as cobs, cupules, glumes, and shanks, which were available for use as fuel or tinder, implies access to kernels. Maize is present in approximately 59 to 73 percent of flotation samples that date from subperiods from which a minimum of 18 samples were collected and analyzed; however, maize is present in only 44 percent of samples dating from the late Pueblo III subperiod. These data suggest that access to maize declined during the final subperiod of occupation of Albert Porter Pueblo.

Albert Porter Pueblo residents were also growing other crops in their fields. Both common beans *(Phaseolus vulgaris*) and squash (*Cucurbita moschata*) were being cultivated by the late Pueblo II subperiod and possibly earlier. The low frequency (see Table 8.3) and ubiquity (see Table 8.7) of these cultigens in samples that date from various periods probably result from the relatively poor preservation potential of these two crop foods rather than lack of access or use. These two domesticates are rarely preserved in quantity in archaeological deposits, because they are usually prepared by boiling rather than parching, which lowers their potential for preservation. Therefore, it is assumed that the level of use of both squash and beans was greater at Albert Porter Pueblo than the frequencies of their preserved parts suggest.

Both whole beans (seeds) and half beans (cotyledons) were recovered from deposits dating from all subperiods. One example of excellent bean preservation can be cited for Albert Porter Pueblo:

a minimum of 35 whole beans and 17 cotyledons were being stored in a bin fashioned of vertical sandstone slabs set into the floor of Structure 168, a non-masonry room, when the structure burned. Evidence of squash seeds and rinds was recovered from deposits that date from most of the Albert Porter Pueblo subperiods (see Table 8.7). The single whole squash seed displayed the frayed edges characteristic of *Cucurbita moschata*.

The recovery of domesticates in archaeological sites implies the presence of people in those locations on the landscape through much of the calendar year. Field preparation, planting, tending, harvesting, drying, and storing can span the period from spring through fall, and some field preparations could have occurred during the late winter. Agricultural products can be stored in bulk in storage facilities throughout the year, so their period of use probably extended through the winter and into the next growing season. The record of maize, squash, and common beans at Albert Porter Pueblo suggests occupation during much, and perhaps all, of the calendar year.

Wild Plant Foods

Evidence of a minimum of 36 wild plant foods were preserved in the form of charred seeds, fruit, or other reproductive parts (see Table 8.3). That these wild plants were used for food is suggested both by ethnographic records of historic foods (Rainey and Adams 2004) and by the contexts in which the remains were found. I infer that plant parts recovered from thermal features were prepared there, and that parts contained within ashpits and middens accumulated during the deposit of refuse materials from the regular cleaning of thermal features and food-preparation locations. The interpretation of wild plant parts as foods is strengthened when many archaeological sites in a region reveal similar patterning of plant remains in thermal features and middens associated with food preparation and discard (Adams and Bowyer 2002).

Charred cheno-am (*Chenopodium* and/or *Amaranthus*) and pigweed (*Amaranthus*) seeds were recovered from contexts dating from all subperiods. The associated weedy plants occupied formerly cultivated maize fields and other disturbed locations surrounding Albert Porter Pueblo. The ubiquity of these seeds in all flotation samples suggests remarkably stable use through time (see Table 8.7). Likewise, the presence of purslane (*Portulaca*) seeds in samples dating from all subperiods suggests harvest of the associated weedy plants as both greens and seeds. Groundcherry (*Physalis*) seeds, the third most common seed type recovered, are produced by a weedy perennial plant that, with adequate summer rains, is able to produce an abundant crop of tiny edible groundcherries. Grasses also provided the occupants of Albert Porter Pueblo with edible grains through time. The remaining wild plant taxa occur in relatively low frequencies (see Table 8.3) and ubiquities (see Table 8.7).

The wild plants represented in the archaeological record at this site offer insight into the season or seasons of occupation. The inventory includes important late spring/early summer resources (*Descurainia, Stipa comata, Stipa hymenoides*) that become available before any agricultural products, and most other wild plants, produce edible parts. It also includes summer/fall weeds (*Cleome, Helianthus annuus, Mentzelia albicaulis*) associated with active and fallow fields as well as numerous and usually dependable perennial resources (*Amelanchier, Artemisia, Echinocereus, Pinus, Prunus virginiana, Scirpus, Sphaeralcea, Yucca baccata*). The seasons of wild-plant gathering suggested by this record coincide with seasons of agricultural tasks such as field preparation and maintenance, and crop planting, tending, and harvesting, which occur in early spring through fall. The collecting and processing of wild plants are linked to seasons of resource availability, but because these products can be stored for indefinite periods, their season(s) of actual use remains unknown.

The wild plants that were exploited by the residents of Albert Porter Pueblo varied through time. For subperiods from which a minimum of 18 flotation samples were collected and analyzed (see Table 8.7), the frequencies of different wild food taxa are similar for the late Pueblo II subperiod and the late Pueblo II through early Pueblo III subperiod (n=16); these frequencies are dramatically higher in the early Pueblo III samples (n=29), but, from this high, decline by more than 50 percent in the late Pueblo III samples (n=14). If this pattern is not a result of differences in sample size between the subperiods, wild plant use declined during the final subperiod of occupation of this settlement. For all subperiods, the wild plant parts recovered represent a mixture of weedy (cheno-ams, *Cleome, Descurainia, Helianthus, Physalis, Portulaca, Solanaceae*) and non-weedy (*Artemisia tridentata, Juniperus,* Malvaceae*, Opuntia, Prunus virginiana, Scirpus,* Sphaeralcea, *Stipa* spp., *Yucca baccata*) plants, revealing broad use of species that thrive in disturbed ground as well as perennials that prefer more stable habitats.

Food Trends through Time

Maize and Cheno-ams

Plant data suggest that maize and cheno-am seeds were the foods consumed most frequently through time at Albert Porter Pueblo. To gauge differential levels of reliance on agricultural products vs. common garden weeds through time, the abundance of charred maize parts and cheno-am seeds in flotation samples collected from in-situ ash in thermal features and ashpits was compared to the abundance of those parts and seeds in samples from middens (Table 8.8). I assume that thermal features were used as cooking facilities through time, and that their final use did not occur during a season when cooking occurred exclusively elsewhere, such as outdoors during the summer. This examination is hampered because different subperiods are represented by different quantities of samples; in particular, abundant flotation samples were collected from deposits dating from the early Pueblo III subperiod. Because of small sample size, this study excludes one sample from a thermal feature that dates from sometime during the terminal Pueblo II or the initial Pueblo III period as well as a sample from a midden deposited during the late Pueblo III subperiod. It also excludes midden samples deposited sometime during the middle Pueblo II through late Pueblo III period, in part because this span covers more than 200 years, and also because no samples were collected from thermal features or ashpits that date from this period.

The presence of maize kernels within thermal features and ashpits at Albert Porter Pueblo clearly indicates that maize was prepared as food during all subperiods of occupation. Cob parts recovered from thermal features are the remnants of cobs used as fuel. The presence of these edible and nonedible parts offers a means of gauging maize use through time (see Table 8.8). The incidence of maize kernels is high (80 percent) in samples collected from thermal features dating from late Pueblo II times but is progressively lower for samples collected from deposits that date successively later in time; the lowest incidence of maize kernels (10 percent), was found in deposits dating from the late Pueblo III subperiod. Likewise, the presence of any maize parts in samples from thermal features declines from 80 percent to 30 percent in samples dating from the same subperiods. A pattern of regular use of cobs as fuel is also indicated.

Data for middens are generally consistent with the data for thermal features and ashpits. The incidence of maize kernels, cob parts, and all maize parts is progressively lower in samples collected from refuse deposited from late Pueblo II through early Pueblo III times. The single midden sample obtained from refuse deposited during the late Pueblo III period is inadequate for evaluating whether these trends continued until the end of the occupation of the settlement.

The flotation data for thermal features, ashpits, and middens suggest that maize use decreased through time during the occupation of Albert Porter Pueblo. However, bone chemistry studies for archaeological sites in the region suggest otherwise. The results of carbon isotope studies reveal considerable reliance on maize and other foods such as amaranth, cactus fruits, and animals that consumed C_4 grasses (Katzenberg 1999) during the Pueblo III period. Flotation data for Albert Porter Pueblo indicate that maize remained accessible during the latter part of the occupation of the settlement, but that it was less abundant. Maize was clearly being processed as ground meal in Kiva 136 when that structure burned before final pueblo depopulation.

During the entire occupation of Albert Porter Pueblo, people gathered and ate weeds, such as cheno-am seeds, that would have been common in fallow gardens. Cheno-am seeds were found in all flotation samples collected from thermal features and ashpits that dated from the late Pueblo II subperiod and in 80 percent of samples that dated from the late Pueblo III subperiod. Data for midden samples suggest relatively consistent use of cheno-am seeds through time. These data suggest that weedy cheno-am plants provided an important and consistently available wild food throughout the occupation of Albert Porter Pueblo.

Flotation data for samples from thermal features, ashpits, and middens suggest that the diversity of additional plant foods exploited by the residents of Albert Porter Pueblo also varied through time (see Table 8.8). In these samples, the frequency of additional plant foods ranges from seven to 24. Notably, the frequency of wild plants in samples dating from the late Pueblo III subperiod (n=8) is one-third that of wild plants in samples dating from the early Pueblo III subperiod (n=24). The diversity of additional wild plant foods within midden samples is also lower in samples that date from progressively later periods of occupation of Albert Porter Pueblo. As with the record of all plant foods in all flotation samples discussed above (see Table 8.7), these results support an inference that use of wild plant foods generally declined during much of the occupation of this settlement, unless these patterns result from differences in sample size for the various subperiods.

Changes in Food Use through Time

Data indicate broad patterns of domestic and wild plant food use that have been summarized graphically (Figures 8.1 and 8.2). The diversity of wild plant foods peaked during the early Pueblo III period and then dropped notably during the late Pueblo III period. The weeds in fallow fields (cheno-ams) provided a consistent food resource through time, but maize consumption—as reflected by the incidence of maize in samples from thermal features—

declined through time. The incidence of maize in midden samples is also lower in the samples dating from the early Pueblo III subperiod; the use of wild plant foods spiked during that time. Although the data indicate that the final meals prepared in late Pueblo III thermal features included some maize, the incidence of maize in samples dating from this period is lower than that for any other subperiod.

A long period of favorable environmental conditions occurred during late Pueblo II times (Van West and Dean 2000). The ability of the landscape around Albert Porter Pueblo to produce dependable crops appears to have deteriorated as late Pueblo II transitioned into early Pueblo III, and farmers were unable to produce as much maize as previously. Their problems might have been various and cumulative: (1) long-term occupation; (2) increasing human population; and (3) the approaching congruence of numerous unfavorable environmental variables such as persistent drought, depressed alluvial water tables, stream-channel entrenchment, and marked reduction in agricultural productivity between A.D. 1130 and 1180 (Van West and Dean 2000).

It is important to try to determine if the residents of Albert Porter Pueblo experienced difficulty acquiring foods immediately before regional depopulation in the late Pueblo III period. At least one structure dating from this time, Kiva 136, contained maize that burned when occupation of the structure ended. However, less maize and a lower diversity of wild plants in samples from thermal features dating from the late Pueblo III period than in samples dating from early Pueblo III times suggest that food became increasingly difficult to procure. However, this assessment is hampered by the absence of comparative data for late Pueblo III middens, refuse that was presumably destroyed by plowing in historic times.

Fuel Use

The temporal distribution of charred non-reproductive plant specimens that are inferred to represent fuels used at Albert Porter Pueblo, from all samples and contexts, is presented in Table 8.9. The most direct evidence of fuel use is charred wood fragments recovered from samples collected from thermal features; evidence that is less direct is contained in samples obtained from middens—where refuse accumulates when the primary refuse in thermal features and ashpits is removed and discarded, or where people discard debris produced by the construction of tools or other household items (Table 8.10). The middens that were sampled at Albert Porter Pueblo contained sparse burned adobe or sandstone suggestive of construction debris; therefore, I assume that most charred wood fragments within this refuse are the remains of fuel. This assumption is supported by ethnographic records of fuel choice among historic groups (Rainey and Adams 2004). Only charred wood and nonreproductive plant parts are examined as fuels here, with the exception of maize—cobs and other vegetative parts provided a convenient source of tinder and fuel. Subperiods from which no samples or a single sample were collected are omitted from the following discussion.

Types of Fuel

Evidence of fuels is preserved in a variety of plant parts recovered from thermal features and ashpits (see Table 8.10). Charred juniper (*Juniperus*) and pinyon pine (*Pinus edulis*) wood, along with maize (*Zea mays*) parts, occur most often, followed by sagebrush (*Artemisia; A. tridentata*).

Other fuels have relatively less presence and were not found in samples dating from all subperiods. Fuels in midden samples collected from the various subperiods are represented by many of the same plant taxa and mimic the patterning of fuel choice evident in samples from thermal features and ashpits.

Nature of the Surrounding Woodland

The fuelwood record suggests that the woodland surrounding Albert Porter Pueblo included many of the same woody trees and shrubs that are present today. The reliance on juniper and pinyon pine trees for fuel, as reflected in the plant record at this site, was probably a function of availability and of the large quantities of wood produced by these trees. Both sagebrush (*Artemisia*) and rabbitbrush (*Chrysothamnus*) are common shrub components of the modern regional pinyon/juniper woodland and tend to be among the first shrubs to become established in abandoned agricultural fields. The other trees and shrubs offer fuels and additional raw materials that would have been moderately accessible, as they are now.

Fuel Use through Time

For Albert Porter Pueblo, thermal features and ashpits provide data on how fuel used for heating, lighting, and cooking changed through time (see Table 8.10). Samples from these features indicate that juniper wood was the fuelwood of choice throughout the occupation of the pueblo. Pinyon pine wood was also used regularly for fuel. Secondary use of maize parts as tinder and fuel declined gradually through time, as reflected by an incidence as low as 30 percent in samples dating from the late Pueblo III subperiod. The midden record of these three major fuels mirrors these trends.

Use of Plant Materials in Construction

For Albert Porter Pueblo, evidence of the types of wood used in roof construction comes from tree-ring samples collected from wall-collapse debris, burned and unburned roof-fall strata, and other contexts. An evaluation of construction materials includes all tree-ring specimens submitted to the Laboratory of Tree-Ring Research (Table 8.11) and the species distribution of tree-ring specimens from roof-fall contexts through time (Table 8.12). In addition to tree-ring samples, flotation and macrofossil samples from roof contexts shed light on species used for smaller roofing elements, including closing materials, and other plant resources associated with roofs when they collapsed (Tables 8.13 and 8.14).

Major Roofing Elements

Most wood specimens submitted for tree-ring analysis (n=377) were identified to various taxonomic levels (see Table 8.11). Clearly juniper (*Juniperus*) wood, which composes 92 percent of identified specimens, was preferred by the residents of this settlement. Pinyon (*Pinus edulis*) tree wood formed about 6 percent of the sample. The remaining specimens were identified as ponderosa pine (*Pinus ponderosa*), sagebrush (*Artemisia*), spruce/fir (*Picea/Abies*), or as non-coniferous elements. Ponderosa pine and spruce/fir would have required a journey of many kilometers to obtain and might have been procured on Ute Mountain (to the south), Mesa Verde (to the southeast), or in the canyon of the Dolores River (to the north).

The subset of specimens from roof-fall contexts only (n=312) provides the same insight into wood preference for construction beams (see Table 8.12). Juniper beams were preferred from late Pueblo II through the late Pueblo III period, and pinyon pine was used for construction beams to a limited extent. People transported at least one ponderosa pine beam during the late Pueblo II subperiod as well as one spruce/fir beam during the early Pueblo III subperiod. Materials from flotation and macrofossil samples collected from roofing debris (see Tables 8.13 and 8.14) confirm a preference for juniper wood and occasional use of pinyon.

Smaller Elements and Closing Layers

Flotation and macrofossil samples collected from roof debris contain evidence of smaller roofing elements and closing layers (see Tables 8.13 and 8.14). Sagebrush (*Artemisia tridentata/ Artemisia*) was commonly chosen for closing material. Numerous other trees and shrubs were procured occasionally for use as smaller roofing elements or closing layers.

Construction Materials through Time

Both the tree-ring data and the materials associated with roofing debris suggest continued availability of juniper wood for roofing needs throughout the occupation of the pueblo. Pinyon wood was also available through time but was not preferred. Changes in ubiquity in flotation and macrofossil samples (see Table 8.14) suggest that use of juniper and pinyon declined from the early Pueblo III to the late Pueblo III subperiods; perhaps the woodland was dwindling after centuries of wood procurement. People consistently gathered sagebrush for closing layers.

Other Plant Materials Associated with Roofs

Non-woody plant materials recovered within roofing strata include foods that might have been dried or stored on roofs or suspended from roof rafters as well as other items of material culture. Because many roofs collapsed onto floors, some items collected from roof-fall debris might have originally been associated with floors. Some plant remains associated with roofing debris might have been deposited as refuse thrown into structures or structure depressions after use of the structure ended. Maize parts were associated with the debris of various roofs that date from numerous times during the occupation of the settlement (see Tables 8.13 and 8.14). Maize might have been dried on roofs, suspended in braids from roof beams inside structures, or stored inside seed jars resting on benches or within niches. The clear association of maize processing and storage on floors and within roof-fall debris in Kiva 136 and Kiva 150 has been discussed previously; squash and common beans were also present. *Yucca* leaves probably provided the raw material for cordage used for lashing roofing elements together or for suspending items. Numerous other seeds and reproductive parts of wild plants are sparsely represented in the archaeological record at this site—many of these were recovered from contexts dating from the early Pueblo III subperiod, which was sampled heavily.

Modified Plant Remains

Numerous archaeobotanical samples from Albert Porter Pueblo contained plant materials intentionally modified by humans (Table 8.15). A possible yucca (*Yucca*) sandal or plaited basket fragment and a possible fragment of a basket fashioned from the stems of lemonade berry were both preserved within the roof-fall debris of Kiva 110. Archaeologists discovered two nested baskets beneath an inverted bowl on the floor of Kiva 136. The upper basket was plaited and was fashioned from yucca leaves; the lower basket was coiled and made of whole and split lemonade berry stems. Each basket contained fragments of maize kernels that were in the process of being winnowed through the plaited basket when the kiva roof burned and collapsed onto the floor.

Modified pieces of juniper wood were recovered in Structure 143 (a masonry surface room) and in Kiva 150. Numerous pieces of juniper wood in Kiva 150 had been cut into small rectangular blocks. In the same structure, one larger, thin and flattened juniper artifact that is rounded on one end was recovered. This item measures 7.5 cm long, 5.5 cm wide, and 1.6 cm thick and might have been a small weaving batten. A weaving batten has been defined as a "smooth, sword-shaped implement varying in length from eight to thirty inches and between one and three inches wide . . . generally rounded at both ends, and a fairly sharp edge . . . given to one or both sides" (Kent 1957:485).

Use of Kivas

Structure use can be inferred from evidence, such as features and material culture, of activities that were conducted within the structure. For Albert Porter Pueblo, flotation samples from thermal features and ashpits within kivas contribute important information about activities that occurred within those structures (Table 8.16). Wood burned in hearths clearly provided heating and lighting. If foods were regularly prepared in hearths, then cooking was regularly conducted in kivas. Data presented here can address this issue.

Foods were preserved in thermal features and ashpits in kivas at Albert Porter Pueblo, which suggests that thermal features in kivas were used for cooking and implies domestic use of these structures (see Table 8.16). Both maize and common beans were prepared and probably consumed in kivas. Some of the most common weedy resources (cheno-ams, Portulaca, Physalis), as well as many other wild plants identified in the remains from this site, were prepared regularly within kivas. The same fuels that were found in thermal features in other locations at the site and that were discarded during all subperiods, particularly juniper, pinyon, and sagebrush wood, were also found in thermal features in kivas. These data suggest that fires within thermal features in kivas were fed the same fuels used elsewhere in the pueblo on a regular basis, and that the same foods that were prepared within kivas were also prepared in other locations across the pueblo.

A look at these data in chronological sequence reveals some of the same patterning already discussed for Albert Porter Pueblo. Ubiquity of maize parts is lower in samples collected from kiva thermal features and ashpits that date from the late Pueblo III subperiod as compared to those from to earlier subperiods. Use of weedy cheno-ams and purslane plants continued at a high level or increased during the late Pueblo III subperiod. Data suggest that numerous wild plants were prepared in kivas during the early Pueblo III subperiod; this abundance results in part from the large number of flotation samples analyzed but reveals the potentially wide variety of wild plant foods prepared within thermal features in kivas. Less juniper wood was used as fuel in thermal features in kivas during late Pueblo III times than during the early Pueblo III subperiod, in contrast to the use of pinyon wood, which did not decrease during the final subperiod. This might reflect long-term effects of collecting juniper wood, which was preferred, from the surrounding woodland.

Of the structures exposed during Crow Canyon's excavations at Albert Porter Pueblo, only Kiva 112 was heavily influenced by Chacoan architectural style. Five thermal feature/ashpit flotation samples collected in this kiva that dates from the early Pueblo III subperiod contain many of the same foods and wood types found in samples from other kivas at Albert Porter. However, the presence of charred tobacco (*Nicotiana attenuata*) seeds within two of the samples from Kiva 112 (see Table 8.16) represents the only evidence of tobacco use found at the site, with the exception of tobacco remains that date from sometime during the middle Pueblo II through late Pueblo III subperiods. Tobacco plants currently grow on the site in areas disturbed by excavation, and uncharred tobacco seeds were noted in many flotation samples from this site. However, it is reasonable to assume that the charred tobacco seeds from Kiva 112 represent ritual uses of tobacco that might have been similar to those described in ethnographic accounts of indigenous American Indian groups that have used tobacco in ritual and ceremonial contexts in the Southwest during the historic period (Adams 1990). Kiva 112 was also the only location at Albert Porter Pueblo in which a rare and unusual charred stoneseed (*Lithospermum*), capable of being strung to produce a necklace of pearly white seeds, was preserved.

Two kivas at Albert Porter Pueblo contain special architectural features. Kiva 150, which dates from terminal Pueblo II through initial Pueblo III times, and Kiva 108, which dates from early Pueblo III, were both constructed with floor vaults, and Kiva 150 also contained socketed pilasters. The presence of these traits suggests that these kivas were used for special functions. Flotation samples from the thermal features and ashpits in these two subterranean kivas contained preserved foods and fuels similar to those found in other kivas at this site; however, Kiva 150 also contained modified pieces of juniper wood, the possible weaving batten discussed under Modified Plant Remains, above, maize on the floor and in collapsed roofing debris that was also discussed previously, and large quantities of charred pigweed (*Amaranthus*) seeds approximately 20 cm above the floor in roof-fall debris. These pigweed seeds were probably being stored, possibly in a jar that rested on the surface of the southern recess until the jar fell from the surface and shattered. The estimated quantity of pigweed seeds recovered (1 liter) can be evaluated for the return of energy it might provide. An energy return rate of 383 Kcal/hour and a net caloric return of 1,927 Kcal/kg has been suggested for harvested and processed goosefoot/lambsquarter (*Chenopodium*) and pigweed (*Amaranthus*) seeds (Diehl and Waters 2006:endnote 5). These estimates indicate that the 1-liter volume of pigweed seeds within Kiva 150 contained 1,927 Kcal of food energy, which was enough to fulfill one person's daily caloric requirement.

The plant evidence within flotation samples from last-used thermal features and ashpits in eight kivas associated with the great house and that date from the early Pueblo III subperiod were compared to that from six kivas on the periphery, or outside, the great house and that date from the same subperiod (Table 8.17). People utilizing these kivas all used juniper and pinyon wood for fuel and ate maize and cheno-am seeds. However, numerous reproductive parts of plants such as *Cleome*, *Corispermum*, *Helianthus annuus*, *Lithospermum*, Malvaceae, *Mentzelia albicaulis*, *Nicotiana attenuata*, *Polygonum/Scirpus*, *Scirpus*, and Sphaeralcea, are unique to the kivas in the great house. Also, numerous reproductive parts of other plants, such as *Cycloloma atriplicifolium*, *Descurainia*, Leguminosae, *Phaseolus vulgaris*, *Sporobolus*, *Stipa hymenoides*, and *Yucca baccata*, are unique to the kivas that are peripheral to, or outside, the great house. As discussed previously, some of these plants, such as *Lithospermum* and *Nicotiana attenuata,* probably represent ceremonial or ritual activities associated with the Great House. Three fuelwoods (*Fraxinus anomala*, *Quercus gambelii*, and *Rhus aromatica*) are also unique to the kivas within the great house. These patterns suggest differences in plant uses between kivas within the great house vs. those outside the great house.

Reconstructing the Past Environment

The archaeobotanical remains provide an extensive record of plants available to the residents of Albert Porter Pueblo during its long occupation, including both agricultural products and wild resources. The record remains silent on local plants not procured, or that were used in places that were not sampled, or that have degraded completely. Temporal patterns of preserved plant remains provide indicators of changes in surrounding vegetation that were probably caused in part by the occupants of Albert Porter Pueblo. The plant records for each subperiod reveal the basic vegetation assemblage of that time and how plant use changed during the 250 years of occupation.

Ancient and Modern Plant Communities

The plants recovered from flotation and macrofossil samples collected at Albert Porter Pueblo (see Table 8.2) suggest that the pinyon-juniper woodland present in the region today was also present when Albert Porter Pueblo was occupied. The presence of diverse juniper tree parts (berry, bud, cone with pollen ball, scale leaf, twig, and wood) and pinyon tree parts (bark scale, bud, cone scale, needle, twig, and wood) implies that these conifer trees grew within a reasonable distance of the pueblo. Other trees and shrubs represented in the archaeological record, such as *Amelanchier/Peraphyllum, Artemisia tridentata/Artemisia, Atriplex canescens/Atriplex, Cercocarpus montanus, Chrysothamnus nauseosus, Ephedra viridis, Fraxinus anomala, Populus/Salix, Prunus virginiana, Purshia, Quercus gambelii, Rhus aromatica,* and Rosaceae, form a list that is nearly identical to the plants in the current surrounding woodland. Likewise, nearly all of the ancient perennials and annuals are components of the modern vegetation. Exceptions to this include the few conifer beams brought from some distance.

Agricultural Fields

The nearer agricultural fields were to a settlement the more likely that nonedible portions of the maize plant (cobs, cupules, shanks) would be carried into that settlement. The presence of diverse maize parts (see Table 8.3) and the quantities of maize in some contexts (see Table 8.6) imply that agricultural fields were relatively accessible to the residents of Albert Porter Pueblo. This interpretation is supported by the consistent presence, in samples dating from all subperiods, of cheno-am seeds, which were harvested from plants that thrive in the disturbed ground of active and fallow agricultural fields. This interpretation is also supported by interviews with modern successful dryland farmers in the Goodman Point area (Connolly 1992).

Human Impact to the Pinyon-Juniper Woodland through Time

In addition to the procurement of fuelwood (see Table 8.10) and construction elements (see Table 8.14), residents opened the woodland for agricultural fields. Plant remains in flotation samples collected from thermal features and ashpits indicate that juniper, pinyon, and sagebrush wood, as well as maize cobs, were the major fuel sources used through time in this settlement. In the late Pueblo III subperiod, maize cobs were no longer a significant fuel, and less juniper wood was used as fuel in kivas. Instead, the use of sagebrush increased, and serviceberry/peraphyllum shrub wood was procured for fuel more often. Midden data reveal that all four primary fuel sources were used through the early Pueblo III subperiod, but midden data are lacking for the late Pueblo III subperiod. The types of wood in roof debris suggest that residents consistently used juniper and pinyon beams through all subperiods, although use of both of these conifers declined by the late Pueblo III subperiod (see Table 8.14). This suggests that people had less access to conifer trees that possessed trunks and branches of a size and shape acceptable for construction.

Environmental Impact Relative to Regional Depopulation

Evidence of fuel and construction beam use suggests that the nature of the surrounding environment had changed by the late Pueblo III subperiod. Maize harvests were less bountiful than in earlier subperiods. Use of maize parts as fuel also decreased, and the wood of serviceberry/peraphyllum shrubs was used more widely as fuel (see Table 8.10). Builders at Albert Porter used fewer juniper and pinyon beams (see Table 8.14). This decline in the use of conifer trees suggests that agricultural fields expanded during the late Pueblo III subperiod. A reasonable conclusion from this plant evidence is that by the final subperiod, human impacts had opened the woodland and reduced the availability of major trees as more land was brought under cultivation.

Summary and Conclusions

A total of 219 flotation samples and 247 macrofossil samples from Albert Porter Pueblo provide information on the use of plants for foods, fuels, construction elements, and other needs, as well as perspective on the nature of the surrounding environment. This record includes materials from six subperiods of occupation spanning A.D. 1020 to 1280 and enables us to look at changes in plant use through time. Particular attention has been paid to the late Pueblo II (Chaco) to early Pueblo III (post-Chaco) transition and to the late Pueblo III subperiod, which immediately preceded regional depopulation. These plant materials have also provided perspective on whether kivas were used for domestic activities. More than half of the flotation samples represent thermal features, ashpits, and midden contexts, where evidence of food preparation and other daily activities would be expected.

The large archaeobotanical sample makes Albert Porter among the best sampled sites in the region. An overview of plant patterns at this site presents a condensed view of plant use by subperiod. Despite uneven sampling that includes a large quantity of samples from the early Pueblo III subperiod and a general lack of samples from middens dating from the late Pueblo III subperiod, numerous observations can be made regarding plant use at Albert Porter Pueblo. Both domesticates and wild plants were regularly used for food. More than 90 percent of the thermal features and ashpits excavated at this site contained one or more reproductive parts, making samples from these features prime locations to examine food use. Even though middens are subject to a wide variety of degradation effects, more than 90 percent of the midden samples analyzed also contained food evidence. Most roof-fall debris also contained foods, such as maize, that might have been in storage.

The farmers who resided at Albert Porter Pueblo grew three types of domesticates. Maize was present and clearly important in all subperiods. Both flint- and pop-type maize kernels were recovered and, similar to other maize described for the region, ears held10 to12 rows of kernels. Maize burned while being stored on the floors of two kivas—one dating from sometime during the terminal Pueblo II/initial Pueblo III subperiod, and the other dating from the late Pueblo III subperiod. Firm evidence of beans and squash dates from the late Pueblo II subperiod, and these crops might have been cultivated earlier. The low frequency of common beans and squash in archaeological contexts at this site is not unusual, and it is likely that these domesticates played a greater role in subsistence than their limited frequency suggests.

Evidence of maize is abundant at this site, and the archaeobotanical data reflect the intensity of maize use through time. Numerous trends are suggestive of reduced access to maize by the late Pueblo III subperiod: (1) the ubiquity of maize parts in all flotation samples declines, (2) the ubiquity of maize parts in thermal features and ashpits declines, (3) the ubiquity of maize parts in middens declines, and (4) the frequency of maize kernels in thermal features and ashpits is lowest in samples dating from the late Pueblo III subperiod. The occupants of this settlement clearly had access to maize just before the pueblo was depopulated, but they had less access than in earlier subperiods. Bone chemistry studies from other sites in the region suggest consistent consumption of maize through time.

The recovery of domesticates implies that people resided in the immediate area for much of each calendar year. The farmers needed to attend to the many agricultural tasks related to field preparation, crop tending, harvest, and storage. It is reasonable to assume that the pueblo was occupied year-round.

The more than 35 wild plants procured as food include a mix of annual weedy species characteristic of disturbed habitats such as active and fallow agricultural fields and perennial species associated with stable landscapes. Seasons of availability of these resources spanned much of the growing season—from late spring/early summer through autumn. Plant remains recovered from flotation samples from all contexts reveal that the diversity of wild plant foods varied through time. This diversity peaked during the early Pueblo III subperiod, for which contexts were heavily sampled, and then declined by more than 50 percent in the late Pueblo III subperiod.

The most abundant wild resource, cheno-am seeds, preserved in all flotation samples from late Pueblo II thermal features and ashpits and in approximately 67 to 83 percent of samples from all subsequent subperiods. The incidence of cheno-am seeds in midden deposits appears relatively unchanged through time except for the final subperiod, for which midden samples are lacking. The data suggest that the occupants of Albert Porter Pueblo were gathering and preparing cheno-am seeds regularly during the 250 years of pueblo occupation.

The most frequently utilized fuels were juniper, pine, and sagebrush wood, and maize cobs. The use of these fuels fluctuated slightly during much of the occupation of the pueblo. The charred plant parts within thermal features and ashpits suggest that, by the late Pueblo III subperiod, there had been a shift away from the use of maize parts and an increased reliance on serviceberry/peraphyllum wood. The record of fuels in midden deposits also shows less use of maize parts by early Pueblo III times. Fuels within thermal features in kivas that were last used in the late Pueblo III subperiod indicate that use of juniper as fuel had declined by that time.

Juniper trees were clearly preferred as roof construction elements. This is evident in both the record of tree-ring samples and in the charred wood fragments preserved within flotation and macrofossil samples associated with roof-fall strata. However, the use of both juniper and pinyon as construction elements declined by the late Pueblo III subperiod. Obtaining trees such as ponderosa pine and spruce/fir required traveling substantial distances. Sagebrush was consistently used to form a closing layer in roof construction. Maize and other plant foods were found in the collapsed roofing debris of numerous structures.

Numerous intentionally modified plant materials were recovered at Albert Porter Pueblo. On the floor of Kiva 136, both a plaited yucca (Yucca) basket and the coiled lemonade berry (Rhus aromatica) basket in which it was nested were being used for sifting ground maize kernels when the roof burned and collapsed during the late Pueblo III subperiod. Portions of two possibly similar baskets were preserved within the roof-fall debris of Kiva 110, a structure that dates from the early Pueblo III subperiod. Modified pieces of juniper wood were recovered from Kiva 136, Kiva 150, and Structure 143 (a masonry surface room). One specimen in Kiva 150 might have been a weaving batten.

The plant record suggests that food was often prepared in kivas; these structures can thus be considered locations of periodic domestic activities. The record also suggests that the main fuels utilized during the long occupation of Albert Porter Pueblo were the same fuels burned regularly in kiva hearths. Samples from thermal features and ashpits in kivas dating from the late Pueblo III period also reflect a reduction in access to maize during that time. Kiva 112, which dates from the early Pueblo III period and exhibits Chacoan architectural elements, contained an unusual record of charred seeds of tobacco and stoneseed as well as other more commonly used foods and fuels. The presence of these unusual plant remains suggests that ritual/ceremonial activities occurred there. Two additional kivas with unusual architectural features, Kiva 150 (dating from sometime during the terminal Pueblo II through initial Pueblo III) and Kiva 108 (dating from early Pueblo III), contained foods and fuels similar to those in other excavated kivas at Albert Porter Pueblo. However, Kiva 150 also contained modified pieces of juniper wood, including a possible weaving batten, and a concentration of charred pigweed seeds. A comparison of plant remains from eight kivas within the great house with six kivas located either on the periphery of or outside the great house reveals differing patterns of plant food and wood use, which suggests differences between these groups of kivas during the early Pueblo III subperiod.

The late Pueblo II subperiod (A.D. 1060–1140) coincides with the intensive occupation of Chaco Canyon and Chaco influence in the northern Southwest. During this time, the occupants of Albert Porter Pueblo discarded maize parts into middens more often than they did in the following, post-Chaco, early Pueblo III subperiod. During the late Pueblo II period, occupants of Albert Porter Pueblo also utilized fewer (n=16) wild plants than they did during the early Pueblo III period; they might have been forced to gather broadly diverse wild foods (n=29) as maize became less available. The late Pueblo II regional environment was relatively favorable, but by early Pueblo III, the residents of Albert Porter Pueblo occupied a landscape increasingly disturbed by their own activities and were plagued by prolonged drought between A.D. 1130 and 1180.

Before regional depopulation in the late Pueblo III subperiod, the residents of Albert Porter Pueblo experienced some level of food stress. They had less access to maize than in previous subperiods. A lower diversity of wild plant foods procured during this time relative to early Pueblo III times suggests diminished availability of wild plants to supplement poor maize harvests. Reliance on weedy plants in the cheno-am group was still high. The lack of middens dating from the late Pueblo III period hamper inferences about routine food consumption during this final subperiod; refuse dating from this period might have been destroyed by historic plowing.

The area surrounding Albert Porter Pueblo was composed of pinyon/juniper woodland with an understory of sagebrush, rabbitbrush, other woody trees and shrubs, herbaceous perennials, and annuals. This woodland persisted during the 250 years of the occupation of the settlement. Juniper and pinyon trees grew near enough to the pueblo that smaller parts such as bark scales, berries, buds, cone scales, cones with pollen, needles, scale leaves, and twigs were occasionally carried in with the wood. Many of the wild plants exploited as foods during the occupation continue to grow in the area today. This includes both annual plants of disturbed habitats and perennial plants of more stable landscapes.

At least some agricultural fields were located relatively near Albert Porter Pueblo. This is implied by the diversity of nonedible maize parts (cobs, cupules, shanks) recovered, and the high ubiquity of maize parts in most contexts. The success of modern dryland farmers in this area, including the immediate environs of Albert Porter Pueblo, provides indirect evidence that ancient fields were nearby. Harvest of cheno-am seeds appears to have been a regular endeavor in these fields.

Before the region was depopulated in the late Pueblo III subperiod, the residents of Albert Porter Pueblo had cleared some portions of the surrounding woodland for agricultural fields. It is likely that the harvesting of construction elements had reduced the frequency of juniper and pinyon trees. The increased presence of sagebrush wood in thermal features and ashpits dating from late Pueblo III times suggests that this shrub, one of the first to become established in fallow agricultural fields, was more plentiful than it had been previously. The plant evidence generally suggests that by the late Pueblo III subperiod, residents had opened the pinyon/juniper woodland, had less access to maize, and possibly had less access to the many weedy plants that encroached on an increasingly disturbed environment.

Acknowledgments

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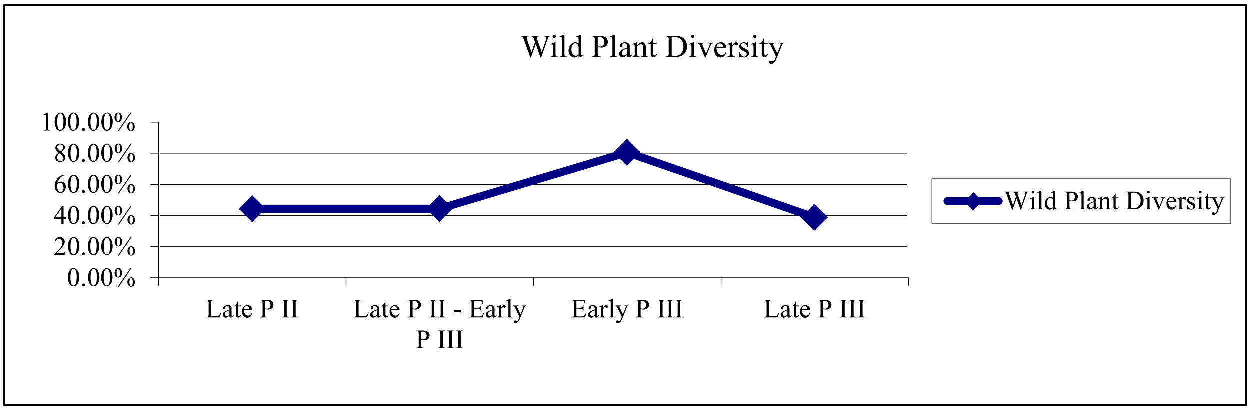

Figure 8.1. Trend in diversity of wild plant foods, Albert Porter Pueblo. Maximum wild plant diversity = 36 taxa. See Table 8.7 for details.

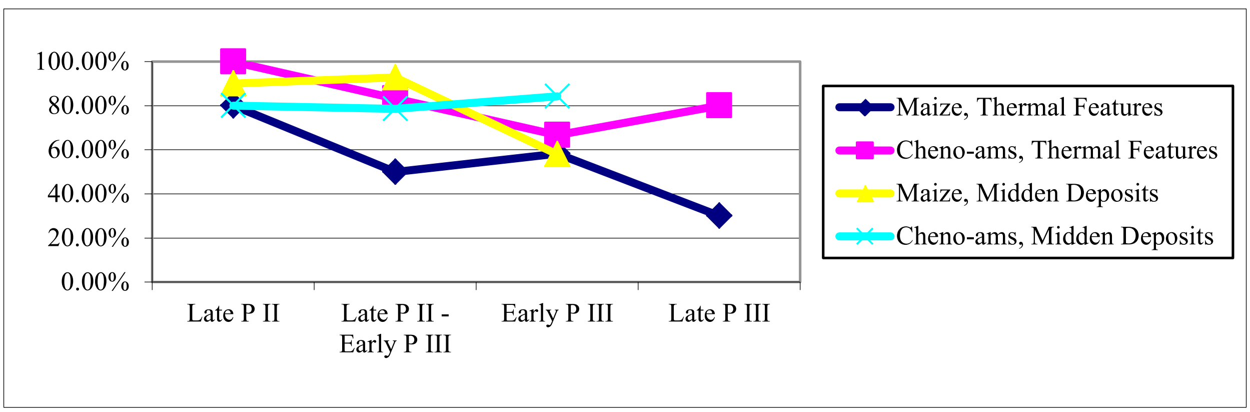

Figure 8.2. Summary of trends in wild plant foods, maize (all parts), and cheno-am seeds, Albert Porter Pueblo. See Table 8.8 for details on maize and cheno-ams in thermal features and middens.

Table 8.1. Analyzed Archaeobotanical Samples, by Context and Subperiod, Albert Porter Pueblo.

Sample Type	Context	Middle Pueblo II through Late Pueblo III (A.D. 1020–1280)	Late Pueblo II (A.D. 1060–1140)	Late Pueblo II through Early Pueblo III (A.D. 1060–1225)	Terminal Pueblo II through Initial Pueblo III (A.D. 1100–1180)	Early Pueblo III (A.D. 1140–1225)	Late Pueblo III (A.D. 1225–1280)	Unassigned	TOTAL
Basketry	Other						7		7
Subtotal, basketry samples							*7*		*7*
Flotation sample	Thermal features and ashpits		5	6	1	48	10		70
Flotation sample	Midden deposits	15	10	14	0	19	1	8	67
Flotation sample	Roof fall		4	2	1	14	3	2	26
Flotation sample	Other	14	24	4	2	6	4	2	56
Subtotal, flotation samples		*29*	*43*	*26*	*4*	*87*	*18*	*12*	*219*
Other modified vegetal	Other				1				1
Subtotal, other modified vegetal samples					*1*				*1*
Textile	Roof fall					1			1
Subtotal, textile samples						*1*			*1*
Macrofossil	Thermal features and ashpits		1			2			3
Macrofossil	Midden deposits	12	13	15		40	13	2	95

Sample Type	Context	Middle Pueblo II through Late Pueblo III (A.D. 1020–1280)	Late Pueblo II (A.D. 1060–1140)	Late Pueblo II through Early Pueblo III (A.D. 1060–1225)	Terminal Pueblo II through Initial Pueblo III (A.D. 1100–1180)	Early Pueblo III (A.D. 1140–1225)	Late Pueblo III (A.D. 1225–1280)	Unassigned	TOTAL
Macrofossil	Roof fall		7	5	19	22	9	1	63
Macrofossil	Other	9	14	5	11	33	11	3	86
Subtotal, macrofossil samples		*21*	*35*	*25*	*30*	*97*	*33*	*6*	*247*
TOTAL, all samples		50	78	51	35	185	58	18	475

Table 8.2. Counts of All Plant Taxa and Parts Identified in Analyzed Archaeobotanical Samples from Albert Porter Pueblo, by Condition.

Taxon	Common Name	Part	Condition	Basketry Samples	Flotation Samples	Other Modified Vegetal Samples	Textile Samples	Macrofossil Samples	TOTAL
Amaranthus-type	pigweed	fused mass	charred		8			5	13
Amaranthus-type	pigweed	seed	charred		539			2,118	2,657
Amaranthus-type	pigweed	seed	uncharred		5				5
Amelanchier utahensis-type	Utah serviceberry	seed	charred		2				2
Amelanchier/Peraphyllum-type	serviceberry/peraphyllum	twig	charred		3				3
Amelanchier/Peraphyllum-type	serviceberry/peraphyllum	wood	charred		135				135
Artemisia tridentata-type	big sagebrush	seed	charred		5				5
Artemisia tridentata-type	big sagebrush	wood	charred		109				109
Artemisia-type	sagebrush	achene	charred		54				54
Artemisia-type	sagebrush	flower bud	charred		35				35
Artemisia-type	sagebrush	flowering head	charred		2				2
Artemisia-type	sagebrush	flowering head	uncharred		1				1
Artemisia-type	sagebrush	leaf	charred		18				18
Artemisia-type	sagebrush	seed	charred		3				3
Artemisia-type	sagebrush	twig	charred		17			1	18
Artemisia-type	sagebrush	wood	charred		365				365
Artemisia-type	sagebrush	wood	uncharred		9				9
Astragalus-type	locoweed	seed	charred		2				2
Astragalus-type	locoweed	seed	uncharred		2				2
Atriplex canescens-type	four-wing saltbush	fruit core	charred		6				6
Atriplex canescens-type	four-wing saltbush	fruit core	uncharred		1				1
Atriplex-type	saltbush	seed	charred		1				1

Taxon	Common Name	Part	Condition	Basketry Samples	Flotation Samples	Other Modified Vegetal Samples	Textile Samples	Macrofossil Samples	TOTAL
Atriplex-type	saltbush	twig	charred		4				4
Atriplex-type	saltbush	wood	charred		21				21
Cactaceae-type	cactus family	epidermis fragment	uncharred		1				1
Capparaceae-type	caper family	stem	charred		3				3
Celtis-type	hackberry	seed	uncharred		2				2
Cercocarpus montanus-type	alderleaf mountain mahogany	seed	charred		2				2
Cercocarpus montanus-type	alderleaf mountain mahogany	seed	uncharred		1				1
Cercocarpus montanus-type	alderleaf mountain mahogany	twig	charred		3				3
Cercocarpus montanus-type	alderleaf mountain mahogany	wood	charred		72				72
Cercocarpus/Artemisia-type	mountain mahogany/sagebrush	axillary bud	charred		2				2
Cheno-am	goosefoot/pigweed	embryo	charred		13				13
Cheno-am	goosefoot/pigweed	embryo	uncharred		1				1
Cheno-am	goosefoot/pigweed	seed	charred		1,078			5	1,083
Cheno-am	goosefoot/pigweed	seed	uncharred		1,136				1,136
Cheno-am	goosefoot/pigweed	seed coat	charred		1				1
Chrysothamnus nauseosus-type	rubber rabbitbrush	wood	charred		35				35
Cleome-type	beeplant	seed	charred		7				7
Cleome-type	beeplant	seed coat	charred		1				1
Compositae-type	sunflower family	achene	charred		1				1
Compositae-type	sunflower family	achene	uncharred		7				7
Corispermum-type	bugseed	seed	charred		9				9

Taxon	Common Name	Part	Condition	Basketry Samples	Flotation Samples	Other Modified Vegetal Samples	Textile Samples	Macrofossil Samples	TOTAL
Cruciferae-type	mustard family	seed	uncharred		2				2
Cucurbita moschata-type	butternut squash	seed	charred		1				1
Cucurbitaceae-type	gourd family	rind	charred		7				7
Cucurbita-type	gourd/squash	rind	charred		3				3
Cucurbita-type	gourd/squash	seed	charred		5				5
Cycloloma atriplicifolium-type	winged pigweed	seed	charred		17				17
Cycloloma atriplicifolium-type	winged pigweed	seed	uncharred		10				10
Descurainia-type	tansy mustard	seed	charred		10				10
Descurainia-type	tansy mustard	seed	uncharred		35				35
Dicotyledon-type	dicots	stem	charred		6				6
Dicotyledon-type	dicots	twig	charred		1				1
Dicotyledon-type	dicots	wood	charred		2				2
Diffuse porous-type	diffuse porous	twig	charred		1				1
Diffuse porous-type	diffuse porous	wood	charred		12				12
Echinocereus-type	hedgehog	seed coat	charred		1				1
Ephedra viridis-type	Mormon tea	twig	charred		12				12
Ephedra viridis-type	Mormon tea	wood	charred		24				24
Erodium-type	storksbill	seed	uncharred		24				24
Euphorbia-type	spurge	seed	charred		2				2
Euphorbia-type	spurge	seed	uncharred		1				1
Fraxinus anomala-type	single leaf ash	wood	charred		32				32
Gramineae-type	grass family	caryopsis	charred		42				42
Gramineae-type	grass family	caryopsis	uncharred		90			1	91
Gramineae-type	grass family	embryo	charred		2				2
Gramineae-type	grass family	floret	charred		7				7
Gramineae-type	grass family	floret	uncharred		38				38

Taxon	Common Name	Part	Condition	Basketry Samples	Flotation Samples	Other Modified Vegetal Samples	Textile Samples	Macrofossil Samples	TOTAL
Gramineae-type	grass family	glume	uncharred		2				2
Gramineae-type	grass family	root	charred		7				7
Gramineae-type	grass family	stem (culm)	charred		10				10
Gramineae-type 3	grass family	caryopsis	charred		4				4
Gramineae-type 4	grass family	caryopsis	charred		1				1
Gymnospermae	gymnosperms	wood	charred		76				76
Helianthus annuus-type	common sunflower	achene	charred		5				5
Helianthus annuus-type	common sunflower	achene	uncharred		73				73
Juniperus osteosperma-type	Utah juniper	berry	charred		1				1
Juniperus osteosperma-type	Utah juniper	bud	charred		3				3
Juniperus osteosperma-type	Utah juniper	cone with pollen balls	charred		1				1
Juniperus osteosperma-type	Utah juniper	fiber	charred		16				16
Juniperus osteosperma-type	Utah juniper	scale leaf	charred		86				86
Juniperus osteosperma-type	Utah juniper	scale leaf	uncharred		3				3
Juniperus osteosperma-type	Utah juniper	twig	charred		155				155
Juniperus osteosperma-type	Utah juniper	wood	charred	11	1,938	1		86	2,036
Juniperus osteosperma-type	Utah juniper	wood	uncharred		28			32	60
Leguminosae-type	legume (pea) family	cotyledon	charred		1				1
Lithospermum-type	stoneseed	seed	charred		1				1
Malvaceae-type	mallow family	seed	charred		5				5
Malvaceae-type	mallow family	seed	uncharred		2				2
Mentzelia albicaulis-type	stickleaf	seed	charred		5				5
Monocotyledon-type	monocots	fiber	charred		2				2
Monocotyledon-type	monocots	fibrovascular bundles	charred		106				106

Taxon	Common Name	Part	Condition	Basketry Samples	Flotation Samples	Other Modified Vegetal Samples	Textile Samples	Macrofossil Samples	TOTAL
Monocotyledon-type	monocots	leaf	charred		7				7
Monocotyledon-type	monocots	spine	charred		1				1
Monocotyledon-type	monocots	stem	charred		10				10
Monocotyledon-type	monocots	tissue	charred		13				13
Nicotiana attenuata-type	coyote tobacco	seed	charred		3				3
Nicotiana attenuata-type	coyote tobacco	seed	uncharred		72				72
Opuntia (prickly pear)-type	prickly pear	embryo	charred		2				2
Opuntia (prickly pear)-type	prickly pear	embryo	uncharred		2				2
Opuntia (prickly pear)-type	prickly pear	seed	charred		1				1
Peraphyllum-type	peraphyllum	wood	charred		2				2
Phaseolus vulgaris-type	common bean	bean (seed)	charred		13			34	47
Phaseolus vulgaris-type	common bean	cotyledon	charred		16			48	64
Physalis longifolia-type	common groundcherry	fruit coat	uncharred		1				1
Physalis longifolia-type	common groundcherry	seed	charred		124				124
Physalis longifolia-type	common groundcherry	seed	uncharred		43				43
Physalis longifolia-type	common groundcherry	seed coat	charred		1				1
Pinaceae-type	pine family	bark scale	charred		1				1
Pinaceae-type	pine family	wood	charred		1				1
Pinus edulis-type	pinyon pine	bark fragment	charred		1				1
Pinus edulis-type	pinyon pine	bark scale	charred		683				683
Pinus edulis-type	pinyon pine	bud	charred		4				4
Pinus edulis-type	pinyon pine	cone scale	charred		2			3	5
Pinus edulis-type	pinyon pine	cone scale	uncharred		1				1
Pinus edulis-type	pinyon pine	needle	charred		48			10	58
Pinus edulis-type	pinyon pine	needle	uncharred		2				2
Pinus edulis-type	pinyon pine	twig	charred		13			3	16

Taxon	Common Name	Part	Condition	Basketry Samples	Flotation Samples	Other Modified Vegetal Samples	Textile Samples	Macrofossil Samples	TOTAL
Pinus edulis-type	pinyon pine	wood	charred	1	438			7	446
Pinus edulis-type	pinyon pine	wood	uncharred					20	20
Pinus ponderosa-type	ponderosa pine	needle	charred		1				1
Polanisia-type	clammy-weed	seed	charred		2				2
Polygonum/Scirpus-type	bindweed/bullrush	achene	charred		8				8
Polygonum/Scirpus-type	bindweed/bullrush	achene	uncharred		3				3
Polygonum-type	bindweed	achene	uncharred		4				4
Populus/Salix-type	cottonwood/willow	wood	charred		29				29
Populus-type	cottonwood	wood	charred		3				3
Portulaca-type	purslane	seed	charred		129				129
Portulaca-type	purslane	seed	uncharred		33				33
Prunus virginiana-type	chokecherry	seed	charred		5				5
Prunus/Rosa-type	chokecherry/rose	seed	charred					4	4
Prunus/Rosa-type	chokecherry/rose	wood	charred		1				1
Purshia-type	cliff-rose/bitterbrush	leaf	charred		12				12
Purshia-type	cliff-rose/bitterbrush	seed	charred		1				1
Purshia-type	cliff-rose/bitterbrush	wood	charred		43				43
Quercus gambelii-type	Gambel oak	wood	charred		35				35
Rhus aromatica var. *trilobata*-type	lemonade berry	bark fragment	charred	260				93	353
Rhus aromatica var. *trilobata*-type	lemonade berry	stem	charred		2			1	3
Rhus aromatica var. *trilobata*-type	lemonade berry	twig	charred	460	5			75	540
Rhus aromatica var. *trilobata*-type	lemonade berry	wood	charred		20				20

Taxon	Common Name	Part	Condition	Basketry Samples	Flotation Samples	Other Modified Vegetal Samples	Textile Samples	Macrofossil Samples	TOTAL
Rhus aromatica var. *trilobata*-type	lemonade berry	wood	uncharred		1				1
Ring porous-type	ring porous	wood	charred		1				1
Rosaceae-type	rose family	axillary bud	charred		1				1
Rosaceae-type	rose family	wood	charred		2				2
Scirpus-type	bulrush	achene	charred		15				15
Semi-ring porous-type	semi-ring porous	wood	charred		4				4
Solanaceae-type	potato family	seed	charred		5				5
Solanaceae-type	potato family	seed	uncharred		4				4
Sphaeralcea-type	globemallow	bract	uncharred		1				1
Sphaeralcea-type	globemallow	fruit core	uncharred		1				1
Sphaeralcea-type	globemallow	leaf	uncharred		3				3
Sphaeralcea-type	globemallow	schizocarp	uncharred		8				8
Sphaeralcea-type	globemallow	seed	charred		15				15
Sphaeralcea-type	globemallow	seed	uncharred		32				32
Sphaeralcea-type	globemallow	seed coat	uncharred		2				2
Sporobolus-type	dropseed	caryopsis	charred		4				4
Sporobolus-type	dropseed	caryopsis	uncharred		71				71
Stipa comata-type	needle-and-thread grass	caryopsis	charred		2				2
Stipa comata-type	needle-and-thread grass	caryopsis	uncharred		5				5
Stipa hymenoides-type	Indian ricegrass	caryopsis	charred		6				6
Stipa hymenoides-type	Indian ricegrass	floret	charred		26				26
Stipa hymenoides-type	Indian ricegrass	floret	uncharred		2				2
Stipa hymenoides-type	Indian ricegrass	palea	charred		1				1
unknown botanical	unknown	axillary bud	charred		2				2
unknown botanical	unknown	bark fragment	charred		1			1	2

Taxon	Common Name	Part	Condition	Basketry Samples	Flotation Samples	Other Modified Vegetal Samples	Textile Samples	Macrofossil Samples	TOTAL
unknown botanical	unknown	black spherical bodies	charred		10				10
unknown botanical	unknown	black spherical bodies	uncharred		7				7
unknown botanical	unknown	bud	charred		12				12
unknown botanical	unknown	bud	uncharred		1				1
unknown botanical	unknown	capsule	charred		1				1
unknown botanical	unknown	caryopsis	charred		6				6
unknown botanical	unknown	disseminule	charred		52				52
unknown botanical	unknown	disseminule	uncharred		11				11
unknown botanical	unknown	embryo	charred		6				6
unknown botanical	unknown	epidermis fragment	charred		3				3
unknown botanical	unknown	epidermis fragment	uncharred		18				18
unknown botanical	unknown	flower bud	charred		31				31
unknown botanical	unknown	flowering head	charred		9				9
unknown botanical	unknown	flowering head	uncharred		8				8
unknown botanical	unknown	fruit coat	charred		1				1
unknown botanical	unknown	fruit rind	charred		1				1
unknown botanical	unknown	fused mass	charred		23				23
unknown botanical	unknown	leaf	charred		17				17
unknown botanical	unknown	leaf	uncharred		1				1
unknown botanical	unknown	nutshell	charred		1				1

Taxon	Common Name	Part	Condition	Basketry Samples	Flotation Samples	Other Modified Vegetal Samples	Textile Samples	Macrofossil Samples	TOTAL
unknown botanical	unknown	organic material	charred		2				2
unknown botanical	unknown	seed	charred		121				121
unknown botanical	unknown	seed	uncharred		32				32
unknown botanical	unknown	seed coat	charred		7				7
unknown botanical	unknown	spine	charred		3				3
unknown botanical	unknown	spiral embryo	charred		65				65
unknown botanical	unknown	stalk segment	charred		2				2
unknown botanical	unknown	tissue	charred		48			2	50
unknown botanical	unknown	twig	charred		402				402
unknown botanical	unknown	unknown	charred		359			1	360
unknown botanical	unknown	unknown	uncharred		4				4
unknown botanical	unknown	wood	charred		3				3
unknown botanical	unknown	wood	uncharred		8				8
unknown, Type 1	unknown, Type 1	unknown	charred		2				2
unknown, Type 2	unknown, Type 2	seed	charred		1				1
unknown, Type 2	unknown, Type 2	unknown	charred		2				2
Verbena-type	vervain	seed	uncharred		6				6
Yucca angustissima-type	narrow-leaved yucca	leaf	charred	100			50	280	430
Yucca baccata-type	datil yucca	leaf	charred		3				3
Yucca baccata-type	datil yucca	seed	charred		1				1
Yucca-type	yucca	leaf	charred		11				11
Zea mays	maize/corn	cob fragment	charred		190			464	654
Zea mays	maize/corn	cob segment	charred		6			202	208
Zea mays	maize/corn	cob, whole	charred					2	2
Zea mays	maize/corn	cupule	charred		500			164	664

Taxon	Common Name	Part	Condition	Basketry Samples	Flotation Samples	Other Modified Vegetal Samples	Textile Samples	Macrofossil Samples	TOTAL
Zea mays	maize/corn	embryo	charred		9				9
Zea mays	maize/corn	fused mass	charred	11	45			1,072	1,128
Zea mays	maize/corn	glume	charred		23			5	28
Zea mays	maize/corn	kernel	charred	3,302	263			7,675	11,240
Zea mays	maize/corn	kernel embryo	charred		4				4
Zea mays	maize/corn	shank segment	charred					12	12
Zea mays	maize/corn	stalk segment	charred		5				5
			TOTAL	4,145	11,042	1	50	12,426	27,664

Table 8.3. Plant Foods at Albert Porter Pueblo: Counts of Individual Charred Non-Wood Plant Parts Identified in Flotation and Macrofossil Samples from All Contexts, by Subperiod.

			Middle Pueblo II through Late Pueblo III (A.D. 1020–1280)	Late Pueblo II (A.D. 1060–1140)	Late Pueblo II through Early Pueblo III (A.D. 1060–1225)	Terminal Pueblo II through Initial Pueblo III (A.D. 1100–1180)	Early Pueblo III (A.D. 1140–1225)	Late Pueblo III (A.D. 1225–1280)	Unassigned	TOTAL
Total Number of Flotation and Macrofossil Samples			50	78	51	34	184	51	18	466
Domestic or Wild	Taxon	Part	N=	N=	N=	N=	N=	N=	N=	N=
domestic	*Cucurbita moschata*-type	seed		1						1
domestic	Cucurbitaceae-type	rind			1		5	1		7
domestic	*Cucurbita*-type	rind		2	1					3
domestic	*Cucurbita*-type	seed			5					5
domestic	*Phaseolus vulgaris*-type	bean (seed)	1	36		9			1	47
domestic	*Phaseolus vulgaris*-type	cotyledon		18	3	14	19	10		64
domestic	*Zea mays*	cob fragment	21	64	103	129	209	125	3	654
domestic	*Zea mays*	cob segment	6	16	11	38	57	80		208
domestic	*Zea mays*	cob, whole						1	1	2
domestic	*Zea mays*	cupule	72	164	136	60	137	77	18	664
domestic	*Zea mays*	embryo		2		2	4		1	9
domestic	*Zea mays*	fused mass				4	13	111		128
domestic	*Zea mays*	glume		13	3	9	3			28
domestic	*Zea mays*	kernel	7	42	26	333	139	9,691	2	10,240
domestic	*Zea mays*	kernel embryo			2		2			4

			Middle Pueblo II through Late Pueblo III (A.D. 1020–1280)	Late Pueblo II (A.D. 1060–1140)	Late Pueblo II through Early Pueblo III (A.D. 1060–1225)	Terminal Pueblo II through Initial Pueblo III (A.D. 1100–1180)	Early Pueblo III (A.D. 1140–1225)	Late Pueblo III (A.D. 1225–1280)	Unassigned	TOTAL
Total Number of Flotation and Macrofossil Samples			50	78	51	34	184	51	18	466
Domestic or Wild	Taxon	Part	N=	N=	N=	N=	N=	N=	N=	N=
domestic	*Zea mays*	shank segment			3	1	8			12
wild	*Amaranthus*-type	fused mass				13				13
wild	*Amaranthus*-type	seed				2,648	3	6		2,657
wild	*Amelanchier utahensis*-type	seed	2							2
wild	*Artemisia tridentata*-type	seed	2	1			2			5
wild	*Artemisia*-type	achene	1	3	12		37	1		54
wild	*Artemisia*-type	flower bud		4	1		28	2		35
wild	*Artemisia*-type	flowering head					2			2
wild	*Artemisia*-type	seed		1		1	1			3
wild	*Astragalus*-type	seed		1			1			2
wild	*Atriplex canescens*-type	fruit core					6			6
wild	*Atriplex*-type	seed					1			1
wild	*Cercocarpus montanus*-type	seed					2			2
wild	*Cercocarpus/ Artemisia*-type	axillary bud		1				1		2
wild	Cheno-am	embryo		4			9			13
wild	Cheno-am	seed	100	155	166	156	436	55	15	1,083

			Middle Pueblo II through Late Pueblo III (A.D. 1020–1280)	Late Pueblo II (A.D. 1060–1140)	Late Pueblo II through Early Pueblo III (A.D. 1060–1225)	Terminal Pueblo II through Initial Pueblo III (A.D. 1100–1180)	Early Pueblo III (A.D. 1140–1225)	Late Pueblo III (A.D. 1225–1280)	Unassigned	TOTAL
Total Number of Flotation and Macrofossil Samples			50	78	51	34	184	51	18	466
Domestic or Wild	Taxon	Part	N=	N=	N=	N=	N=	N=	N=	N=
wild	Cheno-am	seed coat					1			1
wild	*Cleome*-type	seed	2	1			3	1		7
wild	*Cleome*-type	seed coat					1			1
wild	Compositae-type	achene					1			1
wild	*Corispermum*-type	seed					9			9
wild	*Cycloloma atriplicifolium*-type	seed	2			10	4	1		17
wild	*Descurainia*-type	seed	2	1	2		5			10
wild	*Echinocereus*-type	seed coat	1							1
wild	*Euphorbia*-type	seed					2			2
wild	Gramineae-type	caryopsis	13	10	3		16			42
wild	Gramineae-type	embryo					1		1	2
wild	Gramineae-type	floret		2			5			7
wild	Gramineae-Type 3	caryopsis		2				2		4
wild	Gramineae-Type 4	caryopsis	1							1

			Middle Pueblo II through Late Pueblo III (A.D. 1020–1280)	Late Pueblo II (A.D. 1060–1140)	Late Pueblo II through Early Pueblo III (A.D. 1060–1225)	Terminal Pueblo II through Initial Pueblo III (A.D. 1100–1180)	Early Pueblo III (A.D. 1140–1225)	Late Pueblo III (A.D. 1225–1280)	Unassigned	TOTAL
Total Number of Flotation and Macrofossil Samples			50	78	51	34	184	51	18	466
Domestic or Wild	Taxon	Part	N=	N=	N=	N=	N=	N=	N=	N=
wild	*Helianthus annuus*-type	achene	2		1		2			5
wild	*Juniperus osteosperma*-type	berry					1			1
wild	*Juniperus osteosperma*-type	bud			1		1		1	3
wild	*Juniperus osteosperma*-type	cone with pollen balls			1					1
wild	Leguminosae-type	cotyledon					1			1
wild	*Lithospermum*-type	seed					1			1
wild	Malvaceae-type	seed					1	1	3	5
wild	*Mentzelia albicaulis*-type	seed			1		4			5
wild	*Nicotiana attenuata*-type	seed	1				2			3
wild	*Opuntia* (prickly pear)-type	embryo	1		1					2
wild	*Opuntia* (prickly pear)-type	seed			1					1

			Middle Pueblo II through Late Pueblo III (A.D. 1020–1280)	Late Pueblo II (A.D. 1060–1140)	Late Pueblo II through Early Pueblo III (A.D. 1060–1225)	Terminal Pueblo II through Initial Pueblo III (A.D. 1100–1180)	Early Pueblo III (A.D. 1140–1225)	Late Pueblo III (A.D. 1225–1280)	Unassigned	TOTAL
Total Number of Flotation and Macrofossil Samples			50	78	51	34	184	51	18	466
Domestic or Wild	Taxon	Part	N=	N=	N=	N=	N=	N=	N=	N=
wild	*Physalis longifolia*-type	seed	13	14	31		57	2	7	124
wild	*Physalis longifolia*-type	seed coat						1		1
wild	*Pinus edulis*-type	bud		2			2			4
wild	*Pinus edulis*-type	cone scale	1		1		3			5
wild	*Polanisia*-type	seed				2				2
wild	*Polygonum / Scirpus*-type	achene	1				5	2		8
wild	*Portulaca*-type	seed	13	8	3	6	84	10	5	129
wild	*Prunus virginiana*-type	seed	2		1			2		5
wild	*Prunus/Rosa*-type	seed						4		4
wild	*Purshia*-type	seed						1		1
wild	Rosaceae-type	axillary bud					1			1
wild	*Scirpus*-type	achene	4	2	1		5	3		15
wild	Solanaceae-type	seed			1		4			5
wild	Sphaeralcea-type	seed	6	1	3		4		1	15
wild	*Sporobolus*-type	caryopsis	1	1	1		1			4

			Middle Pueblo II through Late Pueblo III (A.D. 1020–1280)	Late Pueblo II (A.D. 1060–1140)	Late Pueblo II through Early Pueblo III (A.D. 1060–1225)	Terminal Pueblo II through Initial Pueblo III (A.D. 1100–1180)	Early Pueblo III (A.D. 1140–1225)	Late Pueblo III (A.D. 1225–1280)	Unassigned	TOTAL
Total Number of Flotation and Macrofossil Samples			50	78	51	34	184	51	18	466
Domestic or Wild	Taxon	Part	N=	N=	N=	N=	N=	N=	N=	N=
wild	*Stipa comata*-type	caryopsis	1	1						2
wild	*Stipa hymenoides*-type	caryopsis		2			4			6
wild	*Stipa hymenoides*-type	floret	2	2	7	1	14			26
wild	*Stipa hymenoides*-type	palea					1			1
wild	*Yucca baccata*-type	seed					1			1
unknown	unknown botanical	axillary bud	1				1			2
unknown	unknown botanical	bud		1	4		6	1		12
unknown	unknown botanical	capsule					1			1
unknown	unknown botanical	caryopsis					6			6
unknown	unknown botanical	disseminule	2	7		4	39			52
unknown	unknown botanical	embryo		2			4			6

			Middle Pueblo II through Late Pueblo III (A.D. 1020–1280)	Late Pueblo II (A.D. 1060–1140)	Late Pueblo II through Early Pueblo III (A.D. 1060–1225)	Terminal Pueblo II through Initial Pueblo III (A.D. 1100–1180)	Early Pueblo III (A.D. 1140–1225)	Late Pueblo III (A.D. 1225–1280)	Unassigned	TOTAL
Total Number of Flotation and Macrofossil Samples			50	78	51	34	184	51	18	466
Domestic or Wild	Taxon	Part	N=	N=	N=	N=	N=	N=	N=	N=
unknown	unknown botanical	flower bud	3	3	6		16	3		31
unknown	unknown botanical	flowering head					9			9
unknown	unknown botanical	fruit coat						1		1
unknown	unknown botanical	fruit rind		1						1
unknown	unknown botanical	fused mass					16	7		23
unknown	unknown botanical	nutshell					1			1
unknown	unknown botanical	seed	15	12	19		64	9	2	121
unknown	unknown botanical	seed coat	2	2			3			7
unknown	unknown botanical	spiral embryo	3	12	48		1		1	65
unknown	unknown, Type 2	seed					1			1
		TOTAL	307	617	610	3,440	1,539	10,212	62	16,787

Note: N = number of individual specimens counted. The word "type" following a family, genus or species designation indicates that the ancient botanical specimen is similar to the taxon named, but that other taxon in the area may have similar-looking parts.

Table 8.4. Ubiquity of Charred Non-Wood Plant Parts Considered Foods in all Flotation and Macrofossil Samples from all Contexts, Albert Porter Pueblo.

Context	Number of Samples	Number of Samples with One or More Foods	Percent of Samples with Foods
Midden deposits	162	154	95.1
Other	142	124	87.3
Roof fall	89	78	87.6
Thermal features and ashpits	73	68	93.2

Note: Includes all *Zea mays* parts recovered.

Table 8.5. Observations on 24 Charred Incomplete Maize Cob Segments and 87 Charred Kernels from Albert Porter Pueblo.

Maize Cob Segments

Study Unit Type	Study Unit No.	No. of Cobs	PD	FS	Mean Cob Length (mm)	Mean Row Number	Mean Cupule Width (mm)	Maximum Cupule Width (mm)	Minimum Cupule Width (mm)
STR	136	1	1376	19	25.0	10.0	6.0	7.0	4.0
STR	150	4	1850	36	32.8	11.0	5.5	6.3	4.5
NST	151	9	2008	91	22.7	11.6	4.6	4.8	4.4
NST	152	7	1851	5	25.1	10.9	4.9	5.3	4.4
STR	170	2	2149	5	16.5	10.0	5.0	5.0	5.0
STR	803	1	1710	3	40.0	12.0	4.0	4.0	4.0

Maize Kernels

Study Unit Type	Study Unit No.	No. of Kernels	PD	FS	Mean Kernel Length (mm)	Mean Kernel Width (mm)	Mean Kernel Thickness (mm)	Endosperm Type
STR	136	22	1376, 1377	19, 9	5.5	6.5	3.5	pop
STR	150	35	1850	32, 36	9.3	7.4	4.3	flint
NST	151	30	2008	91	7.5	8.4	3.4	flint

Note: STR = Structure; NST = Non-structure

Table 8.6. Contexts from which *Zea mays* was Recovered, Albert Porter Pueblo.

Time Period	Study Unit	Description	PD	Fill/Assemblage Position–General	Fill/Assemblage Position–Specific	Fill/Assemblage Type–General	Fill/Assemblage Type–Specific	Taxon	TOTAL
Late Pueblo III (A.D. 1225–1280)	STR 136	subterranean kiva	1377	surface contact	prepared floor surface	cultural deposit	primary refuse	*Zea mays*	9,656
Terminal Pueblo II through Initial Pueblo III (A.D. 1100–1180)	STR 150	subterranean kiva	1850	surface contact	prepared floor surface	cultural deposit	primary refuse	*Zea mays*	175
Terminal Pueblo II through Initial Pueblo III (A.D. 1100–1180)	STR 150	subterranean kiva	1848	fill	roof fall	collapsed structure	with mixed refuse	*Zea mays*	156
Terminal Pueblo II through Initial Pueblo III (A.D. 1100–1180)	STR 150	subterranean kiva	2136	surface contact	prepared floor surface	cultural deposit	primary refuse	*Zea mays*	151
Late Pueblo III (A.D. 1225–1280)	STR 136	subterranean kiva	1376	fill	roof fall	collapsed structure	with mixed refuse	*Zea mays*	140
Late Pueblo III (A.D. 1225–1280)	NST 130	midden	1319	fill	above wall/roof fall	cultural deposit	secondary refuse	*Zea mays*	120
Late Pueblo II through Early Pueblo III (A.D. 1060–1225)	NST 182	extramural surface	1531	fill	surface feature contents	cultural deposit	secondary refuse	*Zea mays*	113
Late Pueblo II (A.D. 1060–1140)	STR 168	nonmasonry surface room	1913	fill	surface feature contents	cultural deposit	primary refuse	*Zea mays*	79
Late Pueblo II (A.D. 1060–1140)	NST 167	extramural surface	2060	fill	surface feature contents	cultural deposit	primary refuse	*Zea mays*	64
Early Pueblo III (A.D. 1140–1225)	NST 151	midden	2008	fill	above wall/roof fall	cultural deposit	secondary refuse	*Zea mays*	60
Late Pueblo II (A.D. 1060–1140)	STR 168	nonmasonry surface room	1913	fill	surface feature contents	cultural deposit	primary refuse	*Phaseolus vulgaris*-type	52
Early Pueblo III (A.D. 1140–1225)	NST 189	midden	2052	fill	below a cultural surface	cultural deposit	secondary refuse	*Zea mays*	51

Time Period	Study Unit	Description	PD	Fill/Assemblage Position–General	Fill/Assemblage Position–Specific	Fill/Assemblage Type–General	Fill/Assemblage Type–Specific	Taxon	TOTAL
Early Pueblo III (A.D. 1140–1225)	STR 803	subterranean kiva	1710	fill	surface feature contents	cultural deposit	primary refuse	*Zea mays*	38
Late Pueblo II through Early Pueblo III (A.D. 1060–1225)	NST 901	midden	852	fill	lower	cultural deposit	secondary refuse	*Zea mays*	38
Late Pueblo III (A.D. 1225–1280)	NST 130	midden	1160	fill	above wall/roof fall	cultural deposit	secondary refuse	*Zea mays*	36
Late Pueblo III (A.D. 1225–1280)	NST 130	midden	1291	fill	lower	cultural deposit	secondary refuse	*Zea mays*	33
Late Pueblo II through Early Pueblo III (A.D. 1060–1225)	NST 901	midden	855	fill	lower	cultural deposit	secondary refuse	*Zea mays*	32
Late Pueblo III (A.D. 1225–1280)	NST 130	midden	1282	fill	upper	cultural deposit	secondary refuse	*Zea mays*	28
Late Pueblo II (A.D. 1060–1140)	NST 186	extramural surface	1855	fill	surface feature contents	cultural deposit	secondary refuse	*Zea mays*	26
Terminal Pueblo II through Initial Pueblo III (A.D. 1100–1180)	STR 150	subterranean kiva	1755	fill	roof fall	collapsed structure	with mixed refuse	*Zea mays*	25
Middle Pueblo II through Late Pueblo III (A.D. 1020–1280)	NST 103	midden	200	fill	lower	cultural deposit	secondary refuse	*Zea mays*	23
Early Pueblo III (A.D. 1140–1225)	NST 162	midden	1741	fill	not further specified	cultural deposit	secondary refuse	*Zea mays*	21
Late Pueblo II (A.D. 1060–1140)	STR 1037	subterranean room	1391	fill	not further specified	mixed deposit	postabandonment and cultural refuse	*Zea mays*	21
Early Pueblo III (A.D. 1140–1225)	NST 162	midden	2162	fill	not further specified	cultural deposit	secondary refuse	*Zea mays*	20

Time Period	Study Unit	Description	PD	Fill/Assemblage Position–General	Fill/Assemblage Position–Specific	Fill/Assemblage Type–General	Fill/Assemblage Type–Specific	Taxon	TOTAL
Late Pueblo III (A.D. 1225–1280)	NST 130	midden	1318	fill	lower	cultural deposit	secondary refuse	*Zea mays*	18
Terminal Pueblo II through Initial Pueblo III (A.D. 1100–1180)	STR 150	subterranean kiva	2137	fill	surface feature contents	cultural deposit	primary refuse	*Zea mays*	18
Early Pueblo III (A.D. 1140–1225)	STR 116	subterranean kiva	1378	fill	roof fall	construction deposit	clean fill	*Zea mays*	17
Early Pueblo III (A.D. 1140–1225)	NST 804	midden	1187	fill	above wall/roof fall	cultural deposit	secondary refuse	*Zea mays*	17
Late Pueblo II through Early Pueblo III (A.D. 1060–1225)	STR 904	subterranean kiva	1388	fill	surface feature contents	cultural deposit	primary refuse	*Zea mays*	17
Late Pueblo III (A.D. 1225–1280)	NST 130	midden	1149	fill	upper	cultural deposit	secondary refuse	*Zea mays*	17
Early Pueblo III (A.D. 1140–1225)	NST 132	midden	1127	fill	above wall/roof fall	cultural deposit	mixed refuse	*Zea mays*	16
Middle Pueblo II through Late Pueblo III (A.D. 1020–1280)	NST 103	midden	197	fill	upper	cultural deposit	secondary refuse	*Zea mays*	16
Early Pueblo III (A.D. 1140–1225)	STR 117	subterranean kiva	399	fill	above wall/roof fall	mixed deposit	postabandonment and cultural refuse	*Zea mays*	15
Early Pueblo III (A.D. 1140–1225)	NST 152	midden	1851	fill	above wall/roof fall	cultural deposit	secondary refuse	*Zea mays*	15
Terminal Pueblo II through Initial Pueblo III (A.D. 1100–1180)	STR 150	subterranean kiva	1753	fill	not further specified	mixed deposit	postabandonment and cultural refuse	*Zea mays*	15
Terminal Pueblo II through Initial Pueblo III (A.D. 1100–1180)	STR 150	subterranean kiva	2136	surface contact	prepared floor surface	cultural deposit	primary refuse	*Phaseolus vulgaris*-type	15

Time Period	Study Unit	Description	PD	Fill/Assemblage Position–General	Fill/Assemblage Position–Specific	Fill/Assemblage Type–General	Fill/Assemblage Type–Specific	Taxon	TOTAL
Early Pueblo III (A.D. 1140–1225)	NST 804	midden	1701	fill	above wall/roof fall	cultural deposit	secondary refuse	*Zea mays*	14
Middle Pueblo II through Late Pueblo III (A.D. 1020–1280)	NST 101	midden	1134	fill	upper	cultural deposit	secondary refuse	*Zea mays*	14
Terminal Pueblo II through Initial Pueblo III (A.D. 1100–1180)	STR 150	subterranean kiva	1841	fill	roof fall	collapsed structure	with mixed refuse	*Zea mays*	14
Terminal Pueblo II through Initial Pueblo III (A.D. 1100–1180)	STR 150	subterranean kiva	1847	fill	roof fall	collapsed structure	with mixed refuse	*Zea mays*	14
Early Pueblo III (A.D. 1140–1225)	STR 117	subterranean kiva	625	fill	above wall/roof fall	postabandonment deposit	natural processes	*Zea mays*	13
Early Pueblo III (A.D. 1140–1225)	NST 804	midden	1188	fill	above wall/roof fall	cultural deposit	secondary refuse	*Zea mays*	13
Late Pueblo II (A.D. 1060–1140)	STR 170	nonmasonry surface room	2149	fill	surface feature contents	cultural deposit	primary refuse	*Zea mays*	13
Early Pueblo III (A.D. 1140–1225)	NST 132	midden	1240	fill	above wall/roof fall	cultural deposit	mixed refuse	*Zea mays*	12
Late Pueblo II through Early Pueblo III (A.D. 1060–1225)	NST 901	midden	744	fill	lower	cultural deposit	secondary refuse	*Zea mays*	11
Late Pueblo III (A.D. 1225–1280)	STR 402	subterranean kiva	316	fill	surface feature contents	cultural deposit	primary refuse	*Zea mays*	11
Early Pueblo III (A.D. 1140–1225)	STR 145	masonry surface structure	2034	fill	surface feature contents	cultural deposit	primary refuse	*Zea mays*	10
Early Pueblo III (A.D. 1140–1225)	NST 151	midden	2010	fill	above wall/roof fall	cultural deposit	secondary refuse	*Zea mays*	10

Time Period	Study Unit	Description	PD	Fill/Assemblage Position–General	Fill/Assemblage Position–Specific	Fill/Assemblage Type–General	Fill/Assemblage Type–Specific	Taxon	TOTAL
Late Pueblo II (A.D. 1060–1140)	NST 1039	midden	1305	fill	above wall/roof fall	cultural deposit	secondary refuse	*Zea mays*	10
Late Pueblo II through Early Pueblo III (A.D. 1060–1225)	NST 901	midden	851	fill	upper	cultural deposit	secondary refuse	*Zea mays*	10
Late Pueblo III (A.D. 1225–1280)	NST 130	midden	1319	fill	above wall/roof fall	cultural deposit	secondary refuse	*Phaseolus vulgaris*-type	10
Unassigned	NST 401	midden	137	fill	lower	cultural deposit	secondary refuse	*Zea mays*	10
Early Pueblo III (A.D. 1140–1225)	NST 151	midden	2006	fill	above wall/roof fall	cultural deposit	secondary refuse	*Zea mays*	9
Early Pueblo III (A.D. 1140–1225)	STR 113	subterranean kiva	633	fill	roof fall	collapsed structure	with mixed refuse	*Zea mays*	8
Early Pueblo III (A.D. 1140–1225)	STR 119	subterranean kiva	353	fill	above wall/roof fall	postabandonment deposit	natural processes	*Zea mays*	8
Early Pueblo III (A.D. 1140–1225)	NST 804	midden	1186	fill	above wall/roof fall	cultural deposit	secondary refuse	*Zea mays*	8
Late Pueblo III (A.D. 1225–1280)	NST 130	midden	1277	fill	upper	cultural deposit	secondary refuse	*Zea mays*	8
Terminal Pueblo II through Initial Pueblo III (A.D. 1100–1180)	STR 150	subterranean kiva	1848	fill	roof fall	collapsed structure	with mixed refuse	Phaseolus vulgaris-type	8
Early Pueblo III (A.D. 1140–1225)	STR 109	subterranean kiva	283	fill	surface feature contents	cultural deposit	primary refuse	*Zea mays*	7
Early Pueblo III (A.D. 1140–1225)	STR 148	masonry surface structure	1830	fill	below wall fall	mixed deposit	postabandonment and cultural refuse	*Zea mays*	7
Early Pueblo III A.D. 1140–1225)	NST 152	midden	1824	fill	above wall/roof fall	cultural deposit	secondary refuse	*Zea mays*	7
Early Pueblo III (A.D. 1140–1225)	NST 155	midden	1935	fill	not further specified	cultural deposit	secondary refuse	*Phaseolus vulgaris*-type	7

Time Period	Study Unit	Description	PD	Fill/Assemblage Position–General	Fill/Assemblage Position–Specific	Fill/Assemblage Type–General	Fill/Assemblage Type–Specific	Taxon	TOTAL
Early Pueblo III (A.D. 1140–1225)	STR 803	subterranean kiva	1703	fill	roof fall	collapsed structure	with mixed refuse	*Zea mays*	7
Late Pueblo II (A.D. 1060–1140)	NST 1041	midden	1654	fill	upper	mixed deposit	postabandonment and cultural refuse	*Zea mays*	7
Late Pueblo III (A.D. 1225–1280)	NST 130	midden	1337	fill	above wall/roof fall	cultural deposit	secondary refuse	*Zea mays*	7
Late Pueblo III (A.D. 1225–1280)	STR 141	masonry surface structure	1931	fill	not further specified	cultural deposit	secondary refuse	*Zea mays*	7
Unassigned	NST 9015	extramural surface	1664	fill	surface feature contents	cultural deposit	secondary refuse	*Zea mays*	7
Early Pueblo III (A.D. 1140–1225)	STR 107	subterranean kiva	1042	fill	surface feature contents	cultural deposit	primary refuse	*Zea mays*	6
Early Pueblo III (A.D. 1140–1225)	NST 123	midden	880	fill	not further specified	mixed deposit	postabandonment and cultural refuse	*Zea mays*	6
Early Pueblo III (A.D. 1140–1225)	NST 139	midden	333	fill	above wall/roof fall	cultural deposit	secondary refuse	*Zea mays*	6
Early Pueblo III (A.D. 1140–1225)	NST 504	extramural surface	18	fill	surface feature contents	cultural deposit	secondary refuse	*Zea mays*	6
Early Pueblo III (A.D. 1140–1225)	STR 803	subterranean kiva	1705	fill	roof fall	collapsed structure	with mixed refuse	*Zea mays*	6
Early Pueblo III (A.D. 1140–1225)	NST 9002	midden	337	fill	above wall/roof fall	cultural deposit	secondary refuse	*Zea mays*	6
Late Pueblo II (A.D. 1060–1140)	NST 201	midden	619	fill	upper	mixed deposit	postabandonment and cultural refuse	*Zea mays*	6
Late Pueblo II (A.D. 1060–1140)	NST 1103	midden	1197	fill	upper	cultural deposit	secondary refuse	*Zea mays*	6

Time Period	Study Unit	Description	PD	Fill/Assemblage Position–General	Fill/Assemblage Position–Specific	Fill/Assemblage Type–General	Fill/Assemblage Type–Specific	Taxon	TOTAL
Late Pueblo II through Early Pueblo III (A.D. 1060–1225)	NST 182	extramural surface	1531	fill	surface feature contents	cultural deposit	secondary refuse	*Cucurbita*-type	6
Late Pueblo II through Early Pueblo III (A.D. 1060–1225)	NST 901	midden	858	fill	lower	cultural deposit	secondary refuse	*Zea mays*	6
Late Pueblo II through Early Pueblo III (A.D. 1060–1225)	NST 9019	extramural surface	1517	fill	surface feature contents	cultural deposit	secondary refuse	*Zea mays*	6
Early Pueblo III (A.D. 1140–1225)	STR 119	subterranean kiva	366	fill	surface feature contents	cultural deposit	primary refuse	*Zea mays*	5
Early Pueblo III A.D. 1140–1225)	STR 502	subterranean kiva	217	fill	roof fall	collapsed structure	with mixed refuse	Cucurbitaceae -type	5
Early Pueblo III (A.D. 1140–1225)	STR 502	subterranean kiva	217	fill	roof fall	collapsed structure	with mixed refuse	*Zea mays*	5
Late Pueblo II (A.D. 1060–1140)	NST 206	extramural surface	806	fill	surface feature contents	cultural deposit	secondary refuse	*Zea mays*	5
Late Pueblo II (A.D. 1060–1140)	NST 1043	midden	1642	fill	upper	mixed deposit	postabandonment and cultural refuse	*Zea mays*	5
Late Pueblo II through Early Pueblo III (A.D. 1060–1225)	STR 903	subterranean kiva	1329	fill	roof fall	collapsed structure	with mixed refuse	*Zea mays*	5
Middle Pueblo II through Late Pueblo III (A.D. 1020–1280)	NST 106	midden	1466	fill	upper	cultural deposit	secondary refuse	*Zea mays*	5
Terminal Pueblo II through Initial Pueblo III (A.D. 1100–1180)	STR 150	subterranean kiva	2135	fill	roof fall	collapsed structure	not further specified	*Zea mays*	5

Time Period	Study Unit	Description	PD	Fill/Assemblage Position–General	Fill/Assemblage Position–Specific	Fill/Assemblage Type–General	Fill/Assemblage Type–Specific	Taxon	TOTAL
Early Pueblo III (A.D. 1140–1225)	STR 115	subterranean kiva	359	fill	roof fall	collapsed structure	with mixed refuse	*Zea mays*	4
Early Pueblo III (A.D. 1140–1225)	STR 115	subterranean kiva	634	fill	roof fall	collapsed structure	with mixed refuse	*Zea mays*	4
Early Pueblo III (A.D. 1140–1225)	STR 117	subterranean kiva	676	fill	above wall/roof fall	mixed deposit	postabandonment and cultural refuse	*Zea mays*	4
Early Pueblo III (A.D. 1140–1225)	STR 117	subterranean kiva	1245	fill	roof fall	collapsed structure	with mixed refuse	*Zea mays*	4
Early Pueblo III (A.D. 1140–1225)	STR 119	subterranean kiva	356	fill	wall fall and roof fall	collapsed structure	with mixed refuse	*Zea mays*	4
Early Pueblo III (A.D. 1140–1225)	NST 133	midden	1343	fill	not further specified	cultural deposit	secondary refuse	*Zea mays*	4
Early Pueblo III (A.D. 1140–1225)	ARB 149	noncultural	1858	fill	wall fall	mixed deposit	postabandonment and cultural refuse	*Phaseolus vulgaris*-type	4
Early Pueblo III (A.D. 1140–1225)	NST 152	midden	1770	fill	above wall/roof fall	cultural deposit	secondary refuse	*Zea mays*	4
Early Pueblo III (A.D. 1140–1225)	NST 155	midden	1860	fill	not further specified	cultural deposit	secondary refuse	*Zea mays*	4
Early Pueblo III (A.D. 1140–1225)	STR 302	subterranean kiva	685	fill	surface feature contents	cultural deposit	primary refuse	*Zea mays*	4
Early Pueblo III (A.D. 1140–1225)	NST 804	midden	1185	fill	above wall/roof fall	cultural deposit	secondary refuse	*Zea mays*	4
Early Pueblo III (A.D. 1140–1225)	NST 804	midden	1189	fill	above wall/roof fall	cultural deposit	secondary refuse	*Zea mays*	4
Late Pueblo II (A.D. 1060–1140)	STR 1037	subterranean room	1443	fill	roof fall	collapsed structure	with mixed refuse	*Zea mays*	4
Late Pueblo II (A.D. 1060–1140)	NST 1039	midden	1200	fill	above wall/roof fall	cultural deposit	secondary refuse	*Zea mays*	4

Time Period	Study Unit	Description	PD	Fill/Assemblage Position–General	Fill/Assemblage Position–Specific	Fill/Assemblage Type–General	Fill/Assemblage Type–Specific	Taxon	TOTAL
Late Pueblo II (A.D. 1060–1140)	NST 1039	midden	1302	fill	above wall/roof fall	cultural deposit	secondary refuse	*Zea mays*	4
Late Pueblo II (A.D. 1060–1140)	NST 1042	midden	1911	fill	lower	mixed deposit	postabandonment and cultural refuse	*Zea mays*	4
Late Pueblo II (A.D. 1060–1140)	NST 9003	extramural surface	1098	fill	surface feature contents	cultural deposit	secondary refuse	*Zea mays*	4
Late Pueblo II through Early Pueblo III (A.D. 1060–1225)	NST 165	midden	1535	fill	below a cultural surface	cultural deposit	secondary refuse	*Zea mays*	4
Late Pueblo II through Early Pueblo III (A.D. 1060–1225)	NST 604	extramural surface	932	fill	surface feature contents	cultural deposit	secondary refuse	*Zea mays*	4
Late Pueblo II through Early Pueblo III (A.D. 1060–1225)	NST 901	midden	569	fill	upper	cultural deposit	secondary refuse	*Zea mays*	4
Late Pueblo II through Early Pueblo III (A.D. 1060–1225)	NST 901	midden	742	fill	lower	cultural deposit	secondary refuse	*Zea mays*	4
Late Pueblo II through Early Pueblo III (A.D. 1060–1225)	NST 901	midden	745	fill	lower	cultural deposit	secondary refuse	*Zea mays*	4
Late Pueblo II through Early Pueblo III (A.D. 1060–1225)	NST 901	midden	881	fill	upper	mixed deposit	postabandonment and cultural refuse	*Zea mays*	4
Middle Pueblo II through Late Pueblo III (A.D. 1020–1280)	NST 103	midden	180	fill	upper	cultural deposit	secondary refuse	*Zea mays*	4

Time Period	Study Unit	Description	PD	Fill/Assemblage Position–General	Fill/Assemblage Position–Specific	Fill/Assemblage Type–General	Fill/Assemblage Type–Specific	Taxon	TOTAL
Middle Pueblo II through Late Pueblo III (A.D. 1020–1280)	NST 106	midden	1665	fill	lower	cultural deposit	secondary refuse	*Zea mays*	4
Middle Pueblo II through Late Pueblo III (A.D. 1020–1280)	NST 9104	extramural surface	1551	fill	surface feature contents	cultural deposit	secondary refuse	*Zea mays*	4
Terminal Pueblo II through Initial Pueblo III (A.D. 1100–1180)	STR 150	subterranean kiva	1844	fill	roof fall	collapsed structure	with mixed refuse	*Zea mays*	4
Early Pueblo III (A.D. 1140–1225)	STR 111	subterranean kiva	1433	fill	surface feature contents	cultural deposit	primary refuse	*Zea mays*	3
Early Pueblo III (A.D. 1140–1225)	STR 113	subterranean kiva	874	fill	surface feature contents	cultural deposit	primary refuse	*Zea mays*	3
Early Pueblo III (A.D. 1140–1225)	STR 117	subterranean kiva	635	fill	above wall/roof fall	mixed deposit	postabandonment and cultural refuse	*Zea mays*	3
Early Pueblo III (A.D. 1140–1225)	STR 117	subterranean kiva	1261	fill	surface feature contents	cultural deposit	primary refuse	*Zea mays*	3
Early Pueblo III (A.D. 1140–1225)	STR 119	subterranean kiva	257	fill	above wall/roof fall	postabandonment deposit	natural processes	*Zea mays*	3
Early Pueblo III (A.D. 1140–1225)	STR 125	masonry surface structure	1333	fill	wall fall and roof fall	collapsed structure	not further specified	*Zea mays*	3
Early Pueblo III (A.D. 1140–1225)	NST 151	midden	2008	fill	above wall/roof fall	cultural deposit	secondary refuse	*Phaseolus vulgaris*-type	3
Early Pueblo III (A.D. 1140–1225)	NST 162	midden	1741	fill	not further specified	cultural deposit	secondary refuse	*Phaseolus vulgaris*-type	3
Early Pueblo III (A.D. 1140–1225)	NST 301	midden	231	fill	upper	cultural deposit	secondary refuse	*Zea mays*	3

Time Period	Study Unit	Description	PD	Fill/Assemblage Position–General	Fill/Assemblage Position–Specific	Fill/Assemblage Type–General	Fill/Assemblage Type–Specific	Taxon	TOTAL
Early Pueblo III (A.D. 1140–1225)	NST 301	midden	233	fill	lower	cultural deposit	secondary refuse	*Zea mays*	3
Early Pueblo III (A.D. 1140–1225)	STR 602	subterranean kiva	2084	fill	surface feature contents	cultural deposit	primary refuse	*Zea mays*	3
Early Pueblo III (A.D. 1140–1225)	STR 803	subterranean kiva	1708	fill	lower	mixed deposit	postabandonment and cultural refuse	*Zea mays*	3
Late Pueblo II (A.D. 1060–1140)	STR 118	subterranean kiva	671	fill	surface feature contents	cultural deposit	primary refuse	*Zea mays*	3
Late Pueblo II (A.D. 1060–1140)	STR 158	nonmasonry surface room	1743	fill	not further specified	mixed deposit	postabandonment and cultural refuse	*Zea mays*	3
Late Pueblo II (A.D. 1060–1140)	STR 204	subterranean kiva	1230	fill	roof fall	collapsed structure	with mixed refuse	*Zea mays*	3
Late Pueblo II (A.D. 1060–1140)	NST 1042	midden	1687	fill	lower	mixed deposit	postabandonment and cultural refuse	*Zea mays*	3
Late Pueblo II (A.D. 1060–1140)	NST 1043	midden	1699	fill	lower	mixed deposit	postabandonment and cultural refuse	*Zea mays*	3
Late Pueblo II through Early Pueblo III (A.D. 1060–1225)	NST 801	midden	824	fill	upper	mixed deposit	postabandonment and cultural refuse	*Zea mays*	3
Late Pueblo II through Early Pueblo III (A.D. 1060–1225)	NST 806	extramural surface	1062	fill	surface feature contents	cultural deposit	secondary refuse	*Zea mays*	3
Late Pueblo II through Early Pueblo III (A.D. 1060–1225)	STR 903	subterranean kiva	1077	fill	wall fall and roof fall	collapsed structure	with mixed refuse	*Zea mays*	3

Time Period	Study Unit	Description	PD	Fill/Assemblage Position–General	Fill/Assemblage Position–Specific	Fill/Assemblage Type–General	Fill/Assemblage Type–Specific	Taxon	TOTAL
Middle Pueblo II through Late Pueblo III (A.D. 1020–1280)	NST 101	midden	925	fill	upper	cultural deposit	secondary refuse	*Zea mays*	3
Middle Pueblo II through Late Pueblo III (A.D. 1020–1280)	NST 101	midden	1091	fill	upper	mixed deposit	postabandonment and cultural refuse	*Zea mays*	3
Middle Pueblo II through Late Pueblo III (A.D. 1020–1280)	NST 104	midden	1833	fill	lower	mixed deposit	postabandonment and cultural refuse	*Zea mays*	3
Middle Pueblo II through Late Pueblo III (A.D. 1020–1280)	NST 106	midden	1427	fill	lower	cultural deposit	secondary refuse	*Zea mays*	3
Early Pueblo III (A.D. 1140–1225)	STR 109	subterranean kiva	267	fill	roof fall	collapsed structure	with mixed refuse	*Zea mays*	2
Early Pueblo III (A.D. 1140–1225)	STR 110	subterranean kiva	1281	fill	roof fall	collapsed structure	with mixed refuse	*Zea mays*	2
Early Pueblo III (A.D. 1140–1225)	STR 110	subterranean kiva	1334	fill	roof fall	collapsed structure	with mixed refuse	*Zea mays*	2
Early Pueblo III (A.D. 1140–1225)	STR 111	subterranean kiva	1159	fill	roof fall	collapsed structure	not further specified	*Zea mays*	2
Early Pueblo III (A.D. 1140–1225)	STR 113	subterranean kiva	1300	fill	above wall/roof fall	mixed deposit	postabandonment and cultural refuse	*Zea mays*	2
Early Pueblo III (A.D. 1140–1225)	STR 116	subterranean kiva	1336	fill	roof fall	collapsed structure	with mixed refuse	*Zea mays*	2
Early Pueblo III (A.D. 1140–1225)	STR 116	subterranean kiva	1505	fill	surface feature contents	cultural deposit	primary refuse	*Zea mays*	2

Time Period	Study Unit	Description	PD	Fill/Assemblage Position–General	Fill/Assemblage Position–Specific	Fill/Assemblage Type–General	Fill/Assemblage Type–Specific	Taxon	TOTAL
Early Pueblo III (A.D. 1140–1225)	STR 117	subterranean kiva	1242	fill	roof fall	collapsed structure	with mixed refuse	*Zea mays*	2
Early Pueblo III (A.D. 1140–1225)	ARB 120	noncultural	757	fill	wall fall	mixed deposit	postabandonment and cultural refuse	*Zea mays*	2
Early Pueblo III (A.D. 1140–1225)	NST 133	midden	1256	fill	below wall fall	cultural deposit	secondary refuse	*Zea mays*	2
Early Pueblo III (A.D. 1140–1225)	NST 133	midden	1311	fill	not further specified	cultural deposit	secondary refuse	*Zea mays*	2
Early Pueblo III (A.D. 1140–1225)	ARB 149	noncultural	1827	fill	wall fall	mixed deposit	postabandonment and cultural refuse	*Zea mays*	2
Early Pueblo III (A.D. 1140–1225)	NST 152	midden	1763	fill	above wall/roof fall	cultural deposit	secondary refuse	*Zea mays*	2
Early Pueblo III (A.D. 1140–1225)	STR 803	subterranean kiva	1184	fill	above wall/roof fall	mixed deposit	postabandonment and cultural refuse	*Zea mays*	2
Late Pueblo II (A.D. 1060–1140)	STR 142	masonry surface structure	1726	fill	below wall fall	mixed deposit	postabandonment and cultural refuse	*Zea mays*	2
Late Pueblo II (A.D. 1060–1140)	NST 186	extramural surface	1856	fill	surface feature contents	cultural deposit	secondary refuse	*Zea mays*	2
Late Pueblo II (A.D. 1060–1140)	NST 201	midden	651	fill	lower	cultural deposit	secondary refuse	*Cucurbita*-type	2
Late Pueblo II (A.D. 1060–1140)	NST 201	midden	651	fill	lower	cultural deposit	secondary refuse	*Zea mays*	2
Late Pueblo II (A.D. 1060–1140)	NST 1039	midden	1304	fill	above wall/roof fall	cultural deposit	secondary refuse	*Zea mays*	2
Late Pueblo II (A.D. 1060–1140)	NST 1043	midden	1695	fill	upper	mixed deposit	postabandonment and cultural refuse	*Zea mays*	2

Time Period	Study Unit	Description	PD	Fill/Assemblage Position–General	Fill/Assemblage Position–Specific	Fill/Assemblage Type–General	Fill/Assemblage Type–Specific	Taxon	TOTAL
Late Pueblo II through Early Pueblo III (A.D. 1060–1225)	NST 801	midden	1021	fill	lower	cultural deposit	secondary refuse	*Zea mays*	2
Late Pueblo II through Early Pueblo III (A.D. 1060–1225)	NST 901	midden	950	fill	lower	mixed deposit	postabandonment and cultural refuse	*Phaseolus vulgaris*-type	2
Late Pueblo II through Early Pueblo III (A.D. 1060–1225)	NST 901	midden	1001	fill	lower	cultural deposit	secondary refuse	*Zea mays*	2
Late Pueblo II through Early Pueblo III (A.D. 1060–1225)	NST 9019	extramural surface	1518	fill	surface feature contents	cultural deposit	secondary refuse	*Zea mays*	2
Late Pueblo III (A.D. 1225–1280)	STR 136	subterranean kiva	1342	fill	roof fall	collapsed structure	with mixed refuse	*Zea mays*	2
Middle Pueblo II through Late Pueblo III (A.D. 1020–1280)	NST 101	midden	1128	sterile	undisturbed sediment or geologic deposit	noncultural deposit	not further specified	*Zea mays*	2
Middle Pueblo II through Late Pueblo III (A.D. 1020–1280)	NST 103	midden	170	fill	upper	cultural deposit	secondary refuse	*Zea mays*	2
Middle Pueblo II through Late Pueblo III (A.D. 1020–1280)	NST 103	midden	195	fill	upper	cultural deposit	secondary refuse	*Zea mays*	2
Middle Pueblo II through Late Pueblo III (A.D. 1020–1280)	NST 106	midden	1428	fill	lower	cultural deposit	secondary refuse	*Zea mays*	2
Middle Pueblo II through Late Pueblo III (A.D. 1020–1280)	NST 106	midden	1473	fill	lower	cultural deposit	secondary refuse	*Zea mays*	2

Time Period	Study Unit	Description	PD	Fill/Assemblage Position–General	Fill/Assemblage Position–Specific	Fill/Assemblage Type–General	Fill/Assemblage Type–Specific	Taxon	TOTAL
Middle Pueblo II through Late Pueblo III (A.D. 1020–1280)	NST 106	midden	1478	sterile	undisturbed sediment or geologic deposit	noncultural deposit	not further specified	*Zea mays*	2
Terminal Pueblo II through Initial Pueblo III (A.D. 1100–1180)	STR 150	subterranean kiva	1754	fill	roof fall	collapsed structure	with mixed refuse	*Zea mays*	2
Unassigned	STR 137	subterranean structure, type unknown	1538	fill	roof fall	collapsed structure	not further specified	*Zea mays*	2
Unassigned	NST 912	extramural surface	995	fill	surface feature contents	cultural deposit	secondary refuse	*Zea mays*	2
Early Pueblo III (A.D. 1140–1225)	STR 107	subterranean kiva	639	fill	roof fall	collapsed structure	with mixed refuse	*Zea mays*	1
Early Pueblo III (A.D. 1140–1225)	STR 107	subterranean kiva	672	fill	roof fall	collapsed structure	with mixed refuse	*Zea mays*	1
Early Pueblo III (A.D. 1140–1225)	STR 108	subterranean kiva	1152	fill	below a cultural surface	other deposit	fill/assemblage type is not in this list	*Zea mays*	1
Early Pueblo III (A.D. 1140–1225)	STR 112	aboveground kiva	1777	fill	surface feature contents	cultural deposit	primary refuse	*Zea mays*	1
Early Pueblo III (A.D. 1140–1225)	STR 113	subterranean kiva	1285	fill	wall fall	mixed deposit	postabandonment and cultural refuse	*Zea mays*	1
Early Pueblo III (A.D. 1140–1225)	STR 115	subterranean kiva	840	fill	roof fall	collapsed structure	with mixed refuse	*Zea mays*	1
Early Pueblo III (A.D. 1140–1225)	STR 117	subterranean kiva	1243	fill	roof fall	collapsed structure	with mixed refuse	*Zea mays*	1
Early Pueblo III (A.D. 1140–1225)	NST 123	midden	1049	fill	not further specified	mixed deposit	postabandonment and cultural refuse	*Zea mays*	1

Time Period	Study Unit	Description	PD	Fill/Assemblage Position–General	Fill/Assemblage Position–Specific	Fill/Assemblage Type–General	Fill/Assemblage Type–Specific	Taxon	TOTAL
Early Pueblo III (A.D. 1140–1225)	STR 128	masonry surface structure	1270	fill	roof fall	mixed deposit	postabandonment and cultural refuse	*Zea mays*	1
Early Pueblo III (A.D. 1140–1225)	NST 134	midden	1259	fill	below wall fall	cultural deposit	secondary refuse	*Zea mays*	1
Early Pueblo III (A.D. 1140–1225)	NST 134	midden	1275	fill	below wall fall	cultural deposit	secondary refuse	*Zea mays*	1
Early Pueblo III (A.D. 1140–1225)	ARB 147	noncultural	1828	fill	not further specified	mixed deposit	postabandonment and cultural refuse	*Zea mays*	1
Early Pueblo III (A.D. 1140–1225)	ARB 149	noncultural	1858	fill	wall fall	mixed deposit	postabandonment and cultural refuse	*Zea mays*	1
Early Pueblo III (A.D. 1140–1225)	NST 151	midden	1711	fill	above wall/roof fall	cultural deposit	secondary refuse	*Zea mays*	1
Early Pueblo III (A.D. 1140–1225)	NST 151	midden	2010	fill	above wall/roof fall	cultural deposit	secondary refuse	*Phaseolus vulgaris*-type	1
Early Pueblo III (A.D. 1140–1225)	NST 162	midden	2144	fill	not further specified	cultural deposit	secondary refuse	*Zea mays*	1
Early Pueblo III (A.D. 1140–1225)	NST 197	extramural surface	1815	fill	surface feature contents	construction deposit	other	*Zea mays*	1
Early Pueblo III (A.D. 1140–1225)	NST 501	midden	12	fill	lower	cultural deposit	secondary refuse	*Zea mays*	1
Early Pueblo III (A.D. 1140–1225)	STR 502	subterranean kiva	383	fill	surface feature contents	cultural deposit	primary refuse	*Zea mays*	1
Early Pueblo III (A.D. 1140–1225)	NST 601	midden	842	fill	lower	mixed deposit	postabandonment and cultural refuse	*Zea mays*	1
Early Pueblo III (A.D. 1140–1225)	STR 602	subterranean kiva	642	fill	above wall/roof fall	mixed deposit	postabandonment and cultural refuse	*Zea mays*	1

Time Period	Study Unit	Description	PD	Fill/Assemblage Position–General	Fill/Assemblage Position–Specific	Fill/Assemblage Type–General	Fill/Assemblage Type–Specific	Taxon	TOTAL
Early Pueblo III (A.D. 1140–1225)	STR 803	subterranean kiva	1706	fill	roof fall	collapsed structure	with mixed refuse	*Zea mays*	1
Early Pueblo III (A.D. 1140–1225)	STR 803	subterranean kiva	1710	fill	surface feature contents	cultural deposit	primary refuse	*Phaseolus vulgaris*-type	1
Late Pueblo II (A.D. 1060–1140)	STR 118	subterranean kiva	256	fill	above wall/roof fall	postabandonment deposit	natural processes	*Zea mays*	1
Late Pueblo II (A.D. 1060–1140)	STR 158	nonmasonry surface room	2166	fill	roof fall	collapsed structure	with mixed refuse	*Phaseolus vulgaris*-type	1
Late Pueblo II (A.D. 1060–1140)	NST 164	midden	2026	fill	below a cultural surface	construction deposit	refuse fill	*Zea mays*	1
Late Pueblo II (A.D. 1060–1140)	STR 168	nonmasonry surface room	1913	fill	surface feature contents	cultural deposit	primary refuse	*Cucurbita moschata*-type	1
Late Pueblo II (A.D. 1060–1140)	STR 170	nonmasonry surface room	2147	fill	not further specified	mixed deposit	postabandonment and cultural refuse	*Phaseolus vulgaris*-type	1
Late Pueblo II (A.D. 1060–1140)	STR 170	nonmasonry surface room	2147	fill	not further specified	mixed deposit	postabandonment and cultural refuse	*Zea mays*	1
Late Pueblo II (A.D. 1060–1140)	NST 201	midden	618	fill	lower	cultural deposit	secondary refuse	*Zea mays*	1
Late Pueblo II (A.D. 1060–1140)	STR 204	subterranean kiva	1953	fill	roof fall	collapsed structure	with mixed refuse	*Zea mays*	1
Late Pueblo II (A.D. 1060–1140)	NST 206	extramural surface	717	fill	surface feature contents	cultural deposit	secondary refuse	*Zea mays*	1
Late Pueblo II (A.D. 1060–1140)	STR 906	earth-walled pit structure	1010	fill	not further specified	mixed deposit	postabandonment and cultural refuse	*Zea mays*	1
Late Pueblo II (A.D. 1060–1140)	STR 908	nonmasonry surface room	764	fill	roof fall	collapsed structure	with mixed refuse	*Zea mays*	1

Time Period	Study Unit	Description	PD	Fill/Assemblage Position–General	Fill/Assemblage Position–Specific	Fill/Assemblage Type–General	Fill/Assemblage Type–Specific	Taxon	TOTAL
Late Pueblo II (A.D. 1060–1140)	STR 1037	subterranean room	1309	fill	roof fall	collapsed structure	with mixed refuse	*Zea mays*	1
Late Pueblo II (A.D. 1060–1140)	STR 1037	subterranean room	1442	fill	roof fall	collapsed structure	with mixed refuse	*Zea mays*	1
Late Pueblo II (A.D. 1060–1140)	NST 1041	midden	1626	fill	upper	mixed deposit	postabandonment and cultural refuse	*Zea mays*	1
Late Pueblo II (A.D. 1060–1140)	NST 1041	midden	1733	fill	lower	mixed deposit	postabandonment and cultural refuse	*Zea mays*	1
Late Pueblo II (A.D. 1060–1140)	NST 9003	extramural surface	1093	fill	surface feature contents	cultural deposit	secondary refuse	*Zea mays*	1
Late Pueblo II (A.D. 1060–1140)	NST 9003	extramural surface	1095	fill	surface feature contents	cultural deposit	secondary refuse	*Zea mays*	1
Late Pueblo II through Early Pueblo III (A.D. 1060–1225)	NST 182	extramural surface	1531	fill	surface feature contents	cultural deposit	secondary refuse	*Phaseolus vulgaris*-type	1
Late Pueblo II through Early Pueblo III (A.D. 1060–1225)	NST 801	midden	824	fill	upper	mixed deposit	postabandonment and cultural refuse	Cucurbitaceae -type	1
Late Pueblo II through Early Pueblo III (A.D. 1060–1225)	NST 801	midden	987	fill	upper	mixed deposit	postabandonment and cultural refuse	*Zea mays*	1
Late Pueblo II through Early Pueblo III (A.D. 1060–1225)	NST 801	midden	1030	fill	lower	mixed deposit	postabandonment and cultural refuse	*Zea mays*	1
Late Pueblo II through Early Pueblo III (A.D. 1060–1225)	NST 805	extramural surface	1028	fill	surface feature contents	cultural deposit	secondary refuse	*Zea mays*	1

Time Period	Study Unit	Description	PD	Fill/Assemblage Position–General	Fill/Assemblage Position–Specific	Fill/Assemblage Type–General	Fill/Assemblage Type–Specific	Taxon	TOTAL
Late Pueblo II through Early Pueblo III (A.D. 1060–1225)	NST 901	midden	536	fill	upper	cultural deposit	secondary refuse	*Zea mays*	1
Late Pueblo II through Early Pueblo III (A.D. 1060–1225)	NST 901	midden	570	fill	upper	cultural deposit	secondary refuse	*Zea mays*	1
Late Pueblo II through Early Pueblo III (A.D. 1060–1225)	STR 903	subterranean kiva	1326	fill	roof fall	collapsed structure	with mixed refuse	*Zea mays*	1
Late Pueblo II through Early Pueblo III (A.D. 1060–1225)	STR 904	subterranean kiva	1327	fill	roof fall	collapsed structure	with mixed refuse	*Zea mays*	1
Late Pueblo III (A.D. 1225–1280)	STR 136	subterranean kiva	1350	fill	roof fall	collapsed structure	with mixed refuse	*Zea mays*	1
Late Pueblo III (A.D. 1225–1280)	STR 136	subterranean kiva	1371	fill	roof fall	collapsed structure	with mixed refuse	*Zea mays*	1
Late Pueblo III (A.D. 1225–1280)	STR 136	subterranean kiva	1376	fill	roof fall	collapsed structure	with mixed refuse	Cucurbitaceae -type	1
Middle Pueblo II through Late Pueblo III (A.D. 1020–1280)	NST 101	midden	1213	fill	upper	mixed deposit	postabandonment and cultural refuse	*Zea mays*	1
Middle Pueblo II through Late Pueblo III (A.D. 1020–1280)	NST 102	midden	814	fill	upper	cultural deposit	secondary refuse	*Zea mays*	1
Middle Pueblo II through Late Pueblo III (A.D. 1020–1280)	NST 102	midden	815	fill	lower	cultural deposit	secondary refuse	*Zea mays*	1
Middle Pueblo II through Late Pueblo III (A.D. 1020–1280)	NST 103	midden	286	fill	lower	cultural deposit	secondary refuse	*Zea mays*	1

Time Period	Study Unit	Description	PD	Fill/Assemblage Position–General	Fill/Assemblage Position–Specific	Fill/Assemblage Type–General	Fill/Assemblage Type–Specific	Taxon	TOTAL
Middle Pueblo II through Late Pueblo III (A.D. 1020–1280)	NST 104	midden	1602	fill	upper	mixed deposit	postabandonment and cultural refuse	*Zea mays*	1
Middle Pueblo II through Late Pueblo III (A.D. 1020–1280)	NST 104	midden	1610	fill	upper	mixed deposit	postabandonment and cultural refuse	*Zea mays*	1
Middle Pueblo II through Late Pueblo III (A.D. 1020–1280)	NST 104	midden	2155	fill	lower	mixed deposit	postabandonment and cultural refuse	*Phaseolus vulgaris*-type	1
Middle Pueblo II through Late Pueblo III (A.D. 1020–1280)	NST 105	midden	1572	fill	upper	mixed deposit	postabandonment and cultural refuse	*Zea mays*	1
Middle Pueblo II through Late Pueblo III (A.D. 1020–1280)	NST 106	midden	1416	fill	upper	mixed deposit	postabandonment and cultural refuse	*Zea mays*	1
Middle Pueblo II through Late Pueblo III (A.D. 1020–1280)	NST 106	midden	1420	fill	upper	cultural deposit	secondary refuse	*Zea mays*	1
Middle Pueblo II through Late Pueblo III (A.D. 1020–1280)	NST 106	midden	1457	fill	lower	mixed deposit	postabandonment and cultural refuse	*Zea mays*	1
Middle Pueblo II through Late Pueblo III (A.D. 1020–1280)	NST 106	midden	1475	fill	lower	mixed deposit	postabandonment and cultural refuse	*Zea mays*	1
Middle Pueblo II through Late Pueblo III (A.D. 1020–1280)	NST 106	midden	1477	fill	lower	cultural deposit	secondary refuse	*Zea mays*	1
Terminal Pueblo II through Initial Pueblo III (A.D. 1100–1180)	STR 150	subterranean kiva	1846	fill	roof fall	collapsed structure	with mixed refuse	*Zea mays*	1

Time Period	Study Unit	Description	PD	Fill/Assemblage Position–General	Fill/Assemblage Position–Specific	Fill/Assemblage Type–General	Fill/Assemblage Type–Specific	Taxon	TOTAL
Terminal Pueblo II through Initial Pueblo III (A.D. 1100–1180)	STR 150	subterranean kiva	2002	surface contact	bench surface	construction deposit	masonry	*Zea mays*	1
Unassigned	ARB 124	noncultural	1253	fill	wall fall	mixed deposit	postabandonment and cultural refuse	*Zea mays*	1
Unassigned	NST 401	midden	132	fill	upper	cultural deposit	secondary refuse	*Zea mays*	1
Unassigned	NST 401	midden	138	fill	upper	cultural deposit	secondary refuse	*Zea mays*	1
Unassigned	NST 401	midden	142	fill	lower	cultural deposit	secondary refuse	*Zea mays*	1
Unassigned	ARB 1004	noncultural	663	not applicable	fill/assemblage position is not applicable	mixed deposit	sampling column	*Phaseolus vulgaris*-type	1

Note: ARB = Arbitrary Unit; STR = Structure; NST = Nonstructure

Table 8.7. Plant Foods at Albert Porter Pueblo: Ubiquity of Charred Non-Wood Parts in all Flotation Samples, by Subperiod.

		Middle Pueblo II through Late Pueblo III (A.D. 1020–1280)		Late Pueblo II (A.D. 1060–1140)		Late Pueblo II through Early Pueblo III (A.D. 1060–1225)		Terminal Pueblo II through Initial Pueblo III (A.D. 1100–1180)		Early Pueblo III (A.D. 1140–1225)		Late Pueblo III (A.D. 1225–1280)		Unassigned	
Total Number of Flotation Samples Analyzed		29		43		26		4		87		18		12	
Number of Flotation Samples Containing the Taxon/Part, and %		N=	%	N=	%	N=	%	N=	%	N=	%	N=	%	N=	%
Domesticated Taxa	Part(s)														
Cucurbita moschata-type	seed			1	2.3										
Cucurbitaceae-type	rind					1	3.8			1	1.1	1	5.6		
Cucurbita-type	rind			1	2.3	3	11.5								
Phaseolus vulgaris-type	bean (seed), cotyledon			2	4.7	1	3.8			1	1.1				
Zea mays	cob fragment, cob segment, cupule, embryo, fused mass, glume, kernel, kernel embryo	17	58.6	26	60.5	19	73.1	4	100.0	51	58.6	8	44.4	6	50.0
Wild Plant Taxa	Part(s)														
Amaranthus-type	fused mass, seed							1	25.0	2	2.3	3	16.7		
Amelanchier utahensis-type	seed	1	3.4												
Artemisia tridentata-type	seed	2	6.9	1	2.3					1	1.1				
Artemisia-type	achene	1	3.4	4	9.3	5	19.2	1	25.0	19	21.8	2	11.1		
Astragalus-type	flower			1	2.3					1	1.1				

		Middle Pueblo II through Late Pueblo III (A.D. 1020–1280)		Late Pueblo II (A.D. 1060–1140)		Late Pueblo II through Early Pueblo III (A.D. 1060–1225)		Terminal Pueblo II through Initial Pueblo III (A.D. 1100–1180)		Early Pueblo III (A.D. 1140–1225)		Late Pueblo III (A.D. 1225–1280)		Unassigned	
Total Number of Flotation Samples Analyzed		29		43		26		4		87		18		12	
Number of Flotation Samples Containing the Taxon/Part, and %		N=	%	N=	%	N=	%	N=	%	N=	%	N=	%	N=	%
Atriplex canescens-type	flowering head									1	1.1				
Atriplex-type	seed									1	1.1				
Cercocarpus montanus-type	seed									1	1.1				
Cercocarpus/ Artemisia-type	axillary bud			1	2.3							1	5.6		
Cheno-am	embryo, seed, seed coat	18	62.1	31	72.1	20	76.9	3	75.0	63	72.4	14	77.8	8	66.7
Cleome-type	seed, seed coat	2	6.9	1	2.3					2	2.3	1	5.6		
Compositae-type	achene									1	1.1				
Corispermum-type	seed									4	4.6				
Cycloloma atriplicifolium-type	seed	1	3.4					3	75.0	4	4.6	1	5.6		
Descurainia-type	seed	2	6.9	1	2.3	2	7.7			3	3.4				
Echinocereus-type	seed coat	1	3.4												
Euphorbia-type	seed									2	2.3				
Gramineae-type	caryopsis, embryo, floret	8	27.6	9	20.9	2	7.7			16	18.4			1	8.3
Gramineae-type 3	caryopsis			1	2.3							1	5.6		
Gramineae-type 4	caryopsis	1	3.4												
Helianthus annuus-type	achene	1	3.4			1	3.8			1	1.1				
Juniperus osteosperma-type	berry					2	7.7			2	2.3			1	8.3

		Middle Pueblo II through Late Pueblo III (A.D. 1020–1280)		Late Pueblo II (A.D. 1060–1140)		Late Pueblo II through Early Pueblo III (A.D. 1060–1225)		Terminal Pueblo II through Initial Pueblo III (A.D. 1100–1180)		Early Pueblo III (A.D. 1140–1225)		Late Pueblo III (A.D. 1225–1280)		Unassigned	
Total Number of Flotation Samples Analyzed		29		43		26		4		87		18		12	
Number of Flotation Samples Containing the Taxon/Part, and %		N=	%	N=	%	N=	%	N=	%	N=	%	N=	%	N=	%
Leguminosae-type	cotyledon									1	1.1				
Lithospermum-type	seed									1	1.1				
Malvaceae-type	seed									1	1.1	1	5.6	2	16.7
Mentzelia albicaulis-type	seed					1	3.8			2	2.3				
Nicotiana attenuata-type	seed	1	3.4							2	2.3				
Opuntia (prickly pear)-type	embryo	1	3.4			2	7.7								
Physalis longifolia-type	seed, seed coat	7	24.1	10	23.3	10	38.5			15	17.2	3	16.7	3	25.0
Pinus edulis-type	bud			1	2.3					2	2.3				
Polanisia-type	seed							1	25.0						
Polygonum / Scirpus-type	achene	1	3.4							4	4.6	2	11.1		
Portulaca-type	seed	6	20.7	4	9.3	3	11.5	2	50.0	26	29.9	7	38.9	5	41.7
Prunus virginiana-type	seed	1	3.4			1	3.8					2	11.1		
Purshia-type	seed											1	5.6		
Rosaceae-type	axillary bud									1	1.1				
Scirpus-type	achene	3	10.3	1	2.3	1	3.8			5	5.7	3	16.7		
Solanaceae-type	seed					1	3.8			3	3.4				
Sphaeralcea-type	seed	4	13.8	1	2.3	3	11.5			4	4.6			1	8.3
Sporobolus-type	caryopsis	1	3.4	1	2.3	1	3.8			1	1.1				
Stipa comata-type	caryopsis	1	3.4	1	2.3										

		Middle Pueblo II through Late Pueblo III (A.D. 1020–1280)		Late Pueblo II (A.D. 1060–1140)		Late Pueblo II through Early Pueblo III (A.D. 1060–1225)		Terminal Pueblo II through Initial Pueblo III (A.D. 1100–1180)		Early Pueblo III (A.D. 1140–1225)		Late Pueblo III (A.D. 1225–1280)		Unassigned	
Total Number of Flotation Samples Analyzed		29		43		26		4		87		18		12	
Number of Flotation Samples Containing the Taxon/Part, and %		N=	%	N=	%	N=	%	N=	%	N=	%	N=	%	N=	%
Stipa hymenoides-type	caryopsis, florets	1	3.4	4	9.3	4	15.4	1	25.0	10	11.5				
Yucca baccata-type	seed									1	1.1				
Total Number of Wild Food Taxa per Subperiod, excluding non-edible tobacco (*Nicotiana attenuata*) and stoneseed (*Lithospermum*)		21		16		16		7		29		14		7	

Note: N = number of grains identified; % = percentage of the total grains identified within the sample.

Table 8.8. *Zea Mays* and Cheno-am Seeds at Albert Porter Pueblo: Ubiquity of Charred Non-Wood Plant Parts in Flotation Samples from Thermal Feature/Ashpit and Midden Deposits, by Subperiod, and including the Number of Additional Food Taxa in the Samples.

Context(s)		Middle Pueblo II through Late Pueblo III (A.D. 1020–1280)		Late Pueblo II (A.D. 1060–1140)		Late Pueblo II through Early Pueblo III (A.D. 1060–1225)		Terminal Pueblo II through Initial Pueblo III (A.D. 1100–1180)		Early Pueblo III (A.D. 1140–1225)		Late Pueblo III (A.D. 1225–1280)		Unassigned	
Thermal Features and Ashpits															
Total Number of Flotation Samples Analyzed		0		5		6		1		48		10		0	
Number of Flotation Samples Containing the Taxon/Part, and %		N=	%	N=	%	N=	%	N=	%	N=	%	N=	%	N=	%
Taxon	Part														
Cheno-am	embryo, seed, seed coat	0		5	100.0	5	83.3	1	100.0	32	66.7	8	80.0	0	
Zea mays	all parts	0		4	80.0	3	50.0	1	100.0	28	58.3	3	30.0	0	
Zea mays	kernels only	0		4	80.0	2	33.3	1	100.0	13	27.1	1	10.0	0	
Zea mays	cob parts only	0		2	40.0	3	50.0	1	100.0	23	47.9	3	30.0	0	
Number of Additional Food Taxa		0		8		7		1		24		8		0	
Midden Deposits															
Total Number of Flotation Samples Analyzed		15		10		14		0		19		1		8	
Number of Flotation Samples Containing the Taxon/Part, and %		N=	%	N=	%	N=	%	N=	%	N=	%	N=	%	N=	%
Taxon	Part														
Cheno-am	embryo, seed, seed coat	13	86.7	8	80.0	11	78.6	0		16	84.2	1	100.0	6	75.0
Zea mays	all parts	13	86.7	9	90.0	13	92.9	0		11	57.9	1	100.0	5	62.5
Zea mays	kernels only	3	20.0	4	40.0	7	50.0	0		4	21.1	1	100.0	1	12.5
Zea mays	cob parts only	13	86.7	8	80.0	12	85.7	0		11	57.9	1	100.0	5	62.5
Number of Additional Food Taxa		18		6		12		0		9		1		5	

Note: N = number of grains identified; % = percentage of the total grains identified within the sample.

Table 8.9. Fuels at Albert Porter Pueblo: Counts of All Charred Non-Reproductive Parts and *Zea mays* Non-Food Parts in Flotation and Macrofossil Samples from All Contexts, by Subperiod.

Wild or Domestic	Taxon	Part	Middle Pueblo II through Late Pueblo III (A.D. 1020–1280)	Late Pueblo II (A.D. 1060–1140)	Late Pueblo II through Early Pueblo III (A.D. 1060–1225)	Terminal Pueblo II through Initial Pueblo III (A.D. 1100–1180)	Early Pueblo III (A.D. 1140–1225)	Late Pueblo III (A.D. 1225–1280)	Unassigned	TOTAL
			N=	N=	N=	N=	N=	N=	N=	N=
domestic	*Zea mays*	cob fragment	21	64	103	129	209	125	3	654
domestic	*Zea mays*	cob segment	6	16	11	38	57	80		208
domestic	*Zea mays*	cob, whole						1	1	2
domestic	*Zea mays*	cupule	72	164	136	60	137	77	18	664
domestic	*Zea mays*	shank segment			3	1	8			12
domestic	*Zea mays*	stalk segment				5				5
wild	*Amelanchier/ Peraphyllum*-type	twig	3							3
wild	*Amelanchier/ Peraphyllum*-type	wood	19	9	2		86	6	13	135
wild	*Artemisia tridentata*-type	wood	7	28	18	4	51	1		109
wild	*Artemisia*-type	flower bud		4	1		28	2		35
wild	*Artemisia*-type	flowering head					2			2
wild	*Artemisia*-type	leaf			2		16			18
wild	*Artemisia*-type	twig		3	1	1	6	4	3	18
wild	*Artemisia*-type	wood	18	30	75		169	65	8	365
wild	*Atriplex*-type	twig	2				2			4
wild	*Atriplex*-type	wood		1		1	18		1	21
wild	Capparaceae-type	stem					3			3
wild	*Cercocarpus montanus*-type	twig					3			3
wild	*Cercocarpus montanus*-type	wood	6	12	2	2	41		9	72
wild	*Chrysothamnus nauseosus*-type	wood	3	2			25	4	1	35
wild	*Dicotyledon*-type	stem					6			6
wild	*Dicotyledon*-type	twig						1		1

Wild or Domestic	Taxon	Part	Middle Pueblo II through Late Pueblo III (A.D. 1020–1280)	Late Pueblo II (A.D. 1060–1140)	Late Pueblo II through Early Pueblo III (A.D. 1060–1225)	Terminal Pueblo II through Initial Pueblo III (A.D. 1100–1180)	Early Pueblo III (A.D. 1140–1225)	Late Pueblo III (A.D. 1225–1280)	Unassigned	TOTAL
			N=	N=	N=	N=	N=	N=	N=	N=
wild	*Dicotyledon*-type	wood					1		1	2
wild	diffuse porous-type	twig						1		1
wild	diffuse porous-type	wood					8	4		12
wild	*Ephedra viridis*-type	twig			2		10			12
wild	*Ephedra viridis*-type	wood	1	1	3		17	2		24
wild	*Fraxinus anomala*-type	wood				3	29			32
wild	Gramineae-type	root		2			2	2	1	7
wild	Gramineae-type	stem (culm)	3	2	4		1			10
wild	*Juniperus osteosperma*-type	cone with pollen balls			1					1
wild	*Juniperus osteosperma*-type	scale leaf	9	27	9		38	3		86
wild	*Juniperus osteosperma*-type	twig	13	44	23	2	61	11	1	155
wild	*Juniperus osteosperma*-type	wood	180	339	247	133	761	292	84	2,036
wild	*Monocotyledon*-type	leaf	1	3			2	1		7
wild	*Monocotyledon*-type	stem	4	2			4			10
wild	*Peraphyllum*-type	wood					2			2
wild	*Pinaceae*-type	bark scale					1			1
wild	*Pinaceae*-type	wood					1			1
wild	*Pinus edulis*-type	bark fragment						1		1
wild	*Pinus edulis*-type	bark scale	41	30	27		563	16	6	683
wild	*Pinus edulis*-type	cone scale	1		1		3			5
wild	*Pinus edulis*-type	needle	4	17	6	11	19	1		58
wild	*Pinus edulis*-type	twig	3	2	5	3	1		2	16
wild	*Pinus edulis*-type	wood	46	159	43	10	153	22	13	446
wild	*Pinus ponderosa*-type	needle		1						1
wild	*Populus/Salix*-type	wood	2	1	2	3	21			29
wild	*Populus*-type	wood			2			1		3
wild	*Prunus/Rosa*-type	wood					1			1

Wild or Domestic	Taxon	Part	Middle Pueblo II through Late Pueblo III (A.D. 1020–1280)	Late Pueblo II (A.D. 1060–1140)	Late Pueblo II through Early Pueblo III (A.D. 1060–1225)	Terminal Pueblo II through Initial Pueblo III (A.D. 1100–1180)	Early Pueblo III (A.D. 1140–1225)	Late Pueblo III (A.D. 1225–1280)	Unassigned	TOTAL
			N=	N=	N=	N=	N=	N=	N=	N=
wild	*Purshia*-type	leaf					12			12
wild	*Purshia*-type	wood	8	4	3		26	2		43
wild	*Quercus gambelii*-type	wood		7	3	1	23	1		35
wild	*Rhus aromatica* var. *trilobata*-type	bark fragment						353		353
wild	*Rhus aromatica* var. *trilobata*-type	stem					1	2		3
wild	*Rhus aromatica* var. *trilobata*-type	twig						339	1	340
wild	*Rhus aromatica* var. *trilobata*-type	wood	1				1	18		20
wild	ring porous-type	wood					1			1
wild	Rosaceae-type	wood	2							2
wild	semi-ring porous-type	wood	1	3						4
wild	*Yucca angustissima*-type	leaf					50	370		420
wild	*Yucca baccata*-type	leaf						3		3
wild	*Yucca*-type	leaf						11		11
unknown	unknown botanical	bark fragment			1		1			2
unknown	unknown botanical	flower bud	3	3	6		16	3		31
unknown	unknown botanical	flowering head					9			9
unknown	unknown botanical	leaf		1			12	4		17
unknown	unknown botanical	stalk segment					2			2
unknown	unknown botanical	twig			2		400			402
unknown	unknown botanical	wood					3			3
		TOTAL	480	981	744	407	3,123	1829	166	7,730

Note: N=Number of individual specimens.

Table 8.10. Fuels at Albert Porter Pueblo: Ubiquity of Charred Non-Reproductive Plant Parts and *Zea Mays* Non-Food Parts in Flotation Samples from Thermal Features, Ashpits, and Middens, by Subperiod.

(a) Table 8.10, Thermal Features and Ashpits

	Middle Pueblo II through Late Pueblo III (A.D. 1020–1280)		Late Pueblo II (A.D. 1060–1140)		Late Pueblo II through Early Pueblo III (A.D. 1060–1225)		Terminal Pueblo II through Initial Pueblo III (A.D. 1100–1180)		Early Pueblo III (A.D. 1140–1225)		Late Pueblo III (A.D. 1225–1280)		Unassigned	
Total number of flotation samples analyzed	0		5		6		1		48		10		0	
Number of flotation samples containing the taxon/part, and %	N=	%	N=	%	N=	%	N=	%	N=	%	N=	%	N=	%
Amelanchier/Peraphyllum-type			1	20.0					9	18.8	4	40.0		
Artemisia tridentata-type			2	40.0					6	12.5				
Artemisia-type			3	60.0	5	83.3			27	56.3	9	90.0		
Atriplex-type							1	100.0	4	8.3				
Cercocarpus montanus-type			1	20.0					11	22.9				
Chrysothamnus nauseosus-type									5	10.4	2	20.0		
Dicotyledon-type									1	2.1				
diffuse porous-type									5	10.4	3	30.0		
Ephedra viridis-type									4	8.3				
Fraxinus anomala-type									3	6.3				
Gramineae-type											1	10.0		
Juniperus osteosperma-type			5	100.0	5	83.3	1	100.0	47	97.9	10	100.0		
Monocotyledon-type			1	20.0					2	4.2	1	10.0		
Peraphyllum-type									1	2.1				
Pinaceae-type									1	2.1				
Pinus edulis-type			5	100.0	3	50.0			38	79.2	10	100.0		
Populus/Salix-type					2	33.3			7	14.6				
Purshia-type			1	20.0	2	33.3			8	16.7	2	20.0		
Quercus gambelii-type			1	20.0					2	4.2	1	10.0		
Rhus aromatica var. *trilobata*-type									1	2.1	1	10.0		
ring porous-type									1	2.1				
unknown botanical			2	40.0					6	12.5	4	40.0		
Zea mays (all parts)			2	40.0	3	50.0	1	100.0	23	47.9	3	30.0		

(b) Table 8.10, Midden Deposits

	Middle Pueblo II through Late Pueblo III (A.D. 1020–1280)		Late Pueblo II (A.D. 1060–1140)		Late Pueblo II through Early Pueblo III (A.D. 1060–1225)		Terminal Pueblo II through Initial Pueblo III (A.D. 1100–1180)		Early Pueblo III (A.D. 1140–1225)		Late Pueblo III (A.D. 1225–1280)		Unassigned	
Total number of flotation samples analyzed	15		10		14		0		19		1		8	
Number of flotation samples containing the taxon/part, and %	N =	%	N =	%	N =	%	N =	%	N =	%	N =	%	N =	%
Amelanchier/Peraphyllum-type	7	46.7	1	10.0					3	15.8	1	100.0		
Artemisia tridentata-type	1	6.7			5	35.7			5	26.3				
Artemisia-type	7	46.7	7	70.0	7	50.0			9	47.4	1	100.0	5	62.5
Atriplex-type	2	13.3	1	10.0									1	12.5
Capparaceae-type									1	5.3				
Cercocarpus montanus-type	3	20.0	1	10.0	1	7.1			5	26.3			3	37.5
Chrysothamnus nauseosus-type	1	6.7	1	10.0					3	15.8			1	12.5
diffuse porous-type									1	5.3				
Ephedra viridis-type	1	6.7	1	10.0	3	21.4					1	100.0		
Fraxinus anomala-type									1	5.3				
Gramineae-type			2	20.0	2	14.3			1	5.3			1	12.5
Juniperus osteosperma-type	15	100.0	10	100.0	14	100.0			19	100.0	1		8	100.0
Monocotyledon-type	4	26.7							1	5.3				
Pinus edulis-type	10	66.7	8	80.0	11	78.6			17	89.5	1	100.0	6	75.0
Populus/Salix-type	1	6.7							4	21.1				
Populus-type					1	7.1					1	100.0		
Prunus/Rosa-type									1	5.3				
Purshia-type	1	6.7	1	10.0					3	15.8				
Quercus gambelii-type			1	10.0	2	14.3			3	15.8				
Rhus aromatica var. *trilobata*-type	1	6.7											1	12.5
Rosaceae-type	1	6.7												
semi-ring porous-type	1	6.7												
unknown botanical	1	6.7	1	10.0	3	21.4			4	21.1				
Zea mays (all parts)	13	86.7	8	80.0	12	85.7			11	57.9	1	100.0	5	62.5

Note: N=Number of individual specimens.

Table 8.11. Counts and Percents of All Albert Porter Pueblo Tree-Ring Specimens.

Tree Species	Number Identified	Percent
Juniper	347	92.0
Pinyon	24	6.4
Nonconiferous	3	0.8
Ponderosa pine	1	0.3
Sagebrush	1	0.3
Spruce/fir	1	0.3
TOTAL	377	100

Note: Identifications made by the Laboratory of Tree-Ring Research.

Table 8.12. Counts of All Identified Tree-Ring Specimens from Roof-Fall Contexts, by Subperiod, Albert Porter Pueblo.

	Late Pueblo II (A.D. 1060–1140)	Late Pueblo II through Early Pueblo III (A.D. 1060–1225)	Terminal Pueblo II through Initial Pueblo III (A.D. 1100–1180)	Early Pueblo III (A.D. 1140–1225)	Late Pueblo III (A.D. 1225–1280)	Unassigned
Tree Species	N=	N=	N=	N=	N=	N=
Juniper	21	1	64	101	98	7
Pinyon	3	1	5	3	2	
Nonconiferous				3		
Ponderosa pine	1					
Sagebrush				1		
Spruce/fir				1		
TOTAL	25	2	69	109	100	7

Note: N = Number of individual specimens. Counts include specimens with cutting dates, non-cutting dates, and no dates.

Table 8.13. Construction Materials and Plants Associated with Roofs at Albert Porter Pueblo: Counts of All Charred Parts in Flotation and Macrofossil Samples from Roofs, by Subperiod.

Wild or Domestic	Taxon	Part(s)	Late Pueblo II (A.D. 1060–1140)	Late Pueblo II through Early Pueblo III (A.D. 1060–1225)	Terminal Pueblo II through Initial Pueblo III (A.D. 1100–1180)	Early Pueblo III (A.D. 1140–1225)	Late Pueblo III (A.D. 1225–1280)	Unassigned	TOTAL
			N=	N=	N=	N=	N=	N=	N=
domestic	Cucurbitaceae-type	rind				5	1		6
domestic	*Phaseolus vulgaris*-type	bean (seed)			4				4
domestic	*Phaseolus vulgaris*-type	cotyledon	1		4				5
domestic	*Zea mays*	cob fragment	3	5	21	27			56
domestic	*Zea mays*	cob segment	1	1	15	8	2		27
domestic	*Zea mays*	cob, whole					1		1
domestic	*Zea mays*	cupule	1	2	28	21			52
domestic	*Zea mays*	embryo				1			1
domestic	*Zea mays*	fused mass				1	41		42
domestic	*Zea mays*	glume			5				5
domestic	*Zea mays*	kernel	6	2	151	21	100	2	282
domestic	*Zea mays*	shank segment			1	1			2
wild	*Amaranthus*-type	fused mass			5				5
wild	*Amaranthus*-type	seed			1,119	3	5		1,127
wild	*Amelanchier/Peraphyllum*-type	wood				7		10	17
wild	*Artemisia tridentata*-type	wood	1			9			10
wild	*Artemisia*-type	achene				2			2
wild	*Artemisia*-type	flower bud				8			8
wild	*Artemisia*-type	flowering head				2			2
wild	*Artemisia*-type	leaf				15			15
wild	*Artemisia*-type	seed				1			1
wild	*Artemisia*-type	twig			1	6	4		11
wild	*Artemisia*-type	wood	1	13		54	13		81
wild	*Astragalus*-type	seed				1			1
wild	*Atriplex canescens*-type	fruit core				6			6
wild	*Atriplex*-type	twig				2			2
wild	*Atriplex*-type	wood				6			6
wild	*Cercocarpus montanus*-type	wood	2	1				5	8

Wild or Domestic	Taxon	Part(s)	Late Pueblo II (A.D. 1060–1140)	Late Pueblo II through Early Pueblo III (A.D. 1060–1225)	Terminal Pueblo II through Initial Pueblo III (A.D. 1100–1180)	Early Pueblo III (A.D. 1140–1225)	Late Pueblo III (A.D. 1225–1280)	Unassigned	TOTAL
			N=	N=	N=	N=	N=	N=	N=
wild	Cheno-am	embryo				1			1
wild	Cheno-am	seed	8	7	120	72	12	1	220
wild	*Cleome*-type	seed				2			2
wild	*Cleome*-type	seed coat				1			1
wild	Compositae-type	achene				1			1
wild	*Corispermum*-type	seed				7			7
wild	*Descurainia*-type	seed	1			2			3
wild	*Dicotyledon*-type	stem				6			6
wild	*Dicotyledon*-type	twig					1		1
wild	*Dicotyledon*-type	wood						1	1
wild	diffuse porous-type	twig					1		1
wild	diffuse porous-type	wood				2			2
wild	*Ephedra viridis*-type	twig				10			10
wild	*Ephedra viridis*-type	wood				9			9
wild	Gramineae-type	caryopsis				3			3
wild	Gramineae-type	floret				1			1
wild	Gramineae-type	root				2			2
wild	Gramineae-type	stem (culm)	2						2
wild	*Juniperus osteosperma*-type	bud		1				1	2
wild	*Juniperus osteosperma*-type	fiber					16		16
wild	*Juniperus osteosperma*-type	scale leaf	2			32	1		35
wild	*Juniperus osteosperma*-type	twig	2	2		25	1		30
wild	*Juniperus osteosperma*-type	wood	51	20	81	134	94	27	407
wild	Malvaceae-type	seed					1		1
wild	*Monocotyledon*-type	stem				1			1
wild	*Physalis longifolia*-type	seed				1	1		2
wild	Pinaceae-type	wood				1			1
wild	*Pinus edulis*-type	bark scale		2		13	1		16
wild	*Pinus edulis*-type	needle			10	7			17
wild	*Pinus edulis*-type	twig			3				3
wild	*Pinus edulis*-type	wood	10	3	5	16			34
wild	*Polanisia*-type	seed			2				2

Wild or Domestic	Taxon	Part(s)	Late Pueblo II (A.D. 1060–1140)	Late Pueblo II through Early Pueblo III (A.D. 1060–1225)	Terminal Pueblo II through Initial Pueblo III (A.D. 1100–1180)	Early Pueblo III (A.D. 1140–1225)	Late Pueblo III (A.D. 1225–1280)	Unassigned	TOTAL
			N=	N=	N=	N=	N=	N=	N=
wild	*Polygonum / Scirpus*-type	achene				1			1
wild	*Populus/Salix*-type	wood	1						1
wild	*Portulaca*-type	seed		1	3	1	1		6
wild	*Quercus gambelii*-type	wood			1	6			7
wild	*Rhus aromatica* var. *trilobata*-type	stem				1			1
wild	*Scirpus*-type	achene					1		1
wild	semi-ring porous-type	wood	1						1
wild	Solanaceae-type	seed				1			1
wild	*Stipa hymenoides*-type	caryopsis				2			2
wild	*Stipa hymenoides*-type	floret	1			2			3
wild	*Stipa hymenoides*-type	palea				1			1
wild	*Yucca angustissima*-type	leaf				50	20		70
unknown	unknown botanical	bark fragment				1			1
unknown	unknown botanical	black spherical bodies				5			5
unknown	unknown botanical	bud					1		1
unknown	unknown botanical	disseminule				7			7
unknown	unknown botanical	epidermis fragment				1			1
unknown	unknown botanical	flower bud				16	1		17
unknown	unknown botanical	flowering head				9			9
unknown	unknown botanical	fruit coat					1		1
unknown	unknown botanical	fused mass				11	5		16
unknown	unknown botanical	leaf				1	1		2
unknown	unknown botanical	seed				5			5
unknown	unknown botanical	seed coat				1			1
unknown	unknown botanical	spiral embryo				1			1
unknown	unknown botanical	twig				400			400
unknown	unknown botanical	unknown	4			28	2		34
unknown	unknown botanical	wood				1			1
		TOTAL	99	60	1,579	1,108	329	47	3,222

Note: N=Number of individual specimens.

Table 8.14. Construction Materials and Plants Associated with Roofs at Albert Porter Pueblo: Ubiquity of All Charred Parts in Flotation and Macrofossil Samples from Roofs by Subperiod.

Wild or Domestic	Taxon	Part(s)	Late Pueblo II (A.D. 1060–1140)		Late Pueblo II through Early Pueblo III (A.D. 1060–1225)		Terminal Pueblo II through Initial Pueblo III (A.D. 1100–1180)		Early Pueblo III (A.D. 1140–1225)		Late Pueblo III (A.D. 1225–1280)		Unassigned	
	Total number of flotation and macrofossil samples analyzed		11		7		20		36		12		3	
	Number of flotation and macrofossil samples containing the taxon/part(s), and %		N=	%	N=	%	N=	%	N=	%	N=	%	N=	%
domestic	Cucurbitaceae-type	rind							1	2.8	1	8.3		
domestic	*Phaseolus vulgaris*-type	bean (seed), cotyledon	1	9.1			1	5.0						
domestic	*Zea mays*	cob fragment, cob segment, cob (whole), cupule, embryo, fused mass, glume, kernel, shank segment	6	54.5	5	71.4	13	65.0	26	72.2	9	75.0	1	33.3
wild	*Amaranthus*-type	fused mass, seed					3	15.0	2	5.6	2	16.7		
wild	*Amelanchier/Peraphyllum*-type	wood							3	8.3			1	33.3
wild	*Artemisia tridentata*-type	wood	1	9.1					3	8.3				
wild	*Artemisia*-type	achene	1	9.1	2	28.6	1	5.0	10	27.8	3	25.0		
wild	*Astragalus*-type	seed							1	2.8				
wild	*Atriplex canescens*-type	fruit core							1	2.8				
wild	*Atriplex*-type	twig							2	5.6				
wild	*Cercocarpus montanus*-type	wood	1	9.1	1	14.3							2	66.7
wild	Cheno-am	embryo seed	3	27.3	2	28.6	1	5.0	11	30.6	2	16.7	1	33.3
wild	*Cleome*-type	seed, seed coat							1	2.8				
wild	*Compositae*-type	achene							1	2.8				
wild	*Corispermum*-type	seed							2	5.6				
wild	*Descurainia*-type	seed	1	9.1					2	5.6				
wild	*Dicotyledon*-type	stem, twig, wood							1	2.8	1	8.3	1	33.3
wild	diffuse porous-type	twig, wood							1	2.8	1	8.3		
wild	*Ephedra viridis*-type	twig, wood							2	5.6				
wild	Gramineae-type	root, stem (culm)	1	9.1					4	11.1				

Wild or Domestic	Taxon	Part(s)	Late Pueblo II (A.D. 1060–1140)		Late Pueblo II through Early Pueblo III (A.D. 1060–1225)		Terminal Pueblo II through Initial Pueblo III (A.D. 1100–1180)		Early Pueblo III (A.D. 1140–1225)		Late Pueblo III (A.D. 1225–1280)		Unassigned	
	Total number of flotation and macrofossil samples analyzed		11		7		20		36		12		3	
	Number of flotation and macrofossil samples containing the taxon/part(s), and %		N=	%	N=	%	N=	%	N=	%	N=	%	N=	%
wild	*Juniperus osteosperma*-type	bud, fiber, scale leaf, twig, wood	5	45.5	3	42.9	5	25.0	17	47.2	3	25.0	2	66.7
wild	Malvaceae-type	seed									1	8.3		
wild	Monocotyledon-type	stem							1	2.8				
wild	*Physalis longifolia*-type	seed							1	2.8	1	8.3		
wild	Pinaceae-type	wood							1	2.8				
wild	*Pinus edulis*-type	bark scale, needle, twig, wood	3	27.3	2	28.6	4	20.0	7	19.4	1	8.3		
wild	*Polanisia*-type	seed					1	5.0						
wild	*Polygonum / Scirpus*-type	achene							1	2.8				
wild	*Populus/Salix*-type	wood	1	9.1										
wild	*Portulaca*-type	seed			1	14.3	1	5.0	1	2.8	1	8.3		
wild	*Quercus gambelii*-type	wood					1	5.0	2	5.6				
wild	*Rhus aromatica var. trilobata*-type	stem							1	2.8				
wild	*Scirpus*-type	achene									1	8.3		
wild	semi-ring porous-type	wood	1	9.1										
wild	Solanaceae-type	seed							1	2.8				
wild	*Stipa hymenoides*-type	caryopsis	1	9.1					2	5.6				
wild	*Yucca angustissima*-type	leaf							1	2.8	2	16.7		

Note: N=Number of individual specimens.

Table 8.15. Intentionally Modified Artifacts Made of Charred Wild Plant Materials Recovered from All Sample Types, Albert Porter Pueblo.

PD No.	FS No.	Artifact Category	Study Unit	Study Unit Description	Fill/ Assemblage Position	Fill/ Assemblage Type	Subperiod	Scientific Name	Common Name	Item Description
1281	61	textile	Structure 110	subterranean kiva	fill: roof fall	collapsed structure: with mixed refuse	Early Pueblo III (A.D. 1140–1225)	*Yucca angustissima*-type	narrow-leaved yucca	Possible charred sandal or plaited basket fragment.
1334	7	vegetal	Structure 110	subterranean kiva	fill: roof fall	collapsed structure: with mixed refuse	Early Pueblo III (A.D. 1140–1225)	*Rhus aromatica* var. *trilobata*-type	lemonade berry	Possibly part of a basket.
1376	20	flotation sample	Structure 136	subterranean kiva	fill: roof fall	collapsed structure: with mixed refuse	Late Pueblo III (A.D. 1225–1280)	*Juniperus osteosperma*-type	Utah juniper	Wood fragments; some split and having right angles.
1377	14, 15, 16, 17, 18, 20, 21, 22, 26, 28, 29, 30, 33	vegetal, basketry, flotation sample	Structure 136	subterranean kiva	surface contact: prepared floor surface	cultural deposit: primary refuse	Late Pueblo III (A.D. 1225–1280)	*Rhus aromatica* var. *trilobata*-type	lemonade berry	Complete and split stem fragments from a coiled basket that contained maize fragments.
1377	15, 16, 17, 18, 21, 26, 28, 32	basketry	Structure 136	subterranean kiva	surface contact: prepared floor surface	cultural deposit: primary refuse	Late Pueblo III (A.D. 1225–1280)	*Zea mays*	maize/corn	Kernel fragments from within a coiled basket.

PD No.	FS No.	Artifact Category	Study Unit	Study Unit Description	Fill/ Assemblage Position	Fill/ Assemblage Type	Subperiod	Scientific Name	Common Name	Item Description
1377	20, 21, 22, 32	flotation sample, basketry	Structure 136	subterranean kiva	surface contact: prepared floor surface	cultural deposit: primary refuse	Late Pueblo III (A.D. 1225–1280)	*Yucca*-type	yucca	Leaves fashioned into a plaited basket. This basket contained maize kernel fragments.
1813	4	vegetal	Structure 143	masonry surface structure	fill: wall and roof fall	collapsed structure: with mixed refuse	Unassigned	*Juniperus osteosperma*-type	Utah juniper	Possibly modified wood fragments.
1753	23	vegetal	Structure 150	subterranean kiva	fill: not further specified	mixed deposit: post-abandonment and cultural refuse	Terminal Pueblo II through Initial Pueblo III (A.D. 1100–1180)	*Juniperus osteosperma*-type	Utah juniper	Modified wood fragments, cut into squares and slightly rectangular blocks, ranging from 5 to 35 cm long and 3 to 8 cm wide.
1848	30, 33	vegetal	Structure 150	subterranean kiva	fill: roof fall	collapsed structure: with mixed refuse	Terminal Pueblo II through Initial Pueblo III (A.D. 1100–1180)	*Juniperus osteosperma*-type	Utah juniper	Modified wood, cut into squares to slightly rectangular blocks, some almost quadrangular in shape, 1–12 cm wide, 2–10 cm long.

PD No.	FS No.	Artifact Category	Study Unit	Study Unit Description	Fill/ Assemblage Position	Fill/ Assemblage Type	Subperiod	Scientific Name	Common Name	Item Description
1850	33	other modified vegetal	Structure 150	subterranean kiva	surface contact: prepared floor surface	cultural deposit: primary refuse	Terminal Pueblo II through Initial Pueblo III (A.D. 1100–1180)	*Juniperus osteosperma*-type	Utah juniper	Modified wooden artifact, broken into two pieces. Formally a large item, flattened on two sides, rounded on one end. At least 7.5 cm long, 5.5 cm wide, and 1.6 cm thick.

Table 8.16. Charred Plant Parts within Flotation Samples from Thermal Features and Ashpits of Kivas at Albert Porter Pueblo.

		Late Pueblo II (A.D. 1060–1140)		Early Pueblo III (A.D. 1140–1225)		Late Pueblo III (A.D. 1225–1280)	
	Total number of kivas	3		14		3	
	Total number of flotation samples analyzed	9		47		10	
	Number of flotation samples containing the taxon/part, and %	N=	%	N=	%	N=	%
Taxon	Part						
Amelanchier/Peraphyllum-type	wood	1	11.1	7	14.9	4	40.0
Artemisia tridentata-type	wood			3	6.4		
Artemisia-type	achene	5	55.6	5	10.6	1	10.0
Artemisia-type	flower bud	2	22.2	4	8.5	1	10.0
Artemisia-type	leaf	2	22.2	1	2.1		
Artemisia-type	twig	1	11.1				
Artemisia-type	wood	8	88.9	26	55.3	9	90.0
Atriplex-type	seed			1	2.1		
Atriplex-type	wood			4	8.5		
Cercocarpus montanus-type	twig			1	2.1		
Cercocarpus montanus-type	wood	1	11.1	8	17.0		
Cercocarpus/Artemisia-type	axillary bud	1	11.1			1	10.0
Cheno-am	embryo			2	4.3		
Cheno-am	seed	8	88.9	3	6.4	8	80.0
Cheno-am	seed coat			1	2.1		
Chrysothamnus nauseosus-type	wood			5	10.6	2	20.0
Cleome-type	seed			1	2.1		
Corispermum-type	seed			2	4.3		
Cycloloma atriplicifolium-type	seed			4	8.5		
Descurainia-type	seed			1	2.1		
Dicotyledon-type	wood			1	2.1		
diffuse porous-type	wood			5	10.6	3	30.0
Ephedra viridis-type	wood			4	8.5		
Euphorbia-type	seed			1	2.1		
Fraxinus anomala-type	wood			3	6.4		
Gramineae-type	caryopsis	1	11.1	6	12.8		
Gramineae-type	embryo			1	2.1		
Gramineae-type	floret			1	2.1		
Gramineae-type	root					1	10.0

		Late Pueblo II (A.D. 1060–1140)		Early Pueblo III (A.D. 1140–1225)		Late Pueblo III (A.D. 1225–1280)	
Total number of kivas		3		14		3	
Total number of flotation samples analyzed		9		47		10	
Number of flotation samples containing the taxon/part, and %		N=	%	N=	%	N=	%
Taxon	Part						
Gramineae-type 3	caryopsis	1	11.1			1	10.0
Gymnospermae	wood			1	2.1		
Helianthus annuus-type	achene	1	11.1	1	2.1		
Juniperus osteosperma-type	scale leaf	2	22.2	3	6.4	1	10.0
Juniperus osteosperma-type	twig	5	55.6	7	14.9	3	30.0
Juniperus osteosperma-type	wood	7	77.8	44	93.6	1	10.0
Leguminosae-type	cotyledon			1	2.1		
Lithospermum-type	seed			1	2.1		
Malvaceae-type	seed			1	2.1		
Mentzelia albicaulis-type	seed			2	4.3		
Monocotyledon-type	fiber			1	2.1		
Monocotyledon-type	fibrovascular bundles			2	4.3	1	10.0
Monocotyledon-type	leaf	1	11.1	1	2.1	1	10.0
Monocotyledon-type	spine			1	2.1		
Monocotyledon-type	stem			1	2.1		
Nicotiana attenuata-type	seed			2	4.3		
Phaseolus vulgaris-type	cotyledon			1	2.1		
Physalis longifolia-type	seed	3	33.3	9	19.1	1	10.0
Physalis longifolia-type	seed coat					1	10.0
Pinaceae-type	bark scale			1	2.1		
Pinus edulis-type	bark fragment					1	10.0
Pinus edulis-type	bark scale	6	66.7	28	59.6	7	70.0
Pinus edulis-type	needle					1	10.0
Pinus edulis-type	twig	1	11.1				
Pinus edulis-type	wood	3	33.3	25	53.2	6	60.0
Polygonum/Scirpus-type	achene			3	6.4	2	20.0
Populus/Salix-type	wood	2	22.2	6	12.8		
Portulaca-type	seed	4	44.4	22	46.8	6	60.0
Purshia-type	seed					1	10.0
Purshia-type	wood	3	33.3	7	14.9	2	20.0
Quercus gambelii-type	wood	1	11.1	2	4.3	1	10.0

		Late Pueblo II (A.D. 1060–1140)		Early Pueblo III (A.D. 1140–1225)		Late Pueblo III (A.D. 1225–1280)	
Total number of kivas		3		14		3	
Total number of flotation samples analyzed		9		47		10	
Number of flotation samples containing the taxon/part, and %		N=	%	N=	%	N=	%
Taxon	Part						
Rhus aromatica var. *trilobata*-type	twig					1	10.0
Rhus aromatica var. *trilobata*-type	wood			1	2.1		
ring porous-type	wood			1	2.1		
Rosaceae-type	axillary bud			1	2.1		
Scirpus-type	achene	1	11.1	5	10.6	2	20.0
Sphaeralcea-type	seed	1	11.1	2	4.3		
Sporobolus-type	caryopsis	1	11.1	1	2.1		
Stipa hymenoides-type	floret			2	4.3		
Yucca baccata-type	seed			1	2.1		
Zea mays	cob fragment	1	11.1	3	6.4	2	20.0
Zea mays	cob segment			1	2.1		
Zea mays	cupule	3	33.3	21	44.7	3	30.0
Zea mays	embryo			2	4.3		
Zea mays	glume			1	2.1		
Zea mays	kernel	5	55.6	9	19.1	1	10.0
Zea mays	kernel embryo	1	11.1	2	4.3		

Note: Late Pueblo II kivas include: Structures 118, 903, and 904. Early Pueblo III kivas include: Structures 107, 108, 109, 110, 111, 112, 113, 116, 117, 119, 302, 502, 602, and 803. Late Pueblo III kivas include: Structures 114, 402, and 403. A single thermal feature sample is from terminal Pueblo II through initial Pueblo III (A.D. 1100–1180). Structure 150 has not been included here.

Table 8.17. Charred Plant Parts within Flotation Samples from Thermal Features and Ashpits of Kivas within the Great House (Structures 107, 108, 109, 110, 111, 112, 113, and 119) or on the Periphery of the Great House (Structures 116 and 117) or Outside of the Great House (Structures 302, 502, 602, and 803), Albert Porter Pueblo.

		Inside Great House		Periphery of or Outside Great House	
	Total number of kivas	8		6	
	Total number of flotation samples analyzed	27		20	
	Number of flotation samples containing the taxon/part, and %	N=	%	N=	%
Taxon	Part				
Amelanchier/Peraphyllum-type	wood	4	14.8	3	15
Artemisia tridentata-type	wood			3	15
Artemisia-type	achene	2	7.4	3	15
Artemisia-type	flower bud	2	7.4	2	10
Artemisia-type	leaf	1	3.7		
Artemisia-type	wood	13	48.1	13	65
Atriplex-type	seed	1	3.7		
Atriplex-type	wood	1	3.7	3	15
Cercocarpus montanus-type	twig	1	3.7		
Cercocarpus montanus-type	wood	3	11.1	5	25
Cheno-am	embryo			2	10
Cheno-am	seed	17	63.0	13	65
Cheno-am	seed coat			1	5
Chrysothamnus nauseosus-type	wood	2	7.4	3	15
Cleome-type	seed	1	3.7		
Corispermum-type	seed	2	7.4		
Cycloloma atriplicifolium-type	seed			4	20
Descurainia-type	seed			1	5
Dicotyledon-type	wood	1	3.7		
diffuse porous-type	wood	3	11.1	2	10
Ephedra viridis-type	wood	1	3.7	3	15
Euphorbia-type	seed			1	5
Fraxinus anomala-type	wood	3	11.1		
Gramineae-type	caryopsis	1	3.7	5	25
Gramineae-type	embryo	1	3.7		
Gramineae-type	floret			1	5
Gymnospermae	wood	1	3.7		
Helianthus annuus-type	achene	1	3.7		
Juniperus osteosperma-type	scale leaf	2	7.4	1	5
Juniperus osteosperma-type	twig	5	18.5	2	10

		Inside Great House		Periphery of or Outside Great House	
Total number of kivas		8		6	
Total number of flotation samples analyzed		27		20	
Number of flotation samples containing the taxon/part, and %		N=	%	N=	%
Taxon	Part				
Juniperus osteosperma-type	wood	26	96.3	18	90
Leguminosae-type	cotyledon			1	5
Lithospermum-type	seed	1	3.7		
Malvaceae-type	seed	1	3.7		
Mentzelia albicaulis-type	seed	2	7.4		
Monocotyledon-type	fiber	1	3.7		
Monocotyledon-type	fibrovascular bundles			2	10
Monocotyledon-type	leaf			1	5
Monocotyledon-type	spine	1	3.7		
Monocotyledon-type	stem	1	3.7		
Nicotiana attenuata-type	seed	2	7.4		
Phaseolus vulgaris-type	cotyledon			1	5
Physalis longifolia-type	seed	5	18.5	4	20
Pinaceae-type	bark scale	1	3.7		
Pinus edulis-type	bark scale	18	66.7	10	50
Pinus edulis-type	wood	14	51.9	11	55
Polygonum/Scirpus-type	achene	3	11.1		
Populus/Salix-type	wood	4	14.8	2	10
Portulaca-type	seed	15	55.6	7	35
Purshia-type	wood	5	18.5	2	10
Quercus gambelii-type	wood	2	7.4		
Rhus aromatica var. *trilobata*-type	wood	1	3.7		
ring porous-type	wood	1	3.7		
Rosaceae-type	axillary bud			1	5
Scirpus-type	achene	5	18.5		
Sphaeralcea-type	seed	2	7.4		
Sporobolus-type	caryopsis			1	5
Stipa hymenoides-type	floret			2	10
Yucca baccata-type	seed			1	5
Zea mays	cob fragment	1	3.7	2	10
Zea mays	cob segment			1	5
Zea mays	cupule	9	33.3	12	60
Zea mays	embryo			2	10

		Inside Great House		Periphery of or Outside Great House	
	Total number of kivas	8		6	
	Total number of flotation samples analyzed	27		20	
	Number of flotation samples containing the taxon/part, and %	N=	%	N=	%
Taxon	Part				
Zea mays	glume	1	3.7		
Zea mays	kernel	3	11.1	6	30
Zea mays	kernel embryo			2	10

Note: All kivas date to the Early Pueblo III subperiod (A.D. 1140–1225).

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Chapter 9

Human Skeletal Remains

by Kathy Mowrer

Introduction

In this chapter, I describe the human skeletal remains and mortuary practices for Albert Porter Pueblo. Analytic data on human remains and mortuary practices provide important information about the lives, health, social dynamics, and deaths of ancestral Pueblo people who occupied Albert Porter Pueblo. This chapter provides an overview of the analytical methods and an inventory of the human remains as well as information about bone preservation, age and sex, pathologies, metric measurements, nonmetric traits, and mortuary practices. This information is followed by a summary of the analysis. In the final section, I discuss the similarities and differences between the human remains found at Albert Porter Pueblo and those discovered at selected other sites in the Mesa Verde region.

Adhering to the policy of the Crow Canyon Archaeological Center concerning the treatment of human remains and associated funerary objects, archaeologists did not intentionally seek out human remains. However, during the four years of excavation, 12 human remains occurrences (HROs) and 11 isolated human bones (IHBs) were found. Crow Canyon defines a "human remains occurrence" as either a 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 bone or tooth. Crow Canyon has compiled a Human Remains Occurrence database that includes maps, photographs, and other information that is not available to the general public because of the sensitivity of the material.

In most cases, fewer than 25 percent of the human skeletal remains of a particular individual were exposed; remains ranged from portions of complete burials with associated funerary objects to isolated remains consisting of a single tooth or bone. All HROs were analyzed in situ with minimal disturbance to the bones and were reburied immediately after the recording process was complete.

During the four-year research project at Albert Porter Pueblo, three analysts were contracted to examine the skeletal remains. HROs 1–7 and IHBs 1–10 were analyzed by Cynthia Bradley, HRO 8 was analyzed by Elizabeth Perry and Kathy Mowrer, and HROs 9–12 and IHB 11 were analyzed by Kathy Mowrer. *Standards for Data Collection for Human Skeletal Remains*, or SOD (Buikstra and Ubelaker 1994), provided the primary method of analysis for all analysts, thereby minimizing analytic discrepancies. In a few cases, the criteria used to determine sex or age was not specified by Bradley; this information was extrapolated from the data and photographs.

Methods

Osteological analysis drew from several sources (Buikstra and Ubelaker 1994; Ortner 2003; Scheuer and Black 2000). The following data were recorded where possible: (1) adult age and sex, (2) immature bone epiphyseal closure (infant, child, and subadult age), (3) dental development and wear, (4) primary nonmetric traits, (5) immature cranial and postcranial measurements, (6) adult cranial and postcranial measurements; (7) dental and skeletal pathologies and trauma, (8) age-related degenerative changes, (9) congenital anomalies, and (10) cultural modification.

Demographics

Data on age and sex provided the foundation for all subsequent analysis. Studies that examine diet, pathologies, activity patterns, behavior, social dynamics, and death all involve the separation of individuals by sex and age. Wherever possible, multiple lines of evidence were used to increase the accuracy of age and sex determinations.

Sex Determination

The primary methods used to determine sex for adult skeletal remains consisted of analyzing attributes found on the pelvis and skull. Pelvic traits carried more weight, because there is a tendency for the female skull to exhibit an increasingly masculine appearance with increasing age. Also, a male skull can retain a gracile, female appearance into adolescence (Buikstra and Ubelaker 1994). Pelvic and cranial attributes were scored with the five-point scale outlined in Buikstra and Ubelaker (1994) in which the gracile, female characteristics are at the lower end of the range, and the robust, male characteristics are at the higher end of the range.

For the pelvis, three criteria for the subpubic area and two for the ilium were used to determine sex. The subpubic characteristics include the shape of the subpubic concavity, the width of the medial surface of the ischiopubic ramus ridge, and the shape of the ventral arc. The characteristics of the ilium consist of the absence or presence and size of the preauricular sulcus and the form of the greater sciatic notch (Buikstra and Ubelaker 1994). The criteria for the skull include robusticity of the nuchal crest, the size of the mastoid process as compared with surrounding structures, the prominence of the supraorbital margin, the prominence of glabella, and the prominence of the mental eminence (Buikstra and Ubelaker 1994).

Primary sex characteristics have not fully developed in infants (0–2 years of age), children (3–12 years of age), and some subadults, (13–18 years of age), which precludes specific sex determination. As a result, these individuals were classed as “immature” to differentiate between the remains of younger individuals and those of adults for which sex could not be determined. The categories for recording sex consist of the following: (1) female, (2) probable female, (3) ambiguous (displays characteristics of male and female), (4) probable male, (5) male, (6) indeterminate, and (7) immature.

Age Determination

Criteria adapted from SOD (Buikstra and Ubelaker 1994) were used to determine age. Similar to the pelvic attributes for determining sex, the pelvis provides the most reliable criteria for assessing the age at death in adult human remains. Techniques for scoring the pubic symphysis included the10-phase scoring system of Todd (1921a, 1921b) and Brooks and Suchey (1990) as well as the five-phase system of Suchey et al. (1984). Morphological changes to the auricular surface were scored with an eight-phase scoring system adapted from Lovejoy et al. (1985) and Meindl and Lovejoy (1989).

To supplement the pelvic age assessment, or if the pelvis was not observable, Meindl and Lovejoy's (1985) cranial composite scoring system described in SOD for determining age on the basis of suture closure was used. If cranial composite scores could not be calculated from the exposed portions of the crania, age was assessed from the observable sutures and thickness of the cranium. Corroborating lines of evidence, including dental development (Buikstra and Ubelaker 1994; Hillson 2002; Ubelaker 1989), epiphyseal union (Buikstra and Ubelaker 1994; Scheuer and Black 2000), and long-bone length (Scheuer and Black 2000) were used to strengthen age assessment wherever possible.

For subadults and children, age determination relied largely on dental development, epiphyseal union, and long-bone length. Long-bone length was given less weight in determining age, because health conditions and some genetic and congenital conditions can influence long-bone length. The age categories used are listed here: (1) fetus = < birth; (2) infant=0 months–2 years of age; (3) child=3–12 years of age; (4) subadult=13–18 years of age; (5) young adult=19–35 years of age; (6) middle adult=36–49 years of age; (7) old adult=50+ years of age.

Pathologies and Trauma

All observable signs of disease were recorded, with emphasis on skeletal markers that have demonstrated favorable results when assessing health in prehistoric populations of the U.S. Southwest. These included, but were not limited to, cribra orbitalia and porotic hyperostosis, localized and systemic infections, periosteal lesions, osteoarthritis, spinal osteophytosis, dental caries, enamel hypoplasia, and periodontal disease.

Periostitis and Infectious Disease

Periostitis is defined as an inflammatory condition of the osteogenic tissue (periosteum) that surrounds the bone. Infectious diseases, traumatic injury, nutritional deficiency, and other conditions (Cook 1984; Lambert 1999; Ortner and Putschar 1985) can cause periosteal reactions. Periosteal reactions that involve multiple long bones, often bilaterally, are likely to have been the result of systemic infectious diseases, whereas many isolated reactions are the result of localized trauma (Martin et al. 1991).

Porotic Hyperostosis

Porotic hyperostosis and cribra orbitalia are caused by an expansion of the diploë, an increase in the thickness of the cranial vault, and a reduction or destruction of the outer table of the cranium. Researchers have sought the causes of porotic hyperostosis in Western populations and generally agree that this condition is the result of a complex set of variables involving diet and infectious disease (Mensforth et al. 1978).

Enamel Hypoplasia

Enamel hypoplasia is a pathological condition of tooth enamel that is considered by many researchers to be a reliable indicator of health stress. Hypoplastic lesions form when childhood growth is disturbed by systemic metabolic disturbances, usually from nutritional stress or disease, although some are hereditary or traumatic in origin. Hypoplasia is especially useful to analysts because the 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).

Dental Caries

Dental caries is a chronic disease in which acids produced by bacteria demineralize or destroy tooth enamel. This demineralization creates an environment favorable for the growth of bacteria, which can lead to accelerated tooth decay and tooth loss. The impact of caries on the health of the individual is usually not significant unless the disease progresses, spreads to other parts of the body, and becomes a serious health risk. Dental caries can develop in deciduous and permanent dentition but is most common in the latter. Dental caries is usually considered a progressive age-related disease (Larsen 1983, 1995). The frequency of caries in pre-Contact agricultural communities varies widely.

Degenerative Joint Disease

Osteoarthritis, or degenerative joint disease (DJD), is a progressive disease of the synovial and intervertebral joints (Ortner 2003). The three major stages include Stage 1 DJD, which is the development of bony outgrowths, lipping on the vertebral articular surfaces and joints (especially the elbow and knee), and bony outgrowths, or osteophytes, on the vertebral centra. Stage 2 DJD is the development of small deposits of bone or pitting on the vertebral articular surfaces and joints. In Stage 3 DJD, the bony deposits may grow large enough to destroy cartilage. When this occurs, bone rubs on bone, producing eburnation—abrasion or polishing on 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.

Repetitive activities associated with biomechanical stress can result in distinct patterns of osteoarthritis within and between skeletal elements. These patterns can provide insights about workload and patterns of movement. Different types of stress will affect the development of arthritis in different ways (Ortner 2003; Solomon 2001). In archaeological populations, DJD is found most commonly at the elbow—which was probably caused by flexion/extension and rotation movements associated with the joint that stimulates osteophyte formation (Ortner 2003)—and second most commonly at the knee. All joint surfaces and vertebrae at Albert Porter Pueblo were examined for evidence of DJD. The vertebral articular surfaces, arms, legs, and extremities were scored for DJD, and the intervertebral joints (vertebral bodies) were scored for osteophytosis.

Spinal osteoarthritis, or osteophytosis, is similar to joint changes seen in the appendicular skeleton 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 generally occurs in individuals over the age of 40 but can occur as early as the third decade of life. Any segment of the spine can be affected, and one vertebra or multiple vertebrae can be involved (Ortner 2003).

Trauma

Traumatic injuries can provide information about physical and social settings and the ability of a population to safeguard itself against risks. All exposed bones were examined for evidence of postmortem and perimortem traumatic injury, including burning and fractures.

Metrics

Estimates of long-bone length can provide useful information about age, sex, stature, and activity patterns (Krogman and Iscan 1986; Ubelaker 1989). Stature can be an important indicator of overall health. Nutritional deficiencies and infection can have a direct effect on development and growth. Cranial and postcranial measurements were recorded in millimeters using digital sliding calipers, a measuring tape, or a metric ruler. Stature measurement followed Genovés (1967) for Mesoamerican adult females and males. Scheuer and Black's (2000) guide was used as necessary to determine age for children and subadults from the length of long bones.

Biodistance

The significance of studying nonmetric traits—also termed discrete traits, epigenetic traits, or discontinuous morphological traits—is that these variants can show familial inheritance in *Homo Sapiens* (Saunders and Popovich 1978; Selby et al. 1955; Torgersen 1951a, 1951b, 1963). Population differences in skeletal morphology are often the result of genetic and environmental differences between groups. Cranial and postcranial nonmetric traits were recorded wherever possible.

Cultural Modification

Cranial deformation is one of the most ubiquitous cultural practices found throughout the world (Ortner 2003; Ortner and Putschar 1985; Rogers 1992; White and Folkens 1999). In ancestral Pueblo populations, cranial deformation is thought to have been caused by "cradleboarding." According to Reed (2000), a marked increase in flattened heads occurred during the transition from the Basketmaker III period (about A.D. 400–750) to the Pueblo I period (about A.D. 750–

900). Piper's (2002) examination of cradleboards from the Colorado Plateau demonstrated that, with the adoption of agriculture as the chief subsistence strategy, practices for the care of infants and young children changed. Piper (2002) suggests that cranial flattening resulted from how cradleboards were used: babies attached to cradleboards were laid flat or propped against a wall, tree, or rock while parents performed tasks nearby. The principal types of cranial deformation seen in the Southwest consist of occipital or lambdoidal deformation (Piper 2002). Occipital deformation is characterized by a flattened area at the back of the skull at a 90-degree angle from the Frankfort plane (a standard plane of reference extending from the upper border of the external auditory meatus through the lower border of the eye orbit). Lambdoidal-deformed crania are flattened on the upper portion of the occiput (the posterior part of the head above the base of the neck) at an angle of 50–60 degrees. All observable crania at Albert Porter Pueblo were examined for cradleboarding.

Mortuary Practices

The study of mortuary practices examines one of the most complex and varied of human interactions—the relationship between the living and the dead (Mowrer 2003). Studies by Saxe (1970) and Binford (1971) are considered by many anthropologists to be the starting point for mortuary studies (McHugh 1999). Both researchers examined cross-cultural differentiation that includes age and gender differentiation, rank, status, social position, and social affiliation (membership in a clan, sodality, or moiety) and how these differences are reflected in mortuary practices (Binford 1971; Saxe 1970). Archaeologists continue to examine mortuary studies for age and gender differentiation (Buikstra and Beck 2006; Crown 2000; Mowrer 2003; Neitzel 2000) but now often integrate osteological data, such as nutrition and trauma information, to see how these data correlate with mortuary practices (Lambert 1999; Martin 2000). Other archaeologists have expanded mortuary studies to include the examination of mortuary attributes for clues about symbolism, religion, and ideology (Brown 1996, 1997: Hill 1998; Plog and Heitman 2010; Schlanger 1992) and to provide a context for mortuary sites as part of the overall landscape in which people live (Beck 1995).

In the following section, I provide an overview of ancestral Pueblo mortuary practices found throughout much of the Four Corners area. This section is followed by examples of inferences regarding ancestral Pueblo peoples from the Basketmaker II through the Pueblo IV periods. The first four examples are from the northern Southwest, whereas the final two are from south-central Utah and east-central Arizona, respectively, and are included because, as the discussion below indicates, many aspects of ancestral Pueblo mortuary practice appear to be ubiquitous throughout much of the Southwest.

Many formal burials were placed in a prepared oval or rectangular pit with the individual's legs semi-flexed (legs together and knees drawn up), flexed (fetal), or extended with the hands along the sides of, or folded across, the body (Bradley 2002, 2003; Cattanach 1980; Hinkes 1983; Karhu 2000; Kuckelman and Martin 2007; Morris 1924; Mowrer 2003; Nordenskiöld 1979; Schlanger 1992; Stodder 1987; Turner and Turner 1999; Wiener 1984). Funerary objects, particularly pottery vessels, accompanied many individual burials, especially adult burials (Akins 1986; Bradley 2002; Rohn 1971, 1977; Whittlesey and Reid 2004). Formal burials were placed primarily in middens from the Basketmaker II through the Pueblo II periods (Schlanger 1992).

However, formal burials have also been discovered in pit structures, abandoned rooms, in burial pits under floors in rooms that continued to be used after interment, in rooms that appear to have been intentionally sealed after entombment, in the fill of kivas, on the floor of kivas, and in rock crevices (Bradley 1988; Bradley 2002; Cattanach 1980; Kuckelman and Martin 2007). The few formal burials that have been found on kiva floors are inferred to result from an unusual event (Bradley 2002). Some archaeologists (Bradley 2002; Huber 1989; Katzenberg 1999; Kuckelman 2000; Kuckelman and Martin 2007; Morris 1924) have observed a greater quantity of burials in rooms dating from the Pueblo III period (A.D. 1150–1300) than in rooms dating from earlier periods. This pattern is discussed in more detail below under "Mortuary Practices."

Many informal burials are found in abandonment contexts and differ considerably from formal burials. The remains are often sprawled, loosely flexed, prostrate, or haphazardly placed on the floor of a structure (Martin 2000). Some remains are disarticulated and exhibit perimortem (occurred around the time of death) trauma or healed fractures of cranial or postcranial elements, or some combination of these features (Kuckelman and Martin 2007; Martin 2000). There is no prepared burial pit or associated funerary objects (Kuckelman and Martin 2007; Martin 2000). Informal burials found in abandonment contexts have been observed in a variety of locations including structure floors, ventilator shafts, structure roof fall, room floors, and structural collapse within rooms (Kuckelman and Martin 2007). Cater (2007) found that most skeletal remains that exhibited trauma or were disarticulated, or both, were found in pit structures, kivas, and surface rooms, and that children as well as adults died as a result of trauma. The age group most abundantly represented was adults between 30 and 40 years of age (Cater 2007). Isolated or scattered human remains are also found throughout much of the Southwest. Crow Canyon defines an IHB as fewer than five disarticulated bones. Isolated human bone can be found in the same types of contexts as formal or informal burials.

I compiled late Archaic and Basketmaker II (about 2000 B.C.–A.D. 500) mortuary data for the Four Corners area in the northern Southwest (Mowrer 2003) to determine if social differentiation was expressed through mortuary practices during that time. In this study, I found that, in Basketmaker II societies, the most prominent distinctions in mortuary practices reflect age rather than gender or status. The funerary items that accompanied adults (atlatls, bifaces, projectile points, manos, metates, etc.) suggest economic role, whereas funerary items that accompanied children and infants (blankets and bedding) suggest body preparation, grief, or both (Mowrer 2003).

Neitzel (2001) calculated "grave lot values" (GLV), defined as an "estimate of the aggregate value of all the grave goods buried with an individual" (Neitzel 2000:152). a measure utilized in several mortuary studies (Brunson 1989; Effland 1988; Hagopian 1994; McGuire 1992) to determine whether gender differentiation was characterized by a gender hierarchy and, if so, to define the ranking of males and females for various sites from the Pueblo I period (A.D. 900–1150) through the Pueblo III period (A.D. 1150–1300). Neitzel found that the GLV at Pueblo I, McPhee Phase (A.D. 850–975) burials near Dolores, Colorado, suggest comparative gender equality, whereas at a late Pueblo II–Pueblo III (A.D. 1000–1200s) Yellow Jacket site northwest of Cortez, Colorado, the GLV suggest male-dominated gender hierarchies. In contrast, at Chaco Canyon in northwest New Mexico, which was occupied from the Pueblo I through the Pueblo III periods (approximately A.D. 900 through A. D. 1300), the GLV suggest both males and females exhibited hierarchical distributions, indicating that gender hierarchies might have changed through time (Neitzel 2000).

A study of several Pueblo II (about A.D. 950–1100) sites in the La Plata valley by Martin (2000) combined osteological evidence with an examination of mortuary practices to determine how political centralization and hierarchy effected gender and age differentiation. The osteological data indicate that a subgroup of females frequently experienced blunt-force trauma to the head and lower body, and bone degeneration related to strenuous muscle strain. This same group of women did not receive the same consideration at death as most of the individuals buried at the La Plata sites. Most of the formal burials were flexed or semi-flexed, accompanied by funerary objects, and placed in abandoned structures or storage pits (Martin 2000.) In contrast, the subgroup females were placed haphazardly in abandoned pit structures with no associated funerary objects (Martin 2000). Martin (2000) states that the osteological and mortuary data may indicate that labor could have been divided by sex as well as by "class" at the La Plata sites.

In a recent study, Plog and Heitman (2010) examined mortuary practices at Chaco Canyon for social differentiation and to address questions about the chronology of social and political processes within the canyon. They focused on mortuary patterns for great houses and small-house settlements. At small-house settlements, many burials were found in middens. Because small-house middens have been subject to professional and nonprofessional excavations since the late 1880s, artifact counts and the types of artifacts that accompanied individuals were difficult to determine; however, documented excavations indicate that an average of 1.5 vessels were placed with each burial in a small-house midden (Akins 1986). In contrast, at Pueblo Bonito, burials were placed in rooms, and the number of burials was much lower than expected for a pueblo that might have had as many as 1,000 occupants (Judd 1954). Most of the burials at this site were clustered in two mortuary crypts composed of four rooms each—one in the north and one in the west section of the pueblo. Funerary items included turquoise beads and pendants, shell, jet, and unusual artifacts such as flutes, wooden ceremonial staffs, cylinder jars, and conch shell trumpets (Plog and Heitman 2010). Plog and Heitman (2010) concluded that social differentiation occurred in Chaco Canyon as early as the A.D. 1000s, and that the difference between great-house and small-house mortuary practices was a result of cultural rules that specified that particular individuals could be buried in Pueblo Bonito and other great houses. Moreover, they suggest that great-house burials and associated funerary objects provided important social, ritual, and cosmological connections by linking people to founders, ancestors, and cosmological forces (Plog and Heitman 2010).

At RB568, a Pueblo III (A.D. 1150–1350) site near Kayenta, Arizona, the most elaborate burials were those of older adult females (Crotty 1983), and all adult male burials were more elaborate than subadult burials. Crotty (1983) concluded that the funerary items at Site RB568 reflect age and gender differentiation. However, at Grasshopper Pueblo, a Pueblo IV (about A.D. 1300–1450) site located in east-central Arizona, funerary items were found in more male burials than female burials, and the types of funerary items that accompanied the male vs. female burials differed and suggested gender-specific roles during life. Flint-knapping kits and projectile points accompanied male burials; food-processing tools, such as manos and metates, accompanied female burials (Whittlesey and Reid 2004).

As the examples above demonstrate, studying mortuary practices can provide important insights about an individual and a society. As reported in Mowrer (2003), most adult Basketmaker II burials in the Four Corners area and most Grasshopper Pueblo burials in east-central Arizona Whittlesey and Reid (2004) contained funerary items that suggest economic roles in life. Neitzel (2000), calculating GLV, determined that gender hierarchies changed through time and differed from site to site. The Pueblo I burials near Dolores, Colorado, reflect gender equality, whereas the Pueblo II–Pueblo III burials at Yellow Jacket, northwest of Cortez, Colorado, suggest male-dominated hierarchies. In contrast, at Chaco Canyon, which was occupied from the Pueblo I to the Pueblo III periods, funerary items suggest the presence of both male- and female-dominated hierarchies that changed through time. Martin (2000) examined osteological data and mortuary practices at the Pueblo II La Plata sites in northwestern New Mexico and was able to determine that labor might have been divided by sex as well as by "class." Plog and Heitman's (2010) examination of funerary items and burial locations at Chacoan great-house and small-house settlements also demonstrates how funerary items can provide clues about status as well as belief systems, political systems, and roles in life. Crotty (1983) found that the mortuary practices at RB568, a late Pueblo III site near Kayenta, Arizona, reflect gender and age differentiation.

In sum, mortuary practices can provide information at the individual level about roles in life, rank, status, and social and political position. At a broader level, mortuary practices can provide insights into a society's belief systems, political systems, and social complexity and how these aspects of a group can change through time. All pertinent mortuary information was recorded for the Albert Porter Pueblo population.

Analytical Data

In this section, I present a detailed description of the osteological analysis for Albert Porter Pueblo, including bone condition, skeletal inventory, age and sex assessment (Table 9.1), skeletal and dental pathologies (Table 9.2), mortuary data (Table 9.3), metric measurements, and nonmetric traits. The osteological data are followed by a description of the mortuary context, including body position, head direction, and associated funerary items.

The skeletal remains of 23 individuals were analyzed at Albert Porter Pueblo, including 12 HROs and 11 IHBs. The condition of the skeletal remains varied from excellent, with minimal ground weathering, to poor, with moderate to severe ground weathering, water damage, postmortem breaks, and disturbances from bioturbation. No evidence of trauma was observed on any element analyzed. The context, temporal assignment, age, and sex of each HRO and IHB can be found in Table 9.1.

HRO 1

HRO 1 is the remains of an infant or young child approximately one to three years of age. Fewer than 25 percent of the skeletal elements were found, and those were exposed in a 1-x-1-m unit in Nonstructure 801. The fill surrounding the burial consisted of secondary refuse. Neither head orientation nor body position could be determined from the exposed elements, and no funerary objects were associated with this individual. The skeletal elements consist of the superior section of the cranium, including partial left and right frontals and parietals. The skeletal elements were in good condition.

Age was assessed on the basis of cranial sutures and thickness of the cranial fragments. The anterior fontanelle, which usually fuses between one and two years of age (Scheuer and Black 2000), is fused. This age assessment is supported by the articulated but unfused sagittal and coronal sutures and the thickness of the cranial fragments. Sex cannot be determined for an individual this young. Cranial and postcranial metric measurements and nonmetric traits could not be recorded, because only a few fragments of the cranium were exposed. No evidence of pathology was observed.

HRO 2

HRO 2 consists of the remains of an adult of indeterminate sex. Fewer than 25 percent of the skeletal elements were exposed; these bones were found in a 1-x-1-m midden unit in the northeastern portion of Nonstructure 901. No burial pit was evident; however, the remains probably represent a formal burial disturbed by heavy rodent activity. The body and associated funerary objects appear to have been placed within secondary refuse and covered with additional midden deposits. The bones were in poor condition from rodent disturbance and ground weathering. Body position and head direction could not be determined from the exposed elements. Two associated funerary objects, a complete Chaco/McElmo-style miniature pitcher (Vessel 2) that was probably produced A.D. 1050–1300 (Blinman and Wilson 1989) and approximately one-half of a large Mancos Corrugated jar (Vessel 3) that probably dates A.D. 1050–1200 (Blinman and Wilson 1989), were placed above the burial, possibly near the lower legs.

The skeletal elements designated HRO 2 include three tibia mid-shaft fragments (side indeterminate), an adult first, second, third, or fourth distal phalanx, one premolar fragment, and one possible tibia fragment. The size of the bone fragments, the fusing of the distal phalanx, and the stage of dental development suggest that these elements are from one individual. The complete development of the premolar suggests this individual was at least 13 years of age, whereas the bone robusticity indicates that this person was an adult at least 19 years of age. Sex could not be determined from the exposed elements. Metric measurements and nonmetric traits could not be recorded, and no evidence of pathology was observed on the exposed elements.

HRO 3

HRO 3 is the remains of a young adult or middle adult, possibly female, who was between 30 and 35 years of age. The skeletal elements were exposed in three adjacent 1-x-1-m midden units in Nonstructure 901. No burial pit could be discerned; the elements were heavily disturbed by rodent activity and damaged by ground weathering. However, this was probably a formal burial. The burial fill consisted of secondary midden deposits placed over the individual. Fewer than 50 percent of the skeletal elements were present. Head direction and body position could not be determined for this individual, nor were any funerary objects observed. The elements were in fair condition.

No cranial elements were exposed. The axial skeleton includes a partial right pubic symphysis, with a fragmentary portion of the pubis and ramus visible, and a partial left sacrum that consists of the superior vertebral surface and upper one-third of the anterior surface. The ribs include three fragmentary mid-shaft rib fragments (side indeterminate), one partial left rib minus the head, and the distal portion of one left rib. A partial left scapula with a complete associated acromion process represents the shoulder girdle. The long bones include a fibula mid-shaft fragment (side indeterminate), a tibia fragment (side indeterminate), and a long tibia- or femur-shaft fragment (side indeterminate). The extremities consist of one distal foot phalanx (side indeterminate).

The pelvic girdle indicates that HRO 3 was a young adult, probably female, 30–35 years of age. The pubic symphysis suggests an age between 30 and 35 years. The pelvic criteria for sex, the pubis and ramus, fall in the "probable female" range. No pathologies were observed, and nonmetric traits could not be recorded for this individual. One IHB, a premolar from a child five-to-six years of age, was exposed with HRO 3 and is discussed in the IHB section below.

HRO 4

HRO 4 consists of the remains of a child between four and 12 years of age. Fewer than 25 percent of the skeletal elements were exposed, and these were found during the excavation of a 1-x-1-m midden unit in Nonstructure 606. An oval-to-rectangular burial pit (Feature 1) was defined, and the fill surrounding the burial consisted of secondary refuse and natural sediments. Body position could not be determined; however, the head was oriented to the east. No associated funerary objects were found with HRO 4. The bones were in poor condition from extensive ground weathering and surface weathering.

The skeletal remains consisted of a fragment of the left temporal bone with part of the petrous portion and sphenosquamosal and squamosal suture lines exposed. The size and vault thickness suggest that the temporal fragment represents a child between four and 12 years of age. This estimate is supported by the sphenosquamosal and squamosal sutures, which exhibited postmortem breaks but appear to be unfused. Sex could not be determined, and cranial measurements and nonmetric traits could not be recorded, because only a few fragments of the cranium were exposed**.** No evidence of pathology was observed on the exposed bones.

HRO 5

HRO 5 consists of the remains a child between three and five years of age. Fewer than 25 percent of the skeletal elements were exposed; these were found during the excavation of a 1-x-1-m midden unit in Nonstructure 901. Although a burial pit was not visible in profile, the presence of a pit is likely. The body was covered with secondary refuse deposits. Body position and head direction could not be determined, and no funerary objects were observed. The bones had been subjected to ground weathering and surface weathering and were in good to poor condition.

The exposed skeletal remains consisted of partial left and right parietals and partial left and right occipitals. The unfused condition of the sagittal and lambdoidal sutures, as well as the thickness of the cranium, indicates that this individual was a child between three and five years of age. Sex cannot be determined for an individual this young. Metric measurements and nonmetric traits could not be recorded, because only a few fragments of the cranium were exposed. No evidence of pathology was observed on these skeletal elements.

HRO 6

HRO 6 is the remains of a young- or middle-adult female who was between 27 and 40 years of age. Fewer than 50 percent of the skeletal elements were exposed; these were found during the excavation of a 2-x-2-m midden unit in Nonstructure 1103. A burial pit could not be defined; however, it is likely the visible remains represent a small portion of a complete inhumation. It appears that the body was placed in midden deposits and covered with additional refuse. Body position could not be determined. The head was oriented to the southwest and was facing upwards. Two Mancos Black-on-white bowls that were probably produced about A.D. 1000–1150 (Blinman and Wilson 1989) were located near the skull. The bones were in excellent condition with minimal ground weathering.

The skeletal elements consisted of complete left and right facial bones including the zygomatics, lacrimals, nasal bones, and maxillae. Partial elements include left and right frontals, parietals, and mandibles, the left greater wing of the sphenoid, and the vomer. All of the maxillary dentition was present except the left and right third molars and the right second molar. Observable mandibular dentition included the left and right central and lateral incisors and canines.

Cranial suture closure, and dental wear and development, indicates this was a young-to-middle age adult. Cranial composite scores could not be calculated, because not all of the suture sites were exposed. However, the degree of suture closure for the lateral anterior sites indicates that this individual was probably between 27 and 50 years of age. Dental development indicates an age of at least 21 years, because the root apex is closed on all observable teeth; however, dental wear is moderate to heavy, suggesting that the individual was older than 25 years of age. An age younger than 40 years is suggested by minimal dental pathologies and the absence of antemortem tooth loss.

Three cranial sex criteria suggest that this individual was female. The supraorbital margin and glabella fell at the extreme end of the range for female, whereas the mental eminence fell into the probable female range. This assessment should, however, be considered tentative, because no other elements could be assessed for sex, and cranial sex indicators are not considered as reliable as pelvic sex indicators (Buikstra and Ubelaker 1994).

Cranial and postcranial measurements could not be recorded, because only a portion of the cranium was exposed. Nonmetric traits include the presence of a metopic suture, left and right supraorbital sutures, infraorbital sutures and foramina, and zygomatic facial foramina. No evidence of pathology was observed on the cranial elements.

Tooth wear was moderate to heavy with significant dentin exposure especially on the mandibular incisors and canines. No antemortem tooth loss was observed. The entire observable maxillary dentition exhibits Type A (small amounts) calculus, and the mandibular incisors and canines exhibit Type B (moderate amounts) calculus. Mild porosity and minimal bone resorption is present on the alveolar bone surrounding the central mandibular incisors, which suggests mild periodontal disease in that location.

HRO 7

HRO 7 consists of the remains of a middle adult of indeterminate sex between 35 and 45 years of age. Fewer than 25 percent of the skeletal elements were discovered; these were found during the excavation of a 1-x-1-m midden unit in Nonstructure 9004. An oval-shaped burial pit (Feature 1) was apparently excavated into undisturbed native sediment, and the body was covered with secondary refuse. Head direction and body position could not be determined, except that the right arm appeared to extend down the body with the hand near the right knee. No associated funerary objects were identified. The elements are in good condition with some postmortem fracturing and ground weathering.

Only portions of the appendicular skeleton and extremities were exposed in the excavation unit. The arm bones included the distal epiphyses for the right radius and ulna. The leg bones included a fragmentary mid-shaft section of the left tibia and partial proximal shaft portions of the right tibia and fibula. The extremities consist of complete right third and fourth metacarpals, several complete proximal carpal phalanges (side indeterminate), and one complete first distal carpal phalanx (side indeterminate).

Epiphyseal union and age-related degenerative changes indicate this individual was a middle adult between 35 and 45 years of age. The distal epiphyses on the radius and ulna are completely fused, indicating an age of at least 20 years (Scheuer and Black 2000). The presence of Stage 1 DJD on the distal right radius and ulna, metacarpals, and carpal phalanges, suggest that this individual was probably a middle adult older than 30 years of age. This assessment is supported by the development of ligamentous attachments on the palmar surface of the proximal phalanges. There is no evidence of Stage 2 pitting, or Stage 3 DJD that would suggest an older adult. Sex could not be determined; however, the field analyst noted that the bones appeared small and gracile, suggesting that HRO 7 was female, but not enough of the remains were exposed to confirm this observation.

Cranial and postcranial measurements and nonmetric traits could not be recorded, because only a portion of the cranium was exposed. No pathologies, other than age-related degenerative changes, were observed on the exposed elements. These remains exhibited Stage 1 DJD, consisting of slight to moderate lipping on the bones of the right arm and hand. The articular margins of the distal epiphyses of the radius and ulna exhibit lipping, whereas the hands exhibit lipping on the proximal and distal articular surfaces of the third and fourth metacarpals, the proximal and distal articular surfaces of two proximal carpal phalanges, and the proximal articular surface of the first distal carpal phalanx. The proximal phalanges exhibit ligamentous attachments on the palmar surface.

HRO 8

HRO 8 consists of the remains of a middle adult of indeterminate sex between 35 and 45 years of age. Fewer than 25 percent of the skeletal elements were discovered; these were exposed during the excavation of a 2-x-2-m unit in Structure 1104 and consisted of a cluster of disarticulated bones. It appeared that the skeletal elements were placed on or within the top layer of roof sediments of a pit structure. Head direction and body position could not be determined, because the elements were not articulated. No associated funerary objects were observed. The bones were in good condition with slight ground weathering.

Only portions of the axial skeleton were exposed. These include a complete atlas, a partial third lumbar vertebra, four complete left ribs, and one rib fragment (side indeterminate). The fusing of the vertebral annular epiphyseal rings and presence of age-related degenerative changes indicate that this was a middle adult between 35 and 45 years of age. The complete fusing of the superior and inferior vertebral annular epiphyses on the vertebrae indicates an age of at least 19 years (Scheuer and Black 2000). The presence of moderate to significant osteophytosis (lipping) on the superior body of the third lumbar vertebra, Stage 1 DJD (slight to moderate lipping) on the superior and inferior facets of the third lumbar vertebra and on the inferior articular facets of the atlas, suggest that this individual was a middle adult between 35 and 45 years of age (Ubelaker 1989). The presence of moderate to significant osteophytosis suggests that age is likely to have been nearer to 45 years. Sex could not be determined from the exposed elements, nor could cranial and postcranial measurements and nonmetric traits be recorded from the exposed elements. No evidence of pathology other than age-related degenerative changes to the bone was observed on the exposed elements.

This individual exhibited moderate to significant Stage 1 DJD: lipping on the vertebrae and ribs and osteophytosis on the third lumbar vertebra. The inferior articular facets of the first cervical vertebra (the atlas) exhibit slight lipping, whereas the third lumbar vertebra exhibits slight to moderate lipping on the superior and inferior articular facets. The observable vertebral articular facets on the ribs exhibit Stage 1 DJD along the margins. Moderate to significant osteophytosis (lipping) is present on the superior aspect of the centrum of the third lumbar vertebra.

HRO 9

HRO 9 consists of the remains of a child who was probably between two and four years of age. Fewer than 25 percent of the skeletal elements were exposed; the one element was found during the excavation of a 1-x-1-m midden unit in Nonstructure 101. A partial adult rib, IHB 11 (see Table 9.1), was also exposed in this excavation unit and is discussed in the "Isolated Human Bone" section. The excavation unit exhibited disturbance from rodent burrowing; however, it appeared that the remains of this individual were placed in refuse mixed with natural sediments. Body position and head direction could not be determined, nor were any funerary objects identified. The bone had been subjected to ground weathering and rodent activity and was in good to poor condition.

The skeletal element observed consists of a complete right femur, with the posterior aspect of the bone exposed. The greater trochanter, femoral head and distal epiphysis (condyles) are unfused, indicating an age of less than 14 years. The maximum length of the femur diaphysis is 198 mm (+/-5 mm) long, which narrows the possible age to between two and four years (Scheuer and Black 2000). However, the age assessment should be considered an estimate, because health conditions and some genetic and congenital conditions can influence long-bone length. Sex could not be determined for an individual this young. No acceptable method to determine stature for a child has been developed. No other postcranial or cranial measurements or nonmetric traits could be recorded for this individual. No evidence of pathology was observed.

HRO 10

HRO 10 consists of the remains of a child between six and 10 years of age. Fewer than 25 percent of the skeletal elements were discovered; these were exposed in a 1-x-1-m midden unit in Nonstructure 9007. The visible remains were probably a small portion of a complete inhumation. The body was apparently placed in a burial pit (Feature 1) and covered with midden material mixed with natural sediments. The shape of the burial pit could not be defined. The cranium was oriented to the west, and it faced north. Body position could not be determined. Associated funerary objects consist of two Pueblo III side-notched projectile points (PLs 2 and 3). Placement of the projectile points in relation to the body is unknown. The bone was in excellent condition with slight ground weathering.

This individual is represented by portions of the cranium and one middle phalanx. The cranium consists of complete left and right maxillae, and partial left and right frontals that include complete left and right orbital plates and zygomatics. The deciduous dentition includes complete upper left and right canines, first molars, and the left second molar. The permanent dentition includes complete upper right central and lateral incisors, the left canine and first premolar, and a lower first premolar. The extremities are represented by a fragment of a middle phalanx (side indeterminate).

Dental development indicates that this child was between six and 10 years of age. The crown and root of the second deciduous molar are complete, whereas the apex tip of the root is approximately one-half closed. The permanent dentition had complete crowns but had not erupted and had not developed roots. Sex could not be determined for an individual this young. Cranial and postcranial measurements could not be recorded from the skeletal remains exposed. Nonmetric traits could not be recorded for this individual. No evidence of pathology was observed on the exposed bones.

HRO 11

HRO 11 consists of the remains of a middle adult male between 35 and 49 years of age. Fewer than 25 percent of the skeletal elements were exposed; these were discovered during the excavation of a 1-x-1-m midden unit in Nonstructure 1041. No burial pit could be defined; however, the visible remains probably represent a small portion of a complete inhumation. It appears that the remains were placed on, and covered with, secondary refuse mixed with natural sediments. The head was oriented to the northeast. Body position could not be determined, and no associated funerary objects were observed. The bones were in excellent condition.

This individual is represented by a nearly complete cranium and one metatarsal. Complete elements of the cranium consist of left and right occipitals, including the nuchal crest, and the right parietal. Partial cranial elements consist of the following: left parietal, superior portion; the right temporal including the external auditory meatus; the mastoid process; and the zygomatic process. The extremities are represented by the proximal fourth right metatarsal.

The degree of suture closure and the fusing of the epiphysis on the metatarsal suggest that this individual was between 35 and 49 years of age. This age determination reflects a general range of years, because only a portion of the cranium and the fourth metatarsal were exposed. Composite cranial suture scores could not be calculated for all sites on the cranium; however, the superior sphenotemporal and midlambdoid sutures exhibit significant closure, as does bregma (the intersection of the sagittal and coronal sutures) and lambda (the intersection of the sagittal and lambdoidal sutures). Moreover, the anterior sagittal suture and obelion are completely obliterated, which further suggests this was an adult, probably between 35 and 49 years of age. This age assessment is further supported by the complete fusing of the proximal epiphysis on the fourth metatarsal.

Sex was determined by observable cranial characteristics. Characteristics of the nuchal crest, the supraorbital margin, and the mastoid process all fall into the extreme end of the range for males. However, given the lack of supporting pelvic or other postcranial characteristics used to determine sex, and the tendency of the skull to exhibit increasing masculine morphology with increasing age, this designation should be considered tentative. Cranial and postcranial metric measurements could not be recorded from the exposed remains. No evidence of pathology was observed on the cranium or fourth metatarsal.

Observable nonmetric traits consist of three extra sutural bones. These include two lambdoidal ossicles: one on the left side of the occipital near midlambdoid and one along the right side of the occipital near bregma, and an asterionic bone along the right lambdoid suture near the intersection of the parietal, temporal, and occipital bones.

Occipital cranial deformation suggests cradleboarding. A 30-x-29-mm depression is present approximately 12 mm below lambda. This depression is inferred to be associated with cradleboard remodeling rather than the result of trauma because there was no observable indication of active or healed trauma.

HRO 12

HRO 12 consists of the remains of a middle adult between 35 and 45 years of age. Fewer than 25 percent of skeletal elements were exposed; these were observed during excavations in a 1-x-1-m midden unit in Nonstructure 101. The remains probably represent a small portion of a formal burial; however, no burial pit was defined. The body was placed on top of, and covered with, secondary refuse mixed with natural sediments. The body had been placed on its right side with the legs flexed. Head direction could not be determined, and no associated funerary objects were observed with these remains. The bones were in excellent condition, although some ground weathering and postmortem breaks were observed.

The skeletal elements consist of the articulated portion of the left knee and one hand bone. A portion of the femoral distal epiphysis including the lateral condyle was almost completely exposed, and the medial condyle and the left patella were partly exposed. The lower leg bones consist of a partial left tibia including the anterior and lateral portions of the proximal epiphysis, a portion of the articular surface, and the proximal third of the tibia shaft. The fibula includes the anterior and lateral portions of the proximal epiphysis and proximal third of the shaft. The hand is represented by a complete left trapezium.

Age was assessed through observation of epiphyseal union and age-related degenerative changes. The complete fusing of the distal epiphysis on the femur and of the proximal epiphyses on the tibia and fibula (with total obliteration of the epiphyseal line), indicate an age of at least 25 years (Scheuer and Black 2000). The left trapezium and the medial condyle on the distal femur exhibit Stage 1 DJD. Slight to moderate lipping on the margins of the articular surfaces, and the anterior tubercle on the left tibia, indicates slight to moderate ligament ossification. This stage of DJD and ligament ossification is indicative of normal age-related degenerative changes that suggest that this individual was probably a middle adult. There is no evidence of severe DJD characteristic of older adults such as pitting, eburnation, or osteoporosis. Given these general indicators, it is likely that the age range for this individual is 35–45 years. Sex could not be determined from the elements exposed.

Cranial and post-cranial metric measurements and nonmetric traits could not be recorded for this individual. No evidence of pathology, other than age-related degenerative changes, was observed on the exposed bones. The DJD exhibited at the hands and knee is probably stress-related and might be indicative of the type of work the individual participated in, such as grinding activities that require kneeling and repetitive hand movement. The left trapezium exhibits Stage 2 DJD, with lipping and pitting on the articular surfaces. The articular surfaces for the distal femur, the medial condyle, and the condyle articular surface on the proximal tibia exhibit Stage 2 DJD, and the tibial anterior tubercle exhibits slight ossification.

Isolated Human Bone

In this section, I describe the isolated human bones exposed at Albert Porter Pueblo. As noted above, an IHB is defined as five or fewer disarticulated bones.

IHB 1

One isolated occurrence, a premolar from a child five-to-six years of age, was exposed with HRO 1 (a young adult female) during the excavation of a 1-x-1-m unit in Nonstructure 901. Dental development suggests that IHB 1 represents a child between five and six years of age. No evidence of pathology was observed on the tooth.

IHBs 2, 3, and 4

IHBs 2, 3, and 4 were exposed during the excavation of a 1-x-1-m unit in a kiva, Structure 502. The elements represent at least two individuals—a subadult (Individual 1) and an adult (Individual 2). The bones were in fair condition with some postmortem breaks. Individual 1, a subadult, is represented by an unfused metatarsal distal epiphysis and a premolar. The lack of fusing of the metatarsal distal epiphysis and the premolar development indicate that this was a subadult between 13 and 18 years of age (Scheuer and Black 2000). Sex could not be determined and no evidence of pathology was observed.

IHB 3 represents Individual 2, an adult of indeterminate age, and is a temporal fragment that includes the mastoid process. Adult age was estimated from the size and thickness of the cranial fragment. Sex could not be determined and no evidence of pathology was observed. A third bone was exposed and is a possible navicular fragment that might be human or faunal. No further data were collected for the bone.

IHB 4 is a lumbar vertebra, possibly L1. This bone was in fair condition with postmortem breaks. The presence of osteophytosis, or slight lipping, on the superior surface of the centrum suggests that this vertebra represents a middle adult between 35 and 45 years of age. Sex could not be determined.

IHB 5

These skeletal elements represent a child between six and 10 years of age. The bones were exposed during the excavation of a 1-x-1-m unit in Structure 502, a kiva. The elements were in fair to good condition with some postmortem breaks. IHB 5 consists of a fragmentary left maxilla and several teeth. The deciduous dentition includes the right first molar and the left first and second molars. The permanent maxillary dentition includes the left central and lateral incisors. The development and wear on the dentition suggest this individual was a child between six and 10 years of age. The roots on the deciduous dentition are completely developed, and the crowns on the permanent lateral and central incisors are completely developed. In addition, the root on the permanent lateral incisor is 25 percent developed, indicating an age between six and 10 years (Hillson 2002). This age assessment is supported by extreme wear on the deciduous first molars. Sex could not be determined for an individual this young. The teeth were fractured, which precluded taking measurements and assessing for dental pathologies. No evidence of pathology was observed on the maxilla fragment.

IHB 6

IHB 6 represents an adult of indeterminate age. This fragmentary os coxa, side indeterminate, was exposed during the excavation of a 1-x-1-m midden unit in Nonstructure 401. The bone was in fair condition. Age is based on bone robusticity. Sex could not be determined and no evidence of pathology was observed.

IHB 7

These skeletal elements represent an infant between six months and two years of age. The remains were exposed in a 1-x-1-m midden unit in Nonstructure 401.The bones were in good condition and consist of a partial cranium that includes partial left and right parietals and partial left and right frontals. The unfused developmental stage of the anterior fontanelle suggests that this individual was less than two years of age. This estimate is supported by the size and thickness of the cranium, as well as by the unfused but articulated frontal and left and right parietals, which indicate that this individual was an infant between six months and two years of age (Scheuer and Black 2000). Sex could not be determined and no evidence of pathology was observed.

IHB 8

This left proximal radius fragment was exposed in a 1-x-1-m midden unit in Nonstructure 904. The bone was eroded but in fair condition with moderate surface weathering, ground weathering, and postmortem breaks. Bone robusticity and the fusing of the proximal epiphysis on the radius indicate that this individual was at least 20 years of age (Buikstra and Ubelaker 1994). Sex could not be determined. No evidence of pathology was observed.

IHB 9

This complete proximal phalanx (side indeterminate) was exposed in a 1-x-1-m midden unit in Nonstructure 901. The bone was in good condition. The fusing of the proximal epiphysis suggests an age of at least 20 years (Scheuer and Black 2000). This age estimate is supported by the robusticity of the bone. Sex could not be determined, and no evidence of pathology was observed.

IHB 10

This fragmentary left rib and fragmentary tibia mid-shaft were exposed in a 1-x-1-m midden unit in Nonstructure 904. The bones were in fair condition with moderate ground weathering and postmortem breaks. Bone robusticity suggests that the skeletal elements represent an adult. Sex could not be determined, and no pathology was observed.

IHB *11*

This partial rib (side indeterminate) was discovered during the excavation of a 1-x-1-m midden unit in Nonstructure 101. The entire unit exhibited evidence of rodent disturbance. The bone was in good condition. Bone robusticity and DJD indicates that this partial rib represents a middle adult 35 to 49 years of age. Stages 1 and 2 DJD and moderate lipping and pitting on the vertebral margins of the rib suggest that this individual was probably a middle adult between 35 and 49 years of age. Sex could not be determined.

Comparisons with Selected Assemblages

In this section, I compare the Albert Porter Pueblo burials with burials from sites in the surrounding area that were at least partly contemporaneous with the Albert Porter occupational components. Sand Canyon Pueblo (A.D. 1250–1280) and Woods Canyon Pueblo (A.D. 1140–late 1200s) in southwestern Colorado were chosen for to their proximity to Albert Porter Pueblo. Woods Canyon is approximately 1.8 km (1.1 mi) west of Albert Porter Pueblo, and Sand Canyon Pueblo is approximately 10 km (6.2 mi) south-southwest of Albert Porter Pueblo. Salmon Ruins (A.D. 1090 and the 1280s) in northwestern New Mexico is approximately 88 km (55 mi) southeast of Albert Porter Pueblo and was chosen for comparison to present a broader picture of the demographics, health, and mortuary practices during the Pueblo III period in the Southwest.

Sand Canyon Pueblo, a late Pueblo III site, was a village occupied from approximately A.D. 1250 until about 1280. The site consists of an estimated 420 rooms, 90 kivas, and 14 towers, an enclosed plaza, a D-shaped bi-wall building, and a great kiva. Crow Canyon Archaeological Center conducted excavations at Sand Canyon Pueblo from 1984 through 1989 and from 1991 through 1993 (Kuckelman 2007).

Woods Canyon Pueblo was occupied from about A.D. 1140 until the late 1200s, a span that generally corresponds to the Pueblo III period. The village included hundreds of surface rooms, 50 kivas, 16 towers, several checkdams, and extramural walls that might have served as terrace walls for gardens (Churchill 2002).

Salmon Ruins are on the north bank of the San Juan River in northwestern New Mexico approximately 3.2 km (2 mi) west of Bloomfield and 14 km (9 mi) east of Farmington. Salmon Ruins was founded about A.D. 1090 and consisted of 275–300 rooms spread across three stories, with an elevated tower kiva in the central portion and a great kiva in the plaza. Subsequent use, from A.D. 1125 to 1280, resulted in widespread modification to the original structure, including the division of large Chaco-style rooms into smaller rooms, the modification of several rooms into small kivas, and the creation of a plaza area (Reed 2006).

Data for 42 burials recovered from Room 64W, the tower kiva, at Salmon Ruins were not utilized for comparisons here because of the unusual context of the bones. These skeletal remains are fragmented and commingled and subject to numerous interpretations (Akins 2008), including that they resulted from a planned cremation of individuals that had died previously (Bergschneider 1996).

Seventy-one inhumations and 34 isolated human remains were recovered from locations other than Room 64W. Only the data for the 100 inhumations and isolated human remains recovered from deposits dating from the second occupation were compared with the skeletal remains data for Albert Porter, Woods Canyon, and Sand Canyon pueblos.

Age, Sex, and Demographics

In this section, I compare the age and sex of individuals at Albert Porter Pueblo, Sand Canyon Pueblo, Woods Canyon Pueblo, and Salmon Ruins (Table 9.4). Age categories for Sand Canyon were modified to more closely align with the age categories suggested by Buikstra and Ubelaker (1994). In the Sand Canyon Pueblo data, adolescents 18 years of age were placed in the “adult” category and individuals 12 to 17 years of age were classed as subadults. Individuals for which the age category was listed as adolescent (15 to 20 years) were left in the “adolescent/subadult” category. The Woods Canyon “adolescent” category is slightly different from the “subadult” category delineated in SOD (Buikstra and Ubelaker 1994) and includes individuals 19 years of age. The Salmon Ruins “adolescent” category coincides with the “subadult” category defined in SOD (Buikstra and Ubelaker 1994) and was utilized for the Albert Porter Pueblo population.

The average age at death of the Albert Porter Pueblo population varies somewhat from that of Sand Canyon Pueblo, Woods Canyon Pueblo, and Salmon Ruins (see Table 9.4). At Albert Porter Pueblo, 61 percent of the individuals represented were adults older than 18 years of age; 39 percent were under 18 years of age, including 4 percent subadults, 26 percent children, and 10 percent infants. In contrast, at Sand Canyon Pueblo, 41 percent of the burials were adults; 59 percent were under 18 years of age, including 25 percent adolescents, 9 percent children, and 25 percent infant/fetus/newborn burials. At Woods Canyon Pueblo, 36 percent of the burials were adults; 65 percent of the individuals were 19 years of age or younger, including 10 percent infants, 10 percent adolescents between 12 and 20 years of age, and 45 percent children between three and 11 years of age. The burials at Salmon Ruins present a similar profile: 47 percent of the burials were adults; 54 percent were under 18 years of age, including 6 percent adolescents 12 to 17 years of age, 21 percent children, and 27 percent infants/fetuses/newborns (Shipman 2006). The infant mortality percentage for Albert Porter Pueblo and Woods Canyon Pueblo (10 percent) suggests that the infant survival rate was higher at these sites than at Sand Canyon Pueblo and Salmon Ruins, because the infant mortality rates at Sand Canyon Pueblo and Salmon Ruins were more than double (25 and 27 percent, respectively) those of Albert Porter Pueblo.

The subadult or adolescent mortality rates and child mortality rates were similar for Albert Porter Pueblo and Salmon Ruins, with an adolescent/subadult and child mortality rate of approximately 27 percent. Sand Canyon had a somewhat higher adolescent/subadult and child mortality rate of 34 percent. At 45 percent, the child mortality was highest at Woods Canyon Pueblo. These data suggest that, as with many sites throughout the Southwest, life was somewhat precarious for infants, children, and subadults; however, if an individual reached approximately 18 to 20 years of age, the chance of survival into at least middle-age was relatively good. This is consistent with the burial data for Albert Porter Pueblo: 75 percent of the adult burials for which age could be assessed (six of eight) were middle adults more than 35 years of age, and 25 percent were young adults. This contrasts with the data for Sand Canyon and Salmon Ruins, in which the young-adult mortality rate was higher than that for middle adults. At Sand Canyon, 50 percent were young adults 20 to 35 years of age, 40 percent were middle adults, and 10 percent, or one individual, was an older adult more than 50 years of age. The data for Salmon Ruins are similar: 40 percent, or 11 of 28 individuals, were between 18 and 29 years of age; 21 percent, or six individuals, were between 30 and 39 years of age; 21 percent were between 40 and 49 years of age; and 18 percent, or five individuals, were more than 50 years of age. At Woods Canyon Pueblo, the remains of all three of the adults that could be assessed for age were young adults between 20 and 35 years of age.

Sex could not be determined for 11 (78 percent) of the adults analyzed at Albert Porter Pueblo (see Table 9.4). One individual was male and two individuals were female. This is consistent with the demographics for Sand Canyon Pueblo and Woods Canyon Pueblo but contrasts with those for Salmon Ruins (Table 9.5). At Woods Canyon Pueblo, two individuals (50 percent) were female, and sex could not be determined for the other two individuals. Similar to Sand Canyon and Woods Canyon pueblos, few male skeletal remains were discovered at Albert Porter Pueblo. That is not to say that there were no males at these sites. Rather, it suggests that many adult males died elsewhere. In addition, the majority of the adult burials encountered at Albert Porter and Woods Canyon pueblos were examined in situ, and the skeletal elements used to assess sex were not visible. At Salmon Ruins the ratio of males to females is less skewed, with 14 individuals (42 percent) female and 16 individuals (48 percent) male.

Health Profile

Overall, it appears that the residents of Albert Porter Pueblo experienced relatively good health (see Table 9.2). One individual exhibited evidence of mild periodontal disease. None of the skeletal remains exhibited periosteal reactions that would indicate past or current skeletal infections or fractures. And none of the exposed elements exhibited any evidence of trauma in the form of healed or active fractures. This contrasts with surrounding Pueblo III villages such as Sand Canyon Pueblo (Kuckelman and Martin 2007) and Castle Rock Pueblo (Kuckelman, ed. 2000; Kuckelman et al. 2002). However, it should be noted that the absence of any trauma or pathologies, other than age-related degenerative bone changes, is unusual and may be the result of sampling basis. Less than 25 percent of most of the HROs or IHBs at Albert Porter were exposed; therefore, inferences regarding health status from this small sample should be considered tentative.

Periosteal Reactions

Periosteal reactions can be caused by infectious diseases, traumatic injury, nutritional deficiency, and other conditions (Cook 1984; Lambert 1999; Ortner 2003; Ortner and Putschar 1985). None of the elements at Albert Porter Pueblo exhibited periosteal reactions, and only 6 percent of the individuals from Salmon Ruins exhibited periosteal reactions (Shipman 2006). This contrasts with remains at Sand Canyon Pueblo; six of 30 individuals (20 percent) exhibited slight to severe periosteal reactions (Kuckelman and Martin 2007) and Woods Canyon Pueblo, where two of 11 individuals (18 percent) exhibited possible periosteal reactions (Bradley 2002). The absence or low percentages of periosteal reactions suggest that the Albert Porter Pueblo population and most of the Salmon Ruins occupants did not suffer from infectious disease, injuries, or nutritional stress.

Cribra Orbitalia or Porotic Hyperostosis

None of the crania from Albert Porter Pueblo exhibited the cribra orbitalia or porotic hyperostosis that suggests a poor diet or infectious disease. In contrast, two of five individuals (40 percent) from Woods Canyon, (Bradley 2002), five of the 22 crania (23 percent) analyzed from Sand Canyon Pueblo (Kuckelman and Martin 2007), and nine crania (13 percent) from Salmon Ruins exhibited cribra orbitalia or porotic hyperostosis (Angel 1967). The absence of cribra orbitalia and porotic hyperostosis supports the suggestion that the Albert Porter Pueblo population did not suffer from nutritional stress or infectious disease.

Dental Caries

None of the teeth analyzed from Albert Porter or Woods Canyon pueblos exhibited dental caries, whereas at Sand Canyon Pueblo, 45 percent of the individuals with dentition exhibited dental caries (Kuckelman and Martin 2007), and at Salmon Ruins, 38 percent of the individuals exhibited dental caries (Shipman 2006). The caries were found primarily in adult dentition; only one child and one subadult exhibited caries at Sand Canyon Pueblo and Salmon Ruins, respectively. Although the rate of dental caries varies from site to site (Bradley 2002), it is unusual, especially at maize-dependent Pueblo III period habitations, that none of the individuals from Albert Porter or Woods Canyon pueblos exhibited dental caries. The rate at Sand Canyon Pueblo and Salmon Ruins is more consistent with many other Pueblo III sites.

Enamel Hypoplasia

Individuals exposed at Albert Porter Pueblo did not exhibit any enamel hypoplasia—defects suggestive of nutritional deficiencies—whereas several individuals from Sand Canyon Pueblo, Woods Canyon Pueblo, and Salmon Ruins did exhibit enamel hypoplasia. Defects were present on 69 percent of the individuals from Sand Canyon Pueblo, all of whom had lesions on multiple teeth (Kuckelman and Martin 2007). At Woods Canyon Pueblo, 100 percent of the individuals who could be assessed exhibited enamel hypoplasia. Shipman (2006) does not specify the number of people at Salmon Ruins with this condition, stating only that several individuals exhibited enamel hypoplasia. The absence of enamel hypoplasia from Albert Porter Pueblo suggests that the residents of Porter Pueblo enjoyed better health than those of surrounding communities.

Age- or Stress-Related Pathologies

Similar to the rates at Sand Canyon and Woods Canyon pueblos and Salmon Ruins, five individuals at Albert Porter Pueblo—HROs 7, 8, and 12 and IHBs 4 and 11, all middle adults between 35 and 49 years of age—exhibit age-related degenerative bone disease or stress-related markers, or both. HRO 8 and IHBs 4 and 11 exhibited osteoarthritis on vertebrae or ribs or both, whereas HROs 7 and 12 exhibited age and/or stress-related markers at the wrist and on the hands, probably associated with age and repetitive activity involved in hand and arm movements such as movements associated with grinding and perhaps gathering. HRO 12 also exhibited age- and/or stress-related markers at the knee that might have been caused by bending or kneeling actions associated with gathering and grinding activities.

Kuckelman and Martin (2007) note that DJD was present on the remains of five individuals from Sand Canyon Pueblo who were at least 30 years of age. Two individuals exhibited osteoarthritis at the elbow, and one had this condition at the shoulder; osteoarthritis in either location could result from grinding activities. Two individuals exhibited age-related degenerative osteoarthritis of the spine. Only one individual from Woods Canyon Pueblo, a female, exhibited evidence of DJD or stress-related markers, or both. This female had a well-developed foramen magnum facet at the base of the cranium as well as flattening and lipping of the axis (second cervical vertebra) that can result from hyperextension of the neck. Such hyperextension may occur from the use of a tumpline—a strap that is placed across the forehead to support a heavy burden (Bruhns and Stothert 1999). These remains also exhibited DJD at the elbow, which can be the result of the repetitive action of grinding activities. At Salmon Ruins, six individuals at least 25 years of age exhibited varying degrees of DJD of the spine, and two individuals exhibited DJD on rib heads, at the ankle, knee, and hand (Shipman 2006).

Osteophytosis

Two individuals at Albert Porter Pueblo, HRO 8 and IHB 4, exhibited slight to moderate osteophytosis (lipping) on the superior aspect of lumbar centra. None of the individuals exposed at Sand Canyon Pueblo or Woods Canyon Pueblo exhibited osteophytosis. This could be due to the young age of the individuals at Woods Canyon and Sand Canyon pueblos. The remains of four individuals from Salmon Ruins exhibited osteophytosis on lumbar vertebrae. The lower back is the most common site for the manifestation of osteophytosis and was probably caused by the aging process (Ortner 2003).

Trauma

None of the individuals analyzed at Albert Porter Pueblo showed any evidence of antemortem or perimortem trauma. At Sand Canyon Pueblo, at least seven individuals exhibited antemortem skull fractures and at least four individuals show evidence of perimortem trauma (Kuckelman and Martin 2007). Many of the skeletons were incomplete or disarticulated with perimortem skull fractures that suggest these individuals died in one or more violent events. The human remains exposed at Woods Canyon Pueblo did not exhibit any evidence of trauma (Bradley 2002). At least five individuals from Salmon Ruins exhibit trauma in the form of antemortem fractures, and one individual exhibited a green-stick fracture (Shipman 2006). As with pathologies, it is highly unlikely that none of the individuals at Albert Porter Pueblo experienced any broken bones or head injuries during the course of their daily lives; however, no trauma was represented in this dataset.

Metric Measurements and Stature

Metric measurements and stature could not be recorded for any of the individuals at Albert Porter Pueblo. It is likely that stature estimates for individuals at this site would fall within the ranges for the remains from Sand Canyon Pueblo, Woods Canyon Pueblo, and Salmon Ruins (Table 9.6). Height for males ranged between 166 cm (65.35 in) and 161.22 cm (63.47 in) and between 156 cm (61.41 in) and 153.32 cm (60.36 in) for females (see Table 9.6). Analysts for all three sites used Genovés' (1967) method to estimate stature.

Skeletal Evidence of Relatedness

Congenital Anomalies

Barnes (1994) notes that "every population has its own genetic pattern of developmental tendencies for producing particular defects." However, no congenital anomalies were observed on the remains at Albert Porter Pueblo. At Sand Canyon Pueblo, congenital anomalies included postaxial polydactyly, various dental anomalies, craniosynostosis (a congenital deformity in which at least one cranial suture fuses prematurely), and sternal anomalies (Kuckelman and Martin 2007). At Woods Canyon Pueblo, several congenital anomalies were observed, including the premature fusion of an epiphysis, fusion anomalies involving digits, and possible nonfusion of the fourth and fifth sacral vertebrae. The unfused fourth and fifth vertebrae may be normal or a mild case of spina bifida. Shipman (2006) does not discuss congenital anomalies for remains at

Salmon Ruins. The absence of any congenital anomalies at Albert Porter Pueblo is unusual and is probably the result of sampling strategies and the small population exposed during excavations.

Biological Distance

It appears that a minimum of one individual, HRO 11, a middle-adult male at Albert Porter Pueblo, shared at least one nonmetric trait—lambdoidal ossicles—with HRO 3, a young adult female at Sand Canyon Pueblo, and several individuals at Chaco Canyon (Akins 1986), that suggests relatedness. This suggestion is supported by the proximity of Sand Canyon Pueblo, which is 10 km (6.2 mi) south-southwest of Albert Porter Pueblo. However, the presence of lambdoidal ossicles (extra sutural or wormian bones) appears to have been a fairly common occurrence throughout the northern Southwest and has been observed on remains dating from as early as the Pueblo I period (Akins 1986; Bennett 1965; Douglas and Stodder 2010). Therefore, without further corroborating evidence, inferences regarding relatedness should be considered tentative. Because the observable nonmetric traits were located on different portions of the cranium for HROs 6 and 11 (the face and back of the skull, respectively) at Albert Porter Pueblo, no inferences can be drawn concerning intrasite or intersite relatedness. It is worth noting, however, that Douglas and Stodder (2010) found that the presence of infraorbital sutures and foramina, traits also found on HRO 6 at Albert Porter Pueblo, increased from the Basketmaker II/III period to the Pueblo I/II period in Canyon de Chelly in northeastern Arizona. For Woods Canyon, Bradley (2002) indicates that nonmetric traits were observed on four individuals but does not identify them in her report. Nor did Shipman (2006) provide information about nonmetric traits for the Salmon Ruins population.

Cultural Modification

Occipital cradleboarding was the only form of cultural modification observed at Albert Porter Pueblo, and this modification was observed on the remains of only one individual—HRO 11. At Sand Canyon Pueblo, Woods Canyon Pueblo, and Salmon Ruins, both occipital and lambdoidal cranial modification was observed. At Sand Canyon Pueblo, seven cases of occipital cradleboarding were observed, and three cases of lambdoidal flattening were observed (Kuckelman and Martin 2007). All three of the skulls that could be assessed for cradleboarding at Woods Canyon Pueblo exhibited lambdoidal flattening, whereas at Salmon Ruins, at least seven individuals exhibited lambdoidal flattening, and one individual exhibited occipital flattening (Espinosa 2006).

Mortuary Practices

In this section, I examine and compare mortuary practices at Albert Porter Pueblo with mortuary practices at Sand Canyon Pueblo, Woods Canyon Pueblo, and Salmon Ruins. I discuss formal burials, skeletal remains found in abandonment contexts, and IHBs.

Formal Burials

Many ancestral Pueblo people used middens as locations to formally bury their dead (Hurst and Till 2006). Burial rooms have been discovered at large pueblos including Pueblo Bonito in

Chaco Canyon (Akins 1986, 2003; Judd 1954) and Aztec Ruins (Morris 1924) in northwestern New Mexico, at smaller sites in the La Plata valley (Morris 1939) in northwestern New Mexico, and at Mesa Verde (Fewkes 1909; Nordenskiöld 1979). During the Pueblo III period (A.D. 1150 to 1300), the remains of many individuals were interred in structures and possibly in undetermined locations (Bradley 2002, 2003; Huber 1989; Katzenberg 1999; Kuckelman 2000). Structures appear to have been the preferred location for formal burials at Sand Canyon Pueblo, Woods Canyon Pueblo, and Salmon Ruins. At Sand Canyon Pueblo, seven of the nine formal burials (78 percent) were found in rooms; the other two individuals were located in the southwest corner of a courtyard and in a midden (Kuckelman and Martin 2007). At Woods Canyon Pueblo, 10 of the 11 formal burials (91 percent) discovered were exposed on one kiva floor, and one individual was found in a formally prepared pit on a talus slope (Bradley 2002). Salmon Ruins and Albert Porter Pueblo had similar occupational histories: a Pueblo II component and a Pueblo III component. All burials discovered at Salmon Ruins were found in rooms. In contrast, 11 of 12 formal burials discovered at Albert Porter Pueblo were located in middens. Two midden burials date from the late Pueblo II period (A.D. 1060–1150), five date from late Pueblo II–early Pueblo III times (A.D. 1060–1225), and four date from the span from mid-Pueblo II to late Pueblo III (A.D. 1020–1280). One individual appears to have been placed in or on pit-structure roof fall and dates from the late Pueblo II–early Pueblo III span (see Table 9.1 and Table 9.3); however, if this was a formal burial, it would have been a secondary inhumation.

These data suggest that structures were preferred interment locations for formal burials at Sand Canyon Pueblo, Woods Canyon Pueblo, and Salmon Ruins, and that middens were preferred at Albert Porter Pueblo. However, Kuckelman and Martin (2007) caution that because middens at Sand Canyon Pueblo were sampled relatively lightly, it is not clear if the preference for structures at that site is a strong pattern, and Bradley (2002) suggests that the presence of the remains of 10 individuals on the floor of a kiva at Woods Canyon Pueblo might indicate an unusual or catastrophic event.

However, further research suggests that the absence of formal burials in rooms and the use of middens for formal burials at Albert Porter Pueblo might be an anomaly. A preference for placing burials in rooms has been observed at a minimum of one other Pueblo II–Pueblo III site. At Aztec Ruins (A.D. 1085–1120) in northwestern New Mexico, approximately 21 km (13 mi) north-northeast of Salmon Ruins, four burials dating from the Pueblo II period were recovered. Two of the Pueblo II burials were found in rooms, and the other two were in a midden. All but two of 149 burials dating from the Pueblo III period were discovered in rooms (Morris 1924). It is possible that the HROs at Albert Porter Pueblo that date from the middle-to-late Pueblo II or early Pueblo III time span might have been interred during the Pueblo II period; however, this would not explain the absence of burials dating from the Pueblo III period from the excavated rooms at that site.

At Albert Porter Pueblo, only two burials pits could be defined, and these were oval to rectangular. The shape of these pits, the positions of the remains, and the association of funerary objects indicate that these individuals were interred in a manner similar to burials dating from Pueblo II–Pueblo III times throughout much of the northern Southwest. The right arm of HRO 6 was extended down the right side of the body, and HRO 12 was resting on the right side with legs possibly flexed. Kuckelman and Martin (2007) note that most of the formally buried individuals at Sand Canyon Pueblo were either flexed or semi-flexed. At Woods Canyon Pueblo, HR0 11, the remains of a child that were exposed on a talus slope, had been placed in a prepared pit in a semi-flexed position (Bradley 2002). The remains of the 10 individuals in a kiva had not been placed in burial pits; rather, they were laid out on the floor. Six of the 10 individuals were supine with the legs extended, one individual was semi-flexed, and body position could not be determined for the other three individuals. Although the mortuary context of these remains is unusual, multiple burials have been reported at Pueblo sites dating from the Basketmaker through Pueblo III periods (Nordenskiöld 1979; Turner and Turner 1999). Researchers tend to interpret mass burials as resulting from epidemics especially when the remains of children are present (Morris 1939). This appears to be the case for Woods Canyon; Bradley (2002) notes that care was taken in the placement of the bodies, and no perimortem trauma was observed. The burials associated with the second component at Salmon Ruins were interred in a manner similar to those at Albert Porter and Woods Canyon pueblos. With one exception, the bodies at Salmon Ruins were flexed, supine, or resting on one side (Shipman 2006); body position could not be determined for burials dating from the earlier component.

Body orientation and head direction varied at Albert Porter Pueblo. HRO 2, an adult, was oriented along an east-west axis with the head to the east. HRO 6, a female between 27 and 39 years of age, was oriented along a southwest axis with the head to the southwest and facing up. HRO 10, a child between 6 and10 years of age, was oriented with the head to the west and facing up. Body orientation and head direction was not listed in the Sand Canyon Pueblo report. All 10 individuals exposed in the kiva at Woods Canyon Pueblo were oriented south-to-north with the head to the south, whereas the remains of the child encountered on the talus slope was oriented along a northwest axis with the face to the north (Bradley 2002). At Salmon Ruins, body orientation and head direction varied (Shipman 2006).

Associated funerary objects were identified with the remains of three individuals at Albert Porter Pueblo. HRO 2, an adult, was accompanied by a Chaco/McElmo Black-on-white-style miniature pitcher that was probably produced A.D. 1075–1300 (Blinman and Wilson 1989) and a Mancos Corrugated jar that probably dates A.D. 920–1180; the funerary objects were placed on the individual, possibly near the lower legs. HRO 6, a female 27 to 40 years of age, was accompanied by two Mancos Black-on-white bowls that probably date A.D. 1000–1150 (Blinman and Wilson 1989); the bowls had been placed near the head. HRO 10, a child six to 10 years of age, was accompanied by two Pueblo III side-notched projectile points. The location of the projectile points relative to the body is unknown. Although funerary objects were identified with only three burials at Albert Porter Pueblo, other burials might also contain funerary items. Excavating human remains was not part of the research design, and therefore excavation stopped when remains were encountered without any attempt to expose additional elements or associated funerary objects.

Four of the nine formal burials at Sand Canyon Pueblo were accompanied by funerary objects (Kuckelman and Martin 2007:Table 1). The pottery included Pueblo III White ware, including Mesa Verde Black-on-white, dating from about A.D. 1100–1300, and McElmo Black-on-white, dating from about A.D. 1075–1300 (Blinman and Wilson 1989). One formal burial, that of a subadult/young adult between 15 and 20 years of age, contained numerous possible grave goods including one Pueblo III White Unpainted bowl, one Pueblo III White Painted mug, a Mesa

Verde Black-on-white mug, two Mesa Verde Black-on-white bowls, one McElmo Black-on-white bowl, and one Pueblo III White Painted bowl. Lithic artifacts included one abrader, one core, five fragments of chipped-stone debris, one modified flake, and one mano. At Woods Canyon Pueblo, two vessels accompanied an individual buried in a prepared pit on a talus slope. Possible associated funerary items were in proximity to several of the 10 individuals on the kiva floor at Woods Canyon: a pottery disk was near the remains of one child, a quartz stone was near the remains of another child, an axe was found under the remains of an adult, and partly reconstructible vessels were near the remains of two adults. Because of the unusual context of these burials, it was difficult to determine whether the items were intended to be funerary objects (Bradley 2002). At Salmon Ruins, funerary objects were recovered with the remains of males and females as well as all age groups, including infants. The funerary objects included wood items, baskets, textiles, basketry, faunal and floral material, and, most frequently, pottery vessels (Espinosa 2006). The pottery includes several Mesa Verde Black-on-white bowls and at least one McElmo Black-on-white bowl. The presence and types of funerary objects at Albert Porter Pueblo are consistent with those at Sand Canyon Pueblo, Woods Canyon Pueblo, Salmon Ruins, and many other sites in the northern Southwest.

The presence of an unusual, Chaco/McElmo vessel with HRO 2 suggests that this individual might have been an important person; this appears to be the only suggestion of social differentiation in funerary objects at Albert Porter Pueblo. The presence of two projectile points with HRO 10 reflects a practice of placing funerary objects with the remains of children; the significance of the projectile points is unknown but could represent gender, belief systems, or grief. The placement of the remains of a person of status in a midden and the use of middens for formal burials during the Pueblo III period (see Table 9.1) supports the inference that, in contrast to at least four other sites with Pueblo III components—Woods Canyon and Sand Canyon pueblos, and Salmon and Aztec ruins—middens, rather than rooms or other structures, were the preferred location for formal burials at Albert Porter Pueblo during the Pueblo III period.

Informal Burials and IHBs

In this section, I discuss the IHBs and the skeletal remains found in abandonment contexts at Albert Porter and Woods Canyon pueblos. Shipman (2006) and Espinosa (2006) do not discuss the isolated human remains at Salmon Ruins. All of the human remains exposed in structures at Albert Porter Pueblo were IHBs, and most consist of one or two bones or bone fragments. The bones were disarticulated, and no formal burial pits or associated funerary objects were observed. IHBs 2, 3, 4, and 5, which date from the early Pueblo III (A.D. 1150–1225) occupation, were recovered from kiva (Structure 502) fill and represent individuals ranging in age from child to adult (see Table 9.1). The other two isolated elements dating from the Pueblo III period, IHBs 6 and 7, elements from an adult and an infant, respectively, were discovered in midden contexts. IHBs 1, 8, 9, and 10 were also discovered in middens and date from the late Pueblo II–early Pueblo III time span (A.D. 1060–1225). IHB 11 was found in a midden dating mid-Pueblo II–late Pueblo III. The informal burials and isolated remains discovered at Woods Canyon Pueblo were found in similar contexts, and no perimortem or antemortem trauma or modification was observed. Twenty-four isolated elements were found at Woods Canyon Pueblo; seven of these were in structure fill and 17 were in nonstructure areas such as middens (Bradley 2002). The origins of the IHBs in structures at Albert Porter Pueblo are ambiguous; they might have been intentionally placed in the kiva fill, they might be portions of one or more disturbed burials, or they might have been moved from their original location by natural processes. Sex could not be determined for any of the remains in structures.

Conclusions

The Albert Porter Pueblo skeletal remains and mortuary practices contribute important and interesting information to our knowledge of the Pueblo II–Pueblo III periods in the Mesa Verde region and the northern Southwest. In many respects, the osteological analysis and mortuary practices suggest that life at Albert Porter Pueblo differed from that at nearby Woods Canyon and Sand Canyon pueblos and as far south as Salmon Ruins. Other aspects of the skeletal and mortuary analytic results are consistent with Pueblo II–Pueblo III sites over much of the northern Southwest. The skeletal remains suggest that, in contrast to the comparison sites of Sand Canyon Pueblo, Woods Canyon Pueblo, and Salmon Ruins, the residents of Albert Porter Pueblo were in excellent health, with the remains of only one individual exhibiting evidence of infection. The same can be said of degenerative changes to bone and of stress markers that reflect repetitive activity. On the basis of the available data, I suggest that the Albert Porter population experienced better health than the residents of the comparison sites. It would be interesting to see how the Albert Porter population compares with other Pueblo II–Pueblo III sites in the northern Southwest.

Nor is there evidence of any antemortem or perimortem trauma. This suggests that not only did the residents of Albert Porter Pueblo enjoy relatively good health, but they were not subject to the violent events that occurred at nearby Sand Canyon Pueblo near the time of permanent regional abandonment in the late A.D. 1200s. The remains in the burials at nearby Woods Canyon Pueblo exhibit some evidence of health issues, but no evidence of violence was observed on those remains, either. The absence of trauma on exposed remains at these two sites poses interesting questions that deserve further attention, because there is evidence that violence occurred near the time of regional abandonment at a minimum of one additional nearby site—Castle Rock Pueblo, which was occupied from A.D. 1250 until about 1280 (Kuckelman et al. 2002). In other words, at four sites in relative proximity, two, Sand Canyon and Castle Rock pueblos, show evidence of violence and two, Albert Porter and Woods Canyon pueblos, show no evidence of violence. One explanation for the difference is that the residents of the latter sites controlled the surrounding region and were the aggressors at Sand Canyon and Castle Rock pueblos. Nevertheless, research at other nearby sites might shed light on the relationship between Albert Porter Pueblo and surrounding sites.

Another difference that deserves attention between Albert Porter Pueblo and the comparison sites is burial location. As noted earlier, during the Pueblo III period, most formal burials were placed in structures. This does not appear to have been the case at Albert Porter Pueblo. The mortuary data indicate that middens remained the preferred location for formal burials. There are numerous reasons for placing an individual in a particular location including ideology, symbolism, rank, and gender. Whatever the reason, the residents of Albert Porter Pueblo appear to have continued to formally bury their dead in middens, whereas the residents of Sand Canyon Pueblo and possibly Woods Canyon Pueblo, as well as Salmon and Aztec ruins, placed formal burials in structures. This suggests another fundamental difference between Albert Porter Pueblo and other Pueblo III sites that warrants further investigation, particularly with nearby sites.

There are similarities between the Albert Porter Pueblo burials, burials at the comparison sites, and Pueblo II–Pueblo III burials across the northern Southwest. Two individuals at Albert Porter Pueblo exhibit stress markers on bone that suggest repetitive activities such as bending and grinding. Similar to burials throughout much of the northern Southwest, formally buried remains at Albert Porter Pueblo were placed in prepared burial pits with the legs flexed, semi-flexed, or extended, were positioned with variable head direction and body orientation, and funerary objects were included with at least three individuals. Although funerary objects were identified with only three individuals, it is likely that funerary objects accompanied at least some of the other formal burials. If present, such items might have remained obscured as a result of Crow Canyon's policy to stop excavation when human remains are discovered. The lack of identified funerary objects precludes inferences about status, age, or gender differentiation, other than the presence of the Chaco/McElmo vessel that accompanied one formal adult burial, which is an unusual vessel type and may indicate high status, and that the presence of funerary objects with a child is consistent with Pueblo II–Pueblo III mortuary practices throughout the Southwest. The type of funerary items with the child—Pueblo III projectile points—is unusual and might indicate high status.

Although the funerary items at Albert Porter Pueblo are suggestive of social differentiation, a closer look at Pueblo II–Pueblo III funerary objects from contemporary sites could provide insights into age and gender differentiation and economic roles during the Pueblo II–Pueblo III time span. Previous mortuary studies tend to focus on elite vs. non-elite burials. A study that focuses on the individual and how economic roles, age, and gender are reflected in mortuary practices would be informative at the site and regional level. Moreover, whereas body orientation and head direction varied and exhibited no discernible pattern, further research is warranted. These characteristics might have been determined by age or sex, or on other factors including clan, rank, or ideological beliefs, or some combination of these factors. For example, Albert Yava (1978), a Tewa-Hopi elder from northern Arizona, explains that the different groups that came to live on the Hopi Mesas brought their own ideas about the treatment of the dead. Some Hopi, the Oraibis, buried their dead facing west towards the Grand Canyon, whereas the Walpis and Tewas buried their dead facing east or with the feet to the east, so that they could sit up and look to the east (Yava 1978).

In conclusion, the remains discovered at Albert Porter Pueblo offer new insights into the Pueblo II–Pueblo III time span in the Mesa Verde region. The sample from Albert Porter Pueblo is small, and that must be taken into consideration. However, two glaring contrasts with nearby, generally contemporaneous, sites are evident. Both the absence of perimortem trauma at village abandonment and the use of middens for formal burials add to knowledge of Pueblo II–Pueblo III mortuary practices. Both raise questions about possible ideological, social, and political differences between settlements and the relationships between the residents of Albert Porter Pueblo, their neighbors, and the occupants of other pueblos throughout the region.

Table 9.1. Demographics, Albert Porter Pueblo.

	Context	Temporal Assignment*	Individual	Age (years)	Sex
HRO #					
1	NST 801 (midden)	LPII–EPIII	1	Infant/Child 1–3	Immature
2	NST 901 (midden)	LPII–EPIII	1	Adult	Indeterminate
3	NST 901 (three midden units)	LPII–EPIII	1	Young Adult 30–35	Possible female
4	NST 601 (midden)	LPII–EPIII	1	Child 4–12	Immature
5	NST 901 (midden)	LPII–EPIII	1	Child 3–5	Immature
6	NST 1103 (midden)	LPII	1	Young Adult-Middle Adult 27–40	Possible female
7	NST 101 (midden)	Mid PII–LPIII	1	Middle Adult 35–45	Indeterminate
8	STR 1104 (pit structure)	LPII–EPIII	1	Middle Adult 35–45	Indeterminate
9	NST 101 (midden)	Mid PII–LPIII	1	Child 2–4	Immature
10	NST 101 (midden)	Mid PII–LPIII	1	Child 6–10	Immature
11	NST1041 (midden)	LPII	1	Middle Adult 35–49	Male
12	NST 101 (midden)	Mid PII–LPIII	1	Middle Adult 35–45	Indeterminate
IHB #					
1	NST 901 (three midden units)	LPII–EPIII	2 (HRO-3)	Child 5–6	Immature
2	STR 502 (kiva)	EPIII	1	Subadult	Immature
3	STR 502 (kiva)	EPIII	2 (IHB-2)	Adult	Indeterminate
4	STR 502 (kiva)	EPIII	1	Middle Adult 35–49	Indeterminate
5	STR 502 (kiva)	EPIII	1	Child 6–10	Immature
6	NST 401 (midden)	PIII	1	Adult	Indeterminate
7	NST 401 (midden)	PIII	1	Infant 0.5–2	Immature
8	NST 904 (midden)	LPII–EPIII	1	Adult	Indeterminate
9	NST 901 (midden)	LPII–EPIII	1	Adult	Indeterminate
10	NST 904 (midden)	LPII–EPIII	1	Adult	Indeterminate
11	NST 101 (midden)	Mid PII–LPIII	2	Middle Adult 35–49	Indeterminate

* Temporal Assignments:
LPII = Late Pueblo II (A.D. 1060–1140)
LPII–EPIII = Late Pueblo II–Early Pueblo III (A.D. 1060–1225)
Mid PII–LPIII = Mid-Pueblo II–Late Pueblo III (A.D. 1020–1280)
EPIII = Early Pueblo III (A.D. 1040–1225)
PIII = Pueblo III (A.D. 1140–1225)

Table 9.2. Pathologies, Albert Porter Pueblo.

	Age (years)	Sex	Dental Pathologies	Trauma	Degenerative Joint Disease/Stress Markers
HRO #					
1	Infant/Child 1–3	Immature	N/A	None	N/A
2	Adult	Indeterminate	None	None	None
3	Young Adult 30–35	Possible female	N/A	None	None
4	Child 4–12	Immature	N/A	None	None
5	Child 3–5	Immature	N/A	None	None
6	Young Adult-Middle Adult 27–40	Possible female	Calculus, and mild periodontal disease at alveolar bone around central mandibular incisors	None	None
7	Middle Adult 35–45	Indeterminate	N/A	None	Stage 1 DJD on the hand at the right distal ulna and radius and hand phalanges
8	Middle Adult 35–45	Indeterminate	N/A	None	Stage 1 DJD at C-1 and L-3; osteophytosis at L-3 vertebrae
9	Child 2–4	Immature	N/A	None	None
10	Child 6–10	Immature	None	None	None
11	Middle Adult 35–49	Male	N/A	None	None
12	Middle Adult 35–45	Indeterminate	N/A	None	Stage 2 DJD at the knee on the distal femur and proximal tibia and ossification on the tibia anterior tubercle
IHB #					
1	Child	Immature	None	None	N/A
2	Subadult	Immature	None	None	None
3	Adult	Indeterminate	N/A	None	None
4	Middle Adult 35–49	Indeterminate	N/A	None	Osteophytosis at L-1 vertebrae
5	Child 6–10	Immature	None	None	None
6	Adult	Indeterminate	N/A	None	None
7	Infant	Immature	N/A	None	N/A
8	Adult	Indeterminate	N/A	None	None
9	Adult	Indeterminate	N/A	None	None
10	Adult	Indeterminate	N/A	None	None
11	Middle Adult 35–49	Indeterminate	N/A	None	Stages 1 and 2 DJD at the vertebral margins of the ribs

Table 9.3. Mortuary Practices, Albert Porter Pueblo.

HRO #	Age (years)	Sex	Burial Pit	Funerary Objects	Head Direction	Body Position	Single/ Multiple Burial	Comments
Midden Inhumations								
1	Infant	Immature	Indeterminate	Indeterminate	Indeterminate	Indeterminate	Single	
2	Adult	Indeterminate	Indeterminate	Chaco/McElmo miniature jar and Mancos Corrugated jar	Indeterminate	Indeterminate	Single	Located near lower legs
3	30–35	Probable female	Indeterminate	Indeterminate	Indeterminate	Indeterminate		Child premolar
4	4–12	Immature	Oval/rectangular	None	East	Indeterminate	Single	
5	3–5	Immature	Indeterminate	Indeterminate	Indeterminate	Indeterminate	Single	
6	27–40	Probable female	Indeterminate	2 Mancos Black-on-white bowls	Southwest/face up	Indeterminate	Single	
7	35–45	Indeterminate	Oval	Indeterminate	Indeterminate	Right arm extended down body	Single	
9	2–4	Immature	Indeterminate	Indeterminate	Indeterminate	Indeterminate	Single	
10	6–10	Immature	Indeterminate	2 Pueblo III period side-notched projectile points	West/face north	Indeterminate	Single	
11	35–49	Male	Indeterminate	Indeterminate	Northeast	Indeterminate	Single	Cradleboarding
12	35–45	Indeterminate	Indeterminate	Indeterminate	Indeterminate	Right side-possible flexed	Single	
Structure Inhumations								
8	35–45	Indeterminate	No	None	Indeterminate	Indeterminate	Single	Disarticulated cluster of bones, possibly not a formal burial

Table 9.4. Age and Sex Distribution at Albert Porter Pueblo and Selected Sites.

Age Range (years)	Males/ Probable Males	Females/ Probable Females	Age and/or Sex Unknown	TOTAL	Percent
Albert Porter Pueblo					
Infant			2	2	10
Child			6	6	26
Subadult (12–18)			1	1	4
Adult	1	2	11	14	61
TOTAL, Albert Porter Pueblo				23	100
Sand Canyon Pueblo					
Infant			8	8	25
Child			3	3	9
Adolescent (12–18)			8	8	25
Adult	2	10	1	13	41
TOTAL, Sand Canyon Pueblo				32	100
Woods Canyon Pueblo					
Infant			1	1	10
Child			5	5	45
Adolescent (12–20)			1	1	10
Adult	0	2	2	4	36
TOTAL, Woods Canyon Pueblo				11	100
Salmon Ruins					
Infant (and newborn/fetus)			19	19	27
Child (3–11)			15	15	21
Adolescent (12–17)			4	4	6
Adult	16	14	3	33	47
TOTAL, Salmon Ruins				71	100

Note: Percentages shown as totals may not add up to exactly 100% due to rounding.

Table 9.5. Male and Female Burials at Albert Porter Pueblo, Sand Canyon Pueblo, Woods Canyon Pueblo, and Salmon Ruins.

	Males/ Probable Males	Females/ Probable Females	Sex Unknown	TOTAL
Albert Porter Pueblo				
	1	2	1	4
Sand Canyon Pueblo				
	2	10	2	14
Woods Canyon Pueblo				
	0	2	2	4
Salmon Ruins				
	16	14	3	33

Table 9.6. Average Stature Estimates for Individuals at Sand Canyon Pueblo, Woods Canyon Pueblo, and Salmon Ruins.

	Males	Females	Source
Sand Canyon Pueblo	166 cm (65.35 inches) (one individual)	156 cm (61.41 inches)	Kuckelman and Martin 2007
Woods Canyon Pueblo	N/A	153.60 cm (60.50 inches)	Bradley 2002
Salmon Ruins	161.22 cm (63.47 inches)	153.32 cm (60.36 inches)	Shipman 2006

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Chapter 10

Faunal Remains

by Shaw Badenhorst and Jonathan C. Driver

Introduction

Albert Porter Pueblo (Site 5MT123) is located in the central Mesa Verde region in what was the most densely settled area of the northern San Juan (Varien 1999, 2000:1–2). Driver (2002a) presents an overview of faunal patterns for the northern San Juan region that spans the Basketmaker II period to the Pueblo III period. His main conclusions consist of the following: (1) domestic turkey first became an important food item during the Pueblo II period, and turkey consumption increased significantly compared to rabbit consumption during the Pueblo III period; (2) the consumption of jackrabbits declined in relation to that of cottontails during the Pueblo III period; and (3) the consumption of Artiodactyla declined relative to rabbit consumption in the Pueblo III period (Driver 2002a:157–158). These changes in animal usage were probably associated with an increase in human populations especially during the Pueblo III period. As large-bodied animals such as deer became sparser from over-hunting, more turkeys were raised. Deforestation from increasing human populations in the region could have created favorable conditions for cottontails (Driver 2002a:158). The data from excavations at Albert Porter Pueblo (Ryan 2002, 2003, 2004, 2005) offer an opportunity to determine whether faunal exploitation at this settlement was consistent with regional-scale patterns. Additionally, intrasite spatial variations in faunal remains are examined.

Albert Porter Pueblo is a multi-component site consisting of a great house, surrounding unit pueblos, and associated middens (Ryan 2002, 2003, 2004, 2005). Study units at this site were dated using dendrochronology, pottery, stratigraphy, radiocarbon dating, archaeomagnetic dating, and structural morphology (see Chapter 3). The following time periods were assigned: Pueblo I/III period (mixed); Pueblo II period (A.D. 900–1150); Pueblo II–III period (A.D. 900–1350); and Pueblo III period (A.D. 1150–1350). Fine-resolution dating of some deposits was also possible (e.g., early Pueblo III and late Pueblo III). Study units and their assigned dates are summarized in Table 10.1. Study units from which no faunal remains were recovered are excluded from this report.

With relatively few zooarchaeological studies of great houses completed to date, little is known about the associated archaeofauna (e.g., Durand and Durand 2006; Fothergill 2008; Kantner and Mahoney 2000). Fauna have been reported from the following great houses in the central Mesa Verde region: Ida Jean, Bluff, Escalante, Wallace, Morris 31, Lowry, Yellow Jacket, and Comb Wash (Badenhorst 2008; Driver 2002a). The Albert Porter Pueblo faunal assemblage will therefore add to our knowledge of animal usage at great houses in the central Mesa Verde region. Results of this faunal analysis were used to address the following research questions:

- Are there differences between the archaeofauna from the Albert Porter Pueblo great house compared to surrounding residential units during the Pueblo II, II/III, and III periods that might suggest differential access to resources?

- Are there changes in faunal usage through the Pueblo II, II/III, and III periods?

- How does the faunal assemblage from Albert Porter Pueblo compare to assemblages from other villages and great houses in the northern San Juan Basin?

Methods

The faunal remains collected from Albert Porter Pueblo were analyzed by Badenhorst and Driver of Simon Frasier University. The general analytical approach used in this analysis is that of Driver (1991, 2005). During analysis, the taxon and skeletal element of specimens were identified. Each specimen was described using a code system (Driver 2005) that includes side, age, breakage (e.g., spiral, transverse, irregular), and taphonomic modification. Essentially, this method assumes that all specimens that can be identified as to element are “identifiable” and attributable to a taxon. Furthermore, although loose teeth are recorded and considered identifiable, these are excluded from any subsequent quantification. Many teeth fracture into numerous pieces, and because all of these fragments are regarded as “identifiable,” they inflate species counts. Also, teeth of small animals such as cottontails and rodents fall through screens in the field, and thus the quantity of specimens that are collected do not accurately represent abundance. Eggshell fragments, which are fragile and break into numerous small pieces, are also excluded from species counts. Details of this analysis are presented by Badenhorst (2008).

This study used the Number of Identified Specimens (NISP) as the most basic quantification method. NISP is the preferred method of quantification for sites in the northern San Juan region (e.g., Driver 2002a; Muir 1999; Rawlings 2006). Using methods described elsewhere (Binford 1978; Pickering et al. 2003), Minimum Number of Elements (MNE) and Minimum Animal Units (MAU) were also calculated; these methods aid in the investigation of body-part frequencies of taxa. Minimum Number of Individuals (MNI), a method used by many researchers (e.g., Grayson 1979; Lyman 2008; Perkins 1973; Plug and Plug 1990; Reitz and Wing 1999), was not used in this study because of its research limitations.

Indices were calculated for artiodactyls, rabbits, and turkeys. Indices are ratios of NISP counts between different animal groups or species and are designed to highlight specific aspects of a faunal assemblage. An index that changes through time suggests that the ratios between different taxa changed (e.g., Driver 2002a; Durand and Durand 2006; Szuter and Bayham 1989). The Artiodactyla Index compares artiodactyls to rabbits (Szuter and Bayham 1989) and measures the relative use of large and small game. The Lagomorph Index measures the ratio of cottontails to all lagomorphs and is designed to reveal environmental differences resulting from either natural or anthropogenic factors (Driver and Woiderski 2008; Szuter and Bayham 1989). The Turkey Index is the ratio of turkeys to cottontails and jackrabbits (lagomorphs) and reflects the relative importance of domestic turkey in relation to wild game (Driver 2002a; Spielmann and Angstadt-Leto 1996).

Results

The total faunal assemblage from Albert Porter Pueblo consists of 19,438 specimens, excluding teeth and eggshell fragments. In total, 9,977 specimens (51 percent) were identified. Most of the faunal remains recovered date from the Pueblo III period, followed by remains from contexts dating from the Pueblo II/III category, the Pueblo II period, and the unassigned, mixed Pueblo I/III category (Table 10.2). The faunal assemblage for the unassigned, mixed Pueblo I/III category contained only seven specimens—these results will be excluded from the tables because of the small size of this subassemblage.

Mammal, bird, fish, reptile, and amphibian remains were identified in the Albert Porter Pueblo assemblage. Mammal remains included a variety of carnivore, artiodactyla, squirrel, rodent, and rabbit bones, although cottontail remains dominate the mammal assemblage. A variety of birds are represented; turkey and indeterminate large bird bones (which probably are turkey) are common in the subassemblages for all time periods, particularly the Pueblo III period. Few amphibian, reptile, and fish remains were identified (Table 10.3).

For Albert Porter Pueblo, time periods (e.g., Pueblo III) have been divided into sub-phases on the basis of pottery and architectural data. The identified fauna are presented by sub-phase in Table 10.4. The faunal remains indicate that turkeys (and indeterminate large birds) first became prominent during the early Pueblo III period (A.D. 1140–1225).

The lagomorph, artiodactyla, and turkey indices are presented in Table 10.5 by general time period. The Lagomorph Index is greater for the Pueblo II period (0.87) than the Pueblo II/III category (0.69) but similar to the Pueblo III period (0.83). The Artiodactyla Index is low for all time periods. The Turkey Index for the Pueblo II period (0.18) is about one-half of that for the Pueblo II/III period (0.31), and the Turkey Index for the Pueblo III period (0.81) is more than double the index for the Pueblo II/Pueblo III assemblage (see Table 10.5).

Table 10.6 presents the indices as calculated for the following date spans: early Pueblo III period (A.D. 1140–1225), terminal Pueblo II–initial Pueblo III period (A.D. 1100–1180), the late Pueblo III period (A.D. 1225–1280), and the late Pueblo II period (A.D. 1060–1140). Some sub-periods were excluded due to their long time span and small sample size. The Artiodactyla Index is low for all periods of occupation of Albert Porter Pueblo but is lowest for the late Pueblo III period. The Lagomorph Index is similar for the late Pueblo II period (0.87) and the late Pueblo III period (0.94). The Turkey Index is the lowest for the late Pueblo II period, significantly higher for the terminal Pueblo II–early Pueblo III period and is greatest for the late Pueblo III period.

We addressed possible differences in animal use between residents of the great house vs. those of the surrounding unit pueblos. Few faunal remains were obtained from masonry surface rooms at Albert Porter Pueblo, because excavations focused largely on kivas and middens, and because few rooms contained midden deposits. Most faunal remains recovered from the site were collected from middens.

Cottontail, jackrabbit, and turkey/large bird NISPs were totaled for each study unit within the great house and surrounding residences. These data are expressed as percentages in Tables 10.7, 10.8, and 10.9. For comparative purposes, all study units in Architectural Block 100—which includes the great house as well as additional middens and kivas—are grouped together in the "great house" category. All other study units are grouped as "outside" features.

Minor differences are apparent in the cottontail and turkey/large bird subassemblages. All common taxa were deposited in nearly equal proportions within and outside the great house during the Pueblo II period. This indicates that, during the Pueblo II period, faunal utilization was similar between the users of the great house and those occupying surrounding unit pueblos. Cottontail is the most common taxon represented in the assemblage (see Table 10.7). Higher percentages of cottontail and jackrabbit were present in contexts assigned to the Pueblo II/III category in the residences outside the great house. However, a higher percentage of turkey/large bird remains were associated with the great house. Turkey/large bird remains were more plentiful in deposits assigned to the Pueblo II/III category and are the most common taxa represented in the great house assemblage (see Table 10.8). Within the great house, cottontail remains occur in similar frequencies in deposits that date from the Pueblo III period and in deposits that could be dated no more precisely than "Pueblo II/III." In deposits dating from the Pueblo III period, jackrabbit remains were found in greater frequencies in areas outside the great house than within the great house. Turkey/large bird remains were found inside and outside the great house in similar frequencies (see Table 10.9). The data suggest that use of turkey increased in the great house during Pueblo II/III times, and use increased in the surrounding residences during the Pueblo III period (see Tables 10.7, 10.8, and 10.9).

Ethnographic accounts (e.g., Beaglehole 1970; Gnabasik 1981; Schroeder 1968) suggest that all animals identified in the Albert Porter Pueblo faunal assemblage, except rodents, had ritual connotations in recent times. These views might have originated during the Pueblo II or Pueblo III periods. Remains of carnivores and birds of prey were found in all contexts at the site and these animals might have been used for purposes other than consumption. No significant spatial patterning is evident for the site. Unfortunately, subassemblages of ritual taxa are too small to be compared by context (e.g., kiva floor vs. kiva fill). In addition, comparisons of subassemblages are all hampered by the following: element fragmentation and poor preservation, which interfere with taxon identification; possible disturbance of deposits; and variation in sample size. Contexts with larger samples yielded a larger variety of taxa that might not have been consumed (e.g., wild carnivores and wild birds). One particular deposit does provide direct evidence of ritual activities—75 vertebrae and 114 ribs of a snake were found on the floor of Structure 502, a masonry-lined kiva. This snake was decapitated before being placed near the hearth. Snakes had strong ritual significance ethnographically (Beaglehole 1970).

The age structure represented in the remains of a hunted population can provide evidence of the intensity of predation. Variation in population-age structure is documented most easily in species that have relatively long lives and reproduce relatively slowly, such as deer. Teeth provide the most useful data; however, few deer teeth were found at Albert Porter Pueblo. Thus, the following method was used to assess the average age of the deer whose remains were recovered from the site.

Long-bone epiphyses fuse to the diaphysis (bone shaft) in a specific sequence as the animal matures. The ratio of artiodactyls killed before or after attaining skeletal maturity can be determined by inspecting the state of fusion of the epiphyses that fuse last (proximal humerus, distal radius, proximal and distal femur, proximal tibia). In the Albert Porter Pueblo assemblage, 83 percent (15 of 18) of these late-fusing epiphyses were unfused. Data from all time periods were combined because of the small sample of artiodactyla elements and the relatively brief time periods. Rawlings (2006) noted the same finding in the deer remains from Shields Pueblo, which is also located in the central Mesa Verde region. Because unfused epiphyses are more susceptible to destruction than fused bones, the remains recovered can be inferred to reflect the minimum percentage of immature deer that were harvested. High frequencies of immature specimens suggest intensive predation (Munro 2004); thus, the data for Albert Porter Pueblo are consistent with the conclusion that the deer population declined in the northern San Juan region as a result of intensive hunting (Driver 2002a).

Taphonomy

An ongoing issue in Southwest archaeology is whether fossorial (burrowing) small animals such as squirrels, wood rats, and pocket gophers were consumed by humans (Szuter 1994), or whether the presence of these elements represent natural intrusions into the archaeological record (Muir 1999; Rawlings 2006). We use the following multiple lines of evidence to determine whether the small rodents and squirrels represented in the faunal assemblage for Albert Porter Pueblo were consumed: ethnographic evidence of the consumption of small rodents and squirrels by Pueblo groups; a low frequency of fresh and sun-bleached specimens; fresh spiral fractures on long bones; the presence of charred mandibles; and ethological considerations such as live weights, group size, and burrowing habits (Badenhorst 2008). On the basis of the types of evidence listed above, we infer that small rodents and squirrels were consumed at Albert Porter Pueblo. Percentage NISP indicates that small rodents are nearly equally represented in the Pueblo II (11 percent) and Pueblo III (10 percent) subassemblages. Therefore, rodents were not used as an emergency food supply as the population of larger game animals declined.

Artiodactyla limb bone MNE, MAU, and percentage MAU for Albert Porter Pueblo were compared to density values (Table 10.10) taken from Brain (1981) and Lyman (1994) as applied by Rawlings (2006:110). Unfortunately, few artiodactyla remains were recovered from Albert Porter Pueblo. Bones with less density, such as humeri, were absent from this assemblage. No anthropogenic activities are discernible in the artiodactyla, lagomorph, or turkey subassemblages (Table 10.11).

Numerous specimens in the Albert Porter Pueblo faunal assemblage were burned. The Pueblo II/III subassemblage contains the highest incidence (19 percent of the total sample) of burned bone (Table 10.12), whereas the Pueblo III subassemblage contains the lowest (10 percent).

A few bones from this site display butchering damage in the form of cut marks and chop marks (Table 10.13). A total of 89 bones from a variety of taxa show carnivore chew marks, although no particular pattern can be discerned (Table 10.14). A few specimens display rodent gnaw marks (Table 10.15), although it is not possible to determine if these were inflicted during or after occupation of the settlement.

Modified Bone

In total, 444 artifacts of modified bone were identified in the faunal assemblage for Albert Porter Pueblo. These objects were made from the remains of various taxa (Table 10.16). Only a few items are burned; high frequencies of burned-bone artifacts may indicate special treatment of these specimens during manufacture. Most of the abraded bone artifacts from this site are fragments with evidence of polish; none could be assigned an artifact type. Of 444 worked bones from this site, 177 have sharpened points and are probably awls. Another 78 specimens are complete or broken tubes or beads. Three small oval gaming pieces are also present. Other than the awls, gaming pieces, beads, and tubes, the sample consists largely of fragments that show some evidence for use as tools. Many different elements were used to make bone tools, but no meaningful patterns are discernible. Most bone tools were manufactured from turkey and indeterminate large bird remains that date from the Pueblo III period. The frequency of bone tools correlates strongly with the size of the sample.

Discussion

The Use of Animals

The carnivore remains found in the Albert Porter Pueblo assemblage indicate that the residents hunted or trapped carnivores. It is unlikely that many of these carnivores were eaten, although such a possibility cannot be excluded. Many of the wild carnivores, such as wolf, fox, lynx, badger, and weasel, might have been sought for their pelts, which might have had ritual or ceremonial value.

Artiodactyla were hunted by the residents of this settlement, although bison were probably not hunted. Bison meat might have been traded from the plains east and north of the Four Corners (Driver 1990). Although only two specimens were identified as bison, another four indeterminate artiodactyla and 20 indeterminate large mammal elements may also be bison. These specimens date from all time periods and a variety of contexts, and no particular patterns are discernible. It is possible that more bison remains are present in the sample of unidentified bones. Some specimens identified as “indeterminate large mammal” may be bear.

It is not surprising that deer remains dominate the small artiodactyla sample from Albert Porter Pueblo. The deer represented in this assemblage are probably mule deer (*Odocoileus hemionus*), which inhabit the Four Corners region today (Anderson and Wallmo 1984). Artiodactyla meat was probably prized highly for its nutritive value (Driver 2002a).

Most of the squirrels, wood rats, pocket gophers, and even smaller rodents such as mice and voles represented in the Albert Porter Pueblo assemblage were consumed rather than being natural intrusions. Only the few specimens that are sun-bleached or fresher than the other bones in the assemblage may be natural intrusions. Cottontail bones dominate many Ancestral Pueblo faunal assemblages, although jackrabbits are also well represented (Driver 2002a; Lang and Harris 1984; Muir 1999; Rawlings 2006; Szuter 1991). Jackrabbits might have been used in feasting (Potter 1997), although it cannot be determined if they were used in this way at Albert Porter Pueblo.

The variety of wild birds is represented by few specimens, which suggests that wild birds were not procured regularly. Many taxa, such as small birds, might not have been a source of protein but instead provided materials such as feathers for ritual paraphernalia (Schroeder 1968). The turkeys at this site were probably kept not only for their meat and eggs but also for their feathers. A probable burial of a headless turkey in Nonstructure 151—midden deposited above burned roofing debris in Structure 150, a masonry-lined kiva—dates from the late A.D. 1100s.

Faunal Changes through Time

Turkeys were raised during the Pueblo II occupation of Albert Porter Pueblo; however, the low frequency of specimens suggests that turkeys were not important in the diet. Turkey remains are much more frequent in the early Pueblo III subassemblage from the site. Driver's (2002a:157) overview of faunal assemblages from the northern San Juan region indicates that turkey-specimen frequencies increase in Pueblo II and Pueblo III assemblages. Subsequent research in the northern San Juan region showed a similar pattern (Badenhorst 2008; Rawlings 2006). Turkey use at Albert Porter Pueblo conforms to the regional trend (Driver 2002a).

The Lagomorph Index for Albert Porter Pueblo is the same for the Pueblo II and the Pueblo III subassemblages. However, the dietary contribution of lagomorphs decreased through time as turkey became the dominant protein source during the Pueblo III period. It is probable that much of the area surrounding the settlement was covered in sagebrush that would have provided a favorable environment for cottontails. The abundance of cottontail remains in the site assemblage therefore relates to environmental conditions around the settlement, the natural prevalence of cottontails over jackrabbits in this area, and the slower reproduction rates of jackrabbits (Driver 2002a).

The site assemblage contains few artiodactyl remains; the predominance of immature animal remains suggests that these animals had been hunted intensively. It may also be possible that rabbits were easier to procure than artiodactyls. Other assemblages from the northern San Juan region also contain lower frequencies of artiodactyl than of rabbit and turkey (Driver 2002a; Muir 1999; Rawlings 2006).

Use of the Great House

The individuals who occupied or used the great house and the residents of the surrounding habitations utilized a similar array of animals. There is no evidence to suggest sumptuary rules. Taxa of birds of prey, small colorful birds, and carnivores are represented in remains from middens and kivas dating from all time periods and contexts across the site. Many of these taxa probably had ritual significance. This suggests that ritual or ceremonial activities were conducted in a variety of locations and contexts (cf. Durand 2003). No evidence was found to suggest that the great house at Albert Porter Pueblo was provisioned with artiodactyla meat, and no evidence was found of feasting on jackrabbits (Potter 1997) or other animals.

Fauna from Other Sites in the Northern San Juan Region

Driver (2002a:160) points out that artiodactyls might have been preferred game in the northern San Juan region in terms of nutrition, meat weight, fat, raw materials, ceremonies, and prestige. Moreover, the decline in the availability of artiodactyls by the Pueblo III period was more pronounced north of McElmo Creek, where human settlement was densest and neighboring settlements formed barriers between hunters and deer habitats. It is conceivable that deer increased in value during the Pueblo III period, and that specific individuals or groups controlled access to deer (Driver 2002a:160).

No clear differences exist either in relative proportion or spatial distribution between the animal taxa represented at Albert Porter Pueblo and other sites in the central Mesa Verde region. Muir (1999) found that cottontail and turkey remains dominated the faunal assemblage from Sand Canyon Pueblo, a well studied, single-component village dating from the late Pueblo III period. An array of carnivores, artiodactyls, squirrels, rodents, and wild birds are also represented in that assemblage. Interestingly, Muir (1999) found carnivore and artiodactyla remains associated with abandonment contexts in towers at Sand Canyon Pueblo. Moreover, wild birds are associated with a D-shaped bi-wall building (Block 1500) and towers at that site. Apart from these possibly ritual deposits, the composition of this faunal assemblage is similar to that of Albert Porter Pueblo. The faunal assemblage from Shields Pueblo is also similar to that of Albert Porter Pueblo (Rawlings 2006).

Other sites in the northern San Juan region yielded similar results with regard to animal usage (Badenhorst 2008; Driver 2002a); that is, a dominance of cottontail and turkey and lower frequencies of jackrabbit. An array of carnivore, artiodactyl, rodent, and wild bird remains are also present. Differences in taxa composition probably result from differences in sample size and slight local environmental variation. These patterns were also noted in the Pueblo III subassemblage from Woods Canyon Pueblo (Driver 2002b), the assemblage from the late Pueblo III village of Castle Rock (Driver 2000), and the assemblage for Yellow Jacket Pueblo, which dates from the Pueblo II and Pueblo III periods (Muir and Driver 2003).

It is interesting that great house communities, most notably Ida Jean, Bluff, Escalante, Wallace, Morris 31, Lowry, Yellow Jacket, Comb Wash, and other settlements in the Mesa Verde region, had similar faunal usage. This is hardly surprising considering the relative uniformity of extant animal taxa in the northern San Juan region (e.g., Hall 1981). The data thus suggest that great houses and villages used animal resources in similar ways. In terms of taxa representation, settlements with great houses outside Chaco Canyon, at least in the northern San Juan region, cannot be differentiated from settlements that did not contain great houses.

Conclusions

The faunal assemblage from Albert Porter Pueblo is similar to the assemblages from other villages and great houses in the central Mesa Verde region that date from the Pueblo II and Pueblo III periods. Cottontail generally dominates these assemblages, although the use of turkey increased significantly during the early Pueblo III period. No conclusive evidence was found at Albert Porter Pueblo to suggest differential animal usage between the great house and surrounding residences. The presence of the remains of ritually important taxa such as artiodactyls, carnivores, and birds of prey in various contexts and locations at this site and that date throughout its occupation suggests that rituals were performed in various contexts, and that the great house was not a place where distinctive activities involving fauna occurred.

Table 10.1. Study Units and Assigned Time Periods Yielding Faunal Remains, Albert Porter Pueblo.

Architectural Block	Structure	Description	Sub-Phase	Range of Years
Pueblo II				
100	100	NST	LPII	A.D. 1060–1140
	100	STR	LPII	A.D. 1060–1140
	118	STR (Kiva)	LPII	A.D. 1060–1140
200	201	NST	LPII	A.D. 1060–1140
900	900	STR	LPII	A.D. 1060–1140
	901	NST	LPII	A.D. 1060–1140
	906	STR (Kiva)	LPII	A.D. 1060–1140
1000	1039	NST	LPII	A.D. 1060–1140
1037	1037	STR	LPII	A.D. 1060–1140
1040	1040	NST	LPII	A.D. 1060–1140
1041	1041	NST	LPII	A.D. 1060–1140
1042	1042	NST	LPII	A.D. 1060–1140
1043	1043	NST	LPII	A.D. 1060–1140
1100	1101	NST	LPII	A.D. 1060–1140
Pueblo II–III				
100	100	NST		
	101	NST	MPII – LPIII	A.D. 1020–1280
	102	NST	MPII – LPIII	A.D. 1020–1280
	103	NST	MPII – LPIII	A.D. 1020–1280
	104	NST	MPII – LPIII	A.D. 1020–1280
	105	NST	MPII – LPIII	A.D. 1020–1280
	106	NST	MPII – LPIII	A.D. 1020–1280
	100	STR		
	150	STR	TPII – IPIII	A.D. 1100–1180
500	501	NST		
600	601	NST		
800	801	NST	LPII – EPIII	A.D. 1060–1225
900	901	NST	LPII – EPIII	A.D. 1060–1225
	903	STR (Kiva)	LPII – EPIII	A.D. 1060–1225
	904	STR (Kiva)	LPII – EPIII	A.D. 1060–1225
1100	1101	NST		
	1104	STR (Kiva)	LPII – EPIII	A.D. 1060–1225
Pueblo III				
100	100	NST		

Architectural Block	Structure	Description	Sub-Phase	Range of Years
	100	STR		
	107	STR (Kiva)	EPIII	A.D. 1140–1225
	108	STR (Kiva)	EPIII	A.D. 1140–1225
	109	STR (Kiva)	EPIII	A.D. 1140–1225
	110	STR (Kiva)	EPIII	A.D. 1140–1225
	111	STR (Kiva)	EPIII	A.D. 1140–1225
	112	STR (Kiva)	EPIII	A.D. 1140–1225
	113	STR (Kiva)	EPIII	A.D. 1140–1225
	114	STR (Kiva)	LPIII	A.D. 1225–1260
	115	STR (Kiva)	EPIII	A.D. 1140–1225
	116	STR (Kiva)	EPIII	A.D. 1140–1225
	117	STR (Kiva)	EPIII	A.D. 1140–1225
	119	STR (Kiva)	EPIII	A.D. 1140–1225
	136	STR (Kiva)	LPIII	A.D. 1225–1280
200	201	NST		
300	301	NST	EPIII	A.D. 1140–1225
	305	STR	EPIII	A.D. 1140–1225
	302	STR (Kiva)	EPIII	A.D. 1140–1225
	303	STR (Kiva)	EPIII	A.D. 1140–1225
400	401	NST		
	402	STR (Kiva)	LPIII	A.D. 1225–1260
	403	STR (Kiva)	LPIII	A.D. 1225–1260
500	501	NST	EPIII	A.D. 1140–1225
	502	STR (Kiva)	EPIII	A.D. 1140–1225
600	601	NST	EPIII	A.D. 1140–1225
	602	STR (Kiva)	EPIII	A.D. 1140–1225
800	801	NST		
	803	STR (Kiva)	EPIII	A.D. 1140–1225
900	901	NST		
Pueblo I/III (mixed)				
100	100	NST		
800	801	NST		
900	901	NST		

Note: NST = Nonstructure, STR = Structure, EP = Early Pueblo, MP = Middle Pueblo, LP = Late Pueblo, TP = Terminal Pueblo, IP = Initial Pueblo.

Table 10.2. Assemblage Size of Faunal Remains, Albert Porter Pueblo.

	Pueblo I/III Period	Pueblo II Period	Pueblo II/III Period	Pueblo III Period	TOTAL
Identified	2	1,531	2,534	5,910	9,977
Unidentified	5	1,584	2,704	5,168	9,461
TOTAL	7	3,115	5,238	11,079	19,438
Percent Identified	29%	49%	48%	53%	51%

Table 10.3. Taxa Represented, by Time Period, Presented by Number of Identified Specimens, Albert Porter Pueblo.

Taxa	Common Name	PI/PIII Period	PII Period	PII/PIII Period	PIII Period	TOTAL
Lagomorpha	Rabbit, hare		32	180	160	372
Sylvilagus sp.	Cottontail	1	736	792	1,505	3,034
Lepus sp.	Jackrabbit		108	342	308	758
Sciuridae	Squirrel		44	36	120	200
Eutamias sp.	Chipmunk			1	3	4
Spermophilus variegatus	Rock squirrel				1	1
Spermophilus sp.	Ground squirrel		3	3	8	14
Cynomys gunnisoni	Gunnison's prairie dog			1	1	2
Cynomys sp.	Prairie dog		12	17	32	61
Tamiasciurus hudsonicus	Red squirrel				1	1
Geomyidae	Pocket gopher		33	47	100	180
Perognathus sp.	Pocket mouse			1		1
Peromyscus sp.	Mouse		5	8	33	46
Microtus sp.	Vole			1	14	15
Muridae	Deer mice, vole				2	2
Neotoma sp.	Wood rat		34	20	61	115
Castor canadensis	Beaver		1	1	8	10
Erethizon dorsatum	Porcupine		1	1	7	9

Taxa	Common Name	PI/PIII Period	PII Period	PII/PIII Period	PIII Period	TOTAL
Small rodent	Small rodent		32	42	203	277
Large rodent	Large rodent			1		1
Carnivora	Carnivore				1	1
Canis sp.	Dog, wolf, coyote		1	1	5	7
Canis lupus	Wolf			1	1	2
Canis familiaris	Dog		5	8	11	24
Vulpes vulpes	Red fox		4	5	2	11
Vulpes sp.	Red or kit fox				1	1
Ursidae	Bear		1		1	2
Bassariscus astutus	Ringtail		1			1
Mustela sp.	Weasel				2	2
Mustela erminea	Ermine				2	2
Mustela frenata	Long-tailed weasel			1		1
Taxidea taxus	Badger		1		1	2
Lynx sp.	Lynx or bobcat		1			1
Small carnivore	Small carnivore		2		2	4
Medium carnivore	Medium carnivore		2	6	8	16
Cervidae	Deer family				1	1
Odocoileus sp.	Deer	1	10	27	23	61
Antilocapra americana	Pronghorn		1	1	1	3
Ovis canadensis	Bighorn sheep			3	2	5
Bison bison	Bison		1	1		2
Medium Artiodactyla	Medium artiodactyla		34	43	79	156
Large Artiodactyla	Wapiti, bison-sized artiodactyla		2	1	1	4
Small mammal	Small mammal		66	242	163	471
Medium mammal	Medium mammal		14	64	49	127
Large mammal	Large mammal		5	8	7	20
Falconiformes	Vulture, hawk, eagle			2	1	3
Buteo sp.	Hawk		1	5	7	13
Buteo swainsoni	Swainson's hawk				2	2
Small falcon	Small falcon				1	1

Taxa	Common Name	PI/PIII Period	PII Period	PII/PIII Period	PIII Period	TOTAL
Medium Falconiformes	Medium falcon		1	1		2
Galliformes	Grouse, quail, turkey		1	4	4	9
Tetraonidae	Grouse		7		1	8
Centrocercus urophasianus	Sage grouse			1		1
Meleagris gallopavo	Turkey		156	270	1,567	1,993
Grus canadensis	Sandhill crane				1	1
Scolopacidae	Sandpiper				1	1
Zenaida macroura	Mourning dove				3	3
Strigiformes	Owl				1	1
Colaptes auratus	Common flicker				2	2
Passeriformes	Perching bird		4		2	6
Corvidae	Jay, crow				1	1
Pica pica	Magpie				1	1
Turdidae	Thrushes, robin			1		1
Small bird	Small bird		2	6	31	39
Medium bird	Medium bird		19	6	8	33
Large bird	Large bird		148	328	1,143	1,619
Amphibia	Amphibian				2	2
Snake	Snake			4	192	196
Reptilia	Reptiles				1	1
Pisces	Fish				8	8
TOTAL NISP		2	1,531	2,534	5,910	9,977

Table 10.4. Taxa Represented by Sub-Period, Presented by Number of Identified Specimens (NISP), Albert Porter Pueblo.

Taxa	A.D. 1020–1280	A.D. 1060–1140	A.D. 1060–1225	A.D. 1100–1180	Unassigned PII–III Period	A.D. 1140–1225	A.D. 1225–1280	Unassigned PIII Period	Unassigned PI–PIII Period
Lagomorpha	22	34	157			133	22	4	1
Sylvilagus sp.	124	757	659	17	19	1,328	143	33	1
Lepus sp.	60	111	273	9		302	9	5	
Sciuridae	10	46	24	2		86	29	3	
Eutamias sp.			1			1	1	1	
Spermophilus variegatus						1			
Spermophilus sp.		3	3			7	1		
Cynomys gunnisoni			1			1			
Cynomys sp.	4	12	13			28	4		
Tamiasciurus hudsonicus						1			
Geomyidae	20	33	25	1		71	29	1	
Perognathus sp.			1						
Peromyscus sp.		5	2	1	5	27	6		
Microtus sp.			1			7	6		
Muridae						2			
Neotoma sp.	5	34	15			48	9	5	
Erethizon dorsatum	1	1				7			
Castor canadensis		1	1			8			
Small rodent	17	32	24		4	139	54	6	1

Taxa	A.D. 1020–1280	A.D. 1060–1140	A.D. 1060–1225	A.D. 1100–1180	Unassigned PII–III Period	A.D. 1140–1225	A.D. 1225–1280	Unassigned PIII Period	Unassigned PI–PIII Period
Large rodent			1						
Canis sp.		1	1			5			
Canis lupus	1					1			
Canis familiaris	2	5	6			9	1	1	
Vulpes vulpes	2	4	3			2			
*Vulpe*s sp.						1			
Ursidae		1				1			
Bassariscus astutus									
Mustela erminea			1			2			
Mustela frenata									
Mustela sp.		1				1		1	
Taxidea taxus		2				1			
Lynx sp.		1							
Small carnivore		2				2			
Medium carnivore		2	5	1		6	1		
Carnivora									
Cervidae						1			
Odocoileus sp.	10	10	17			23		1	
Antilocapra americana		1	1			1			
Ovis canadensis			3			2			
Bison bison	1	1							
Medium Artiodactyla	14	35	36	2		78	5		

Taxa	A.D. 1020–1280	A.D. 1060–1140	A.D. 1060–1225	A.D. 1100–1180	Unassigned PII–III Period	A.D. 1140–1225	A.D. 1225–1280	Unassigned PIII Period	Unassigned PI–PIII Period
Large Artiodactyla	1	2				1			
Small mammal	24	67	214	1	4	130	30	2	
Medium mammal	23	14	36	5		45	1	3	
Large mammal	6	5	2			5	1	1	
Buteo sp.		1	4			7	2		
Buteo swainsoni									
Small falcon							1		
Medium Falconiformes	1	1							
Falconiformes	1		2			2			
Galliformes	3	1	2			3		1	
Tetraonidae		7				1			
Centrocercus urophasianus									
Meleagris gallopavo	116	161	132	21	4	1,289	209	61	1
Grus canadensis						1			
Scolopacidae						1			
Zenaida macroura						2			
Strigiformes							1		
Colaptes auratus									
Passeriformes		4				4			

Taxa	A.D. 1020–1280	A.D. 1060–1140	A.D. 1060–1225	A.D. 1100–1180	Unassigned PII–III Period	A.D. 1140–1225	A.D. 1225–1280	Unassigned PIII Period	Unassigned PI–PIII Period
Corvidae						1			
Pica pica									
Turdidae			1						
Small bird	4	2	2			14	17		
Medium bird	26	189	62			97	84	3	
Large bird	104	148	195	28		908	199	36	1
Amphibia						2			
Snake	3		1			192			
Reptilia							1		
Pisces						7	1		
TOTAL NISP	605	1,737	1,927	88	36	5,045	867	168	5

Table 10.5. Faunal Index Values, Albert Porter Pueblo.

Index	Pueblo II Period	Pueblo II/III Period	Pueblo III Period	SITE TOTAL
Lagomorph	0.87	0.69	0.83	0.8
Artiodactyla	0.02	0.03	0.03	0.03
Turkey	0.18	0.31	0.81	0.52

Table 10.6. Faunal Index Values according to Sub-Period, Albert Porter Pueblo.

Index	A.D.1060–1140	A.D.1060–1225	A.D.1100–1180	A.D.1140–1225	A.D.1225–1280
Lagomorph	0.87	0.71	0.65	0.81	0.94
Artiodactyla	0.05	0.05	0.07	0.06	0.03
Turkey	0.26	0.23	0.65	0.55	0.7

Table 10.7. NISP and Percentage NISP for Common Taxa for the Pueblo II Period, Albert Porter Pueblo.

Pueblo II Period	Great House	Outside	TOTAL
Sylvilagus sp.	238 (60%)	514 (66%)	752 (64%)
Lepus sp.	41 (10%)	70 (10%)	111 (10%)
Meleagris/large bird	115 (30%)	189 (24%)	304 (26%)

Table 10.8. NISP and Percentage NISP for Common Taxa for the Pueblo II/III Period, Albert Porter Pueblo.

Pueblo II/III Period	Great House	Outside	TOTAL
Sylvilagus sp.	176 (33%)	645 (53%)	821 (47%)
Lepus sp.	74 (13%)	269 (22%)	343 (19%)
Meleagris/large bird	290 (54%)	308 (25%)	598 (34%)

Table 10.9. NISP and Percentage NISP for Common Taxa for the Pueblo III Period, Albert Porter Pueblo.

Pueblo III Period	Great House	Outside	TOTAL
Sylvilagus sp.	1,224 (34%)	184 (22%)	1,408 (32%)
Lepus sp.	199 (6%)	111 (13%)	310 (7%)
Meleagris/large bird	2,174 (60%)	535 (65%)	2,709 (61%)

Table 10.10. Artiodactyla Minimum Number of Elements (MNE), Minimum Animal Units (MAU), and Percentage MAU, Albert Porter Pueblo.

Element	Part	MNE	MAU	Percent MAU	Brain (1981)	Lyman (1994)
Scapula	Glenoid	1	0.5	33%	High	0.36
Humerus	Distal	1	0.5	33%	High	0.39
Radius	Proximal	3	1.5	100%	High	0.5
Radius	Distal	2	1	66%	Intermediate	0.43
Femur	Proximal	1	0.5	33%	Intermediate	0.36
Femur	Distal	1	0.5	33%	Intermediate	0.28
Tibia	Proximal	2	1	66%	Low	0.3
Tibia	Distal	1	0.5	33%	High	0.5
Metapodial	Proximal	3	1.5	100%	High	0.5
Metapodial	Distal	3	1.5	100%	High	0.5

Sources: Based on Brain (1981), Lyman (1994), and Rawlings (2006:110).

Table 10.11. Minimum Number of Elements (MNE), Albert Porter Pueblo.

	Artiodactyls		*Lepus* sp.		*Sylvilagus* sp.		*Meleagris*/Large Bird	
Element	NISP	MNE	NISP	MNE	NISP	MNE	NISP	MNE
Mandible	4	2	37	21	299	159	40	5
Quadrate	N/A	N/A	N/A	N/A	N/A	N/A	27	27
Sternum			2	1	4	2	74	2
Furculum	N/A	N/A	N/A	N/A	N/A	N/A	45	3
Rib	1	1	1	1	1	1	227	100
Sternal rib	N/A	N/A	N/A	N/A	N/A	N/A	100	37
Atlas	1	1	2	2	19	14	1	1
Axis			1	1	3	2	2	2
Cervical			1	1			133	104
Thoracic	13	2			5	5	10	3
Lumbar	11	2	36	21	89	48	6	2
Sacrum			2	1	6	5	N/A	N/A
Synsacrum	N/A	N/A	N/A	N/A	N/A	N/A	16	3
Pygostyle	N/A	N/A	N/A	N/A	N/A	N/A	10	7
Caudal	1	1					21	17
Scapula	3	1	57	48	292	215	114	60
Humerus	13	1	68	51	289	144	165	37
Radius	16	3	57	28	166	103	148	34
Ulna	6	2	50	30	164	102	161	20
Carpal	10	9	5	5	1	1	62	62
Metacarpal			31	31	52	51	99	51
Coracoid	N/A	N/A	N/A	N/A	N/A	N/A	129	58
Wing phalanx	N/A	N/A	N/A	N/A	N/A	N/A	102	98
Innominate	7	3	57	37	420	58	67	34
Femur	10	1	56	25	254	80	80	11
Patella					2	2		
Tibia	21	5	98	44	347	139	277	90

	Artiodactyls		*Lepus* sp.		*Sylvilagus* sp.		*Meleagris*/Large Bird	
Element	NISP	MNE	NISP	MNE	NISP	MNE	NISP	MNE
Fibula			2	2	1	1	83	31
Astragalus	5	4	19	17	13	12	N/A	N/A
Calcaneum	2	1	47	36	134	96	N/A	N/A
Metatarsal	7	4	50	49	170	166	212	74
Tarsal	5	5	10	10	9	9	N/A	N/A
1st Phalanx	8	6	11	10	40	40	N/A	N/A
2nd Phalanx	19	17	2	2	9	9	N/A	N/A
3rd Phalanx	7	4			6	6	N/A	N/A
Phalanx	N/A	N/A	N/A	N/A	N/A	N/A	765	611

Note: N/A = not applicable

Table 10.12. Burned Bone, Albert Porter Pueblo.

	Black	Localized	Calcined (Burned Blue or White)	TOTAL	Percent Total Sample
Pueblo II	174	64	175	413	13%
Pueblo II/III	482	199	307	988	19%
Pueblo III	485	175	473	1,133	10%
TOTAL	1,141	438	955	2,534	13%
Percent Total Sample	6%	2%	5%		

Table 10.13. Bones with Cut Marks and Chop Marks, Albert Porter Pueblo.

Time Period	Cut	Chop
Pueblo II	9	1
Pueblo II/III	20	4
Pueblo III	62	4
TOTAL	91	9

Table 10.14. Taxa with Carnivore Chew Marks, Albert Porter Pueblo.

Taxa	Pueblo II Period	Pueblo II/III Period	Pueblo III Period	TOTAL
Sylvilagus sp.	2		1	3
Lepus sp.	3	4	4	11
Castor canadensis	1			1
Canis familiaris		1		1
Medium carnivore			1	1
Odocoileus sp.	1	3		4
Medium artiodactyla	1		1	2
Large artiodactyla	1			1
Small mammal		1		1
Medium mammal		1	1	2
Meleagris gallopavo	1	7	26	34
Galliformes		1		1
Large bird	2	3	5	10
Unidentified	5	3	9	17
TOTAL	17	24	48	89

Table 10.15. Bones with Rodent Gnaw Marks, Albert Porter Pueblo.

Period	Count	Percent Total Sample
Pueblo II	18	0.50%
Pueblo II/III	31	0.50%
Pueblo III	168	1.50%
TOTAL	217	2.50%

Table 10.16. Bone Artifacts by Species, Albert Porter Pueblo.

Taxa	Count (Burnt)	Percent NISP
Sylvilagus sp.	2	0.03
Lepus sp.	18 (1)	2.5
Castor canadensis	1	10.0
Canis sp.	1	14.3
Vulpes vulpes	1	9.1
Taxidea taxus	1	50.0
Cervidae	1	100.0
Odocoileus sp.	3 (1)	4.9
Medium artiodactyla	18 (4)	3.9
Small mammal	2	0.4
Medium mammal	7	4.7
Large mammal	2	10.0
Meleagris gallopavo	68(2)	3.5
Large bird	57 (3)	3.8
Unidentified	262 (46)	2.7
TOTAL (Burnt)	444 (57)	

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Chapter 11

Population Estimates

Susan C. Ryan

Introduction

The goal of this chapter is to estimate the population of Albert Porter Pueblo through time using multiple lines of archaeological evidence as presented in Chapter 3, including dating evidence (tree-ring data, pottery data, and archaeomagnetic results), as well as the quantity of structures built during each time period and the spatial distribution of specific types of pottery. This chapter begins with a discussion of the various methods used to infer the population of archaeological sites followed by a summary of the time periods assigned to cultural deposits at Albert Porter Pueblo. The chapter concludes with an estimate of the population during each period of occupation at the site.

Estimating population using the archaeological record provides researchers not only with information on how many people occupied a site at any given time, but with insights into how people in the past structured economic, political, ritual, and social systems. Furthermore, inferring population allows researchers to determine how villages and communities formed, provides information on migrations and depopulations, and allows us to assess the nature and tempo of regional trends over extended periods of time.

Methods Used for Estimating Population

Several methods of estimating population size have been developed and applied to the archaeological record (Cook 1972; Hassan 1981) including estimates using the following data: structure floor area (LeBlanc 1971; Naroll 1962), total number of households present (Churchill 2002; Kuckelman 2000, 2003; Lightfoot 1994), number of rooms (Adler 1990; Hill 1970), number of kivas (Churchill 2002; Kuckelman 2000, 2003; Rohn 1989), number of artifacts (Cook 1972:11–12; Hassan 1981:78–79), amount of food refuse (Cook 1972), area of roomblock rubble on the modern ground surface (Adler 1990; Schlanger 1987), hearth size (Ciolek-Torrello and Reid 1974), site size (Hack 1942), and number of human burials or bones present (Cook 1972). The utility of the above methods is determined by the amount, type, and condition of the material remains present on any given site. However, variability may also exist at an intrasite scale as well as at an intersite scale, as exemplified at Albert Porter Pueblo.

Household: The Unit of Analysis

Before I begin discussing population estimates, a distinction must be made between two terms—“household” and “unit pueblo”—that are pertinent to this discussion. A household is a social group in which members participate in five activities (Wilk and Netting 1984): (1) production, (2) distribution, (3) transmission, (4) reproduction, and (5) co-residence. Production and distribution serve as the economic base of the household, transmission is the distribution of resources among household members and subsequent generations, and reproduction refers not only to a biological increase of members but also to the reproduction of social systems within the household (Wilk and Netting 1984). Alternatively, a unit pueblo—also referred to as a "Prudden Unit" (Prudden 1903, 1914, 1918)—is architecturally composed of a single pit structure (pithouse or kiva), a block of contiguous surface rooms made of jacal or masonry (five to 10 rooms on average) located just north or northwest of the pit structure, and a trash area or midden located to the south or southeast of the pit structure. In the Mesa Verde region, the unit pueblo is interpreted as the architectural representation of a single household composed of a nuclear or small extended family (Lipe 2006:263; Varien 1999:18) beginning about A.D. 750 and continuing until regional depopulation in the late A.D. 1200s (Bullard 1962; Lipe 1989:55, 2006:263; Varien 1999:18).

Using Wilk and Netting's (1984) concept of household, Lightfoot (1994) examined household organization at the Duckfoot site, a small Pueblo I habitation in the central Mesa Verde region that included 19 surface rooms and four pit structures. From data collected on architecture, floor assemblages, feature assemblages, and abandonment mode, Lightfoot (1994) inferred that activities that took place in pit structures were distinct from those that occurred in surface rooms. Lightfoot (1994) concluded that each household at the Duckfoot site was represented architecturally by a single pit structure that was used for both domestic and ritual activities, and that surface rooms were used for both domestic activities and storage.

Additionally, Lightfoot (1994:147) examined cross-cultural ethnographic literature on the number of occupants per household and concluded that, on average, most households are composed of between 4.2 and 7.0 individuals. Although the number of individuals is not a defining characteristic of Wilk and Netting's (1984) concept of household, it does allow archaeologists to reconstruct how many individuals composed the social group that performed household activities. In sum, I will use Lightfoot's (1994:147) estimate that between five and seven individuals formed one household, and assume that the unit pueblo is an architectural representation of a single household composed of a nuclear or small extended family (Lipe 2006:263; Varien 1999:18) starting at approximately A.D. 750 and continuing until regional depopulation in the late A.D. 1200s (Bullard 1962; Lipe 1989:55, 2006:263; Varien 1999:18).

As outlined above, I use the total number of identified pit structures to estimate the population size for each period of occupation at Albert Porter Pueblo. The reason for using the total number of pit structures to infer population size instead of using the other methods presented above—such as structure floor area, number of rooms, area of roomblock rubble on the modern ground surface, or hearth size—is twofold. First, most of the site, with the exception of Architectural Block 100 (see Figure 5.4), was disturbed by mechanized plowing. Numerous surface rooms were damaged by plowing, and many more might have been demolished. Second, Albert Porter Pueblo was occupied for several centuries, and I infer that most of the structures built during the Basketmaker III, Pueblo I, and Pueblo II periods were buried by construction during the Pueblo III period. Further, it seems likely that some of the materials used in earlier constructions were salvaged for use in the construction of later buildings. Thus, the majority of the architecture visible on the modern ground surface—with the exception of the great house "core" in Architectural Block 100—is representative of the Pueblo III period. In sum, population estimates would be inaccurate if they were inferred from estimation methods other than the quantity of pit structures present on the site, or if estimates were derived only from the quantity of pit structures visible on the modern ground surface.

During the 2001 field season, a remote-sensing survey was conducted to supplement our knowledge of structures that might be present but not visible at the modern ground surface at Albert Porter Pueblo. Specifically, as noted in Chapter 2, an electrical-resistance survey was conducted on 40 20-x-20-m grid units, or a total area of 16,000 m². Results of the survey indicated the presence of 36 anomalies of possible pit structures—in addition to those visible on the modern ground surface—as well as multiple linear features representing possible footpaths, numerous possible middens and surface rooms, a natural bedrock formation in the eastern portion of the site, and a carbon dioxide pipeline along the eastern edge of the survey area (see Figure 2.7). If the 36 previously undetected possible pit structures suggested by the survey did, in fact, prove to be pit structures, the number of such structures at the site would more than triple. The Crow Canyon Archaeological Center was granted permission from The Archaeological Conservancy to test the 36 possible pit structures with a 7-cm-diameter auger to confirm the presence and type of cultural feature present in each of those locations. Testing indicated that 33 of the 36 anomalies identified on the electrical-resistance map were indeed pit structures (Table 11.1). Several of the confirmed pit structures were further tested with excavation units; the results provided information on construction techniques, use, and use-life of each of the structures. Even though the majority of structures identified by the electrical-resistance survey were not tested through excavation, we were able, using relative dating techniques, to assign date ranges to those structures.

Periods of Occupation at Albert Porter Pueblo

The chronological assignments used in this report consist of periods ranging from broad spans of time—consisting of a few centuries—to short periods of time spanning only a few decades (Table 11.2). The broadest of these time periods are drawn from the Pecos Classification system and are referred to in this report as Basketmaker III (A.D. 500-750), Pueblo I (A.D. 750–900), Pueblo II (A.D. 900–1150), and Pueblo III (A.D. 1150–1300); the shorter spans are subperiods defined within the broader Pecos periods. Because structures, features, and other cultural deposits might have been used for lengthy periods of time, many study units have been assigned date ranges that span more than one Pecos Classification period. The following time periods and subperiods are used most often in this publication: Basketmaker III (A.D. 500–750); Pueblo I (A.D. 750–900); early Pueblo II (A.D. 900–1050); late Pueblo II (A.D. 1050–1150); early Pueblo III (A.D. 1150–1225); and late Pueblo III (A.D. 1225–1300).

For the purposes of this chapter, I will provide population estimates for the following periods and subperiods: Basketmaker II and III, Pueblo I, late Pueblo II, early Pueblo III, and late Pueblo III. Note that the intention of the following paragraphs is to provide population estimates. This discussion does not contain information on regional population trends or provide a sociocultural backdrop for Albert Porter Pueblo; for this information, please refer to Chapter 3. In general, the types of pottery found at the site suggest that people were living in this location at least as early as the Basketmaker III period (A.D. 600–750). The most intensive occupation of Albert Porter Pueblo dates from the Pueblo II (A.D. 900–1150) and Pueblo III (A.D. 1150–1300) periods. Architectural and artifact data indicate that the settlement reached its maximum extent sometime between A.D. 1100 and 1250. During the mid-to-late A.D. 1200s, people living in the Mesa Verde region emigrated southward where descendants of ancestral Pueblo people continue to reside today.

Basketmaker III (A.D. 500–750) Period

Unfortunately, no excavation unit at Albert Porter Pueblo exposed architecture that is characteristic of the Basketmaker period. This was probably a consequence of the research design and the methods used to sample the cultural deposits at the site. For instance, structures visible on the modern ground surface were more likely to have been tested than structures dating from the Basketmaker and Pueblo I periods, which might be present but obscured by subsequent construction. Regardless, pottery data for the site suggest that people were living in the location of Albert Porter Pueblo as early as the Basketmaker III period and possibly as early as the Basketmaker II period (see Table 3.5). As shown in Figure 11.1, pottery from the Basketmaker III period was found primarily in Architectural Block 100 but was sparsely represented in the following architectural blocks: 200, 300, 400, 500, 900, 1000, and 1100. Thus, it seems likely that the Basketmaker III period occupation was located primarily in the central portion of the site with secondary occupations in the south-central, southeastern, eastern, and northeastern portions of the site. As indicated in Table 3.5, six sherds, or 14.5 g of pottery, were identified from the Basketmaker II period, accounting for 0.004 percent of the total pottery assemblage, and 133 sherds, or 881.3 g of Chapin Black-on-white and Chapin Gray pottery, were identified from the Basketmaker III period, accounting for 0.08 percent of the overall pottery assemblage. Although the pottery counts and weights for the Basketmaker II and III periods are not robust, they do indicate some cultural activity during this time. In sum, the Basketmaker pottery recovered suggests that a relatively small population—perhaps one to several households—resided in the location of Albert Porter Pueblo during the Basketmaker II and Basketmaker III periods.

Basketmaker III-Pueblo I Period (A.D. 500–900)

Additionally, there is a strong signature of pottery that could date from either the Basketmaker III or Pueblo I period at Albert Porter Pueblo; 12,298 sherds, or more than 64,000 g of Indeterminate Local Gray Ware pottery (see Table 3.5) were collected. This subassemblage constitutes more than 7 percent of the overall pottery assemblage by count and more than 5 percent by weight. Indeterminate Local Gray Ware was initially produced in the Basketmaker III period, and it continued to be produced through the Pueblo I period. Thus, it is difficult to determine how many households were present at Albert Porter Pueblo during the Basketmaker III period vs. the Pueblo I period; however, it is likely that several households resided in the settlement sometime between A.D. 500 and 900.

Pueblo I Period (A.D. 750–900)

Unfortunately, no excavation unit at Albert Porter Pueblo exposed architecture characteristic of the Pueblo I period. Again, this was probably a consequence of the research design and the methods used to sample the cultural deposits at the site. However, 902 sherds, or more than 4,474 g of Mancos Gray neckbanded, Abajo Red-on-orange, Bluff Black-on-red, Early White Unpainted, Indeterminate Neckbanded Gray, Moccasin Gray, Piedra Black-on-white, and Early White Painted pottery sherds date from the Pueblo I period (see Table 3.5). This pottery constitutes 0.543 percent by count and 0.407 percent by weight of the total pottery assemblage. As shown in Figure 11.2, pottery that dates from the Pueblo I period was found primarily in Architectural Block 100 and was found in lesser quantities in the following architectural blocks: 200, 300, 400, 500, 600, 800, 900, 1000, and 1100. Thus, it seems likely that occupation during the Pueblo I period was located primarily in the central and north-central portion of the site with secondary occupations in the south-central, southeastern, eastern, and northeastern portions of the site. Fewer sherds could be assigned to the Pueblo I category than to the combined Basketmaker III-Pueblo I category. This is probably a result of how researchers classify pottery, specifically Indeterminate Local Gray ware, which was manufactured for four centuries and spans two Pecos Classification periods. At this time, it is impossible to determine if a particular Indeterminate Local Gray ware sherd was produced during the Basketmaker III period or the Pueblo I period. Thus, as stated above, it is difficult to determine how many households resided at Albert Porter Pueblo during the Pueblo I period; however, it can be stated with confidence that several households resided at the site sometime between A.D. 700 and 900.

Late Pueblo II Period (A.D. 1050–1150)

The strongest occupational signature at Albert Porter Pueblo is for the late Pueblo II period (A.D. 1050–1150). A total of 11,334 sherds, or more than 89,927 g of pottery—composed of Deadmans Black-on-red, Mancos Black-on-white, Mancos Corrugated Gray, Pueblo II White Painted, and Cortez Black-on-white—date from the Pueblo II period (see Table 3.5). This subassemblage constitutes 6.82 percent by count and 8.17 percent by weight of the total pottery assemblage. As shown in Figure 11.3, Pueblo II period pottery was found primarily in Architectural Block 100 and was found in lesser quantities in the following architectural blocks: 200, 300, 400, 500, 600, 800, 900, 1000, and 1100. Thus, it seems likely that occupation during the Pueblo II period was located primarily in the central and north-central portions of the site with secondary occupations in the south-central, southeastern, northeastern, and eastern portions of Albert Porter Pueblo.

Additionally, I estimate that residences for 33 households were constructed during the late Pueblo II period (see Figure 3.3); this inference is drawn from absolute and relative dating of structures. Assuming five to seven people occupied a single residence, I estimate the population for the late Pueblo II period at 165 to 231 individuals. This should be considered a maximum, because all of the kivas might not have been occupied simultaneously. Studies of architecture have revealed that timbers used to build pit structures required replacement after only 10 to 40 years, particularly beams that were in contact with the ground and thus vulnerable to rot and insect infestation (Ahlstrom et al. 1995; Cameron 1990; Gilman 1987; Matson et al. 1988; Nelson and LeBlanc 1986; Powell 1983; Schlanger 1987; Varien and Ortman 2005; Varien et al.

2007). As a result, many researchers believe that the average use span of a unit pueblo was approximately 20 years. Beginning in the mid-A.D. 1100s however, the average occupation span of unit pueblos increased from approximately 20 years to an estimated 45 years when, for the first time in the central Mesa Verde region, structures were built using sandstone masonry (Varien 1999; Varien and Ortman 2005). This lengthier occupation span was calculated from pottery accumulations that reflect the length of time people actually resided in a unit pueblo rather than the average length of time the structural elements could endure (Ryan 2010). In sum, 33 households occupied Albert Porter Pueblo during the late Pueblo II period, but it is probable that not all residences were occupied simultaneously.

Pueblo III Period (A.D. 1150–1300)

The second strongest occupational signature at Albert Porter Pueblo is for the Pueblo III period. A total of 11,471 sherds, or more than 146,168 g, of pottery composed of McElmo Black-on-white, Pueblo III White Painted, Mesa Verde Black-on-white, and Mesa Verde Corrugated date from the Pueblo III period (see Table 3.5). This subassemblage constitutes 6.9 percent by count and more than 13 percent by weight of the overall pottery assemblage. As shown in Figure 11.4, pottery dating from the Pueblo III period was found primarily in Architectural Block 100 and was found in lesser quantities in the following architectural blocks: 200, 300, 400, 500, 600, 800, 900, 1000, and 1100. Thus, it seems likely that the Pueblo III-period occupation was located primarily in the central and north-central portions of the site with secondary occupations in the south-central, southeastern, northeastern, and eastern portions of the site. The results of absolute and relative dating suggest that residences for 20 households (see Figure 3.4) were constructed at Albert Porter Pueblo during the early Pueblo III period (A.D. 1150–1225). If five to seven people formed a single household, then 100 to 140 individuals occupied the settlement during the early Pueblo III period. The results of absolute and relative dating suggest that residences were constructed for an estimated three households (see Figure 3.5) at Albert Porter Pueblo during the late Pueblo III period (A.D. 1225–1300). In sum, residences for 23 households were constructed at Albert Porter Pueblo during the Pueblo III period; however, as stated above, it is probable that not all of the households were occupied simultaneously. The overall population estimate for A.D. 1150–1300 is 115 to 161 individuals.

Summary

Population estimates for Albert Porter Pueblo were drawn from the results of both absolute and relative dating. As outlined above, I used the quantity of identified pit structures to infer the population size for each period of occupation at the site. The presence of pottery produced during Basketmaker times suggests that a relatively small population—perhaps one to several households—resided in the location of Albert Porter Pueblo during the Basketmaker II and Basketmaker III periods. It is difficult to determine how many households formed Albert Porter Pueblo during the Pueblo I period; however, pottery data indicate that several households resided in this location sometime between A.D. 700 and 900. The strongest occupational signature at the site is for the late Pueblo II period. I estimate that residences for 33 households were constructed during this period; thus, an estimated 165 to 231 individuals resided in the pueblo during the late

Pueblo II period. The second strongest occupational signature at Albert Porter Pueblo is for the Pueblo III period. Residences for 23 households were constructed at the site during this period, suggesting a population of 115 to 161 individuals.

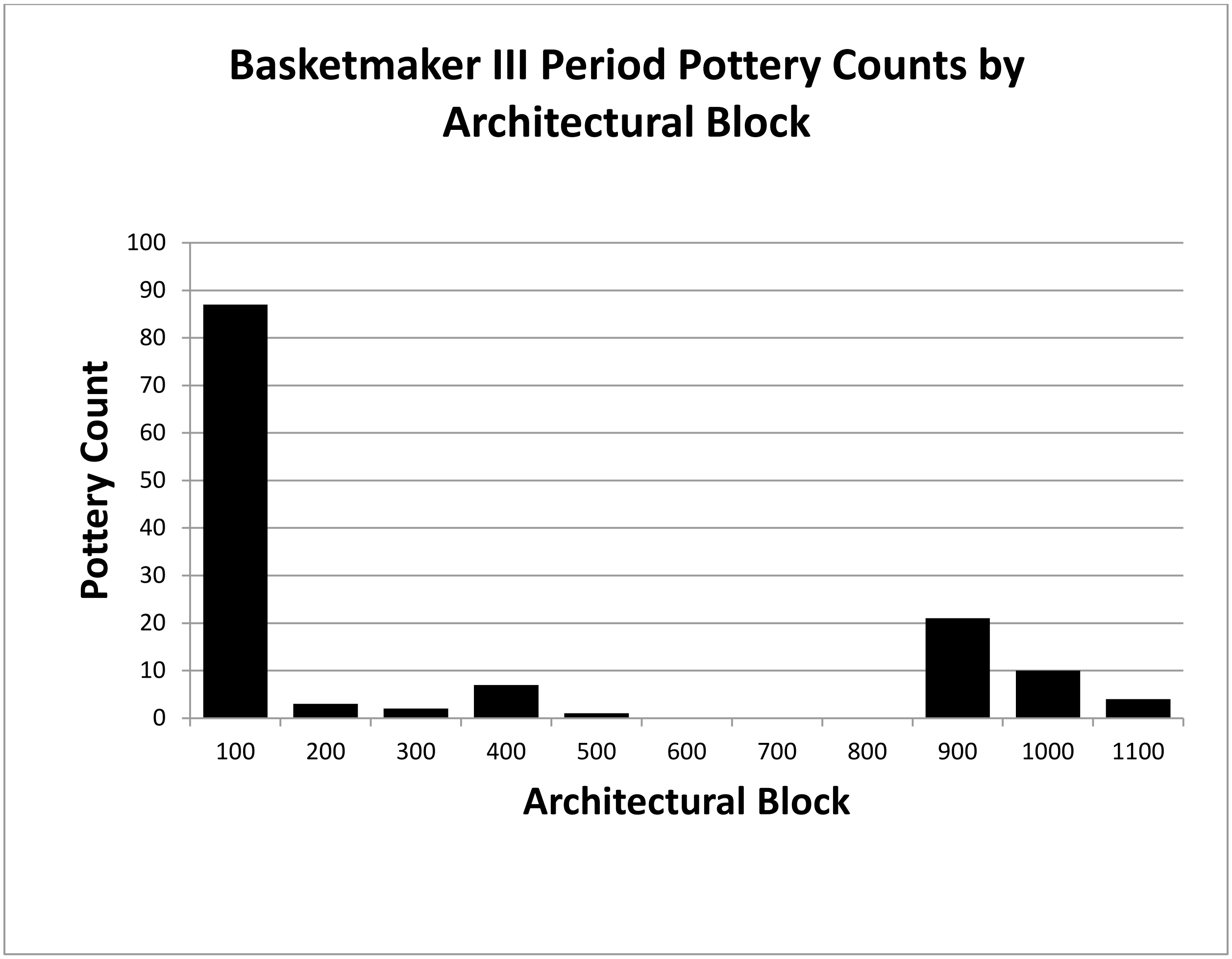

Figure 11.1. Basketmaker III period pottery counts by architectural block, Albert Porter Pueblo.

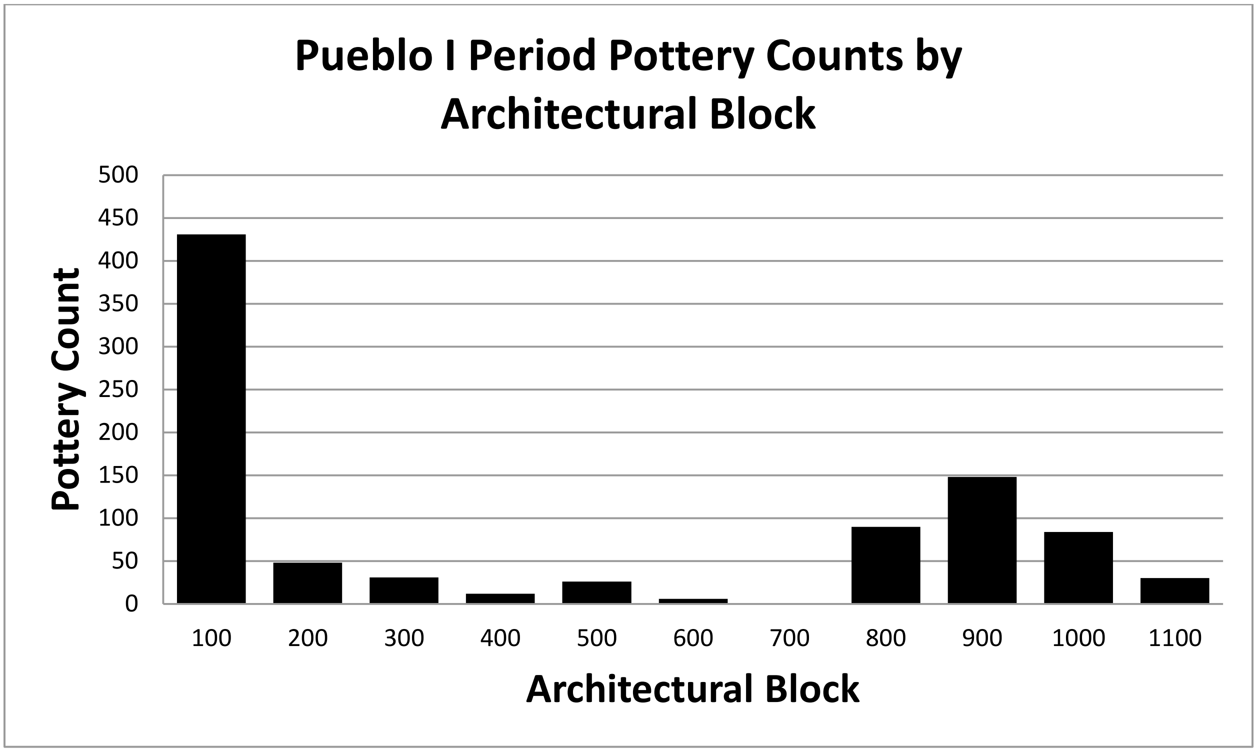

Figure 11.2. Pueblo I period pottery counts by architectural block, Albert Porter Pueblo.

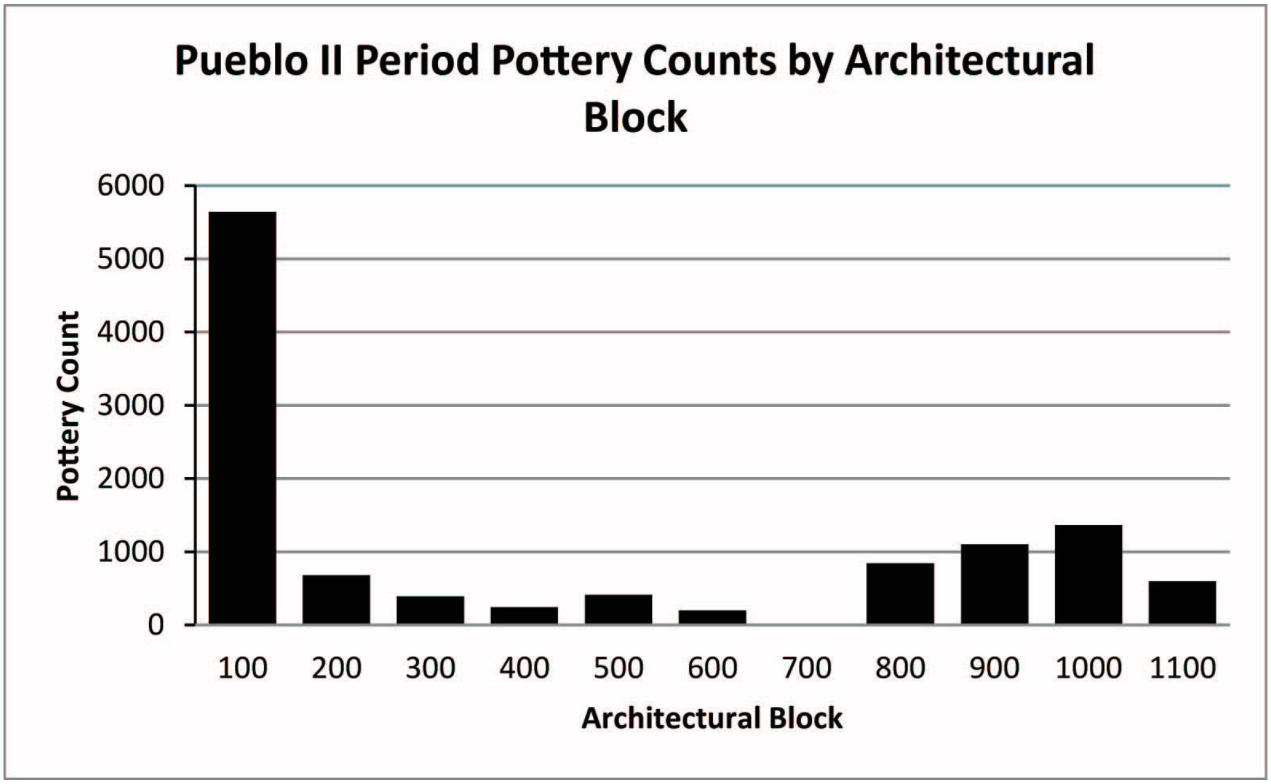

Figure 11.3. Pueblo II period pottery counts by architectural block, Albert Porter Pueblo.

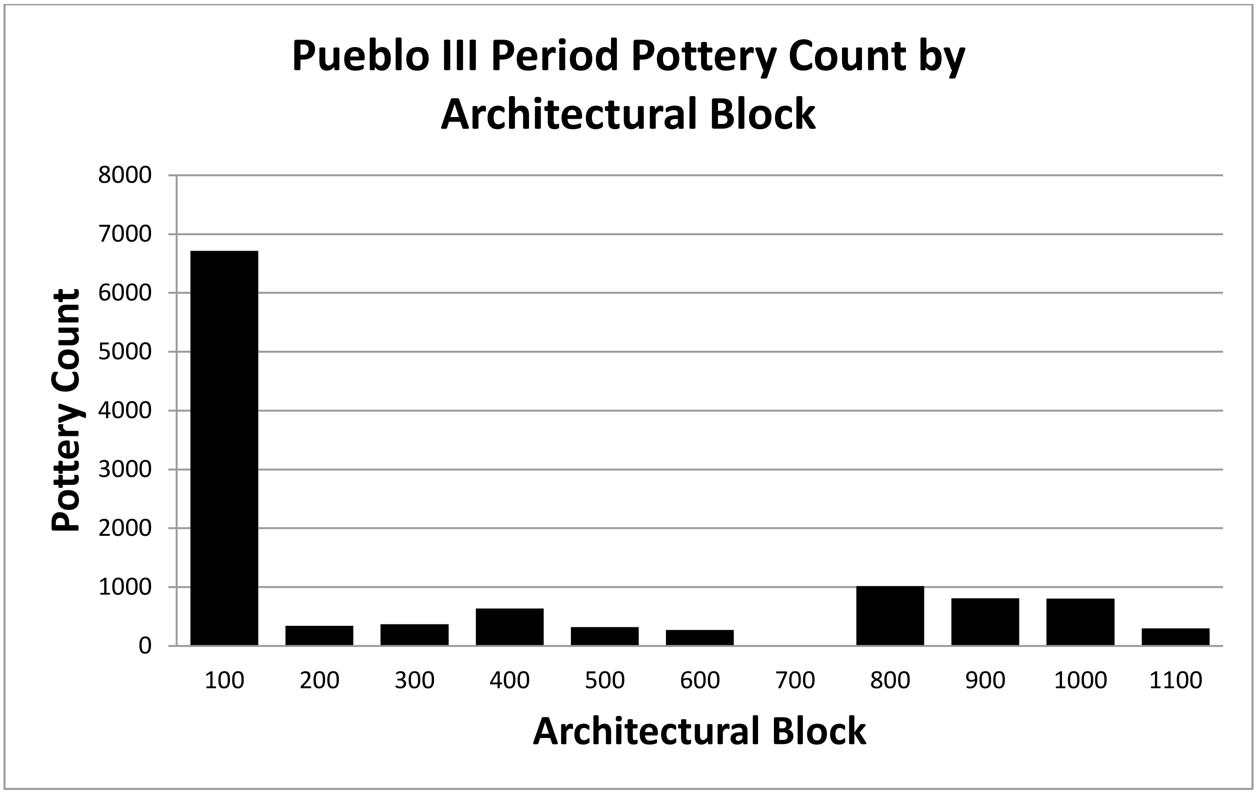

Figure 11.4. Pueblo III period pottery count by architectural block, Albert Porter Pueblo.

Table 11.1. Anomaly Testing Results, Albert Porter Pueblo.

Anomaly Number	Study Unit	Northing/ Easting	Depth of Auger (m)	Fill Types	Midden	Burned	Structure Present
A-1	1002	590/508	0.73	Natural fill w/ ponding			X
A-2	1003	580/506	0.77	Natural fill			X
A-3	1004	573/517	1.37	Natural fill; midden at 0.70	X		X
A-4	1005	567/530	1.30	Natural fill; redeposited caliche at 0.60			X
A-5	STR 904			Natural fill			X
A-6	STR 903			Natural fill			X
A-7	1006	572.3/556	0.60	Natural fill; cultural fill; rock at 0.60			?
A-8	1007	580/560	1.66	Natural fill; midden; rock at 1.66	X		X
A-9	1008	577/565	0.80	Natural fill; midden; rock at 0.80	X		X
A-10	1009	585/568	0.98	Natural fill; cultural fill w/charcoal; rock at 0.98		X?	X
A-11	1010	564/534	2.07	Natural fill; redeposited caliche; loess; sterile			X
A-12	1012	544/544	1.18	Natural fill; midden	X		X
A-13	1011	558.5/565	1.40	Natural fill; midden; sterile	X		X
A-14	1013	488/466	2.02	Natural fill; midden; roof fall; ash	X		X
A-15	1014	486/472	1.31	Natural fill; dense midden	X		X
A-16	1015	548.2/528	0.50	Natural fill; hit rock at 0.50			?
A-17	1016	533/532	0.50	Natural fill; hit rock at 0.50 approaching caliche			?
A-18	1017	534/542	1.90	Natural fill; construction fill; powder caliche at 1.90			X

Anomaly Number	Study Unit	Northing/ Easting	Depth of Auger (m)	Fill Types	Midden	Burned	Structure Present
A-19	1018	534/552	2.00	Natural fill; midden; caliche at 1.40	X		X
A-20	1019	520/540	1.75	Natural fill; midden; sterile at 1.25	X		X
A-21	1020	508/575	1.45	Natural fill; cultural fill; rock at 1.45			X
A-22	1021	530/580	0.50	Cultural until 0.23; sterile			–
A-23	1025	491/547	1.50	Natural fill; midden; burned architecture	X	X	X
A-24	1022	475/486	1.02	Natural fill w/ adobe and charcoal		X	X
A-25	1023	473/595	0.90	Natural fill w/ charcoal flecks; bedrock?			?
A-26	1024	440/580	1.28	Natural fill; midden; construction fill; rock at 1.28	X		X
A-27	1026	548/535	1.93	Natural fill; midden; sterile at 1.20	X		X
A-28	1027	440/560	2.07	Natural fill; midden	X		X
A-29	1028	490/455	1.0	Midden; sterile at 0.80	X		–
A-30	STR 111			Natural fill			X
A-31	1029	428/504	1.40	Natural fill; midden; sterile at 1.20	X		X
A-32	1030	533/513	1.40	Natural fill; midden; sterile at 1.10	X		X
A-33	1031	440/572	0.65	Natural fill w/charcoal; rock at 0.65		X	X
A-34	1032	436/580	0.55	Natural fill; midden; cultural fill; rock at 0.55	X		X
A-35	1033	470/600	2.10	Natural fill; construction fill			X
A-36	1034	487/464	1.10	Natural fill; midden; sterile at 0.90	X		–

Table 11.2. Date Ranges Assigned to Study Units, Albert Porter Pueblo.

Date Range	Span of Years	Period or Subperiod
1	A.D. 725–920	Pueblo I
2	A.D. 920–1140	Pueblo II
3	A.D. 1140–1280	Pueblo III
4	A.D. 725–800	Early Pueblo I
5	A.D. 1020–1060	Middle Pueblo II
6	A.D. 1060–1140	Late Pueblo II
7	A.D. 1140–1225	Early Pueblo III
8	A.D. 1225–1280	Late Pueblo III
9	A.D. 1060–1100	Not applicable
10	A.D. 1100–1140	Not applicable
11	A.D. 1140–1180	Not applicable
12	A.D. 1180–1225	Not applicable
13	A.D. 1225–1260	Not applicable
14	A.D. 1060–1225	Late Pueblo II period through Early Pueblo III
15	A.D. 1020–1280	Middle Pueblo II period through Late Pueblo III
16	A.D. 725–1225	Early Pueblo I period through Early Pueblo III
17	A.D. 920–1280	Pueblo II through Pueblo III
18	A.D. 725–1280	Pueblo I period through Pueblo III period
19	A.D. 1060–1180	Late Pueblo II period through Early Pueblo III period
20	A.D. 1180–1260	Middle Pueblo III period
21	A.D. 1100–1180	Terminal Pueblo II period through early Pueblo III period
22	Not Applicable	Not applicable
23	A.D. 1100–1225	Late Pueblo II period through the end of the Early Pueblo III period; used primarily for the great house construction

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Chapter 12

Synthesis

by Susan C. Ryan

Introduction

Research at Albert Porter Pueblo was guided by Crow Canyon Archaeological Center's multi-year (1997–2004) research design titled "Communities through Time: Cooperation, Conflict, and Migration" (Varien and Thompson 1996). The wider research examines the development and depopulation of ancestral Pueblo communities in the central Mesa Verde region during the period A.D. 900–1300. Data were gathered and examined at the residential site, community, and regional levels. Site-level data were generated from test excavations and surface collections at multiple sites throughout the central Mesa Verde region; at Albert Porter Pueblo, these data were generated by testing each architectural block identified from surface remains on the modern ground surface (see Figure 2.1).

The research guided by the "Communities though Time: Cooperation: Conflict, and Migration" research design was conducted at two spatial scales (Varien and Thompson 1996)**—**the locality level and the regional level. Thus, research questions focused broadly on topics including settlement pattern, community continuity, chronology at the household and site level, regional connectedness, cooperation at the community and regional levels, conflict at the community and regional levels, and access to resources. On the community level, the overarching goal of the Albert Porter Pueblo project was to reconstruct the historic development of the pueblo and the community of which it was a part. To achieve this, various periods of occupation, as well as periods of population growth and decline, were identified. Additionally, the emergence of the village as a community center and the role of the settlement within the community were examined. Community centers in the central Mesa Verde region were focal points within their respective communities, and they are recognized archaeologically by the presence of distinctive residential and public architecture (Adler and Varien 1994; Varien 1999). "Public architecture" is defined by Lipe (2002:221) as architecture "that differs from ordinary domestic structures." Researchers infer that public architecture—which includes great kivas, plazas, and great houses—served as gathering places for members of the community where ceremonies and information sharing could take place (Adler and Wilshusen 1990).

The goal of this chapter is to address the primary research questions outlined in Chapter 2. Specifically, this chapter highlights major research findings of the Albert Porter Pueblo project, synthesizing information from individual chapters in this report while noting key research themes and data that shed light on research questions at both site and community scales.

Locality and Regional-Level Research Questions

When was Albert Porter Pueblo first occupied?

Albert Porter Pueblo was occupied as early as the Basketmaker III period. However, no Basketmaker III structures were exposed in any excavation unit; this is probably a consequence of the research design and how excavation units were selected for sampling (for example, architecture visible on the modern ground surface was more likely to have been tested than non-visible architecture). As stated in Chapter 3, 133 sherds, or 881.26 gm of pottery date from the Basketmaker III period (see Table 3.5). Although the overall count and weight percentages are low for this period, I infer that a small population resided at Albert Porter Pueblo during the Basketmaker III period.

Was the occupation of Albert Porter Pueblo continuous, or were there fluctuations in the residential occupation of the site?

The occupation of Albert Porter Pueblo was not continuous. As noted above, the types of pottery found at the site suggest occupation as early as the Basketmaker III period. The use of this location was limited during this time but increased during the Pueblo I period. Excavation data suggest that, mirroring regional trends, the location was not occupied between A.D. 900 and A.D. 1060. At approximately A.D. 1060, the location was reoccupied, and approximately 33 new residences were constructed during the late Pueblo II period (see Figure 3.3). Occupation of the site was continuous until the mid-to-late A.D. 1200s, when residents moved to Wood Canyon Pueblo.

How did the occupational pattern at Albert Porter Pueblo relate to regional occupational trends? Did it mirror region-wide patterns or deviate from them?

Research conducted at Albert Porter Pueblo has vastly contributed to our understanding of the culture history of the central Mesa Verde region. Settlement trends at Albert Porter Pueblo followed a community-center succession model that describes how the form of community centers changed through time (Lipe and Ortman 2000: Varien 1999), with one exception noted below. As noted in Chapter 4, during the Chaco period, community centers in the northern San Juan region were large isolated buildings, many were in mesa-top settings, and some were accompanied by a great kiva. In the early post-Chaco period, community centers were composed of a cluster of buildings located on mesa tops, and many contained a larger central structure. In the late post-Chaco period, community centers were large, aggregated villages located in canyon settings.

Albert Porter Pueblo deviates from the community-center succession model in one characteristic. The model proposes that mesa-top community centers shifted from the mesa tops to canyon heads or rims by A.D. 1225, and that the mesa-top communities were depopulated. Although this is mostly the case at Albert Porter Pueblo, three residences were constructed in this settlement during the late Pueblo III period, indicating that a small population continued to reside at Albert Porter pueblo during the late A.D. 1200s (see Figure 3.5).

When was Albert Porter Pueblo last occupied? Where did the last occupants of Albert Porter Pueblo resettle? Did they join other regional communities or did they leave the region?

The late Pueblo III period witnessed limited construction activity at Albert Porter Pueblo; only three new residences were constructed during this time (see Figure 3.5). The wood sample that yielded the latest cutting date for the site—A.D. 1250r—was recovered from burned roofing timbers in Structure 114 (see Table 3.3), a masonry-lined kiva. The same structure also contained the timber that yielded the latest noncutting tree-ring date for the entire site—A.D. 1258+vv (see Table 3.3). Most kivas were occupied for an average of 45 years (Varien 1999); thus, it is reasonable to infer that a small group of people was living at Albert Porter Pueblo at least as late as the early A.D. 1260s. I estimate that 15–21 individuals composed the new households. Because it is highly probable that additional individuals resided in structures built before the late Pueblo III period, it is difficult estimate the overall population of the village during late Pueblo III period, though it was probably significantly lower than that of the early Pueblo III period.

Two events might have drawn a significant portion of the population away from Albert Porter Pueblo during the late thirteenth century: the construction of Woods Canyon Pueblo, and regional depopulation. The shift to highly aggregated canyon-head villages appears to have occurred over a 20–30 year period and became the dominant settlement pattern during the late Pueblo III period (Lipe and Varien 1999a:303). Although some mesa-top community centers—including Albert Porter Pueblo— retained a small portion of their population, many households were living in highly aggregated villages by A.D. 1250. Many of these villages were constructed on canyon rims—usually at the head of the canyon—and below canyon rims in shelters or on the talus slopes below, or both. Woods Canyon Pueblo succeeded Albert Porter Pueblo as the community center during the late Pueblo III period. The momentary household population estimate for Woods Canyon Pueblo is approximately 70–112 individuals (Churchill 2002); no doubt some of these individuals were born at Albert Porter Pueblo.

As stated in Chapter 3, some researchers argue that migrations from the Mesa Verde region began in the A.D. 1250s. Alternatively, Duff and Wilshusen (2000) state that individuals began to depart the Mesa Verde region as early as the first part of the thirteenth century. Regardless of when migrations began, Ortman (2009) infers that people living in the Mesa Verde region moved southward to the northern Rio Grande region where descendants live today and are Tewa speakers. Based on population estimates for Woods Canyon Pueblo, it appears that some individuals might have begun migrating from the region at the end of the early Pueblo III period.

Is there public architecture at Albert Porter Pueblo? Is there a great kiva at the site? Is there a great house at Albert Porter Pueblo?

Community centers in the central Mesa Verde region were focal points within their respective communities, and they are recognized archaeologically by the presence of distinctive residential and public architecture (Adler and Varien 1994; Varien 1999). Public architecture is defined by

Lipe (2002:221) as architecture "that differs from ordinary domestic structures." Researchers infer that public architecture—which includes great kivas, plazas, and great houses—served as gathering places for members of the community where ceremonies and information sharing could take place (Adler and Wilshusen 1990).

Although we did not discover a great kiva at Albert Porter Pueblo, it is likely that one exists somewhere in the Woods Canyon community. However, a great house was constructed in the early A.D. 1100s. The great house, within Architectural Block 100, was located in the center of the village (see Figure 2.1). This building is distinctive in terms of its size, layout, and architectural details. Although it is much smaller than the well-known great houses in Chaco Canyon—located in modern day north-central New Mexico—the great house at Albert Porter Pueblo shares many characteristics with these Chaco structures (also see Chapter 5).

There is an earthen-and-masonry dam dating from the Pueblo II-III period located in a small tributary north of Woods Canyon; the reservoir is approximately 750 m northeast of Wood Canyon Pueblo and 1.25 km south of Albert Porter Pueblo. Pottery data, tree-ring dates, and stratigraphy date the construction of the dam to about A.D. 1050–1175 (Wilshusen et al. 1997:678). It seems likely that the dam was constructed by the occupants of Albert Porter Pueblo at approximately the same time the great house was constructed in Architectural Block 100. The reservoir, like other "public" Chaco-period constructions (such as roads, berms, and great kivas) might have served to maintain community cohesion as well as to support and maintain members of the Woods Canyon community and attract new members to the community.

Is there any indication of a road at Albert Porter Pueblo?

There is evidence of a possible road or footpath in the form of an architectural alignment as revealed through remote sensing. Pit structures appear to be aligned southwest-northeast just north of the great house in the following 20-x-20-m grids: 520N 520E, 520N 540E, and 540N 560E (see Figure 2.7). Additionally, the remote-sensing survey revealed linear alignments in the following 20-x-20-m grid squares: 500N 440E; 480N 540E; 460N 560E; and 460N 580E (see Figure 2.7). The linear alignment in grid square 480N 540E was tested with five contiguous 1-x-1-m units but was not observable in the stratigraphic profiles of those units.

Is there any evidence of differentiation between residents of the great house and those living in other residences?

As seen in Figure 12.1, a total of eight exotic artifacts—defined as artifacts made from materials including jet, shell, obsidian, copper, and Washington Pass chert—was recovered from Architectural Block 100. This suggests that residents of that block had acquired more exotic artifacts than the residents of other areas of the village. However, it is worth mentioning that the copper bell fragment—found in Block 1000—and the two turquoise fragments—found in Blocks 500 and 600—were not found in Block 100. This suggests that the occupants of Architectural Block 100 and other residents had equal access to nonlocal or exotic resources.

Additionally, as noted in the Chapter 8, ash collected from a hearth in Structure 112—the Chaco-influenced kiva located in the core of the great house—revealed the presence of uncharred tobacco (*Nicotiana attenuata*) seeds and a single charred stoneseed (*Lithospermum*). As noted by Adams (1990), the presence of tobacco indicates probable ritual use of the structure similar to ritual use of structures contained in ethnographic accounts of Pueblo people during the historic period. The stoneseed might have been used for personal adornment as part of a pearly-white string of beads (also see Chapter 8).

How long were community centers used, and did they last longer than residences of individual families?

Although Albert Porter Pueblo was occupied during the Pueblo I period, and possibly during the Basketmaker III period, the most intensive and continuous occupation dates from A.D. 1060–1280; it was during this period that Albert Porter Pueblo served as a center for the surrounding community. Architectural Block 100, in which the great house was located, is distinctive in terms of its size, layout, and architectural details. On the basis of the presence of the great house, the dense concentration of smaller architectural units surrounding this structure, and the long occupation span of this settlement as compared to the farmsteads in the surrounding community, I infer that Albert Porter Pueblo was a community center. Our research indicates that the Albert Porter Pueblo community center endured for approximately 200 years or about 20 generations. Indeed, the community center persisted longer than the residences of individual families living at the pueblo.

Did the families living at or near the community centers live in their houses longer than other families in the surrounding community?

Beginning in the mid-A.D. 1100s, the average occupation span of a unit pueblo increased from about 20 years to an estimated 45 years when, for the first time, buildings were constructed with sandstone masonry (Varien 1999; Varien and Ortman 2005). This longer use life was calculated from pottery accumulations that reflect the length of time people resided in a unit pueblo rather than the average amount of time the roofs of these structures could endure (Ryan 2010). For example, Structure 112—a masonry-lined kiva located in the original core of the great house in Architectural Block 100—was constructed in the early A.D. 1100s and was continuously occupied until the mid-A.D. 1200s. Perhaps the best way to address the above question is to note that specific buildings located within community centers had an extremely long use life that spanned multiple generations, whereas buildings located outside of the community center were not typically occupied for more than one or two generations. Thus, central structures—such as the great house—public architecture, and special-use buildings constructed within community centers were carefully maintained, creating an atmosphere of community success and longevity as opposed to residences within and outside of the community center, which were not typically occupied for more than 45 years.

Did the families who lived at or near the community center become important decision makers within the community?

The great house, located in the center of the community, was constructed directly on top of the remains of residential structures from earlier occupations. This particular location was sought out and utilized for centuries for several reasons: it was a prominent location on the landscape, it was located near sustainable resources including land, water, and construction materials, and it had ties to past generations. Like many great houses in the Mesa Verde region, earlier deposits symbolically connected the past to the present in an effort to maintain cultural identity and to emphasize community success and longevity (Ryan 2008:82). The individuals who constructed the great house were probably the descendants of individuals who occupied the pit structures located directly beneath the great house. During the Pueblo II period, the great house was constructed as an isolated structure; however, during the Pueblo III period, restrictions were lifted, and at least 11 households were added to the great house. The original great house was probably occupied by a small extended family of perhaps one or two households. In the Pueblo III period, the great house appears to have been appropriated by a larger descendant-household group with shared power, indicating that the descent group consisted of at least 55 individuals. In sum, it appears that the Pueblo II-period great house was occupied by one or two families who probably organized the social, political, and economic activities at Albert Porter Pueblo. By the Pueblo III period, the great house was occupied by approximately 11 households who probably shared decision-making responsibilities for the community.

Were communities dating from A.D. 1050–1150 part of the Chaco regional system?

Many researchers agree that Chaco Canyon was the center of a much larger regional system, although there is a great deal of debate about the nature and organization of that system. The primary evidence of the regional system is the presence of Chaco-influenced architecture and a network of roads found in an area more than 200 mi in diameter around Chaco Canyon. This area encompasses northwestern New Mexico, southeastern Utah, southwestern Colorado, and northeastern Arizona (Mahoney and Kantner 2000). The Chaco regional system was an intricate structure that was probably tied to social power concentrated in the hands of people who occupied the great houses in Chaco Canyon. Although the exact nature of this power is not well understood, it probably derived from control over material and ideological resources such as labor, farmland, water resources, material goods (including exotic goods), and ritual knowledge.

About A.D. 1080, the Chaco regional system expanded to its farthest extent, and for the first time, extended north of the San Juan River. In the late A.D. 1000s and early 1100s, connections in the north intensified when Aztec and Salmon pueblos, the largest Chaco outliers, were constructed near the confluence of the Animas, La Plata, and San Juan rivers, an area known today as the middle San Juan region (formerly known as the Totah region). Chaco Canyon remained the primary center of the ancestral Pueblo world until the early A.D. 1100s. Construction of Chaco great houses ended about A.D. 1140 roughly coincident with the onset of a persistent and severe drought. The complex of great houses at Aztec became an equal center—if not the primary center—of the post-Chaco world (Lekson 1999). Approximately 250 outliers have been recorded in the Chaco regional system to date (Sipapu—The Chaco World Great

House Database, accessed December 3, 2008). These outliers were much smaller than the great houses at Aztec, Salmon, and Chaco Canyon, but they were larger than the farmsteads and residential units that surrounded them in their local communities. Many great houses served as community centers in the northern San Juan region.

Great houses in the Mesa Verde region, including the great house at Albert Porter Pueblo, exhibit architectural characteristics similar to those found in Chaco Canyon. These characteristics include the following: preplanned construction; visually imposing, multiple-story buildings; and buildings with thick walls constructed in a core-and-veneer masonry style. Some Chaco great houses are associated with features such as great kivas, earthen mounds or berms, and roads (Van Dyke 2003:181). Additional architectural characteristics that are associated with the Chacoan construction style are distinctive kivas, many aboveground, that were typically incorporated into a roomblock by enclosing them in a square room. In addition, these kivas typically have subfloor ventilation systems and eight pilasters, many of which are of the radial-beam type (Lekson 1984; Van Dyke 2003). Albert Porter Pueblo was a small Chaco outlier.

Was there a break in community continuity during the A.D. 1130–1180 drought?

The single greatest drought recorded for North America occurred in the western half of the continent from A.D. 1140 to1162; this period shows 23 consecutive years of negative Palmer Drought Severity Index values (Cook et al. 2007). This megadrought occurred within a period of prolonged moisture deficiency in the Colorado Plateau that spanned five decades—from A.D. 1130 to1180. In a recent study of drought in the northern Southwest, Meko et al. (2007) reconstructed annual Colorado River flows at Lee Ferry, Arizona for the period A.D. 762–2005 from tree-ring samples and from stream-flow data beginning with 1906. Although this study focused solely on stream flow, which is affected by factors other than precipitation, the results clearly indicate that Colorado River flows in the middle A.D. 1100s were the lowest of the past 1,200 years. Below-normal flow occurred for 13 consecutive years between A.D. 1143 and A.D. 1155 (Meko et al. 2007). The mid-A.D. 1100s megadrought almost certainly had environmental and cultural repercussions: depressed water tables; eroded floodplains; decreased climatic variability; reduced precipitation; and reduced agricultural productivity (Van West and Dean 2000). Consequently, because of its duration, intensity, and persistence, the drought of the mid-A.D. 1100s must have had significant social impacts on occupants of the northern San Juan region (Benson et al. 2007; Van West and Dean 2000).

In the Mesa Verde region, there are relatively few tree-ring cutting dates for the span A.D. 1150–1170. If regional patterns of tree-ring dates reflect occupational patterns, then wood harvesting and construction projects should be evident in the tree-ring record even when populations were static or decreasing (Berry and Benson 2010). Some researchers have interpreted the decline in tree harvesting during the A.D. 1130–1180 drought as evidence of great-house abandonment (Benson et al. 2007), and others suggest that complete regional depopulation occurred (Berry 1982). Even though few sites have been excavated in the central Mesa Verde region that were demonstrably constructed during the A.D. 1130–1180 period—Albert Porter Pueblo is one of these sites (see Table 3.3)—it seems unlikely that the region was depopulated (Lipe 2006; Lipe and Varien 1999b; Ryan 2010; Varien 1999).

Can we identify patterns of cooperation between households and the community? For example, how did households cooperate on public-works projects?

Other than the great house, there is only one known “public-works project”—Woods Canyon Reservoir—in the Woods Canyon Community (see Figure 1.4). The Woods Canyon Reservoir is a Pueblo II–III period earthen-and-masonry dam located in a small tributary north of Woods Canyon, approximately 750 m northeast of Woods Canyon Pueblo and 1.25 km south of Albert Porter Pueblo. Pottery data, tree-ring dates, and stratigraphy date the construction of the dam to approximately A.D. 1050–1175 (Wilshusen et al. 1997:678). It seems likely that the dam was constructed by the occupants of Albert Porter Pueblo at about the same time the great house was constructed. The reservoir, like other “public” Chaco-period constructions such as roads, berms, and great kivas, might have served to maintain community cohesion, support and maintain members of the Woods Canyon community, and attract new members into the community.

Did households affiliate with groups that were larger than a single family, but smaller than the community?

As noted above, the original great house—located in Architectural Block 100 (see Figure 1.2)—was probably occupied by a small extended family of perhaps one or two households. During the Pueblo II period, the great house was occupied by 5–14 individuals who probably organized the social, political, and economic activities at Albert Porter Pueblo. During the Pueblo III period, the great house appears to have been appropriated by a larger descendant-household group with shared power, indicating that the descent group consisted of at least 11 households. By this time, the great house was occupied by approximately 55–77 individuals who probably shared decision-making responsibilities for the community. In sum, it was not until the Pueblo III period, or about A.D. 1140, that households affiliated with corporate groups larger than a single family, but smaller than the community.

Can we identify patterns of cooperation among communities within the locality? For example, did two or more communities form alliances with one another?

Did unequal access to either resources or leadership positions create conflict within and between communities?

Three large-village sites compose the Woods Canyon community (see Figure 1.4): (1) Albert Porter Pueblo; (2) Bass Site complex (Site 5MT136), located approximately 2.25 km southwest of Albert Porter Pueblo; and (3) Woods Canyon Pueblo (Site 5MT11842). A fourth site, Woods Canyon Reservoir (Site 5MT12086), located approximately 1.75 km south of Albert Porter Pueblo, was constructed during the Pueblo II period and used by residents of the Woods Canyon community until regional depopulation about A.D. 1300 (Churchill 2002). Albert Porter Pueblo and the Bass Site complex were probably contemporaneous; however, this inference is drawn from diagnostic artifacts recovered from the modern ground surface at the Bass Site complex, not from subsurface testing. Although there is little empirical evidence to answer the above question, it seems likely—from the absence of evidence of conflict at Albert Porter Pueblo—that the two large pueblos, both community centers, cooperated with one another. Additionally, it appears that the occupants of Albert Porter Pueblo, and possibly the Bass Site complex, moved to Woods Canyon Pueblo—a canyon-rim village located in nearby Woods Canyon—during the Pueblo III period. The absence of evidence of conflict at both Albert Porter and Woods Canyon pueblos suggests cooperation between the two pueblos.

Did residents of Architectural Block 100 have more access to nonlocal or exotic resources than residents of other portions of the village?

As seen in Figure 12.1, a total of eight exotic artifacts—defined as artifacts made from materials including jet, shell, obsidian, Washington Pass chert, and copper—was recovered from Architectural Block 100. This suggests that residents living in Architectural Block 100 had acquired more exotic artifacts than the residents living in other portions of the village. However, the fragment of copper bell was found in Block 1000, and the two turquoise fragments were found in Blocks 500 and 600 (Table 12.1). This suggests that the occupants of Block 100 and the occupants of other blocks had equal access to nonlocal or exotic resources.

Additionally, significantly higher proportions of Abajo Red-on-Orange and Indeterminate Local Red Unpainted sherds were recovered from Architectural Block 100 than from other blocks (Figures 12.2 and 12.3). Because both Abajo Red-on-orange and Indeterminate Local Red Unpainted date from the Basketmaker III and Pueblo I periods, I infer that the recovery locations of these sherds reflect the primary location of the first settlements at Albert Porter Pueblo.

Do the location and placement of structures at Albert Porter Pueblo provide any indications of concerns for defense?

Albert Porter Pueblo is located on a mesa top between Woods and Sandstone canyons (see Figure 1.4). Topographically, the site is situated on the highest and most prominent location on the landscape. This location, combined with the two-story great house, would have made Albert Porter Pueblo a major visual focal point, if not the primary focal point, for residents of the community (Ryan 2008). Similarly, the Bass Site complex is situated in a prominent position on the landscape, as are many other great houses in the northern San Juan region, including Escalante Ruin, Lowry Pueblo, the Bluff great house, the Cottonwood Falls great house, and Haynie Ruin. There appears to be a correlation between the placement of great houses and visually prominent locations. Does this placement indicate a concern with defense? Probably not. Constructing villages on exposed, elevated locations is counter to what one would expect if residents were concerned with defense (Haas and Creamer 1993; Kuckelman 2002; LeBlanc 1999; Wilcox and Haas 1994). Aggregation itself may be interpreted as a defensive posture; that is, large numbers of individuals living in proximity might have deterred would-be assailants.

Is there any skeletal evidence of violence at Albert Porter Pueblo?

There is no evidence of violence on any of the skeletal remains exposed at Albert Porter Pueblo. In accordance with Crow Canyon Archaeological Center's human remains policy, collecting data on human remains was not a part of our overarching research design; thus, human remains were not targeted during test excavations. However, despite our attempts to avoid human remains, 12 human remains occurrences were encountered during excavations (also see Chapter 9). When remains were encountered, all excavation within the excavation unit ceased, and the remains were documented in situ by a physical anthropologist. Further exposure of the remains was not permitted. All excavation units containing human remains were backfilled in a timely manner after documentation was completed.

Is there evidence of violence in other sites located in the Woods Canyon community?

Test excavations at two of the three largest sites in the Woods Canyon community (see Figure 1.4)—Albert Porter Pueblo and Wood Canyon Pueblo—did not result in the exposure of evidence of violence. The deaths of 10 individuals whose remains were interred contemporaneously in Kiva 5-S at Woods Canyon Pueblo are inferred by Bradley (2002) to be the result of infectious disease. The third large site, the Bass Site complex, has not been the subject of intensive research or excavation; thus, it is unknown if the residents of that settlement were involved in violence.

How does the faunal assemblage from Architectural Block 100 compare to surrounding architectural blocks?

With the exception of turkey/large bird and cottontail, all common taxa were found in nearly equal proportions across the site in deposits dating from the Pueblo II period (also see Chapter 10), from which Badenhorst and Driver infer that, during the Chaco period, faunal utilization by the residents of Architectural Block 100 was similar, if not identical, to that of residents of other blocks. During the Pueblo II/III period, a higher percentage of cottontail and jackrabbit was deposited in Blocks 200–1100. The opposite was true for turkey/large bird: a higher percentage of those remains were found in Block 100. During the Pueblo III period, cottontail bones were deposited in greater percentages within Block 100, and jackrabbit remains were found in greater percentages in other blocks. Also during the Pueblo III period, turkey/large bird bones were deposited in almost equal frequencies in Block 100 and other blocks. Badenhorst and Driver suggest that the deposition of turkey remains first increased in Block 100 during the Pueblo II/III period, and increased in other blocks during the Pueblo III period.

Taxa such as birds of prey, small colorful birds, and carnivores are found across Albert Porter Pueblo in middens and kivas that date from all periods of occupation. These taxa were most likely used for ritual or ceremonial activities, and the presence of their remains across the site suggests that these activities took place throughout the village and were not restricted to Architectural Block 100. However, of the eight fish bones found at the site, six were recovered from Block 100. Five of these bones were recovered from a sealed floor vault (Feature 6) in the floor of Structure 108, and a single fish bone was found in Nonstructure 130, a midden located just above Structure 136, a masonry-lined kiva (see Figure 5.4). Two other fish bones were recovered from Nonstructure 804, a midden in Block 800. Thus, it appears that residents of Albert Porter Pueblo had limited access to fish, and that, during the Pueblo II period, residents of Block 100 ritually sealed fish remains in a floor vault in Structure 108. Species-level identification could not be made on the fish remains recovered from Albert Porter Pueblo; however, two unidentified fish bones and 52 gar (*Lepistoseus*) scales were recovered from Escalante Ruin—a Pueblo II great house located near Dolores, Colorado (Reed et al. 1979:311). Gar remains have also been reported from the sites of two great houses in Chaco Canyon. At Kin Kletso, part of a lower jaw and 25 scales were recovered (Vivian and Mathews 1964:22–23), and Judd (1959:35) recovered gar scales from Pueblo Del Arroyo.

How does the Albert Porter Pueblo faunal assemblage compare to other sites in the region?

According to Badenhorst and Driver (Chapter 10), no significant differences exist, either in relative proportion or spatial distribution, between the taxa from Albert Porter Pueblo and other sites in the central Mesa Verde region. Slight differences are attributed to sample size and minor environmental variation. In general, sites in the northern San Juan region yielded similar results with regard to animal usage— the remains of cottontails and turkeys dominate, and jackrabbit remains occur in lower numbers. The remains of an array of carnivores, artiodactyls, rodents, and wild birds are also present.

How does the Albert Porter Pueblo faunal assemblage compare to other great house sites in the northern San Juan region?

Albert Porter Pueblo exhibits a pattern of faunal usage similar to other great-house sites in the northern San Juan region—including Ida Jean, Bluff great house, Escalante, Wallace, Morris 31, Lowry Ruin, Yellow Jacket Pueblo, and Comb Wash great house (Chapter 10). This conclusion implies that great-house settlements across the northern San Juan region used animals in similar ways. Furthermore, the use of animals at great-house sites cannot be differentiated from sites without great houses in the region. Thus, animal use was the same in all settlements during all time periods in the northern San Juan region.

Did residents live at Albert Porter Pueblo year-round?

As Adams notes in Chapter 8, the recovery of maize (both flint and pop varieties), beans, and squash indicates the presence of people in the village for much, and probably all, of the year. Farming activities—preparing fields for planting, planting, tending, harvesting, drying, and storing—were probably conducted from early spring until late fall. Winter was probably spent in the making and repairing of tools.

What was the most common wild-plant resource utilized at Albert Porter Pueblo?

Cheno-am seeds were the most abundant wild-plant resource utilized at Albert Porter Pueblo from the late Pueblo II period through depopulation. As noted by Adams in Chapter 8, the use of cheno-am seeds remained unchanged for the 250 years of occupation of Albert Porter Pueblo.

What were the most frequently used fuel resources at Albert Porter Pueblo? Did their use change over time?

As noted by Adams in Chapter 8, the fuels most frequently utilized were juniper, pine, sagebrush, and maize cobs. The choice of fuels changed slightly through time. The charred-plant parts present in thermal features used in the late Pueblo III subperiod suggest a decrease in the use of maize cobs and an increase in the use of serviceberry/peraphyllum wood. Additionally, the use of juniper declined in late Pueblo III kivas.

What were the most frequently used roof construction elements at Albert Porter Pueblo? Did their use change over time?

Timbers were the most utilized roof-construction elements at Albert Porter Pueblo and compose 92 percent of identified specimens; pinyon trees compose 6.4 percent of the identified specimens (also see Chapter 8). Because only three new residences were constructed during the late Pueblo III subperiod, the use of both juniper and pinyon wood as construction elements declined by this time. The other roof-construction elements were ponderosa pine (0.3 percent), spruce/fir (0.3 percent), sagebrush (0.3 percent), and nonconiferous trees (0.8 percent).

What were the human impacts to the environment immediately surrounding Albert Porter Pueblo?

As noted by Adams in Chapter 8, fuel and construction-element use had changed by the late Pueblo III subperiod. We recovered less maize from deposits dating from this time than from deposits that dated earlier, and serviceberry/peraphyllum shrubs apparently became a preferred fuel source. Additionally, fewer construction elements of juniper and pinyon were recovered from contexts dating from the late Pueblo III subperiod, possibly indicating a reduction in the pinyon/juniper woodlands and an increase in agricultural fields in the area immediately surrounding Albert Porter Pueblo.

Was plant use in Architectural Block 100 kivas different from plant use in kivas located in surrounding architectural blocks?

The residents of Architectural Block 100 acquired plants differently from residents of other blocks. As noted by Adams in Chapter 8, all residents used juniper and pinyon wood and consumed maize and cheno-am seeds. However, numerous reproductive plants parts are unique to the great house, including *Cleome, Corispermum, Helianthus annuus, Lithospermum,* Malvaceae, *Mentzelia albicaulis, Nicotiana attenuata, Polygonum/Scirpus, Scirpus,* and Sphaeralcea. Additionally, numerous reproductive plant parts are unique to the other blocks, including *Cycloloma atriplicifolium, Descurainia,* Leguminosae, *Phaseolus vulgaris, Sporobolus, Stipa hymenoides,* and *Yucca baccata*. Two of these plants, *Lithospermum* and *Nicotiana attenuata*, were probably used in ceremonial or ritual activities, or both, that were associated with the great house. Additionally, three woods (*Fraxinus anomala, Quercus gambelii,* and *Rhus aromatica*) are unique to kivas within the great house. In Chapter 8, Adams notes that these patterns suggest differential use of flora within Architectural Block 100 vs. the other blocks.

As Adams noted in Chapter 7, a pollen grain recovered from the floor of Structure 119, a masonry-lined kiva dating from the early Pueblo III subperiod, was tentatively identified as cotton (*Gossypium*). The presence of such pollen would be highly unusual for the northern San Juan region.

Conclusions

The Albert Porter Pueblo research project contributed greatly to our understanding of the culture history of the central Mesa Verde region. The key contributions of this research are numerous and include the following: community-center formation and the location of community centers through time, the nature and extent of Chaco influence in the northern San Juan region, human impacts to the environment, human behavior during periods of environmental stress, the nature and tempo of settlement patterns through time, community cooperation, community violence, differential access to resources, and social connectedness within and outside the region.

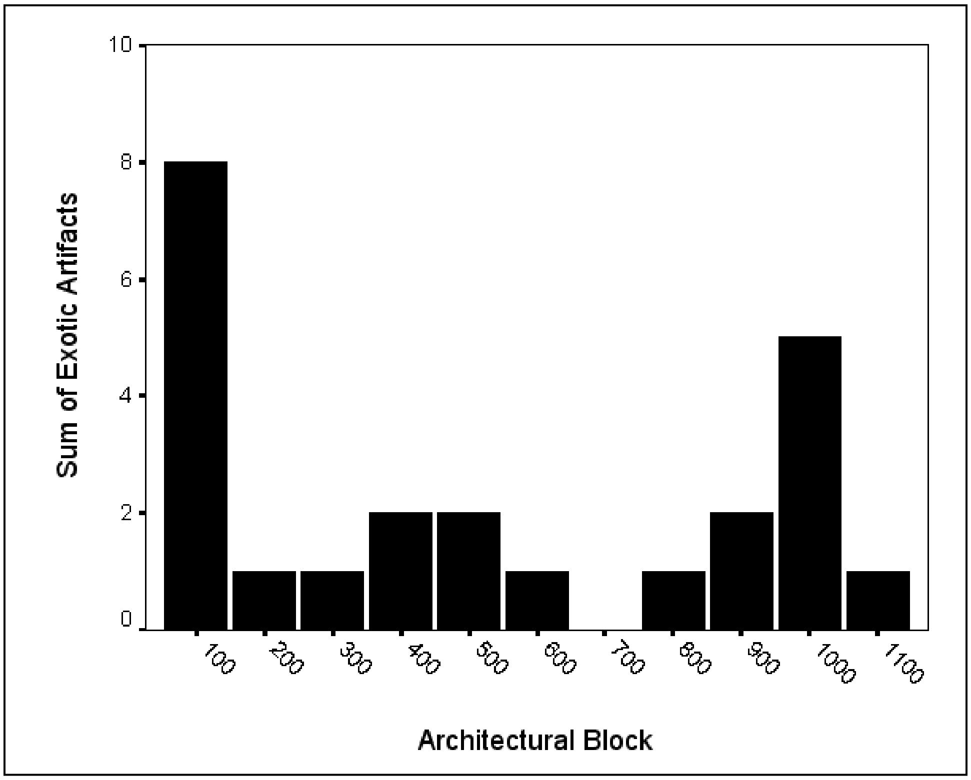
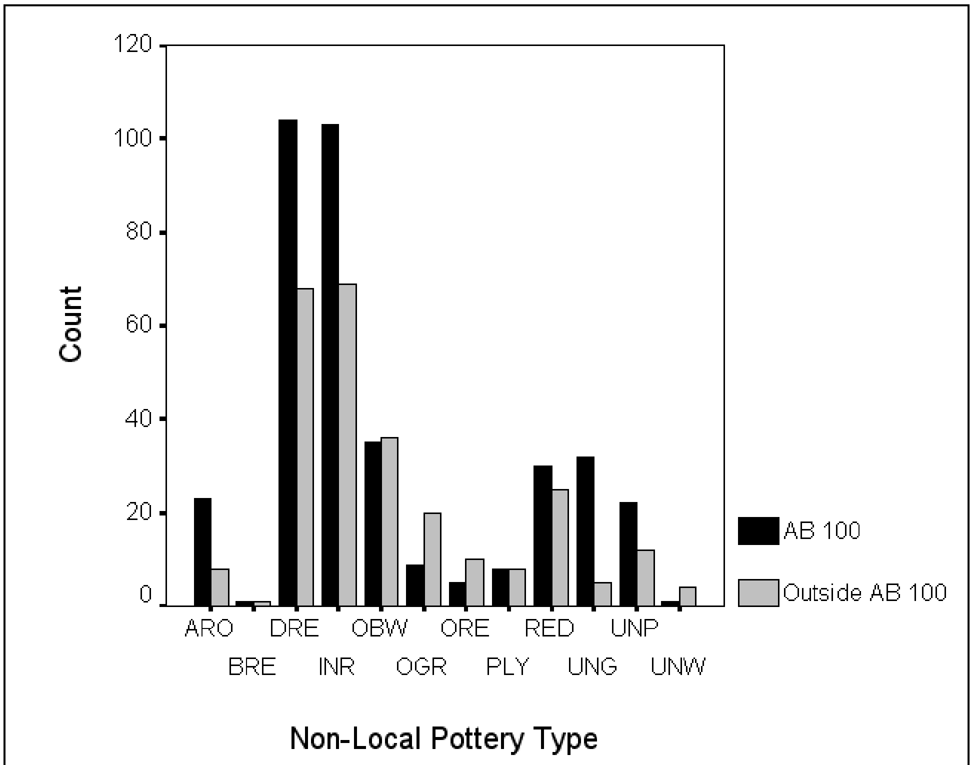
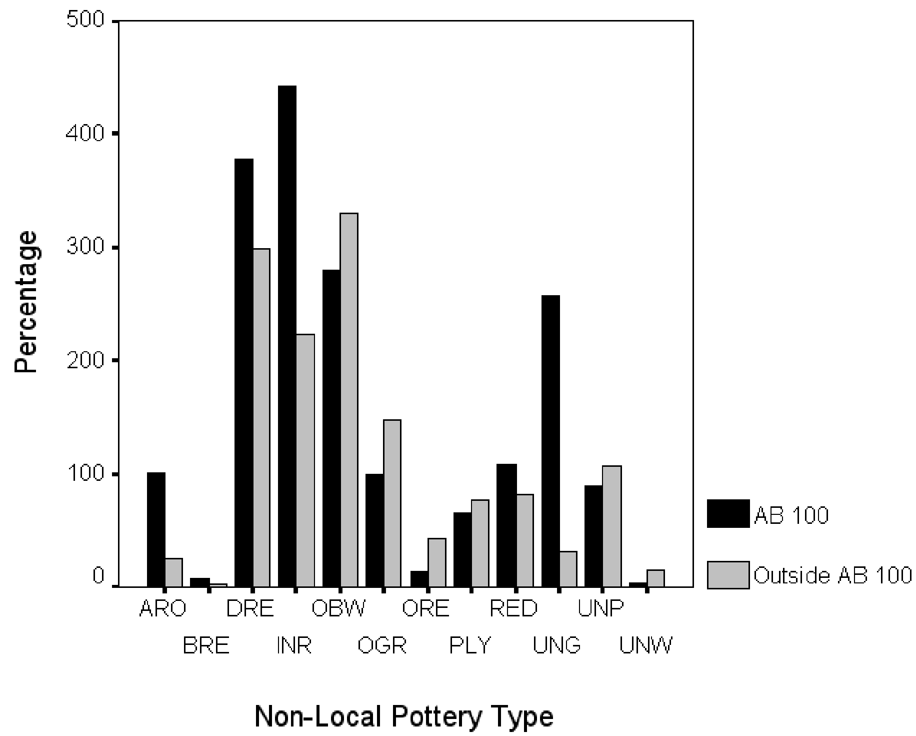


Figure 12.1. Sum of all exotic artifacts by architectural block, Albert Porter Pueblo. Exotic artifacts include items made from the following materials: jet, shell, obsidian, Washington Pass Chert, and copper.



Key:
ARO = Abajo Red-on-Orange
BRE = Bluff Black-on-Red
DRE = Deadmans Black-on-red
INR = Indeterminate Local Red Unpainted
OBW = Other White, Nonlocal
OGR = Other Gray, Nonlocal
PLY = Polychrome
RED = Indeterminate Local Red Painted
UNG = Unknown Gray
UNP = Unknown Pottery
UNW = Unknown White
AB 100 = Architectural Block 100
Note: These percentages have been standardized against the total count of gray ware pottery.

Figure 12.2. Nonlocal pottery types inside and outside of Architectural Block 100, Albert Porter Pueblo.



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UNG = Unknown Gray
UNP = Unknown Pottery
UNW = Unknown White
AB 100 = Architectural Block 100
Note: These percentages have been standardized against the total percentage of gray ware pottery.

Figure 12.3. Nonlocal pottery types by percentage from Architectural Block 100 and outside of Architectural Block 100, Albert Porter Pueblo.

Table 12.1. All Exotic Artifacts, Albert Porter Pueblo.

Exotic Material Type	Artifact Type	Study Unit	Architectural Block
Copper	Copper bell	1043	1000
Jet	Bead	1037	1000
Jet	Bead	1101	1100
Jet	Other modified stone/mineral	104	100
Jet	Other modified stone/mineral	107	100
Jet	Other modified stone/mineral	204	200
Jet	Pebble	1042	1000
Jet	Pendant	402	400
Jet	Ring	502	500
Obsidian	Biface	1037	1000
Obsidian	Projectile point	102	100
Obsidian	Projectile point	119	100
Obsidian	Projectile point	151	100
Obsidian	Projectile point	901	900
Shell	Bead	1000	1000
Shell	Bead	101	100
Shell	Bead	106	100
Shell	Bead	305	300
Shell	Bead	800	800
Shell	Bead	901	900
Shell	Pendant	139	100
Turquoise	Gaming piece	502	500
Turquoise	Pendant	601	600
Washington Pass Chert	Drill	403	400

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