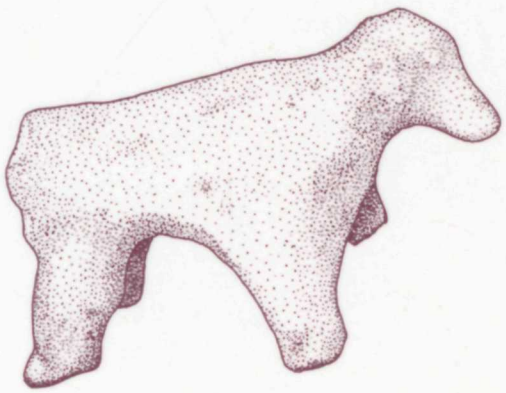
Bandelier Archaeological Excavation Project:

Summer 1989 Excavations at Burnt Mesa Pueblo

edited by
Timothy A. Kohler

with contributions by
Ingrid K. Carlson
Michele Gray
Timothy A. Kohler
Angela Linse
Meredith H. Matthews
Markku Niskanen
Mark Slaughter
W. Nicholas Trierweiler



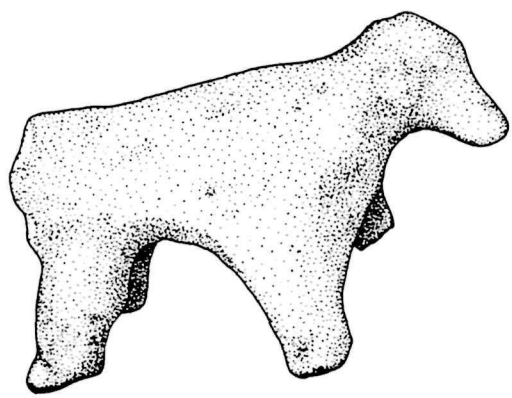
WSU Department of Anthropology Reports of Investigations 62

Bandelier Archaeological Excavation Project:

Summer 1989 Excavations at Burnt Mesa Pueblo

edited by
Timothy A. Kohler

with contributions by
Ingrid K. Carlson
Michele Gray
Timothy A. Kohler
Angela Linse
Meredith H. Matthews
Markku Niskanen
Mark Slaughter
W. Nicholas Trierweiler



WSU Department of Anthropology Reports of Investigations 62

Complete bibliographic format for WSU *Reports of Investigations* 61:

Kohler, Timothy A., editor
1990 Bandelier Archaeological Excavation Project:: Summer 1989 Excavations at Burnt Mesa Pueblo. *Reports of Investigations* 62. Department of Anthropology, Washington State University, Pullman.

Contibution No. 5, Bandelier Archeological Project

Cover: Animal effigy from Area 1, Subarea 4. Actual size, about 1" (2.4 cm). (Drawing by Sarah Moore)

This report is printed on acid-free paper.
Price: $14.75

Reports of Investigations is an occasional series published by the Department of Anthropology, Washington State University, to disseminate information resulting from research undertaken by students, staff, and faculty associated with the department. Timothy A. Kohler, General Editor.

PREFACE

This is the second report on a collaboration between Washington State University (WSU) and the National Park Service (NPS) to investigate the prehistory of Bandelier National Monument. We are fortunate to have had several sponsors for the 1989 excavations and the subsequent analyses that are reported in this volume, including the National Science Foundation (BNS 8906748), the Wenner-Gren Foundation for Anthropological Research (Grant 5051, and its renewal), the L. J. and Mary C. Skaggs Foundation (through the National Park Foundation), the Southwest Parks and Monuments Association, and, finally, the Friends of Bandelier, who were also instrumental in initiating this project. The excavations were carried out under ARPA permit #89-BAND-1, and all work since January 16, 1990, has been performed under Cooperative Agreement #CA 7029-0-0003 between NPS and WSU.

We continue to enjoy generous logistical support from Bandelier National Monument and important assistance from several key members of its staff, especially José Cisneros (Superintendent), Craig Allen, Rory Gauthier, Ed Greene, Phil LoPiccolo, Virginia Robicheau, and Bill Sweetland. The NPS Southwest Region's Bandelier Survey Project is directed by Robert P. Powers and Janet D. Orcutt (who are also co-Principal Investigators on BNS-8906748); I deeply appreciate their active assistance in many phases of excavation and planning. Other representatives of the Southwest Region or of the survey project who provided assistance include John Cook (Regional Director), Robert Belous (Special Assistant to the Regional Director), Ron Ice (Regional Archeologist), Susan Eininger, Karen Harry, Genevieve Head, Sarah Herr, Judith Miles, Larry Nordby, and Tom Windes.

The students in the field school did most of the excavation reported here. In Area 1, excavations were supervised by Angela Linse, a doctoral student in anthropology at the University of Washington; in Area 2, by Ingrid K. Carlson, a master's student in anthropology at WSU. Linse's crew consisted of Ralph Bailey, Jr., Douglas Harro, Michael Hayton, Christine Jirikowic, Mark Rhoades, and David Sinclair; Chris Barrett, Paul Blomgren, Charles Brown, Steven Ewald, and Debbie Mankovitz served on Carlson's crew. Another field school student, Marcia Jean Schoppe, doubled as the supervisor of the flow of materials in the field laboratory and was not assigned to either crew.

In the field lab, ceramic analysis was carried out by Michele Gray, a doctoral student in anthropology at the University of Virginia. Mark Slaughter, who at the time was working towards an M.A. in anthropology from Eastern New Mexico University, directed the analysis of lithic materials. Data entry and editing was performed by Alice Gronski, who during the academic year serves as Curator of the Museum of Anthropology at WSU. Markku Niskanen, who was completing an M.A. in physical anthropology at WSU, undertook the analysis of human remains reported in Appendix A. Everett Nelson, a graduate student in cultural anthropology at WSU, served as camp cook and camp manager. Back in Pullman, Jean Schoppe assisted Alice Gronski in completing data entry and also undertook all sorts of other chores in support of the project. Except for Fig. 9.1, and the cover illustration by Sarah Moore, Lisa Shifrin drafted the figures in this volume. Matthew Root assisted in copy editing chores.

Michele Gray would like to acknowledge Stephen Plog and Jeffrey Hantman for their advice and support at the University of Virginia, as well as Laura Anderson, Lori Gibson, Lora Yowell, and especially Terry Schreck for their assistance with the attribute analysis project in Charlottesville. The efforts of Walter Bartholomew, a sediment analysis technician working at the University of Washington with Angela Linse, are also gratefully acknowledged.

Several volunteers from local communities gave freely of their time in both the field and the lab. I hope I have not forgotten any of you in this

list: Stacia Hansen, Edith Kimbrough, Melanie Miles, Pat Stein, Lee Sullivan, Melvin Thieme, and Kenneth Wilson. Rochelle Marrinan, visiting from Florida State University, volunteered her field expertise. Finally, for moral support of the project, for generous sharing of her knowledge, and for assistance in arranging support through the Friends, our debt to Dorothy Hoard, President of the Friends of Bandelier, is very great.

Correspondence with the authors should be directed as follows:

- Carlson, Kohler, and Niskanen: Department of Anthropology, WSU, Pullman, WA 99164-4910;

- Michele Gray, P.O. Box 9024, Department of Anthropology, University of Virginia, Charlottesville, VA 22906;

- Angela Linse, Department of Anthropology, DH-05, University of Washington, Seattle, WA 98195;

- Meredith Matthews, San Juan College CRM Program, 4601 College Blvd., Farmington, NM 87110;

- Mark Slaughter, 1645 N. Harrison, Tucson, AZ 85710; and

- W. Nicholas Trierweiler, Mariah Associates, 1700 South Lamar, Suite #240, Austin, TX 78704.

To our sponsors, to the professional staff of Bandelier National Monument and the Southwest Region, to the community volunteers, and, most of all, to the students and staff of the 1989 Bandelier Archaeological Excavation Project: thank you. I hope this report is a credit to your substantial efforts.

— T. Kohler
May 1990
Pullman

TABLE OF CONTENTS

PREFACE iii

LIST OF TABLES vii

LIST OF ILLUSTRATIONS xi

1. INTRODUCTION *(KOHLER)* 1
   - Project Organization 2
   - Procedures, Data Structure, and Report Organization 4

2. PROLEGOMENON TO THE STUDY OF HABITATION SITE ARCHITECTURE DURING THE COALITION PERIOD ON THE PAJARITO PLATEAU *(CARLSON & KOHLER)* 7
   - Introduction 7
   - Late Developmental/Early Coalition (A.D. 1150-1250) 10
   - Late Coalition (A.D. 1250-1325) 20
   - Summary 24

3. EXCAVATIONS IN AREA 1 *(LINSE)* 27
   - Introduction 27
   - Methods 27
   - Subarea 4 (Outside the Roomblock) 28
   - Subarea 1 (Roomblock) 37
   - Subarea 2 (Courtyard) 43

4. EXCAVATIONS IN AREA 2 *(CARLSON, LINSE, & KOHLER)* 49
   - Introduction 49
   - Subarea 2 49
   - Subarea 1 56

5. CERAMIC MATERIALS *(GRAY)* 75
   - Introduction 75
   - Area 1 76
   - Area 2 80
   - Comparison of Areas 1 and 2 83
   - Conclusions 84

6. LITHIC MATERIALS *(SLAUGHTER)* 87
   - Introduction 87
   - Area 1 88
   - Area 2 93
   - Comparison of Areas 1 and 2 97

7. FAUNAL RESOURCES AND THEIR CALORIC YIELDS *(TRIERWEILER)* ____ 103
Introduction 103
Methods 103
Results 105
Discussion 112

8. MACROBOTANICAL ANALYSIS *(MATTHEWS)* ____ 129
Introduction 129
Processing and Analytical Procedures 129
Results 130
Discussion 139
Summary 143

9. SUMMARY *(KOHLER)* ____ 145
The Probability Sample from Burnt Mesa Pueblo 145
Chronology 147
Ceramic Materials 149
Stone Tools 150
Subsistence 151
Proposed Summer 1990 Fieldwork 152

APPENDIX: HUMAN REMAINS FROM
2 X 2 M UNIT 144S 136E, AREA 2 *(NISKANEN)* ____ 155

BIBLIOGRAPHY ____ 159

LIST OF TABLES

1.1 Progress Towards Completing the Probability Sample at LA 60372 ____ 2

2.1 Room Count by Tentative Functional Class for Selected Coalition Period Sites ____ 25

3.1 Tree-ring Samples from 2 x 2 m unit 80S 74E ____ 33

3.2 Traditional Black-on-white Pottery Types in the Ceramic Assemblage of 2 x 2 m Unit 80S 74E ____ 33

3.3 Tree-ring Samples from 2 x 2 102S 86E ____ 36

3.4 Tree-ring Samples from Room 1 ____ 38

3.5 Tree-ring Samples from Room 10 ____ 40

3.6 Floor Assemblage from Room 10, Surface 1 ____ 42

3.7 Room 10 Masonrry Statistics ____ 42

3.8 Tree-ring Samples from 2 x 2 m unit 84S 96E ____ 45

3.9 Tree-ring Samples from 2 x 2 m unit 90S 88E ____ 47

4.1 Volumes of Building Materials from Excavated Rooms in Area 2 ____ 56

4.2 Tree-ring Samples from Room 2 ____ 57

4.3 Point-located Artifacts in Contact with Surface 1, Room 2 ____ 58

4.4 Point-located Artifacts in Contact with Surface 2, Room 2 ____ 61

4.5 Tree-ring Samples from Room 4 ____ 65

4.6 Point-located Artifacts in Contact with Surface 1, Room 4 ____ 66

4.7 Point-located Artifacts in Contact with Surface 2, Room 4 ____ 68

4.8 Tree-ring Samples from Room 6 ____ 71

4.9 Point-located Artifacts in Contact with Surface 1, Room 6 ____ 72

5.1 Utility Wares in Area 1 by Subarea ____ 76

5.2 Service and Glaze Wares in Area 1 by Subarea ____ 78

5.3 Whiteware Vessel Form for Area 1 by Subarea ____ 79

5.4 Utility Wares in Area 2 by Subarea ____ 80

5.5 Service and Glaze Wares in Area 2 by Subarea ____ 81

5.6 Whiteware Vessel Form for Area 2 by Subarea ____ 82

6.1 Debitage Raw Material by Technological Classes, Area 1 ____ 89

6.2 Nonflaked Stone Tool Morpho-use Category by Raw Material, Area 1 ____ 91

6.3 Primary Functional Class of Chipped Stone by Use-phase, Area 1 ____ 92

6.4 Chipped Stone Tool Raw Material by Primary Functional Class, Area 1 ____ 94

6.5 Debitage Raw Materials by Technological Class, Area 2 ____ 95

6.6 Nonflaked Stone Tool Morpho-use Category by Raw Material, Area 2 ____ 96

6.7 Chipped Stone Tool Primary Functional Classes by Raw Material, Area 2 ____ 98

6.8 Primary Functional Class of Chipped Stone Tools by Use-phase, Area 2 ____ 99

6.9 Debitage Technological Classes by Area and Subarea ____ 100

6.10 Nonflaked Stone Tool Morpho-use Categories by Area and Subarea ____ 101

6.11 Primary Functional Class of Chipped Stone Tools by Area and Subarea ____ 102

7.1 Faunal Size Ranges Inferred from Unidentified Bone Specimens ____ 104

7.2 Faunal Sample Units ____ 105

7.3 Average Biomass, Edible Portion, and Caloric Yield of Represented Faunal Taxa ____ 106

7.4 Total Faunal Sample, by Season and Specimen Type ____ 106

7.5 Burned Faunal Specimens ____ 107

7.6 Bone Tools ____ 107

7.7 Total Number of Specimens, Minimum Number of Individuals, and Total Caloric Yield, by Taxon and Area ____ 109

7.8 Total Number of Specimens and Minimum Number of Individuals, by Taxon and Faunal Sampling Unit ____ 110

7.9 Total Caloric Yield, by Taxon and Faunal Sampling Unit (Maximum Distinction Method) ____ 111

7.10 Data Listing, Excavated Faunal Specimens, LA 60372, 1989 ____ 113

8.1 Macrobotanical Taxa Represented at LA 60372 ____ 131

8.2 Resource-use Categories of Identified Plants ____ 132

8.3 Macrobotanical Remains from Area 1 ____ 133

8.4 Macrobotanical Remains from Area 2 ____ 136

8.5 Maize in Areas 1 and 2 by Row Count ____ 141

9.1 Data for Population Total Estimates, Ceramics ____ 146

9.2 Data for Population Total Estimates, Flaked Lithic Debitage ____ 147

9.3 Data for Population Total Estimates, Flaked Lithic Tools ____ 148

9.4 Data for Population Total Estimates, Nonflaked Lithic Tools ____ 149

9.5 Population Total Estimates ($\hat{X}$) and 80% Confidence Intervals for Completed Sampling Strata ____ 150

9.6 Ratios of Generalized Material Types across Strata ____ 151

9.7 Tree-ring Dates for Burnt Mesa Pueblo, 1988 and 1989 Seasons 151

LIST OF ILLUSTRATIONS

1.1 Composite map of 1988 and 1989 sampling excavations at Burnt Mesa Pueblo 3

1.2 Field school student Michael Hayton advises Ralph Bailey, Jr., on technique for bailing 4

1.3 Field school student Paul Blomgren and Ingrid Carlson stack construction block 4

1.4 Bandelier excavation data base 5

2.1 The Pajarito Plateau, showing sites discussed in this chapter 8

2.2 Kiva House in Bandelier National Monument 12

2.3 Saltbush Pueblo in Bandelier National Monument 15

2.4 Kiva, Saltbush Pueblo 17

2.5 LA 14185 18

2.6 LA 15935 19

2.7 The North Bank Site, LA 6462 21

2.8 LA 8681 23

3.1 East profile of 2 x 2 m unit 126S 94E 30

3.2 West profile of 2 x 2 m unit 94S 112E 31

3.3 South profile of 2 x 2 m unit 80S 74E 32

3.4 South profile of 2 x 2 m unit 70S 82E 34

3.5 North profile of 2 x 2 102S 86E 36

3.6 Midroom N-S profile, Room 10 39

3.7 Room 10 Surface 1, showing point-located artifacts ____ 41

3.8 North wall of Room 10 ____ 43

3.9 West profile of 2 x 2 m unit 84S 96E ____ 44

3.10 West profile of 2 x 2 m unit 90S 88E ____ 47

4.1 East profile of 2 x 2 144S 134E (top) and plan of burial in Feature 2 ____ 51

4.2 West profile of 2 x 2 m unit 128S 142E ____ 53

4.3 East profile of 2 x 2 m unit 122S 114E ____ 54

4.4 South profile of 2 x 2 m unit 114S 140E ____ 55

4.5 Mid-room profile, Room 2 ____ 58

4.6 Surface 1 (roof) of Room 2, showing point-located artifacts ____ 59

4.7 Surface 2 (uppermost floor) of Room 2, showing point-located artifacts ____ 60

4.8 Room 2, looking east, with all point-located artifacts ____ 62

4.9 Room 4 showing point-located artifacts associated with Surfaces 1 and 2 ____ 67

4.10 Niche (Feature 10) in N wall of Room 6 ____ 68

4.11 Mid-room profile, Room 6 ____ 71

4.12 Room 6 showing point-located artifacts ____ 73

9.1 Tree-ring dates for Burnt Mesa Pueblo, 1988 and 1989 seasons ____ 152

1

INTRODUCTION

Timothy A. Kohler

In June and July of 1989, eight weeks of excavation were conducted at Burnt Mesa Pueblo (LA 60372) by a Washington State University field school. Burnt Mesa Pueblo is at an elevation of about 2150 m (≈ 7000') in the transition between the piñon-juniper woodlands of lower elevations and the higher ponderosa-dominated woodlands. Some 100 m south of the site, the mesa edge drops precipitously into Frijoles Canyon, although nearby side canyons may have provided some access into Frijoles Canyon. Today, at least, there is no permanent source of water closer than Frijoles Canyon. The two components of this site span at least the last half of the 13th century, a time of great change on the Pajarito Plateau. During this period, local populations began to coalesce into large settlements for the first time; networks of exchange widen as non-local faunal products and distant lithic sources become important in the archaeological record; and new forms of ritual and community organization manifest themselves.

Earlier, in the summer of 1988, we had spent four weeks mapping and sampling four sites in Bandelier National Monument. One of those sites, LA 3852, proved to be earlier than either component of LA 60372; the other two, in Frijoles Canyon, were later. Based on these initial samples, and given our goal of understanding the process of aggregation (Kohler 1989b), we judged Burnt Mesa Pueblo a good prospect for harboring the chronological, architectural, and subsistence information needed to test our model of population aggregation. Accordingly, a probabilistic sample of the two components of the site, begun in 1988, was further pursued, but was not completed in 1989. Altogether, in summer 1989, we excavated 10 2 x 2 m units in external areas; two 2 x 2 m units in an internal plaza; and most of five rooms.

This is not a final report for the Burnt Mesa Site, as preparations are underway to complete our sample from this site in summer 1990. In order to disseminate the basic results of the Bandelier Archaeological Excavation Project as rapidly as possible, we are producing yearly descriptive reports on each season of excavation. This is the second such report. It contains substantial descriptive information on the sediments, structures, artifacts, and ecofacts encountered or recovered during excavation. Necessarily, as in any interim report produced within a few months of excavation, it does not undertake synthetic analyses or pretend to test or refine the model for aggregation proposed in the earlier report.

Nevertheless, we hope that much of what we have to say will be useful for archaeologists working in this area and of interest to the public. The Pajarito Plateau holds an important place in the history of North American archaeology because of an early series of excavations by Edgar Lee Hewett and others, but surprisingly little excavation has been undertaken here in recent years using modern techniques. In this volume we report eight new tree-ring and one archaeomagnetic date which, in this area, and in conjunction with three tree-ring dates obtained in 1988, qualifies Burnt Mesa Pueblo as "well dated;" we describe architectural evidence for four rooms in an area where many of the visible prehistoric structures have been rebuilt or stabilized several times; and we tabulate a wealth of systematic data on ceramic and lithic artifacts, and floral and faunal materials, in a region where many earlier excavations ignored such materials entirely.

PROJECT ORGANIZATION

These excavations are undertaken in conjunction with an archaeological survey of Bandelier National Monument, begun in 1987, that aims to sample 40% of the monument by the end of 1991 (Powers 1988). Excavation results will be used to help refine estimates of site chronology, and the duration and size of occupation, based on the surface information gathered by survey, and will provide the direct assessments of subsistence activities lacking in surface information. In turn, the survey results will establish the demographic and settlement location context necessary to make sense of the events and processes at the excavated sites. Excavations will continue through at least 1990, and substantial samples of two sites (LA 60372 and LA 3852) will be obtained. If excavations conclude in Summer 1991 rather than summer 1990, a substantial sample of a third, later site can be obtained.

Each of the 11 field school students spent six weeks excavating at Burnt Mesa Pueblo, one week in the field lab helping with washing chores and receiving training in either ceramic or lithic analysis, and one week in a backcountry camp with the NPS survey crews. The size of the crew in Areas 1 and 2, then, averaged about four, plus one supervisor. This was enough to keep two units open in each area. In Area 1, we put the highest priority on completing the sample of the external area (stratum 4, Fig. 1.1) and the plaza (stratum 2), and this was in fact accomplished. (Sampling strata 1 - 4 and subareas 1 - 4 refer to the same spaces; I use the term "stratum" here and in chapter 9 specifically in reference to the probability sample, unless otherwise noted.) In addition, in the roomblock, we continued excavations in Room 1 (begun in 1988) and completed excavations down to the uppermost surface in Room 10. Completing our excavations in these two rooms, and sampling at least two more rooms and the probable kiva in the courtyard will be our highest priorities for Summer 1990.

In Area 2, a linear roomblock consisting of between eight and 10 rooms, we strove to complete the probability sample, originally set at four exterior units, and three rooms. Unfortunately, two weeks of exceptionally wet weather in late July slowed all excavation significantly (Fig. 1.2). Nevertheless, the sample of exterior units was completed and three rooms were also excavated, but we were unable to conduct subfloor investigations in one of these rooms, Room 4. Sample sizes and proportions for each stratum in each area are given in Table 1.1. Tables summarizing the materials recovered from each of the sample units in the completed strata, and material population total estimates for those strata, are given in Chapter 9.

Table 1.1. Progress towards completing the probability sample at LA 60372, 1988 and 1989 seasons combined.

Area	Subarea (Stratum)	Description	N (Population of units)	n (Sample of units achieved to date	Target sample size	Sampling proportion to date
1	1	Quadrangular roomblock	40 surface rooms (est.)	portions of 2	4	< .050
	2	plaza excluding probable kiva	31 2 x 2 m units	3	3	.097
	3	probable kiva in plaza	1 pitstructure	0	1	.000
	4	external area	931 2 x 2 m units	6	6	.008
2	1	linear roomblock	8-10 surface rooms	most of 3	3	< .375
	2	external area	336 2 x 2 m units	4	4	.012

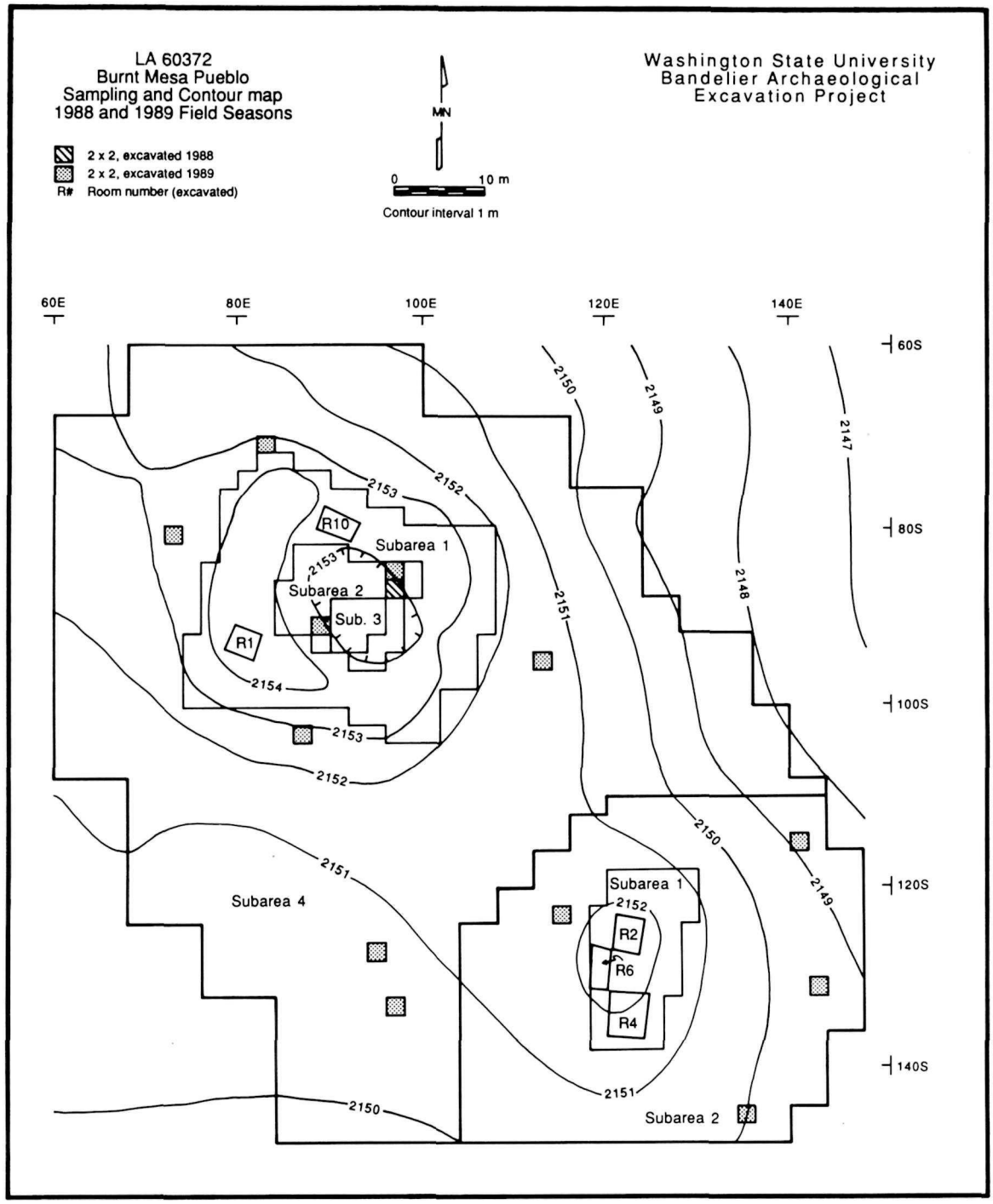


Fig. 1.1. Composite map of 1988 and 1989 sampling excavations at Burnt Mesa Pueblo. Area 1 (the northwest and central portions of the site) is divided into four subareas; Area 2 (the southeastern portion of the site) is divided into two subareas.

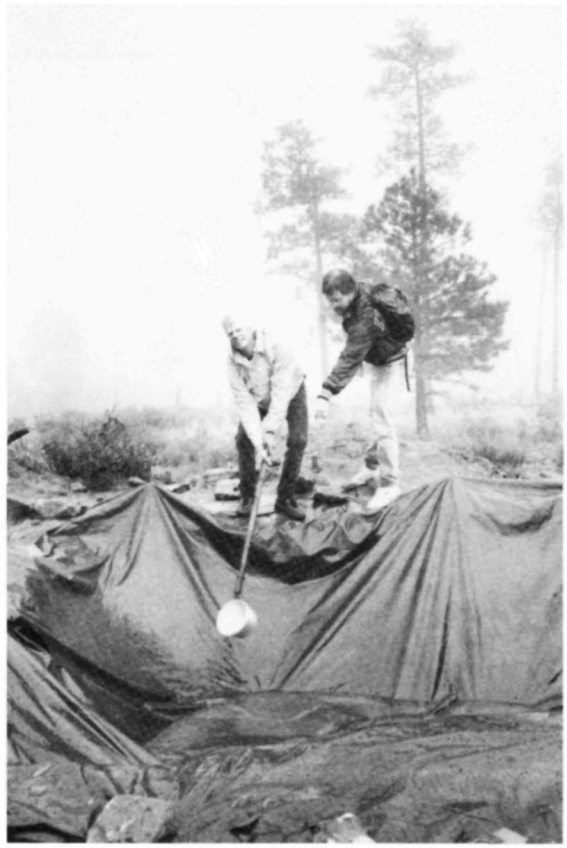


Fig. 1.2. Field school student Michael Hayton (right) advises Ralph Bailey, Jr., on technique for bailing out an Area 2 room.

PROCEDURES, DATA STRUCTURE, AND REPORT ORGANIZATION

Excavation and laboratory procedures in the 1989 season were very similar to those described for the 1988 season (Kohler, ed., 1989). Three changes in fieldwork procedures ought to be noted, however.

First, at the suggestion of Linse, we recorded the volume of sediments screened in each provenience (FS) more precisely than had been done in 1988. Previously, we took opening and closing elevations on each level. In 1989, we also kept track of the number of 10 l buckets of sediment passed to the screen from the unit. This will enable us to couch comparisons within the site in terms of artifact densities, in cases where that is desirable.

A second change was to estimate, for each vertical stratum in each excavation unit, the volume of tuff building blocks removed. To do this, we stacked these materials in pillars approximately 1 x 1 m at the base, and measured the height of the pillars at the close of the stratum or unit (Fig. 1.3). Among other things, this permits much more refined estimates of original wall heights in the roomblocks (see Chapter 4).

The third change was implemented part way through the season to speed excavation within the rooms, which often had a very high ratio of building materials to fine sediments and were difficult to screen. In Rooms 2, 6, and 10, after defining the limits of the rooms through superficial excavation, one half of each room was chosen for standard excavation, with screening of all sediments with 1/4" screen. After this half was brought down nearly to the uppermost surface, and after a profile was drawn, the sediments in the other half were removed to the same level without screening, although obvious artifacts and ecofacts were retained. These differing collection modes were recorded on our provenience forms. After that point, standard procedures were reinitiated across the entire room. When it comes time to form estimates of the populations of various materials in the roomblocks, the collections from those rooms that were not fully screened will have to be multiplied by a raising factor that is the inverse of the proportion of the deposits that were screened. This is a violation of strict probability

Fig. 1.3. Field school student Paul Blomgren (left) and Ingrid Carlson stack tuff construction block in Area 2.

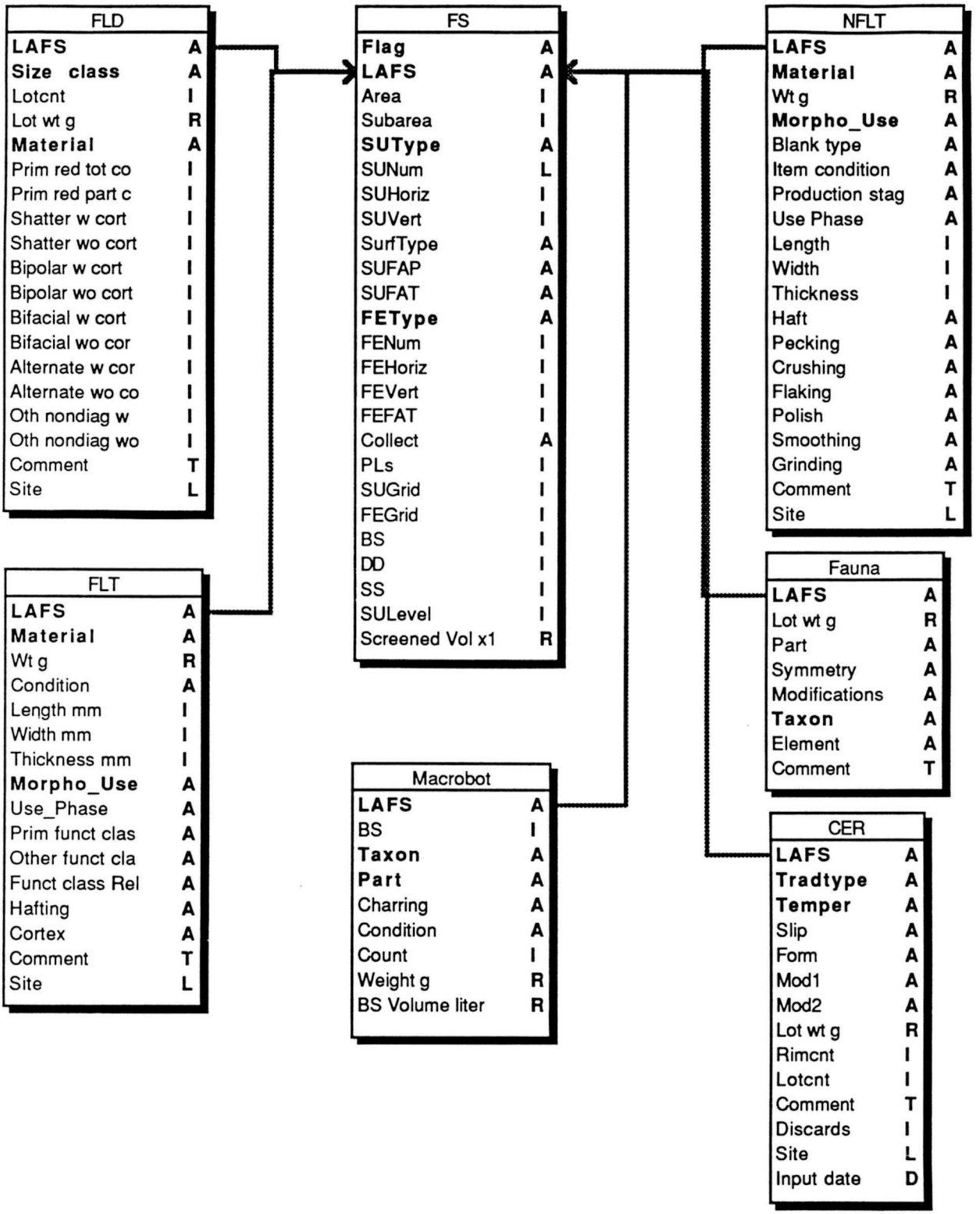


Fig. 1.4. The Bandelier excavation data base is composed of seven files: FS (Field Specimen, or provenience); FLD (Flaked Lithic Debitage), FLT (Flaked Lithic Tools), Macrobot, CER (Ceramics), Fauna, and NFLT (Non-Flaked Lithic Tools). All the files containing material analyses link with the provenience file through the field called "LAFS" which is composed of the Laboratory of Anthropology site number, followed by a decimal, followed by the FS number. This relational structure allows us to enter provenience data only once, but have it apply to all the analysis files. The variables in the FLD, NFLT, FLT, and CER files are defined in appendices to Kohler (ed., 1989). "A" denotes an alphanumeric field; "I" an integer field; "R" a field allowing real numbers (decimals); "T" a text field; "L" a long integer field, and "D" a date field.

sampling procedures, since it assumes that the artifacts were spread absolutely homogeneously through the fill, but the gain in architectural information ought to outweigh any possible decrease in accuracy and precision in the estimates. It should also be noted that if unusual conditions are encountered in the unscreened portions (if, for example, a lens of secondary refuse were identified), normal screening practices would resume. Such special circumstances did not arise in the 1989 season, however.

Once materials were removed from the field, they were quickly inspected by lab personnel for possible adhesions that would recommend against washing, and then cleaned in some appropriate manner before being routed to the appropriate analyst. Jean Schoppe oversaw the washing and routing process, assisted by field school students and local volunteers. Ceramic materials were analyzed by Michele Gray, with assistance from field school students, and are reported in Chapter 5. All of the utility wares and some of the service wares underwent the standard analysis while the field work was still in progress; Michele completed the analysis of the service wares at Charlottesville. All lithic materials were analyzed by Mark Slaughter with assistance from students while the field work was still underway; his results, tabulated and written in Pullman, are reported in Chapter 6. Faunal and floral materials were sent to W. Nicholas Trierweiler and Meredith Matthews at the close of the season, and reports from these consultants form chapters 7 and 8 of this volume. Trierweiler and Matthews also visited the site while the excavations were in progress to advise on recovery techniques and discuss last year's results. As soon as provenience data, and analyses of floral and faunal materials became available, they were entered into a Fourth Dimension® (4-D) database running on a Macintosh® computer. The structure of this relational database is mapped in Fig. 1.4. Data entry and editing were completed in Pullman by Alice Gronski and Jean Schoppe. Artifact summaries were produced for the analysts either through reporting functions on 4-D or through tables produced in statistical packages running on the Mac or, back in Pullman, on the WSU mainframe.

Following this chapter, the volume continues with an overview of what is known about Coalition Period architecture on the Pajarito Plateau. We include this report because the relevant literature is scattered and often difficult to obtain; we hope it serves as a handy reference and as a source of comparative information for our own results reported in Chapters 3 and 4. In Chapter 9, I summarize the most important results of the 1989 season, tabulate the status of the sampling program, and make recommendations for the next and final season at Burnt Mesa Pueblo.

2

PROLEGOMENON TO THE STUDY OF HABITATION SITE ARCHITECTURE DURING THE COALITION PERIOD ON THE PAJARITO PLATEAU

Ingrid K. Carlson
and
Timothy A. Kohler

INTRODUCTION

After an initial colonization in the mid-1100s, the number of Anasazi sites increased dramatically on the Pajarito Plateau between A.D. 1200 and 1325. In the Cochiti study area, a region of some 540 km^2 centered on Cochiti Reservoir, Biella (1977) counted 363 Pueblo III (≈ Coalition period) sites. These sites occurred throughout the study area, but with greatest frequency in Biella's Pajarito District. Hill and Trierweiler (1986) reported a decrease in the total number of habitation sites in this general area after that time. In their sample from the Pajarito and the adjoining Caja del Rio, 142 sites were recorded for the Early Coalition, while only seven were recorded for the Late Classic. However, the mean size of habitation sites increased steadily from 175 m^2 in the Early Coalition to 2864 m^2 during the late Classic, while maximum site size similarly increased from 784 m^2 to 9810 m^2. Hill and Trierweiler estimate population (using the total floor area of all pueblo sites) to have increased through the Early Classic, before declining in the Middle and Late Classic periods. However, these figures are not corrected for length of time period or number of periods a site is occupied. Others, including Orcutt (1988) who does apply these corrections, reconstructed population as beginning to decrease in the Early Classic. At the same time, there was a shift in regional settlement pattern from highly localized clusters on mesa tops along major drainages prior to the Late Coalition, to a regular linear pattern that more or less parallels the Rio Grande during the Early and Middle Classic (Preucel 1987).

The purpose of this chapter is to provide background information on patterns of prehistoric construction and architectural change in this demographic setting during the Coalition period on the Pajarito Plateau. It is meant both as a quick review of the available literature on these topics, and as a representation of some sources that are not readily available. Excavation results of the present project are not included. We also do not include any discussion of cavates, although we recognize the likelihood that some of these functioned as dwellings and that a few may have been in use as early as the Coalition period. Finally, in this chapter we uncritically apply many interpretive principles that have become traditional in the Southwest (such as the principle that formal hearths signal habitation rooms, and that lack of floor features signals storage spaces); the foundations for these principles, and their limitations, are more fully appraised by Carlson (1990).

This chapter is organized chronologically, beginning with the Early Coalition (Wendorf and Reed 1955) and proceeding to the Late Coalition. Both sections are divided geographically into southern and northern subregions. Chapman and Biella (1980), following traditional sources, identified Frijoles Canyon (Fig. 2.1) as a territorial boundary separating southern and northern

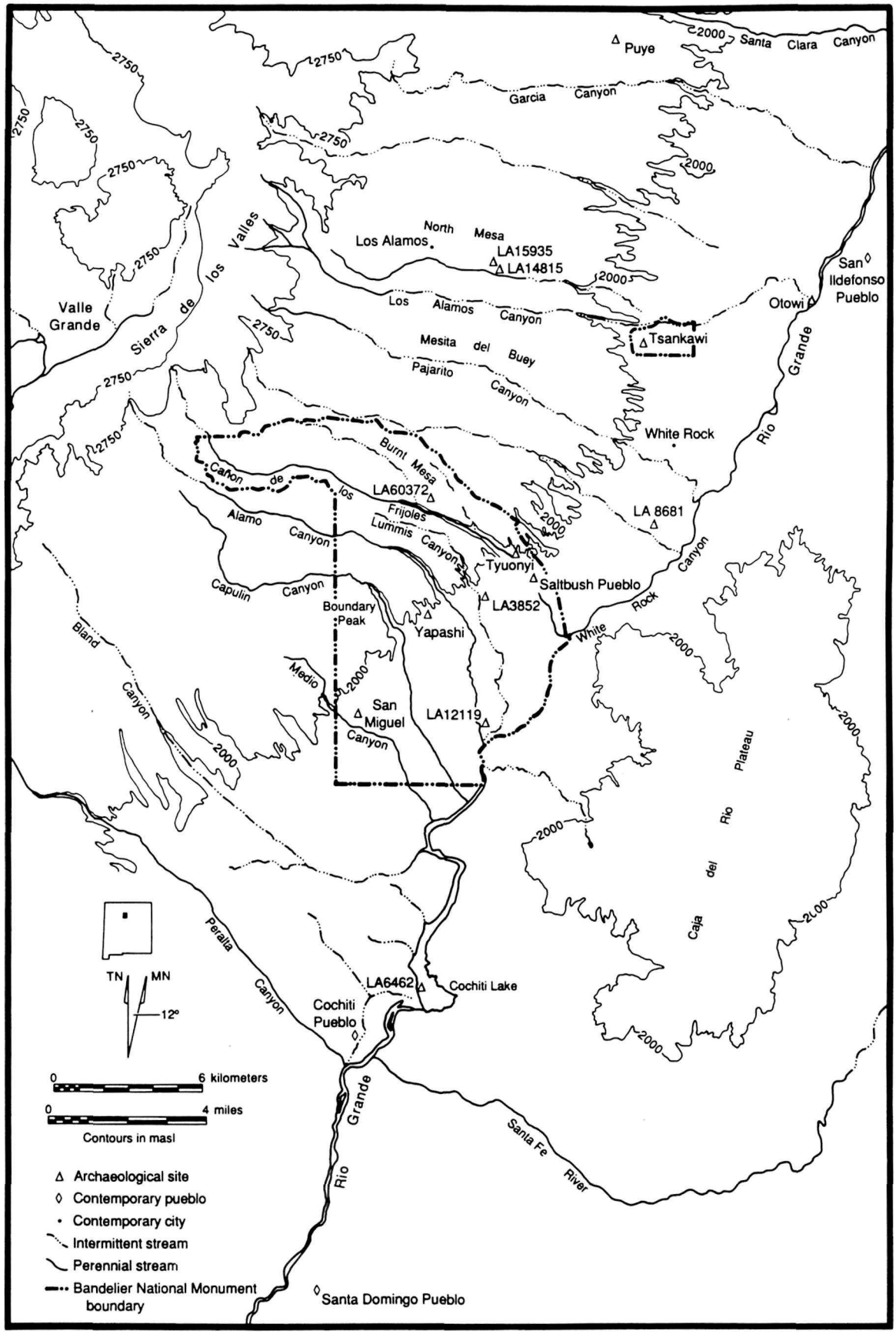


Fig. 2.1. The Pajarito Plateau, located between the Rio Grande and the Sierra de los Valles of the Jemez Mountains, showing the sites discussed in this chapter.

plateau populations. They suggested that settlement pattern, architecture, and ceramic technology north of Frijoles during the Classic period were a continued outgrowth of Coalition trends, but that south of Frijoles "social, economic, and technological trends . . . suggest an altogether different system of behavior bearing little resemblance to that of the preceding Coalition period" (Chapman and Biella 1980:10).

We begin by discussing some architectural commonalities for the period as a whole, based primarily on observations by Biella (1979), McKenna and Powers (1986), and Steen (1977). Maxon (1969), for example, noted a general lack of doorways leading to the outside throughout the area, meaning that ceiling entrances would have been employed. This remained the dominant practice even into the Classic period at such large sites as Tyuonyi, Tsankawi, Otowi, and Puye.

More important commonalities are found in the types and sizes of sites on the Pajarito. Two types of Early and Late Coalition residential sites exist. The first consists of one to three isolated surface or subsurface rooms; at least some of these may not be long-term residential sites but may have been used seasonally. The second consists of small roomblocks of no more than nine rooms, generally associated with a kiva. Large roomblocks of more than 15 rooms associated with one or more kivas make up a third type which, however, appears to occur much more commonly in the Late Coalition. Laumbach et al. (1977:57) stated that the ratio of rooms inferred to be living rooms and rooms believed to have a storage function is close to one in Pueblo III times, with storage rooms perhaps slightly more numerous than living rooms. However, our review suggests that the ratio of living rooms to storage rooms decreased by the Late Coalition period.

The one- to three-room class of sites is rather variable. Rooms can occur on the surface or can be semisubterranean. Hearths have been found, along with small bins and cists. These hearths are best described as burned areas on the floor, rather than as formally excavated and lined firepits. These sites tend to vary in size and shape, and were constructed in three ways: (1) of dry-laid, nearly unshaped materials, sometimes incorporating a large boulder into one of the walls, (2) of mortar and shaped tuff block, or (3) of adobe. These differences are assumed to reflect availability of raw materials and anticipated use. However, Steen (1982:37) also calls attention to a tendency to use adobe construction for the earliest (Santa Fe B/w) habitation sites in the Los Alamos portions of the Pajarito.

During the 1985 pilot survey of Bandelier National Monument, 34 of the 67 identified Anasazi sites were small structures. Slightly over half of these 34 structures with room estimates had only one room or had two separate structures with one room each. These small structure sites were usually accompanied by a sparse refuse area to the south, southeast, or east. The leeward (east or southeast) side of ridges were favored as site locations, possibly because of their thermal advantages (McKenna and Powers 1986:22; larger pueblos tended to favor open exposures with little or no protective slope).

Biella (1979:115) believes that the wide range of architectural patterns occurring contemporaneously in the Coalition period is evidence for seasonal occupation of some (especially single-room) sites. Many of these probably served as field houses. The lack of a second room for storage in such sites indicates that a year-round occupation was not intended. Small sites with two or three rooms, however, would have been large enough to accommodate a single household with sufficient storage to allow year-round occupation (Biella 1979:115).

The second, larger class of residential sites, commonly with seven to 12 rooms, often accompanied by a kiva, is called the "basic residential unit" of the Coalition Period by Biella (1979), who suggested that such roomblocks housed an extended family or clan. Some pueblos of this size in Bandelier have round, subterranean kivas with both Rio Grande and San Juan style features (Snow 1974; Zier 1982). But many, particularly north of Frijoles Canyon, appear to lack subterranean kivas altogether and instead have large, rectangular or D-shaped "ceremonial" rooms with a firepit-deflector-vent complex incorporated into the roomblock near one of its corners (Steen 1982). Wendorf and Reed (1955:145) considered such "corner kivas" particularly common in the later Coalition (which they called the "Galisteo stage") and noted their presence off the Pajarito Plateau at Pindi Pueblo near Santa Fe and in the Tesuque and Pecos areas.

These roomblocks ordinarily consist of two rows of rooms, one directly behind the first. The kiva, if subterranean, can be situated either off to one side or located directly in front of the roomblock. The rooms closest to the kiva are considered habitation rooms due to the presence of hearths; the back rooms are interpreted as storage. The linear arrangement of most habitations tended to be north-south so that the orientation of the structures was towards the east. Refuse scatters are concentrated to the east or southeast of the roomblock. Exterior features such as bins or hearths are sometimes present. These units correspond to what Steen (1977, 1982) identified as the initial Anasazi settlement of the northern Pajarito in the 1200s, with the difference that on the northern Pajarito D-shaped "ceremonial" rooms with a firepit, deflector, and ventilator complex were substituted for subterranean kivas. Steen (1982) also noted that even though courtyards were present between the roomblock and the refuse area, exterior features seemed rare. He believed that many outdoor activities were carried out on the roofs instead.

The largest site type contains up to 50 rooms, or even more in the case of the large pueblos whose construction began in the Late Coalition. Usually such sites are made up of two or more small roomblocks joined together and enclosing a plaza. In this class there is great variability in the overall number of rooms, the arrangement of the roomblocks, and the total number of kivas (Biella 1979). The largest sites, of 200 or more rooms, occur at the end of the Late Coalition (considered to terminate in 1325) before the large-scale building explosion of the Classic Period. Biella and Chapman (1979:9) noted the absence of sites of this size in the Cochiti Reservoir area during the Late Coalition, while noting the existence of aggregations of this size in the Late Coalition on the northern Pajarito. Probably some occupation of this period is obscured by later occupations of the large Classic communal pueblos (such as Tyuonyi).

McKenna and Powers (1986) discovered that all the structures they recognized in Bandelier, regardless of site type, were constructed of (usually tuff) masonry; other stone could be used, reflecting local availability of materials. In the Boundary Peak area, granodiorites were employed (LA 50907); sites located on the canyon bottoms used a variety of river cobbles and basalt. Adobe construction is found in those portions of the monument adjacent to the Rio Grande. Finally, at two sites southeast of Frijolito south of Frijoles Canyon, McKenna and Powers (1986:26) observed widely spaced upright boulders that might have been used as bases of structures made of perishable material. The importance of stone as a construction material on the Pajarito contrasts with the Rio Grande valley to the east, where Early Coalition structures are more commonly of jacal, and Late Coalition roomblocks of adobe, as at Pindi (Stubbs and Stalling 1953:25).

The early excavations on the Pajarito carried out by Hewett and others were concentrated on Classic period sites. Therefore, most of what we know about local Coalition period architecture comes from excavations carried out in conjunction with building Cochiti Dam and investigating the sites in its floodpool west of Santa Fe, all within the area we are calling the southern Pajarito. In the earliest of these (Lange, assembler, 1968) one important Coalition site, LA 6462, was investigated (Bussey 1968b). In 1974, a more intensive, multi-year project began to investigate archaeological sites in the floodpool of Cochiti Reservoir west of Santa Fe. Parts of these excavations were undertaken by the Office of Contract Archaeology (OCA) of the University of New Mexico (Biella and Chapman, eds., 1979); investigations in the Bandelier portions of the floodpool were reported by Hubbell and Traylor (eds., 1982). The major Coalition period site investigated by OCA was LA 5014, Pueblo Medio, in White Rock Canyon at the mouth of Medio Canyon (Laumbach et al. 1977).

LATE DEVELOPMENTAL/EARLY COALITION (A.D. 1150-1250)

National Park Service excavations in the Cochiti floodpool investigated two important Early Coalition sites: LA 12121, occupied in the mid to late A.D. 1100s, and LA 12119 (Kiva House). LA 12121 consists of a linear roomblock of seven rooms with an eighth room attached to the western end. The roomblock has a row of three front and four back rooms and no associated kiva. LA 12119 (Kiva House) probably was occupied during the late 1100s and early 1200s although the tree-ring evidence also points to later re-use or remodeling. Kiva 1 at the site, with an archeomagnetic date of A.D. 1180 and

one +vv tree-ring date of 1191, was probably constructed relatively early in the occupation of the site, but was not the earliest construction. With its several building episodes, Kiva House is larger and more complex than the typical habitation of this period, but will be discussed as representative of the class because of its architectural richness and complete excavation.

LA 12119 (Kiva House)

LA 12119 is located on a bench on the east side of lower Alamo Canyon (Zier 1982:33) at an elevation of 5420' (1626 m; sites discussed in detail are located in Fig. 2.1). The site contains 20 one-story rooms and three kivas. A plaza was located east of the pueblo, but surface compaction was more pronounced on the north side. Some artifacts but no structures were found under the original floors of some of the rooms.

Architecture

The rooms of the main roomblock are arranged in a more or less rectangular block of 14 rooms with a single row of six rooms extending eastward from the center (Fig. 2.2); this portion of the site represents a third or fourth, and final, episode of construction at the site. The main roomblock gives the illusion of being built on a north-south axis, but this is the result of these late building additions and modifications; the original pueblo axis is east-west. Kiva 1 is located in the SE corner of and is connected to the roomblock. It also shares a small section of wall with Kiva 2, which is a square SW corner kiva. Kiva 3, apparently dating to the earliest building episode at the site, is located opposite Kiva 1 in the NE corner. Room 18 is located within the kiva boundaries and Room 20 is the northern most room that is connected to Kiva 3. The midden is located south of the east wing.

Habitation rooms were identified by the presence of hearths. Most of the interior rooms were considered to be for storage, as were some exterior rooms that lack hearths. No habitation rooms were located in the east wing. It is hard to associate storage rooms with particular habitation rooms. Only three doorways were identified, so most access to rooms was probably through openings in the roof.

Two styles of construction distinguish the walls in the main roomblock and in the east wing. The first type, in the main roomblock, consists of crude tuff block masonry that may or may not have been shaped, while the second type, in the east wing, is consistently of hewn tuff blocks laid in neat courses. In the main roomblock, the base of the tuff masonry walls are shallowly entrenched in sand and adobe. The unshaped blocks are usually of medium size, about 25 x 20 x 15 cm, while the hewn blocks are generally smaller. The coursing is crude with courses of small rocks at the bottom of the walls supporting courses of larger rocks higher up, and with the rocks themselves laid at odd angles (Zier 1982:39). Much more mortar was utilized in the walls of the main roomblock than elsewhere, with as much as 18 cm of mortar between courses. Wall mortar is coarse, with many pebble-sized inclusions. The construction plaster used in the floor and walls was of the same material as the mortar, but with fewer pebbles. Finishing plaster is very fine in texture, no more than 1 cm thick and often sooted. In three rooms, floors were lined with slabs or cobbles, probably as a guard against rodents (Zier 1982:39). The second type of construction, in the east wing, consists of tuff hewn into blocks approximately 35-45 x 20 x 10-15 cm, laid lengthwise and neatly coursed with a minimum of mortar (Zier 1982:41).

In both, plaster floors were laid at the upper margins of the foundations and smoothed to blend with the wall plaster. Floor thickness was greatest along the walls, adding extra strength and support. Room interiors were covered with construction and finishing plaster, while the exterior walls lacked finishing plaster. Two-thirds of the walls were 25 cm in thickness, while the remaining third were between 30 cm and 35 cm in the rooms and 50 cm to 75 cm in kivas. Courses were one rock thick, except in Kiva 1 which had double coursing. Room sizes varied from 1.7 x 2.2 m to 2.2 x 4.7 m (room sizes for all sites are summarized in the final section of this chapter). Roofs were believed to be constructed with vigas and latillas covered with reddish clay. There was evidence of only one post hole from this site, in Kiva 1. Rock slabs were occasionally used as hatch covers and door sills were occasionally used (Zier 1982:35).

Altogether, 19 hearths were discovered in the eight rooms and three kivas. Eleven of these

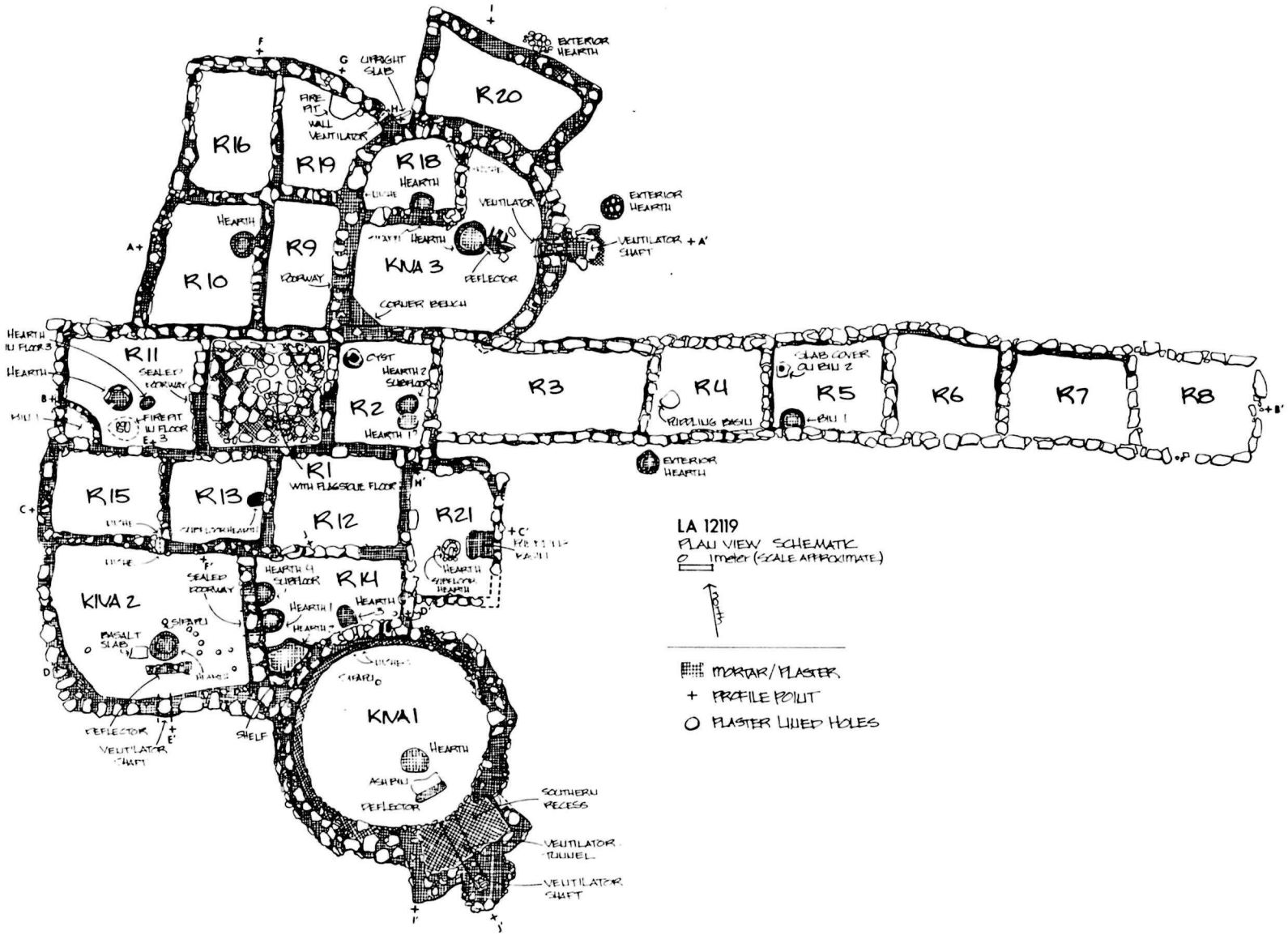


Fig. 2.2. Kiva House in Bandelier National Monument (from Zier 1982:34, by permission of the National Park Service, Southwest Region).

had raised rims. All were circular in plan, with a plaster lining covering a coarse mixture of pebble-sand-clay. Four exterior hearths were also reported.

Three bins were recorded; Bin 1 was located in the southwest corner of Room 5 (in the east wing) and consisted of a rounded rectangular hole surrounded by an adobe collar. The storage space beneath the floor was deep, but the bottom of the bin was not prepared, nor were the sides. Bin 2 was located below the floor in the same room; upright andesite slabs formed its walls. The bottom was formed of an andesite slab as was the cover, which lay flush with the floor. Room 5, in the middle of the eastern wing, was designated a storage room. The third bin was found in Room 11, which is the westernmost room along the E-W axis. This bin was formed by a low, arcing masonry wall that enclosed the west corner. The room, also containing a hearth, was considered a habitation room. Thus the presence or absence of a bin does not appear to depend on the room's apparent primary function. However, bins occur only in this latest, E-W oriented part of the site.

All three kivas were excavated into the original ground surface. The sides were lined with tuff blocks and mortar. The walls continued up from the contemporary ground surface starting with a layer of plaster, followed by courses of stone. Those portions of the walls that were above ground were thicker than the subterranean masonry lining.

Kiva 1 measured 4.5 m in diameter and 2.07 m deep. The upper walls were coursed with large, usually shaped, tuff blocks. They average 35 x 25 x 20 cm with the courses on the north side being one rock wide and set with their long axes at right angles to the wall. Elsewhere, courses were two rocks in width, consisting of building stones set lengthwise with slightly smaller rocks occurring on the exterior, possibly acting as chinking material. The lower walls consist of a bench 1.0 to 1.2 m high and 25 cm at its widest point. The bench was made of coursed river cobbles, tuff blocks that were either rounded or rectangular, and little or no chinking. The bench becomes smaller on the west side of the southern recess, disappearing completely on the southeast side. The plaster in the kiva varies. On the upper walls and the floor there is one construction phase and a sooted finishing layer. The bench walls have one construction phase and five finishing layers. Two light-colored wavy lines were painted on the north wall near the floor (Zier 1982:50).

The floor features in Kiva 1 are in a line oriented towards the SSE. The ventilator (of the tunnel-shaft variety) is 14 cm above the floor with walls of coursed tuff blocks. The floor and ceiling of the vent shaft were plastered. Short lengths of wood may have been used in the ceiling as evidenced by impressions in the plaster. The tunnel is 2.1 m long and exits on the southern side of the kiva and passing below the middle of the southern recess. The deflector was built from two foundation rocks embedded in a lower floor, followed by small rocks and mortar. Directly behind (NW of) the deflector was a rectangular, sunken area, probably an ash pit. The hearth measures 60 cm in diameter by 14 cm in depth. It is plaster-lined, rimless, with a flat bottom and vertical sides. The sipapu (9 cm in diameter and 24 cm in depth) is plaster lined. A round wall niche 84 cm above the floor was found in alignment with the floor features and the ventilator.

Kiva 2 is a rectangular corner kiva. Its northwest and southeast corners were squared while its other two corners were rounded. The walls were constructed of tuff blocks averaging 35 x 25 x 20 cm that were roughly hewn. The walls had two construction layers of plaster followed by seven sooted finishing layers. The floor had one construction layer with only one sooted finishing layer. Kiva features include a tunnel-shaft type ventilator which was 56 cm deep and was plastered. Two slabs close to the opening probably formed a damper. The hearth was lined with plaster and has a raised rim; a possible ash bin is located between the deflector and the hearth. A floor sipapu and a circular wall niche were also present.

Kiva 3 was circular in construction, but was later modified to a D shape. The original kiva walls were constructed of large, unshaped tuff blocks; lower courses were composed of smaller rocks. Associated with the D-shaped room was a small corner bench. It was built after the west wall received its construction layer of plaster. The bench itself was made entirely of adobe which was then covered with five layers of finishing plaster. Two floors were found, the lowest being associated with the original kiva. The second

floor is associated with the D-shape modifications. The floor has from one to three finishing layers of plaster. A ventilator shaft lined with andesite slabs is located 8 cm above the floor; its floor was plastered and its upper surface had evidence of wood incorporated into the construction. Other kiva features include a poorly preserved deflector, a raised rim hearth, and in between the deflector and the hearth, an area believed to have been used as an ash pit, and a sipapu.

The building sequence of LA 12119 was inferred mainly from architectural evidence, but also from the few tree ring dates obtained. It would appear that Kiva 3 and Rooms 15, 13, and 12 were constructed first. Next came Room 14 and Kiva 1. It could not be determined whether Kiva 2 was built before or after Kiva 1. Rooms 11,1, and 2 were built by the addition of cross walls to a newly built wall and the already standing north wall of Rooms 12, 13, and 15. Next came the block containing Rooms 9, 10, 16, and 19 set against Kiva 3 and north of Rooms 11 and 1. Room 18 was built by bonding to the east wall of Kiva 3 and abutting the south wall. Kiva 3 by this point was being used primarily for refuse disposal. Room 20 was probably a late addition since it abuts Kiva 3. The last building phase was the east wing. The rooms were built one after the other heading east. Room 21 appears to be an after-thought since it abuts Rooms 12 and 14 (Zier 1982:57).

Interpretations

The presence of doorways at a site may give clues to social ties and ownership of storage rooms (Adams 1983; Rohn 1965). Of the three doorways present at LA 12119, one leads from a kiva into a storage room (Kiva 3 to Room 9); one from a kiva to a habitation room (Kiva 2 to Room 14) and the third leads from Room 11 to Room 1, the only flagstone-floored room on the site. Hence all the doorways joined a habitation room or storage space with a kiva or another "unusual" room. The lack of doorways from habitation rooms to storage rooms appears to be generally true of Coalition period sites.

The building sequence at the site suggests that it began as a small, year-round habitation unit for one household, as is seen in the one habitation room, two storage rooms and one kiva. Perhaps as a second household joined the settlement, Room 14 and Kiva 3 were built. Then two more habitation rooms and one storage room were added, followed by another habitation room and three additional storage rooms. The next seven rooms constructed were all for storage, while the last room built at the site was for habitation. A total of eight rooms had evidence of hearths or firepits. Zier (1982:55) estimated that if four people occupied one living room (defined as those rooms containing a hearth, of which she counted seven), then the maximum population of the pueblo was probably 25 to 30 people, or seven households. However, it seems unlikely to us that all the surface rooms were ever in use at the same time, especially since it appears that no more than two kivas were ever in use simultaneously. In fact, Biella (1979:118) attempted to separate two sequential occupations at the site. Given simultaneous use of two kivas, it could be that the site was occupied by two unrelated groups of households using different ceremonial facilities; or that all the resident households shared ceremonial facilities that were functionally distinct. The lack of restricted access to storage rooms from specific habitation rooms may suggest that the resident households considered themselves to be part of a single economic unit.

LA 4997 (Saltbush Pueblo)

Saltbush Pueblo, located within Bandelier National Monument about 50 m east of the Administrative Headquarters buildings on an access road, was excavated by David Snow in 1971. Construction of the road in the 1930s had truncated the southern portions of the roomblock, partially destroying at least two rooms. Saltbush Pueblo consists of two components. The earliest is a small masonry roomblock aligned N-S and arranged front-to-back, with a kiva situated off the northeast corner of the roomblock (Fig. 2.3). Rooms 18 and 19 on this plan also probably belong to this earlier component, according to Snow, and may in fact have been the earliest surface rooms constructed. Snow argues that this component was associated with a set of kiva floor features aligned E-W that included a firepit archaeomagnetically dated to 1190 ± 10. Later, two additional contiguous, N-S aligned rooms were attached to the southern end of the roomblock, many of the original rooms were subdivided, and a southern recess and a new set of floor

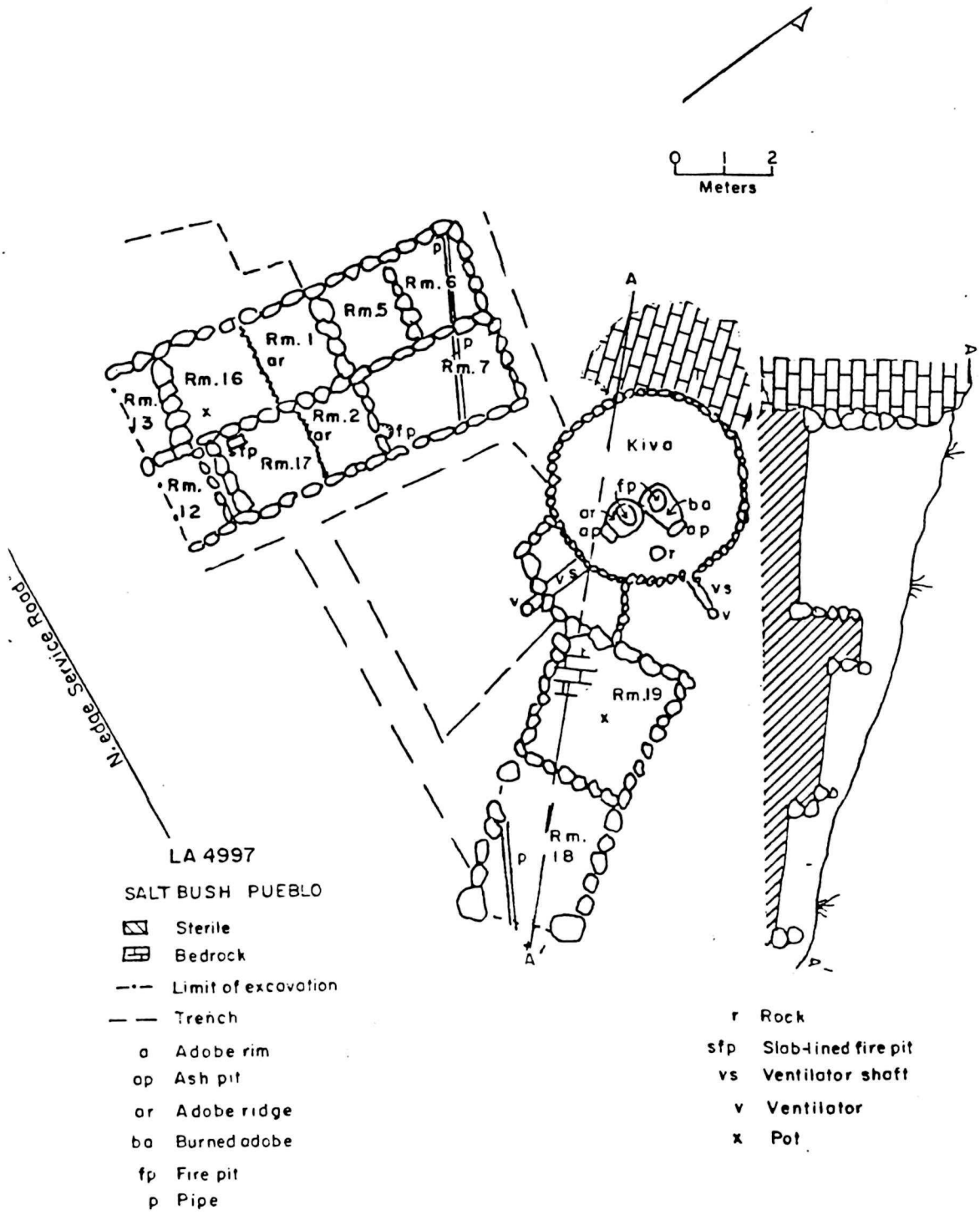


Fig. 2.3. Saltbush Pueblo in Bandelier National Monument (from Snow 1971:3, by permission of the Laboratory of Anthropology, Museum of New Mexico, Santa Fe).

features, aligned N-S, were set into the floor of the kiva. The hearth in the later set of features was archaeomagnetically dated to 1230 ± 20; piñon in the kiva fill yielded dates of 1194vv and 1215vv. Both components, therefore, are solidly Early Coalition in date.

Architecture

Component 1 consisted of an east-facing roomblock and a simple Rio Grande-style kiva with two adjacent surface rooms. The roomblock originally had at least four long rooms: two "front" rooms (on the eastern side of the roomblock) with hearths against a wall; and two "back" rooms of similar dimensions but no floor features. These rooms were constructed as a single unit with its long axis running N-S, at right angles to the slope. The two adjacent rooms whose long axes were oriented NW-SE, attached to the southern recess of the kiva, were built with large, unshaped stones and incorporated several large in-place boulders into their walls, as did the kiva. Floors in these rooms were poorly preserved, but Snow suggested that they once contained hearths. Snow placed the probable population of the site during this time at two, possibly three, households.

Component 2 is represented by major remodeling within the kiva and the main roomblock. Two rooms (12 and 13, Fig. 2.3) were added to the south end of the roomblock. In the kiva, the floor features were realigned towards the south and a southern recess was added. In the main roomblock three of the four rooms were rather casually subdivided to create a total of nine rooms. The tuff blocks used in remodeling the main roomblock were mostly rectangular; unshaped blocks were used in construction of the southern recess of the kiva. Only one hearth was associated with this component. Snow (1974:32) considered this apparent lack of cooking facilities to be an argument that the roomblock had two stories in places; he suggested that the amount of charcoal found within the fill was also evidence for a second story, since the pueblo showed no signs of having been burnt.

The kiva is circular in plan, measuring 4.00 m E-W and 4.05 m N-S (Fig. 2.4). It was built mainly of tuff blocks, but one large boulder was incorporated into the north wall. Walls were of both shaped and unshaped blocks, with chinking in the mortar except on the east and west walls of the southern recess. Wall interiors were plastered, except for those portions of the southern recess that had no chinking (Snow 1974:24). A single viga socket pecked into the south edge of the boulder forming the north wall provided the only clue as to roof construction; the kiva lacks pilasters and the main roof beams were laid north to south. No beam fragments were recovered; Snow considers the tree-ring-dated materials to be firewood. A single posthole in the floor may have been a support socket for a roof post.

As originally laid out, the kiva contains a circular firepit with an adobe collar; a rimless, rectangular ashpit is located just to its east. The hearth and ash pit had been sealed at the end of their use by a layer of noncultural sediments and plaster. Behind a deflector ridge on the floor by the east wall is a ventilator of the shaft-tunnel variety; the walls of the tunnel were not plastered or reinforced. Together, these features form a straight line, except that the ventilator was slightly offset to the south. Directly behind the east-oriented firepit, 40 cm above the level of the floor, is a wall niche, the only other feature associated with the early component. Constructed by leaving a hollow space in the cobbles forming the east wall, the opening had been plugged with an ill-fitting stone (Snow 1974:26).

In a major change in the orientation of the kiva features that probably took place in the early 1200s, the hearth-ashpit-ventilator complex was moved to align N-S. The later firepit partially overlapped the earlier. The long axis running of the new, rectangular hearth, runs E-W; it is surrounded by an adobe collar and was filled with ash, charcoal and dirt. An adjacent ashpit was filled with white ash (Snow 1974:26). The ventilator tunnel is directly south of the ashpit. The inside walls were plastered and lined with sticks. In front of the ventilator opening is an elaborate damper that consists of an adobe groove and a floor slot inside the opening of the ventilator; this perhaps explains the absence of a deflector south of the ashpit. The vent tunnel measures 1.4 m in length and intersects a vertical shaft 41 cm outside the south wall (Snow 1974:27-28).

Interpretations

Snow asserted that the reorientation of the kiva features and the addition of the southern

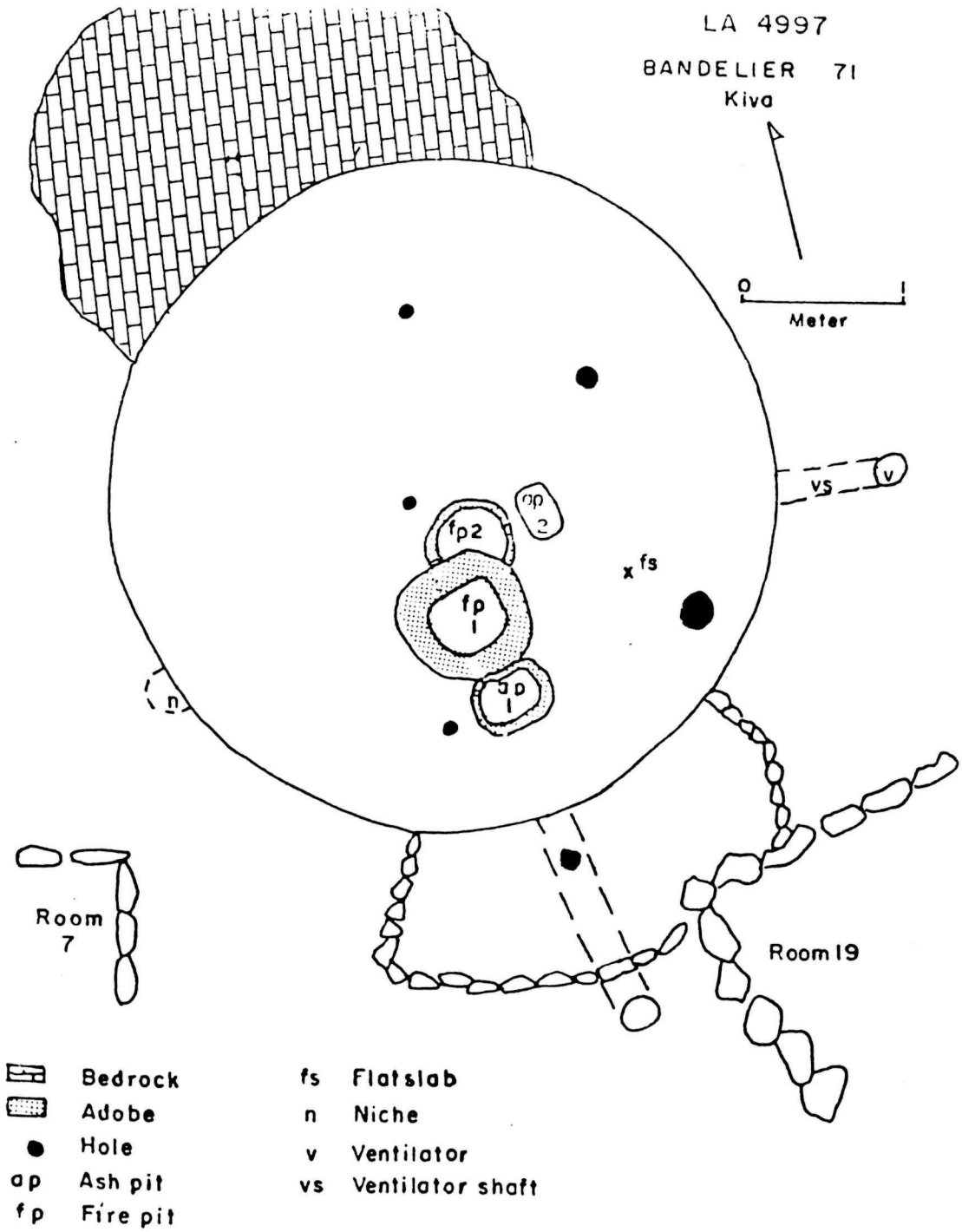


Fig. 2.4. Kiva, Saltbush Pueblo in Bandelier National Monument (from Snow 1971:29, by permission of the Laboratory of Anthropology, Museum of New Mexico, Santa Fe).

recess substantiate the hypothesis that ideas or people were moving into the Rio Grande in the early 1200s from the San Juan area. "Its construction ..." he suggested, "may have been directly stimulated by Chacoan migrants, probably of Mesa Verde affiliation" (Snow 1975:68). Following logic suggested by Rock (1974) the subdivision of the original four rooms into eight smaller rooms may reflect an increase in population, or, possibly, an increased separation of adult children from their parents.The presence of only one fire hearth in the later component might support Snow's claim that the pueblo probably had two stories after its major remodeling. However, it appears at least as likely that hearths were once present in those portions of either Room 12 or 13, or in rooms beyond them to the south, that were lost to construction in the 1930s. It is also worth remembering that, for whatever reason, late construction at Kiva House tended to add more space for storage than for habitation, decreasing the ratio of habitation to storage rooms from near one, to well below one. Towards the end of its use-life, Saltbush Pueblo may have been similarly affected.

LA 14815

The next two sites to be discussed, as we move north, represent the smallest class of habitation sites in the Coalition period. LA 14815 and LA 15935 (see Fig. 2.1) were located on property in Los Alamos that was developed as "Pueblo Canyon Cliffs," and were destroyed for an apartment complex. The sites were excavated by the Los Alamos Archaeological Society (Poore 1981) with Steward Peckham, Laboratory of Anthropology, Museum of New Mexico, overseeing the excavations. The two sites were dated to between A.D. 1150 and 1325 on the basis of abundant Santa Fe B/w ceramics in the virtual absence of other service wares. We favor an Early Coalition date for these sites because of the apparent absence of Wiyo B/w. Some tree-ring and archaeomagnetic samples collected from LA 15935 were, apparently, never submitted or did not yield dates.

Architecture

LA 14815 was L-shaped and consisted of three adjoining tuff block masonry rooms, two of which had hearths (Fig. 2.5). Room 3 was the

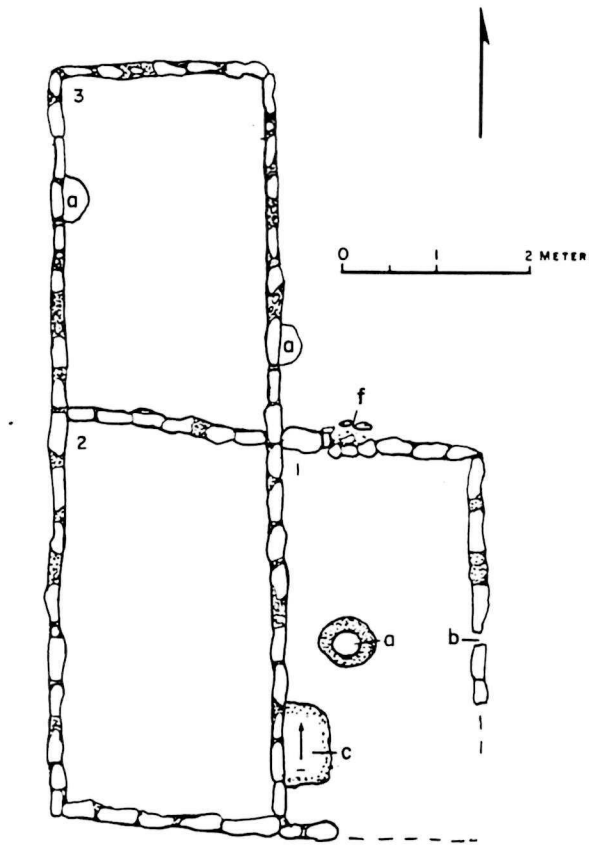


Fig. 2.5. LA 14185. a: hearth; b: ventilator; c: mealing bin; f: possible doorway. From Poore (1981).

northernmost room; Room 2 lay directly to the south; and Room 1 was adjacent to and east of Room 2. The walls were layered in crude courses, with the building blocks averaging 50 cm long x 25 cm wide. Their average thickness was not reported, except to say that the walls were one stone deep. Courses were joined with mortar and covered with a layer of plaster. The long axis of the site ran N-S; most refuse was southeast of the roomblock (Poore 1981:38).

The floor in Room 1 was of smoothed adobe that curved gently to join the walls. A mealing bin was located in its SW corner. In the center of the room was a round hearth full of ash, with an adobe rim. Directly east of the hearth, in the wall, was a round ventilator at the same level as the first course of masonry. The only possible doorway at

this site was in the north wall of this room, and had been sealed with a column of tuff rocks prior to the abandonment of the site (Poore 1981:39).

Room 2, directly west of Room 1, was featureless and contained few artifacts. It was probably used for storage, which might indicate that the site was meant to be occupied year round. Its architecture was otherwise similar to that in Room 1. Room 3 was located to the north of Room 2 and northwest of Room 1. A semi-circular burned area was discovered against its west wall from a fire made directly on the floor. A similar burned area was found outside the east wall of Room 3.

Interpretations

The only doorway on the site led to the outside, not to either of the storage rooms. However, with only three rooms present on the site, and with only one of these having a formal hearth, it is easy to conclude that the site was occupied by no more than one household. The presence of the two apparent storage rooms and a formal hearth suggests that the site could have been occupied year-round.

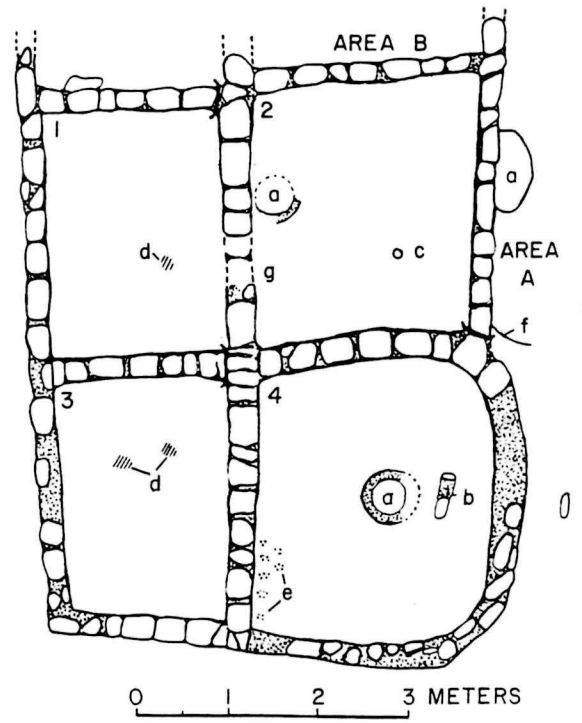


Fig. 2.6. LA 15935. a: hearth; b: deflector; c: rock set in floor; d: burned floor areas; e: subfloor digging stick scars; g: possible doorway.

LA 15935

LA 15935 consisted of four masonry rooms and, like LA 14815, was oriented to magnetic north (Fig. 2.6; Poore 1981:42). Room 1 was located to the northwest with Room 2 adjacent and to the east. Room 3 was to the south of Room 1 and west of Room 4.

Architecture

LA 15935 was generally similar to LA 14815 in layout and construction. The walls were built of single-coursed tuff blocks, some of which showed evidence of being partially shaped. All of the interior walls were plastered except the east wall in Room 2. The only unusual architectural feature of the site was the gently curving east wall in Room 4, made mostly of adobe. The west wall in Room 3 was also built with a high proportion of adobe (Poore 1981:44). Room 1 had no formal features, but did have a small burned area on the floor, located off-center close to the east wall. Poore did not identify this area as a hearth. Room 3 also had no formal features, but did have two burned spots on the floor.

Room 2 was defined as a habitation room due to the formal hearth located against the west wall. The hearth had a raised rim, but only a portion of its southern half was still intact. It showed few signs of burning. Poore believed that this hearth had seldom been used. Also located in the west wall, near the south wall, was a possible doorway leading to Room 1. An exterior semicircular hearth was also located against the east wall. Based on a remnant surface and wall extending eastward from the east wall of Room 2, Poore suggested that a ramada may have been attached to the roomblock in this direction.

The east wall in Room 4 curved to the south and included the south wall in what appears to have been a single building phase. A nearly centrally located fire hearth with a partial adobe collar was lined with a layer of pure sand, covered by ash which filled the hearth depression. To the east was a poorly preserved deflector mold. Poore (1981) believed that the east wall had a

ventilator or door because of the deflector mold and the lack of ladder anchors. The floor showed evidence of four plastering episodes.

Interpretations

This site presents in simple form an important and unresolved puzzle that will affect our population estimates from many similar sites. Ought we to suppose that it consists of two household suites, consisting of one front and back room each? Or ought we to suppose that Room 4, with its larger size, curved wall, and corner location, is a surface kiva, used primarily for ceremonial purposes by a household based in Rooms 1, 2, and perhaps 3, and perhaps shared by other small, nearby pueblos (such as LA 14815) that lack a ceremonial room ? Although we wish to pose this question here, we unfortunately cannot answer it. However, it is worth noting that the one doorway present at this site leads from Room 2 to a storage room, Room 1; this door seems to mark ownership of the storage space by inhabitants of Room 2. If Rooms 4 and 3 were in a similar relationship, we might expect that there would also be a door between them. Perhaps we ought to conclude that this site was occupied by one household, but provided a ceremonial focus for other, nearby (and probably related) households as well.

LATE COALITION (A.D. 1250-1325)

The Late Coalition period on the Pajarito Plateau is poorly documented and poorly understood. That, in fact, was one reason for the selection of Burnt Mesa Pueblo for excavation. One obvious new feature is the appearance of such "plaza sites" (Steen 1977) in the northern portions of the Pajarito. In briefly surveying the tendencies and variability in this period, we shall once again begin at the south and work north through the best available examples.

The Southern Pajarito: LA 6462

Late Coalition architecture from the southern Pajarito appears to differ from that in the northern Pajarito in utilizing more adobe in wall construction and less masonry. However, excavated sites of this period in the southern Pajarito are apparently restricted to the Rio Grande valley, which almost certainly affected this choice of construction material. The North Bank site (LA 6462; Bussey 1968b) is an example of the Late Coalition on the southern Pajarito. Located about 1.5 miles north of Cochiti Pueblo on the west bank of the Rio Grande (see Fig. 2.1), LA 6462 was investigated by Stanley D. Bussey as part of the Cochiti Dam archaeological salvage project. Of the eight "units" (spatially separable groups of roomblocks and pitstructures) present at this site, Unit VII (of Late Coalition date) has been reviewed elsewhere (Biella 1979:113).

With 16 preserved surface rooms, five of which had hearths (Fig. 2.7), Unit VI is another good example of a Late Coalition habitation site. This portion of LA 6462 has been dated by ceramic typology as well as by 15 cutting dates from the kiva. Of these 15, one dated to A.D. 1103r, two others dated to A.D. 1278r and 1278rB, and the others dated to A.D. 1280r or rB. Bussey has interpreted the A.D.1103 date as coming from a beam salvaged from an earlier (Kwahe'e period) structure. Honea (1968:114), who analyzed the ceramic materials from this site, considered the Unit VI roomblock to be approximately contemporaneous (in the late 1200s) with this kiva.

Architecture

The roomblock was arranged in two rows, with eight rooms to the west and six to the east. Two additional rooms were added to the east, one to the south abutting Room 15, the other to the north abutting Room 10. A round kiva was located SE of the roomblock, while a square pitroom was located east of the northern portions of the roomblock. The surface rooms were poorly preserved, but appear to have been made of coursed adobe. The remaining wall evidence consisted of shallow foundation trenches filled with adobe. Some of the trenches contained vertical stone slabs or cobbles. Although the floors were either eroded or poorly preserved, floor features seem to have been preserved. Only two rooms in the western (back) row of rooms had floor features: Room 6 had a circular, unburned, stone-lined feature built against the north wall, and Room 9 had a circular fire pit.

Of the six rooms identified in the eastern (middle and front) row of rooms, five had hearths. The hearths in Rooms 10 and 15 were circular and unplastered, while the hearth in Room

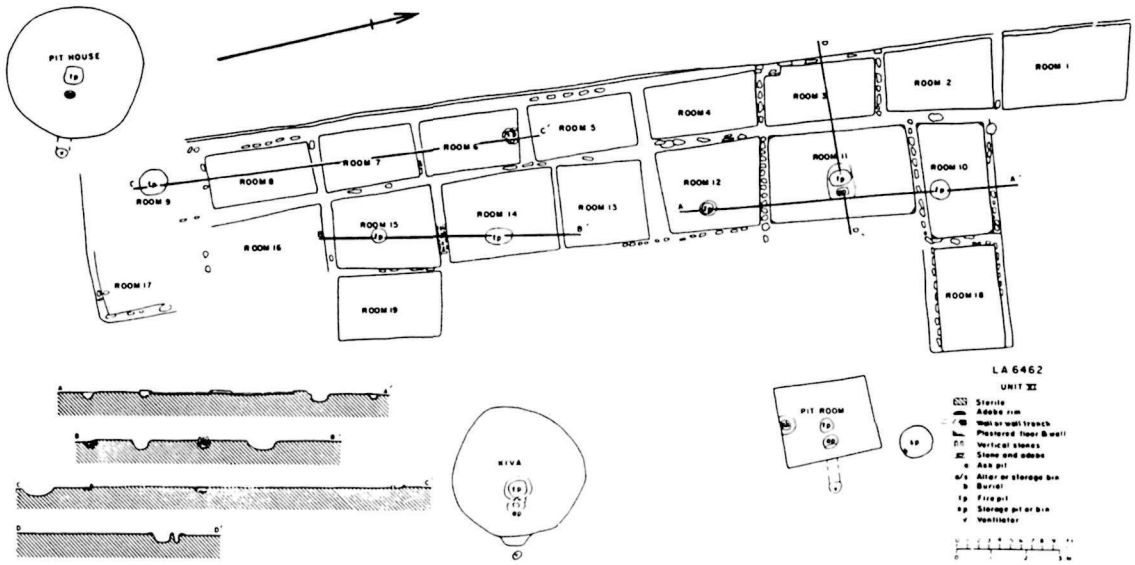


Fig. 2.7. The North Bank Site, LA 6462, Unit VI (from Bussey 1968b:52, by permission of the Laboratory of Anthropology, Museum of New Mexico, Santa Fe). The pithouse belongs to an earlier occupation.

12 was plastered and was encircled by a low adobe collar. The hearths in Rooms 14 and 11 were oval and unplastered. Of the surface rooms, only Room 11 contained a hearth that was also paired with a small rectangular ash pit; these two features were separated by a low partition of adobe and surrounded by a low adobe platform. The two easternmost rooms, 18 and 19, had no floor features.

The kiva was circular, 4.2 m in diameter x 1.4 m deep, and was constructed by excavating a pit into sterile sediments and then plastering the walls. Due to the high frequency of cobbles located in the fill, Bussey believed that the upper portions of the walls were made of adobe and cobbles. The only observed floor features were an ashpit, a deflector, and a circular hearth, all aligned E-W with an above-floor ventilator in the east wall. The deflector consisted of a low adobe base into which vertical sandstone slabs were set.

The kiva roof had burned and collapsed before any fill had been deposited on the floor. Bussey reports several instances of beam ends resting directly on the floor. The main beams, running NE-SW, were *Populus* (cottonwood or aspen) and *Pinus ponderosa*. The secondary beams, laid at right angles to the main beams, were piñon and juniper.

The rectangular pit room measured about 2.9 m N-S and 2.4 m E-W and reached a depth of 2 m below the modern ground surface. As in the kiva to the south, the pit room contained an E-W aligned complex of hearth, ash pit, and ventilator; a trench in the edge of the ashpit nearest to the ventilator may have anchored a wooden deflector. An adobe-walled "bin or altar" was identified on the floor near the south wall, and a small wall niche was seen near the floor in the east wall near the SE corner.

Interpretations

The alignment of E-W walls relative to the habitation and storage rooms suggests at least two divisions within the site (following logic set forth by Rock 1974). The first occurs between Rooms 4 and 3 in the western rank of room, and between Rooms 12 and 11 in the eastern rank; the second division separates Rooms 8 and 7 on the west, and Rooms 16 and 15 on the east. There also may be a division between Rooms 5 and 4 to the west and Rooms 13 and 12 to the east. If these divisions have any validity, and if they demarcate

suites used by closely cooperating groups of household size or larger (perhaps lineages), then such groups could consist of a single household (with only one living and one to four storage rooms), or of two households (with two living rooms and five storage rooms). Of course, these particular inferences are very tenuous. While this site plan does seem to suggest considerable variability in the size of the space used by a household, in the ratio of storage to living rooms, and in the numbers of households in the next larger cooperating unit, it also suggests that the ratio of storage rooms to living rooms is higher than in the Early Coalition, and averages 2:1 or greater. It also suggests that there is a considerable concurrent diversity in the placement and shape of rooms that may have some ceremonial function. If Room 12 belongs in that category, as its size and unusual features suggest, then surface kivas, round subterranean kivas, and square kivas may coexist contemporaneously within a single small community.

The Northern Pajarito: LA 8681

Most attention to the northern Pajarito Late Coalition sites has been due to Steen (1977) and his recognition of what he called "plaza sites." This class of sites also seems to have been recognized by Hewett (see for example 1906:14-26) who in places implies that they were temporally intermediate between the small "clan houses" (linear roomblocks) of the earliest occupation and the later large villages. These Late Coalition sites are identified by the arrangement of rooms surrounding a central, enclosed plaza, and also by the ratio of Santa Fe B/w pottery to Wiyo B/w. Steen characterizes the local Early Coalition habitations as small farmsteads located on mesa tops. In the Late Coalition blocks of rooms are added in double or triple rows, also aligned N-S. Finally, in Steen's opinion, plaza sites were formed by extending one or two rows of rooms eastward from nearby N-S-aligned roomblocks. The plaza often contained a kiva. He characterizes plaza sites as a "cluster of house blocks with one dominant building, a two-or three-story structure built around a plaza" (Steen 1977:13). The tallest construction was on the west side of the plaza, and usually there was a narrow opening into the plaza on the east side. There usually was a second kiva built outside the plaza, on the east side and south of the entrance.

Steen (1977) reports the existence of a dozen plaza sites within or near the boundary of Los Alamos National Laboratory, and cites LA 4632, reported by Worman (1967) and LA 4729, reported by Worman and Steen (1978) as probably representative of a slightly earlier portion of the Late Coalition. More recently the Pajarito Archaeological Research Project (Hill and Trierweiler 1986) has identified 15 Late Coalition sites on the Pajarito, including some recognized by Steen. Rough plans of a few plaza pueblos can be found in Hewett's 1906 monograph (Site 5, Pininicangwi, p. 16; Site 13, Sandia, p. 22; Site 16, p. 25; and Sites 18 and 19, p. 26). Steen (1977:36) provides a better map of Hewett's Site 18, as well as sketches of two other plaza sites (LA 4693 and LA 12609). He reports that "excavations have been made at only one of the plaza sites within the [boundaries of what was then called Los Alamos National Laboratory]. In 1950, Fred Worman dug three trenches at LA 4693. Unfortunately, no notes, photographs, or other records of that work have been found" (1977:13).

Indeed, despite the apparent abundance of sites dating to this period on the northern Pajarito, there has been little reported excavation. One exception is a 1969 master's thesis by James Maxon who wrote up investigations undertaken by the Los Alamos Archaeological Society between 1953 and 1956 at "Fulton [or Ramon Vigil Grant] 190" (LA 8681) located about two miles south of White Rock. This site was also summarily described by Fretwell (1954, 1959) and Steen (1977:59). Four tree-ring samples, none of them cutting dates, provided determinations ranging from A.D. 1167 to 1264, with intermediate dates of 1229 and 1257. The site consisted of a roomblock of 21 rooms (several not fully enclosed), one surface kiva, and a single, detached room (Fig. 2.8). The main roomblock was aligned N-S and arranged in three rows of seven rooms each. The kiva was located in the easternmost row, in the north corner of the site with one room to the north and five rooms to the south. The site has since been destroyed for additional building in the Pajarito Acres development.

While LA 8681 is not a plaza pueblo, it probably does date to the earliest part of the Late Coalition, roughly contemporaneous with Area 2 of LA 60372. Maxon considered it to represent other contemporary pueblos on the Pajarito

and east walls large vertical slabs of tuff were set on edge as a base for further construction, apparently similar to the pattern seen in Room 4 of LA 60372, reported in Chapter 4 of this volume.

Room 5 was built using two styles of architecture. The west, north, and south walls were of Type II masonry. The east wall was of Type III. The north and south walls did not extend out to meet the east wall (Fretwell 1954:11). The southern gap was filled with large tuff blocks. The north gap remained open and presumably served as a doorway. The floor was not plastered, but was simply compacted. A shallow, circular, hearth lined with blackened adobe was located in the northern part of the room.

Room 14 is the last room with a hearth that might have served as a habitation room. The east wall was laid over the fragment of an earlier wall and bowed outward. Near the NE corner, a ventilator was set into the east wall at floor level. A circular, masonry-lined hearth was located in front of the ventilator. There was no evidence of a deflector between the hearth and the ventilator. The NW and SW corners were filled with adobe and tuff blocks to make them more curved. Maxon (1969) suggested that Room 14 was originally a habitation room, remodeled into a ceremonial chamber or kiva.

The room just north of Room 14, in the NE corner of the block of fully enclosed rooms, was also interpreted as a kiva, and also appeared to have been formed by modifying an originally square room into a rounded form (see Fig. 2.9). In addition to an E-W oriented firepit, masonry deflector, and ventilator complex, a large flat slab was found in the ventilator, somewhat similar to that in Room 3.

Interpretations

If we consider Rooms 14 and the kiva to have been for ceremonial purposes only, and if we further assume that Room 5 was not fully enclosed and therefore did not serve as a habitation room, there are only two habitation rooms in this complex, using a total of nine fully enclosed storage rooms and a number of partially enclosed rooms. Earlier in the occupation of the site, however, the ratio of storage rooms to living rooms could have been as low as 7:4, approximating that reconstructed for LA 6462. The only preserved doorways present on the site led to the outside, not to interior storage rooms. The lack of clear evidence for connection of storage rooms with particular habitation rooms, at this site and the others reviewed, may indicate that these sites were occupied by related individuals that considered themselves a corporate group with a right to call on each other's storage.

SUMMARY

Table 2.1 summarizes data on the number of rooms of various presumed functions for the habitation sites discussed in this chapter, and other selected published examples for which these data could be reconstructed. Our tabulation overlaps with that of Biella (1979:110-118) for the southern Pajarito, but extends the comparison to the northern Pajarito and attempts to distinguish between predominantly Early and Late Coalition sites. Carlson (1990) provides additional tabulations based on floor areas for this same set of sites.

Pan-Pajarito Trends

One broad trend seen in this short review and evident from Table 2.1 is for an increase in site size from Early to Late Coalition, although this trend is weakened by the inclusion of the probably unusually large Early Coalition Kiva House in the sample. The inclusion of a plaza pueblo in this sample would strengthen this trend. Early Coalition sites are generally small sites ranging from a single room to roomblocks of nine or more rooms; Late Coalition sites can be more than twice the size of the largest Early Coalition sites.

Another trend is for the ratio of storage to living rooms to increase through time in both the northern and southern portions of the Plateau. In each area, ceremonial rooms exhibit a slight tendency to become more common relative to habitation rooms in the Late Coalition.

North-South Differences

Certain differences can also be seen between the north and south. Because the plaza pueblo is apparently unknown in the south (or, at least, is

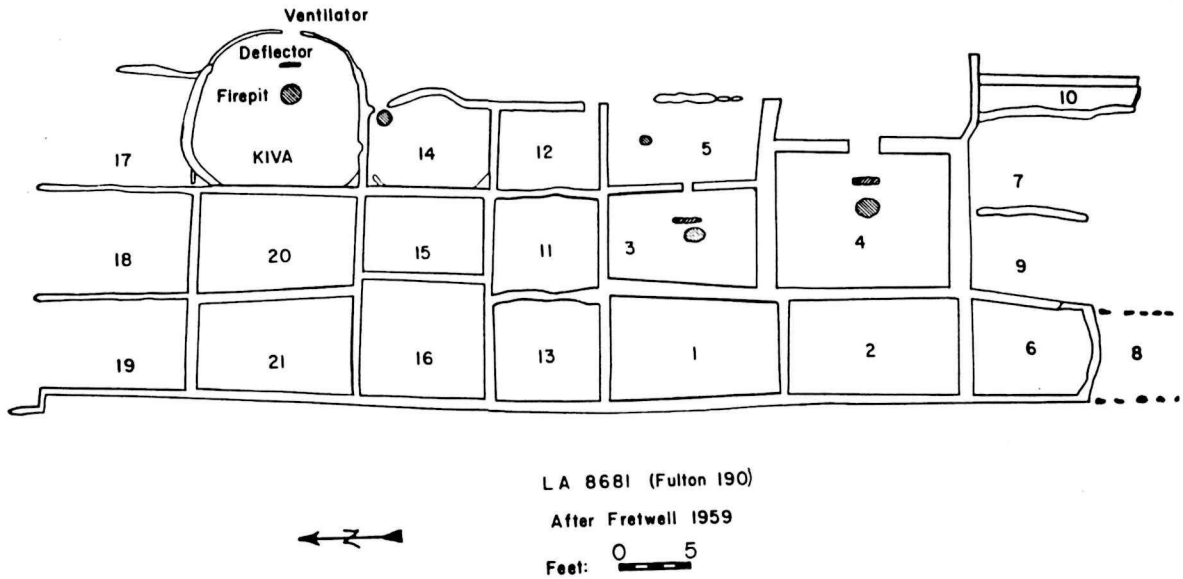


Fig. 2.8. LA 8681. From Maxon (1969).

Plateau in general construction, masonry techniques and size (Maxon 1969:29). It is similar in size, construction, and interior features to LA 4632 (Worman 1967:3-10) on Mesita del Buey.

Architecture

Construction practices at LA 8681 retain similarities with the Early Coalition. Floors were prepared by plastering or covering with packed clay. The walls were made of either shaped or unshaped blocks of tuff with adobe mortar. Maxon reported three distinct types of wall construction. Type I consists of walls at least two courses deep. Type II walls are one stone wide (single-coursed) with blocks that could be either shaped or unshaped, but were smaller than those used in Type I, and were generally uncoursed. Type III walls were made mostly of adobe with a few unshaped or shaped rocks set into the wall at random (see also Fretwell 1959:16-17). All the walls appeared to have had interior wall plaster; existence of exterior plaster could not be determined. Hearths and corner storage bins were common features. Doorways, when present, were narrow and often had a single large stone forming the threshold. These doorways allowed not only access into some rooms, but also entry of air and light. However, the lack of doorways in many rooms indicates entrance through roof hatches. Rooms 6-10 and 17-19 are believed to have been added on to the main block of rooms; in this main roomblock, Rooms 1-3 were apparently the first constructed.

Only four enclosed rooms had hearths; 16 had no floor features and were presumably storage rooms, and five rooms, considered by Maxon to be outdoor but sheltered work areas, had only three walls. Only a few of these rooms will be discussed, to give some sense for the variability in construction and types of features that were present.

Room 3 was built with Type II masonry and had a circular fire hearth in the center of the room surrounded by a raised collar of adobe. A flat stone was set into the bottom and the sides were covered with plaster. To the east of the hearth was an upright deflector consisting of a single slab set into the floor. A square ventilator opening, later sealed with adobe, was located in the east wall in front of the deflector (Fretwell 1954:6-7).

Room 4 was similar to Room 3 in its Type II masonry and in the presence of a fire hearth, deflector, and ventilator complex. However, the deflector in Room 4 was not made of a single stone slab, but was built of masonry. In the south

Table 2.1. Room Count by Tentative Functional Class for Selected Coalition Period Sites on the Pajarito Plateau.

Subreg. of Pajarito	Subper. of Coalition	Site Number (name/other #)	Reference	Habit. rooms	Storage rooms	Cerem. rooms
South	**Early**	12119 (Kiva House)	Zier 1982:32-57	8	12	3
		12121	Zier 1982:57-64	4	4	0
		6462 (North Bank) Unit III	Bussey 1968b	3	5	1
		6462 (North Bank) Unit IV	Bussey 1968b	4	3	1
		4997 (Saltbush) Comp. 1	Snow 1971	2-4[a]	2-4	1
		4997 (Saltbush) Comp. 2	Snow 1971	1	8	1
	Sums			≈ 23	≈ 35	7
North	**Early**	14815	Poore 1981	2	1	0
		15935	Poore 1981	2	1	1
		4628[b] (RVG 197A)	Worman 1967; Steen 1982	3	7	0
		4631 (RVG 194)	Worman 1967	1	7	0
	Sums			8	16	1
South	**Late**	6462 (North Bank) Unit VII	Bussey 1968b	5	11	2[c]
	Sums			5	11	2
North	**Late**	4629 (RVG 196)	Steen 1982	5	8	0[d]
		4632 (RVG 193)	Worman 1967	3	17	1
		8681 (RVG 190)	Maxon 1969	4	11	2
	Sums			12	36	3

[a] The higher number would apply if Rooms 18 and 19 originally had hearths, as Snow suggested. Applying Adams' (1983) principle that habitation rooms are larger than storage rooms, and using the smallest room with a hearth as the lower limit for habitation room size, would result in higher estimates of habitation rooms and lower estimates of storage rooms for both components.

[b] Steen (1982:16-19) would probably place this site in the Late Coalition; Worman's and Steen's criteria for segregating Santa Fe B/w and Wiyo B/w apparently differed dramatically. We suspect the site is near the A.D. 1250 demarcation.

[c] Counting the pitroom.

[d] Room 10 would have been counted as a kiva, except that it apparently was not walled in completely.

more characteristic of the north) the south appears to lag behind the north in site size during the Late Coalition. (This trial generalization is not upheld by Table 2.1, which lacks any representative of the plaza pueblo class). Because many archaeologists (see for example Ford et al. 1972:32) believe that the plaza pueblos, with their Wiyo B/w ceramics, can be unequivocally connected with ancestral Tewa, the lack of these "unit villages" south of the Frijoles is often used to establish the presence of eastern Keres in that area by Late Coalition times (Ford et al. 1972:35).

Table 2.1 demonstrates a slight trend for there to be more storage rooms per habitation room on the northern than on the southern Pajarito. However, even more striking is the relative scarcity of ceremonial rooms per habitation room on the Northern Pajarito, a feature that survives into the Late Coalition. We have already seen that the ceremonial rooms (that we are able to recognize) are more diverse in form on the Southern Pajarito as well. In fact, one issue that stands out from this review as a large unsolved problem is the difficulty of differentiating "ceremonial" from "habitation" rooms. Of course, identifying spaces used primarily for ritual purposes is difficult elsewhere in the Southwest as well (Lipe and Hegmon 1989), but the presence of structures such as "pit rooms" and "corner kivas" in the present sample seems to multiply such problems enormously. Fortunately, the purpose of this paper is not to resolve such problems, but to identify them.

3

EXCAVATIONS IN AREA 1

Angela Linse

INTRODUCTION

Burnt Mesa Pueblo, LA 60372, lies atop and near the edge of the southeasternmost extension of Burnt Mesa in Bandelier National Monument. The grassy woodland surrounding the site is sparsely forested by ponderosa pine (*Pinus ponderosa*). The openness of the area is, in part, a result of the recurrent forest fires for which the mesa is named. Adjacent to the site there remains visible evidence of the La Mesa fire of 1977. The two areas of the site are topographically anomalous and readily identifiable as an archaeological site (or sites). The site was officially recorded in 1987 as a result of the NPS Bandelier Archeological Survey. This chapter will concentrate on the excavations in the larger of the two roomblocks, hereafter referred to as Area 1 (Fig. 1.1).

Area 1 consists of four linear roomblocks joined to form a rough square that encloses a courtyard or plaza. At this time, the western section of the roomblock is estimated to have been 2 stories, while the other sections have produced evidence suggestive of only a single story. Although Area 1 and Area 2 may have been occupied concurrently for a time, ceramic data indicate that occupation of Area 1 predominantly postdates that of Area 2 (see Chapter 5, this volume).

The sampling strategy followed a stratified random design (see Chapter 1, this volume). The area was divided into four sampling strata, or subareas: the roomblock, the interior courtyard, the suspected kiva, and the adjacent outlying area. The 1989 sample included only three of the four strata. We were unable to examine the presumed kiva due to the time expended on investigation of complex deposits in the other subareas. The strata are being sampled disproportionately, with low sampling rates in the exterior area (see Table 1.1). Six 2 x 2 m units were chosen randomly in this outlying area (Subarea 4). Two additional 2 x 2 m units were selected in the courtyard (Subarea 2), one in the northeast adjacent to the single courtyard unit excavated in 1988, and another in the southwest corner. In the roomblock, Subarea 1, excavations begun in 1988 continued in Room 1, and began in one other room (Room 10).

After a discussion of the excavation methods, this chapter contains a description of the excavations from periphery to center, beginning with Subarea 4 and concluding with Subarea 2. Except for materials from floors and features, which are briefly described here, discussion of the recovered materials can be found in chapters 5-8.

METHODS

With the exception of one-half of Room 10, as explained in Chapter 1, all deposits were excavated by natural or cultural strata; strata greater than 10 cm in depth were subdivided into arbitrary 10 cm levels. Volumetric information for the individual strata was collected as masonry measurements (in m^3) and as liters of sediment. All of the sediments that were excavated stratigraphically were screened through 1/4" screen. All material remaining on the screen, with the exception of tuff gravel and large adobe chunks, was separated into the following categories: ceramics, flaked lithics, non-flaked lithics, non-human bone, vegetal materials, other inorganic materials, other organic materials, and other (usually dendrochronology samples). No human bone was recovered from Area 1. Artifact density is reported as counts of artifacts greater than 1/4" (63.5 mm) per 10 liters of sediment, exclusive of the volume of masonry

rocks. The artifacts included in the counts were flaked and non-flaked lithic tools, lithic debitage and ceramics. Although bones and vegetal material are also considered artifacts, their counts were not included in the density calculations. The number of bones recovered was generally so small that it would not make a significant difference in the artifact density. The counts for vegetal remains, on the other hand, are so high that they could obscure changes in counts of other artifacts.

Deposits identified during excavation are termed "strata," while the lithostratigraphic units (Gasche and Tunca 1983) identified in profile are referred to as "layers" (Stein 1989). Strata (and layers) were delineated primarily through changes in texture and consistence (consolidation) and less frequently on color and differences in composition. Of course, archaeological deposits can often be more finely divided in profile than in excavation, and stratigraphic profiles are not always representative of the changes observed during plan excavation. Consequently, some of the layers delineated in profile are grouped together (or, infrequently, divided) in order to be correlated to strata distinguished during excavation. Correlations are noted in all profile figures. The following descriptions refer to excavated strata rather than layers recognized in the stratigraphic profiles. When division of strata into finer increments aids in description and interpretation, information is included on the stratigraphic layers identified in profile.

All units had at least 2 profiles photographed in both black and white (Kodak films Tri-X Pan or TMAX 400), and color (Kodak Ektachrome 200) slide film. One stratigraphic profile was drawn (with the exception of 2 x 2 102S 86E) and sediment samples were collected from every unit. The attributes of color (Munsell, dry in direct sunlight), structure, inclusions, and boundary characteristics were recorded for all recognizable layers. The layers will be assigned to formal textural classes following laboratory analysis of sediment samples that is currently in progress. Many of the strata were difficult to classify texturally in the field due to relatively high percentages of tuff gravel.

Informal particle size descriptions follow the Wentworth classification (Folk 1980). The tuff masonry rocks are thus referred to as cobbles (64-256 mm) or boulders (256-1024 mm). Most recovered artifacts fall into the pebble size fraction (4-64 mm) or larger. Soil horizon designations follow the guidelines of the Soil Conservation Service (Soil Survey Staff 1984). (The uppermost, or A-horizon, consists of a zone of maximum organic content, from which clay, iron, or aluminum may have been lost. This overlies a B-horizon where clay, iron, or aluminum accumulate; aggregates of sediment, called peds, are also characteristic of the B-horizon. The B-horizon in turn overlies unweathered parent material called the C-horizon. Not all of these horizons are present in all soils.) Strata were numbered consecutively as they were excavated, therefore the most recent deposits have the lowest numbers. In the following, strata are described in the order in which they were excavated. Tentative interpretations of depositional sequence proceed in depositional order, from oldest to youngest.

SUBAREA 4 (OUTSIDE THE ROOMBLOCK)

The outlying subarea is defined primarily on the presence of large-sized artifacts on the surface. The boundaries of the stratum have been drawn generously to the south, where it encompasses some areas of very low surface and subsurface artifact density. Some surface artifacts do extend downslope beyond the limits of the stratum to the east, but we believed that substantially enlarging the gridded area to encompass these materials was neither cost-effective, nor likely to make a significant difference in the ultimate material population estimates. The 2 x 2 m units in the outlying subarea were relatively evenly distributed around the roomblock. Three were located to the south, and one each to the north, west, and east. Two of the units (west and south) were so close to the boundary between the roomblock and outlying subarea that there is some question as to whether they lie within or outside of the roomblock. The distribution of the units provides an ideal means of testing the empirically derived hypothesis that Puebloan peoples traditionally discard their refuse to the south and east of their living areas.

A limited amount of coring with a Giddings Soil Probe and augering with a 3" bucket auger demonstrates that there is very little depth to the cultural deposits west and southwest of the roomblock (and not directly adjacent to it). No cultural material was recovered from the soil cores and only a few artifacts were recovered from the upper

levels of the auger samples. This portion of subarea 4 has been influenced by slope wash from the roomblock, surface runoff, and rodent activity. The primary evidence for erosion and slope wash includes a very shallow to non-existent A-horizon (inconsistent with the well-developed B-horizon) and a discontinuous veneer of tuff pebbles. The pebbles are suspended in overland flow during heavy rains and subsequently trapped by grass tufts.

2 x 2 m units 126S 94E and 132S 96E

Excavation began in two units furthest away from the roomblock that were also conveniently close together; the deposits are so similar that they will be described together. Both units are located south of the Area 1 roomblock (and west of the Area 2 roomblock) on a surface that has a slight (1-3.5°) slope to the southwest (see Fig. 1.1). The sediments of Stratum 1 in both units were relatively unconsolidated with many small roots, a high percent of gravel- to pebble-sized tuff in a silty matrix, and a low artifact density (1.6/10 l). This stratum probably includes recent slope wash and a zone of grass root disturbance. The second stratum showed a change to a more consolidated sediment (probably due to a decrease in the number of rootlets) and an increase in the percent of tuff gravel. Artifact density decreased (0.9/10 l). The deposits at this level, and below, have been disturbed by rodents and some burrows were still occupied.

The change to the third stratum was again based on a change in the consistence and composition of the sediments. The sediment was less consolidated and artifact density remained low (0.8/10 l). Excavation ceased when no cultural material was recovered from at least 50 liters of sediment or when cemented tuff gravel was exposed between 40 and 60 cm below modern ground surface (mgs). A deposit of lapilli, gravel- to pebble-sized volcanic tuff bombs, unconformably underlies the deposits containing cultural material. The lapilli deposit, which may belong to the El Cajete Series (Self et al. 1988), is probably the result of the most recent eruption in the Jemez Mountains to the west. The surface of the culturally sterile deposit is topographically irregular (Fig. 3.1) and appears to be the result of burrowing rodents.

Interpretations

Sedimentary structures visible in the profiles, as well as abundant rodent trails and burrows exposed during excavation, document substantial rodent disturbance. Further evidence of disturbance can be provided by sedimentary and ceramic analyses. Sediment samples collected at 10 cm intervals down the profile should not be significantly different in texture and composition if the deposit has been thoroughly mixed (qualitative examination of these samples supports this expectation). Any variation should be attributable to soil formation processes (e.g. illuvial [translocated from the A- to the B-horizon] clay and carbonate). The profile does not resemble undisturbed midden deposits identified elsewhere on the site. However, relative frequencies of Wiyo B/w (not reported here) do generally increase in a regular fashion from Stratum 3 to Stratum 1, as would be expected in a stratified deposit, so the mixing may not be complete.

The character of the deposits does not support the hypothesis that the occupants of the site deposited refuse to the south (as well as to the east) of their habitation sites. Artifact density is extremely low (less than 1.5/10 l) relative to other midden areas (e.g. 2 x 2s 94S 112E and 80S 74E that average 27/10 l). The artifactual material recovered from these units may have been deposited on the surface as a result of slope wash, and incorporated to the depths at which they were recovered by rodents. Moreover, if the occupation of Area 1 does postdate that of Area 2 (see tables throughout this chapter for the tree-ring data), the inhabitants of Area 1 may also have been using Area 2 as a refuse repository.

2 x 2 m unit 94S 112E

This unit lies approximately 9 m east of the probable eastern entrance to the roomblock and about 7 m from a possible exterior wall (Fig. 1.1). The unit lies on a gradual (2.5-4°) slope that dips east toward a minor side canyon that cuts into Burnt Mesa. There was a fairly high frequency of sherds and lithic debitage on the surface. The first excavated stratum corresponds to a zone of root disturbance and recent slope wash. The artifact density remained high throughout all deposits, though decreasing with depth (Stratum 1, 26.5/10 l; Stratum 2, 17.5/10 l; Stratum 3,

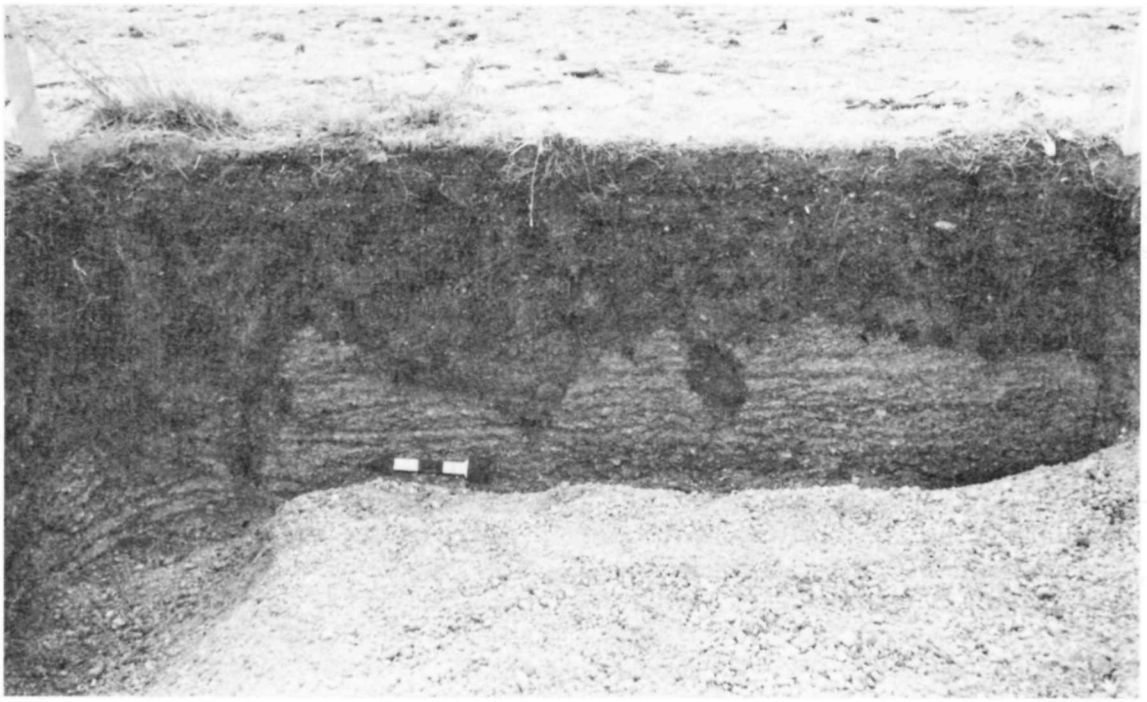


Fig. 3.1. East profile of 2 x 2 m unit 126S 94E showing evidence of rodent disturbance (08/13).

15.8/10 l). The second stratum had a high percentage of gravel-sized tuff and a firm consistence. The change in consistence may be due to an increased illuvial clay content from soil formation although a distinct B horizon is not visible in the profiles. A few tuff boulders, possibly building material, were spread across the unit in Stratum 2 but were not in a context that resembled a wall or wall fall. All three of the 10 cm levels in Stratum 3 showed evidence of considerable rodent activity. The lower level of Stratum 3 contained an area of orange/brown, highly consolidated sediment with charcoal flecks and a few artifacts. The sediment may have been burned, although there was no corresponding evidence of a hearth; it is similar to sediment associated with a recently burned tree south of Area 1.

The cultural material lies atop a volcanic ash deposit on which is superimposed by a thin film of carbonate. The volcanic ash deposit has a slope of 1-3°, slightly less than that of the modern surface. It is easily crushed and has been disturbed by rodents that have left trails and cavities in the ash (Fig. 3.2). The ash deposit also appears in some of the Area 2 external units and in the control cores but has been destroyed by erosion, or by human or rodent activity, on other areas of the site. The ash overlies a thick deposit of lapilli, some of which has been transported upwards by rodents and fills their burrows in the archaeological deposits.

Interpretations

Deposition of refuse, other human activity (e.g. excavation), and rodent disturbance probably interfered with the soil formation that produced the carbonate film on the volcanic ash deposit. The disturbance was of a magnitude great enough so that a developed soil profile is no longer visible. The consistence and composition of Stratum 3, as well as the patch of burned sediment (hearth refuse?), indicates that it may have been an activity or a midden area. Following the abandonment of the site, this area was probably influenced by slope wash and colluvial processes that moved material downslope from its initial position in or near the roomblock. Colluviation would account for the presence of the masonry boulders at this distance from the roomblock (if they were not discarded there by the site occupants). Concurrently, slopewash and surface runoff could account for the high artifact density at

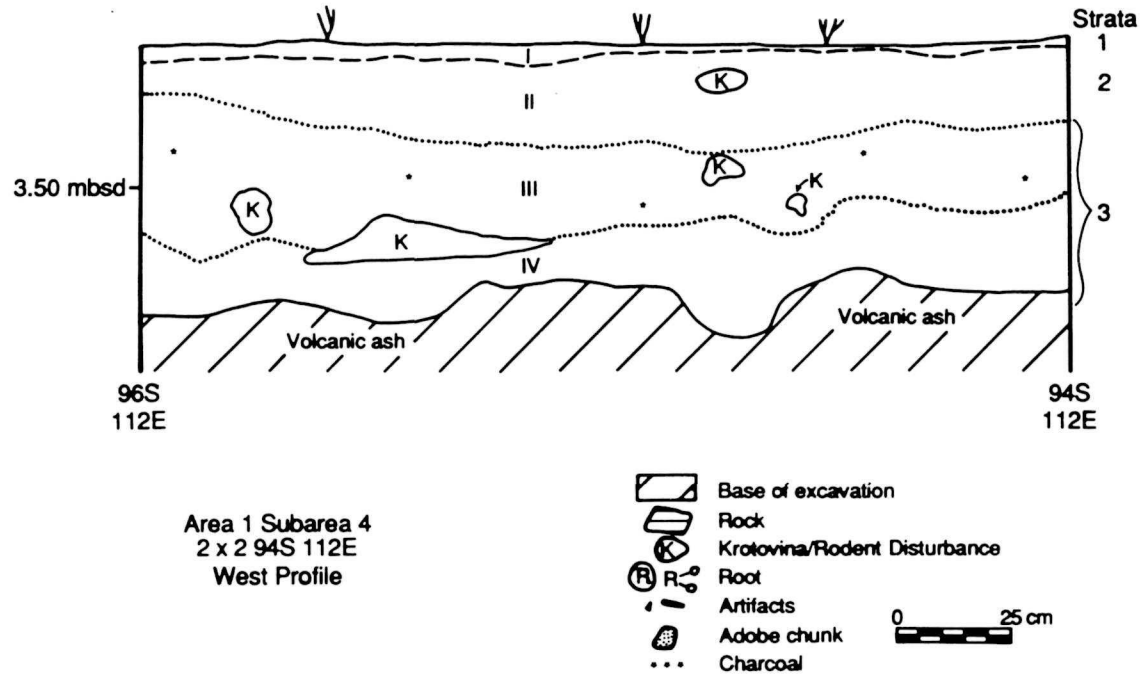


Fig. 3.2. West profile of 2 x 2 m unit 94S 112E.

the surface and in Stratum 1 (i.e. the artifacts may be a lag deposit). If the strata are products of different depositional processes (natural vs. cultural), the deposits should differ significantly in their composition, texture and consistence. Questions of differences in texture and composition between strata will be addressed in future sedimentological analyses of these deposits.

2 x 2 m unit 80S 74E

This unit is located WNW of the roomblock at a slope of approximately 6°, within 3-4 m of a possible exterior wall (see Fig. 1.1). Although there were no masonry boulders on the modern surface, there were many artifacts both at the surface and in the first stratum (29.9/10 l). The second stratum was more consolidated than the first, and extended through three 10 cm levels (three additional levels, 4-6, were limited to northeast corner of the unit). Stratum 2 contained only scattered masonry boulders in the southern portion of the unit (where the profile, Fig. 3.3, was drawn), but did not appear to be a wall fall in plan. The third stratum is composed of masonry cobbles and boulders, some exposed upon excavation of Stratum 2 and others enclosed in an unconsolidated silty matrix. Stratum 3 represents a wall fall and consists of a high frequency of tuff cobbles and small boulders. The underlying sediments of Stratum 4 were deposited in a basin excavated into the Bt/Btk horizons (horizons enriched in illuvial clay [Bt] and carbonate [Btk]). The B-horizon was first exposed along the eastern portion of the 2 x 2 during excavation of the upper levels of Stratum 4 and was subsequently identified along the western margin of the unit only in the deepest level (5) of Stratum 4. Approximately 25 cm of Bhorizon was exposed along the east wall and 15-20 cm along the west wall (Fig. 3.3); the B-horizon was not visible in the other walls of the unit.

Interpretations

There are no geomorphological indicators of removal of the B-horizon by natural processes and it was probably removed prehistorically by human excavation. The part of the B-horizon exposed in this unit may be a section of a northerly trending trench (approximately 165 cm wide) adjacent to the roomblock. The basin in which the Stratum 4 deposits accumulated was perhaps the result of prehistoric mining of the clay- and carbonate-enriched sediments for adobe manufacture (no other easily accessible source of clay has been identified in the area). This would account for the irregular

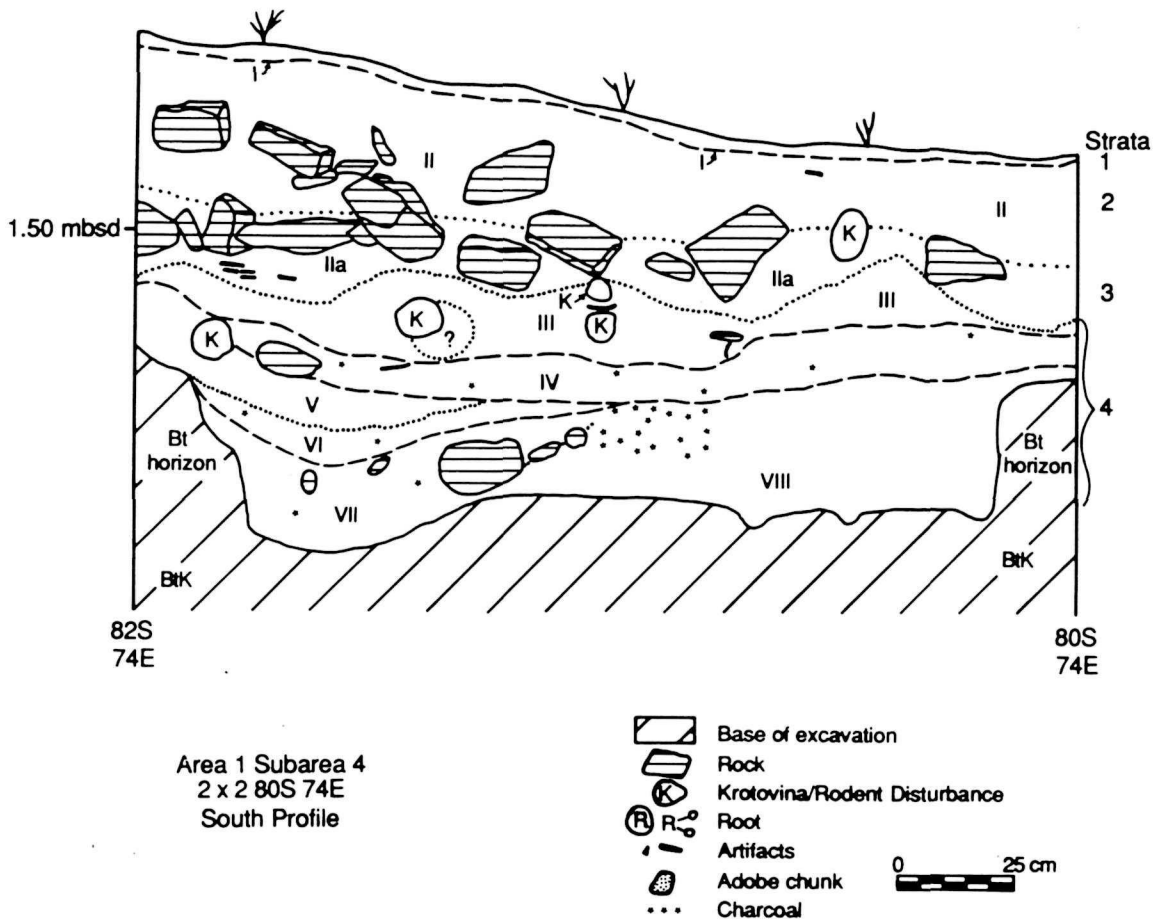


Fig. 3.3. South profile of 2 x 2 m unit 80S 74E.

topography and absence of an easily identifiable prehistoric surface outside the roomblock. In future geoarchaeological studies, samples of different kinds of adobe will be compared to B-horizon samples to ascertain whether adobe is significantly different from the B-horizon.

This excavated pit or trench was subsequently filled with refuse (Layers IV-VII, Strata 4 and 5, in Fig. 3.3). Stratum 4 contained a high frequency of small cobbles that may have been used to fill the basin and level the ground surface after excavation. Some indication of the time of infilling of the basin can be derived from the single tree-ring (DD) date obtained from this unit of 1189vv (Table 3.1), the other sample collected did not produce a date. Although an unknown number of rings were missing from this sample, the date might be considered a sign of early infilling of the basin, especially when compared with other dates obtained from Area 1 that cluster in the 1270s. The resolution of the occurrence seriations is not fine enough to accurately date the lower deposits (especially given the temporal range assigned to Santa Fe B/w, AD 1175-1400 [McKenna and Miles 1989]). There is little difference between the upper and lower strata in the percentage of the traditionally defined black-on-white wares (Table 3.2). This lack of regular stratigraphic change in the ceramic types may indicate that infilling took place fairly quickly (as opposed to over a number of years).

Based on the size and shape of the deposits, the eastern part of the basin excavated into the B-horizon (Fig. 3.3, Layers VI and VII) may be associated with adobe manufacture. One other site in the monument (LA 60550) has features interpreted as adobe puddling features (Kohler 1989d:47), or basins for mixing clayey sediment

Table 3.1. Tree-ring Samples from 2 x 2 m unit 80S 74E .

DD#	Provenience	Date	Species
25	Stratum 4 level 2	1189vv	*Pseudotsuga menziesii*
34	Stratum 4 level 3		*Pinus ponderosa*

Note: vv indicates that the outermost ring is absent and an unknown number of outer rings are missing.

Table 3.2. Traditional Black-on-white Pottery Types in the Ceramic Assemblages of the Upper and Lower Strata of 2 x 2 m unit 80S 74E.

Stratum	% Kwahe'e B/w	% Santa Fe B/w	% Wiyo B/w
1	0.0	8.2	0.0
2	0.0	5.5	0.7
3	0.1	7.2	0.4
4	0.1	7.7	0.5

and water to produce adobe or plaster. If the clay/water solution were left undisturbed for a period of time, the larger particles would settle to the bottom of the basin and thereby result in a mixture with a higher percentage of clay.

The wall fall of Stratum 3 (Layer IIa) may effectively separate an upper post-abandonment deposit from a lower midden deposit. The upper deposits are relatively homogeneous with no sedimentary structure and may be the result of accumulation due to slope wash or colluvial processes. Alternatively, the material below the wall fall (Layers V-VII) is heterogeneous and appears to represent individual depositional events within a larger midden deposit. Unfortunately, no tree-ring dates were obtained from the upper strata; they are, however, not significantly different from the lower strata, at least in terms of selected black-on-white pottery types that are often used as chronological indicators.

2 x 2 m unit 70S 82E

This 2 x 2 is one of two outlying units that may intersect the roomblock. It lies on the steep (approximately 17°) northern slope of the Area 1 roomblock mound. Examination of wall alignments visible at the surface provides limited evidence that this unit may cut across the NW corner, or the northern exterior wall of the roomblock. Numerous masonry boulders were encountered at the surface and throughout the deposits. The strata were difficult to delineate during excavation because of the near vertical orientation of some of this masonry and the similarity of the matrix in different deposits.

Two episodes of wall fall were visible in the profile of the south wall (Layers II and IV, Fig. 3.4) although it is more visible in the east and west walls of the 2 x 2. Stratum 2 constitutes the upper wall fall, cobbles and boulders in a consolidated gravelly silty matrix. These rocks were concentrated at the periphery of the unit. The third and fourth strata represent the lower wall fall; both strata are composed of boulders carved from the Bandelier Tuff and have a lower frequency of small rounded cobbles than the upper wall fall. Stratum 5 is concentrated in the southern (upslope) portion of the unit. It is distinguished from the other strata, although it includes masonry boulders, because of the hard consistence of the fine sediments in the matrix. The masonry rocks in this stratum are distinctly aligned and indicate that the wall (that includes the rocks of Strata 3 and 4) fell toward the NE.

Strata 6 and 7 underlie the episodes of wall fall. Stratum 6 is a loose highly disturbed sediment with a slightly higher density of artifacts (4.4/10 l) than overlying strata (e.g. Stratum 5, 2.6/10 l). Stratum 7 is a consolidated sediment with a concentration of adobe in the center of the unit adjacent to the southern wall of the 2 x 2 (artifact density = 4.7/10 l).

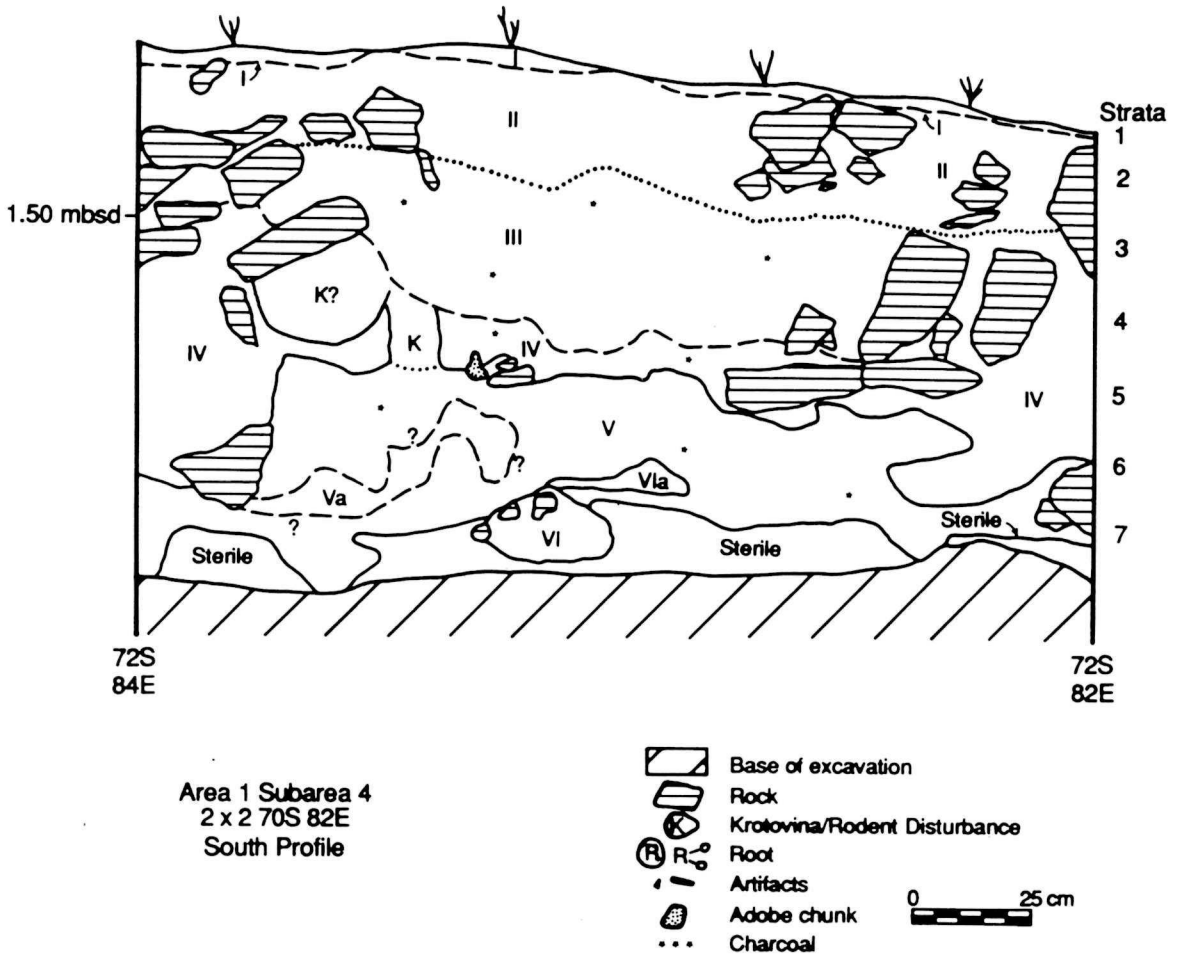


Fig. 3.4. South profile of 2 x 2 m unit 70S 82E.

Interpretations

The sediment in Strata 6 and 7 appear to represent material deposited during the occupation of the pueblo. The concentration of adobe in Stratum 7 (Fig. 3.4, Layer VI) may be associated with an adobe manufacture pit (Layer VIa could be the back dirt from excavation of the pit). Stratum 6 is probably refuse that was disturbed by rodents during occupation of the pueblo. The depth below the surface is greater than that at which modern rodents currently operate, and the wall fall deposits provide a further barrier to modern rodent activity. The aligned rocks noted in Stratum 5 may represent the base of the wall, thus only approximately 75% of the unit could be considered to be "outside" the roomblock. Strata 4 and 5 are probably part of the same episode of wall fall wherein Stratum 4 represents the upper part of the wall and Stratum 5 the lower. The rocks at the base of a fallen wall are expected to be nearly aligned whereas the rocks from the upper part of the wall would not. The upper portion of the wall would have travelled farther from its original position, come to rest further downslope at a higher gradient, and thus, would be more disordered than the base of a fallen wall. If the wall contained a door or window it would account for the concentration of masonry around the periphery of the unit in Stratum 2 (and correlated with Layer III, devoid of tuff boulders, Fig 3.4).

2 x 2 m unit 102S 86E

This is the second of the two outlying units that may intersect the roomblock. It lies on the southern slope of the roomblock mound. The

northern limit of the unit either intersects a possible wall, or it lies 3 m south of the southern wall of the roomblock, although this wall is not clearly defined at the surface (see Fig. 1.1). Disintegration of the pueblo walls has resulted in a modern ground surface that slopes approximately 11° toward the southwest. A number of masonry boulders were removed from the surface and the first stratum, but the majority exposed during excavation of Stratum 1 were left to be removed with Stratum 2. The first stratum has an unconsolidated silty matrix. Stratum 2 consists of very compact fine sediment, cobbles and an alignment of larger masonry boulders. Excavation exposed an essentially intact fallen wall. The amount of fine sediment decreased dramatically with the exposure of the masonry because the only sediment that could be excavated was the mortar between the rocks. The high artifact density in Stratum 2 (34.1/10 l) can be attributed to the use of ceramic sherds as chinking between the masonry, and the small volume of sediment.

The subsequent stratum (Stratum 3) was intermediate between the upper wall fall and a lower one. Stratum 3 was distinguished from overlying deposits because it is lighter in color (10YR 6/4 relative to Stratum 2, 10YR 5/4) and has a loose consistence. The sediment of Stratum 3 is silty with tuff cobbles and pebbles and charcoal fragments and a decreased artifact density (19.7/10 l). Stratum 3 was difficult to differentiate from the underlying stratum. Stratum 4 is an earlier wall fall concentrated in the northern two-thirds of the unit; only the upper wall fall is visible in the southern profile. Localized concentrations of the sediment were described by the excavators as "ashy," some of which also occurred at the base of Stratum 3. The ashy sediment is probably powdered or crushed tuff, a product of the impact of the wall fall; the tuff cobbles and boulders of which the pueblo was constructed, break and shatter very easily. The lower portions of this stratum contain randomly oriented chunks of adobe, blackened on one side. Stratum 4 has a much lower density of artifacts than the adjacent strata and may indicate a different construction strategy for this wall relative to the wall represented by Stratum 2.

The deposits become much more complex below the lower wall fall. Stratum 5 is a light-colored orange/brown (7.5YR 4/6) sediment that consists of chunks of consolidated gravelly, clayey silt, or adobe. The chunks are blackened or sooted on one side and are most likely wall or ceiling plaster associated with the overlying masonry wall fall. The adobe chunks are greater than 3 cm thick, and in the northern half of the unit they lie directly on the surface of Stratum 6. The lower boundary of Stratum 5 is very diffuse in the southern half of the 2 x 2 where Stratum 6 does not occur. The base of Stratum 5 lies at a lower slope, just over 3°, than the deposits at the modern ground surface.

Stratum 6 is composed of three proposed surfaces. The first of these surfaces corresponds to Layer VI in Fig. 3.5. This upper surface is light brown (7.5YR 6/4), hard and smooth, and may have been the result of plastering or use compaction. The sediment has a high clay content and shatters into 2-3 mm particles with pressure. No artifacts were recovered from this surface. Two other possible surfaces (Layers VII and VIII, Fig. 3.5) lay beneath Surface 1. They are poorly preserved and more limited in extent than Surface 1.

The southern half of the unit, at an equal depth to the surfaces in Stratum 6, was covered with a loose conglomeration of adobe chunks, silt, pebbles and an occasional tuff cobble (Stratum 7). This deposit was highly disturbed by rodents; it contained many burrows and had an artifact density of 16.8/10 l. Stratum 8 lay beneath both Stratum 6 and part of Stratum 7, and was concentrated in the northern and western part of the unit. The Stratum 8 sediment was consolidated, with a fairly high density of charcoal fragments, an increased number of pebbles with depth, and a relatively high artifact density (22.6/10 l). This stratum was superimposed on a culturally sterile deposit of well-sorted silt, probably of eolian origin, which in turn lay over the lapilli deposit discussed above. None of the tree-ring samples collected from this unit produced a date (Table 3.3).

Interpretations

The Stratum 8 materials may represent the accumulation of cultural material associated with an activity area, or a refuse deposit that has been compacted by trampling. The superimposition of the three levels in Stratum 6 and the finer texture of the upper level, may indicate that Surface 1 was plastered rather than use-compacted because

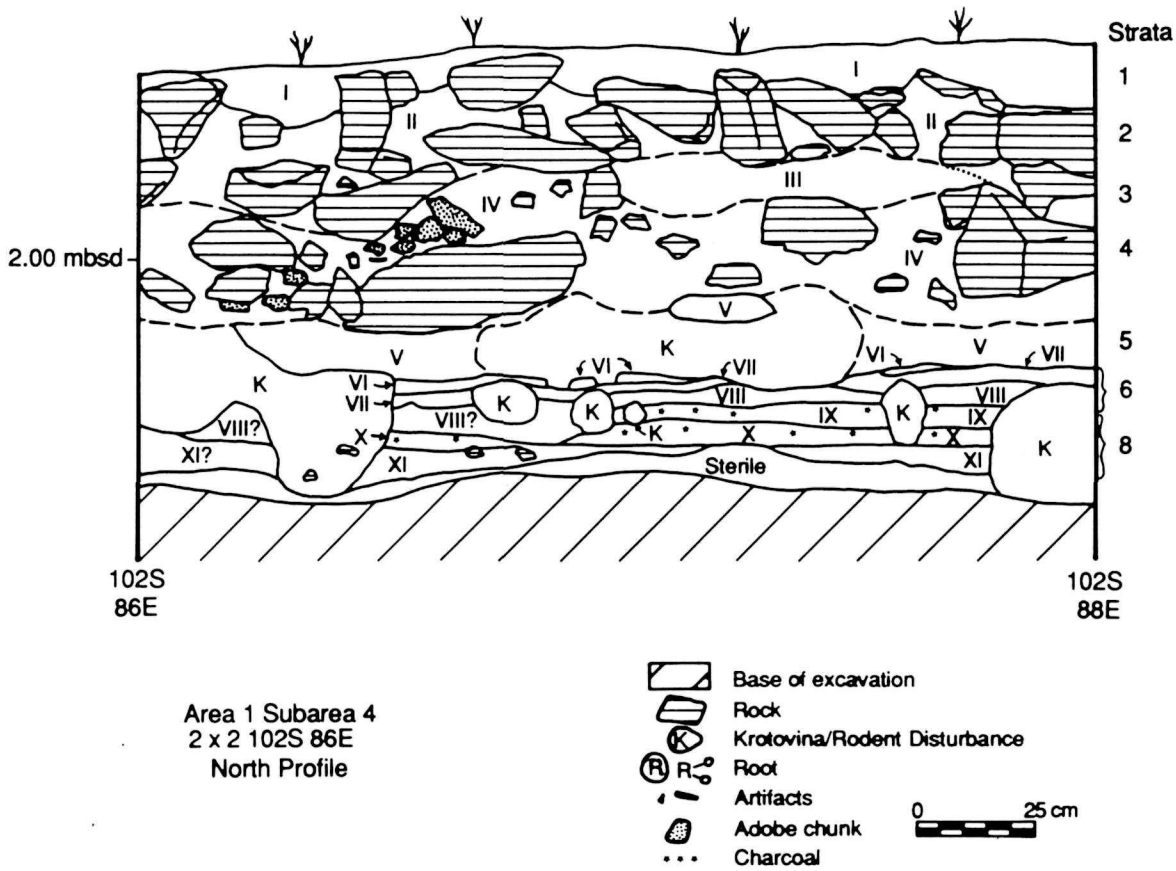


Fig. 3.5. North profile of 2 x 2 102S 86E.

sediment with a high concentration of clay does not occur naturally near the site. Alternatively, the fine sediment of Surface 1 could be the result of adobe from the exterior wall translocated by rainwater and subsequently consolidated. The relatively high density of ceramics in the upper level of Stratum 6 (13.6/10 l) may provide further support for a use-compacted (activity?) surface, although it should be pointed out that this density is lower than that of other strata in this unit.

Could the three surfaces indicate that this unit intercepted a room rather than an exterior use-area? Perhaps, but there are no surface or subsurface indications of the presence of walls east, west or south of the 2 x 2, nor were any artifacts in place on Surface 1. The poor preservation of the three divisions of Stratum 6 provides some evidence of weathering, although this may simply be a result of its position relative to the disintegrating structure. Expansion of this excavation would be required to unequivocally determine whether the surfaces were part of a room floor, part of the area abutting the roomblock (and possibly covered by a ramada), or simply an area that received heavy traffic (e.g. an area outside an entrance).

Table 3.3. Tree-ring Samples from 2 x 2 102S 86E.

DD#	Provenience	Date	Species
13	Stratum 6 level 1		*Pinus ponderosa*
14	Stratum 6 level 1		*P. ponderosa*
14a	Stratum 8 level 1		*P. ponderosa*

Stratum 5 is associated with roof fall or wall fall. The adobe is thicker than that usually found on the walls and is heavily blackened on one side. The blackening, shape, and orientation (blackened side down on Surface 1) of the adobe chunks in Stratum 5 are suggestive of roof fall rather than adobe or mortar from a wall fall episode. Alternatively, the random occurrence and orientation of adobe fragments in the lower level of Stratum 4, as well as the tuff cobbles, denotes wall fall. The consistence and composition (particularly the high artifact density) of Stratum 3 may signify that refuse was deposited in this area during the disintegration of this section of the roomblock. Addition of material to Stratum 3 ceased when the Stratum 2 wall fell. As previously noted, the wall fell virtually intact, which indicates a rapid depositional event. Whether a gravitational threshold was suddenly reached during the natural decomposition of the wall, or whether it fell with the help of people (while salvaging roof beams, for example) remains unknown.

Summary Observations: Subarea 4

Given the character of the deposits in the far southern units as compared to the 2 x 2s to the west and east of the roomblock, the prehistoric inhabitants did not deposit their refuse in the "traditional" locations. Midden deposits are concentrated to the west and east of the Area 1 roomblock, rather than to the east and south. The character of the two midden areas is very different and may reflect different depositional processes or functional variability, even though the density of artifacts is extremely high in both locales. The westernmost 2 x 2 (80S 74E) provided by far the greatest variety of materials (and at slightly higher artifact densities), from large quantities of ceramics, lithics, and charcoal, to figurine fragments, turquoise, muscovite (mica) fragments, and bone tools. The easternmost 2 x 2 (94S 112E) produced primarily lithic debitage and sherds, although one small ceramic figurine and a number of lithic tools were also recovered. Furthermore, there is relatively little sedimentary structure in 2 x 2 94S 112E, whereas 2 x 2 80S 74E contains many distinct depositional units.

If the source of the sediments for local manufacture of plaster or mortar was the Bt and Btk horizon as suggested above, a number of testable implications arise. Extant information on the character of the pre-occupation surface of the mesa, although limited, suggests that some of the B-horizon has been removed through cultural processes. Sedimentary analyses are currently underway in which the similarities and differences between the various kinds of adobe found on the site (e.g. roof, wall, and floor plaster and mortar) and non-cultural sediments are being examined. Additional paleotopographic and sedimentological analyses are necessary to address questions of site formation.

SUBAREA 1 (ROOMBLOCK)

The roomblock sampling stratum was difficult to delineate accurately given the disintegration of the pueblo walls; as noted previously, two of the outlying units may intersect the roomblock. The two rooms selected, however, are well within this sampling strata. Room 1 was originally chosen in 1988 from the set of rooms identifiable by surface alignments of masonry boulders. The roomblock sampling strategy was changed in the 1989 season. The second of the rooms, Room 10, was chosen by randomly selecting a point on the grid in the roomblock sampling stratum; its walls were then exposed. This change in selection criteria ensures that the sample of rooms is not biased toward rooms with the most visible and best preserved walls. In general, excavation in the Area 1 roomblock received a somewhat lower priority than completion of the probabilistic sample in the outlying and courtyard subareas.

Room 1

Room 1 is situated at the southern end of the western section of the roomblock. This western side of the roomblock is somewhat higher in elevation than the other three segments. The room measures 3.85 m N-S and 3.80-4.30 m E-W. Along its southeastern edge the wall expands to the east. Excavation of Room 1 began during the 1988 season (Kohler 1989c:29-30). The northern wall was not securely delineated in that season, but excavation proceeded in what was estimated to be the southern half of the room. Excavation of Room 1 was not completed in 1988 due to time and personnel constraints.

The 1989 work in Room 1 began with the removal of last season's backfill, and delineation

and mapping of the exterior walls to determine whether the 1988 work had proceeded in the south half of the room. A plan map of the walls was constructed and a column of sediment samples was collected from the profile. As in 1988, the northern wall was not discernable at the surface. Two trenches were excavated parallel to the west (50 cm E-W x 53 cm N-S) and east walls (1 m E-W x 75 cm N-S). The excavators stopped when they came to cobbles and boulders that appeared to have plaster adhering to them. The 1988 excavations were determined to have taken place in the approximate southern 3/4 of the room. The entire room was then excavated to the level of the 1988 excavations, approximately 80 cm below the modern surface. The room was subsequently divided into eastern and western halves, and the crew proceeded to excavate only the western half of the room in order to leave a profile.

The first stratum excavated in 1989, Stratum 3, was a mixture of last year's backfill, wall fall (as evidenced by masonry boulders), roof fall (as suggested by large chunks of adobe, some with beam impressions), and fragments of wood the size of latillas or tertiary beams. All of this wood was uncharred and very fragile, thus some of the tree-ring samples were in fragments. One of these samples yielded a date of 1267vv (DD #72, Table 3.4). The 1988 sampling of the overlying Stratum 2 yielded several similar fragments; of these, three pieces of Douglas fir were assigned dates of 1268vv, 1275vv, and 1275vv. The subsequent stratum, 4, was generally devoid of masonry and included adobe chunks that were burned or blackened on one side. The matrix became less consolidated with depth in the first level of this stratum. A number of fragments of non-flaked lithic, or ground stone, were recovered from Stratum 4. Burned adobe (hearth coping?) associated with some ash and other pieces of adobe, heavily blackened on one side, may be fragments of what is locally referred to as "blood floor" or "blood plaster" (cf. Hawley 1943; Bandelier 1916). The unit experienced flooding due to heavy rains that made delineation of stratigraphic breaks and identification of materials difficult. Level 2 of Stratum 4 was not completed during the 1989 field season; excavation will be completed in this room in 1990. Excavation did not proceed far enough to allow re-evaluation of the fill sequence interpretations in the 1988 report (Kohler 1989c).

The 1989 excavations did reveal that the western wall of Room 1 was apparently remodelled; the coursing of the westernmost masonry of the north and south walls does not match that of the rest of the wall. This suggests that the western segment of the north and south walls, and possibly the west wall, had a separate construction sequence from the other walls. The room appears to have been expanded approximately 50 cm to the west, either by the removal of the interior coursing of a double wall, or the addition of a new exterior wall. The eastern wall of Room 1 also shows evidence of double wall construction (Kohler 1989c:29). These double walls may be the result of joining the western section of the roomblock with the southern after their initial, and originally separate, construction.

Room 10

Room 10 is located in the western portion of the northern section of the Area 1 roomblock (see Fig. 1.1). All four walls were easily identified with minor surface investigation. Wall alignments at the surface indicate that this room is an interior room (adjacent to the courtyard), with one room to the north. Although the long axis of the room

Table 3.4. Tree-ring Samples from Room 1.

DD#	Provenience	Date	Species
70	Stratum 3 level 1		*Pseudotsuga menziesii*
72	Stratum 3 level 2	1267vv	*P. menziesii*
73	Stratum 3 level 2		*Pinus ponderosa*
74	Stratum 3 level 2		*P. menziesii*
91	Stratum 4 level 2		*P. menziesii*
92	Stratum 4 level 2		*P. menziesii*
93	Stratum 4 level 2		*P. menziesii*

Note: vv indicates that the outermost ring is absent and an unknown number of outer rings are missing.

is oriented WNW-ESE the room walls will be referred to according to their primary position, north, south, east or west. The elevation of the modern ground surface in this section is suggestive of a single story.

The eastern half of Room 10 was excavated stratigraphically. Stratum 1 was predominantly fine sediment with no evidence of wall masonry. The deposit contained a large quantity of ground stone which could have been associated with a roof activity area prior to the collapse of the room or a reoccupation of the site. Due to the high density of tuff cobbles and boulders, Stratum 2 was classified as wall fall. The density and size of tuff rocks increases with depth. Examination of the north/south profile of Room 1 (Fig. 3.6) reveals that Stratum 2 is probably a combination of two episodes of wall fall (correlated with Layers II and IV in the profile). These episodes are separated by an interval of deposition (represented by Layer III). The profile layers were delineated primarily on the occurrence and orientation of masonry boulders rather than marked differences in the fine matrix of the deposits. The subtle difference in the fine fractions of the two episodes of wall fall helps to explain why the depositional layers were not distinguished in plan during excavation.

Stratum 3 (Layers V and VI in the profile) was distinguished from the overlying strata by a decrease in the number of tuff boulders and an increased frequency of large pieces of adobe. The chunks of adobe encountered in this stratum were assuredly from the ceiling or high on a wall because they are blackened and smooth on one side. The adobe is not burned as would be expected if it were associated with a hearth, nor was any other evidence of a hearth recovered from this unit. Three tree-ring samples of both charred and uncharred wood were collected from Stratum 3. The high frequency of adobe, and these samples, suggest roof rather than wall fall. The samples (DD#s 71, 75, and 76, Table 3.5), however, were too isolated and fragmentary to provide any information about roof construction, and none of the samples was assigned a date. Layer V in the

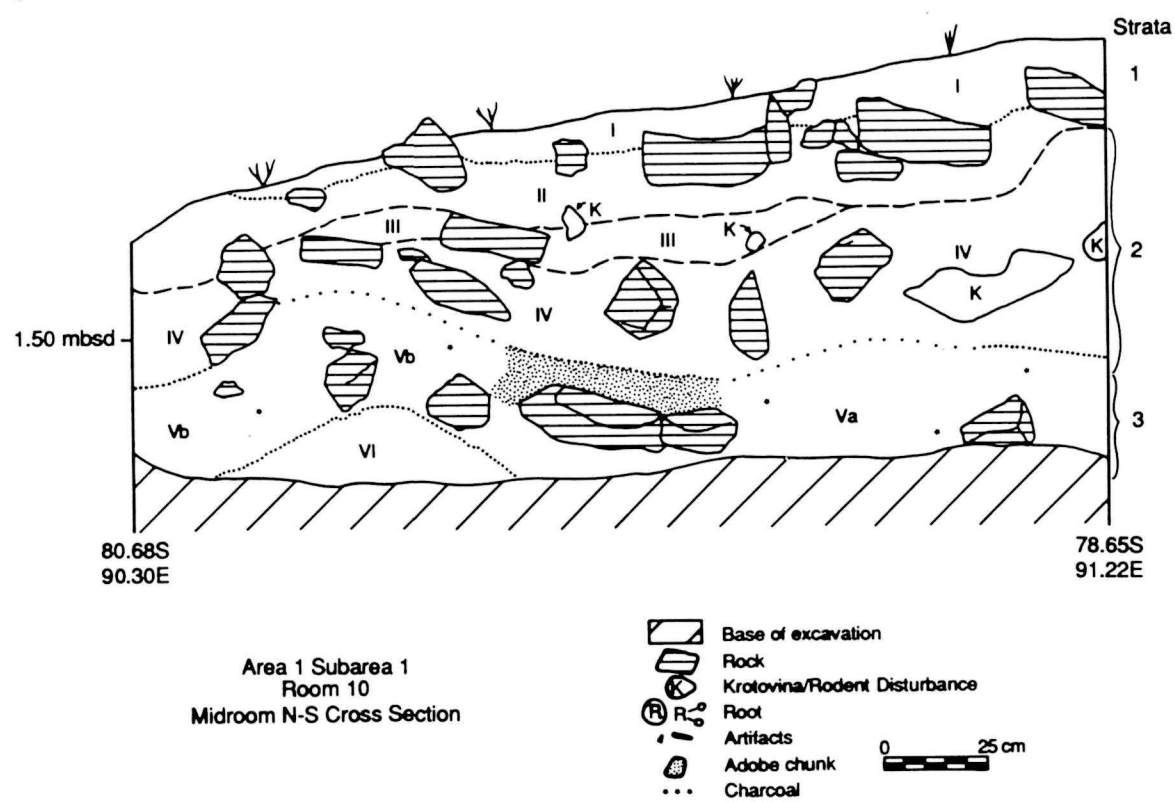


Fig. 3.6. Midroom N-S profile, Room 10.

profile is probably another episode of wall fall that overlies roof materials. A suspected surface was exposed near the southern wall in the SE quadrant of the room at 50 cm below the modern ground surface.

The entire room was excavated to a similar level and divided into quadrants before attempting to expose the entire surface. One of the tree-ring samples recovered from the excavation of the western half of Room 10 (DD #83) was dated to 1272vv (Table 3.5); three other tree-ring samples (#84-85 and 90) did not provide dates. Although this half of the room was not excavated stratigraphically, the provenience of the sample shows that it was located well within the wall fall stratum; we are, however, unable to assign it to a particular episode of wall fall within Stratum 2.

Surface 1 was exposed throughout the room, but was more difficult to identify in the SW and SE quadrants. The floor was highly disturbed in the SW quadrant and showed evidence of rodent disturbance, as well as damage due to wall or roof fall, in its southern half. In the SE quadrant the surface was difficult to follow because it was the area where the crew entered the unit and also the part of the room most heavily impacted by the storms that marked the last two weeks of the field season. A thin film of clayey sediment over the floor plaster suggests that the surface may have been covered by a slip or "wash." The SW and SE quadrants revealed that the floor had been remodeled at least once. Time limitations did not permit additional excavations below Surface 1; any cultural deposits beneath this surface will be investigated during the 1990 field season.

The artifactual assemblage lying directly on the floor was very diverse; it includes sherds, one of which was edge ground, flaked and non-flaked lithics (Fig. 3.7; Table 3.6). The floor also contained a slab of welded tuff (PL [point-located artifact] 20) embedded in an earlier (unnumbered) surface; the slab was partially covered by the upper floor surface.

Features

Two corner features were recorded in Room 10. Small niches were located in both the NW and NE corners at floor level (Fig. 3.8). No artifacts were recovered from the niches. Although similar in appearance and locale, the two features were constructed differently. The feature in the NW corner is a circular, concave area, 8 cm in diameter, made of plaster or adobe; it is situated at the juncture of the walls and floor. The plaster is 1-2 cm thick and appears to be the same as that on the adjacent walls and is blackened in some areas. The other feature is a 10 x 12 cm circular hole carved into a piece of tuff masonry in the north wall. The hole was lined with plaster (0.5-1 cm thick) and located within 2 cm of the wall and floor juncture. Both niches are 10 cm in depth. The original function of these features is unknown.

The north wall of Room 10 also contained a narrow doorway that had been sealed with masonry sometime during the use of the room. The doorway was located near the center of the north wall and measured 80 by 36 cm. The tuff door sill showed evidence of use-wear.

Architecture

Field descriptions of the architecture of this room were compiled by Ingrid Carlson. The exterior dimensions of the room are 4.35 m E-W and 2.8 m N-S (Fig. 3.7). The east and west walls abut the north wall, which appears to have been constructed first. Construction of the west wall followed, and it is abutted by the south wall.

Table 3.5. Tree-ring Samples from Room 10.

DD#	Provenience	Date	Species
71	Stratum 3 level 2		*Pinus ponderosa*
75	Stratum 3 level 3		*P. ponderosa*
76	Stratum 3 level 3		*P. ponderosa*
83	West 1/2	1272vv	*P. ponderosa*
90	West 1/2		*Pseudotsuga menziesii*

Note: vv indicates that the outermost ring is absent and an unknown number of outer rings are missing.

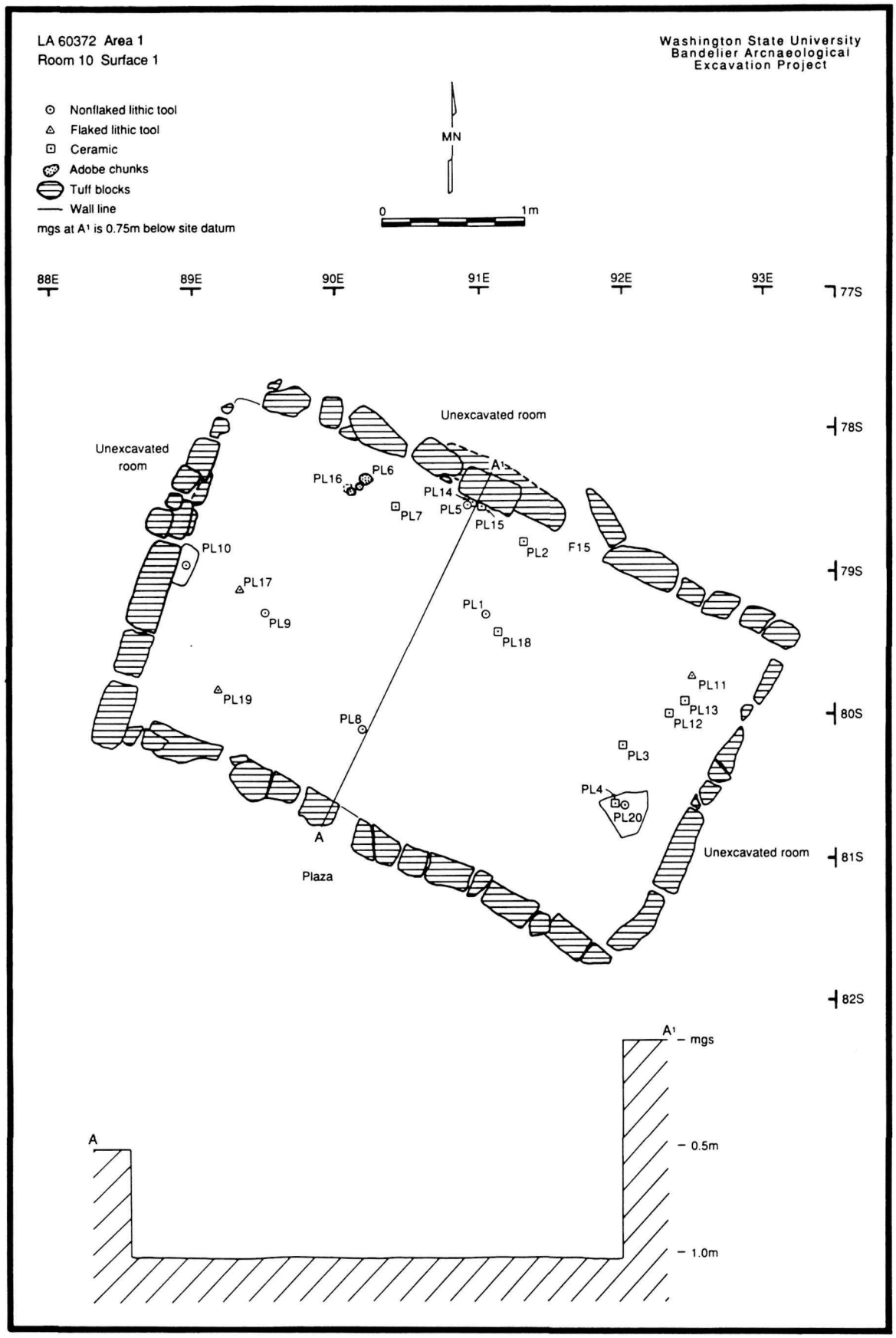


Fig. 3.7. Room 10 Surface 1, showing location of point-located (PL) artifacts.

Table 3.6. Floor Assemblage from Room 10, Surface 1.

PL #	Quadrant	Description
1	NE	Groundstone too fragmentary to classify, andesite, polish on one margin
2	NE	Santa Fe B/w sherd, edge ground
3	NE	Smeared-indented corrugated sherd
4	SE	Smeared-indented corrugated sherd
5	NW	Minimally altered item (possible hammerstone?), unid. material, probably non-local
6	NW	Adobe chunk cluster
7	NW	Santa Fe B/w bowl sherd
8	SW	Mano, two-handed, vesicular basalt, small red stain on one surface
9	SW	Rounded pebble, unused core, basalt/andesite
10	SW	Slab, andesite, leaning against west wall
11	NE	Flat stone w/ flakes removed, one-handed mano, hematite stain on one surface, quartzite
12	NE	Santa Fe B/w sherd
13	NE	Smeared-indented corrugated sherd
14	NW	Corrugated sherd
15	NW	Smeared-indented corrugated sherd
16	NW	Santa Fe B/w sherd, beneath adobe chunks (PL #6)
17	SW	Hammerstone, polish and smoothing on one surface, quartzite
18	NE	Smeared-indented corrugated sherd, embedded in Surface 1
19	SW	Broken biface, snap fracture, possible used end, basalt/andesite
20	SE	Slab, andesite, embedded in unnumbered surface below Surface 1–not collected in 1989

The joining of the west and north walls is incomplete, thus the west wall is classified as a "floating" wall. A 4-7 cm space between the two was filled with unconsolidated sediment. The construction sequence of the remaining walls is unknown because the SE corner is bonded. The abutment of the eastern wall with the north was complete; the NE corner was sealed with chinking stones and adobe. The NE corner of the room showed that the northern wall had been plastered prior to the construction of the east wall.

All of the walls were constructed in the same style. The horizontal joints between the courses were continuous across the wall and filled with mortar and tuff chinking. The vertical spaces between blocks in the same course were discontinuous between courses and did not contain mortar or chinking. The tuff blocks were of uniform shape, although the average size varied from wall to wall (Table 3.7). The modern ground surface prior to excavation had a slope of nearly 9° from the north wall to the south wall, reflecting differential preservation of the interior (north) and exterior (south) walls. This preservation is also recorded in the variation in height and the number of courses remaining in the walls.

The plaster remaining on the walls varied from wall to wall and may reflect the timing of the construction. The central section of the west wall, near the floor, was covered with a thick plaster

Table 3.7. Room 10 Masonry Statistics.

Wall	Height above Surface 1 (cm)	# Courses	Average dimensions (cm) Masonry boulders	chinking materials
North	100-118	7-8	62.1 x 11.1	7.9 x 3.8
South	41-92	4-6	52.5 x 12.3	6.2 x 4.1
West	104-122	7-9	57.8 x 9.6	9.4 x 3.6
East	59-84	unknown	39.5 x 8.4	9.0 x 4.2

textured with finger and hand prints. The plaster on the remainder of the west wall and the other walls was smooth. The plaster of the north wall was blackened in two areas (the center, and west of the sealed doorway). The north wall was also distinctive because it contained masonry blocks that had been incised (Fig. 3.8). The function of these incisions is unknown, but they may be the product of using the tuff as sharpening or abrading stones for bone or other tools.

Interpretations

The sealing of the doorway that originally connected this room with the room to the north, and the blackened plaster (on the north wall and in the roof fall deposits) in the absence of any hearth or fire-pit in Surface 1, suggests that the room function may have changed through time. The surface or surfaces below Surface 1 may contain evidence of more traditional "front room" habitation (e.g. a hearth). Such evidence would indicate that the room was remodeled, the timing of which may have coincided with the sealing of the door to prevent direct access to or from the room to the north. Alternatively, the blackened plaster may simply be the result of smoke drifting from a neighboring room. The adobe studies noted above and geoarchaeological analyses of the different strata will provide information on depositional sequences both during and following occupation of Area 1 and may thereby furnish additional information on room function.

The room was subsequently filled with wall and roof fall deposits. The cross-sectional profile of the room fill reveals at least two, possibly three, episodes of wall fall (Layers II, IV and V, Fig. 3.6). The large quantity of ground stone in Stratum 1 may be indicative of roof activity or reoccupation of the site. There is no evidence to suggest that Stratum 1 or the underlying stratum is roof fall, however, weathering processes may have obscured the depositional evidence. Ceramics dated to the Classic Period on other parts of Area 1 (see Chapter 5, this volume) and a single glazeware sherd in Stratum 1 provide additional support for the suggestion of reoccupation.

SUBAREA 2 (COURTYARD)

The courtyard or plaza subarea is the part of the site enclosed by the Area 1 roomblock that also contains the proposed kiva (Subarea 3). A

Fig. 3.8. North wall of Room 10. Note corner niches at floor level. The narrow doorway just to the right (east) of the center of the wall has not yet been excavated. Two deep incisions can be seen about half a meter to the right of the doorway; several more cannot be discerned in this photo (15/10).

single unit was excavated in the courtyard in 1988 but culturally sterile sediments were encountered only in a small exploratory test at the center of the unit. Two additional units were randomly selected for excavation during the 1989 season.

2 x 2 m unit 84S 96E

This square is located directly north of the courtyard unit excavated in 1988. The relationship of this 2 x 2 to the roomblock is not readily evident from the surface and its proximity to the walls remained unclear after excavation. There was a high density of artifacts on the surface and in the first excavated stratum (17.3/10 1). Stratum 1 was an unconsolidated silty sediment. Stratum 2 was composed of similar sediment although it had a firmer consistence. A rock alignment in Stratum 2 was initially interpreted as a wall of the roomblock because the proximity of the 2 x 2 to the roomblock walls was uncertain. It was excavated as such, but the rocks were eventually determined to be associated with an episode of wall fall (Fig. 3.9, Layer IIa), rather than an upright wall.

The wall fall strata was associated with a broken ceramic vessel (Feature 3), exposed in Stratum 2 level 4. The vessel was a smeared corrugated jar. The base of the jar was intact, although cracked, and contained a mixture of sediment and sherds from the shoulder and neck of the vessel. The jar may have been broken post-

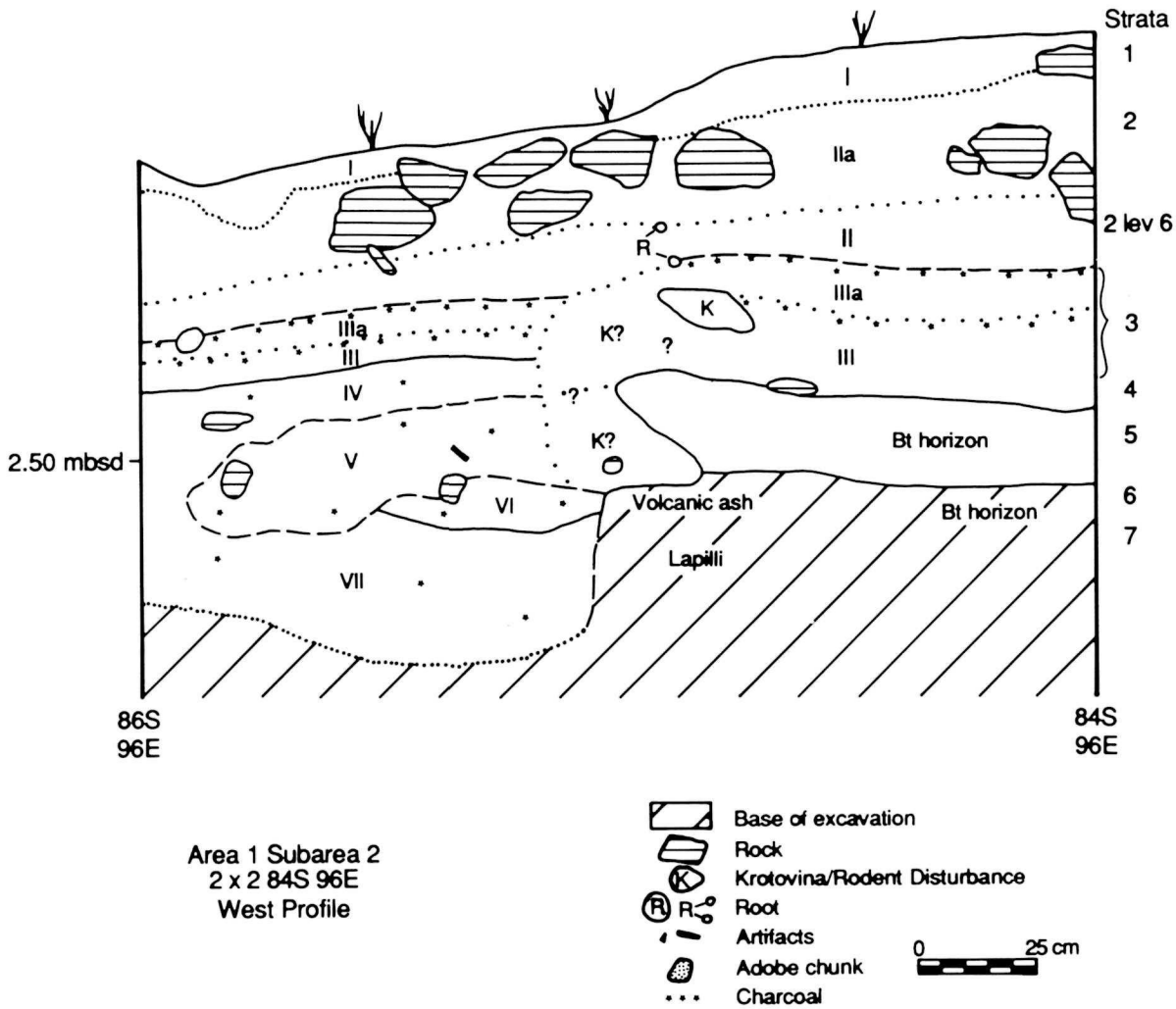


Fig. 3.9. West profile of 2 x 2 m unit 84S 96E.

depositionally by the impact of the wall fall. Although the sediment in Stratum 2 had a constant, slightly hard consistence, there were variable amounts of charcoal (charcoal density was higher in Stratum 2 Level 5 than in the other levels), and artifact density appeared to increase with depth (from 13.7/10 l in the upper levels to 17.2/10 l in the lower levels of Stratum 2). Stratum 3 had a loose consistence, a much higher artifact density (27.6/10 l), and an increased charcoal content. Alternatively, the sediment in Stratum 4 had a firmer consistence, finer texture and lower artifact density (14.8/10 l) relative to overlying strata. The deposits of Stratum 5 are very similar to those of Stratum 3 (unconsolidated with a high charcoal content) and may indicate a similar depositional history, although the artifact density is much lower in Stratum 5 (10.5/10 l).

Stratum 6 was composed of randomly oriented chunks of adobe and some unconsolidated gravel. Many of the pieces of adobe had beam impressions and/or blackening on one side. Although the primary constituent of the deposit appeared to be adobe, the artifact density was relatively high (12.3/10 l). This deposit was limited in extent; culturally sterile sediment (B-horizon) was exposed in the NW and SW corners at the base of this stratum. Stratum 7 had a high percentage of tuff gravel and was initially interpreted as sterile sediment; volumetric information for the sediment from Levels 1 and 2 was inadvertently not recorded. Sterile sediment was exposed in much of the unit at the base of Level 2, however, the surface of the underlying deposit was topographically very irregular and cultural material continued to be recovered, primarily from the SE corner of the unit. The deposit did contain a small proportion of lithics (22), a large number of ceramics (339), and some charcoal flecks and fragments. Although calculations cannot be carried out for the entire deposit, artifact density in Stratum 7 Level 3 was ≈8.0/10 l.

Interpretations

The irregularity of the pre-occupational surface may be, as noted above for other areas of the site, the result of mining of the B-horizon for fine-grained sediments to be used in adobe manufacture. Stratum 7 is most plausibly interpreted as fill used to level the irregular surface of the courtyard. The low artifact density of the lower level of this stratum may reflect a mixture of refuse and non-cultural sediments. Stratum 6 may also have been placed in the courtyard for similar purposes. Such an interpretation is problematic, however, given that the primary constituents of this deposit are chunks of adobe, apparently from a roof. The timing of these depositional events is unknown because none of the dendrochronological samples obtained from this unit were datable (Table 3.8) and ceramic seriations do not provide data at a fine enough resolution to date the events. The ceramic assemblage of Stratum 6 is not significantly different than that of Stratum 7; both contain large percentages of smeared-indented corrugated ware and Santa Fe B/w, as well as small numbers of corrugated, Wiyo B/w, and St. John's Polychrome.

The physical characteristics of the deposits, their structure, composition, and shape (Fig. 3.9, Layers V-VII), suggest that the material in the lower strata of 84S 96E can be classified as refuse in a primary context. The Bt horizon (adjacent to Layer V) may have been excavated from the area to the south and redeposited in its present context. The depositional conditions of Strata 3 and 5 were probably similar with minor fluctuations or differences in their depositional histories (e.g. source, agent of deposition). Stratum 4 appears to be an interruption of the depositional conditions producing Strata 3 and 5, and may represent "adobe melt;" however, clear identification of any such deposit must be postponed until sedimentary analyses are complete. Portions of the material in

Table 3.8. Tree-ring Samples from 2 x 2 m unit 84S 96E.

DD#	Provenience	Date	Species
27	Stratum 2 level 5		*Pinus edulis*
41	Stratum 3 level 2		*Pseudotsuga menziesii*
49	Stratum 3 level 3		*Pinus ponderosa*
78	Stratum 7 level 2		*P. ponderosa*
82	Stratum 7 level 3		*P. ponderosa*

Stratum 3 (Layer III) may have been slightly use-compacted following deposition. This interpretation is based on examination of the profiles and variations in consistence noted during excavation. Stratum 2 has been classified as a wall fall deposit and Stratum 1 is probably the result of post-abandonment colluviation during roomblock decomposition. The upper strata of this unit contain smaller percentages of both Santa Fe B/w and smeared-indented corrugated, and greater numbers of other types considered to occur later in time (e.g. Wiyo B/w, Biscuit wares, smeared corrugated). The chronological and depositional significance of the individual ceramic assemblages remains to be investigated more thoroughly.

2 x 2 m unit 90S 88E

This unit is located on a relatively steep slope (15°) with an ENE aspect in the southwest corner of the courtyard. The first stratum was highly disturbed by vegetation (a squaw bush, *Rhus trilobata*, was growing in the center of the unit). The fine sediments in Stratum 1, and at the surface, represent material trapped upslope of the squaw bush which became a natural dam for sediments moving downslope. The sediments of Stratum 2 are very similar to those of the overlying strata, however, they contain an increased amount of consolidated material (undisturbed) as well as continued evidence of root and possibly rodent disturbance. The underlying stratum (3) contained tuff boulders embedded in a fine pebbly matrix. Stratum 3 had a high artifact density (24.7/10 l) and yielded two unusually small projectile points (<1 cm^2).

The next stratum (4) is comprised of a high percentage of charcoal and primarily fine-grained particles. The western profile of the unit reveals that the sediments are laminated (3-5 cm thick) (Fig. 3.10). The laminae are identifiable in the west profile but do not extend for more than 10-15 cm east in the north and south profiles. The artifact density for this stratum (19.4/10 l) is lower than adjacent strata (23-25/10 l) and may indicate altered depositional conditions.

Stratum 5 is similar to Stratum 4 except that it has a higher percentage of coarse particles (i.e. gravel, pebbles and artifacts). This stratum was initially delineated from overlying sediment by the occurrence of patches of gravelly silty clay (adobe?), but the distinction was later obscured by rainwater from storms late in the season. The particle sizes appear to be bimodally distributed in the silt and gravel size fractions although there was a small concentration of cobbles and boulders near the west wall (possibly associated with similar rocks in Stratum 5). The lowest level of Stratum 4 contained a ground stone cache (Feature 6) that consisted of a large basin metate resting upside-down on two welded tuff slabs.

The distinction between Strata 5 and 6 was ambiguous at times because the sediments were saturated by the rainwater flooding noted above. Stratum 6 had a higher percentage of gravel probably due to its proximity to the underlying deposit of lapilli. The lowest level of this stratum contains a scatter of irregularly shaped cobble- to boulder-sized rocks. Most of the artifactual material was concentrated in the western portion of the unit. Stratum 6 had a high artifact density (23/10 l) and a large number of adobe fragments. This stratum contained a relatively high frequency of charcoal fragments including 14 tree-ring samples and a number of charred corn cobs. One of the tree-ring samples was assigned a date of 1271vv (Table 3.9).

Interpretations

The earliest cultural deposits in this unit, those of Stratum 6, accumulated on a topographically irregular surface composed primarily of lapilli, with occasional patches of B-horizon. The lapilli are cemented in some places but are unconsolidated in others, due to root, rodent and possibly human disturbance processes.

The boulder- and cobble-sized rocks in Strata 5 and 6 may have been part of an auxiliary wall in the courtyard that once trapped sediments (refuse) behind, or west of it. A N-S wall near the western edge of the unit would account for the laminated sediments (Stratum 4) that occur only in the west wall of the unit. The disintegration of the wall would have resulted in a mixture of the sediments trapped behind it, to the west, with those on the eastern side of the wall. If a pitstructure is present in the courtyard, the wall may have served to divert drainage away from it. The stone slabs and the metate (Feature 6) may have been part of a grinding bin set. If the rocks in Strata 5 and 6 have been correctly interpreted as an auxiliary

Fig. 3.10. West profile of 2 x 2 m unit 90S 88E (13/21).

Table 3.9. Tree-ring Samples from 2 x 2 m unit 90S 88E.

DD#	Provenience	Date	Species
35	Stratum 5 level 1		*Pinus ponderosa*
47	Stratum 5 level 2		*P. ponderosa*
48	Stratum 5 level 2		*P. ponderosa*
50	Stratum 5 level 3		*P. ponderosa*
57	Stratum 6 level 1		*P. ponderosa*
58	Stratum 6 level 1		*P. ponderosa*
61	Stratum 6 level 1		*P. ponderosa*
62	Stratum 6 level 1		*P. ponderosa*
63	Stratum 6 level 1		*Pseudotsuga menziesii*
64	Stratum 6 level 1		*P. ponderosa*
65	Stratum 6 level 1		*Pseudotsuga menziesii*
66	Stratum 6 level 1		*Pseudotsuga menziesii*
77	Stratum 6 level 2		*P. ponderosa*
79	Stratum 6 level 2		*P. ponderosa*
80	Stratum 6 level 2		*P. ponderosa*
86	Stratum 6 level 2	1271vv	*Pseudotsuga menziesii*
87	Stratum 6 level 2		*P. ponderosa*
88	Stratum 6 level 2		*Pseudotsuga menziesii*

Note: vv indicates that the outermost ring is absent and an unknown number of outer rings are missing.

wall, this cache would have been at its base on the courtyard side. Stratum 3 and overlying deposits may represent the refuse from a later occupation of the pueblo; the low artifact density, relative to adjacent strata, is also suggestive of a change in the source or agent of deposition. Although the upper strata of this unit do contain a considerable number of Santa Fe B/w sherds they also contain a number of types generally considered later, including Wiyo B/w, Biscuit wares, polychromes and glaze wares.

Based on the presence and orientation of the masonry boulders, the second stratum is most plausibly interpreted as a fallen wall from the roomblock, upslope to the SW of the square. Stratum 1 is considered to represent post-occupational accumulation of material, possibly washing downslope from the disintegrating roomblock.

Summary Observations

A well-defined courtyard surface was not encountered in any of the three plaza units. The excavation and profile information suggest that the natural (or pre-occupational) surface was disturbed throughout the plaza. Formulation of a clear picture of the courtyard paleotopography is difficult given the limited exposures we have obtained; only two of three units excavated in this subarea have encountered culturally sterile sediment. The cultural sediments in 84S 96E and 90S 88E lie on an irregular surface and show that the Bt horizon was exposed prehistorically. The topographic irregularities could be the result of natural (e.g. erosion, bioturbation) or cultural disturbance processes (e.g. excavation and mining of the B horizon). The paleo-surface irregularities were subsequently filled with refuse which resulted in a relatively level surface. In 2 x 2 84S 96E Stratum 3, Levels 2 and 3 (Fig. 3.9, Layers III, IIIa and IIIb) may be the best candidates for use-compacted plaza surfaces. The laminated sediments in the western profile of 90S 88E may also be the result of use compaction. Excavations planned for 1990 in and around the presumed kiva, in the south-central portion of the courtyard, should help to clarify the position and nature of the courtyard surface at the time of occupation.

4

EXCAVATIONS IN AREA 2

Ingrid K. Carlson
Angela Linse
and
Timothy A. Kohler

INTRODUCTION

Area 2, containing a linear roomblock of 8-10 rooms oriented along a N-S axis, is located southeast of Area 1 (Fig. 1.1). The area was divided into subareas 1, the roomblock, and 2, outside the roomblock. In subarea 2 we excavated four 2 x 2 m squares from a gridded population of 336 such units (see Table 1.1). These squares were selected randomly in an attempt to identify the extent of the cultural deposits, and estimate the populations of materials therein. Three of the units were located to the east, and one to the west of the roomblock.

In subarea 1, three rooms were picked randomly in hopes of obtaining a representative sample of the rooms, and to characterize the artifacts therein. We excavated two rooms with hearths (Rooms 2 and 4), in the eastern series of N-S oriented rooms, and one rear (western) room without a hearth (Room 6). Room 2 is tentatively identified as a habitation room and Room 6 as a storage room. Room 4, in the SE corner of the roomblock, is either another habitation room, or possibly a surface kiva. Rooms 2 and 6 were completely excavated; Room 4 still needs subfloor investigations, scheduled to take place in Summer 1990.

Excavation methods were very similar to those in Area 1. All material was excavated stratigraphically and screened through 1/4" screen, except where indicated. All remaining materials, except tuff gravel and pieces of adobe were separated into the following categories: ceramics, flaked lithics, non-flaked lithics, non-human bone, vegetal, other inorganic, other organic, and other (usually tree-ring samples). Human bone recovered from Area 2 was not removed from the site. Instead, analysis was carried out in the field, and the remains reintered in place. As in Area 1, all units had at least two profiles photographed in both black and white, and color slide film. One stratigraphic profile was drawn, and sediment samples were collected from every unit except Room 4.

This chapter begins with a discussion of the outlying stratum (subarea 2) and concludes with a discussion of the roomblock excavations (subarea 1). Detailed discussions of the materials recovered from Area 2 are contained in chapters 5 through 8.

SUBAREA 2 (OUTSIDE OF ROOMBLOCK)

2 x 2 m unit 144S 134E

This 2 x 2 m unit is located 12 m southeast of the roomblock (see Fig. 1.1). The modern ground surface is nearly flat, and is located at 4.61 m below site datum. Two large ponderosa pines are located nearby.

Stratum 1 consisted of unconsolidated sediments, and a large number of roots and rootlets. The fine sediments may be the result of slope wash accumulation Occasional blackened areas and some charcoal fragments appear to be the result of underground root-burning during forest

fires on the mesa. The artifact density in this stratum was 10.2/10 l.

During the excavation of Stratum 1, level 2, the top of a human cranium was located about six cm below mgs (modern ground surface). Stratum 1, level 3, revealed a long bone at a depth of 18 cm below mgs, 88 cm west of the cranium. As excavation proceeded, other human bones were encountered, as described in the section entitled "Feature 2" below. The physical characteristics of these bones are described in the Appendix. A more gravelly sediment was encountered at this same depth in the area of the skeleton, and throughout the square. No clear boundary to the deposit that contained the bone was visible in plan during excavation. Although a possible pit is identifiable in the profile (Layers II-III, Fig. 4.1), Layer II in the profile may postdate the deposition of the human bones, while Layer III corresponds to Stratum 1, level 3.

Stratum 2 was defined by an increase in coarse sediments including gravel- and pebble-sized tuff, with an artifact density of 6.4/10 l. Portions of this stratum appear to be highly disturbed (Layer V Fig 4.1). Mixing by rodents and root disturbance could account for the patches of the lapilli gravel encountered in the lower levels of the deposit (Stratum 2 levels 3 and 4). The lapilli layer was encountered at a depth of 60 cm below mgs. No cultural material was recovered at the base of Stratum 2 level 4 and the unit was closed.

The fill type in this unit was characterized during excavation as a cultural deposit with secondary refuse. Basalt was the predominant lithic material, followed by Pedernal chert, while only one piece of Jemez obsidian was recovered. Compared to the two units east of the roomblock, few ceramics were recovered. The most common pottery types were smeared-indented corrugated, followed by Santa Fe B/w, and Wiyo B/w. In Chapter 5, Gray reports unusually high proportions of Wiyo B/w in this unit, a type that is more abundant in Area 1 refuse than in Area 2 deposits. Some of these sherds may have been originally placed with the burial, if the individual was from Area 1.

Feature 2

The area containing the human remains was designated Feature 2. An attempt was made to leave the bones in place until all were exposed, but the varying depth, orientation, and general disarticulation of the remains made this difficult (Fig. 4.1). The individual was a mature male lying prone, probably flexed, with his head turned to the right. The body was oriented with the head towards the east and the feet to the west. Portions of the right frontal and parietal bones of the skull were located approximately 3-5 cm below mgs, and post-cranial elements were found at depths varying from 4 to 50 cm below mgs. The bones appear to have been disturbed post-depositionally over a 0.9 m^2 area. Most of the long bones were uncovered at a depth of 20-30 cm below the cranium, as were a scapula and portions of the pelvis. Roots associated with the deposit, and earlier ones whose burned traces could still be seen, may have been partially responsible for this post-depositional disturbance.

Two whiteware bowl fragments recovered from Stratum 2, level 2 (45 cm below mgs) were assigned point locations because they were found within the concentration of long bones. Other pottery fragments and some debitage were recovered from the same levels as the bone.

Interpretations

Post-depositional disturbances greatly limit the confidence with which we can interpret the sequence of events in this unit. The cranium and portions of the upper body were recovered at very shallow depths, while other elements were recovered from the base of the midden deposits. Whether the body was placed in a shallow pit toward the beginning of the deposition of refuse in this area, or toward the end is uncertain. The increase in tuff particles in the lower levels of Stratum 2 may be a result of rodent disturbance of the underlying lapilli layer or may indicate that the human bone was originally deposited on the surface. The shape of the deposits in profile, however, are suggestive of some excavation (possibly very limited) by the prehistoric inhabitants.

A weak case can be made for the following sequence of events. After a considerable period of relatively sparse refuse deposition in this location, presumably from the occupants of the Area 2 roomblock, this body was placed in a pit that was shallower towards the east and somewhat deeper towards the west. Given the relatively larger population in Area 1, and the probably longer

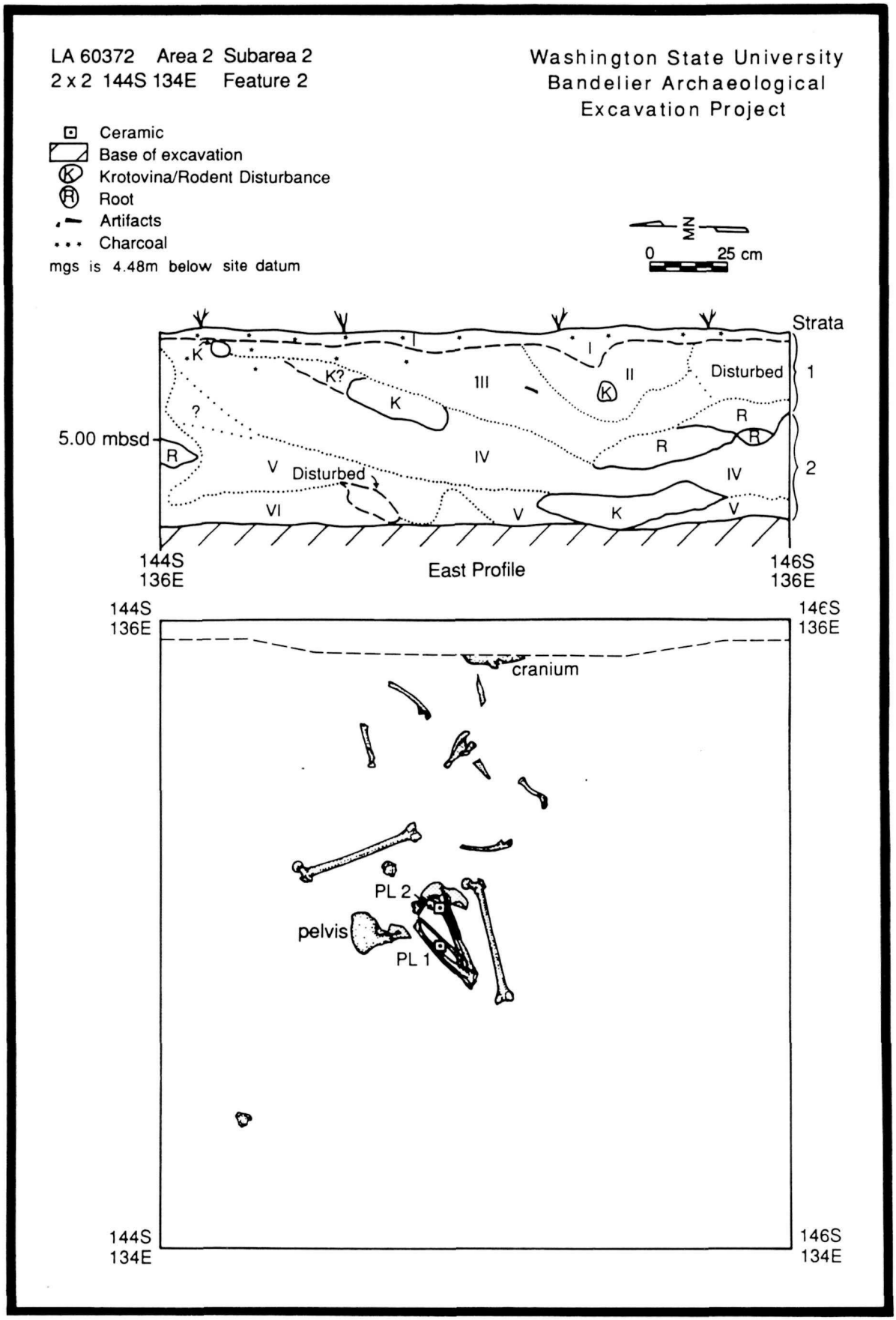


Fig. 4.1. East profile of 2 x 2 144S 134E (top) and plan of burial in Feature 2.

duration of occupation of Area 1, it is not unlikely that the individual was an occupant of Area 1. The absence of most small bones of the hands and feet -- if not simply due to the same disturbances that removed some of the larger bones -- may suggest that this was a secondary inhumation. Today, a basin-shaped depression on the south side of the 2 x 2 unit seems to mark the former location of a large tree. Uprooting of a such a tree, whose roots had penetrated the deposit, could have removed some of the bones from their original context, and disarticulated others.

2 x 2 m unit 128S 142E

This unit is located 18 m east of the eastern limit of the roomblock, and 1 m north of a large ponderosa pine (Fig. 1.1). The modern ground surface of the unit was uneven and sloped toward the east, with a 37 cm difference in elevation between the NW and NE corners. At its uppermost point, in the NW corner, the modern ground surface was 4.85 m below the site datum.

Stratum 1 level 1 consisted of unconsolidated silty sediment interspersed with tuff gravel. The deposits were brown and became darker with depth (from 10YR 6/2 to 10YR 5/4). Although still unconsolidated, the sediments of level 2 were slightly lighter in color (10YR 6/2 - 6/3). The amount of tuff gravel decreases slightly in the lower levels (3-5) of this stratum. By 68 cm below the surface the sediments in Stratum 1 show an increase in the frequency of cobble-sized rocks. These rocks were concentrated in the western half of the square, closest to the roomblock. The density of the artifacts recovered in Stratum 1 was 11.42/10 l.

Stratum 2 was initiated at depths ranging from 70 to 78 cm below the modern ground surface. At the base of this stratum, throughout the square, the sediments changed to orange gravel lapilli similar to patches of gray volcanic ash. Some of the orange gravelly horizon was consolidated while other portions appear to have been disturbed by rodent activity. Due to the low frequency of artifacts in Stratum 2 (average density only 0.8/10 l), excavations were halted at a depth of 88 to 92 cm below mgs.

In the unit as a whole, Basalt was the most common lithic material, followed by Pedernal chert and probable Jemez obsidian. The most frequent ceramic types were smeared-indented corrugated (n=1289), followed by Santa Fe B/w (n=94), whiteware (n=74), and Wiyo B/w (n=13).

Interpretations

The deposits in this unit (Fig. 4.2) were classified as a mixture of post-abandonment and cultural refuse during excavation. If the tuff rocks that were most common towards the bottom of Stratum 1 are correctly interpreted as building materials, their size is more consistent with chinking than with masonry. We suggest the following depositional sequence for the sediments and materials in this unit.

During the occupation of the Area 2 roomblock, some 20 m west of this square, secondary refuse was deposited between this unit and the roomblock. The contemporary ground surface of the 2 x 2 was at or near the level of the volcanic ash/lapilli layer, prior to deposition of the refuse. The abundance of rootlets within the lower levels of Stratum 1 (at the upper boundary of Layers VI and VII, Fig 4.2) may indicate that these deposits were exposed at the surface for a sufficient amount of time for grasses to root. They were not exposed long enough for significant weathering to occur because there are no soil horizons visible in the profile.

When the roomblock was dismantled or disintegrated, the broken, lightweight tuff blocks and chinking material were moved downslope. Later sediments were probably deposited primarily by colluvial action and contained materials from the roomblock and the intervening midden deposits. If so, there should have been little or no direct deposit of secondary refuse in this area, and there may be a slight tendency for ceramics deposited early in the occupation to be higher in the profile than materials deposited later in the occupation.

2 x 2 m unit 122S 114 E

This unit was located about three meters west of the western rooms of the roomblock. The

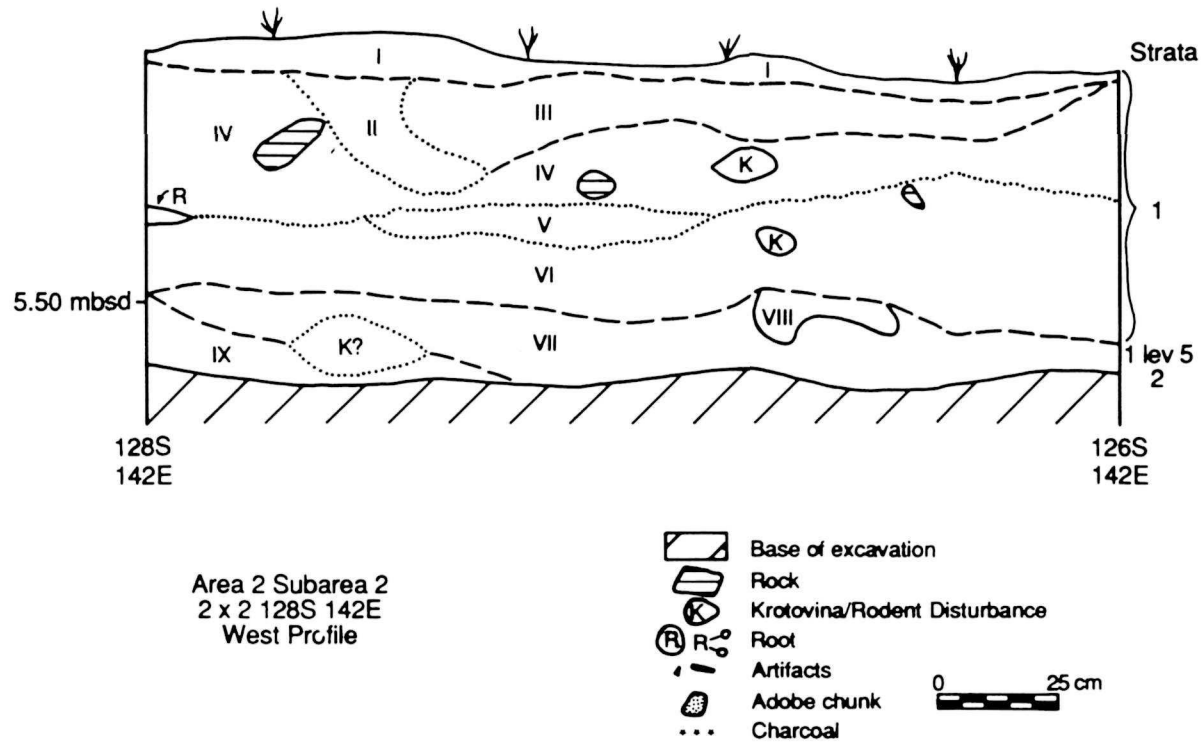


Fig. 4.2. West profile of 2 x 2 m unit 128S 142E.

modern ground surface slopes down 8 cm from east to west (2.3°). The modern ground surface is 2.72 m below site datum.

The upper level of Stratum 1 is an unconsolidated sediment that has recently accumulated over an older, dark-colored (10YR 4/2) A-horizon in level 2 (Layer II, Fig 4.3). This sediment is more consolidated and contains a relatively high percentage of charcoal, possibly from post-occupational forest fires. The deposits in the southeastern corner were lighter in color and contained a number of large cobbles (and may be related to the underlying stratum). Ceramics were plentiful in the first 5 cm, but declined in frequency with depth, to be replaced by a high frequency of small boulders (Layer III). These rocks, however, were not large enough to constitute the building blocks of a collapsed wall, unless considerable fracturing had taken place; they may have been chinking material. Artifact density for Stratum 1 was 4.3/10 l.

Stratum 2 was defined throughout the square, at depths between 23 to 34 cm below mgs, based on differences in compaction and texture; the consolidated sediments were difficult to excavate and contained abundant cobble-sized tuff masonry. Within this stratum, a deposit of apparent wall fall was encountered (Layer IV), in the southeast corner, at depths from 31 to 52 cm below mgs. Although the other eastern portions of this 2 x 2 are not substantially farther away from the room-block than the SE corner, they contained no wall fall. The excavators noted that the artifact density for Stratum 2 appeared to be lower than for Stratum 1, however, the highest artifact density for this unit occurred in Stratum 2 (6.5/10 l). The sediments in the lower levels of Stratum 2, and associated with the wall fall, were unconsolidated due to an increase in gravel content, but still had a high frequency of cobbles. The volume of building materials recovered from Stratum 2 was, in all, very slight and was not measured.

Stratum 3 was defined, at depths ranging from 37 to 50 cm below mgs, by a change in sediment color to a darker, orange/brown color. The density of artifacts decreased to 3.2/10 l. This stratum contained abundant rodent burrows.

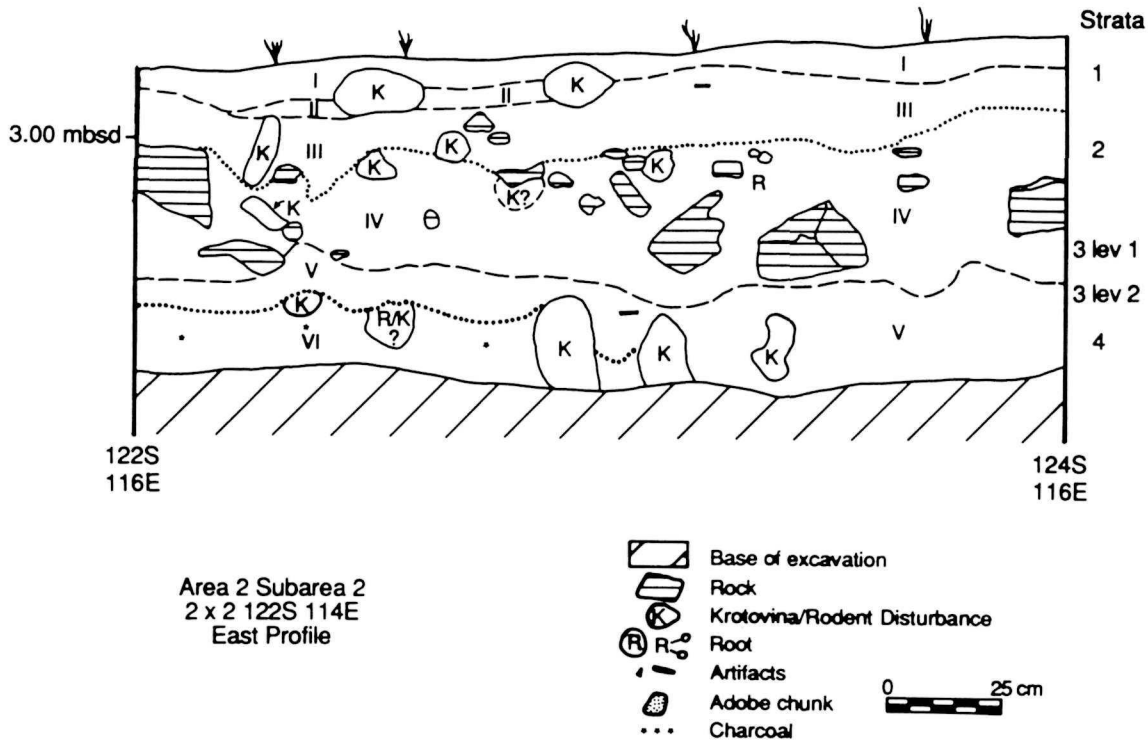


Fig. 4.3. East profile of 2 x 2 m unit 122S 114E.

Interspersed throughout this level were streaks of charred, darker sediments that may have been a result of the 1977 La Mesa Fire, or an earlier burn. At about 60 cm below mgs, a concentration of pottery, possibly from the same vessel, was encountered close to the south wall of the unit.

Stratum 4 was defined at 54 to 66 cm below mgs where the gravelly Stratum 3 was reduced to scattered patches throughout the square; the sediment remained unconsolidated but contained less gravel. The lowest portions of Stratum 4 were lighter in color and appeared be a mixture of cultural material and the underlying volcanic ash and lapilli layers (noted above), probably due to rodent disturbance (Layers V-VI). Artifact density was so low (1.1/10 l) that excavation ceased at depths of between 61 to 76 cm below mgs.

Basalt was the most common flaked lithic material recovered in this square. It was followed closely by Pedernal chert; probable Jemez obsidian was also recovered. The most common ceramic type was smeared-indented corrugated (n=539), followed by Santa Fe B/w (n=47), and Wiyo B/w (n=5).

Interpretations

The Stratum 4 material was interpreted, during excavation, as a mixture of non-cultural, post-abandonment and refuse deposits. Stratum 3 is labeled as a cultural deposit of mixed refuse, to call attention to the presence of both wall fall and possible secondary refuse. The relatively low artifact density in this unit, relative to other outlying units, suggests that most refuse was deposited on the east side of the roomblock. The refuse in this area, west of the roomblock, may be associated with the occupation of Area 1.

2 x 2 m unit 114S 140E

This unit lies on a 4.2° slope with an eastern aspect; it is located about 15 m northeast of the roomblock, and north of the other two 2 x 2 m units east of the roomblock. At its NW corner,

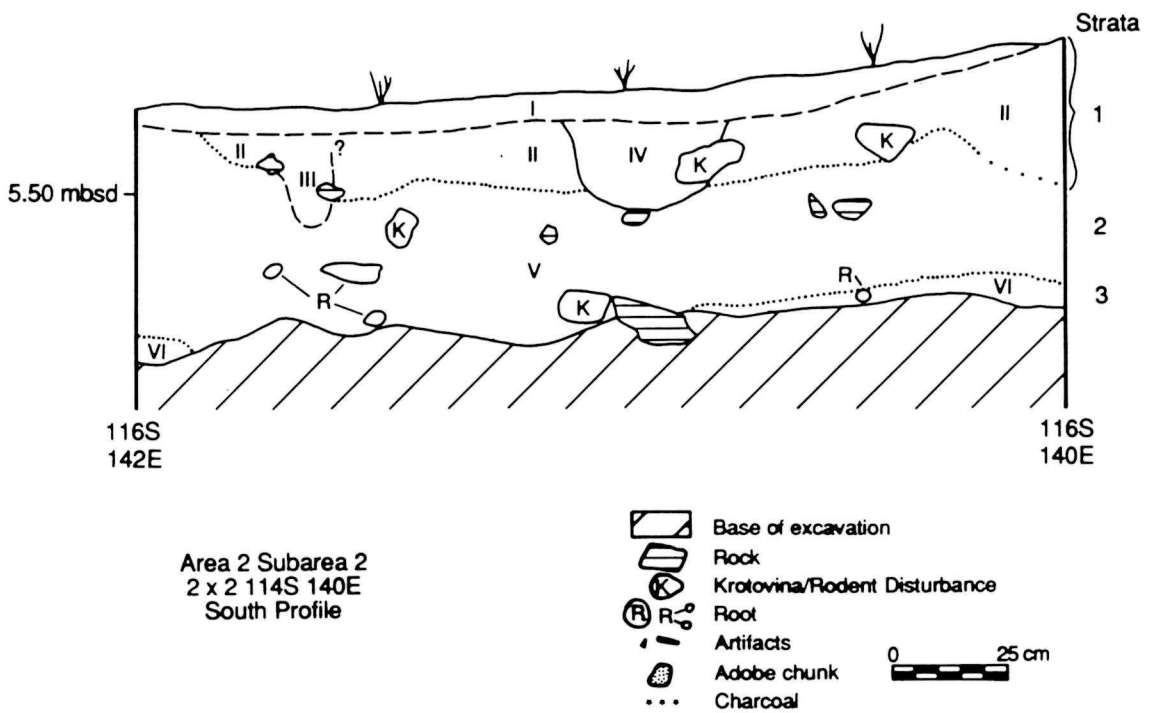
the modern ground surface is 5.09 m below the site datum.

The upper level of Stratum 1 is an unconsolidated gravelly silt. In Stratum 1 level 2, between 10 and 11 cm below the surface, the composition of the sediment became slightly more clayey. The increased clay content may be the result of weathering processes (illuviation of clay from overlying sediment). The change to a darker color in level 2 noted by the excavators may be associated with intrusive deposits similar to those noted in the profile (Layers III and IV, Fig. 4.4) rather than a pervasive, significant change in color The artifacts in this level appeared to decrease in size. The artifact density in this stratum was 10/10 l.

The first evidence of building materials occurred in Stratum 2, at depths ranging from 23 to 27 cm below surface. These cobble-sized tuff rocks were concentrated in the southwestern part of the square. The tuff cobbles appeared to be remnants of collapsed portions of the roomblock. In Stratum 2 level 2, about 33 cm below mgs, an artifact feature was exposed and labeled Feature 1. It consisted of several large pieces of corrugated pottery that formed the base and part of the body of a jar. A bulk soil sample (#7) was removed from the sediments located around the feature for flotation and two sediment samples were also collected, one from the interior of the cluster of ceramic fragments and one from the surrounding deposit. This artifact concentration was resting directly upon a lens of more compact material. The artifact density decreased in Stratum 2 to 8.1/10 l.

Stratum 3, a medium-brown, silty sediment with a decreased amount of gravel, was defined at depths ranging from 43 to 48 cm below mgs. This stratum appeared to be primarily noncultural, and the density of cultural material decreased to 3.6/10 l. Coarse sediments (lapilli) with patches of volcanic ash began to dominate between 53 and 65 cm in depth. Excavations ceased with Stratum 3 level 2, in apparently noncultural deposits.

The dominant artifacts encountered were ceramics and lithics. The two most common lithic materials were Basalt and Pedernal chert. One flake of quartzite, three flakes of Jemez obsidian



Area 2 Subarea 2
2 x 2 114S 140E
South Profile

Fig. 4.4. South profile of 2 x 2 m unit 114S 140E.

and two flakes of sandstone were also recovered. Vegetal materials and non-human bone were found in small amounts. The dominant ceramic type was smeared-indented corrugated (n=762), followed by Santa Fe B/w (n=100). Wiyo B/w (n=38) and plain gray ware (n=34) were also present, but were only a third as common as Santa Fe B/w.

Interpretations

During excavation, the materials encountered were considered to be a mixture of post-abandonment and cultural refuse. This square has a relatively high density of artifacts, second only to 2 x 2 m 128S 142E in this subarea. Some of these deposits may have resulted from refuse deposition by the occupants of Area 1; although the Area 1 roomblock is three times farther away than the Area 2 roomblock, it does lie to the northwest of this unit, while the Area 2 roomblock lies to the southeast.

SUBAREA 1

Room 2

Room 2 is the northern-most room investigated in the Area 2 roomblock (see Fig. 1.1). The modern ground surface was 2.42 m below site datum. This room was partially excavated during the Summer 1988 field season (Kohler 1989c). Room 2 was thought to be a front (eastern) room in the roomblock, and contains those floor features expected in such a room, but it is also possible that there is another room, or ramada, to the east of it, that has not been investigated. Room 2 is roughly 3 m E-W x 4 m N-S, with an unexcavated room behind it (to the west). The 1988 excavations focused on the southern half of the room, which was divided into the southwest and southeast quadrants. The southeast quadrant had been excavated to a deeper level than the southwest quadrant, and our first task, after removing the backfill, was to lower the southwest quadrant to an equal depth. The closing depth of the SW quadrant at the end of Summer 1988 averaged 40 cm below mgs, while the closing elevation for the SE quadrant averaged 94 cm below the surface.

As explained in Chapter 1, the southern half of Room 2 was excavated using standard recovery methods. Sediments in the northern half of the room, after profiling, were removed as a single unit without screening, to a depth about 10 cm above the uppermost surface. Excavation below that level proceeded according to standard procedures. In general, the sediments in the room fill contained abundant tuff building material. Most of the 1989 excavations were conducted in the northern half, thus, Kohler (1989c) should be consulted for a description of the excavated strata. Volumes of building materials recorded during excavation are listed in Table 4.1. The overall artifact density for Room 2 is 3.0/10 l. This includes artifacts on the surfaces, but does not include any material collected in 1988, or from the northern half of the room fill, excavated in 1989 with abbreviated recovery procedures. The most common ceramic types found in the room are as follows: smeared-indented corrugated, indented corrugated, Santa Fe B/w and Wiyo B/w.

During excavation, 17 tree-ring samples were removed from the fill and roof fall of this room, and one more was recovered from a subfloor provenience. The northern half of the room contained more samples (n=13) than the southern half (n=4). The NW quadrant had a greater number of samples in the roof fall (n=5) than did any of the other quadrants. Table 4.2 contains a summary of the locations, species and dates for these samples. Most of these samples were rather small, but were submitted anyway in the hopes of obtaining a date; only one specimen (the sample from the subfloor provenience) was datable. The samples submitted were dominated by ponderosa pine (10

Table 4.1. Volumes of Building Materials from Excavated Rooms in Area 2.

Room	Horizontal Provenience	Vertical Provenience	Volume m^3
2	Southern 1/2	1988 excavations (mostly Stratum 1)	1.04
		Stratum 2	1.03
	Northern 1/2	Full cut	2.08
4	Room (less Segments 1-3)	Stratum 1	0.20
		Stratum 2	1.73
	Segments 1 - 3	Full cut	0.96

Table 4.2. Tree-ring Samples from Room 2.

DD#	Provenience	Species	Date
11	SW quad, Strat 2, level 5, 0.65 m below mgs	*Pinus ponderosa*	
12	SW quad, Strat 2, level 5, 0.60 m below mgs	*P. ponderosa*	
15	N 1/2, full cut, 0.28 m below mgs	*Pseudotsuga menziesii*	
16	N 1/2, full cut, 0.41 m below mgs	*P. ponderosa*	
17	N 1/2, full cut, 0.57 m below mgs	*P. ponderosa*	
18	N 1/2, full cut, 0.59 m below mgs	*P. ponderosa*	
19	N 1/2, full cut, 0.75 m below mgs	*Pseudotsuga menziesii*	
20	N 1/2, full cut	*Pseudotsuga menziesii*	
23	SE quad, Strat 3, level 1, 0.78 m below mgs	*P. ponderosa*	
28	NE quad, 0.68 m below mgs	*P. ponderosa*	
30	NW quad, Strat 3, level 1, 0.78 m below mgs	*Pseudotsuga menziesii*	
31	NW quad, Strat 3, level 1, 0.77 m below mgs	*Pseudotsuga menziesii*	
37	NW quad, Strat 3, level 1, 0.74 m below mgs	*P. ponderosa*	
38	NW quad, Strat 3, level 1, 0.77 m below mgs	*Pseudotsuga menziesii*	
42	NW quad, Strat 3, level 1, 0.75 m below mgs	*Pseudotsuga menziesii*	
67	N 1/2 Feature 7, 1.01 m below mgs	*P. ponderosa*	
69	SE quad, 0.87 m below mgs	*P. edulis*	
94	N 1/2 Feature 12, 1.13 m below mgs	*P. ponderosa*	1250 B

Note: B indicates bark.

specimens), followed by seven samples of Douglas-fir, and one specimen of piñon.

Stratigraphy

The following strata descriptions are a combination of descriptions derived from the E-W profile (Fig 4.5) and the excavation of the southern 1/2 of the room. Stratum 1 (Layer I), slightly consolidated and somewhat disturbed by trampling, was excavated in 1988. Stratum 2 (Layer II) is less consolidated than Stratum 1, with a higher percentage of gravel, abundant boulders, cobbles, and some adobe chunks. This layer has been interpreted as wall fall. Stratum 3, level 1 (Layers III and IV) appears only in the central and western portion of the profile. Although it is at an elevation coincident with the wall fall, and contains masonry boulders, the Stratum 3 deposits are probably associated with a roof fall deposit. They correspond to an ashy sediment noted in the NE corner of the SE quadrant during excavation. The rocks overlying the roof fall in the NE quadrant probably correspond to the rocks visible in the profile between Layers III and IV.

Surface 1

After both halves of Room 2 were excavated to above roof fall (Stratum 3), evidenced by a dense layer of orange adobe fragments, the room was divided into four equal quadrants for greater horizontal control of non-point located artifacts. The top of the roof fall deposit was designated Surface 1, because some artifacts were found resting on top of this layer. The depth from the top of the roof fall to the top of the remaining walls ranged from 99 to 79 cm. The roof fall consisted primarily of adobe chunks about 4 cm thick. Relatively few of these fragments had beam impressions. The adobe was typically blackened on one side and the black side was always found facing down. The artifacts found in association with the roof layer, all of which were located in the SE quadrant, are listed in Table 4.3 (see also Fig. 4.6). A large proportion of the roof assemblage appears to be related to grinding, even though tools like mauls and axes could have other functions, such as roughening metates.

Surface 2

After the roof fall was removed, a very thin, discontinuous lens of sediment was found to separate the roof fall from the dark, compact, prepared, "blood plaster" (cf. Hawley 1943) floor. This sediment (not visible in the profile, Fig. 4.5) was very fine, but contains some pebble-sized adobe fragments. The fine particles may be the result of eolian deposition following abandonment of the room while the adobe fragments may have resulted from the natural disintegration of the

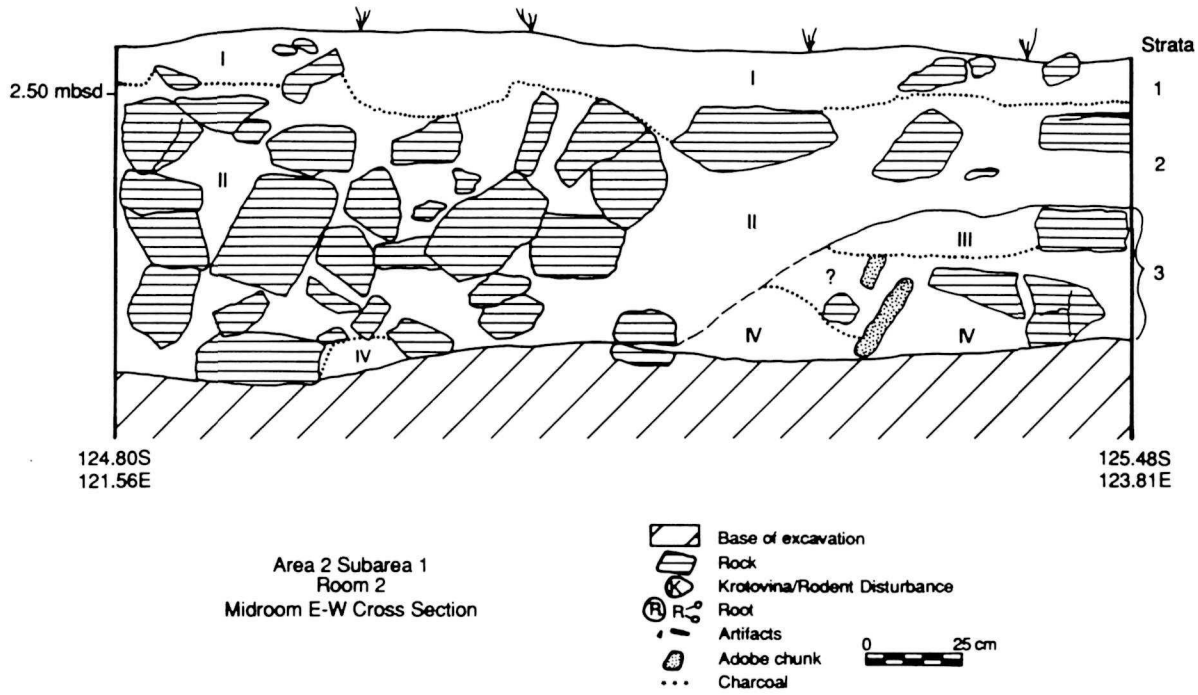


Fig. 4.5. Mid-room profile, Room 2.

roof. The floor was designated Surface 2. Table 4.4 (see also Figs. 4.7 and 4.8) lists the artifacts found in contact with this surface. A fair proportion of this assemblage (but not so large as for Surface 1) may have been related to grinding in conjunction with food processing. Although the metates and manos on both surfaces were fragmentary, some of the mauls and axes appeared to be still usable.

Features 5 and 7, a hearth and ash pit (Fig. 4.7), are associated with this surface. Figure 4.7 also shows the location of a deflector that had been leveled and hidden by a floor (Surface 2). The floor shows evidence of coping that sloped gently towards the walls on the north, west, and south sides, and more markedly on the east side. Surface 2 shows evidence of at least 3 replasterings. The last is about 1 mm thick; the second 2-3 mm; and the lower about 2 mm. The last remodeling of the coping on the north side of the hearth (see below) was completed more recently than the uppermost replastering of Surface 2.

Table 4.3. Point-located Artifacts in Contact with Surface 1, Room 2.

PL#	Material	Comments
1	vesicular basalt	maul, pounding marks on both ends, evidence for hafting
2	quartzite	axe, wear both ends
4	vesicular basalt	grooved maul
5	vesicular basalt	broken two-handed mano, use-wear opposite sides
6	vesicular basalt	metate fragment, hematite stains on surfaces
9	welded tuff	possible bin cover
14	vesicular basalt	metate fragment, hematite stains one side
15	tuff	possible cist cover

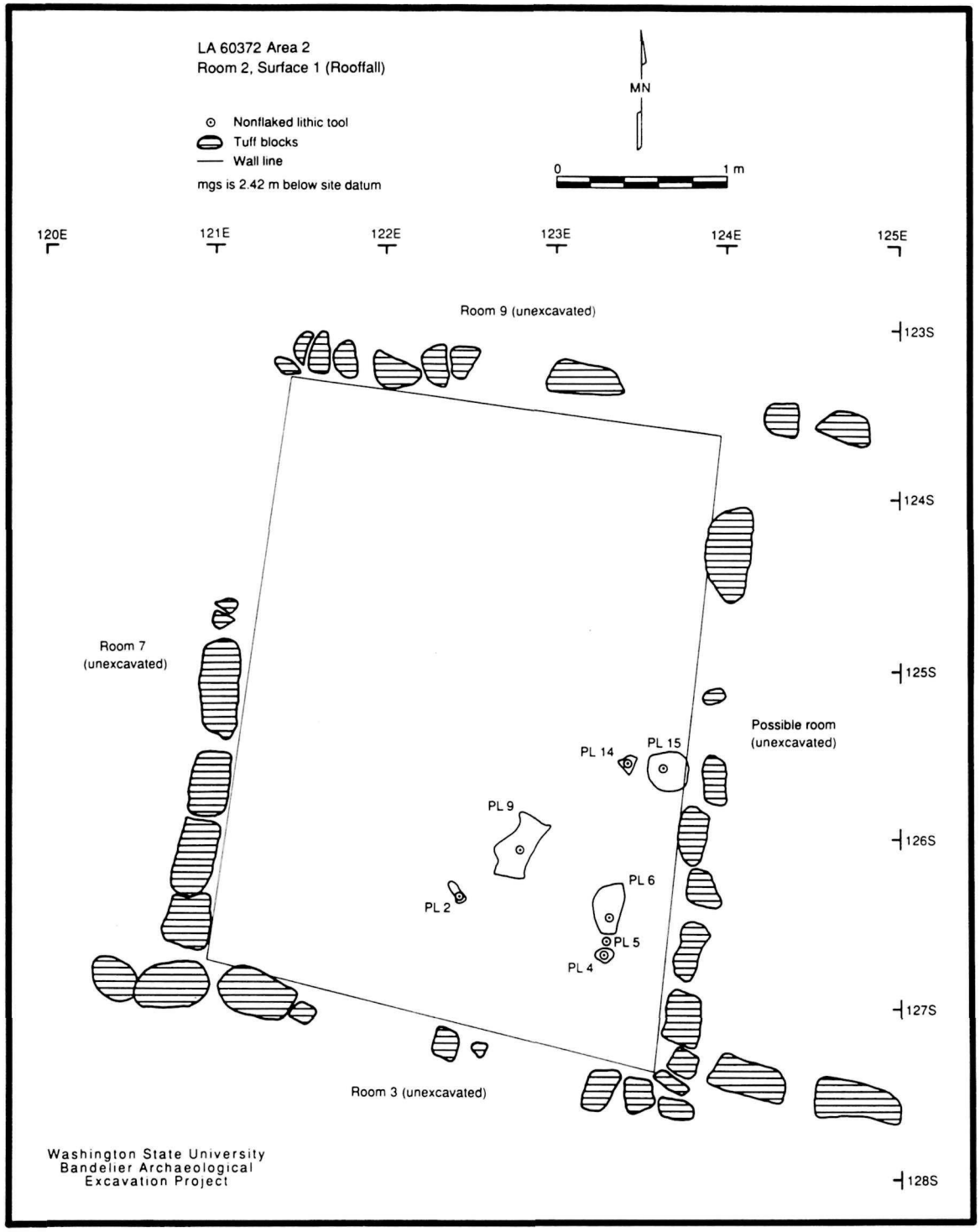


Fig. 4.6. Surface 1 (Roof) of Room 2, showing associated point-located artifacts.

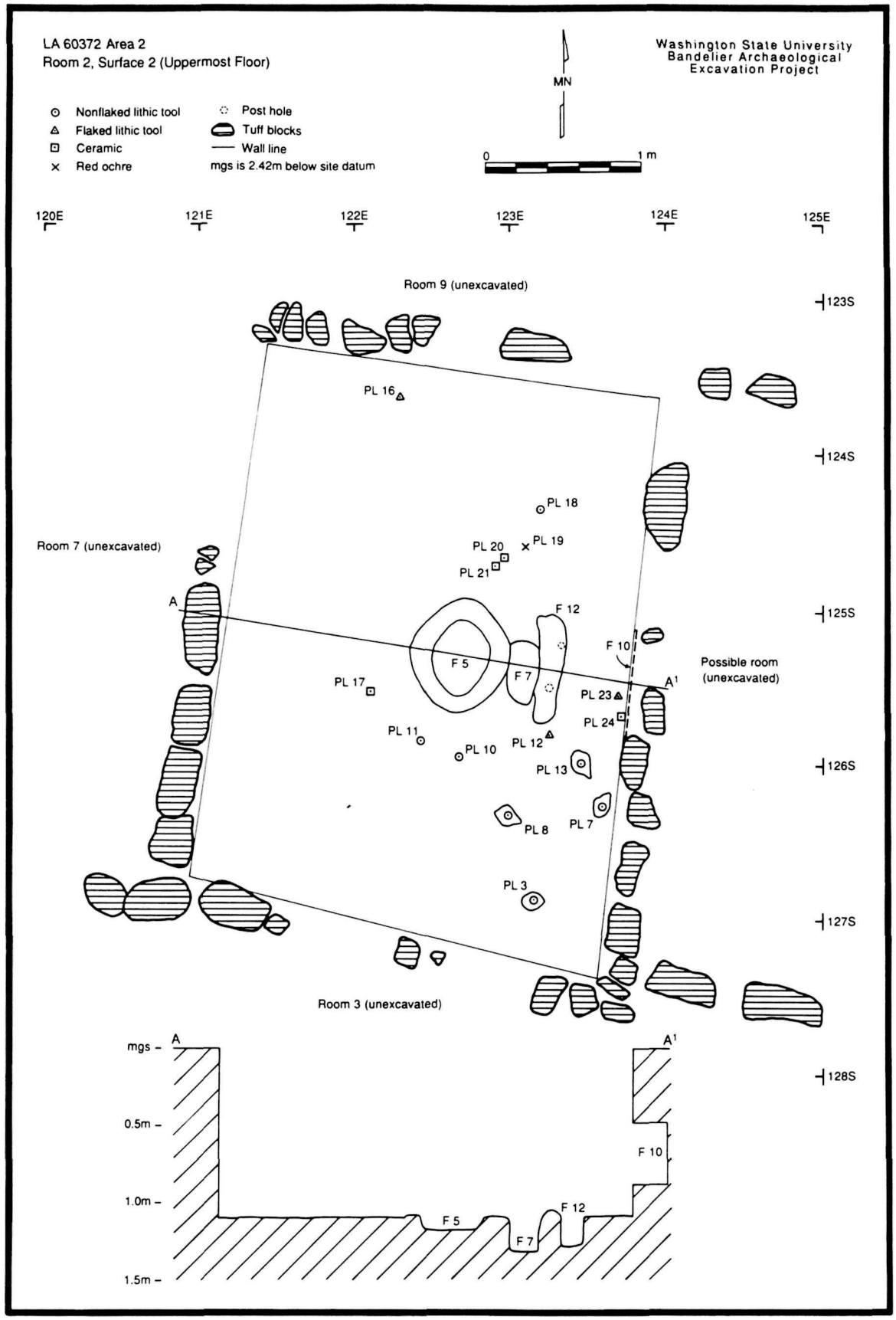


Fig. 4.7. Surface 2 (uppermost floor) of Room 2, showing associated point-located artifacts.

Table 4.4. Point-located Artifacts in Contact with Surface 2 (uppermost floor) Room 2.

PL#	Material	Comments
3	quartzite	possible lapstone, polished with flat surface
7	welded tuff	possible fragment of hatch cover
8	metabasalt	metate fragment
10	welded tuff	slab, polished, sooted one side
11	vesicular basalt	metate fragment
12	basalt	axe, hafted
13	tuff	basin metate fragment
16	Pedernal chert	projectile point, side notched, short base
17	tuff/quartzite/igneous temp.	bowl fragment, Santa Fe B/w, Wiyo-like
18	tuff	chinking or building stone
19	hematite	two pieces
20	fine sand tempered ceramic	jar fragment, smeared-indented corrugated
21	tuff/quartzite/igneous temp.	bowl fragment, Santa Fe B/w
22	tuff	possible bin cover
23	basalt	thin multiple-edge-worked uniface
24	fine sand-tempered ceramic	jar fragment, smeared-indented corrugated

Further exploration revealed two additional floors, Surfaces 3 and 4. These surfaces are assumed to be present across the entire unit, however, time constraints permitted only limited exposure of these surfaces in an area about 1 m in diameter around the central features. In general, the surfaces are separated from the upper floor (Surface 2) by 1-2 cm of fill that consists of fine sediments with fine tuff gravel and charcoal flecks. The distinctions among all the surfaces are lost near the doorway (located in the east wall), where the sediments have a higher gravel content, and towards the SE corner of the room, where the fill dividing Surfaces 2 and 3 becomes negligible in thickness. Surface 4 appears to rest on non-cultural, unmodified sediments that included lapilli, but this observation is based on a very small exposure of only some 25 cm on a side.

Features

Four features were described for this room: a hearth (Feature 5), an ash pit (Feature 7), a deflector mold (Feature 12) and a doorway (Feature 10). The doorway had been sealed at some point after its initial building. All of these features were aligned E-W; the hearth was almost in the center of the room, with the ash pit and then the deflector mold to the east, and the doorway located in the east wall (Fig. 4.7).

The hearth, Feature 5, is oval in plan and basin-shaped in cross-section. It measures 80 cm N-S, 65 cm E-W, and reaches a maximum depth of 16 cm below the top of Surface 2. A prominent coping of adobe encircles the hearth, rising approximately 3 to 4 cm above the level of the floor, except on the southern side where the coping has sloughed away. This encircling adobe ring is about 10 cm wide. The lining of the hearth incorporated at least three chunks of tuff under the coping; one of these was covered by 2-3 cm of very red adobe.

In its upper fill, the hearth contained about 5 cm of roof fall. Underlying this was a layer of very hard, yellow-white ash containing numerous flecks of charcoal. The base of the feature was a hard orange-black adobe. Two sherds and one flake of stone were recovered from the fill.

This hearth, or an earlier version of it, appears to have been an original feature of the room, or, at the latest, was added while the earliest floor (Surface 4) was in use. Part of the coping directly overlies Surface 4, while elsewhere Surface 3 abuts the coping.

Two sets of archaeomagnetic samples were taken from this hearth by Thomas Windes (NPS), but only one set yielded a satisfactory date. This set, sampled from portions of the hearth lining that were black in color, produced a preliminary date of 1270 $\pm$ 30 (Dan Wolfman, personal communication to Kohler, January 1990). The samples taken from portions of the lining that

Fig. 4.8. Room 2, looking east, with all point-located artifacts. Wall plaster has not yet been removed, and the door (Feature 10) has not been excavated (11/36).

were red in color yielded two estimates (1000 ± 30 and 1360 ± 30), neither of which seems plausible.

An ash pit (Feature 7) is located east of the hearth. After its last remodeling, the dimensions of the ash pit were 57 cm N-S, 23 cm E-W, and 20 cm deep (as measured from Surface 2). In the southern half, toward the west side, the feature contained a dense ash deposit visually identical to that recovered from the hearth.

An earlier version of the ash pit, associated with Surface 3, was slightly longer (N-S) and wider (E-W), and its north and south sides sloped up more gradually to meet the floor. Part of the adobe coping of the hearth, that was apparently added with Surface 2, overlapped the edge of the ash pit and was removed to ascertain its full extent. This earlier version of the ash pit also extended part way under the deflector mold to the east. While the ash pit was certainly in use when Surface 3 was the floor, the relationship between it and the lowest surface (Surface 4) could not be ascertained.

During an early period of room use, there was a deflector between the ashpit and the door. We did not discover it until we had removed Surface 2 in that area. We labeled the remnants of the deflector as Feature 12, a deflector mold. The deflector extended beyond the boundary of the ash pit about 12 cm to the south and 18 cm to the north. 5 cm. The original height of the deflector is unknown. The deflector mold was made of adobe with an average thickness of 4.5 cm, but incorporates a small tuff cobble (11 x 8 x 4 cm) towards the south, and two upright posts at the southern and northern ends. The bottom of the northern post (DD #94; ponderosa; 11 cm in length) was located at a depth of about 1.13 m below the ground surface. Its lower end had been

sharpened to a point and driven into culturally sterile sediments. The southern post, of juniper, was unburnt and collected in very small fragments.

In one place where the relation between the lowest surface and the deflector could be seen, the floor appeared to overlap the deflector. The deflector was probably an original feature of the room, but was dismantled at the time Surface 2 was added (or at least after Surface 3 was added). A cutting date of 1250 for DD #94, then, would seem to be a good estimate for the construction of Room 2. Logically, the deflector would have been unnecessary when the door to the east (see Feature 10, below) was sealed, so it seems probable that these events took place at about the same time.

The final feature to be discussed for Room 2 is a walled-up doorway (Feature 10). Although this feature is located on Fig. 4.7 for convenience, it was probably not still in use after Surface 2 was laid. After clearing, the doorway measured 40 cm wide (N-S) x 62 cm high x 23 cm deep (E-W); however, the original height was probably a few centimeters greater. The aperture was centrally located in the east wall about 156 cm south of the northern crosswall. The tuff blocks used to close off the doorway were laid haphazardly and their courses did not match that of the walls on either side. Much more mortar was used in closing off of this feature than in the original walls. A possible lintel stone that measured 50 x 22 x 10 cm thick was slumped downwards at its north end and appeared to have broken. The door sill was about 20 cm above the level of the uppermost floor. When the door was in use, it was lined with adobe and tuff on its sides; on the southern side was a vertical slab. A single layer of plaster covered the sealed door while the rest of the east wall had four layers of plaster.

Architecture

Room 2 was constructed of tuff blocks laid in courses cemented with mortar and tuff chinking. Based on six to eight blocks in each wall, the average size of tuff blocks was 38.1 cm long x 16.5 cm high; width (depth) is estimated at 21 cm. The tuff chinking material averaged 9.4 x 4.8 cm. Courses were laid horizontally with no running joints (vertically aligned spaces between blocks). The exterior dimensions were as follows: the north wall was 3.09 m in length, the south wall, 3.25 m, the west wall, 3.99 m, and the east wall, 4.32 m. The current height of the walls above Surface 2 is 1.0 m on the south (with five courses); 95 cm on the west (with six courses); 87 cm on the north wall (five courses); and 89 cm on the east (with four courses). All the walls were plastered with one to four layers of fine-grained adobe. Little of the final layer remained; it may have been blood-plastered, or may have been soot-blackened.

The west wall of Room 2 (the N-S axis of the roomblock) appeared, from the surface, to have been built in one construction episode and formed the west wall for Rooms 9 (unexcavated), 2, and 3 (unexcavated). The north wall of Room 2 abutted both its west and east walls, while the south wall abutted the west wall in the southwest corner, but abutted and bonded the east wall in the southeast corner. This suggests that the west wall was constructed first, followed by the south and east walls and then, finally, the north wall. The roof appears to have been supported by the walls, since no post holes were found. All of the recovered roofing wood was charred. Based on their size, tertiary beams and/or closing materials only were represented.

The east and west walls were coursed (stones have been sorted so that alternate courses are of different size and/or shape stones); the north wall was semi-coursed (stones are laid in somewhat distinct rows but lack consistency); and the south wall was both coursed and semi-coursed, separated by a visible wall seam near the center of the wall where the two different building styles met. The masonry appeared to be wet laid because the mortar extruded from between layers of tuff blocks. There was a noticeable tendency for a course of large blocks to be followed by a course of smaller blocks above it, and so on; this tendency was least pronounced in the east wall. There also seemed to be a larger amount of chinking and mortar used in the construction of the east wall.

The thickness of the adobe varied greatly due to the sizes of the joints (spaces) between the larger building blocks. Separating the chinking rocks and the exterior of the wall was 1 cm of construction plaster, while the average thickness of the closing plaster from the south wall was 3.7 cm. The south and west walls had two layers of

plaster; the east wall had four; only one layer was noted on the north wall. It therefore appears as if the walls were replastered on an individual basis rather than replastering the entire room.

The original height of the walls in this room can be roughly estimated as follows. The total volume of building material recovered from the fill of the room (Table 4.1) was 4.15 m^3. The perimeter of the room (the sums of the lengths of the four walls) is 12.9 m. The average width of the walls is 21 cm. The recovered rubble would have been sufficient to build 19.8 m^2 of wall (4.15/0.21). If an equal amount of wall fell outside the room, then altogether 39.6 (19.8 x 2) m^2 of wall would be called for. If we divide this figure by the circumference of the room, and divide again by four (because there are four walls), we can estimate that the original walls were about 77 cm higher than the present walls ((39.6/12.9)/4). Therefore, if the present walls average about 93 cm in height, the original walls should have stood some 1.7 m in height. If substantially more or less than half of the original masonry fell inside the room, this figure would have to be adjusted accordingly.

Summary and Inferences

Room 2 is believed to have been one story in height, based on the volume of rock removed during excavation. The room appears to have been built on culturally sterile sediments. The relationship of the construction of this room to others in the roomblock cannot be known with certainty without more excavation, but it is plausible that the main unit of eight rooms was built in one episode. This interpretation is based in part on their similarity in plan (except for Room 4), but primarily on the apparent continuity of the long N-S wall they share. The two rooms that probably form a partial third tier on the NE side of this block were almost certainly later additions.

The floor features from the first use of Room 2 probably included a fire hearth, ash pit, deflector mold, and doorway. With the laying of Surface 2, the fire hearth was enlarged and intersected the ash pit, which was remodeled to be smaller in size. The deflector mold was probably taken out of service when the doorway was sealed, but this conclusion is based more on logic than on evidence.

The presence of the hearth and ash pit throughout the use-life of the room suggests that this was a habitation room. The concentration of artifacts in the SE quadrant of Surface 1 also suggests that the roof was an area for activities such as grinding.

The sealing of the door to the east, and the leveling of the deflector, may have been coincident with the addition of a room to the east that has not been excavated, but for which traces of E-W walls can be seen at the surface. After that time, access to the room was presumably from the roof.

The artifact density in the fill of this room (3.0/10 l), while rather low, is more than three times that of the other two excavated rooms. On that basis one might infer that, of these three, Room 2 was the first to fall into disuse, and that it was used (to a rather limited extent) for refuse disposal for the occupants of other nearby rooms.

Given this information, the abandonment mode of Room 2 is puzzling. According to Steen (1977, 1982), when sites were abandoned on the Pajarito Plateau, rooms were usually swept clean of artifacts and the larger beams are taken to be used elsewhere. In Room 2 several artifacts were left in association with the roof and floor, and the presence of a thin lens of sediment on the floor suggests that the room was left standing, unoccupied, before the roof beams were taken. If other nearby rooms were still in use while this room was abandoned, and its roof removed or collapsed, why were some of the artifacts recovered on both the floor and the roof apparently still useable? Two mauls and an axe found on the roof appear to be useable, while an axe and a projectile point found on Surface 2 are as well. Furthermore, why were many other materials of equal or higher value (such as whole metates) missing from these assemblages? Certainly the abandonment was not catastrophic, since the assemblage appears depleted of ceramic materials. The roof may have been in use until it fell in, while the room was unoccupied; in that case, perhaps only larger items, such as whole metates, could have been readily salvaged. The large roof beams may have been salvaged at that point for re-use elsewhere. The few useable tools left behind inside the structure could have been in storage when they became inaccessible.

Room 4

Room 4 is located south of Room 2 in the SE corner of the roomblock; one unexcavated front room separates these two excavated rooms (Fig. 1.1). The west wall of Room 2 was traced to Room 4, and a few rocks in the north wall, but no other clearly definable wall lines were observed at the surface. A 5 x 5 m unit was placed to encompass the known NW corner of the room in an attempt to expose all of Room 4 and a small portion of the room to the west. This led to identification of the N wall, but the south and east walls remained unexposed. When the 5 x 5 m square was expanded to the south (Segments 1 and 2) and east (Segment 3), Room 4 measured 5 x 5 m. The modern ground surface is 2.53 m below the site datum.

During the excavation of Room 4, human remains were encountered in two places. A possible burial occurred near the center of the southern wall. Teeth, cranial, and post-cranial bone fragments were identified. As with the human bones in 2 x 2 144S 134E, these remains were identified between 5-10 cm below mgs, in post-abandonment fill, unassociated with roof fall or a floor. Given the probable temporal relationship between the two major areas of the site, the inhabitants of Area 1 may have been using the abandoned Area 2 for burial. An area of approximately 2 x 2 m was pedestaled and remained unexcavated; the remains were not disturbed and no further information is available. The second occurrence of human remains in Room 4 included two individual femur shaft fragments and one premolar. These bones were located in the northeast corner of the room, and were also in room fill. Based on tooth wear and the robustness of the femurs when compared to those from the excavated burial, the individual was was most likely a mature female (Markku Niskanen, personal communication). These remains were reburied during the field season.

Once all four walls of Room 4 were located and the fill excavated to just above roof fall, the interior of the room was divided into 2 x 2 m squares to provide greater spatial control over non-point located artifacts. The entire room was excavated stratigraphically with standard procedures, except for the pedestal in the south-central portion of the room (Fig. 4.9). During excavation of the fill, 18 tree-ring specimens were collected (Table 4.5). These were dominated by ponderosa (n=14), with one specimen each of

Table 4.5. Tree-ring Samples from Room 4.

DD#	Provenience	Species	Date
26	Seg. 3, 0.75 m below mgs	*P. ponderosa*	
27	Seg. 3, 0.75 m below mgs	*P. edulis*	
29	Seg. 3, 0.80 m below mgs	*P. ponderosa*	
32	2 x 2 m 131S 119E, Strat 2, level 6, 0.67 m below mgs	*Pseudotsuga menziesii*	
33	2 x 2 m 131S 119E, Strat 2, level 6, 0.65 m below mgs	*P. ponderosa*	1193 vv
36	2 x 2 m 131S 119E, Strat 2, level 6, 0.64 m below mgs	*P. ponderosa*	1204 vv
39	2 x 2 m 131S 119E, Strat 2, level 6, 0.69 m below mgs	*no species reported*	
40	2 x 2 m 131S 119E, Strat 2, level 6, 0.78-0.80 m below mgs (in several fragments)	*no species reported*	
43	2 x 2 m 131S 119E, Strat 2, level 6, 0.79 m below mgs	*P. ponderosa*	1207++vv
44	2 x 2 m 131S 119E, Strat 2, level 6, 0.75 m below mgs	*P. ponderosa*	
51	2 x 2 m 131S 123E, Strat 3, level 1, 0.75 m below mgs	*P. ponderosa*	
52	2 x 2 m 131S 123E, Strat 3, level 1, 0.70 m below mgs	*P. ponderosa*	
53	2 x 2 m 131S 123E, Strat 3, level 1, 0.73 m below mgs	*P. ponderosa*	
54	2 x 2 m 131S 123E, Strat 3, level 1, 0.82 m below mgs	*P. ponderosa*	
55	2 x 2 m 131S 123E, Strat 3, level 1, 0.87 m below mgs	*P. ponderosa*	
56	2 x 2 m 131S 123E, Strat 3, level 1, 0.88 m below mgs	*P. ponderosa*	
59	2 x 2 m 131S 123E, Strat 3, level 1, 0.90 m below mgs	*P. ponderosa*	
60	2 x 2 m 133S 121E, Strat 3, level 1, 0.82 m below mgs	*P. ponderosa*	

Note: vv indicates that there is no way of estimating how far the last ring is from the true outside; ++ indicates that a ring count is necessary beyond a certain point in the series because cross-dating ceases.

piñon and Douglas-fir. Three dates were obtained from these samples, all apparently from relatively small roofing materials. The earliest is A.D. 1193vv, from DD #33. DD #36 dated to A.D. 1204vv, and DD #43 to A.D. 1207++vv.

Stratigraphy

In part because of our great difficulty in locating the walls of this unit early in the excavation, the only stratigraphic balk that remained for potential description was the pedestal surrounding the possible burial. However, this was not described in detail, since it may well have been atypical. The sediments in this balk appeared to be a relatively undifferentiated accumulation of wall fall and post-occupational sediments.

Stratum 1, as defined in excavation, was a superficial deposit of fine sediments mixed with vegetation about 2 cm deep. Stratum 2 was more compact and more orange in color than Stratum 1 and included wall fall; it extended to depths as great as 80 cm below mgs. The underlying Stratum 3 was a deposit of abundant hardened adobe fragments, blackened on the their lower surface; this stratum was interpreted as roof fall and had an average thickness of about 8 cm. The adobe chunks in the roof fall stratum were similar to those found in Room 2. This deposit was labeled as the first of two surfaces identified in Room 4.

The NW corner of Room 4 showed evidence of burning similar to that found in Room 2. Most of the corner was blackened, and ashy sediments in Stratum 3 were removed from directly above Surface 2. The heaviest concentration of tree-ring samples, however, was in the NE corner. The most common ceramic types in Room 4 are smeared-indented corrugated, Santa Fe B/w, and indented corrugated.

Surface 1

Surface 1, the roof fall deposit, was identified by its orange color and hard consistence. It consists primarily of chunks of adobe with a few small rocks; one side of the adobe pieces are blackened. A few artifacts (listed in Table 4.6) were found in association with the roof fall layer, which required its identification as a surface.

Surface 2

After the roof fall was removed, a thin lens of sediment remained separating the roof fall layer from the dark, compact "blood plaster" (cf. Hawley 1943) floor below, which we labeled Surface 2. Table 4.7 lists 8 point-located artifacts associated with Surface 2. In general, these materials are both less abundant and more "used up" than the floor materials in Room 2, and may best be considered primary or secondary refuse. (Primary refuse is discarded at its point of use; secondary refuse has been removed from its point of initial use for disposal elsewhere; Schiffer [1972]). Features 8 and 9 were also associated with this surface.

Due to the time limitations and inclement weather, subfloor excavations were not conducted in this room. However, a possible second floor was exposed, in the SE corner of the room while trying to locate Surface 2 after several days of rain. This floor was not assigned a surface number, and its extent is unknown.

Features

A hearth, Feature 8, is located east of the center of the room (see Fig. 4.9). Feature 8 was lined with adobe and surrounded by a hard, adobe collar that is raised as much as 7 cm above the level of Surface 2. Excluding this collar, which

Table 4.6. Point-located Artifacts in Contact with Surface 1, Room 4.

PL#	Materials	Comments
2	red ochre	located against east wall
3	fine sand tempered ceramic	smeared-indented corrugated jar fragment
4	fine sand tempered ceramic	smeared-indented corrugated jar fragment
12	welded tuff	generalized nonflaked lithic tool

Fig. 4.9 (Facing page). Room 4 showing point-located artifacts associated with Surfaces 1 and 2.

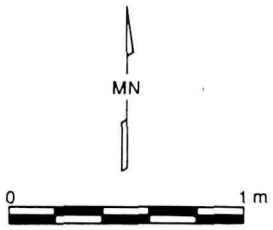
→

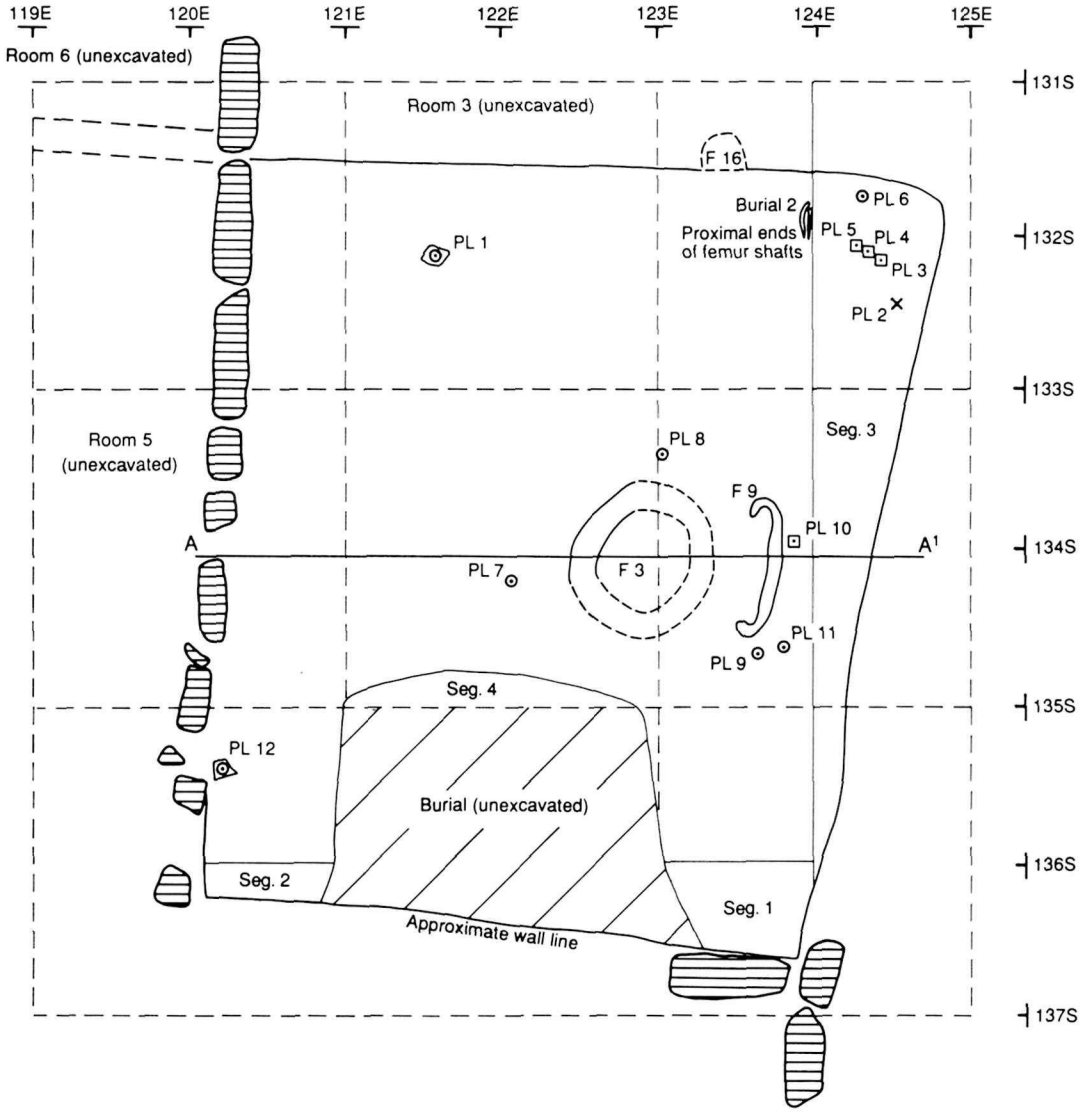
LA 60372 Area 2
Room 4

Washington State University
Bandelier Archaeological
Excavation Project

- Nonflaked lithic tool
- Flaked lithic tool
- Ceramic
- Red ochre
- Tuff blocks
- Unexcavated
- Wall line
- Segment boundary
- 2 x 2 boundary

mgs is 2.53m below site datum





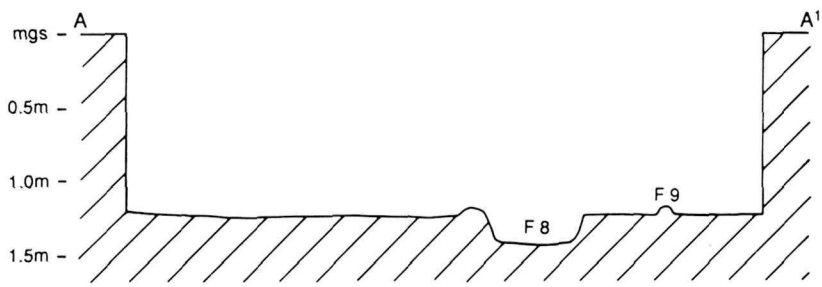


Table 4.7. Point-located artifacts in contact with Surface 2, Room 4.

PL#	Materials	Comments
1	vesicular basalt	mano fragment
5	fine sand tempered ceramic	jar fragment, smeared-indented corrugated
6	welded tuff	mano fragment
7	Jemez obsidian	projectile point, side notched, short based
8	quartzite	hammerstone
9	Pedernal chert	minimally altered piece
10	fine sand tempered ceramic	jar fragment, smeared-indented corrugated
11	tuff	building stone

averaged about 15 cm wide but was poorly preserved on the south and east sides, the hearth measured 77 cm N-S and 65 cm E-W. Three strata were observed during excavation of the hearth, which reached a maximum of depth of 25 cm below the level of Surface 2: the uppermost 10 cm was filled with deposits resembling the roof fall found elsewhere; the next 4 cm was a light gray, consolidated ash; and the final 11 cm contained a highly consolidated ash that contained more flecks of charcoal than the ash above, but was also more yellow in color. Three sherds of smeared-indented corrugated, two sherds of Santa Fe B/w, and one sherd of plain grey were recovered from this lower stratum. This feature was very similar in content, plan, and profile to the hearth in Room 2, but was markedly larger in size. A set of archaeomagnetic samples from this hearth, collected by Tom Windes (NPS) with assistance from Angela Linse, provided estimates of pole position that were too variable to provide a precise date estimate (Dan Wolfman, personal communication to Kohler, January 1990).

A deflector mold, Feature 9, was located 17 cm east of the hearth and 55 cm west of the east wall. Made of adobe, the deflector was rectangular in shape and measured 89 cm in length (N-S) and 27 cm in width (E-W). Although the presence of a deflector implies the existence of an aperture in the wall, no vent shaft or doorway was visible in the east wall. The wall, however, constructed primarily of adobe, was neither high nor well preserved and a doorway or vent might not be recognizable under such circumstances, had one ever existed. Neither the hearth nor the deflector have been investigated beneath their Surface 2 manifestations, and the possibility exists that we may yet recover posts from subfloor proveniences that were incorporated into the deflector during its construction .

A wall niche, Feature 16 (Fig. 4.10), was discovered while describing masonry on the last day of excavation. It is located in the north wall approximately 1.3 m west of the NE corner. The niche, framed by a circle of tuff rocks, is circular in profile, and, including the surrounding collar, measures 46 cm vertically and 67 cm from east to west. Two tuff cobbles had been plastered into place over the niche, and both the north wall and the niche were then covered with 10 cm of mortar and plaster. After the tuff cobbles were removed, the internal opening had a diameter of 25 cm and a depth of 22 cm. Although this approximates the width of the wall, it was the impression of the excavator that the aperture did not completely breach the wall (i.e., it was not a pass-through). The interior of this feature was lined with small pieces of tuff in its lower half; the upper part of the niche was excavated into slightly consolidated sediments. Inside the niche was found the lower half of a small smeared-indented corrugated jar with sooting and traces of burned red adobe on the exterior, covered by unconsolidated sediments.

Fig. 4.10. Niche (Feature 16) discovered in N wall of Room 6 after removal of plaster (15/16).

The north wall and the wall niche were probably plastered at the same time because the material covering the niche was the same as that covering the rest of the wall. A similar amount of plaster covered the niche and the rest of the north wall, possibly suggesting that the niche was sealed relatively early in the existence of the room.

Architecture

Room 4 is subrectangular in plan, although the northeast corner of the wall tends to curve to the south in a gentle arc. The exterior dimensions of Room 4 are as follows: the south wall measures 4.40 m in length; the west wall, 5.38 m; the north wall, 4.94 m; and the east wall, 5.35 m. The current height of the walls above Surface 2 is as follows: the south wall is 58 cm high; the west wall, 71 cm; the north wall, 65 cm; and the east wall 52 cm. Except for the east wall, the materials used in wall construction are tuff held together by adobe mortar and then covered in a layer of fine-grained plaster. The average size of tuff building blocks for Room 4 is 47.7 cm long x 14.0 cm high; based on those exposed on the surface, the average width is about 23 cm. The chinking material averaged 9.5 cm long x 4.5 cm in height.

Each wall was constructed differently. The north wall was initially considered to be constructed entirely of adobe with a few large rocks interspersed to add strength. Further excavation revealed that a 10-cm thick mortar concealed a wall composed of very large tuff building blocks (see Fig. 4.10). Two wall seams separated two uncoursed portions that abutted the west and east walls from the central portion that was made of upright tuff slabs. From the NW corner to 56 cm east along the north wall, the wall was built mainly of adobe, with small tuff blocks interspersed for added strength. The next section, in the center of the north wall, was composed of a series of "upright" tuff blocks. Six of these large stones were discernable with perhaps 2 or 3 smaller, slanting ones further to the east. All of the upright rocks were resting on the floor, or close to it, with one or more courses of rock above. A second wall seam occurred 1.15 m west of the east wall. This section of wall had five courses of large building blocks separated by four layers of adobe and chinking.

The west wall (the N-S backbone of the roomblock) is constructed of five courses of large tuff building blocks separated by four layers of chinking and adobe. Despite the fact that the west wall appears to be a continuation of the N-S wall seen in the west wall of Room 2, the architectural styles do not match. The main building blocks for this wall are larger than those of any other wall in Area 2, with an average size of 75.5 x 13 cm. The relationship between the north and west wall is not entirely clear, because there is either a vertical running joint (or wall seam) in the west wall in the corner, or else the west wall abuts the north wall. Because this pattern of a vertical seam is repeated farther south in the wall, and because examination of the SE corner of Room 6 (described below) suggests that there, at least, the south wall abuts the east wall, it seems better to interpret the north wall of Room 4 as abutting the east wall of Room 4.

About half of the east wall is made of adobe mortar. The other half is embedded with small tuff cobbles. The highest concentration of rock occurs in the NE corner where the two walls abut. Here, at the base of the wall at floor level, is a layer of rock which is replaced by mortar at about 90 cm south of the NE corner. An overlying course of rock continues above the mortar more or less for the length of the exposed wall, although it is difficult to see the courses in some places. Above that, a course of mortar is followed by another course of rocks, that thins out at 74 cm south of the NE corner. Above that, an upper course of mortar lies at the modern ground surface. There is a definite reduction in the amount of rock in the wall at about 1.32 m south of the NE corner. The expected evidence of a vent associated with the deflector mold and hearth was not found. The only possible evidence for such a feature was a lack of masonry in the east wall between 2.43 and 2.92 m south of the NE corner.

The south wall, much of which is obscured by the pedestal, also appears to be constructed mostly of adobe. A 60 cm section of the wall exposed to east of the pedestal does contain rock similar in size, shape, and coursing to that in the west wall, and some rock is visible on the surface here as well. In the 80 cm section of wall exposed west of the pedestal, no rocks were visible at the surface or in the exposed portion.

If, for simplicity, we assume that three of the walls were made of masonry and one (the east) of adobe, the original height of the masonry walls in

this room can be roughly estimated as follows. The total volume of building material recovered from the fill of the room (Table 4.1) was 2.89 m^3. The length of the three masonry walls in this room is 13.3 m. The average width of the three masonry walls is 23 cm. The recovered rubble would have been sufficient to build 12.6 m^2 of wall (2.89/0.23). If an equal amount of wall fell outside the room, then altogether 25.1 (12.6 x 2) m^2 of wall would be called for. If we divide this figure by the total length of the three masonry walls in the room, and divide again by 3 (because there are three such walls), we can estimate that the three masonry walls could have been about 63 cm higher than the present walls ((25.1/13.3)/3). Therefore, since the present masonry walls average about 52 cm in height, the original walls should have stood some 1.15 m in height. If substantially more or less than half of the original masonry fell inside the room, this figure would have to be adjusted accordingly.

Obviously, this is much too short to have permitted standing inside the room, and so it is probably a great underestimate. Several possible explanations are possible for such an underestimate. For example, more masonry could have been borrowed from this structure (than from Room 2) for re-use by either the occupants of Area 1 or Area 2. The upper portions of more than one of the walls could have been disproportionately constructed of adobe.

Summary and Inferences

It does seem safe to assume that Room 4 probably stood only one story high. It has the typical floor features of a habitation room, but its large size (roughly 5 x 5 m) is unusual for the Pajarito Plateau. At one time, the north wall of the room may have been unplastered, exposing the wall niche. The overall size, its odd mode of construction (each wall constructed differently), the slightly curving east wall, the large size of the hearth, and the location of the room in the SE corner of the roomblock may suggest that this room originally served as a corner kiva. It is possible that a change in room function from a kiva to a habitation room may be signaled by the plastering of the north wall, the closing of the niche, and the covering of the sipapu (for which we recovered no evidence in the only surface exposed). The depauperate floor assemblage is not helpful in determining the final function of the room. Only two artifacts from the floor, a hammerstone and a projectile point, were still apparently usable. Subfloor investigations during Summer 1990 may, however, provide additional information for inferences of room use; a complete discussion of the history of room use, disuse, and filling must await that work. Nonetheless, the artifact density for Room 4 (0.3/10 l) was the lowest of the three excavated rooms in Area 2. Very little cultural refuse was found in the fill. If this is not explainable in cultural terms (and dense lenses of secondary refuse are not unknown in kivas) it may indicate that it was one of the last rooms to be abandoned in this roomblock.

Room 6

Room 6 is a back (west) room located behind and between Rooms 2 and 4 (see Fig. 1.1). The southern half of the room was excavated in 10 cm arbitrary levels within strata and screened through 1/4" mesh. The northern half was excavated in a full cut and not screened until the roof fall stratum was encountered. At that point the room was divided into four equal quadrants to allow for greater horizontal control of non-point located artifacts. The modern ground surface is 2.43 m below site datum.

The upper level of Stratum 1 (Layer I, Fig. 4.11) appears to have been highly disturbed by trampling. In general, Stratum 1 was an unconsolidated, slightly gravelly, silty sediment, with few tuff cobbles; it extended to a maximum depth of 7 cm below the surface. Stratum 2, which was terminated at a depth of 66 cm below mgs, was marked by increased numbers of tuff blocks and a few adobe fragments in a matrix of unconsolidated coarse sand and silty sediments. Some of the adobe fragments visible in the profile in this stratum (Layer III) are blackened on one side. Toward the base of the stratum, the rocks became smaller in size and adobe fragments increased in frequency. Stratum 3 was defined by a dominance of the hard abode roof fall. Stratum 3 extended to the floor, encountered between 67 and 75 cm below mgs. Roof fall remains that did not resemble those in the rest of the room occurred in the SW quadrant. The roof fall stratum in this quadrant was compact and it was difficult to determine the boundary between the roof fall and the floor. These uncharacteristic deposits probably

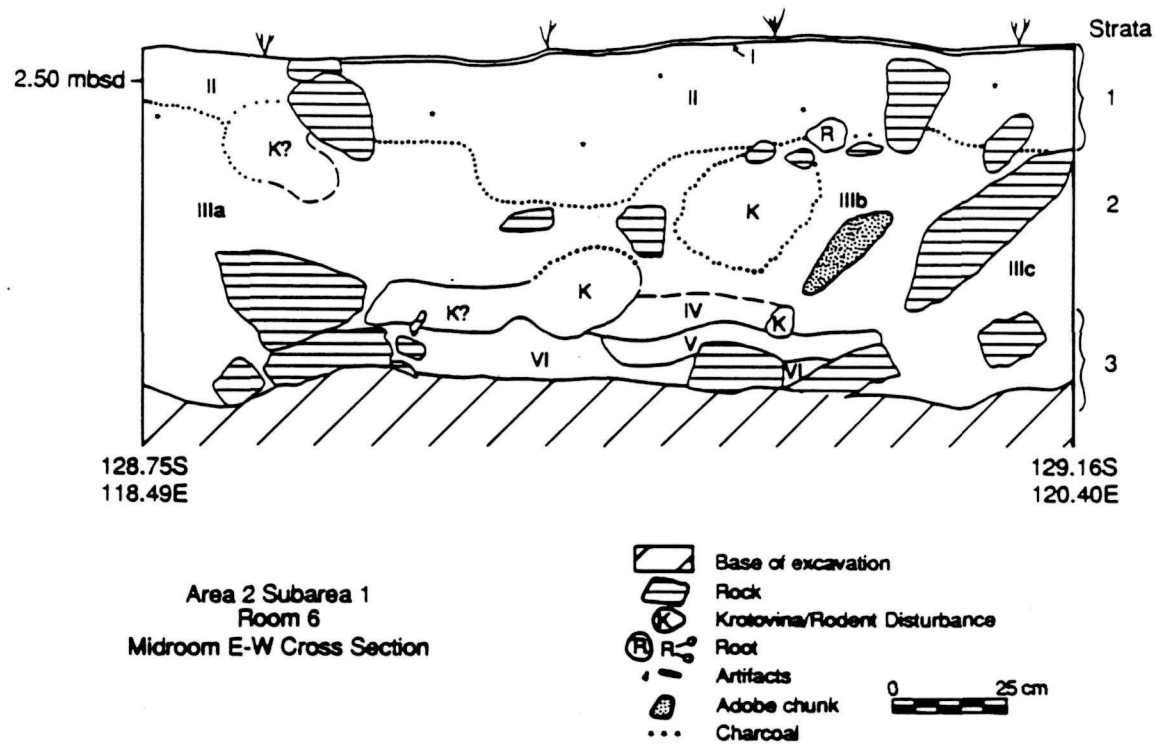


Fig. 4.11. Midroom profile, Room 6.

correspond to the highly consolidated, clayey sediments of Layers IV and V. In general, the roof fall adobe was lacking the soot-blackened surface on one side that had characterized these materials in the rooms to the east, although there is evidence of blackening in some of the adobe visible in the mid-room profile (Layers II, IV-VI).

Only two tree-ring samples were recovered from this room (Table 4.8). The first was from the fill of the northern half of the room. The second came from the SE quadrant in roof fall near the level of the floor. Neither produced a date.

A few artifacts recovered from the fill of the southern half of Room 6 are worthy of mention. In Stratum 2, level 2 (about 27 cm below mgs) a "lightning stone" or spherical piece of quartzite, was recovered. Stratum 2, level 3 (about 30 cm below mgs) revealed a second lightning stone and a complete mano. The artifact density for the room as a whole was rather low, at 1.3 per 10 l of sediment. The most common ceramic type recovered was smeared-indented corrugated (n=529), followed by Santa Fe B/w (n=70), indented corrugated (n=64), and 2 sherds of Wiyo B/w.

Surfaces

The roof fall stratum was mixed with the wall fall in this room, and because it had no associated artifacts it was not defined as a surface. The existing adobe floor, to which the label Surface 1 was assigned, was in poor condition. The floor was broken, uneven and poorly preserved. In the NW quadrant the uneven floor sloped down toward the center. Only in the southern half of the SE quadrant was the floor well preserved, flat, and easy to

Table 4.8. Tree-ring Samples from Room 6.

DD#	Provenience	Species
81	N 1/2, 0.42 m below mgs	*Pseudotsuga menziesii*
89	SE quad, Strat 3, level 2	*P. ponderosa*

Table 4.9. Point-located artifacts in contact with Surface 1, Room 6.

PL#	Material	Comments
1	Pedernal chert	core
2	basalt	mano fragment
3	vesicular basalt	two-handed mano, two-sided with finger grips
4	welded tuff	general NFLT
5	welded tuff	flag stone, possible hatch cover
6	tuff/fine sand tempered ceramic	bowl fragment, Santa Fe B/w
7	voided	-
8	vesicular basalt	mano fragment, finger grooves on one side (in Feature 11)
9	basalt	full-grooved axe, heavy use on one end, hematite stains on one surface (in Feature 11)
10	welded tuff	metate fragment, polished both sides (in Feature 11)

identify. Why this surface appeared prepared in portions of the SE quadrant, and (at best) use-compacted elsewhere in the room is unclear.

Table 4.9 lists the artifacts found in association with Surface 1. One cluster of artifacts was visible in the NE corner; another cluster was located 2.5 m south of the north wall and 20 cm west of the east wall (Fig. 4.12). The cluster in the NE corner consisted of the metate fragment (PL 10), a mano fragment (PL 8), and an axe (PL 9). The group along the east wall consisted of two possible manos (PLs 2 and 3), and a possible hatch cover. A core of Pedernal chert (PL 1) was located in the center of the SW quadrant. An isolated bowl fragment (PL 6) was found embedded in the floor plaster of the NW quadrant.

Due to time constraints, thorough subfloor excavations took place only in the SE quadrant. Here, at least two surfaces below Surface 1 were identified. The oldest, Surface 3, was defined as the contact between natural and cultural strata; the noncultural stratum included lapilli. In the 3-5 cm above this contact, but below the lower floor (Surface 2) a bowl sherd of Santa Fe B/w, a flake of basalt, and one generalized nonflaked lithic tool were found. No cultural materials were found in association with Surface 2 or in the 11 cm of fill between it and Surface 1. Surface 2 is similar to Surface 1 in that both appear to be use-compacted or have had some limited preparation. An earlier version of the pit feature associated with Surface 1 in the NE quadrant (Feature 11) was probably associated with Surface 2.

Features

The only floor feature identified in Room 6 was a pit feature (Feature 11). This unburned pit is oval in plan and basin-shaped in profile. It is 43 cm E-W, 30 cm N-S, and 25.5 cm in depth. The sides of the pit were not lined with adobe or stone; perhaps, if it was originally intended for food storage, the pit may have originally contained a jar that could have been sealed independently. On the surface, an adobe collar surrounded the opening and enclosed its NE corner. A thin slab of welded tuff covered the feature; below it was a second, smaller, half ring of coarse adobe, possibly in association with Surface 2. The six artifacts within the pit were discovered close together at similar depths; the uppermost three of these are listed in Table 4.9. Also cached in this pit, below the point-located artifacts, were a complete and useable one-handed mano, a broken mano of indeterminate size, and a broken nonflaked lithic tool of indeterminate original function. Of these, only the one-handed mano and the grooved axe appeared to have some remaining uselife.

Architecture

The architecture of Room 6 is consistent with the styles previously reported in Area 2. The walls are constructed of courses of tuff blocks chinked with small pieces of tuff set in mortar. A layer of construction adobe covers the masonry walls followed by varying thicknesses of finishing plaster. The plaster and mortar were removed from all but the north wall to describe the

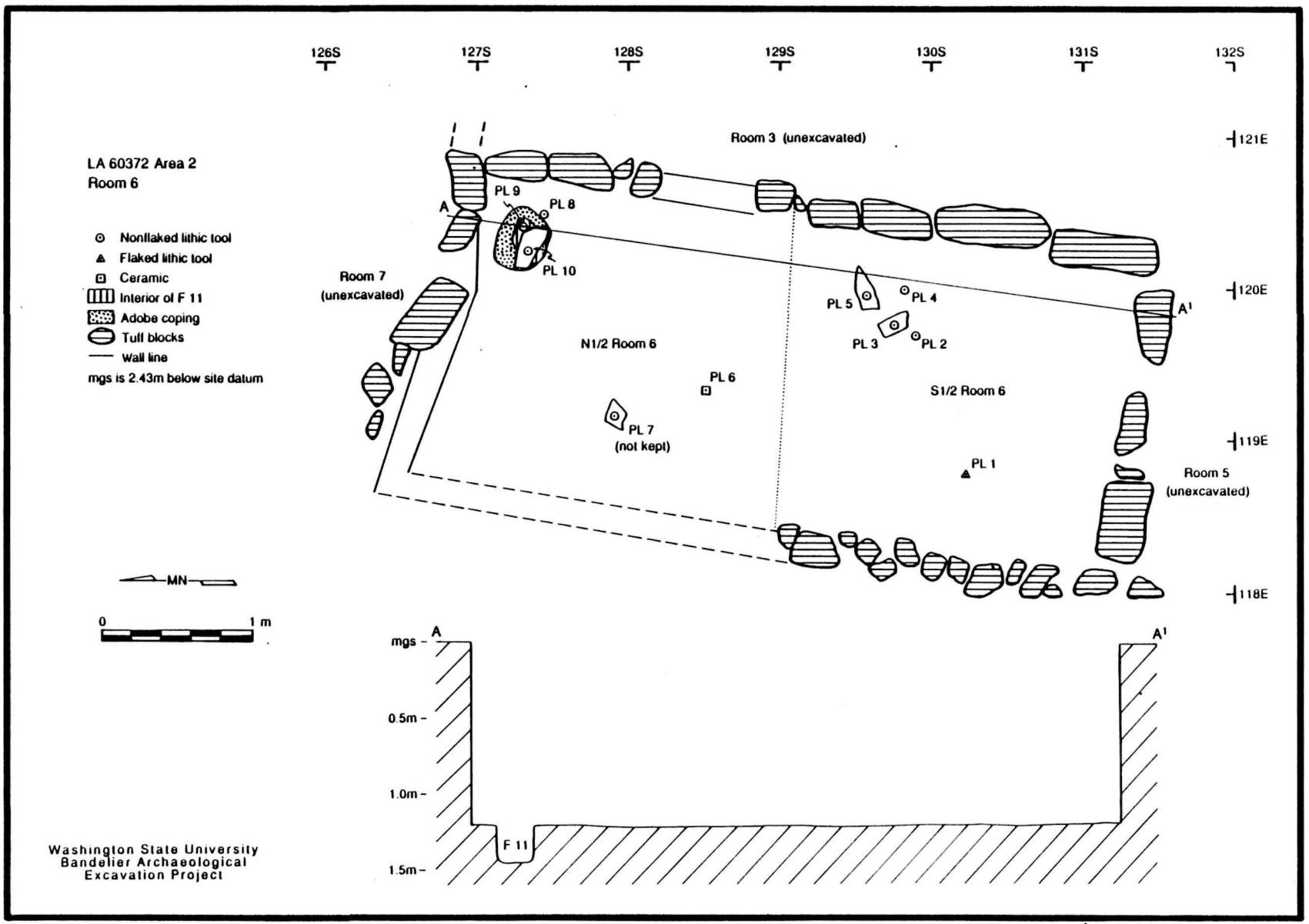


Fig. 4.12. Room 6 showing point-located artifacts.

masonry. Two layers of plaster were visible on the east, west, and south walls

The outside dimensions are as follows: the south wall measured 1.97 m in length; the west wall, 4.85 m; the north wall, 2.21 m; and the east wall, 4.48 m. The south wall currently stands 66 cm high; the west wall, 70 cm; the north wall, 89 cm; and the east wall, 79 cm. The number of courses observed in the west and east walls were 5, while the south wall had 6. The north and south walls appeared to abut the east and west walls, which therefore must have been constructed first. The average size of the tuff building blocks is 36.4 x 10.9 cm; a width of 25 cm can be estimated from those on the surface . The chinking materials average 9.2 x 4.3 cm in size.

The west wall was constructed in two different styles. Its northern portion had large blocks with mortar and chinking separating the courses. Smaller tuff cobbles with greater amounts of chinking and mortar were used in the southern half. The wall seam between the different masonry styles occurred 1.65 m N of the south wall. In the NE quadrant, above Feature 11, the plaster on the north wall showed evidence of sooting and finger and hand impressions. The south wall had large tuff blocks at floor level, with somewhat smaller but quite uniform blocks laid in horizontal rows above that bottom tier.

Summary and Inferences

Room 6 probably stood one story high. Unfortunately, although the masonry from the fill was stacked in the field, its volume was not measured before backfilling. The room lacks the floor features typical of a habitation room, and probably served as a storage room. The few artifacts found on the floor indicate grinding activities, although the room lacks evidence of mealing bins. The fill below Surface 2 may represent an earlier use of this area, or may represent fill brought in to help level the ground surface. In either case, there was possibly some local occupation before this room was constructed.

Sometime before final abandonment, some useful (and some useless) tools were cached in Feature 11 and the pit was sealed. Most of the artifacts found in association with Surface 1, and even most of the cached artifacts found in the sealed Feature 11, were broken. It appears that only relatively low value items were left behind during abandonment; either these artifacts were never needed, were forgotten, or became inaccessible when the structure collapsed. The roof of this room was apparently not burned at the time of, or after, abandonment, although it may have been burned only in very localized areas. The smaller amount of rubble in the profile, in comparison with Room 2, may suggest that the roof and the upper walls were dismantled so that their materials could be reused elsewhere. The relatively low density of artifacts in the fill perhaps indicates that this room was never used for trash disposal, perhaps because it was one of the later rooms used in the roomblock.

5

CERAMIC MATERIALS

Michele Gray

INTRODUCTION

A total of 42,600 analyzable sherds was recovered during the 1989 summer field season at LA 60372 from Areas 1 and 2. For convenience, these will be combined here with the 3982 sherds recovered from Burnt Mesa Pueblo in the 1988 season (Kohler 1989a); analysis protocols were kept as similar as possible for each season. Sherds smaller than a thumbnail with one or both surfaces missing were considered unanalyzable and were discarded.

In the field laboratory, sherds were first sorted into utility ware and service wares by provenience (FS number). Within proveniences they were sorted by traditional type, temper, vessel form, surface treatment, and post-manufacture modifications. Sherds which shared identical attributes in all these categories were considered a "lot" and were treated as a unit for the purposes of cataloging. For each lot, the total number of sherds, the number of rim sherds, and the total weight were recorded. Because materials from the same provenience could come into the lab several days apart, there were some lots which were identical for all attributes. Altogether, the ceramic file for LA 60372 contains 2878 lots; on the average, each lot contains slightly under 15 sherds.

The coding system appeared adequate to cover the range of variation observed for the attributes which were to be measured. For utility wares, type names such as Sapawi'i Washboard were abandoned in favor of descriptive terms for surface treatment, e.g. smeared-indented corrugated, while temper was recorded as a distinct attribute. For service wares, however, use of traditional type names was retained, although additional observations on the temper, presence and location of slip, and form, were also made. While use of such an approach helps insure that the collection can be compared with other similarly classified collections for the region, especially data recorded for the Bandelier survey, it also imparts all of the analytical problems inherent in a typological approach to ceramic analysis (see Plog and Hantman 1986; Hantman et al. 1984; Plog 1980; Redman 1977, 1978; LeBlanc 1975).

One problem, for example, was distinguishing between Santa Fe B/w (Black-on-white) and Wiyo B/w when many sherds seemed to combine attributes of both. In questioning various individuals familiar with the ceramics of the area about problematic sherds, it was interesting to note that there was little agreement about the classification of these "Wiyo-like Santa Fe" sherds. In this analysis these sherds were classified as Santa Fe Black-on-white with note made of the "Wiyo-like" attributes. Given the temporal duration of Santa Fe Black-on-White on the Pajarito Plateau (AD 1175-1400; McKenna and Miles 1989) and the range of variation, both technological and stylistic, an analysis of the distribution of specific attributes similar to that employed by S. Plog (1980) may be one way to gain more insight into both temporal issues and prehistoric social processes.

After the sherds were sorted by type, the temper was identified. Initially fresh breaks on all sherds were examined under a microscope at magnifications of from 10x to 30x. However, it soon became apparent that, for utility wares, this practice was unnecessary since there was little non-macroscopically visible variation in temper. Virtually all utility ware was tempered with fine quartz sand with occasional coarse quartz

inclusions. The main variations were sherds tempered with coarse sand or with mica and sand.

For the service wares, on the other hand, the practice of examining a fresh break on each sherd microscopically was continued for all sherds. While most service ware sherds were tempered with tuff and fine sand, other materials in addition to fine sand were occasionally used along with tuff (which itself was almost universally present in the Burnt Mesa black-on-white ceramics). An interesting case involved several sherds from Area 1 that, based on the exterior treatment, could be coded as smeared-indented corrugated; however, the interior was slipped and painted, typically with an annular design. Furthermore, while the paste looked similar to that in Santa Fe B/w, these vessels were apparently tempered with fine sand with occasional coarse quartz inclusions as if they were utility ware. Because these sherds were so few in number, however, they were coded as PIII/IV carbon-on-white rather than designated as a new type, until and unless significantly more sherds with this particular combination of attributes are recovered in subsequent excavation at LA 60372 or other sites in the region.

Each sherd was then coded for form. If a utility ware sherd showed attributes indicating that it was a bowl, i.e. smoothed interior, or the shape indicated it was a miniature, ball, handle or pipe, it was coded as such. Otherwise it was assumed that utility ware sherds were from jars. In the case of service ware similar guidelines were employed. If a body sherd was slipped on the inside or on both the inside and the outside, or it was unslipped but decorated on the inside, the sherd was coded as from a bowl. If it was just slipped or decorated on the exterior, it was coded as from a jar. In the case of rim sherds, the apparent degree of restriction provides additional information on form.

Some fragments of miniature vessels and figurines were also found, and pipes, balls, and handles were identified. If vessel form could not be determined the sherd was coded as indeterminate for form. This category also included a number of what appeared to be lumps of clay which may have been fired incidentally, as well as several fragments of what looked like broken pottery coils. These miscellaneous ceramic pieces were coded as unknown utility in the traditional type field.

AREA 1

Utility wares

In Area 1, 37,674 analyzable sherds were recovered, of which 87.38% were utility ware. Of these, 6.86% came from subarea 1 (the roomblock), 40.83% from subarea 2 (the plaza), and 52.31% in subarea 4 (the midden). Table 5.1 illustrates the distribution of utility wares in these three subareas. Since additional investigations remain to be done, no attempt is made in this report to assess the possible statistical significance of these differences.

Table 5.1. Utility Wares in Area 1 by Subarea.

	--- Subareas (column %) ---				
Traditional Types	1	2	4	Row n	Row %
corrugated	0.93	1.96	1.42	497	1.51
smeared corrugated	0.44	0.17	0.16	59	0.18
indented corrugated	0.75	3.55	0.39	562	1.71
smeared-indented corrugated	94.47	90.01	92.98	30,239	91.87
plain gray	2.92	3.65	2.67	1016	3.09
striated plain	0.00	0.01	0.06	13	0.04
tooled/incised/appliquéd plain	0.04	0.04	0.03	13	0.04
unknown utility	0.44	0.61	2.46	513	1.56
historic utility	0.00	0.00	0.00	1	0.00
Column totals (n)	2259	13,438	17,216	32,913	

Some interesting distributional patterns for utility ware in Area 1 can be seen. Looking first at the rarer types, it is arguable that the single piece of historic utility ware is intrusive, especially since it was found in the external area (subarea 4). Given the small sample size for the striated plain and the tooled/incised/appliquéd plain, it would be problematic to suggest that their distribution represents a meaningful pattern. The more common types appear to be fairly evenly distributed, however.

The largest patterned departure from this even distribution is in the relatively low frequencies of smeared-indented corrugated in the plaza (subarea 2), where there are, conversely, relatively high frequencies of indented corrugated. By contrast, roomblock proveniences of subarea 1 (mostly room fills; only one room surface was excavated) contain relatively high frequencies of smeared-indented corrugated and smeared corrugated and relatively low frequencies of indented corrugated.

According to McKenna and Miles (1989) indented corrugated dates to between A.D. 1150 and 1350. Smeared-indented corrugated is dated to between A.D. 1250 and 1400, corrugated to between A.D. 1350 and 1450 (very tentative), smeared corrugated to between AD 1400 and 1500 (again very tentative), and plain gray is undated as a type in McKenna and Miles (1989) for Bandelier. Given these dates, a possible interpretation is that the roomblock excavations intercepted some relatively late proveniences, while the plaza excavations recovered some materials from relatively early in the occupation of the site. In fact, some roomblock proveniences may be even later than they appear to be, based on these sherd counts, since a substantial (but unquantifiable) number of sherds incorporated in chinking, which disintegrated into the fill, were recovered. Since these must have been from vessels made and broken before the building or remodeling of the rooms from which they came, their admixture imparts a conservative influence to the ceramic assemblage. Of course, until the roomblock is more thoroughly sampled, any interpretation of the temporal significance of ceramic distributions must be considered very tentative.

Service Wares

Four thousand seven hundred and fifty six service ware sherds were recovered from Area 1, 12.62% of the total sherds recovered from this area. Of these, 7.2% were found in subarea 1, inside rooms; 46.6% in subarea 2, the plaza; and 46.2% in subarea 4, the midden (Table 5.2).

The bulk of the service wares, 96.80%, is made up of whitewares, with Santa Fe B/w comprising 62.7% of that total in Area 1. Wiyo Black-on-white contributed 8.2%, and Kwahe'e Black-on-white 0.7%. Whiteware for which a definite type could not be assigned, usually because there was not paint visible on the sherd, comprised 24.2%. Other types represented in very low amounts were Santa Fe Basket Impressed, 0.23%, PIII/IV carbon-on-white 0.6%, plain buffware 0.2%. Other types which were represented by between one and five sherds total include Socorro B/w, Galisteo B/w, P II/III mineral-on-white, and smudged red.

The PII/III mineral-on-white and PIII/IV carbon-on-white type designations included those sherds for which a specific type name could not be assigned even though the type of paint used was identified, usually because they combined attributes of distinctive types, or because not enough attributes were clearly present to make such a determination. In the latter class, for example, are those sherds, with exteriors treated as though they were a utility ware, from bowls with painted interiors.

Santa Fe B/w (A.D. 1175-1400; McKenna and Miles 1989) appears to be fairly evenly distributed. It makes up 60.3% of the service ware in subarea 1, 63.1% in subarea 2, and 62.7% in subarea 4. Whiteware nfs (not further specified) is a little more common in the midden area, making up 20.4% of the service ware in subarea 1, 22.7% in subarea 2, and 26.7% in subarea 4. Kwahe'e B/w is not found in room fill at all. Only 0.2% of the total number of service ware sherds found in the plaza are Kwahe'e B/w, and 1.3% of the total from the midden. This pattern is interesting in light of the fact that Kwahe'e B/w is the earliest white ware in the sequence (A.D. 1050-1250; McKenna and Miles 1989) although given the small sample size it is not likely to be significant. Wiyo B/w (A.D.

Table 5.2. Service and Glaze Wares in Area 1 by Subarea.

	--- Subareas (column %) ---				
Traditional Types	1	2	4	Row n	Row %
smudged red	0.00	0.04	0.00	1	0.02
plain buffware	0.29	0.18	0.18	9	0.19
Kwahe'e B/w	0.00	0.18	1.27	32	0.67
Socorro B/w	0.00	0.09	0.00	2	0.04
Santa Fe B/w	60.29	63.03	62.66	2981	62.68
Wiyo B/w	15.29	9.25	6.09	391	8.22
Galisteo B/w	0.00	0.09	0.14	5	0.11
PII/III M/w	0.00	0.09	0.00	2	0.04
PIII/IV C/w	0.29	0.86	0.36	28	0.59
whiteware nfs	18.24	22.69	26.70	1152	24.22
Santa Fe Basket Impressed	0.29	0.18	0.27	11	0.23
Biscuit A	0.89	0.68	0.91	38	0.80
Biscuit B	1.47	0.23	0.64	24	0.50
Biscuit nfs	0.00	0.04	0.00	2	0.04
St. Johns B/r	0.00	0.00	0.04	1	0.02
St. Johns Polychrome	0.00	0.45	0.00	10	0.21
White Mountain redwares nfs	0.00	0.00	0.04	1	0.02
Agua Fria G/r	0.59	0.00	0.04	3	0.06
Espinoso Polychrome	0.00	0.04	0.00	1	0.02
San Lazaro Polychrome	0.29	0.04	0.00	2	0.04
Glaze/red nfs	0.89	0.77	0.18	24	0.50
Glaze/yellow nfs	0.00	0.18	0.14	7	0.15
Glaze/polychrome nfs	0.59	0.27	0.18	12	0.25
Glaze nfs	0.59	0.59	0.09	17	0.36
Column totals (n)	340	2217	2199	4756	

1300 - 1400; McKenna and Miles 1989) is more common in room fill (15.3% of the total service ware in subarea 1) than in the plaza or the external subareas (9.3% and 6.1% respectively).

Glaze wares comprised 1.39% of the total, and biscuit ware 1.35%, whereas White Mountain redwares were represented by only twelve sherds. Of the total of 66 glaze ware sherds which were found in Area 1, most were found in subarea 2, the plaza. Correcting for the higher frequencies of all sherd types in subarea 2, however, subarea 1 contains the highest relative frequencies of most of the rare glaze and biscuit ware types at the site. There were no White Mountain Redwares found in room fill. All of the St. John's polychrome, ten sherds, was found in the plaza, while a single sherd each of St. John's B/r (Black-on-red) and a White Mountain redware nfs were found in subarea 4.

The temporal information inferred from these service ware distributions generally underwrites conclusions derived above from the utility wares. Higher relative frequencies of Wiyo B/w, glaze and biscuit wares, and low relative frequencies of earlier White Mountain redwares and Kwahe'e B/w generally make subarea 1 (the roomblock) appear later in part than either the plaza or the external areas. At least two interpretations seem plausible: either trash disposal very late in the occupation of the site was primarily in adjacent, already abandoned rooms, rather than in the plaza and external areas used earlier, or else there is a veneer of materials deposited during a later reuse of the roomblock (perhaps for a fieldhouse) on top of (and perhaps significantly after) the main occupation. Although detailed, stratum by room breakdowns of materials cannot be undertaken in a report of this sort, it is clear that the upper fills of Room 1 tend to contain higher relative

frequencies of late service wares than do the fill and floor of Room 10; Room 1 may have been near the focus of the latest occupation of the site.

Vessel Form

Virtually all utility ware appears to be jars. In subarea 1 there were 2220 utility ware jar sherds, 98.3% of the total number of utility ware sherds. In subarea 2 there were 13,360 utility ware jar sherds, 99.4% of the total. In subarea 4 there were 16,861 utility ware jar sherds, 95.2% of the total.

The service ware category, on the other hand, is primarily made up of bowl sherds. Table 5.3 summarizes the vessel forms for white wares by subarea. With the exception of one whiteware nfs pipe from Room 1, all of the whiteware nfs in the "other" category in Table 5.3 represents sherds coded as indeterminate, i.e., they could have been either bowls or jars since they were unslipped and undecorated, and the shape of the sherd and the surface preparation were such that there was no way to distinguish jar fragments from bowl fragments. These sherds were typically very small, although not small enough to be discarded.

Clearly bowls were the dominant form of service ware with very little variation in the ratio of bowls to jars between types. For each type (except whiteware nfs) bowl fragments comprise between 94.1 and 100 percent of the total for that type, while jars sherds make up a little more than 3% of the total for Kwahe'e B/w and Santa Fe B/w. Wiyo B/w jar sherds are a little rarer making up only about 1.8% of the total. The one exception is the slightly higher concentration of Santa Fe B/w jar fragments in the plaza.

There were 278 sherds coded as miniatures, 14 as handles, three as ladles, 10 as effigies, 10 as pipes and nine as balls. All of the preceding were coded as utility ware, either based on temper and paste or on surface treatment or both, with the following exceptions: one Santa Fe B/w miniature sherd in subarea 2 (the plaza), one Santa Fe B/w miniature sherd in subarea 4 (80S 74E), one Santa Fe B/w handle in Room 10, one whiteware nfs

Table 5.3. Whiteware Vessel Form for Area 1 by Subarea.

	--- Subareas (column %) ---			
Traditional type	1	2	4	Row n
Kwahe'e B/w				**32**
bowls	0.00	100.00	96.43	31
jars	0.00	0.00	3.57	1
other	0.00	0.00	0.00	0
Santa Fe B/w				**2981**
bowls	96.58	94.13	98.91	2877
jars	2.92	5.72	1.02	100
other	0.49	0.14	0.07	4
Wiyo B/w				**391**
bowls	100.00	98.05	94.78	340
jars	0.00	1.95	2.24	7
other	0.00	0.00	2.98	4
Whiteware nfs				**1152**
bowls	91.93	88.07	85.69	1003
jars	4.83	2.38	2.04	27
other	3.22	9.54	12.86	122
Other B/w				**37**
bowls	100.00	100.00	100.00	37
jars	0.00	0.00	0.00	0
	0.00	0.00	0.00	0

pipe in Room 1, one smudged red pipe in the plaza, and one plain buffware pipe in subarea 4 (70S 82E).

In terms of distribution, there were 26 miniatures in subarea 1 (9.4% of the total miniatures in Area 1). Of these 22 came from Room 10. There were 119 miniatures in subarea 2 (42.8%), and 134 miniatures in subarea 4 (48.2%), of which 90 came from one unit, 80S 74E. Miniatures form 0.7% of the total number of sherds found in Area 1.

AREA 2

Utility wares

A total of 8897 analyzable sherds was recovered from Area 2. Of these, 83.9% were utility wares. The utility ware from subarea 1 (the roomblock) accounts for 44.4% of the total, while that from subarea 2 accounts for 55.7% of the total utility ware for Area 2. Table 5.4 breaks down the distribution of utility wares into subarea 1 (Rooms 2, 4, and 6, which includes 5 x 5 m unit 131S 119E) and subarea 2 (the external area).

The distribution of smeared-indented corrugated (85% of the total utility ware for this area) clearly influences the overall pattern. Given the late date for smeared corrugated (A.D. 1400-1500), the low number of sherds found (0.4% of the total utility ware for Area 2), and the fact that most of those were found in the midden subarea, and in the upper levels of those units, at that, a strong argument can be made that this particular type is probably intrusive in Area 2, representing perhaps a later occupation or reuse of this area or of Area 1.

Indented corrugated sherds are much better represented in the roomblock than in the midden. Within the roomblock, this category makes up 18.8% of the utility wares in Room 2; 10% of the utility wares in Room 6, but only 5.5% of the utility wares in Room 4. This rather striking difference in the distribution of this earliest type (ignoring the rare, problematic Lino Gray) of utility ware may reflect an earlier use and abandonment for Room 2 than for the more southern portions of the roomblock, unless some unrecognized factors involving differential use, breakage, and deposition for various utility wares confound the temporal interpretation. As in Area 1, the bulk of the unknown utility ware was found outside the roomblock.

Service Wares

One thousand four hundred and thirty one analyzable service ware sherds were recovered from Area 2, amounting to 16.1% of the total analyzable sherds recovered from Area 2. Table 5.5 summarizes the distribution of these types by subareas.

In Area 2 glazes and biscuits are so uncommon that they probably can be considered intrusive. White Mountain redwares were represented by sixteen sherds, making up 1.1%.

Table 5.4. Utility Wares in Area 2 by Subarea.

	Subareas (column %)			
Traditional types	1	2	Row n	Row %
Lino Gray	0.12	0.00	4	0.05
corrugated	1.09	0.60	61	0.82
smeared corrugated	0.24	0.53	30	0.40
indented corrugated	9.36	2.84	428	5.73
smeared-indented corrugated	83.27	86.42	6348	85.03
plain gray	4.89	2.89	285	3.82
striated plain	0.00	0.05	2	0.03
tooled/incised/appliquéd plain	0.03	0.00	1	0.01
unknown utility	0.91	6.67	307	4.11
Column totals (n)	3311	4155	7466	

Table 5.5. Service and Glaze Wares in Area 2 by Subarea.

Traditional Types	Subareas (column %) 1	2	Row n	Row %
Potsuwi'i Incised	0.00	0.48	3	0.21
plain buffware	0.25	0.96	8	0.56
Kwahe'e B/w	0.50	1.27	12	0.84
Santa Fe B/w	68.16	47.05	843	58.90
Wiyo B/w	3.86	12.12	107	7.48
Galisteo B/w	0.00	0.32	2	0.14
PIII/IV C/w	0.37	0.64	7	0.49
whiteware nfs	25.75	34.60	424	29.63
Santa Fe Basket Impressed	0.12	0.32	3	0.21
Biscuit A	0.37	0.16	4	0.28
Puerco B/r	0.00	0.32	2	0.14
St. Johns B/r	0.25	0.16	3	0.21
St. Johns Polychrome	0.25	0.96	8	0.56
White Mountain redwares nfs	0.12	0.32	3	0.21
Glaze/yellow nfs	0.00	0.16	1	0.07
Glaze nfs	0.00	0.16	1	0.07
Column totals (n)	804	627	1431	

As in Area 1, the bulk of the service wares, 94.4%, was made up of whitewares, with Santa Fe B/w comprising 56.9% of the total service ware in Area 2. Wiyo B/w contributed 7.2%, and Kwahe'e B/w 0.8%. Whiteware for which a definite type could not be assigned comprised 28.6%. Other types represented in very low amounts were Santa Fe Basket Impressed, 0.2%, P III/IV carbon-on-white 0.5%, plain buffware 0.5%, Galisteo B/w 0.1%, and Potsuwi'i Incised 0.2%.

The most striking differences in service ware distribution between the subareas is in Santa Fe B/w (relatively much more common in subarea 1) and in Wiyo B/w and whiteware nfs (relatively more common in subarea 2). Different formation processes for these different subareas probably contribute to these differences. The materials from Area 2 subarea 1 contain a relatively higher proportion of floor assemblage materials (including both primary and de facto refuse) than do the collections from subarea 1 in Area 1. Therefore, the relatively greater importance of whiteware nfs in subarea 2 is probably due to the smaller size of sherds in these areas of secondary refuse deposition, rather than to temporal or other functional factors. However, the greater importance of Wiyo B/w in subarea 2, compared with the roomblock, cannot be explained by these same processes and may be due to contamination from the later occupation in Area 1.

Within the roomblock, the suggestion (based on distribution of utility wares) that Room 2 was in use and was abandoned relatively earlier than Room 4 is not borne out by the ratios of Wiyo B/w to Santa Fe B/w (that ought to provide a simplistic chronological yardstick). In Room 2, seven sherds of Wiyo B/w were recovered, versus 28 sherds of Santa Fe B/w, for a ratio of 0.25. For Room 4 (excluding the upper fills sampled as 5 x 5 m unit 131S 119E) the equivalent ratio is only 0.08, based on 2 sherds of Wiyo B/w and 26 sherds of Santa Fe B/w; if we include the materials from the 5 x 5, the ratio drops to only 0.05. Given this conflicting ceramic evidence, probably affected by sample sizes for the whitewares that are so small as to be unstable, absolute dates will be important in distinguishing any differential period of use for these rooms. These dates, reported in chapters 4 and 9, tend to suggest that Room 4 is earlier than Room 2, although Kohler argues in Chapter 9 that the tree-ring dates for Room 4 are so early that they may reflect reuse of wood from another site. Moreover, the tree-ring dates from Room 4 are not cutting dates, although they do weakly cluster.

Unfortunately, the suite of archaeomagnetic samples taken from the hearth in Room 4 was too variable to provide a precise polar determination.

Any formation processes that result in relatively high proportions of whiteware nfs for subarea 2 cannot account for the relatively higher proportion of Wiyo B/w in the external areas. It may be that some portions of what we sampled as external area for Area 2 might have been better associated with Area 1. Two by two 144S 134E has the highest Wiyo/Santa Fe ratio of the external units, with 5 sherds of Wiyo for 11 sherds of Santa Fe (for a ratio of .46, versus an average ratio for the other three units of 0.14). Of all the external units, however, this one is the farthest from the Area 1 roomblock. If not solely the result of unstable sample sizes, the apparent enrichment of Wiyo relative to Santa Fe in this area may be either the result of some unrecognized outside activity area or structure in this portion of the site used by the occupants of Area 1, or may reflect the inclusion of some sherds with the burial encountered in that unit. During excavation, it was hypothesized that this burial related to the occupation of Area 1, rather than Area 2, because of its shallow stratigraphic position and because of the larger and more durable occupation hypothesized for Area 1. The relatively high proportion of Wiyo B/w in this unit weakly corroborates this hypothesis, although nothing recognizable as grave goods was recovered during excavation.

Vessel Form

As in Area 1, virtually all of the utility ware sherds appear to be from jars. In subarea 1 there are 3248 utility ware jar sherds, 98.1% of the total number of utility ware sherds. In subarea 2 there are 3998 utility ware jar sherds, 96.2% of the total.

Service wares, on the other hand, are primarily made up of bowl sherds. Table 5.6 summarizes vessel forms for whitewares by subarea.

In the category "other" for whiteware nfs, all but one sherd was classed as indeterminate, meaning that they could have been from either

Table 5.6. Whiteware Vessel Form for Area 2 by Subarea.

	Subareas (column %)		
Traditional type	1	2	Row n
Kwahe'e B/w			**12**
bowls	100.00	100.00	12
jars	0.00	0.00	0
other	0.00	0.00	0
Santa Fe B/w			**843**
bowls	96.90	97.97	820
jars	2.37	2.03	19
other	0.73	0.00	4
Wiyo B/w			**107**
bowls	96.77	97.36	104
jars	3.23	2.63	3
other	0.00	0.00	0
Whiteware nfs			**424**
bowls	92.27	76.50	357
jars	4.35	0.92	11
other	3.38	22.58	56
Other B/w			**9**
bowls	100.00	100.00	9
jars	0.00	0.00	0
other	0.00	0.00	0

bowls or jars, since they were unslipped and undecorated, and the shape of the sherd and the surface preparation were such that there was no way to distinguish jar fragments from bowl fragments. The single exception was a sherd which was coded as being a handle from subarea 2 (2 x 2 m unit 144S 134E).

Forty seven sherds were coded as miniatures, two as effigies, one as a pipe and two as balls. Except for four sherds coded as miniatures all of the preceding were coded as utility ware, either on based on temper and paste or on surface treatment or both. The pipe and the two ball sherds were from subarea 1, while the two effigy fragments were from subarea 2. There were 23 miniatures in subarea 2 and 24 in subarea 1. These were all coded as utility wares with the following exceptions: one plain buffware miniature sherd in subarea 2 and three Santa Fe B/w miniature sherds from subarea 1 (Room 4). Miniatures form 0.5% of the total number of sherds found in Area 2.

COMPARISON OF AREAS 1 AND 2

Utility Wares

In both areas smeared-indented corrugated makes up the bulk of the ceramic materials recovered, 71.3% of the total collection for Area 2 and 80.3% for Area 1. If we look just at the distribution of utility ware, smeared-indented corrugated comprises 85.0% of the total utility ware for Area 2 and 91.9% for Area 1, showing an increase of about seven percent. This trend is complemented by a decrease in indented corrugated, from 5.7% of the total utility ware in Area 2 to only 1.7% in Area 1. These differences are consistent with the hypothesis of a generally earlier occupation for Area 2 than Area 1. Plain gray stays about the same, as does smeared corrugated. Corrugated accounts for 0.8% of the total utility ware for Area 2, while in Area 1 it accounts for 1.5% of the total which is also to be expected since corrugated has been assigned a relatively late date, AD 1350-1450 (McKenna 1987). The category unknown utility decreases from Area 2 to Area 1, from 4.1% of the total utility ware in the former to only 1.6% in the latter. Until more is known about the processes which resulted in these fired clay lumps, it is difficult to offer an interpretation of this change.

Service Wares

Overall, there is relatively more service ware in Area 2 (16.9% of the total) than in Area 1 (where service wares constitute 12.6% of the total). The percentage of Santa Fe B/w (computed over all service wares) increases markedly from 58.9% in Area 2 to 62.7% in Area 1, while the relative frequency of Wiyo also increases, but very slightly. The other major types of whiteware remain about the same, although sherds coded as whiteware nfs decrease slightly from 29.6% in Area 2 to 24.2% in Area 1. An intriguing, unexplained difference between these two areas is in where these types occur within each area. In Area 2 Santa Fe B/w is more common inside the roomblock than outside, while Wiyo B/w is more common outside. This pattern is reversed in Area 1.

Relative frequencies of bowls and jars in Areas 1 and 2 are very similar. For all types of service ware, most sherds were apparently bowl fragments. When these areas are compared by traditional type for variation in vessel form, they appear virtually the same, with the exception that Area 1 has a few Kwahe'e B/w jar sherds (3.1% of Kwahe'e sherds) while Area 2 has none. When broken down by subarea, an interesting similarity appears, given the low number of jars of any type of service ware. In both Areas 1 and 2, between four and five percent of the whiteware nfs sherds in room fill are jar sherds. With one exception, this represents the highest concentration of service ware jar sherds. The exception is Santa Fe B/w in Area 1, subarea 2, the plaza. In that subarea 5.7% of the Santa Fe Black-on-white sherds are jar sherds. However, for purposes of comparison between Areas 1 and 2 Santa Fe B/w jar sherds are only a little more common in Area 1 (3.4% in Area 1, 2.3% in Area 2). On the other hand Wiyo Black-on-white jar sherds are a little more common in Area 2, but again only by about one percent (1.8% in Area 1, 2.8% in Area 2).

For both areas it is important to keep in mind that the relatively high percent of whiteware nfs classed as "other," rather than as bowls or jars, are actually sherds which were classed as indeterminate, meaning that they were probably either bowls or jars, yet because of their size and the lack of surface decoration such a determination could not be made. It is probably a safe

assumption, however, that the ratio of bowls to jars would not change much if these sherds had been identified as to form.

Temper

As mentioned earlier virtually all utility ware was tempered with fine sand with occasional quartz inclusions. Micaceous-tempered variants are very rare: in Area 1 there were two utility ware sherds that included mica as one component of the temper, while in Area 2 there was only one such sherd. The other variation in temper for utility ware was coarse sand. Utility ware tempered with coarse sand accounted for only 0.71% of the total utility ware in Area 1, whereas it accounted for 7.00% in Area 2. This pattern suggests a shift away from coarse sand as a tempering agent. Under magnification (40x), what appeared to be fine sand with occasional coarse quartz inclusions looked remarkably similar in terms of range of grain size and the angularity of the grains to a sample of coarse anthill sand which had been crushed for five minutes using a mano and metate. Of course petrographic studies are still needed to verify all of the temper categories.

With regards to the service ware, by definition the White Mountain Redwares in both areas were tempered with crushed sherds and virtually all of the glaze wares with tuff and crushed igneous rock. Biscuit ware was consistently tempered with tuff. The white wares were also almost universally tempered with tuff, but also almost universally included other materials, typically fine sand, although occasionally other materials may have been added. The greatest variation, however, appeared to be in the size and frequency of the added materials, e.g., small and dense quartz grains as opposed to large and sparse black inclusions. These distinctions, although observed during analysis, were not recorded because, given the restrictions of time, money, and facilities, it was not possible to meaningfully sample the collections or accurately identify the various inclusions. It would be interesting, however, to perform petrographic analyses on a selected sample from each area to see how these differences are manifested spatially and temporally.

Area 2 lacks any service ware tempered with mica, while Area 1 has eight sherds that include mica as a component of their temper, and one additional whiteware sherd with a micaceous slip. This fact may, however, be merely a function of differences in sample size. In terms of traditional types, these sherds were coded as follows: two Wiyo B/w, two whiteware nfs, one PIII/VI carbon-on-white, and three Santa Fe B/w sherds. The sherd with the micaceous slip was coded as whiteware nfs.

CONCLUSIONS

Ceramic typologies have traditionally been a useful, although not particularly precise, tool in establishing chronologies. There are certain limitations, however. For instance, even with narrowly defined and dated ceramic types, assigning sites to phases of less than 75 years in length is difficult at best (Plog and Hantman 1986). In the case of Burnt Mesa, these problems are compounded by the fact that the ceramics, if dated at all, appear to have been manufactured over a long period of time, and by the fact that some chronologically important ceramic types (Wiyo B/w and Santa Fe B/w) contain overlapping attributes, rendering their classifications arbitrary, and their ratios, possibly misleading.

In order to resolve some of these issues, two lines of research are being pursued. The first, in collaboration with Judith Miles, is an attempt to build calibration data sets (in the sense of Kohler and Blinman 1987) using ceramic assemblages from the most securely dated proveniences on the Pajarito Plateau and adjacent areas to characterize periods by the mixes of ceramic materials generated in each. This is a typological approach, but utilizes entire ceramic assemblages rather than subsets of the service wares; combinations of ceramic types yield much more precise temporal information than do the presence or absence of particular types. Using multiple linear regression techniques we can recognize the relative contribution of the periods we ultimately define, either in the counts of surface ceramic materials recorded during the NPS survey of Bandelier, or in excavated proveniences.

The second project is an attribute analysis of stylistic variation now being performed on all of the Santa Fe and Wiyo sherds recovered from LA 60372. Once completed, it is hoped that similar analyses can be performed on sites of equivalent

character and age for comparison. Although only a small sample of the sherds have been coded so far (200 from Area 1 and 100 from Area 2) some interesting trends are already becoming apparent. For example, it appears that there was a more diverse set of designs in use in Area 2. Furthermore, the designs appear to have been more finely executed and tend to start immediately below the rim of the vessel. Line widths in Area 1 are generally thicker and the designs are generally separated from the rims by one or more bands. Finally, it appears that slipping was more common in Area 2 whereas polishing was more common in Area 1.

Given that this examination is still in its earliest stages, these trends must be considered extremely tentative. Once completed, however, this analysis ought provide certain objectively definable, temporally sensitive criteria for addressing the problems of chronology posed by Burnt Mesa Pueblo.

6

LITHIC MATERIALS

Mark Slaughter

INTRODUCTION

The descriptive analysis of the combined lithic data sets recovered from LA 60372 (Burnt Mesa Pueblo) in 1988 and 1989 is presented in this chapter. Special attention is paid to defining differences in raw material procurement, reductive strategies, and tool use from the two areas in this site.

The analysis of lithic materials is based heavily on Dolores Archaeological Project protocols (Phagan and Hruby 1984) as amended by Root (1989) to address the specific research concerns of this project and to streamline handling of debitage through mass analysis. Coding formats, and specific definitions for each of the codes used in the analysis, are presented in Appendices B, C, and D of Kohler (ed., 1989).

When lithic materials were received into the field lab from excavation we would remove the remaining sediments from the surface of most of the lithics. Removal of sediments from artifacts occurred after inspecting surfaces and edges to identify and remove any artifacts from washing where important information (such as residual hemoglobin, organic stains, and hematite deposits) might have been lost. The cleaned materials were then sorted into three main categories: flaked lithic debitage, nonflaked lithic tools, and flaked lithic tools.

Within provenience (FS) units, the flaked lithic debitage was first sorted by raw material type. Identification of material type for the project area, as defined by Phagan (n.d.), is based on visual identification using descriptive categories. Material variants from major, well understood source areas are incorporated into the analysis system by using categories such as "Cerro Pedernal" and "atypical Cerro Pedernal." As noted by Root (1989), the accuracy of descriptive categories for obsidian (probably Jemez, probably Polvadera, and probably Jemez opaque) will not be known until chemical tests can be completed. Jemez obsidian can come from a variety of source localities in the Jemez mountains (Baugh and Terrell 1982; Newman and Nielson 1985).

After the debitage was separated into raw material types it was size-graded using geologic sieves of 1", 0.5", and 0.25." If any debitage passed through the last screen, it was retained by a pan. Information was thus recovered for four size grades of debitage. Of course, since most materials in the field were obtained with a 0.25" mesh, the <0.25" class is vastly underrepresented. A "lot" of debitage (that might include one or many items) was made up of all items from a single provenience of the same size and raw material type. Within each lot, counts of several flake technological classes were recorded: primary decortication, secondary decortication, shatter, bipolar, bifacial thinning, alternate, and "other" flakes. The lot was weighed as a unit.

Nonflaked stone tools were treated differently. Each of the nonflaked lithic tools was analyzed and recorded individually. An artifact was first weighed and then its length, width, and thickness measured with calipers. For each item, raw material, morpho-use, blank type, item condition, production stage, use phase, haft characteristics, pecking, crushing and/or battering, flaking, polishing, light striation and/or smoothing, and heavy striation and/or grinding, were recorded. Much of the analysis (and especially the identification of possible use-related signatures such as polishing and grinding) required close examination with a stereozoom microscope at low power (10-70x).

Flaked lithic tools were treated similarly to the nonflaked lithic tools. Each artifact was weighed and measured. Tools were then classified by condition, raw material type, morpho-use, use-phase, primary functional class, other functional class relationship, haft characteristics, and proportion of cortex. As with the nonflaked tools, the flaked tools were closely examined with a stereozoom binocular microscope to identify edge-wear damage (as defined by Ahler 1979) and possible residues on margins or surfaces.

In general, the analysis system seems to be effective in gathering information without burdening the analyst with time-consuming tasks. Size-grading by geologic screens is especially time saving. Nevertheless, minor problems were encountered in the system. In the morpho-use classes for the nonflaked tools, for example, "no allowance is made for multifunctional or recycled tools" (Root 1989:70). Excavations at Burnt Mesa Pueblo did yield recycled materials. Additional problems involve distinguishing between use-wear and postdepositional modification to margins of unmodified flakes. Numerous flakes were found to have edge damage in the form of small flakes that produced a variety of terminations that could be confused with use-wear. Root (1989) had similarly noted that modification to the margins on some otherwise unmodified flakes probably occurred from trampling and/or natural postdepositional movements; experiments on archaeological recovery and treatment (Schutt 1979: 355-381) can be used to draw the same conclusion. The arris (or guide ridge) of some flakes also exhibit pronounced rounding, possibly due to various postdepositional processes.

Finally, the technological status of "other" flakes in the debitage analysis is a source of both interest and some worry. "Other" flakes come from a variety of reductive strategies; many are from the production of flake blanks. These flakes, as indicated by the dorsal flake scar patterns, were removed from multidirectional cores.

AREA 1

Flaked Lithic Debitage

Debitage from Area 1 of Burnt Mesa Pueblo exhibits a variety of raw material types and reductive strategies (Table 6.1). Three thousand and forty one pieces of debitage were recorded. Two raw materials dominate the assemblage: basalt (n=1542) and Pedernal chert (n=1253). Basalt represents over fifty percent all the flaked lithic debitage found at this site and Pedernal chert over forty percent. The nearby Jemez obsidian is the third most common raw material (n=104).

The Pedernal chert includes a high proportion of primary and secondary decortication flakes. Their presence suggests that at least some Pedernal chert was brought to the pueblo with cortex, to be further reduced on the site. Pedernal chert also has a high proportion of shatter produced by percussion. Shatter makes up the third highest proportion of the diagnostic technological classes from Area 1, indicating the common reduction of large pieces of stone by percussion.

Bifacial thinning flakes are the most frequent of all the categories diagnostic of particular reduction techniques; the prehistoric inhabitants of Burnt Mesa were clearly manufacturing bifaces at the site. High counts of bifacial flakes were produced from basalt, Pedernal chert, atypical Pedernal chert, Jemez obsidian, and opaque Jemez obsidian. Basalt (n=371) and Pedernal chert (n=282) were bifacially reduced more frequently than other raw materials. Jemez translucent and Jemez opaque obsidians both have high relative frequencies of bifacial thinning flakes, however. Over 23% of Jemez obsidian is coded as bifacial thinning, and almost 20% of Jemez opaque obsidian are bifacial reduction flakes. The high count of bifacial thinning flakes from Area 1 is due to local reduction of raw materials into bifaces and cores.

Alternate flakes are the second most common of all diagnostic flake lithic debitage classes from Area 1. Alternate flaking is mostly associated with basalt (n=159), but was also used with Pedernal chert (n=21). Alternate flakes result from preparing edges for further reduction, the most likely being sequent bifacial reduction. About one-third of the basalt alternate flakes have cortex on their surfaces. Their importance is attributed to the local reduction of tabular pieces of stone that would have been further modified using bifacial reduction (Root 1989).

Seven bipolar flakes were made from basalt and three from Pedernal chert. The other two

Table 6.1. Debitage Raw Material by Technological Classes, Area 1.

	Primary Decort.	Secon. Decort.	Shatter w/cor.	Shatter w/o cor.	Bipolar w/o cor.	Bif. thin. w/cor.	Bif. thin. w/o cor.	Altem. w/cor.	Altem. w/o cor.	Oth. flk. w/cor.	Oth. flk. w/o cor.	Totals n	Totals %
Indeterm.	1	1	0	2	0	0	0	0	0	1	11	16	0.5
Igneous	0	0	0	0	0	0	1	0	0	0	2	3	0.1
Basalt	4	23	3	56	7	17	354	39	120	123	796	1542	50.7
Rhyolite	0	0	2	0	0	0	0	0	1	1	2	6	0.2
Granodio.	0	1	0	0	0	0	0	0	0	0	1	2	0.06
Jemez ob.	1	5	0	1	1	0	24	0	0	12	60	104	3.4
Plvd. ob.	0	1	0	0	0	0	0	0	0	1	3	5	0.2
Jmz. ob. op.	1	2	0	1	0	1	7	0	0	6	18	36	1.2
Siltstone	0	0	0	0	0	1	1	0	0	3	7	12	0.4
Sil. wood	0	0	0	0	1	0	0	0	0	1	6	8	0.3
Quartzite	3	0	1	0	0	0	0	0	0	2	0	6	0.2
Agate	0	0	0	0	0	0	1	0	1	0	0	2	0.06
Chert	1	0	0	0	0	0	0	0	0	1	1	3	0.1
Ped. chert	15	68	27	68	3	16	266	4	17	170	599	1253	41.2
Atyp. Ped.	2	2	1	0	0	1	8	0	1	4	10	29	0.9
Chert, local	3	0	0	0	0	0	0	0	0	0	4	7	0.2
Chert, non.	0	0	0	0	0	0	0	0	0	3	4	7	0.2
Totals													
n	31	103	34	128	12	36	662	43	140	328	1524	3041	
row %	1.0	3.4	1.1	4.2	0.4	1.2	21.7	1.4	4.6	10.8	50.1		99.9%

bipolar flakes are of silicified wood and Jemez obsidian. Bipolar reduction has the lowest relative frequency (0.4%) of all the technological classes and was not commonly practiced.

The "other" technological class represents over 60% of the total debitage found in Area 1 (n=1842). These flakes came from multidirectional cores, as indicated by their dorsal flake scars. Such flakes were made in order to produce flake blanks that could have been used as expedient tools or modified into other tool forms. Pedernal chert and basalt dominate this technological class.

In summary, the 3041 flakes from Area 1 are dominated by basalt and Pedernal chert. Technological classification of the reduction products of these materials, and the Jemez obsidians, indicates that biface manufacture, core reduction, and occasional decortication occurred at the site.

Nonflaked Lithic Tools

The nonflaked lithic tools from Area 1 are most frequently made of three raw material types: welded tuff, basalt, and vesicular basalt; of these, welded tuff is the most common (n=55). Over 28% of the nonflaked lithic tools were made of welded tuff, almost 20% from basalt, and over 13% from vesicular basalt.

Nonflaked lithic tools, or ground stone, are most easily summarized in terms of their morpho-use category, a dimension of variation that attempts to combine function, traditional form, technology, and morphology (Phagan and Hruby 1984; Root 1989). The tools from Area 1 represent a variety of raw materials and morpho-use categories (Table 6.2). Most are coded as generalized nonflaked lithic tools, a category used when a more specific identification could not be determined, usually due to the fragmentary nature of the artifact. Miscellaneous forms also have a large count (n=125). These miscellaneous forms include minimally altered items, polished stone with flat or curved surfaces, and abrading and or grinding stones. The use-wear and morphology of these items indicate that they were used for bin and hatch covers, mealing bin liners, small work areas, and possibly flagging stones. I have interpreted two as mealing bin liners. These mealing bin liners are similar in size and shape, have ground, abraded edges, and light striations on their medial sections from the ends of a mano. They were found stacked, one on the other, in the courtyard, resting on top of a metate. Other miscellaneous nonflaked lithics, such as the larger stone slabs, would have been hatch covers. These slabs are similar in size, shape, and morphology to hatch covers found at other sites on the Pajarito Plateau (cf. Steen 1977).

There are 21 fragmentary metates and one whole basin metate from Area 1. Slab metates are the most common. The common materials for metates are welded tuff and vesicular basalt. Two metates were made from tuff. Use of tuff for a metate, is puzzling because this material is very soft and is easily modified by even light grinding; this is the same material commonly made into building blocks for room walls at the site. However, the use of tuff for other tool forms such as manos (Maxon 1969:31) and vent plugs (Steen 1977:12) has been noted on the Pajarito. Most of the metates have limited wear (smoothing) and dark, apparently organic stains on their surfaces which I infer to indicate that soft materials, possibly related to food preparation, were being ground.

Manos from this site are generally fragmentary, but five whole manos were recovered. Vesicular basalt is the preferred material (n=7). The use surfaces on the manos indicate considerable variety: two of the whole manos are two-handed with one simple use surface; one mano is two-handed with two simple use surfaces; and the remaining two manos are one-handed with one simple use surface. Two of the whole manos also have apparent hematite stains on their surfaces. These stains are similar to the red stains on three of the metate fragments and three of the minimally altered pieces of ground stone. Evidence for the production of pigments is thus present in the nonflaked lithic data.

Only two tools -- one axe and one maul -- indicate woodworking activities. The maul is slightly modified on the working ends and was discarded, rejected, or purposefully left before the tool was exhausted. The axe is fragmentary and broke during use at the medial, or hafting portion. Hammerstones from Area 1 indicate minimal to moderate use. Quartzite is the favored raw

Table 6.2. Nonflaked Stone Tool Morpho-use Category by Raw Material, Area 1.

	Weld. tuff	Sand-stone	Basalt	Vesicular Basalt	Tuff	Quart-zite	Quartz	Rhyo-lite	Hema-tite	Other[a]	Totals n	Totals %
Minimally altered[b]	12	2	2	2	0	0	1	0	6	11	36	18.7
Abrading[c]	5	6	2	5	1	0	0	0	0	2	21	11.0
General	15	2	5	6	3	3	0	3	0	4	41	21.3
Polished, flt. sur.	3	0	1	0	0	0	3	1	0	0	8	4.1
Metates	9	0	2	4	2	0	0	1	0	3	21	11.0
Flakes pol.[d]	0	0	22	0	0	0	0	0	0	1	23	12.0
Manos	0	1	1	7	0	1	0	0	0	2	12	6.2
Polished, cur. sur.[e]	11	1	1	1	0	1	1	1	2	0	19	9.9
Ornaments	0	0	0	0	1	0	1	0	0	2	4	2.1
Axes/mauls	0	0	1	0	0	1	0	0	0	0	2	1.0
Hammerstones	0	0	1	1	0	3	0	0	0	0	5	2.6
Totals												
n	55	12	38	26	7	9	6	6	8	25	192	
row %	28.6	6.2	19.8	13.5	3.6	4.7	3.1	3.1	4.1	13.0		100%

[a] Includes limestone, indeterminate, nonlocal, NFS chert, agate, diorite, granite, soil salts, sedimentary NFS, Pedernal chert, igneous NFS, granodiorite, and silicified sandstone/siltstone.
[b] Indeterminate and minimally altered items.
[c] Abrading/grinding stone with a flat surface and a grooved abrading/grinding stone.
[d] From the recycling of polished axes/adzes into flake cores.
[e] polishing stones and shaped stone slabs.

material (n=3). Based on their size, these hammerstones were probably collected as river cobbles along the Rio Grande, south and east of the site.

A number of the nonflaked lithic tools (n=23) are of flakes from ground and polished stone tools that, probably, were exhausted or broke during use. Because of their dorsal surface modification, these pieces were handled as nonflaked lithic tools rather than debitage. Fragments of axes or mauls could have been modified into cores to produce flakes for later reduction. Root (1989:76) identified one ground axe that had several flakes removed, possibly indicating similar recycling of ground stone tools. Other evidence for recycling comes from one of the flaked lithic tools. One item, possibly originally an axe (the medial or hafting portion was still visible) was reused as a core. Based on the present sample, axes or mauls that became exhausted or broke during use were not discarded but were recycled. The removal of these flakes by use-related activities, such as chopping wood, is not indicated by examination of flake platforms, most of which have have successful (feather) terminations.

Flaked Lithic Tools

The manufacture of projectile points and other bifacial tools was one of the regular tasks of Burnt Mesa's prehistoric inhabitants. Reduction of tabular basalt pieces and Pedernal chert flakes into bifacial form was common, and most of the resulting tools broke during use or during production (Table 6.3). Eighty-four of the 233

Table 6.3. Primary functional class of chipped stone by use-phase, Area 1.

	--- Use-Phase ---						
Primary Functional Class	indeterminate	unfinished	broken/ rejected in manufacture	complete	broken/ exhausted in use	Totals n	%
Projectile Point	0	1	4	5	1	11	4.7
Core	3	10	5	17	43	78	33.5
Utilized flake/hard material	1	0	0	2	2	5	2.1
Heavy woodworking tool	0	0	0	2	1	3	1.3
Biface	27	7	53	2	3	92	39.5
Utilized flake/variable mat.	2	0	0	2	4	8	3.4
Light-duty bilateral cutting	0	1	0	2	1	4	1.7
Transverse-edged cutting	0	0	0	2	0	2	0.8
Unknown	5	1	1	0	1	8	3.4
Lateral scraper/soft material	1	0	0	1	1	3	1.3
Hammerstone or pounder	0	0	0	0	3	3	1.3
Basal scraper/grinder	0	0	0	3	0	3	1.3
Expedient, general purpose	0	0	0	3	2	5	2.1
Transverse scraper/abrasive	0	1	0	0	0	1	0.4
Heavy-duty scraping/adzing	1	0	0	0	0	1	0.4
Heavy-duty 1 assymetrical	0	0	0	1	0	1	0.4
Light-duty transverse scraper	1	0	0	0	0	1	0.4
Generalized flake tool	0	0	0	1	0	1	0.4
Slotting/grooving tool	0	0	0	0	1	1	0.4
Spokeshave	0	0	0	1	0	1	0.4
Punch/wedge/chisel	0	0	0	1	0	1	0.4
Totals							
n	41	21	63	45	63	233	
%	17.6	9.0	27.0	19.3	27.0		100%

stone tools are diagnostically unfinished. These data concur with the previous interpretation of the "importance of on-site biface and arrow point manufacture" (Root 1989:75). Five of the projectiles and 60 of the bifaces are technologically unfinished.

The flaked lithic tool sample from Area 1 contains 233 items from 21 functional categories (Table 6.4). Basalt and Pedernal chert comprise over 75% of the tools. Taken together, Jemez obsidian and Jemez opaque obsidian, rank third in total count (n=25). Over 39% of the tools are bifaces. A majority (n=53) were broken during production and then discarded. Breakage of bifaces during production is indicated by perverse fractures and transverse fractures from end shock (cf. Crabtree 1972). Over 56% of the bifaces from the Area 1 sample were broken during manufacture. The margins on some of these indicate that edges were lightly abraded to strengthen the platform, and then percussion flaked. One utilized flake suggests that a secondary function these bifaces was as cores, to produce flakes for further reduction or expedient use.

Eleven projectile points were recovered from Area 1; most (54%) were made from Jemez translucent obsidian. Two of these were marginally worked on the ventral surface and the dorsal surface was pressure flaked to remove the dorsal ridge. All the projectile points have ground and/or beveled platforms and all are side-notched. One jasper point had been resharpened. The two Pedernal chert points (from the 1988 field season) "are made from flake blanks; one has a slightly convex base and the other has a concave base" (Root 1989:75).

Of the 78 cores from Area 1, most were of basalt (40%) and Pedernal chert (43%). These multidirectional cores were used for the production of flake blanks. From these cores both short, expanding flakes and longer, narrow flakes were produced.

There are thirteen flakes that have been used to slice hard material, or variable materials that are otherwise unmodified. A number of tools are also associated with cutting and scraping but no one form dominates the assemblage. Seven tools have red mineral residues on their working margins, suggesting the importance of processing pigments at the site.

AREA 2

Flaked Lithic Debitage

The sample of 1258 flakes from Area 2 is dominated by basalt, which accounts for 79% of the raw material (Table 6.5). Technological classification of the basalt, Pedernal chert, and Jemez obsidian flakes indicates that primary decortication, core reduction, and biface production occurred in Area 2. Reduction of tabular pieces of basalt by alternate flaking, preparing the edges for sequent biface reduction, is indicated by 180 flakes. Once a margin was established the knappers would bifacially reduce the remaining piece, resulting in a large number of bifacial thinning flakes (n=225). Bifaces and cores were reduced in the area. In total there are 35 biface thinning flakes and 48 alternate flakes with cortex. Primary decortication (n=15) and secondary decortication (n=45) of basalt indicate some basalt reduction from previously little modified sources. There are also a number of pieces of shatter from Area 2. In this area, shatter is the product of the reduction of large pieces of basalt by hand percussion. The "other" flake technological class contains many pieces used to form cores to produce flake blanks. Pedernal chert was also brought to the area and reduced. After removal of the cortex the material was either made into a biface and or reduced as multidirectional cores. There are only 46 flakes of Jemez obsidian. Jemez obsidian flakes are technologically classified as either "other" flakes or as bifacial thinning flakes.

Nonflaked Lithic Tools

The nonflaked lithic tools from Area 2 are primarily made of three raw materials: welded tuff, basalt, and vesicular basalt. The 111 pieces of nonflaked lithic tools indicate considerable variety in morpho-use categories (Table 6.6). Twenty-eight, over 25% of these, were recovered from room surfaces (both roofs and floors; see Chapter 3).

Table 6.4. Chipped Stone Tool Raw Material by Primary Functional Class, Area 1.

	Un-known[a]	Point	Cutting/ scraping[b]	Core	Util. flake[c]	Wedge	Adze	Ham. stone	Hvy. wood working	Bi-face	Spoke -shave	Totals n	%
Basalt	3	1	13	31	9	0	1	0	1	45	0	104	44.6
Pedernal chert	3	2	5	34	3	0	0	0	0	33	1	81	34.7
Polvadera obs.	0	0	0	0	0	0	0	0	0	1	0	1	0.4
Op.Jmz. obs.	1	0	0	4	0	0	0	0	0	3	0	8	3.4
Welded tuff	0	0	0	0	0	0	0	0	2	0	0	2	0.8
Atyp.Ped.ch.	1	0	0	4	0	0	0	0	0	1	0	6	2.5
Jemez obsidian	0	6	1	0	1	1	0	0	0	8	0	17	7.8
Nonlocal material	0	0	0	1	0	0	0	0	0	0	0	1	0.4
Agate/chalced.	0	0	2	1	0	0	0	0	0	0	0	3	1.3
Unknown	1	0	0	0	0	0	0	0	0	0	0	1	0.4
Siltstone	0	1	0	0	0	0	0	1	0	0	0	2	0.8
Quartzite	0	0	0	1	0	0	0	2	0	0	0	3	1.3
Silicified wood	0	0	0	0	0	0	0	0	0	1	0	1	0.4
Jasper	0	1	0	0	0	0	0	0	0	0	0	1	0.4
Chert, nonlocal	0	0	0	1	0	0	0	0	0	0	0	1	0.4
Limestone	0	0	0	1	0	0	0	0	0	0	0	1	0.4
Totals													
n	9	11	21	78	13	1	1	3	3	92	1	233	
%	3.8	4.7	9.0	33.5	5.6	0.4	0.4	1.3	1.3	39.5	0.4		100%

[a] Unknown and generalized flake tools.

[b] Light-duty bilateral cutting tools, transverse-edged cutting tools, basal scraper and or grinder, light-duty transverse scrapers used on soft materials, expedient gereral purpose cutting tools, heavy-duty 1 assymetrical or unilateral cutting tools, lateral scrapers used on soft material, transverse scrapers used on abrasive material, and slotting/grooving tools.

[c] Utilized flake used to saw or slice hard material and utilized flakes used on variable material.

Table 6.5. Debitage Raw Material by Technological Class, Area 2.

	Prim. Decort.	Second Decort.	Shat.w/ cor.	Shatter w/o cor.	Bipolar w/cor.	Bipolar w/o cor.	Bif. thin. w/cor.	Bif. thin. w/o cor.	Altern. w/cor.	Altern. w/o cor.	Oth. flk. w/cor.	Oth. flk. w/o cor.	Totals n	Totals %
Basalt	15	45	16	30	0	3	28	225	48	101	79	415	1005	79.0
Rhyolite	0	0	0	0	0	0	0	0	0	0	0	5	5	0.4
Jmz. ob.	1	2	0	2	0	0	1	6	0	0	7	27	46	3.6
Plvd. ob.	0	0	0	0	0	0	0	0	0	0	0	2	2	0.1
Jmz. ob. opaque	0	0	0	0	0	0	0	1	0	1	2	4	8	0.6
Obsid. nfs	0	0	0	0	0	0	0	0	0	0	0	1	1	0.1
Siltstone	0	0	0	0	0	0	0	2	0	0	0	3	5	0.4
Sil. wood	0	0	0	0	0	0	0	0	0	0	0	1	1	0.1
Quartzite	1	1	0	0	0	0	0	0	0	0	1	0	3	0.2
Quartz	0	0	1	0	0	0	0	0	0	0	0	0	1	0.1
Ped. chert	7	11	3	8	0	2	5	29	0	8	22	76	171	13.6
Atyp. Ped.	0	1	0	0	0	0	1	2	0	0	1	1	6	0.5
Chert, local	1	0	0	0	0	0	0	0	0	1	2	0	4	0.3
Totals														
n	25	60	20	40	0	5	35	265	48	111	114	535	1258	
row %	2.0	4.0	1.6	3.2	0	0.4	2.0	21.1	3.8	8.8	9.1	42.5		100

Table 6.6. Nonflaked Stone Tool Morpho-use Category by Raw Material, Area 2.

	Weld. tuff	Quart-zite	Ba-salt	Sand-stone	Un-known	Tuff	Vesic-ular bas.[a]	He-ma-tite	Silic. wood	Qrtz.	Non-local chert	Silt-stone	Gran-ite	Gran-odior-ite	Rhy-o-lite	Ped-ernal chert	Totals n	Totals %
Ques/min.alt	2	0	1	0	2	3	0	0	1	1	0	0	0	0	1	1	12	10.8
Gener., frag.	13	0	4	0	1	0	0	0	0	0	0	0	0	1	1	0	20	18.0
Shaped slab	5	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	6	5.4
Abrd.cur.sur	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2	1.8
Palette	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.9
Abrd.grooved	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0.9
Haft. item nfs	1	0	11	0	0	0	0	0	0	0	0	1	0	0	0	0	13	11.7
Polsh. flt. sur	8	1	2	0	0	0	0	1	0	0	0	0	0	0	0	0	12	10.8
Metate, nfs	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0.9
Metate, frag.	4	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	9	8.1
Mano, nfs	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	2	1.8
Mano, frag.	1	0	3	0	0	0	2	0	0	0	0	0	0	0	0	0	6	5.4
1-hnd. mano	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	2	1.8
2-hnd. mano, 1 use surface	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0.9
2-hnd. mano, 2 use surfaces	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0.9
2-hnd. mn. w/f	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0.9
Hstone, frag.	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2	8.1
Axe, notch.	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1.8
Basin metate	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0.9
Maul, grvd.	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0.9
Hstone, cbbl.	0	0	2	0	0	0	0	0	0	1	0	0	0	0	0	0	3	2.7
Shp. obj., geo.	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	2	1.8
Abrd. flt. sur.	1	0	0	1	0	1	0	0	0	0	0	0	0	2	0	0	5	4.5
Plsh. cur. sur	0	0	0	0	1	0	0	1	0	0	0	0	1	0	0	0	3	2.7
Axe, grooved	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.9
Pit. pnd. stn.	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.9
Totals																		
n	35	5	27	3	6	7	12	3	1	3	1	1	1	3	2	1	111	
%	31.5	4.5	24.3	2.7	5.4	6.3	10.8	2.7	0.9	2.7	0.9	0.9	0.9	2.7	1.8	0.9		100

[a] Includes one fragmentary metate of metabasalt

Four different categories of manos were recovered from Area 2: eight were fragmentary or not-further-specified; one was a fragmentary two-handed mano; one a two-handed mano with two simple use surfaces; and one a two-handed mano with two use surfaces with finger grips on one of the margins. One of the five hammerstones from Area 2 was found to have been multifunctional. This hammerstone has typical hammerstone use-wear on one of the working ends and was additionally used as a mano. Two faceted pieces of hematite were found in Area 2 that may have been modified at the site. One metate and two miscellaneous stone slabs have red mineral residues encrusted on their working surfaces. Five small, curated river pebbles were found, of unknown use.

Three axes and one grooved maul were also recovered. Two of the axes are notched and the third is grooved. One of these axes has a surface covered with a red stain, possibly hematite, and another darker stain on the medial portion of the axe that appears to have resulted from hafting. These axes are all exhausted, but not broken. The large grooved maul is made of vesicular basalt with use wear on either end and is still potentially usable.

Ten fragmentary or not-further-specified metates and one basin metate limit what we can say about food preparation and other activities involving grinding in Area 2. I have interpreted five of the flat stone slabs as bin covers. These covers show little modification to their surfaces and are modified on their margins by grinding, flaking, and smoothing. Two of the covers, probably broken postdepositionally, were recovered in two pieces, but could be refitted. There are 13 flakes (11 of basalt, one of welded tuff, and one of silicified siltstone) that were recycled from ground stone tools. Like those from Area 1, these are from ground and polished objects that were probably exhausted and were subsequently recycled as cores.

Flaked Lithic Tools

Eighty chipped stone tools were recovered from Area 2 (Table 6.7). The collection indicates the importance of on-site reduction of cores and bifaces, and of arrow point production. Basalt, Pedernal chert, and Jemez obsidian comprise the majority of the raw material selected for tools at this locality. Technologically, 21 percent of the chipped stone artifacts from Area 2 are not complete, 35 percent of the tools are complete, and 35 percent of all the chipped stone was broken during use (Table 6.8). Six of the bifaces were fractured during production. Perverse fractures of the bifaces from the site occurred during the shaping and thinning process by percussion technique. There are 8 projectile points, 10 percent of the tools from Area 2. Two of these were made from Jemez obsidian, two from Jemez opaque obsidian, two from Pedernal chert, one from atypical Pedernal chert, and one from nonlocal chert. Six of these points are complete and considered to be potentially usable. One of the Jemez opaque obsidian points is corner notched, and all the other points are side notched with short bases. Four spokeshaves, two of basalt, and the remaining two of Polvadera obsidian, were recovered from Area 2. Three of the spokeshaves are still usable and one has been broken from use-related activity. One of the spokeshaves has two utilized notches. Other tools from Area 2 vary in form but were predominantly used for cutting and scraping and are limited in number.

COMPARISON OF AREA 1 AND AREA 2

The outstanding difference between Area 1 and Area 2 is in the choice of raw material that was modified into flakes or other forms. Basalt debitage comprises a little over 50%, and Pedernal chert almost 42%, of the materials for Area 1, while in Area 2 basalt constitutes 79% of the total with Pedernal chert making up less than 14%. The most likely source area for basalt from Burnt Mesa Pueblo is from outcrops below Upper Falls along Frijoles Canyon, while the source area for Pedernal cherts is Cerro Pedernal or materials moved downstream from there along the Rio Grande. Apparently, then, basalt is available at closer distances than Pedernal chert.

Technological classes of debitage are similar for both areas. There are minor decreases in primary decortication flakes, secondary decortication flakes, bifacial thinning flakes with cortex, and alternate flakes with and without cortex in Area 1 (Table 6.9). Most (54%) of the

Table 6.7. Chipped Stone Tool Primary Functional Classes by Raw Material, Area 2.

	Cores	Utililized flakes	Points	Bifaces	Quest.	Spoke-shaves	General-ized[a]	Cutting tools[d]	Totals n	Totals %
Basalt	15	6	0	12	4	2	1	3	43	53.7
Jemez obsidian	3	1	2	1	1	0	1	1	10	12.5
Pedernal chert	7	1	2	1	1	0	1	2	15	18.7
Local chert	0	1	0	0	0	0	0	0	1	1.2
Atyp. Peder. chert	1	0	1	0	0	0	0	0	2	2.5
Opaque Jemez obs.	0	1	2	0	0	2	0	1	6	7.5
Polvadera obsidian	0	0	0	1	0	0	0	0	1	1.2
Chert, nonlocal	0	0	1	0	0	0	0	0	1	1.2
Slate/Hornfels	0	0	0	0	0	0	0	1	1	1.2
Totals										
n	26	10	8	15	6	4	3	8	80	
row %	32.5	12.5	10.0	18.7	7.5	5.0	3.7	10.0		100%

[a] Includes generalized flake tools NFS and practice pieces.

[b] Includes light-duty bilateral cutting tools, transverse-edged cutting tools, basal scraper/grinders, expedient cutting tools, and transverse scrapers used on abrasive materials.

Table 6.8. Primary Functional Class of Chipped Stone Tools by Use-phase, Area 2.

	--- Use-Phase ---						
Primary Functional Class	indet-erminate	unfin-ished	broken/ rejected in manu-facture	com-plete	broken/ exhausted in use	Totals n	%
Core	0	1	1	5	19	26	32.5
Projectile point	0	1	0	6	1	8	10.0
Utilized flake/hard mat.	0	0	0	5	1	6	7.5
Utilized flake/var. mat.	1	0	0	3	0	4	5.0
Biface	1	5	6	0	2	14	17.5
Unknown	3	2	1	0	0	6	7.5
Spokeshave	0	0	0	3	1	4	5.0
Practice pieces	1	0	0	0	1	2	2.5
Basal scraper/grinder	0	0	0	2	1	3	3.7
Transverse-edged cutting	0	0	0	0	1	1	1.2
Generalized flake tool	0	0	0	0	1	1	1.2
Biface/hard material	0	0	0	1	0	1	1.2
Transverse scraper/abras.	1	0	0	1	0	2	2.5
Light-duty bilat. cutting	0	0	0	1	0	1	1.2
Expedient, general purp.	0	0	0	1	0	1	1.2
Totals							
n	7	9	8	28	28	80	
%	8.7	11.2	10.0	35.0	35.0		100%

debitage from Area 1 comes from the external midden area (subarea 4) while in Area 2 over 55% is associated with the room fill and surfaces. Bifacial and alternate flaking have high counts in the midden of Area 1, suggesting that stone-working took place outside the room blocks and the associated plaza. In contrast, the debitage from Area 2 has few defined patterns, with the exceptions of secondary decortication and alternate flakes which are disproportionately located in the external area. Whether due to patterns of use or patterns of discard, secondary decortication flakes are also disproportionately frequent in the Area 1 courtyard.

Contrasts in locus of nonflaked lithic tool recovery from the two areas are also present (Table 6.10). The ground stone in Area 1 is fairly well dispersed, with more tools (n=91) found in the midden. In Area 2 most all the nonflaked lithic tools, over 88%, are in the rooms. This difference, however, is likely an artifact of the relatively greater excavation in Rooms in Area 2, and, possibly, slightly different abandonment modes for rooms in the two areas. All of the metate fragments (n=11) and all of the eleven manos from Area 2 are inside of the room block.

The chipped stone artifacts indicate that most of the tools from Area 2 are associated with rooms (Table 6.11). Tools from Area 1 come from both the plaza and the midden. Cores from Area 2 are found inside rooms, while cores from Area 1 are found in both the plaza and midden subareas. A high count of bifaces (n=50) are found in the midden of Area 1. This and the debitage data (bifacial thinning and alternate flakes) indicate that bifaces were produced outside of the pueblo. In Area 2 bifaces are found in the rooms. The bifacial thinning and alternate flakes in combination with the bifacial tools from Area 2 indicate that activities might have taken place on the roof of the pueblo, with the material deposited in room fill. Seven of the eight projectile points from Area 2 are associated with rooms. In Area 1 seven of the 11 projectile points are found in the courtyard. Scraping and cutting activities in Area 1 took place in the courtyard (n=20), indicating

Table 6.9. Debitage Technological Classes by Area and Subarea.

	Area 1					Area 2			
	Subareas			Totals		Subareas		Totals	
	1	2	4	n	%	1	2	n	%
Primary reduction	3	14	14	31	1.0	10	15	25	2.0
Secondary reduction	13	51	39	103	3.4	19	41	60	4.8
Shatter with cortex	3	17	14	34	1.1	8	12	20	1.6
Shatter w/o cortex	11	42	75	128	4.2	22	18	40	3.2
Bipolar with cortex	0	0	0	0	0.0	0	0	0	0.0
Bipolar w/o cortex	1	7	4	12	0.4	3	2	5	0.4
Bifacial with cortex	1	14	21	36	1.2	10	25	35	2.8
Bifacial w/o cortex	62	183	417	662	21.7	127	138	265	21.1
Alternate with cortex	8	16	19	43	1.4	12	36	48	3.8
Alternate w/o cortex	2	21	117	140	4.6	30	81	111	8.8
Other with cortex	46	119	163	328	10.8	59	55	114	9.1
Other w/o cortex	228	537	759	1524	50.1	395	140	535	42.5
Totals									
n	378	1021	1642	3041		695	563	1258	
row %	12.4	33.6	54.0		99.9%	55.2	44.8		100.1%

Table 6.10. Nonflaked Stone Tool Morpho-use Categories by Area and Subarea.

	Area 1					Area 2			
	Subareas			Totals		Subareas		Totals	
Morpho-use Category	1	2	4	n	%	1	2	n	%
Indeterminate	1	0	0	1	0.5	0	0	0	0.0
Minimally altered	9	9	17	35	18.2	12	0	12	10.8
Generalized NFLT	7	16	18	41	21.3	18	2	20	18.0
Polished, flat surface	4	1	7	12	6.2	11	1	12	10.8
Polished, curved surface	1	3	4	8	4.1	3	0	3	2.7
Abrading stone	4	5	11	20	10.4	2	3	5	4.5
Abrading stone, flat surface	0	2	0	2	1.0	2	0	2	1.8
Abrad. stone, grooved surf.	0	0	1	1	0.5	1	0	1	0.9
Shaped slab	0	4	1	5	2.6	6	0	6	5.4
Palette	0	0	0	0	0.0	1	0	1	0.9
Hammerstone, NFS	0	1	0	1	0.5	2	0	2	1.8
Cobble hammerstone	1	2	1	4	2.1	3	0	3	2.7
Pitted pounding stone	0	0	0	0	0.0	0	1	1	0.9
Mano, fragmentary	0	2	3	5	2.6	4	2	6	5.4
Mano, NFS	1	1	0	2	1.0	2	0	2	1.8
1-hnd. mano, 1 use surface	1	0	1	2	1.0	2	0	2	1.8
2-hnd. mano fragmentary	0	0	0	0	0.0	1	0	1	0.9
Mano with finger grips	0	0	0	0	0.0	1	0	1	0.9
2-hnd. mano, 1 use surface	2	0	0	2	1.0	0	0	0	0.0
2-hnd. mano, 2 use surfaces	0	1	0	1	0.5	1	0	1	0.9
Metate, fragmentary	8	5	5	18	9.4	9	0	9	8.1
Metate, NFS	0	1	1	2	1.0	1	0	1	0.9
Basin metate	0	1	0	1	0.5	1	0	1	0.9
Maul, notched	1	0	0	1	0.5	0	0	0	0.0
Maul, grooved	0	0	0	0	0.0	1	0	1	0.9
Axe, notched	0	0	0	0	0.0	2	0	2	1.8
Axe, grooved	0	0	0	0	0.0	1	0	1	0.9
Axe, other	0	0	1	1	0.5	0	0	0	0.0
Hafted item, NFS	1	5	17	23	12.0	9	4	13	11.7
Ornament, NFS	0	0	1	1	0.5	0	0	0	0.0
Shaped object, geometric	0	0	1	1	0.5	2	0	2	1.8
Pendant	1	0	1	2	1.0	0	0	0	0.0
Totals									
n	42	59	91	192		98	13	111	
%	21.9	30.7	47.4		100.0	88.3	11.7		100%

the importance of this space for reducing or finishing products such as wood and hide. Nine of the 22 tools that indicate scraping and cutting activities are found in the external portions of Area 2.

Table 6.11. Primary Functional Class of Chipped Stone Tools by Area and Subarea.

	Area 1					Area 2			
	Subareas			Totals		Subareas		Totals	
	1	2	4	n	%	1	2	n	%
Cores	11	28	39	78	33.5	23	3	26	32.5
Slotting/grooving tool	1	0	0	1	0.5	0	0	0	0.0
Bifaces	8	34	50	92	39.5	12	2	14	17.5
Spokeshaves	1	0	0	1	0.5	2	2	4	5.0
Projectile points	1	7	3	11	4.7	7	1	8	10.0
Utilized flakes[a]	2	9	2	13	5.5	8	2	10	12.5
Unknown	1	3	4	8	3.4	3	3	6	7.5
Heavy wood working	2	1	0	3	1.3	0	0	0	0.0
Bilateral cutting	1	3	0	4	1.7	0	1	1	1.2
Wedges	0	1	0	1	0.5	0	0	0	0.0
Transverse scrapers[b]	0	2	2	4	1.7	1	2	3	3.7
Lateral scrapers	0	1	2	3	1.3	0	0	0	0.0
Hammerstones	0	2	1	3	1.3	0	0	0	0.0
Basal scrapers	0	1	2	3	1.3	2	1	3	3.7
Expedient	0	4	1	5	2.1	0	1	1	1.2
Scraping/adzing tool	0	1	0	1	0.5	0	0	0	0.0
Assym. or unilat. cutting	0	0	1	1	0.5	0	0	0	0.0
Generalized flake tools	0	0	1	1	0.5	1	0	1	1.2
Practice pieces	0	0	0	0	0.0	1	1	2	2.5
Bifaces, hard materal	0	0	0	0	0.0	1	0	1	1.2
Totals									
n	28	97	108	233		61	19	80	
%	12.0	41.6	46.3		100%	76.2	23.7		100%

[a] Combination of utilized flakes used to saw or slice hard material and utilized flakes used on variable material.

[b] Combination of transverse-edged cutting tools, light-duty transverse scrapers used on soft material, and transverse scrapers used on abrasive material.

7

FAUNAL RESOURCES AND THEIR CALORIC YIELDS

W. Nicholas Trierweiler

INTRODUCTION

This report presents a discussion of analyses performed on non-human bone excavated from Burnt Mesa Pueblo (LA 60372), Bandelier National Monument, by the Bandelier Archaeological Excavation Project, Washington State University, during the 1989 field season.

The discussion is organized in three major sections. The first section discusses both the laboratory methods of specimen identification and also the analytical methods of faunal analysis and dietary reconstruction. The second section presents the descriptive results of specimen identification. Finally, the third section is an economic analysis based on these results, including calculations of minimum numbers of individuals, and a caloric budget for faunal resources from the site. For completeness, these analyses also include the 35 bone specimens excavated from Burnt Mesa Pueblo during the 1988 season.

METHODS

Laboratory Methods

All specimens were dry brushed and individually weighed on a triple-beam balance to the nearest 0.1 g. Previously assigned catalog numbers were used to track specimens. For those catalog lots containing more than one bone or bone fragment, consecutive specimen numbers were assigned to each item. No specimen was physically labeled, and no destructive analyses were performed. Provenience data were copied directly from the original field bags, and included site, area, southing and easting (where applicable), room (where applicable), stratum, and level.

Each specimen was individually examined to identify the skeletal element and the minimally identifiable taxon. Primary identification sources were the extensive comparative collections at the University of New Mexico, Museum of Southwestern Biology. Many specimens were too fragmentary to reliably identify as to element and/or specific taxon and these were recorded as "unknown." However for many fragmentary specimens, a reasonable guess could be made as to the probable taxonomic class and relative size of the animal. Such specimens were provisionally identified as either mammal or bird bones; no fish, reptile, or amphibian bones were represented in the sample. These specimens were then placed within one of several gross size categories based on overall size and robusticity. Six size ranges of mammals and four ranges of birds are summarized in Table 7.1. No attempt at taxon identification was made for any specimen in the smallest size category; experience has shown that these mouse-sized animals are extremely difficult to speciate, and moreover do not contribute measurably to puebloan diet, even in the most sensitive of analyses. Finally, many specimens were simply too fragmentary to permit even such reasonable guesses; these were simply recorded as unknowns.

Also recorded for each specimen were the symmetry (right, left, axial, unknown), portion of the skeletal element (whole, distal fragment, proximal fragment, medial fragment, unknown

Table 7.1. Faunal Size Ranges Inferred from Unidentified Bone Specimens.

Class	Size	Approximate size of animal
mammal	1	mouse
mammal	2	woodrat
mammal	3	rabbit
mammal	4	porcupine
mammal	5	dog
mammal	6	deer (or larger)
bird	1	piñon jay
bird	2	duck
bird	3	grouse
bird	4	turkey

fragment), modifications (burning, worked tool), and codes for unfused epiphises (indicating juveniles) and rodent gnawing. No systematic attempts were made to categorize specimen gender or maturity, or to categorize breakage patterns. Finally, comments were recorded for some specimens. These data were entered into a computer data base and are presented at the end of this chapter as Table 7.10. This table does not include the 35 specimens described for the 1988 season (Trierweiler 1989:89-90).

Analytical Methods

Identified specimen data were used to calculate the total number of specimens (TNS) and minimum number of individuals (MNI) for each taxon. In calculating the MNI, right and left elements were paired, as were proximal and distal fragments. For most taxa with a MNI greater than 1, the critical element was generally a mandible, although for some taxa a femur or an inominate was the most common element. Unidentified specimens, and those which could be identified only to size categories were not included in the MNI analyses.

In the following analyses, MNIs are calculated according to both the minimum and maximum method for distinguishing meaningful groupings of proveniences (Grayson 1973). In the minimum distinction method, Area 1 (the northern plaza pueblo) is contrasted with Area 2 (the southern linear component) on the basis of their differing times of deposition. Analysis of ceramics from the 1988 season suggested that these areas were not completely contemporaneous; the occupation of Area 1 was at least partly later than that of Area 2 (Kohler 1989b:64); this conclusion is generally supported by tree-ring dates for the 1989 season reported elsewhere in this volume. The entire site assemblage is not treated as a single unit under the minimum method.

In the maximum distinction method, nine zones are contrasted, on the basis of horizontal provenience. These zones are designated Faunal Sample Units (FSU), and group together those proveniences which have the greatest chance of postdepositional mixing, and/or the greatest chance of representing single discard events. In both methods, vertical provenience distinctions (strata, levels) are grouped together. While predepositional mixing is always a possibility, each sample unit represents the smallest reasonable grouping of excavated proveniences. These units are identified in Table 7.2. Seven of the nine units include a single horizontal provenience. However, unit C includes three excavation grid squares in close proximity in the main plaza, and unit G includes the three rooms and four 2 x 2 m squares in the southern roomblock. Seven of the nine units are in Area 1, and two are in Area 2.

The MNI per taxon is determined separately for the minimum and maximum distinction methods. These two sets of MNI values are then used independently to calculate the total food energy represented in the excavated sample, according to a formula which uses estimated values for (1) animal biomass, (2) edible portion, and (3) kilocalories.

Table 7.2. Faunal Sample Units.

Faunal Sample Unit	Location	Study Units Types and Numbers
A	North of Area 1 roomblock (subarea 4)	2 x 2 70S 82E
B	West of Area 1 roomblock (subarea 4)	2 x 2 80S 74E
C	Within Area 1 plaza (subarea 2)	2 x 2s 84S 96E, 86S 96E, 88S 92E
D	East of Area 1 roomblock (subarea 4)	2 x 2 94S 112E
E	South of Area 1 roomblock (subarea 4)	2 x 2 102S 86E
F	East of Area 2 roomblock (subarea 2)	2 x 2 128S 142E
G	Area 2 roomblock (subarea 1)	Rooms 2, 4, and 6
H	Area 1 roomblock (subarea 1)	Room 1-
I	Area 1 roomblock (subarea 1)	Room 10

Total standing biomass per taxon is the average mass (weight) of any single adult animal, selected randomly from a natural population. These values range from 0.101 kg for *Thomomys bottae* to 410 kg for *Bison bison*, and are from data presented in Trierweiler (1987), as derived from Cockrum (1982), Burt and Grossenheider (1964), Schorger (1966), and Sprunt (1961). Biomass values are shown in Table 7.3.

Edible portion is that percentage of the total biomass which is convertible to food energy. Inedible portions include bone, hide, etc. The values for edible portion are from data presented in Trierweiler (1987) as derived from the United States Department of Agriculture (1956), except for bison which uses as a constant the value for other large game. Edible portion values are also shown in Table 7.3.

Food energy is calculated in kilocalories. For each taxon, relative food energy is expressed in terms of kilocalories per kilogram of edible meat. These values are derived from data presented in Trierweiler (1987), except for bison, which uses the values for beef, and for skunk, which uses the value for raccoon as listed in Watt and Merrill (1975). Caloric values are shown in Table 7.3.

RESULTS

Sample Size

The 1989 sample totaled 421 specimens (see Table 7.10) including five non-bone items. For analytical purposes, the resulting 416 animal bone specimens were supplemented by previously recorded data for the 35 bone specimens recovered from the site during the 1988 season (Trierweiler 1989), totaling 451 specimens of animal bone (Table 7.4).

Specimen weight ranged from an unmeasurable trace to a maximum of 103.3 g, with a mean of 1.01 g. Only 13 specimens (2.9%) weighed more than 5.0 g. One hundred and seventeen specimens (25.9%) were complete, and the remaining 334 specimens (74.1%) were fragmentary. The whole specimens averaged 1.84 g each, and the fragments averaged 0.77 g each.

The bone recovered was overwhelmingly from Area 1 (91.6%), with only 38 specimens (8.4%) from Area 2. The excavation unit with the densest concentration of bone, by surface area, was 80S 74E with 185 specimens. This 2 x 2 m unit, placed on the west side of the main pueblo structure, is clearly in the trash midden. The second densest area is unit 90S 88E in the plaza, with 71 specimens. By contrast, unit 128S 142E on the east side of the southern linear pueblo (Area 2) had a single specimen. Of the rooms, Room 10 (Area 1) had the greatest number of specimens (n=52), followed distantly by Room 4 (Area 2; n=16), Rooms 1 (Area 1) and 2 (Area 2; n=12 each), and Room 6 (Area 2; n=8).

Of the total number of specimens, 230 (51.0%) were identifiable to both element and taxon. These identified specimens average 1.59 g each, and range from 0.1 to 103.3 g. An additional 114 specimens (25.3%) were identified

Table 7.3. Average Biomass, Edible Portion, and Caloric Yield of Represented Faunal Taxa.

Taxon	Common name	Average Biomass	Edible Portion	Kcals/ Kg.
Thomomys bottae	Botta's pocket gopher	0.101	43%	135
Spermophilus spilosoma	Spotted ground squirrel	0.107	43%	135
Neotoma sp.	woodrat	0.213	43%	135
Spermophilus lateralis	golden-mantled ground squirrel	0.240	43%	135
Sciurus aberti	Abert's squirrel	0.655	43%	135
Spermophilus variegatus	rock squirrel	0.700	43%	135
Cynomys gunnisoni	Gunnison's prairie dog	0.900	43%	135
Sylvilagus sp.	cottontails	0.975	43%	135
Dendragapus obscurus	Blue grouse	1.06	55%	279
Mephitus mephitus	striped skunk	2.30	43%	209
Lepus californicus	black-tailed jack rabbit	2.54	43%	135
Meleagris gallopavo	turkey	5.90	55%	218
Erethizon dorsatum	porcupine	8.20	43%	209
Antilocapra americana	pronghorn	53.5	54%	217
Odocoileus hemionus	mule deer	66.5	54%	217
Bison bison	buffalo	410	54%	280

to size range only. These specimens average 0.54 g each, and range from an unmeasurable trace to 7.8 g. Finally, 107 specimens (23.7%) were completely unidentifiable, averaging only 0.27 grams each, and ranging from an unmeasurable trace to 2.4 g.

Sixteen taxa are represented in the sample, including 14 mammals and two birds. The mammals include 10 taxa of rodents, a carnivore, and three large ungulates. Additionally, the sample includes unidentifiable fragments from all six size ranges of mammals and all four size ranges of birds.

Burning

Sixty-two specimens (13.8%) show evidence of burning, ranging from complete charring to thermal discoloration. Of these, 26 are identified to taxon and element. An additional 36 burned fragments are unidentifiable. Within the very small sample of identifiable burned elements, fully nine of the 16 taxa are represented, including eight of the ten rodent taxa and one of the two bird taxa (Table 7.5). Interestingly, none of the ungulate specimens is burned, nor were any fragments in the largest mammal size category.

While burning may be reasonably taken as evidence of food preparation, lack of burning does not indicate the converse. Taxa which do not show evidence of burning include species considered edible by the Tewa (Hill 1982) including *Antilocapra americana*, *Bison bison*, *Cynomys gunnisoni*, *Dendragapus obscurus*, *Erethizon dorsatum*, *Mephitus mephitus*, and *Odocoileus hemionus*. As a result, while fully

Table 7.4. Total Faunal Sample, by Season and Specimen Type.

	--- Season ---		
Specimen Type	1988	1989	Total
animal bone	35	416	451
not bone	2	5	7
total	37	421	458

Table 7.5. Burned Faunal Specimens.

Taxon	TNS	--- Burned --- n	%
Lepus californicus	4	1	25.0
Meleagris gallopavo	54	8	14.8
Neotoma sp.	43	3	7.0
Sciurus aberti	4	1	25.0
Spermophilus lateralis	1	1	100.0
Spermophilus spilosoma	4	1	25.0
Spermophilus variegatus	23	5	21.7
Sylvilagus sp.	45	5	11.1
Thomomys bottae	24	1	4.2
unknown	221	36	16.3
Total	–	62	13.8

cognizant that some of the rodents may be intrusive, all 16 taxa are considered potential food resources, and are so treated in the analysis.

No burned bone was recovered from Area 2. While all of the burned specimens are from Area 1, a chi-square analysis suggests that the correlation of burning versus area is not significant. However, within Area 1, burned bone is concentrated in the plaza and in the easternmost grid unit in amounts slightly greater than expected by chance. Similarly, in Rooms 1 and 10 and in the northernmost and southernmost grid squares, burned bone is concentrated in amounts slightly less than would be expected by chance alone.

Tools

Ten bone tools were collected during the 1989 season, including seven awls/punches, a whistle, one thick bead, and one polished fragment of unknown function. In addition, an awl/punch, and a needle/awl were collected in 1988. Of these 12 tools, six may be identified as to taxon, including four specimens of mule deer and two of turkey (Table 7.6). Further, five tools may be classed by taxonomic class and gross size range. The final specimen, the bone bead, is so heavily modified that any identification is impossible, except for noting that the bone is robust.

Table 7.6. Bone Tools.

FS#.seq. #	Tool type	Taxon	Element	FSU
4.2*	needle/awl	*M. gallopavo*	proximal podial	H
18.3*	awl/punch	*O. hemionus*	distal metacarpal	C
65.5	needle/awl	mammal size 3-4	medial unknown shaft	C
68.5	awl/punch	*M. gallopavo*	medial unknown shaft	C
109.20	awl/punch	mammal size 5	medial unknown shaft	B
112.1	awl/punch	mammal size 6	medial unknown shaft	B
114.12	thick bead	unknown	unknown fragment	B
123.1	whistle	bird size 4	medial radius	H
163.1	unknown	mammal size 3-4	medial unknown shaft	I
169.1	awl/punch	*O. hemionus*	medial unknown shaft	I
306.1	awl/punch	*O. hemionus*	metatarsal/metapodial	G
312.1	awl/punch	*O. hemionus*	distal metatarsal	G

* from the 1988 season

Ten of the bone tools were recovered from Area 1, and only two from Area 2. While the percentage of bone tools to total bone specimens in Area 2 (5.1%) is double that in Area 1 (2.4%), the sample size from Area 2 is far too small to make a meaningful conclusion. Within Area 1, Rooms 1 and 10 have two bone tools each, the plaza has three tools, and the northernmost 2 x 2 has three tools. No bone tools were recovered from the western, southern and eastern 2 x 2 m units within Area 1. In Area 2, both bone tools are from Room 6.

Analysis

As indicated above, separate but parallel analyses are performed for the minimum and maximum provenience distinctions. These two sets of analyses should be viewed as complementary. Each analysis uses values for MNI, biomass, edible portion, and calories to calculate the total edible calories represented in the excavated sample. The relative contribution of each taxon is then expressed as a percent of the total.

Minimum Distinction

This analysis subdivides the site into two areas and contrasts the northern plaza pueblo (Area 1) with the southern linear component (Area 2). Table 7.7 summarizes the total number of specimens, minimum number of individuals, and total caloric yield for each taxon within the two excavation areas.

As previously noted, Area 1 has far more specimens than does Area 2, but it also has a greater minimum number of individuals. This analysis calculates a minimum of 41 different individuals, with 33 individuals in Area 1, and only eight individuals in Area 2. However, the ratios between TNS and MNI vary from 6.5 specimens per specifically identifiable individual in Area 1 to only 2.1 specimens per individual in Area 2, suggesting that the sample size from Area 2 is far too small for meaningful analysis.

Nevertheless, when caloric yields per taxon are normalized as a function of the total for each area, there is no significant difference between the two areas in the relative caloric contribution from large, medium, and small game animals. This analysis calculates a total of 88,604 kilocalories represented in the excavated sample, with 79,725 of this (90.2%) from Area 1, and only 8,678 kilocalories from Area 2 (9.8%). By way of comparison, previous excavations of similar magnitude on two Early Coalition sites on the Pajarito Plateau recovered faunal specimens representing 86,946, and 93,315 kilocalories, while a Late Coalition pueblo yielded 364,159 kilocalories (Trierweiler 1987:266).

The chief difference between the two is within the large game category, with a switch in the relative importance of bison and deer. While Area 1 has only a slightly greater reliance on large game than does Area 2, over 77% of the total food energy in Area 1 is from bison, with less than 10% coming from deer. The remaining 13% is from one antelope, and small and medium game. In Area 2 however, these values are more than switched, with nearly 90% coming from deer and no food energy from bison.

This switch is not taken to mean a shift in diet; rather it is clearly a function of sample size. The single bison in Area 1 contributes more useable food energy than do eight mule deer (not to mention over one thousand rabbits), and the fortuitous recovery of a bison bone from Area 1 can only be counterbalanced by increasing the sample size through more excavation, or by simply excluding the outlier specimen. Using the latter tactic, the total number of kilocalories represented in Area 1 is reduced from 61,992 to 17,934, with 43.4% of this from mule deer and 35% from antelope. This big game total of 78.4% compares favorably to the 89.8% in Area 2, pointing to a diversification of the faunal resource base between (early) Area 2 and (later) Area 1, both for all game and within the big game class.

When all large game animals are excluded from consideration, several differences are noted between the two areas in the relative importance of medium and small game. In Area 1, 55% of all small and medium game calories are provided by turkey, while in Area 2, turkey accounts for nearly 80% of all calories. Since Area 2 is considered to be earlier, this trend is somewhat surprising considering the reverse trend has been noted for other Coalition period sites on the Pajarito Plateau (Trierweiler 1987); once again, the small sample may be misleading. The same surprising reversal trend is noted for rabbits; these contribute 13% of all small and medium game

Table 7.7. Total Number of Specimens (TNS) , Minimum Number of Individuals (MNI), and Total Caloric Yield, by Taxon and Area.

	------Area 1------				------Area 2------				------Total Site------			
Taxon	TNS	MNI	Total Kcals	% Kcals	TNS	MNI	Total Kcals	% Kcals	TNS	MNI	Total Kcals	% Kcals
Bison bison	1	1	61,992	77.6	0	0	0	0.0	1	1	61,992	70.0
Odocoileus hemionus	6	1	7,793	9.7	3	1	7,793	89.8	9	2	15,585	17.6
Antilocapra americana	1	1	6,269	7.8	0	0	0	0.0	1	1	6,269	7.1
LARGE GAME subtotal	8	3	76,054	95.2	3	1	7,793	89.8	11	4	83,846	94.6
Erethizon dorsatum	10	1	737	0.9	0	0	0	0.0	10	1	737	0.8
Meleagris gallopavo	52	3	2,122	2.7	2	1	707	8.2	54	4	2,830	3.2
MEDIUM GAME subtotal	62	4	2,859	3.6	2	1	707	8.2	64	5	3,567	4.0
Lepus californicus	4	1	147	0.2	0	0	0	0.0	4	1	147	0.2
Mephitus mephitus	3	1	207	0.3	0	0	0	0.0	3	1	207	0.2
Dendragapus obscurus	3	1	163	0.2	0	0	0	0.0	3	1	163	0.2
Sylvilagus sp	39	3	170	0.2	6	2	113	1.3	45	5	283	0.3
Cynomys gunnisoni	1	1	52	0.1	0	0	0	0.0	1	1	52	0.1
S. variegatus	22	2	81	0.1	1	1	41	0.5	23	3	122	0.1
Sciurus aberti	4	1	38	0.0	0	0	0	0.0	4	1	38	0.0
S. lateralis	1	1	14	0.0	0	0	0	0.0	1	1	14	0.0
Neotoma sp.	42	8	99	0.1	1	1	12	0.1	43	9	112	0.1
S. spilosoma	3	1	6	0.0	1	1	6	0.1	4	2	12	0.0
Thomomys bottae	21	6	35	0.0	3	1	6	0.1	24	7	41	0.0
SMALL GAME subtotal	143	26	1,013	1.3	12	6	178	2.1	155	32	1,191	1.3
SUBTOTAL, specific IDs	213	33	79,926		17	8	8,678		230	41	88,604	
bird size #1	1	-	-	-	0	-	-	-	1	-	-	-
bird size #2	11	-	-	-	0	-	-	-	11	-	-	-
bird size #2-3	2	-	-	-	1	-	-	-	3	-	-	-
bird size #3	4	-	-	-	1	-	-	-	5	-	-	-
bird size #4	1	-	-	-	0	-	-	-	1	-	-	-
mammal size #1	18	-	-	-	0	-	-	-	18	-	-	-
mammal size #2	25	-	-	-	2	-	-	-	27	-	-	-
mammal size #2-3	11	-	-	-	0	-	-	-	11	-	-	-
mammal size #3	11	-	-	-	4	-	-	-	15	-	-	-
mammal size #3-4	9	-	-	-	0	-	-	-	9	-	-	-
mammal size #4	1	-	-	-	0	-	-	-	1	-	-	-
mammal size #5	3	-	-	-	2	-	-	-	5	-	-	-
mammal size #6	5	-	-	-	2	-	-	-	7	-	-	-
unidentifiable	98	-	-	-	9	-	-	-	107	-	-	-
UNKNOWN subtotal	200	-	-	-	21	-	-	-	221	-	-	-
TOTAL	413	33	79,926	100.0	38	8	8,678	100.0	451	41	88,604	100.0

calories in earlier Area 2, but contribute only 5% of these calories in the later Area 1.

Maximum Distinction

This analysis subdivides the site into nine areas, based on horizontal proximity or separation of excavation units. Contrasted are the northern off-mound unit (group A), the western off-mound unit (group B), the plaza grid units (group C), the off-mound unit east of the main pueblo (group D), the off-mound unit just south of the main pueblo (group E), the off-mound unit east of the linear pueblo (group F), all units and rooms in the linear pueblo (group G), Room 1 (group H), and Room 10 (group I).

Increasing the number of analytical units of course has no effect on the total number of specimens. However, because the maximum distinction method subdivides the site into more analytical units, both the MNI and the total caloric yield are greater than for the minimum distinction method. Use of the maximum method results in a minimum of 75 individuals on the site (Table 7.8), 34 more individuals than obtained using the

Table 7.8. Total Number of Specimens and Minimum Number of Individuals, by Taxon and Faunal Sampling Unit.

	Total Number of Specimens ----- By Faunal Sample Unit -----										Minimum Number of Individuals ----- By Faunal Sample Unit -----									
Taxon	A	B	C	D	E	F	G	H	I	Tot	A	B	C	D	E	F	G	H	I	Tot.
Bison bison	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1
Odocoileus hemionus	0	0	2	0	1	0	3	0	3	9	0	0	1	0	1	0	2	0	1	5
Antilo. americana	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1
LARGE GAME sub.	0	0	4	0	1	0	3	0	3	11	0	0	3	0	1	0	2	0	1	7
Erethizon dorsatum	0	2	7	0	0	0	0	0	1	10	0	1	1	0	0	0	0	0	1	3
Meleagris gallopavo	0	27	17	1	1	0	2	2	4	54	0	1	2	1	1	0	1	1	1	8
MEDIUM GAME sub.	0	29	24	1	1	0	2	2	5	64	0	2	3	1	1	0	1	1	2	11
Lepus californicus	0	1	1	0	1	0	0	0	1	4	0	1	1	0	1	0	0	0	1	4
Mephitus mephitus	0	0	0	0	0	0	0	3	0	3	0	0	0	0	0	0	0	1	0	1
Dendrag. obscurus	0	3	0	0	0	0	0	0	0	3	0	1	0	0	0	0	0	0	0	1
Sylvilagus sp	1	11	8	3	4	0	6	2	10	45	1	1	1	1	1	0	2	1	2	10
Cynomys gunnisoni	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	1
S. variegatus	0	13	7	0	2	0	1	0	0	23	0	2	1	0	1	0	1	0	0	5
Sciurus Aberti	0	0	1	0	2	0	0	0	1	4	0	0	1	0	1	0	0	0	1	3
S. lateralis	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1
Neotoma sp	0	14	9	2	8	1	0	1	8	43	0	3	3	1	4	1	0	1	2	15
S. spilosoma	0	1	1	1	0	0	1	0	0	4	0	1	1	1	0	0	1	0	0	4
Thomomys bottae	1	4	9	0	1	0	3	1	5	24	1	3	2	0	1	0	1	1	3	12
SMALL GAME sub.	2	47	37	6	18	1	11	7	26	155	2	12	11	3	9	1	5	4	10	57
bird, size #1	0	1	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	1
bird, size #2	0	3	5	0	1	0	0	0	2	11	0	1	1	0	1	0	0	0	1	4
bird, size #2-3	0	2	0	0	0	0	1	0	0	3	0	1	0	0	0	0	1	0	0	2
bird, size #3	0	4	0	0	0	0	1	0	0	5	0	1	0	0	0	0	1	0	0	2
bird, size #4	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	1	0	1
mammal, size #1	0	12	1	0	1	0	0	0	4	18	0	1	1	0	1	0	0	0	2	5
mammal, size #2	0	12	6	1	4	0	2	0	2	27	0	2	1	1	1	0	1	0	1	7
mammal, size #2-3	0	7	3	1	0	0	0	0	0	11	0	1	1	1	0	0	0	0	0	3
mammal, size #3	0	7	3	0	1	0	4	0	0	15	0	1	1	0	1	0	1	0	0	4
mammal, size #3-4	0	2	5	0	0	0	0	0	2	9	0	1	1	0	0	0	0	0	1	3
mammal, size #4	0	1	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	1
mammal, size #5	1	2	0	0	0	0	2	0	0	5	1	1	0	0	0	0	1	0	0	3
mammal, size #6	0	1	1	0	0	0	2	0	3	7	0	1	1	0	0	0	1	0	1	4
unidentifiable	0	54	24	4	7	0	9	4	5	107	-	-	-	-	-	-	-	-	-	0
UNKNOWN subtot.	1	108	48	6	14	0	21	5	18	221	1	13	7	2	4	0	6	1	6	40
TOTAL	3	184	113	13	34	1	37	14	52	451	3	27	24	6	15	1	14	6	19	115

minimum distinction method. While the number of large game animals increases by three, the vast majority of the increase (73.5%) is attributable to small game, especially rabbits and hares (an increase of eight), woodrats (an increase of six), and pocket gophers (an increase of five).

Similarly, the total food energy is calculated as 117,284 kilocalories (Table 7.9), up from 88,604 calculated with the minimum distinction method. However, because of the vastly differential biomasses between large and medium/small game, over 81% of this increase is attributed to the large game, specifically the three additional mule deer. For the site as a whole, 91.4% of all food energy is derived from large game, with 6.7% from medium game, and less than 2% from small game.

The majority of food energy on the site comes from specimens recovered in group C (the plaza), with 78,558 kilocalories (67.0%); again, most of this is attributable to the two mule deer and single antelope and bison individuals represented in the plaza assemblage. The only other sampling unit with a significant portion of the total food energy is group G (the linear pueblo) with 16,458 kilocalories (14.0%).

Table 7.9. Total Caloric Yield, by Taxon and Faunal Sampling Unit (Maximum Distinction Method).

	Total Food Energy, in Kilocalories ------ By Faunal Sampling Unit ------										Food Energy, as a % of Total ------ By Faunal Sampling Unit ------									
Taxon	A	B	C	D	E	F	G	H	I	Total	A	B	C	D	E	F	G	H	I	Total
Bison bison	0	0	61,992	0	0	0	0	0	0	61,992	0.0	0.0	78.9	0.0	0.0	0.0	0.0	0.0	0.0	52.9
Odo. hemionus	0	0	7,793	0	7,793	0	15,585	0	7,793	38,964	0.0	0.0	9.9	0.0	88.2	0.0	94.7	0.0	80.9	33.2
Antilo. americana	0	0	6,269	0	0	0	0	0	0	6,269	0.0	0.0	8.0	0.0	0.0	0.0	0.0	0.0	0.0	5.3
LARGE GAME subtotal	0	0	76,054	0	7,793	0	15,585	0	7,793	107,225	0.0	0.0	96.8	0.0	88.2	0.0	94.7	0.0	80.9	91.4
Ereth. dorsatum	0	737	737	0	0	0	0	0	737	2,211	0.0	37.7	0.9	0.0	0.0	0.0	0.0	0.0	7.7	1.9
Mel. gallopavo	0	707	1,415	707	707	0	707	707	707	5,657	0.0	36.2	1.8	90.4	8.0	0.0	4.3	71.5	7.3	4.8
MEDIUM GAME subtotal	0	1,444	2,152	707	707	0	707	707	1,444	7,868	0.0	73.9	2.7	90.4	8.0	0.0	4.3	71.5	15.0	6.7
Lepus californicus	0	147	147	0	147	0	0	0	147	588	0.0	7.5	0.2	0.0	1.7	0.0	0.0	0.0	1.5	0.5
Meph. mephitus	0	0	0	0	0	0	0	207	0	207	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.9	0.0	0.2
Dendra. obscurus	0	163	0	0	0	0	0	0	0	163	0.0	8.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Sylvilagus sp.	57	57	57	57	57	0	113	57	113	568	90.5	2.9	0.1	7.3	0.6	0.0	0.7	5.8	1.2	0.5
Cyn. gunnisoni	0	0	0	0	0	0	0	0	52	52	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0
S. variegatus	0	81	41	0	41	0	41	0	0	204	0.0	4.1	0.1	0.0	0.5	0.0	0.2	0.0	0.0	0.2
Sciurus Aberti	0	0	38	0	38	0	0	0	38	114	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.4	0.1
S. lateralis	0	0	14	0	0	0	0	0	0	14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Neotoma sp.	0	37	37	12	50	12	0	12	25	185	0.0	1.9	0.0	1.5	0.6	100.0	0.0	1.2	0.3	0.2
S. spilosoma	0	6	6	6	0	0	6	0	0	24	0.0	0.3	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0
Thomomys bottae	6	18	12	0	6	0	6	6	18	72	9.5	0.9	0.0	0.0	0.1	0.0	0.0	0.6	0.2	0.1
SMALL GAME subtotal	63	509	352	75	339	12	166	282	393	2,191	100.0	26.1	0.4	9.6	3.8	100.0	1.0	28.5	4.1	1.9
TOTAL	63	1,953	78,558	782	8,839	12	16,458	989	9,630	117,284	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Within the site, several areas, including groups B (36.2%), D (90.4%), and H (71.5%) have higher caloric returns from turkey than would be expected, given the number of bones identified from the provenience. Similarly, groups D (7.3%) and H (5.8%) have somewhat higher than expected proportions of food energy from rabbits.

DISCUSSION

Comparison of results from the minimum and maximum distinction methods show that the two methods are not grossly dissimilar. While numerous small differences exist, there are no significant discrepancies between the two methods. Nevertheless, the maximum distinction method is probably the most representative, despite the small sample sizes within several faunal sampling units.

The most provocative question resulting from the analysis is the reliability of the energy budget, given the necessary weighting of the single bison bone. This single bone represents well over 50% of the total food energy from the excavated sample, with the other 450 specimens contributing less than 50% of the energy budget. As Grayson (1978) points out, MNI analysis tends to exaggerate the importance of rarer taxa. When these rarer taxa are also the most massive (as in this case), the analysis may be seriously skewed. For example, the non-recovery of any single rabbit bone would have a negligible effect on the overall energy analysis. On the other hand, the analysis would have been significantly different had the single bison bone not been recovered.

Finally, the question may be raised as to the cultural significance of the bison bone. The above analyses have implicitly assumed that all faunal specimens were locally procured in the immediate hunting catchment(s). The Tewa are known to have occasionally hunted bison on the plains east of the Pecos (Henderson and Harrington 1914: 13), but abundant ethnographic evidence suggests that bison may have been more economically available through trade with Plains groups (see Dozier 1970:129). This interpretation becomes more attractive considering the fact that only a single bison bone was recovered in the entire sample of 451 specimens. Moreover, the bone is a phalange, commonly included in traded packages, including hides.

Future excavations on this site or other similar sites should place an emphasis on increasing the sample sizes of bone materials by targeting midden areas. While the overall sample from LA 60372 is sufficient (230 identifiable specimens), the sample from Area 2 is barely marginal (38 identifiable specimens), and additional specimens from this component are highly desirable.

Table 7.10. Data listing, Excavated Faunal Specimens, LA 60372, 1989.

FS #	Spec. #	BAND Cat. #	Site Area	South-ing	East-ing	Room	Stratum	Level	FSU[a]	Wt (g)	Sym.[b]	Portion[c]	Element	Taxon	Mod.	Comments
38	1	13281	1	94	112	-	1	1	D	0.1	U	F	?	unknown	-	–
42	1	13441	1	102	86	-	2	-	E	0.6	R	P	tibia	*Lepus californicus*	-	–
44	1	13179	1	94	112	-	3	2	D	0.1	L	F	inominate	*Sylvilagus* sp.	B	–
44	2	13179	1	94	112	-	3	2	D	0.2	R	P	femur	*Neotoma* sp.	-	–
44	3	13179	1	94	112	-	3	2	D	0.1	L	P	femur	*Spermophilus spilosoma*	B	–
44	4	13179	1	94	112	-	3	2	D	0.1	A	W	vertebra	mammal, size 2	-	–
44	5	13179	1	94	112	-	3	2	D	0.1	U	F	?	unknown	-	–
44	6	13179	1	94	112	-	3	2	D	0.1	U	F	?	unknown	-	–
44	7	13179	1	94	112	-	3	2	D	0.1	U	M	?	unknown	B	–
44	8	13179	1	94	112	-	3	2	D	–	-	-	-	–	-	ceramic
45	1	13263	1	94	112	-	3	3	D	0.9	R	P	mandible	*Sylvilagus* sp.	-	–
45	2	13263	1	94	112	-	3	3	D	1.1	R	W	inominate	*Sylvilagus* sp.	-	–
45	3	13263	1	94	112	-	3	3	D	0.9	A	W	vertebra	*Meleagris gallopavo*	-	–
45	4	13263	1	94	112	-	3	3	D	0.2	U	M	scapula	mammal, size 2-3	B	–
46	1	13153	1	94	112	-	3	4	D	0.2	L	W	tibia	*Neotoma* sp.	-	–
51	1	13436	1	102	86	-	-	1	E	103.3	R	W	metacarpal	*Odocoileus hemionus*	-	–
51	2	13436	1	102	86	-	-	1	E	0.1	R	W	mandible	mammal, size 1	-	–
51	3	13436	1	102	86	-	-	1	E	0.3	U	P	radius	*Meleagris gallopavo*	-	–
52	1	13147	1	102	86	-	5	1	E	0.2	R	W	mandible	*Neotoma* sp.	-	–
52	2	13147	1	102	86	-	5	1	E	0.2	U	F	?	unknown	-	–
54	1	13346	1	102	86	-	6	2	E	0.2	R	W	mandible	*Neotoma* sp.	-	–
55	1	13339	1	102	86	-	7	1	E	0.2	R	P	scapula	*Sylvilagus* sp.	-	–
55	2	13339	1	102	86	-	7	1	E	0.1	L	W	inominate	*Neotoma* sp.	-	–
55	3	13339	1	102	86	-	7	1	E	0.2	L	M	inominate	*Thomomys bottae*	-	–
55	4	13339	1	102	86	-	7	1	E	0.1	U	W	rib	*mammal, size 2*	B	–
55	5	13339	1	102	86	-	7	1	E	0.5	U	D	humerus	*Sylvilagus* sp.	-	–
55	6	13339	1	102	86	-	7	1	E	0.2	L	P	mandible	*Neotoma* sp.	-	–
55	7	13339	1	102	86	-	7	1	E	0.1	A	W	caudal vertebra	mammal, size 2	-	–
55	8	13339	1	102	86	-	7	1	E	0.7	U	W	ulna	*Sylvilagus* sp.	-	–

Table 7.10. Data listing, Excavated Faunal Specimens, LA 60372, 1989 (Continued).

FS #	Spec. #	BAND Cat. #	Site Area	South-ing	East-ing	Room	Strat-um	Level	FSU	Wt (g)	Sym.	Por-tion	Element	Taxon	Mod.	Comments
55	8	13339	1	102	86	-	7	1	E	0.7	U	W	ulna	*Sylvilagus* sp.	-	–
55	9	13339	1	102	86	-	7	1	E	0.3	U	W	rib	mammal, size 3	-	–
55	10	13339	1	102	86	-	7	1	E	0.1	U	P	rib	mammal, size 2	-	–
55	11	13339	1	102	86	-	7	1	E	0.2	U	F	?	unknown	-	–
55	12	13339	1	102	86	-	7	1	E	0.1	U	F	?	unknown	-	–
55	13	13339	1	102	86	-	7	1	E	0.1	U	M	?	unknown	-	–
55	14	13339	1	102	86	-	7	1	E	0.1	U	M	?	unknown	-	–
55	15	13339	1	102	86	-	7	1	E	0.3	U	F	?	unknown	-	–
56	1	13354	1	102	86	-	8	1	E	0.6	R	P	femur	*Sciurus aberti*	B	–
56	2	13354	1	102	86	-	8	1	E	0.2	R	W	mandible	*Neotoma* sp.	-	-
56	3	13354	1	102	86	-	8	1	E	0.4	L	W	mandible	*Neotoma sp.*	-	–
56	4	13354	1	102	86	-	8	1	E	0.4	R	W	mandible	*Neotoma* sp.	-	–
56	5	13354	1	102	86	-	8	1	E	0.1	L	F	zygomatic	*Neotoma* sp.	-	–
56	6	13354	1	102	86	-	8	1	E	0.4	R	P	humerus	*Sciurus aberti*	J	–
56	7	13354	1	102	86	-	8	1	E	0.5	R	P	ulna	*Spermophilus variegatus*	-	–
56	8	13354	1	102	86	-	8	1	E	0.3	L	P	ulna	*Sylvilagus* sp.	-	–
56	9	13354	1	102	86	-	8	1	E	0.2	R	W	radius	*Spermophilus variegatus*	-	–
56	10	13354	1	102	86	-	8	1	E	0.2	U	D	humerus	mammal, size 2	-	–
56	11	13354	1	102	86	-	8	1	E	0.2	U	F	?	bird, size 2	-	–
56	12	13354	1	102	86	-	8	1	E	0.7	U	M	?	unknown	-	–
59	1	13927	1	90	88	-	1	1	C	0.1	U	F	?	unknown	-	–
60	1	13334	1	90	88	-	2	1	C	0.1	R	W	femur	mammal, size 1	-	–
60	2	13334	1	90	88	-	2	1	C	23.3	R	W	phalange	*Bison bison*	-	adult female
60	3	13334	1	90	88	-	2	1	C	0.2	R	M	inominate	*Spermophilus variegatus*	B	–
60	4	13334	1	90	88	-	2	1	C	0.1	U	F	?	mammal, size 2-3	-	–
61	1	13336	1	90	88	-	2	2	C	0.3	R	M	inominate	*Sylvilagus* sp.	-	–
61	2	13336	1	90	88	-	2	2	C	0.3	U	M	?	mammal, size 3	-	–
61	3	13336	1	90	88	-	2	2	C	0.2	U	F	?	unknown	-	–
64	1	13424	1	90	88	-	4	2	C	0.6	R	D	humerus	*Sylvilagus* sp.	-	–
64	2	13424	1	90	88	-	4	2	C	0.4	R	D	radius	*Meleagris gallopavo*	-	–
64	3	13424	1	90	88	-	4	2	C	1.4	R	D	humerus	*Meleagris gallopavo*	-	–

Table 7.10. Data listing, Excavated Faunal Specimens, LA 60372, 1989 (Continued).

FS #	Spec. #	BAND Cat. #	Site Area	South-ing	East-ing	Room	Strat-um	Level	FSU	Wt (g)	Sym.	Por-tion	Element	Taxon	Mod.	Comments
64	4	13424	1	90	88	-	4	2	C	0.9	A	M	foramen magnum	mammal, size 6	B	–
64	5	13424	1	90	88	-	4	2	C	10.5	R	W	femur	*Meleagris gallopavo*	-	–
65	1	13508	1	90	88	-	5	1	C	7.0	L	D	tibiotarsus	*Meleagris gallopavo*	-	–
65	2	13508	1	90	88	-	5	1	C	0.3	L	W	femur	*Neotoma* sp.	-	–
65	3	13508	1	90	88	-	5	1	C	0.3	L	W	mandible	*Neotoma* sp.	-	–
65	4	13508	1	90	88	-	5	1	C	0.2	U	F	?	unknown	-	–
65	5	13508	1	90	88	-	5	1	C	1.1	U	M	shaft	mammal, size 3-4		needle/awl
65	6	13508	1	90	88	-	5	1	C	0.1	U	F	?	unknown	B	–
65	7	13508	1	90	88	-	5	1	C	0.1	U	F	?	unknown	-	–
65	8	13508	1	90	88	-	5	1	C	0.1	U	F	?	unknown	-	–
66	1	13504	1	90	88	-	5	2	C	0.4	L	W	tibia	mammal, size 2-3	-	–
66	1	13505	1	90	88	-	5	2	C	–	-	-	-	–	-	gastrolith
66	2	13504	1	90	88	-	5	2	C	0.3	U	W	tibia	mammal, size 2	-	–
66	2	13505	1	90	88	-	5	2	C	–	-	-	-	–	-	gastrolith
66	3	13505	1	90	88	-	5	2	C	–	-	-	-	–	-	mica
66	3	13504	1	90	88	-	5	2	C	0.1	U	W	?	bird, size 2	-	–
66	4	13504	1	90	88	-	5	2	C	0.1	A	M	frontal	mammal, size 2	-	–
66	5	13504	1	90	88	-	5	2	C	0.2	U	F	?	unknown	-	–
66	6	13504	1	90	88	-	5	2	C	0.2	*	*	*	unknown	-	–
67	1	13562	1	90	88	-	5	3	C	0.3	R	W	mandible	*Neotoma* sp.	-	–
67	2	13562	1	90	88	-	5	3	C	0.1	L	D	tarsometa-tarsus	bird, size 2	-	–
67	3	13562	1	90	88	-	5	3	C	0.1	R	W	scapula	mammal, size 2-3	-	–
67	4	13562	1	90	88	-	5	3	C	0.1	U	F	?	unknown	-	–
68	1	13580	1	90	88	-	5	4	C	0.3	R	W	mandible	*Spermophilus spilosoma*	-	–
68	2	13580	1	90	88	-	5	4	C	0.3	R	W	inominate	*Neotoma* sp.	-	–
68	3	13580	1	90	88	-	5	4	C	0.3	R	W	femur	*Neotoma* sp.	B	–
68	4	13580	1	90	88	-	5	4	C	0.2	R	D	tibia	*Lepus californicus*	B	–
68	5	13580	1	90	88	-	5	4	C	1.1	U	M	?	*Meleagris gallopavo*	T	awl/punch

Table 7.10. Data listing, Excavated Faunal Specimens, LA 60372, 1989 (Continued).

FS #	Spec. #	BAND Cat. #	Site Area	South-ing	East-ing	Room	Strat-um	Level	FSU	Wt (g)	Sym.	Por-tion	Element	Taxon	Mod.	Comments
70	1	13609	1	90	88	-	6	1	C	4.1	L	P	tibiotarsus	*Meleagris gallopavo*	B	–
70	2	13609	1	90	88	-	6	1	C	3.7	L	D	metatarsal	*Antilocapra americana*	-	–
70	3	13609	1	90	88	-	6	1	C	3.9	L	P	tibia	*Erethizon dorsatum*	-	–
70	4	13609	1	90	88	-	6	1	C	3.5	L	M	tibia	*Erethizon dorsatum*	-	–
70	5	13609	1	90	88	-	6	1	C	0.7	L	D	tibia	*Erethizon dorsatum*	-	–
70	6	13609	1	90	88	-	6	1	C	1.3	U	D	tibia	mammal, size 3	-	–
70	7	13609	1	90	88	-	6	1	C	0.6	L	D	humerus	*Sciurus aberti*	-	–
70	8	13609	1	90	88	-	6	1	C	0.1	A	W	axis	mammal, size 2	-	–
70	9	13609	1	90	88	-	6	1	C	0.1	A	W	vertebra	mammal, size 2	-	–
70	10	13609	1	90	88	-	6	1	C	0.3	U	P	rib	mammal, size 3-4	-	–
70	11	13609	1	90	88	-	6	1	C	0.6	L	W	podial	*Meleagris gallopavo*	B	–
70	12	13609	1	90	88	-	6	1	C	0.1	R	D	humerus	*Spermophilus lateralis*	B	–
70	13	13609	1	90	88	-	6	1	C	0.2	R	W	coracoid	bird, size 2	-	–
70	14	13609	1	90	88	-	6	1	C	0.2	U	D	tibia	*Sylvilagus* sp.	B	–
70	15	13609	1	90	88	-	6	1	C	0.5	U	F	?	unknown	-	–
70	16	13609	1	90	88	-	6	1	C	0.4	U	F	?	unknown	B	–
70	17	13609	1	90	88	-	6	1	C	0.1	U	F	?	unknown	B	–
70	18	13609	1	90	88	-	6	1	C	0.7	U	M	? shaft	mammal, size 3-4	-	–
70	19	13609	1	90	88	-	6	1	C	0.2	U	F	?	unknown	-	–
70	20	13609	1	90	88	-	6	1	C	0.2	U	F	?	unknown	-	–
70	21	13609	1	90	88	-	6	1	C	0.1	U	F	?	unknown	-	–
70	22	13609	1	90	88	-	6	1	C	0.1	U	F	?	unknown	-	–
71	1	13951	1	90	88	-	6	2	C	1.8	L	D	tibia	*Erethizon dorsatum*	-	-
71	2	13951	1	90	88	-	6	2	C	4.0	L	D	femur	*Meleagris gallopavo*	-	–
71	3	13951	1	90	88	-	6	2	C	0.5	A	M	cranium & frontal	*Spermophilus variegatus*	-	–

Table 7.10. Data listing, Excavated Faunal Specimens, LA 60372, 1989 (Continued).

FS #	Spec. #	BAND Cat. #	Site Area	South-ing	East-ing	Room	Strat-um	Level	FSU	Wt (g)	Sym.	Por-tion	Element	Taxon	Mod.	Comments
71	4	13951	1	90	88	-	6	2	C	0.4	L	M	maxilla	*Spermophilus variegatus*	-	–
71	5	13951	1	90	88	-	6	2	C	0.4	L	W	mandible	*Neotoma* sp.	-	–
71	6	13951	1	90	88	-	6	2	C	0.7	R	P	tibia	*Spermophilus variegatus*	B	–
71	7	13951	1	90	88	-	6	2	C	0.2	U	M	inominate	*Neotoma* sp.	-	–
71	8	13951	1	90	88	-	6	2	C	0.2	R	P	mandible	mammal, size 2	-	–
71	9	13951	1	90	88	-	6	2	C	0.3	U	D	tibia	*Spermophilus variegatus*	B	-
71	10	13951	1	90	88	-	6	2	C	0.1	U	F	zygomatic	mammal, size 2	-	–
79	1	13368	1	70	82	-	3	-	A	0.4	R	P	humerus	*Sylvilagus* sp.	-	–
82	1	13376	1	70	82	-	5	2	A	0.7	R	W	mandible	*Thomomys bottae*	-	–
85	1	13427	1	70	82	-	7	1	A	0.9	R	P	ulna	mammal, size 5	-	–
94	1	13440	1	84	96	-	2	5	C	0.4	U	F	shaft	mammal, size 3	-	–
96	1	13439	1	84	96	-	3	2	C	0.5	L	W	mandible	*Thomomys bottae*	-	–
96	2	13439	1	84	96	-	3	2	C	2.4	L	P	coracoid	*Meleagris gallopavo*	-	–
97	1	13507	1	84	96	-	3	2	C	0.6	L	W	mandible	*Spermophilus variegatus*	-	–
97	2	13507	1	84	96	-	3	2	C	1.1	U	M	? shaft	mammal, size 3-4	-	–
98	1	13576	1	84	96	-	3	3	C	1.3	R	W	humerus	*Sylvilagus* sp.	-	–
99	1	13584	1	84	96	-	4	1	C	0.1	U	F	skull	mammal, size 3-4	-	–
102	1	13435	1	80	74	-	2	1	B	1.9	A	W	vertebra	*Erethizon dorsatum*	-	–
103	1	13177	1	80	74	-	2	2	B	4.8	R	W	ulna	*Meleagris gallopavo*	-	–
107	1	13426	1	80	74	-	6	-	B	0.3	A	W	vertebra	mammal, size 3	B	–
107	2	13426	1	80	74	-	6	-	B	0.8	U	M	?	mammal, size 3-4	B	–
107	3	13426	1	80	74	-	6	-	B	0.1	U	F	?	unknown	-	–
107	4	13426	1	80	74	-	6	-	B	0.2	L	W	tibia	*Neotoma* sp.	B	–
108	1	13438	1	80	74	-	3	1	B	0.9	R	W	mandible	*Spermophilus variegatus*	-	–

Table 7.10. Data listing, Excavated Faunal Specimens, LA 60372, 1989 (Continued).

FS #	Spec. #	BAND Cat. #	Site Area	South-ing	East-ing	Room	Strat-um	Level	FSU	Wt (g)	Sym.	Por-tion	Element	Taxon	Mod.	Comments
108	2	13438	1	80	74	-	3	1	B	0.6	L	W	inominate	*Spermophilus variegatus*	-	–
108	3	13438	1	80	74	-	3	1	B	0.1	L	M	inominate	*Neotoma* sp.	-	–
108	4	13438	1	80	74	-	3	1	B	0.5	A	W	sacrum & inominate	*Thomomys bottae*	-	–
108	5	13438	1	80	74	-	3	1	B	0.8	U	M	? shaft	bird, size 3	-	–
108	6	13438	1	80	74	-	3	1	B	0.4	R	W	cuneiform	*Meleagris gallopavo*	-	–
108	7	13438	1	80	74	-	3	1	B	0.4	L	D	radius	mammal, size 5	B	–
108	8	13438	1	80	74	-	3	1	B	0.1	U	F	?	unknown	-	–
108	9	13438	1	80	74	-	3	1	B	0.8	U	M	? shaft	unknown	-	–
108	10	13438	1	80	74	-	3	1	B	0.1	U	M	? shaft	mammal, size 2-3	B	–
108	11	13438	1	80	74	-	3	1	B	0.1	U	F	?	unknown	B	–
108	12	13438	1	80	74	-	3	1	B	0.5	U	F	?	unknown	-	–
108	13	13438	1	80	74	-	3	1	B	0.2	U	M	? shaft	mammal, size 3	-	–
108	14	13438	1	80	74	-	3	1	B	0.1	U	M	? shaft	mammal, size 3	-	–
108	15	13438	1	80	74	-	3	1	B	0.1	U	M	? shaft	mammal, size 3	-	–
108	16	13438	1	80	74	-	3	1	B	0.1	U	M	? shaft	mammal, size 3	-	–
108	17	13438	1	80	74	-	3	1	B	0.4	U	F	?	unknown	-	–
108	18	13438	1	80	74	-	3	1	B	0.2	U	F	?	unknown	-	–
109	1	13437	1	80	74	-	4	1	B	6.9	R	D	tibiotarsus	*Meleagris gallopavo*	-	–
109	2	13437	1	80	74	-	4	1	B	3.6	R	W	radius	*Meleagris gallopavo*	-	–
109	3	13437	1	80	74	-	4	1	B	0.3	R	D	tibiotarsus	bird, size 2	-	–
109	4	13437	1	80	74	-	4	1	B	0.4	R	W	scapula	*Spermophilus variegatus*	-	–
109	5	13437	1	80	74	-	4	1	B	0.9	R	M	inominate	*Spermophilus variegatus*	-	–
109	6	13437	1	80	74	-	4	1	B	0.3	R	M	inominate	*Neotoma* sp.	-	–
109	7	13437	1	80	74	-	4	1	B	0.3	L	W	femur	*Neotoma* sp.	-	–
109	8	13437	1	80	74	-	4	1	B	0.1	L	W	humerus	bird, size 1	-	–
109	9	13437	1	80	74	-	4	1	B	0.7	R	D	tibia	*Sylvilagus* sp.	-	-
109	10	13437	1	80	74	-	4	1	B	0.3	R	M	maxilla	*Spermophilus variegatus*	-	–
109	11	13437	1	80	74	-	4	1	B	0.7	R	P	tibiotarsus	*Meleagris gallopavo*	-	–

Table 7.10. Data listing, Excavated Faunal Specimens, LA 60372, 1989 (Continued).

FS #	Spec. #	BAND Cat. #	Site Area	South-ing	East-ing	Room	Strat-um	Level	FSU	Wt (g)	Sym.	Por-tion	Element	Taxon	Mod.	Comments
109	12	13437	1	80	74	-	4	1	B	0.2	R	M	tibia	mammal, size 2	-	–
109	13	13437	1	80	74	-	4	1	B	0.1	L	M	mandible	*Neotoma* sp.	-	–
109	14	13437	1	80	74	-	4	1	B	0.2	R	W	tibia	*Neotoma* sp.	-	-
109	15	13437	1	80	74	-	4	1	B	0.1	A	W	vertebra	mammal, size 2	-	–
109	16	13437	1	80	74	-	4	1	B	0.1	U	P	rib	mammal, size 2	-	–
109	17	13437	1	80	74	-	4	1	B	0.5	U	M	radius	bird, size 3	-	–
109	18	13437	1	80	74	-	4	1	B	0.1	U	D	femur	bird, size 2	-	–
109	20	13437	1	80	74	-	4	1	B	2.8	U	M	?	mammal, size 5	T	awl/punch
109	21	13437	1	80	74	-	4	1	B	1.2	U	M	tibiotarsus	*Meleagris gallopavo*	-	–
109	22	13437	1	80	74	-	4	1	B	0.9	U	M	?	*Meleagris gallopavo*	-	–
109	23	13437	1	80	74	-	4	1	B	0.9	U	F	?	unknown	-	–
109	24	13437	1	80	74	-	4	1	B	0.2	U	F	?	unknown	-	–
109	25	13437	1	80	74	-	4	1	B	0.2	U	F	?	unknown	B	–
109	26	13437	1	80	74	-	4	1	B	0.2	U	F	?	unknown	B	–
109	27	13437	1	80	74	-	4	1	B	0.1	U	F	?	unknown	B	–
109	28	13437	1	80	74	-	4	1	B	0.1	U	F	?	unknown	B	–
109	29	13437	1	80	74	-	4	1	B	0.1	U	M	?	unknown	-	–
109	30	13437	1	80	74	-	4	1	B	0.1	U	M	?	unknown	-	–
109	31	13437	1	80	74	-	4	1	B	0.1	U	M	?	unknown	-	–
109	32	13437	1	80	74	-	4	1	B	0.1	U	M	?	unknown	-	–
109	33	13437	1	80	74	-	4	1	B	0.1	U	F	?	unknown	-	–
109	34	13437	1	80	74	-	4	1	B	0.1	U	F	?	unknown	-	–
109	35	13437	1	80	74	-	4	1	B	0.1	U	F	?	unknown	-	–
109	36	13437	1	80	74	-	4	1	B	0.1	U	F	?	unknown	-	–
109	37	13437	1	80	74	-	4	1	B	0.1	U	F	?	unknown	-	–
109	38	13437	1	80	74	-	4	1	B	0.1	U	F	?	unknown	-	–
109	39	13437	1	80	74	-	4	1	B	0.1	U	F	?	unknown	-	–
109	40	13437	1	80	74	-	4	1	B	0.1	U	F	?	unknown	-	–
110	1	13425	1	80	74	-	4	2	B	1.0	U	W	rib	*Meleagris gallopavo*	-	–
110	2	13425	1	80	74	-	4	2	B	1.0	U	W	rib	mammal, size 4	-	–
110	3	13425	1	80	74	-	4	2	B	0.5	U	F	?	*Meleagris gallopavo*	-	–
110	4	13425	1	80	74	-	4	2	B	1.3	L	D	radius	*Erethizon dorsatum*	-	–

Table 7.10. Data listing, Excavated Faunal Specimens, LA 60372, 1989 (Continued).

FS #	Spec. #	BAND Cat. #	Site Area	South-ing	East-ing	Room	Strat-um	Level	FSU	Wt (g)	Sym.	Por-tion	Element	Taxon	Mod.	Comments
110	5	13425	1	80	74	-	4	2	B	0.8	A	M	vertebra	*Meleagris gallopavo*	-	–
110	6	13425	1	80	74	-	4	2	B	0.3	R	W	scapula	*Sylvilagus* sp.	-	–
110	7	13425	1	80	74	-	4	2	B	0.3	L	M	cranium	*Sylvilagus* sp.	-	–
110	8	13425	1	80	74	-	4	2	B	0.3	R	W	mandible	*Spermophilus variegatus*	-	–
110	9	13425	1	80	74	-	4	2	B	0.2	U	W	ungual phalange	*Meleagris gallopavo*	-	–
110	10	13425	1	80	74	-	4	2	B	0.7	R	M	maxilla	*Sylvilagus* sp.	-	–
110	11	13425	1	80	74	-	4	2	B	0.7	L	M	maxilla	*Sylvilagus* sp.	-	–
110	12	13425	1	80	74	-	4	2	B	0.2	R	M	inominate	*Neotoma* sp.	-	–
110	13	13425	1	80	74	-	4	2	B	0.2	U	F	rib	*Meleagris gallopavo*	-	–
110	14	13425	1	80	74	-	4	2	B	0.4	R	W	ulna	*Spermophilus variegatus*	-	–
110	15	13425	1	80	74	-	4	2	B	0.2	R	P	femur	*Neotoma* sp.	-	–
110	16	13425	1	80	74	-	4	2	B	0.2	R	W	radius	*Spermophilus variegatus*	-	–
110	17	13425	1	80	74	-	4	2	B	0.1	A	W	vertebra	mammal, size 2	B	–
110	18	13425	1	80	74	-	4	2	B	0.2	L	P	ulna	*Spermophilus variegatus*	B	–
110	19	13425	1	80	74	-	4	2	B	0.1	L	D	mandible	*Spermophilus variegatus*	-	–
110	20	13425	1	80	74	-	4	2	B	0.1	L	D	ulna	*Spermophilus variegatus*	B	–
110	21	13425	1	80	74	-	4	2	B	0.4	A	F	vertebra	*Meleagris gallopavo*	-	–
110	22	13425	1	80	74	-	4	2	B	0.4	A	F	vertebra	*Meleagris gallopavo*	-	–
110	23	13425	1	80	74	-	4	2	B	0.3	A	F	vertebra	*Meleagris gallopavo*	B	–
110	24	13425	1	80	74	-	4	2	B	0.2	A	F	vertebra	*Meleagris gallopavo*	-	–
110	25	13425	1	80	74	-	4	2	B	0.1	A	F	vertebra	*Meleagris gallopavo*	-	–
110	26	13425	1	80	74	-	4	2	B	0.1	A	F	vertebra	*Meleagris gallopavo*	-	–

Table 7.10. Data listing, Excavated Faunal Specimens, LA 60372, 1989 (Continued).

FS #	Spec. #	BAND Cat. #	Site Area	South-ing	East-ing	Room	Strat-um	Level	FSU	Wt (g)	Sym.	Por-tion	Element	Taxon	Mod.	Comments
110	27	13425	1	80	74	-	4	2	B	0.1	A	F	vertebra	*Meleagris gallopavo*	-	–
110	28	13425	1	80	74	-	4	2	B	0.3	U	F	?	unknown	-	–
110	29	13425	1	80	74	-	4	2	B	0.3	U	F	?	unknown	-	–
110	30	13425	1	80	74	-	4	2	B	tr	A	W	atlas	mammal, size 1	-	–
110	31	13425	1	80	74	-	4	2	B	tr	A	W	caudal vertebra	mammal, size 1	-	–
110	32	13425	1	80	74	-	4	2	B	tr	U	W	ulna	mammal, size 1	-	–
110	33	13425	1	80	74	-	4	2	B	tr	U	W	podial	mammal, size 1	-	–
110	34	13425	1	80	74	-	4	2	B	tr	U	W	podial	mammal, size 1	-	–
110	35	13425	1	80	74	-	4	2	B	tr	U	W	podial	mammal, size 1	-	–
110	36	13425	1	80	74	-	4	2	B	tr	U	W	podial	mammal, size 1	-	–
110	37	13425	1	80	74	-	4	2	B	tr	U	F	?	mammal, size 1	-	–
110	38	13425	1	80	74	-	4	2	B	tr	U	F	?	mammal, size 1	-	–
110	39	13425	1	80	74	-	4	2	B	tr	U	F	?	mammal, size 1	-	–
110	40	13425	1	80	74	-	4	2	B	tr	U	F	?	mammal, size 1	-	–
110	41	13425	1	80	74	-	4	2	B	0.1	U	M	? shaft	bird, size 2-3	-	–
110	42	13425	1	80	74	-	4	2	B	0.6	U	M	? shaft	*Meleagris gallopavo*	-	–
110	43	13425	1	80	74	-	4	2	B	0.6	U	M	? shaft	unknown	B	–
110	44	13425	1	80	74	-	4	2	B	0.4	U	M	? shaft	unknown	B	–
110	45	13425	1	80	74	-	4	2	B	0.4	U	M	? shaft	unknown	B	–
110	46	13425	1	80	74	-	4	2	B	0.3	U	M	? shaft	unknown	B	–
110	47	13425	1	80	74	-	4	2	B	0.2	U	F	?	unknown	B	–
110	48	13425	1	80	74	-	4	2	B	0.2	U	F	?	unknown	B	–
110	49	13425	1	80	74	-	4	2	B	0.2	U	F	?	unknown	B	–
110	50	13425	1	80	74	-	4	2	B	0.1	U	F	?	unknown	B	–
110	51	13425	1	80	74	-	4	2	B	0.1	U	F	?	unknown	B	–
110	52	13425	1	80	74	-	4	2	B	0.1	U	F	?	unknown	B	–
110	53	13425	1	80	74	-	4	2	B	0.1	U	F	?	unknown	B	–
110	54	13425	1	80	74	-	4	2	B	0.1	U	F	?	unknown	B	–
110	55	13425	1	80	74	-	4	2	B	0.1	U	F	?	unknown	B	–
110	56	13425	1	80	74	-	4	2	B	0.1	U	F	inominate	mammal, size 3	-	–
110	57	13425	1	80	74	-	4	2	B	0.1	U	F	?	mammal, size 2-3	-	-
110	58	13425	1	80	74	-	4	2	B	0.1	U	F	?	mammal, size 2-3	-	–

Table 7.10. Data listing, Excavated Faunal Specimens, LA 60372, 1989 (Continued).

FS #	Spec. #	BAND Cat. #	Site Area	South-ing	East-ing	Room	Strat-um	Level	FSU	Wt (g)	Sym.	Por-tion	Element	Taxon	Mod.	Comments
110	59	13425	1	80	74	-	4	2	B	0.1	U	F	?	mammal, size 2-3	-	–
111	1	13433	1	80	74	-	5	1	B	0.1	L	W	mandible	*Spermophilus spilosoma*	-	–
112	1	13428	1	80	74	-	4	3	B	7.8	U	M	? shaft	mammal, size 6	T	awl/punch
112	2	13428	1	80	74	-	4	3	B	1.5	U	D	tibiotarsus	bird, size 3	-	–
112	3	13428	1	80	74	-	4	3	B	0.3	L	W	mandible	*Neotoma* sp.	-	–
112	4	13428	1	80	74	-	4	3	B	0.4	R	P	mandible	*Sylvilagus* sp.	-	–
112	5	13428	1	80	74	-	4	3	B	0.3	L	P	mandible	*Thomomys bottae*	-	–
112	6	13428	1	80	74	-	4	3	B	0.3	L	P	mandible	mammal, size 2	-	–
112	7	13428	1	80	74	-	4	3	B	0.2	L	M	inominate	*Neotoma* sp.	-	–
112	8	13428	1	80	74	-	4	3	B	0.2	R	D	mandible	*Sylvilagus* sp.	-	–
112	9	13428	1	80	74	-	4	3	B	0.3	A	M	vertebra	*Meleagris gallopavo*	-	–
112	10	13428	1	80	74	-	4	3	B	0.3	U	M	inominate	mammal, size 2	-	–
112	11	13428	1	80	74	-	4	3	B	0.1	A	M	cranium & frontal	mammal, size 1	-	–
112	12	13428	1	80	74	-	4	3	B	0.3	U	P	rib	*Meleagris gallopavo*	-	–
112	13	13428	1	80	74	-	4	3	B	0.9	U	M	? shaft	unknown	-	–
112	14	13428	1	80	74	-	4	3	B	0.1	U	F	?	*Meleagris gallopavo*	-	–
112	15	13428	1	80	74	-	4	3	B	0.2	R	M	mandible	*Sylvilagus* sp.	-	–
112	16	13428	1	80	74	-	4	3	B	0.1	U	F	?	unknown	-	–
112	17	13428	1	80	74	-	4	3	B	0.1	U	M	?	unknown	-	–
112	18	13428	1	80	74	-	4	3	B	0.1	U	F	?	unknown	-	–
112	19	13428	1	80	74	-	4	3	B	0.1	U	M	?	unknown	-	–
112	20	13428	1	80	74	-	4	3	B	0.1	U	F	?	unknown	-	–
112	21	13428	1	80	74	-	4	3	B	0.1	U	F	?	unknown	-	–
112	22	13428	1	80	74	-	4	3	B	0.1	U	F	incisor	mammal, size 2-3	-	–
113	1	13510	1	80	74	-	5	2	B	0.1	R	M	mandible	mammal, size 2	-	–
114	1	13638	1	80	74	-	4	4	B	5.1	R	P	femur	*Meleagris gallopavo*	-	–
114	2	13638	1	80	74	-	4	4	B	1.2	L	W	inominate	*Sylvilagus* sp.	-	–
114	3	13638	1	80	74	-	4	4	B	0.4	R	P	inominate	*Sylvilagus* sp.	-	–
114	4	13638	1	80	74	-	4	4	B	0.3	R	P	scapula	*Sylvilagus* sp.	-	–

Table 7.10. Data listing, Excavated Faunal Specimens, LA 60372, 1989 (Continued).

FS #	Spec. #	BAND Cat. #	Site Area	South-ing	East-ing	Room	Strat-um	Level	FSU	Wt (g)	Sym.	Por-tion	Element	Taxon	Mod.	Comments
114	5	13638	1	80	74	-	4	4	B	0.1	L	W	scapula	*Neotoma* sp.	-	–
114	6	13638	1	80	74	-	4	4	B	0.5	L	P	femur	*Spermophilus variegatus*	-	–
114	7	13638	1	80	74	-	4	4	B	0.4	L	W	mandible	*Thomomys bottae*	-	–
114	8	13638	1	80	74	-	4	4	B	0.4	L	W	mandible	*Thomomys bottae*	-	–
114	9	13638	1	80	74	-	4	4	B	0.3	L	W	mandible	*Neotoma* sp.	-	–
114	10	13638	1	80	74	-	4	4	B	0.4	A	M	vertebra	*Lepus californicus*	-	–
114	11	13638	1	80	74	-	4	4	B	0.6	L	W	coracoid	*Dendragapus obscurus*	-	–
114	12	13638	1	80	74	-	4	4	B	1.7	U	F	?	unknown	B/T	–
114	13	13638	1	80	74	-	4	4	B	0.1	A	M	cranium	mammal, size 2	-	–
114	14	13638	1	80	74	-	4	4	B	0.1	L	D	humerus	*Spermophilus variegatus*	-	–
114	15	13638	1	80	74	-	4	4	B	0.1	R	M	maxilla	*Neotoma* sp.	-	–
114	16	13638	1	80	74	-	4	4	B	0.1	R	M	mandible	mammal, size 2	-	–
114	17	13638	1	80	74	-	4	4	B	0.3	L	W	tibia	*Neotoma* sp.	-	–
114	18	13638	1	80	74	-	4	4	B	0.3	U	W	ungual phalange	*Meleagris gallopavo*	-	–
114	19	13638	1	80	74	-	4	4	B	0.2	L	D	femur	*Dendragapus obscurus*	-	–
114	20	13638	1	80	74	-	4	4	B	0.3	U	D	? shaft	bird, size 3	B	–
114	21	13638	1	80	74	-	4	4	B	0.2	U	F	?	*Dendragapus obscurus*	-	–
114	22	13638	1	80	74	-	4	4	B	0.1	U	D	tibia	mammal, size 2	-	–
114	23	13638	1	80	74	-	4	4	B	0.1	U	W	phalange	mammal, size 3	-	–
114	24	13638	1	80	74	-	4	4	B	0.1	U	W	phalange	mammal, size 2	-	–
114	25	13638	1	80	74	-	4	4	B	0.1	U	F	?	bird, size 2	-	–
114	26	13638	1	80	74	-	4	4	B	0.1	U	F	?	unknown	B	–
114	27	13638	1	80	74	-	4	4	B	0.7	U	M	?	*Meleagris gallopavo*	-	–
114	28	13638	1	80	74	-	4	4	B	0.5	U	M	?	mammal, size 3-4	-	–
114	29	13638	1	80	74	-	4	4	B	0.4	U	W	?	*Meleagris gallopavo*	-	–

Table 7.10. Data listing, Excavated Faunal Specimens, LA 60372, 1989 (Continued).

FS #	Spec. #	BAND Cat. #	Site Area	South-ing	East-ing	Room	Stratum	Level	FSU	Wt (g)	Sym.	Portion	Element	Taxon	Mod.	Comments
114	30	13638	1	80	74	-	4	4	B	0.2	U	M	tarsometa-tarsus	bird, size 2-3	-	–
114	31	13638	1	80	74	-	4	4	B	0.2	U	M	?	mammal, size 2-3	-	–
114	32	13638	1	80	74	-	4	4	B	0.1	U	M	?	mammal, size 2	-	–
114	33	13638	1	80	74	-	4	4	B	0.1	U	F	?	mammal, size 2-3	-	–
114	34	13638	1	80	74	-	4	4	B	0.1	U	F	?	unknown	-	–
114	35	13638	1	80	74	-	4	4	B	0.1	U	F	?	unknown	-	–
114	36	13638	1	80	74	-	4	4	B	0.1	U	F	?	unknown	-	–
114	37	13638	1	80	74	-	4	4	B	0.1	U	F	?	unknown	-	–
114	38	13638	1	80	74	-	4	4	B	0.1	U	F	?	unknown	-	–
120	1	13813	1	–	–	1	3	2	H	0.9	L	M	inominate	*Sylvilagus* sp.	-	–
120	2	13813	1	–	–	1	3	2	H	1.9	R	W	carpometa-carpus	*Meleagris gallopavo*	-	–
120	3	13813	1	–	–	1	3	2	H	0.9	R	P	ulna	*Mephitus mephitus*	-	–
120	4	13813	1	–	–	1	3	2	H	0.3	R	P	radius	*Mephitus mephitus*	-	–
120	5	13813	1	–	–	1	3	2	H	0.3	R	D	ulna	*Mephitus mephitus*	-	–
120	6	13813	1	–	–	1	3	2	H	0.6	U	F	?	unknown	-	–
120	7	13813	1	–	–	1	3	2	H	0.4	U	F	?	unknown	-	–
122	1	13972	1	–	–	1	4	1	H	0.6	L	P	tibia	*Sylvilagus* sp.	-	–
122	2	13972	1	–	–	1	4	1	H	0.2	U	F	?	unknown	-	–
123	1	16382	1	–	–	1	4	2	H	2.8	U	M	radius	bird, size 4	T	–
123	2	16382	1	–	–	1	4	2	H	0.2	R	W	mandible	*Neotoma* sp.	-	–
123	3	16382	1	–	–	1	4	2	H	0.2	U	F	?	*unknown*	B	–
150	1	13582	1	84	96	-	5	1	C	0.3	R	M	mandible	*Thomomys bottae*	-	–
150	2	13582	1	84	96	-	5	1	C	0.5	L	W	mandible	*Thomomys bottae*	-	–
150	3	13582	1	84	96	-	5	1	C	0.5	A	M	maxilla	*Thomomys bottae*	-	–
150	4	13582	1	84	96	-	5	1	C	0.1	A	M	cranium	*Thomomys bottae*	-	–
150	5	13582	1	84	96	-	5	1	C	0.3	L	W	femur	*Thomomys bottae*	-	–

Table 7.10. Data listing, Excavated Faunal Specimens, LA 60372, 1989 (Continued).

FS #	Spec. #	BAND Cat. #	Site Area	South-ing	East-ing	Room	Strat-um	Level	FSU	Wt (g)	Sym.	Por-tion	Element	Taxon	Mod.	Comments
150	6	13582	1	84	96	-	5	1	C	0.1	U	W	tibia	*Thomomys bottae*	-	–
150	7	13582	1	84	96	-	5	1	C	0.1	U	F	?	unknown	-	–
150	8	13582	1	84	96	-	5	1	C	0.1	U	F	?	unknown	-	–
151	1	13607	1	84	96	-	6	1	C	0.1	U	F	?	unknown	B	–
153	1	13842	1	84	96	-	7	2	C	3.5	L	D	tibiotarsus	*Meleagris gallopavo*	-	–
163	1	13610	1	–	–	10	1	3	I	1.5	U	M	? shaft	mammal, size 3-4	T	polished frag.
164	1	13645	1	–	–	10	1	4	I	0.4	L	W	mandible	*Sciurus aberti*	-	–
164	2	13645	1	–	–	10	1	4	I	2.2	U	F	?	mammal, size 6	-	–
164	3	13645	1	–	–	10	1	4	I	0.5	U	F	?	bird, size 2	-	–
164	4	13645	1	–	–	10	1	4	I	0.1	U	F	?	unknown	-	–
165	1	13641	1	–	–	10	1	5	I	0.1	R	M	inominate	*Neotoma* sp.	-	–
166	1	13738	1	–	–	10	2	1	I	7.4	L	M	inominate	*Odocoileus hemionus*	-	–
166	2	13738	1	–	–	10	2	1	I	0.2	U	W	metapodial	*Sylvilagus* sp.	-	–
166	3	13738	1	–	–	10	2	1	I	0.2	U	W	metapodial	*Sylvilagus* sp.	-	–
166	4	13738	1	–	–	10	2	1	I	0.1	U	W	metapodial	*Sylvilagus* sp.	-	–
166	5	13738	1	–	–	10	2	1	I	0.1	R	W	mandible	mammal, size 1	-	–
167	1	13734	1	–	–	10	2	2	I	7.8	U	M	? shaft	mammal, size 6	-	–
167	2	13734	1	–	–	10	2	2	I	5.7	A	M	vertebra	*Odocoileus hemionus*	-	–
167	3	13734	1	–	–	10	2	2	I	0.2	A	P	skull & maxilla	*Neotoma* sp.	-	–
167	4	13734	1	–	–	10	2	2	I	0.2	A	P	skull & maxilla	unknown	-	–
167	5	13734	1	–	–	10	2	2	I	0.5	A	M	maxilla	*Thomomys bottae*	-	–
167	6	13734	1	–	–	10	2	2	I	0.2	U	M	?	unknown	-	–
167	7	13734	1	–	–	10	2	2	I	0.2	U	D	ungual phalange	*Meleagris gallopavo*	-	–
167	8	13734	1	–	–	10	2	2	I	0.1	U	P	incisor	mammal, size 2	-	–
168	1	13740	1	–	–	10	2	3	I	0.5	U	M	? shaft	mammal, size 3-4	-	–
169	1	13793	1	–	–	10	3	1	I	9.0	U	M	? shaft	*Odocoileus hemionus*	T	awl/punch
169	2	13793	1	–	–	10	3	1	I	1.1	L	M	tibia	*Sylvilagus* sp.	-	–

Table 7.10. Data listing, Excavated Faunal Specimens, LA 60372, 1989 (Continued).

FS #	Spec. #	BAND Cat. #	Site Area	South-ing	East-ing	Room	Stratum	Level	FSU	Wt (g)	Sym.	Portion	Element	Taxon	Mod.	Comments
169	3	13793	1	–	–	10	3	1	I	0.1	L	W	scapula	*Neotoma* sp.	-	–
169	4	13793	1	–	–	10	3	1	I	0.2	R	D	humerus	*Neotoma* sp.	-	–
169	5	13793	1	–	–	10	3	1	I	0.5	R	M	mandible	*Lepus californicus*	-	–
169	6	13793	1	–	–	10	3	1	I	1.1	L	M	incisor, upper	*Erethizon dorsatum*	-	–
169	7	13793	1	–	–	10	3	1	I	0.1	U	F	?	unknown	-	–
171	1	13998	1	–	–	10	3	3	I	1.4	U	P	ulna	*Meleagris gallopavo*	-	–
171	2	13998	1	–	–	10	3	3	I	0.1	L	W	mandible	*Neotoma* sp.	-	–
171	3	13998	1	–	–	10	3	3	I	0.1	U	F	?	unknown	-	–
173	1	13999	1	–	–	10	-	-	I	2.2	R	W	radius	*Meleagris gallopavo*	-	–
174	1	13686	1	–	–	10	3	4	I	0.2	L	D	humerus	*Neotoma* sp.	B	–
174	2	13686	1	–	–	10	3	4	I	0.1	R	W	scapula	*Neotoma* sp.	-	–
174	3	13686	1	–	–	10	3	4	I	0.1	U	W	tibia	mammal, size 1	-	–
177	1	16388	1	–	–	10	3	4	I	2.1	R	M	femur	*Meleagris gallopavo*	B	–
177	2	16388	1	–	–	10	3	4	I	0.9	R	W	inominate	*Sylvilagus* sp.	B	–
177	3	16388	1	–	–	10	3	4	I	0.4	A	F	nasal	mammal, size 6	-	–
177	4	16388	1	–	–	10	3	4	I	0.2	L	W	mandible	*Neotoma* sp.	-	–
177	5	16388	1	–	–	10	3	4	I	0.1	R	W	mandible	*Thomomys bottae*	-	–
177	6	16388	1	–	–	10	3	4	I	0.1	R	M	mandible	*Thomomys bottae*	-	–
177	7	16388	1	–	–	10	3	4	I	0.1	A	M	cranium	mammal, size 1	-	–
179	1	16389	1	–	–	10	3	4	I	2.8	A	W	maxilla & nasals	*Cynomys gunnisonni*	-	–
179	2	16389	1	–	–	10	3	4	I	0.3	R	W	mandible	*Thomomys bottae*	-	–
179	3	16389	1	–	–	10	3	4	I	0.3	L	W	mandible	*Thomomys bottae*	-	–
179	4	16389	1	–	–	10	3	4	I	0.6	L	D	humerus	*Sylvilagus* sp.	B	–
179	5	16389	1	–	–	10	3	4	I	0.6	L	P	tibia	*Sylvilagus* sp.	-	–
179	6	16389	1	–	–	10	3	4	I	0.4	R	P	ulna	*Sylvilagus* sp.	-	–
179	7	16389	1	–	–	10	3	4	I	0.4	R	D	tibia	*Sylvilagus* sp.	-	–
179	8	16389	1	–	–	10	3	4	I	0.2	A	F	skull & frontal	mammal, size 2	-	–

Table 7.10. Data listing, Excavated Faunal Specimens, LA 60372, 1989 (Continued).

FS #	Spec. #	BAND Cat. #	Site Area	South-ing	East-ing	Room	Strat-um	Level	FSU	Wt (g)	Sym.	Por-tion	Element	Taxon	Mod.	Comments
181	1	16398	1	–	–	10	3	4	I	0.7	R	D	tibia	*Sylvilagus* sp.	-	–
181	2	16398	1	–	–	10	3	4	I	0.1	A	M	cranium	mammal, size 1	-	–
181	3	16398	1	–	–	10	3	4	I	0.2	U	F	?	bird, size 2	-	–
228	1	13273	2	128	142	-	1	3	F	0.3	L	W	mandible	*Neotoma* sp.	-	–
239	1	13164	2	–	–	2	-	-	G	2.9	U	P	metapodial/ tarsal	mammal, size 6	-	–
242	1	13173	2	–	–	2	2	3	G	0.6	L	D	tibia	*Sylvilagus* sp.	-	–
243	1	13186	2	–	–	2	-	-	G	0.5	R	P	tibia	*Sylvilagus* sp.	-	–
244	1	13430	2	–	–	2	2	4	G	–	-	-	-	–	-	ceramic
250	1	13432	2	–	–	2	3	1	G	2.4	U	F	?	unknown	-	9 spongy frags
250	2	13432	2	–	–	2	3	1	G	0.2	R	W	humerus	*Thomomys bottae*	-	–
251	1	13442	2	–	–	2	3	1	G	0.1	A	W	sacrum	mammal, size 2	-	–
251	2	13442	2	–	–	2	3	1	G	0.6	A	W	vertebra	*Meleagris gallopavo*	-	–
251	3	13442	2	–	–	2	3	1	G	0.3	L	P	mandible	*Thomomys bottae*	-	–
251	4	13442	2	–	–	2	3	1	G	0.3	L	M	inominate	*Sylvilagus* sp.	-	–
251	5	13442	2	–	–	2	3	1	G	0.3	U	F	?	unknown	-	–
254	1	13566	2	–	–	2	3	1	G	0.5	U	M	? shaft	unknown	-	–
263	1	13309	2	131	119	-	-	-	G	2.9	U	F	?	mammal, size 6	-	–
265	1	13429	2	–	–	4	2	3	G	0.3	L	D	humerus	*Spermophilus variegatus*	-	–
265	2	13429	2	–	–	4	2	3	G	0.8	U	F	?	mammal, size 3	-	–
266	1	13192	2	–	–	4	2	4	G	0.7	U	M	rib	mammal, size 3	-	–
266	2	13192	2	–	–	4	2	4	G	0.5	A	M	sternum	bird, size 2-3	-	–
266	3	13192	2	–	–	4	2	4	G	0.8	U	F	rib	mammal, size 3	-	–
267	1	13434	2	–	–	4	2	5	G	1.0	R	W	mandible	*Sylvilagus* sp.	-	–
267	2	13434	2	–	–	4	2	5	G	0.3	U	F	?	unknown	-	–
271	1	13431	2	–	–	4	-	-	G	0.3	U	F	?	unknown	-	–
272	1	13616	2	131	123	4	3	1	G	0.9	A	F	sternum	bird, size 3	-	–
272	2	13616	2	131	123	4	3	1	G	0.3	U	F	?	unknown	-	–
275	1	13619	2	133	121	4	3	1	G	0.2	U	D	rib	mammal, size 3	-	–
281	1	13936	2	133	123	4	3	1	G	0.1	U	F	?	mammal, size 2	-	–
304	1	13741	2	–	–	6	2	2	G	0.7	U	F	?	mammal, size 5	-	–
306	1	13782	2	–	–	6	2	4	G	6.2	U	F	metatarsal/ podial	*Odocoileus hemionus*	T	awl/punch

Table 7.10. Data listing, Excavated Faunal Specimens, LA 60372, 1989 (Concluded).

FS #	Spec. #	BAND Cat. #	Site Area	South-ing	East-ing	Room	Strat-um	Level	FSU	Wt (g)	Sym.	Por-tion	Element	Taxon	Mod.	Comments
306	2	13782	2	–	–	6	2	4	G	0.7	L	W	inominate	*Sylvilagus* sp.	-	–
307	1	13797	2	–	–	6	2	5	G	0.5	A	P	cranium & maxilla	*Thomomys bottae*	-	–
309	1	13815	2	–	–	6	3	2	G	1.5	U	M	tarsometa-tarsus	*Meleagris gallopavo*	-	–
312	1	13938	2	–	–	6	-	-	G	11.4	R	D	metatarsal	*Odocoileus hemionus*	T	awl/punch
314	1	16401	2	–	–	6	3	1	G	0.2	R	M	maxilla	*Sylvilagus* sp.	-	–
321	1	13987	2	–	–	6	3	2	G	0.2	L	P	mandible	*Spermophilus spilosoma*	-	–

[a] See Table 7.2
[b] R=right, L=left, A=axial, and U=unknown
[c] W=whole, D=distal fragment, P=proximal fragment, SF=shaft fragment, and F=other fragment

8

MACROBOTANICAL ANALYSIS

Meredith H. Matthews

INTRODUCTION

This report describes the results of analysis of macrobotanical remains retrieved during the 1989 excavations at LA 60372, Burnt Mesa Pueblo. The macrobotanical assemblage described herein consists of small-scale botanical remains recovered from 14 flotation samples and vegetal remains collected from Areas 1 and 2 of the site.

There were several objectives involved in analysis of the macrobotanical remains from LA 60372. Results of analysis were expected to enhance the preliminary data base, established in 1988, concerning subsistence resources utilized by the occupants of the site (Matthews 1989). Following the 1988 excavations at LA 60372, Kohler (1989c:27) suggested that, based upon the differences in ceramic assemblages from Area 1 and 2, the occupation of Area 1 partly or completely postdated Area 2, although both areas were occupied between A.D. 1200-1350. Given this proposed occupation sequence, it was of interest to investigate similarities or differences in resource use during the two occupations.

PROCESSING AND ANALYTICAL PROCEDURES

Vegetal remains collected during excavation did not require processing prior to analysis. Flotation samples were processed by WSU personnel using a simple water separation technique. The principle directing water separation techniques is that botanical remains, especially charred remains, are lighter than water and the surrounding matrix. Therefore, botanical remains can be extracted from sediments by immersion in water and removing the suspended materials. The flotation method used for this project simultaneously extracted and size-graded the floated material (or light fraction) into 5.6, 2.0, 1.0 and 0.5 mm classes. Size-grading botanical remains facilitates analysis and also can help differentiate between species within a genus. The botanical remains were sorted and identified using a binocular microscope with a magnification power of 8x-40x. Botanical remains were identified and separated to the finest taxonomic level possible and information such as quantity, plant part and condition (i.e. charred, eroded, fragmented) was recorded for each taxon. In some cases a large quantity of wood charcoal was collected from a particular provenience or extracted from a flotation sample. In order to expedite analysis of these larger lots of material, a subsample of 20-40 pieces of wood was randomly selected for identification. This subsample was considered to be representative of the various taxa of wood within the total lot. No effort was made, however, to estimate the total quantity of each taxon of wood identified based upon the quantity within the subsample.

Given time and budgetary constraints, not all of the flotation samples and vegetal remains collected during excavation could be analyzed. Fourteen flotation samples were selected by the field director for analysis. These samples were from contexts with cultural fills of good or excellent integrity believed to have the highest preservation potential for small-scale remains, thereby maximizing the information value of the sample. Vegetal remains, predominantly consisting of charred wood, were abundant at LA 60372. Order of priority for analysis was established for remains from: 1) any feature; 2)

room fill or floors with some sort of cultural fill designation, as defined by the excavators; 3) cultural fills within the two test units (84S 96E, 90S 88E) excavated within the plaza of Area 1; 4) cultural fills from all other test units excavated outside of the roomblocks; and 5) any other fill type, following the same sequence of proveniences. Vegetal remains included in this report are from priority categories 1-3. Using this priority system however, caused disproportionate representation of Area 2 compared to Area 1 because there were more rooms excavated in Area 2 than Area 1.

It should also be noted that there is potential for large-scale contamination within the macrobotanical assemblage from LA 60372. The site is located on a mesa that has been affected over time by a number of natural fires, although the site itself does not appear to have burned. The site borders an area impacted in 1977 by a large conflagration, the La Mesa fire (Kohler 1989c: 27). As mentioned above, the majority of vegetal remains from LA 60372 are charred wood. The possibility exists that some of this wood is the redeposited byproduct of natural fires. In instances when the provenience of vegetal remains made their integrity questionable, such as association with a root or rodent burrow, they were not collected (T. Kohler, personnel communication 1989). Nonetheless, many of the strata yielding vegetal remains were mixed deposits and, since it is difficult in the field to differentiate between natural and cultural charcoal, some of the charcoal collected may not be associated with the prehistoric use of the site. Ford (n.d.:146) has suggested some means of distinguishing between the two types of charcoal during analysis. However, the defining characteristics suggested, degree of carbonization and hardness of the wood, are believed to be too ambivalent to be considered extremely useful, given the variability of these same characteristics within macrobotanical assemblages from sites never impacted by fires.

RESULTS

Twenty-nine taxa were identified within the assemblage of macrobotanical remains from the 1989 excavations at LA 60372 (Table 8.1), representing three classes and 14 families of plants. Some specimens could only be categorized to the class or family level. However, specific identification of 18 genera and 8 species was possible. The macrobotanical assemblage consists of seeds, wood, cotyledons (seed leaves) and various parts of corn plants. For this report, "seed" will be used in the generic sense to include such specific terms as achene, caryopsis and so forth.

It should be noted that some or all of the wood categorized as Pinaceae may in fact be *Pseudotsuga menziesii* (Douglas-fir). Positive identification could not be made, although preliminary analysis of specimens identified only as Pinaceae suggests that most of these specimens are fragments of *Pseudotsuga menziesii*. Intensive analysis of tangential thin sections of these specimens, which is necessary for positive identification of *Pseudotsuga menziesii*, was not conducted. However, dendrochronological specimens collected in 1988 from Room 1 were identified as *Pseudotsuga menziesii* (Kohler 1989c:29), which provides positive evidence for prehistoric utilization of this type of wood and supports the probable occurrence of this genus of wood within the macrobotanical assemblage.

The macrobotanical assemblage can be segregated into four categories of plant types that can also be regarded as potential plant resource categories (Table 8.2). The categories are devised using the ecological habits of the plants and, to some degree, the plant part recovered. The cultigen category should be self-explanatory. Pioneer plants are usually herbaceous, weedy annuals that occupy disturbed habitats and therefore benefit from human activity that inadvertently perpetuates an early successional sere. Wild plants, on the other hand, usually are perennials that do not necessarily benefit from human disturbance and tend to proliferate during more advanced stages of succession. The division between wild and woody is based upon the part represented and also upon ethnographic documentation of plant use. Woody plants have similar ecological characteristics as wild plants but it is assumed that the former would have been utilized primarily for the wood while the latter would have been sought for the seeds, fruits, fiber and so forth.

As will be noted in the following tables, macrobotanical remains were recovered in both charred and noncharred conditions. The majority of the seeds recovered from flotation samples

Table 8.1. Macrobotanical Taxa Represented at LA 60372 (x indicates presence).

Taxon	Common Name	Area 1	Area 2
Amaranthus[a]	pigweed	[c]	x
Atriplex canescens	fourwing saltbush	-	x
Cercocarpus cf[b] *montanus*	mountain mahogany	x[c]	x[c]
Chenopodium[a]	goosefoot	x[c]	x
cheno-am[a,d]	-	x	
Chrysothamnus	rabbitbush	x	-
Dicotyledoneae	Dicot class	x[c]	x
Gramineae	Grass family	-	x
Gymnospermae	Gymnosperm class	x[c]	x[c]
Juniperus	juniper	x[c]	x
Monocotyledoneae	Monocot class	x	-
Phaseolus vulgaris	common bean	x	x
Physalis	groundcherry	x	x
Pinaceae	Pine family	x	x
Pinus	pine	x	x
Pinus edulis	piñon	x[c]	x[c]
Pinus ponderosa	ponderosa pine	x[c]	x[c]
Populus	cottonwood	x	x
Portulaca	purslane	x	x
Prunus	chokecherry	-	x
Pseudotsuga menziesii	Douglas-fir	x	x
Quercus	oak	x[c]	x[c]
Quercus cf. *undulata*	wavyleaf oak	x	x
Rhus trilobata	squawbush	-	x
Rosaceae[a]	Rose family	-	x
Salicaceae	Willow family	x	x
Sporobolus[a]	dropseed	-	x
Yucca	yucca	-	x
Zea mays	corn	x[c]	x[c]

[a] represented only by noncharred remains
[b] compares favorably with
[c] represented in a charred condition in the 1988 assemblage
[d] *Chenopodium-Amaranthus* indistinguishable

were noncharred, while wood recovered from flotation samples and that collected during excavation was charred. The charred or noncharred condition of seeds is often used as a criterion to differentiate between cultural debris and post-occupational contaminants. Interpretation of noncharred seeds from cultural deposits has been a point of discussion in the literature (cf. Gasser 1982; Keepax 1977; Lopinot and Brussel 1982; Minnis 1981); it is the general consensus that noncharred seeds from open-air sites should be considered contaminants. This is not necessarily the case for remains such as noncharred wood, which has a better preservation potential in a noncharred state. In general, the noncharred seeds recovered were of pioneer plants that characteristically settle as seed rain into the soil bank (Minnis 1981). Noncharred seeds from the flotation samples appear to be relatively recent, based on intact seed coats and/or presence of an embryo. Therefore noncharred seeds from LA 60372 will be considered intrusive and not associated with the prehistoric use of the site.

A point should be made in regard to pioneer plant remains. The charred condition of pioneer

Table 8.2. Resource-use Categories of Identified Plants; taxa identified only to the level of class are not included.

Cultigen	Pioneer	Wild	Woody
Phaseolus vulgaris	*Amaranthus*[a]	Gramineae	*Atriplex canescens*
Zea mays	*Chenopodium*[a]	Rosaceae[a]	*Cercocarpus montanus*
	Physalis[a]	*Yucca*	*Chrysothamnus*
	Portulaca		*Juniperus*
			Pinaceae
			Pinus
			P. edulis
			P. ponderosa
			Populus
			Prunus
			Pseudotsuga menziesii
			Quercus
			Q. undulata
			Rhus trilobata
			Salicaceae

[a] represented only by noncharred remains

seeds does not necessarily imply that the plant represented or the actual remains were intentionally brought into a cultural context. Pioneer plants thrive in the anthropogenic ecosystems created by human disturbance and these plants are dependent to some extent on humans for dispersal and perpetuation. The dispersal and reproductive mechanisms of this category of plants and their affinity for disturbed habitats increases the potential for their unintentional inclusion in cultural contexts.

There are many pathways by which pioneer disseminules can be introduced into cultural contexts (Adams 1980:225). Some of these pathways include transport on clothing or game, unintentional inclusion with harvested resources, transport by rodents or ants, deposition by wind and water, and intentional collection. Once incorporated into a cultural context, pioneer plant parts can become charred accidently during processing activities or because of their location in the site.

Deciding whether the occurrence of pioneer disseminules implies direct utilization or accidental inclusion is difficult. The provenience, preservation potential, fill type, associated remains, quantity and frequency of occurrence need to be evaluated in assessing the cultural integrity of pioneer seeds. Singular occurrences provide little information and may actually represent accidental inclusion.

Area 1

Macrobotanical remains from Area 1 consist of vegetal remains from various excavated levels within Room 10 and the 2 x 2 m test units (84S 96E, 90S 88E) in the plaza, and of remains retrieved from two flotation samples (Table 8.3). Vegetal remains from Room 10 were collected from structure fill above roof fall, from the roof fall and from the stratum just above the floor. Ten taxa of wood, a Monocotyledoneae stem fragment and *Zea mays* cob fragments are represented. The Monocot stem may also be *Zea mays* but was too eroded for positive identification. Given the context of the remains, the wood is assumed to represent structural materials. As shown in Table 8.3, *Juniperus*, *Pinus edulis* and *P. ponderosa* were the most abundant and frequently occurring genera and therefore may be fragments of the major construction elements, with the less frequently occurring fragments of *Cercocarpus*, *Populus* and *Quercus* representing minor construction elements. Numerous cob fragments were recovered from the stratum just above the floor. None of these fragments retained kernels, implying that they were waste material that possibly had been incorporated into the roof as

Table 8.3. Macrobotanical Remains from Area 1 (all are charred unless otherwise indicated).

		Room 10								94S 112E	Plaza 90S/88E	
		Full cut W 1/2	Door (F15)	Strat 3		NE Quad	SE Quad	SW Quad	NW Quad	Strat 3	Strat 6	
				Level 1	Level 2 Below	Above	Above	Above	Above	Level 2	Level 1	Level 2
Taxon	Part	Fill FS 173	Fill FS 185	Fill FS 169	Roofall FS 170	floor FS 179	floor FS 181	floor FS 177	floor FS 174	Fill BS 9	Fill FS 70	Fill FS 71
Cercocarpus cf. *montanus*	wood			0.2g			0.1g	<0.1g	0.3g		0.3g	
Dicotyledoneae	wood										0.3g	2.3g
Gymnospermae	wood			0.6g	2.5g+	1.7g	0.6g	0.7g			3.5g	
Juniperus	wood	7.9g	0.2g	0.7g	0.1g	0.6g	1.3g	<0.1g	2.0g		1.7g	1.6g
Monocotyl-edoneae	stem			<0.1g								
Phaseolus vulgaris	cotyledon										1	
Pinaceae	wood			0.6g				0.4g	2.4g		7.2	3.0g
Pinus	wood	2.0g										
P. edulis	wood		<0.1g	5.1g	0.6g	2.1g	1.5g	6.3g	2.0g		6.6g	8.1g
P. ponderosa	wood			5.5g	3.6g	4.0g	3.2g	5.9g	3.5g		4.3g	10.1g
Populus	wood								0.1g		3.1g	0.2g
Portulaca	seed									1		
Quercus	wood				0.4g	0.1g		1.3g				
Q. cf. *undulata*	wood										0.8g	
Zea mays	cob				3fg	1fg		38fg	1fg		40fg	7fg
	kernel										1	
	shank										3fg	

BS - bulk soil flotation samples; columns without BS designation are vegetal remains
* - noncharred + - charred & partially charred g - gram(s) fg - fragment(s)

Table 8.3. Macrobotanical Remains from Area 1 (Concluded).

Taxon	Part	Plaza 2 x 2 m unit 84S 96E											
		Strat 2						Strat 3			Strat 4	Strat 7	
		Feat 3 Vessel BS 20	Level 1 Fill FS 88	Level 2 Fill FS 89	Level 4 Fill FS 91/92	Level 5 Fill FS 94	Level 6 Fill FS 95	Level 1 Fill FS 96	Level 2 Fill FS 97	Level 3 Fill FS 98	Level 1 Fill FS 99	Level 1 Fill FS 152	Level 2 Fill FS 153
Cercocarpus cf. *montanus*	wood	<1.0g		0.9g	0.1g	0.1g	<0.1g	0.2g	0.6g	0.4g	<0.1g		0.4g
Chenopodium	seed	12*											
Chrysothamnus	wood									0.1g			
Compositae	seed	1*											
Dicotyledoneae	wood						0.3g	0.2g	0.4g		0.2g	2.1g	
	wood											0.1g*	
Gymnospermae	wood			0.3g	0.2g				4.3g	0.3g		1.3g	0.6g
Juniperus	wood	<0.1g		0.1g	0.5g	0.6g		0.2g	7.4g	1.7g	0.2g		0.6g
Physalis	seed	1*											
Pinaceae	wood	0.5g				1.4g		2.0g	2.3g		1.2g	0.6g	
Pinus	wood									1.5g	1.0g		
P. edulis	wood	0.1g		1.8g	4.0g	5.6g	2.0g	5.4g	5.2g	5.1g	3.1g	0.9g	1.5g
P. ponderosa	wood				2.7g	0.4g	0.6g	3.1g	4.2g	2.0g	3.9g	9.8g	2.3g
Populus	wood										0.8g		
Portulaca	seed	3*											
Quercus	wood	<0.1g			0.3g					0.9g	0.2g	0.7g	0.5g
Q. cf. *undulata*	wood					0.4g	0.1g	0.2g	0.1g				
Salicaceae	wood								0.1g	0.2g			
Zea mays	cob		1fg						8fg		1fg		
	cupule	3											

BS - bulk soil samples; columns without BS designation are vegetal remains
* - noncharred g - gram(s) fg - fragment(s)

closing material or were being cached in the ceiling of Room 10 to be used for some other purpose, possibly as fuel.

Vegetal remains from the two test units excavated in the plaza are similar to those recovered from Room 10, supporting the suggestion by Kohler (1989c:34) that refuse from the roomblock was being disposed of in the plaza. All the same taxa of wood noted in Room 10 are represented in the plaza deposits with the addition of an unidentified genus of dicot wood. A single bean (*Phaseolus vulgaris*) cotyledon and numerous fragments of hulled corn cobs, a single kernel and three shank fragments are also present.

A flotation sample from Feature 3, a ceramic concentration representing a single vessel located in 84S 96E, contained fragments of wood charcoal, several *Zea mays* glumes and noncharred seeds. Although less diverse, taxa of wood charcoal are similar to those identified from vegetal remains within this test unit. The noncharred seeds represent four genera of pioneer plants (see Table 8.3). Given that the wood fragments and possibly the glumes are secondary refuse from the rooms and the pioneer plant remains are intrusive, the botanical remains from Feature 3 do not provide information concerning the use or contents of the vessel.

One other flotation sample from Area 1 was analyzed. This sample was collected from secondary refuse in test unit 94S 112E, excavated east of the roomblock. One charred *Portulaca* seed was recovered from this sample. *Portulaca* is ethnographically documented as a food resource, gathered for both the edible greens and seeds (e.g. Elmore 1944; Stevenson 1915; Whiting 1939). The seed may indicate prehistoric utilization of this pioneer resource but as was discussed earlier, single occurrences of pioneer seeds do not provide strong evidence for use because of the many ways such seeds can be introduced into a cultural context.

Area 2

Macrobotanical remains from Area 2 were collected from structure fills and features within Rooms 2, 4 and 6, and from features within two 2 x 2 m test units excavated outside of the roomblock (Table 8.4). Macrobotanical remains from Room 2, a front room, were retrieved from above, within and below the roof fall stratum, from three floor features (Features 5, 7, 12) and from Surface 3. Vegetal remains from the roof fall consist of nine taxa of wood. Given the context of the wood remains, it is assumed that they represent structural materials, although some of the remains could be postoccupational debris that has been redeposited in Room 2. The ubiquity and abundance of *Pinus edulis* and *P. ponderosa* wood may indicate these taxa were used as major construction elements, with the less abundant and frequently occurring taxa used as minor construction elements. Although less diverse, taxa of wood from three flotation samples from the roof fall are similar to the vegetal remains, although an unidentified dicot genus and *Rhus trilobata* are also represented. In addition to wood, the flotation samples contained a *Pinus* cone scale, one *Pseudotsuga menziesii* and two *P. ponderosa* needles, two *Zea mays* glumes, a modern *Artemisia* leaf and four taxa of seeds. Except for 12 Gramineae florets, all of the seeds are noncharred (see Table 8.4) and therefore probably intrusive. The *Artemisia* leaf is definitely recent and therefore intrusive. Association of the florets and glumes with the roof fall may indicate that larger parts of these plants (i.e., stems, cobs) were used as closing material. It is also possible that these particular remains originated from some other provenience and were incorporated into the roof fall following abandonment of the room.

Feature 5 in Room 2 is the central hearth. Macrobotanical remains from the hearth consist of fragments of Gymnospermae, *Juniperus*, *Pinus edulis*, *P. ponderosa*, *Quercus* cf. *undulata* and Salicaceae wood, as well as two cupules and a glume of *Zea mays*. The wood is presumed to represent fuel resources, unless some of the roof fall debris has infiltrated the feature. The cupules and glume are assumed to be debris from food processing or from cobs used for fuel. Feature 7 is the ash pit associated with Feature 5. Remains from this feature are similar to those from the hearth with the addition of a minimal amount of *Cercocarpus* and Dicotyledoneae wood and noncharred seeds representing three taxa of pioneer plants.

Feature 12 is the deflector mold in Room 2. As can be noted from Table 8.4, large numbers of noncharred *Amaranthus*, *Chenopodium* and

Table 8.4. Macrobotanical Remains from Area 2 (all charred unless otherwise noted).

		Room 2										
		Stratum 3 - Level 1 Roof fall							Feature 5 - Hearth			
		NE Quad		SE Quad		SW Quad	NW Quad		W 1/2		E 1/2 Strat 1	E 1/2 Strat 2
		FS	FS	BS	FS	FS	BS	BS	BS	FS	FS	FS
Taxon	Part	252	254	10	251	250	12	13	14	258	259	260
Amaranthus	seed			2*								
Artemisia	leaf							2*				
Atriplex canescens	wood					3.1g						
Cercocarpus cf. *montanus*	wood					1.6g						
Chenopodium	seed			3*				1*				
Dicotyledoneae	wood			<.1g			<.1g					
Gramineae	floret							12				
Gymnospermae	wood								<.1g			
Juniperus	wood			<.1g	1.1g	0.8g	<.1g	<.1g	0.3g	0.2g	0.4g	0.6g
Pinaceae	wood		0.4g									
Pinus	cone scale			1								
P. edulis	wood	2.0g	0.6g	0.4g	1.5g	1.6g			0.4g	0.7g		0.1g
P. ponderosa	wood	3.4g	3.5g	<.1g	4.3g	1.2g	<.1g			0.5g	0.3g	1.3g
	needle			2								
Populus	wood		1.0g	<.1g	3.0g		<.1g					
Portulaca	seed			1*				1*				
Pseodotsuga menziesii	needle			1								
Quercus	wood	0.1g										
Q. cf. undulata	wood		0.2g		4.0g						0.1g	
Rhus trilobata	wood			<.1g								
Rosaceae	seed			2*								
Salicaceae	wood											<.1g
Zea mays	cupule			2					2			
	glume								1			

BS - bulk soil flotation samples; columns without BS designation are vegetal remains
* - noncharred g - gram(s) fg - fragment(s)

Rosaceae seeds were recovered from this feature. The seeds have intact seed coats and intact, desiccated embryos, giving the impression that the seeds are recent but have been buried for some short amount of time. It is considered likely that the seeds from Feature 12 are from an insect or rodent food cache, despite the lack of evidence for predation. The occurrence of noncharred seeds of the same taxa above and within the roof fall tends to substantiate the suggestion that these seeds are intrusive.

Room 4 is a front room within the main roomblock of Area 2. The room is larger than other front rooms, somewhat D-shaped and may represent a surface kiva (see Chapter 3). Macrobotanical remains from Room 4 were recovered from the structure fill, the roof fall-surface contact stratum and the main hearth (see Table 8.4). Nine taxa of wood are represented by vegetal remains collected from the structure fill and the roof fall/surface contact stratum. These same taxa were represented in similar strata in Room 2, although taxa diversity was higher in Room 2. Fragments of *Juniperus*, *Pinus edulis* and *P. ponderosa* are the most abundant and frequently encountered. These three genera may be the remains of the major construction elements, with the other taxa of wood representing the minor construction elements. In addition to the wood, a single *Zea mays* cob fragment was recovered from the roof fall/surface contact stratum. This stratum contains mixed post-occupation and cultural deposits and, therefore,

Table 8.4. Macrobotanical Remains from Area 2 (Continued).

		Room 2				Room 4						
		Feature 7 Ash Pit		Feat. 12	Surf. 3	Strat. 2	Strat. 3 Level 1				Strat. 3 Level 2	
		N1/2	N1/2	De-flector	Level 6	Lev. 6 Roof fall Fill	Roof fall Contact	Roof fall Contact	Roof fall Contact	Roof fall Contact	Roof fall Floor	Roof fall Floor
Taxon	Part	FS 290	BS 15	FS 331	FS 324	FS 268	FS 272	FS 281	FS 289	FS 278	FS 280	FS 284
Amaranthus	seed			1998*								
Cercocarpus cf. *montanus*	wood		<.1g		<.1g	<.1g						
Chenopodium	seed		22*	61*								
Dicotyledoneae	wood	<.1g	<.1g				<.1g			<.1g		
Gymnospermae	wood	0.1g	0.4g			1.7g	1.2g		0.3g			
Juniperus	wood	0.5g	0.1g					1.2g	1.6g	0.3g	<.1g	
Pinaceae	wood	0.6g	0.3g			1.4g					0.2g	0.1g
	cone scale		1									
P. edulis	wood	0.6g	0.4g		0.8g	0.4g		3.0g	0.6g		0.8g	
P. ponderosa	wood	0.9g	0.1g			3.4g	5.0g	0.1g	0.9g	0.7g		
Populus	wood					0.5g	0.2g					
Portulaca	seed		6*									
Quercus	wood	<.1g							0.3g			
Rosaceae	seed			471*								
Salicaceae	wood	0.3g										
Sporabolus	seed		2*									
Zea mays	cob						1fg					
	cupule		3									

BS - bulk soil flotation samples; columns without BS designation are vegetal remains
* - noncharred g - gram(s) fg - fragment(s)

some of the wood and the cob fragment may not be directly associated with Room 4.

Vegetal specimens and flotation remains from the main hearth, Feature 8 (see Table 8.4), include fragments of *Juniperus*, *Pinus edulis* and *P. ponderosa* wood, a *Zea mays* cupule and three noncharred seeds representing two pioneer plant taxa. The noncharred seeds are definitely recent. Although three strata were definable within the hearth fill, the difference in botanical remains between the strata is minimal. It is assumed that the fragments of wood represent fuel resources and the cupule represents debris from processing or the use of cobs for fuel.

Room 6 is a back storage room within the Area 2 roomblock (see Chapter 3). Macrobotanical remains from Room 6 (see Table 8.4) consist of vegetal remains collected from above and within the roof fall stratum and from the roof fall/surface contact stratum, as well as flotation remains recovered from a floor feature (Feature 11). The vegetal remains include 13 taxa of wood, a slightly higher diversity of wood taxa than noted in Rooms 2 and 4. Two taxa, *Prunus* and an indeterminate Rosaceae genus, appear to be unique to Room 6. Although the basic pattern of taxa representation noted in Rooms 2 and 4 is repeated among the woody remains from Room 6, there is a notable increase in the occurrence of Pinaceae, which may in fact be *Pseudotsuga menziesii*. In addition to wood, vegetal remains include a couple of *Zea mays* cobs, a *Yucca* leaf fragment and one *Phaseolus vulgaris* cotyledon. The wood and possibly the *Yucca* leaf recovered from Room 6 are assumed to represent, at least in part, construction material. Since the vegetal remains were collected from both primary and mixed postoccupational/cultural deposits, some of the vegetal remains may be unrelated to Room 6. The cob fragments may be part of the roofing

Table 8.4. Macrobotanical Remains from Area 2 (Continued).

		Room 4					Room 6						
				Feature 8 Hearth			Full cut Seg. 1 Fill	Lev. 3 Above Roof	Strat 2 Lev. 4 Above Roof	Lev. 5 Above Roof	Roof fall	Strat 3 Level 1 Roof fall	Roof fall
		S1/2			N1/2								
				Strat 1	Strat 2	Strat 3							
		FS	BS	FS	BS	BS	FS	FS	FS	FS	FS	FS	FS
Taxon	Part	315	16	316	17	18	310	305	306	307	308	313	314
Chenopodium	seed		1*										
Dicotyledoneae	wood							<.1g					
Gymnospermae	wood						0.2g				0.5g		
Juniperus	wood		<.1g		<.1g	0.2g	<.1g	1.4g	0.4g		<.1g		0.6g
Pinaceae	wood									0.5g		0.9g	0.9g
Pinus	wood				0.2g							1.2g	
P. edulis	wood	2.5g	<.1g	0.8g	<.1g	<.1g	0.9g	2.6g	4.5g	1.3g	1.5g	3.0g	0.7g
P. ponderosa	wood						0.1g		2.2g	2.6g	2.8g	0.4g	3.7g
Populus	wood								<.1g				0.2g
Prunus	wood								0.3g				
Q. cf. *undulata*	wood						<.1g				0.1g		
Rosaceae	wood											<.1g	
Sporobolus	seed		2*										
Yucca	leaf								1fg				
Zea mays	cob						1fg						1fg
	cupule				1								

BS - bulk soil flotation samples; columns without BS designation are vegetal remains
* - noncharred g - gram(s) fg - fragment(s)

material, debris from processing activities or may have been incorporated following abandonment of the room. The single cotyledon was recovered from primary deposits within the roof fall/contact stratum. It is considered likely that the cotyledon is directly related to use of Room 6, but since the room lacks a hearth, the cotyledon may be debris from processing activities that occurred in the adjacent front room or possibly was charred following abandonment.

Feature 11 is a cache pit that contained non-flaked lithic tools. A flotation sample was collected from the feature to investigate the possibility that the feature had been used to store something other than the tools. As can be seen from Table 8.4, limited botanical material was recovered from Feature 11. Remains consist of small amounts of *Juniperus*, *Pinus edulis*, *Populus* and *Quercus* cf. *undulata* wood and noncharred seeds representing three taxa of pioneer plants. The fragments of wood are probably from the overlying roof fall stratum and the noncharred seeds are contaminants. It appears that if Feature 11 was used to store something other than nonflaked lithic tools, it was cleaned out prior to caching the tools.

Outside of the Area 2 roomblock, macrobotanical remains were analyzed from Feature 1, a ceramic concentration representing a single vessel, and Feature 2, a burial. Feature 1 was located northeast of the roomblock, within 2 x 2 m unit 114S 140E. Botanical remains from this feature (see Table 8.4) consist of small amounts of Gymnospermae, *Juniperus* and *Pinus edulis* wood and one recent, noncharred *Chenopodium* seed. The wood is not considered to be related to the use of the vessel, but rather is part of the general occupational debris.

Feature 2 was located southeast of the roomblock, within 2 x 2 m unit 144S 134E. Fragments of Dicotyledoneae, *Juniperus*, Pinaceae, *Pinus edulis* and *Quercus* wood, a *P. edulis* cone scale, *P. ponderosa* needles, *Zea mays* cupules and glumes, and recent, noncharred pioneer seeds were recovered from the fill of the burial. It is considered likely that the charred botanical remains represent secondarily deposited,

Table 8.4. Macrobotanical Remains from Area 2 (Concluded).

		Room 6				114S 140E		144S 134E	
		Surface 1 Contact			Feat. 11	Feature 1		Feature 2	
		SW Quad	SE Quad	NW Quad	Cache Pit	Vessel		Burial	
Taxon	Part	FS 309	FS 321	FS 322	BS 19	BS 7	FS 211	BS 8	BS 11
Cercocarpus cf. *montanus*	wood		0.3g						
Chenopodium	seed				5*	1*		5*	8*
cheno-am	seed				2*				
Dicotyledoneae	wood								<.1g
Gymnospermae	weod		1.0g			0.2g			
Juniperus	wood		0.4g	0.3g	0.1g	<.1g		<.1g	0.2g
Phaseolus vulgaris	cotyledon		1						
Physalis	seed								1*
Pinaceae	wood	1.0g	0.4g	0.3g				<.1g	
P. edulis	wood		0.8g	<.1g	<.1g		0.2g		<.1g
	cone scale							1	
P. ponderosa	wood	<.1g	1.5g	0.3g					
	needle							6fg	
Populus	wood				<.1g				
Portulaca	seed				1*				2*
Quercus	wood				<.1g				<.1g
Zea mays	cob	1fg							
	cupule								5
	glume								3

BS - bulk soil flotation samples; columns without BS designation are vegetal remains
* - noncharred g - gram(s) fg - fragment(s)

occupational debris not directly associated with the burial.

DISCUSSION

Representation of taxa from the various proveniences within Area 1 is fairly homogeneous. Remains that are abundant and frequently encountered in Room 10 tend to be abundant and frequently encountered within the plaza test units. Deviations in this trend are minor and consist of either a single occurrence of a taxa (e.g. one *Phaseolus vulgaris* cotyledon from the plaza) or higher representation of a taxa (e.g. greater frequency of *Quercus* - *Q. undulata* in the plaza) in one provenience compared to another. As mentioned before, the homogeneity in representation of remains between Room 10 and the plaza supports the suggestion that debris from the rooms was being deposited in the plaza. The slightly higher diversity of taxa represented outside of Room 10 can be attributed to the fact that occupants of other rooms in the roomblock would have been contributing to the accumulation of debris in the plaza and outside of the roomblock.

In Area 2, the representation of taxa from the various proveniences within the roomblock is also fairly homogeneous. Differences between macrobotanical remains from the three rooms appear to be insignificant and consist of singular occurrences of a taxa or a minor difference in abundance or frequency. The density and diversity of remains from the two test units outside of the roomblock are substantially lower, although this is not unexpected given the location of the units in open areas of redeposited occupational debris.

None of the macrobotanical remains from Room 4, which may be a surface kiva, can be directly related to nonsecular activities. The majority of the remains analyzed are from the roof fall or the roof fall/contact strata and are assumed to represent construction materials directly

associated with the room or deposited following abandonment of the room. Remains from the hearth consist of fragments of wood and a cupule, material that could be expected to occur in a domestic or ceremonial structure. Furthermore, the remains from Room 4 do not differ from those recovered from the other rooms. It is difficult to formulate exactly what differences can be expected to occur in the macrobotanical assemblages from domestic and ritual structures. A review of the ethnobotanical literature (cf. Hill 1982; Robbins et al. 1916; Train et al. 1956; Stevenson 1915), suggests two factors affecting the visibility and interpretation of ceremonial or medicinal botanical remains. First, the parts of plants used for ceremonial or medicinal purposes often are the stems, roots and leaves prepared by boiling, steaming or mastication. Not only do these plant parts rarely preserve, but the usual preparation techniques further reduce their chances for preservation. Second, although some plants (e.g., *Datura meteloides*) are used for medicinal or ceremonial purposes only, many other plants are multifunctional. The ritual or medicinal status of some plants is derived through their use in particular contexts or situations, and once outside of these contexts, these plants lose their special status. This can make it difficult to distinguish between secular and nonsecular botanical remains. Therefore, while it appears that the botanical remains from Room 4 represent domestic debris, if other artifacts from this room indicate that it is a ceremonial structure, then the possibility that the remains from the hearth may have ceremonial meaning cannot be ruled out.

The macrobotanical assemblages from Areas 1 and 2 are fundamentally similar. The differences between the two areas seem minor, with the exception of the much more abundant representation of *Zea mays* in Area 1 compared to Area 2. There are 100 cob fragments within the analyzed subsample from Area 1 and 3 cob fragments within the subsample from Area 2. It should be noted that numbers of fragments can not be equated with numbers of whole cobs because numerous fragments can be produced by one cob. The majority of the cobs from Area 1 were collected from the roof fall stratum in Room 10 or from 2 x 2 m unit 90S 88E. It cannot be determined if the discrepancy in representation of corn is the result of fortuitous recovery, differential preservation, or an indication of some real difference between the occupations of Areas 1 and 2. If the latter is the case, then it is expected that the other artifact classes analyzed from the two areas will also reflect differences that may be significant.

In terms of minor differences between Areas 1 and 2, the higher diversity of taxa and abundance of most remains associated with Area 2 are considered to be the result of the greater number of Area 2 proveniences from which remains were collected and analyzed. Possibly if all of the vegetal remains and flotation samples from the site, or at least more units associated with Area 1, had been analyzed, more significant differences between the two occupation areas would be apparent. Probably, however, the subsample of proveniences selected for analysis is sufficient to provide some indication of significant difference between the two areas if it exists; perhaps the differential representation of corn is such an indication. In other ways, the macrobotanical assemblages from the two areas tend to point to constancy in resource exploitation.

The macrobotanical assemblage from LA 60372, however, provides little information on the range of botanical resources utilized by the occupants. As was noted throughout the previous section of this report, wood charcoal was the most abundant and frequently encountered botanical remain recovered from the site. While remains of wood indicate such things as taxa procured for construction, fuel and utilitarian items, and the vegetation zones exploited for these resources, they do not provide much information on other resource categories, such as food.

Cultigens are represented by remains of *Zea mays* and *Phaseolus vulgaris*, with the former more abundant and frequently recovered than the latter. There was no evidence of *Cucurbita* within the macrobotanical assemblage analyzed. Furthermore, there was no indication of either *Cucurbita* or *Phaseolus* in the macrobotanical assemblage analyzed from the 1988 excavations conducted at LA 60372 (Matthews 1989:99). The minimal occurrence of cultigens from LA 60372 is believed to be an inaccurate reflection of their subsistence importance, given the assumption that the site occupants were agriculturalists. The dearth of *Cucurbita* and *Phaseolus* remains has been noted for other Pueblo III-Pueblo IV habitation sites on the Pajarito Plateau and along the adjacent Rio Grande River (Biella 1979; Trierweiler 1987).

Prehistoric preparation techniques, consumption practices and poor preservation potential of these cultigens, especially that of *Cucurbita* and *Phaseolus*, are believed to undermine evidence of these resources in the general archaeological record (Gasser 1982; Gasser and Adams 1981) and within this particular macrobotanical assemblage.

As previously indicated, cobs are the most abundant representative of *Zea mays*, with 103 cob fragments noted within the analyzed subsample. Twenty-three of the fragments were complete enough to allow a row count. Row numbers represented in the collection include 8-rowed, 10-rowed, 12-rowed and 14-rowed (Table 8.5). Although the sample of cobs with countable rows is small, the representation is typical for Pueblo III/Late Coalition Period sites. During the initial introduction of maize into the Southwest, an early type of flint corn grown was a 12 or more rowed Chapolote variety. In late Basketmaker III-Pueblo I period, a new race, Maiz de Ocho, was integrated into the Southwest (Galinat et al. 1970). This 8-rowed corn is believed to have been a more productive, easier-to-mill flour corn, better adapted to higher elevations and cooler temperatures. The cross of Maiz de Ocho and Chapolote is thought to have resulted in a productive 10-rowed hybrid, often referred to as Pima-Papago (Cutler 1966; Doebly and Bohrer 1980) that could reproduce as a flint, flour, or flinty-flour corn.

Table 8.5. Maize in Areas 1 and 2 by Row Count, LA 60372.

Row Count	Area 1	Area 2
8	3	1
10	12	-
12	4	2
14	1	-
N/A	80	-

N/A-row count not possible

The broad pattern in corn cob morphology seen in the Anasazi area is larger rowed cobs occurring during the Basketmaker-early Pueblo I periods, grading into a co-predominance with 8-rowed cobs during the late Pueblo I-early Pueblo II period and a transition to the 10-rowed cob during late Pueblo II-Pueblo III times (Toll 1985). This is not to say that 8-rowed or cobs with greater than 10-rows did not occur during the Pueblo III period and later, but that 10-rowed cobs tend to dominate assemblages in the Anasazi region during the later periods.

Evidence of pioneer and wild resources is extremely minimal, in part because remains of such resources have to be charred to be considered associated with the occupation of the site. A single *Portulaca* seed was recovered from a test unit outside of the Area 1 roomblock and 12 Gramineae florets were recovered from the roof fall of Room 2. As previously discussed, singular occurrences of pioneer plant remains, such as the *Portulaca* seed, may be due to accidental inclusion in a cultural context. The provenience of the Gramineae florets suggests that they could be present as a result of grass plant parts being used as closing material or stored in the ceiling for some other purpose other than food, with the florets inadvertently being preserved. The evidence for pioneer and wild resources is therefore quite limited. A paucity of pioneer and wild plant remains was also noted during analysis of the 1988 macrobotanical sample (Matthews 1989:99). Within the 1988 sample, charred pioneer remains consisted of one *Amaranthus* seed and one *Chenopodium* seed, and wild plant resources were represented by a single charred *Rhus (aromatica) trilobata* seed.

Site LA 60372 is located within an open *Pinus ponderosa*-dominated grassy woodland. The open character and grassy nature of the surrounding vegetation zone have in part been developed by the frequent fires in the area (Kohler 1989c:27). The various taxa of wood represented at the site indicate that a variety of vegetation zones were exploited. The majority of the taxa are now and presumably were then available within the immediate vicinity of the site, which is within the Transition life zone. The upper end of this zone includes the ponderosa-oak woodland which grades into the pinyon-juniper-oak woodland that is interfingered with a mixed mountain shrub and scrub understory. At lower elevations, the Transition zone grades into the Upper Sonoran life zone which is characterized by arid, open grasslands and juniper and cactus communities (Trierweiler 1987:54). Recovery of *Populus* and Salicaceae (*Populus-Salix* indistinguishable)

wood denote exploitation of riparian communities, found at the bottom of Frijoles Canyon or in some of the deeper side canyons. The location of agricultural fields has not been identified. In many places on the Pajarito, soil on the mesa tops tends to be shallow and rocky while soil in the canyon bottoms and side terraces is sandy and thicker, suggesting that the drainages may have been important for agriculture. The soils on Burnt Mesa, and on other adjacent areas of Bandelier National Monument north of Frijoles Canyon, appear to be exceptionally deep, however, and several small structures can be seen on Burnt Mesa that may represent fieldhouses.

Despite the lack of evidence within the macrobotanical assemblage, it is assumed that these various vegetation zones were exploited for more than wood resources. Furthermore, it is presumed that vegetation zones not represented by wood remains were also included in the effective prehistoric catchment area. Floristic studies conducted in conjunction with the Cochiti Reservoir project (Tierney 1977, 1979) have identified a wide variety of native edible plant resources in the vicinity of the reservoir. Although the study area was contained within the Upper Sonoran life zone, results of the study are, to a large extent, applicable to the present project area. In addition, research conducted on five habitation sites located on the Pajarito Plateau and the Caja del Rio Plateau (Trierweiler 1987) indicate that the biomass of potentially available pioneer and wild plant resources would have made significant contributions to the subsistence economy of the prehistoric occupants. In short, a variety of pioneer and wild resources were probably available and some undoubtedly were important constituents within the subsistence economy.

Based on the assumption that the occupants of LA 60372 were subsistence agriculturalists, it was expected that the macrobotanical assemblage would consist of numerous remains of cultigens, a fairly diverse and abundant representation of pioneer plant resources and a less diverse and abundant representation of wild plant resources. Pioneer plant remains were expected to be more abundant than wild plant remains because they generally co-occur with cultigens as a byproduct of the mutualistic relationship between agriculture and pioneer plant production and exploitation (Ford 1968, 1984; Matthews 1985). Furthermore, pioneer plants are prodigious producers of seeds, which would increase their chances of being represented in the archaeological record. The expectation that wild plants would be less abundant in the assemblage is in part because of an assumption that agricultural products would decrease the importance of wild resources within the subsistence economy, at least as long as cultivated resources were productive. Also, preparation methods and consumption practices (e.g., fruits eaten raw) would limit the representation of wild plant resources in the archaeological record.

As has already been pointed out, there is a paucity of nonwoody remains represented in the macrobotanical assemblage, with the exception of Zea mays. There is a noticeable lack of *Cucurbita*, remains of pioneer plant taxa commonly associated with agricultural fields (e.g. *Amaranthus*, *Chenopodium*, *Cleome*, *Helianthus*, *Portulaca*) and remains of high yield-high protein wild plants (e.g. *Quercus* acorns and *P. edulis* nuts). Limited recovery of nonwood plant remains was noted for Pueblo III-Pueblo IV sites excavated in conjunction with the Cochiti Reservoir project (Biella 1979) and for Archaic sites excavated in conjunction with the Baca Geothermal Anthropological project (Donaldson and Struever 1981), located on the west side of the Jemez Mountains. However, it has been found that macrobotanical assemblages from Archaic sites in northwestern New Mexico contain few remains and a low diversity of taxa, especially compared to Anasazi and Navajo sites (Toll 1983). On the other hand, flotation analysis conducted by Trierweiler (1987:251) on the five Pueblo III-Pueblo IV habitation sites mentioned above was fairly productive. The abundance and diversity of remains noted in his study is partially the result of 190 flotation samples contributing to the macrobotanical assemblage.

Two factors are considered to be most responsible for the low representation of nonwoody remains in the macrobotanical assemblage from LA 60372. The first is preservation. Based on the results of the 1988 analysis and the results of macrobotanical analysis conducted by other researchers in the area, with the exception of Trierweiler, it is concluded that the preservation potential of open-air sites on the Pajarito Plateau and adjacent areas is low. Donaldson and Struever (1981) cite increased precipitation associated with higher elevation, high vegetative biomass,

slightly acidic soil and high microbial activity supported by these factors as major elements affecting preservation of archaeobotanical remains within their project area. Some or all of these factors probably also affect preservation at Burnt Mesa Pueblo. Given these problems, it is possible that the standard 1-l flotation sample is too small and that larger samples need to be processed. Trierweiler (1987:239-240) processed and analyzed 1-gallon flotation samples and that larger size may be a factor in the greater return of macrobotanical remains in his study. In addition to these considerations, the inherent preservation potential of various plant parts, preparation techniques, consumption practices, disposal practices and sampling biases have undoubtedly affected the composition of the macrobotanical assemblage.

SUMMARY

Analysis of macrobotanical remains from the 1989 excavations at LA 60372 minimally enhances the data base from the 1988 analysis. As in 1988, most of the botanical remains recovered are wood, which limit our view of the subsistence resources used by the site occupants. While information concerning cultigens was slightly expanded, reliable evidence of pioneer and wild resource use remains scanty. With the possible exception of the greater abundance of maize in Area 1, the differences between Areas 1 and 2 seem insignificant and can be explained by vagaries of preservation and sampling. Preservation and size of the flotation samples were discussed as the main factors responsible for the limited recovery of nonwoody botanical remains.

9

SUMMARY

Timothy A. Kohler

THE PROBABILITY SAMPLE FROM BURNT MESA PUEBLO

For the three strata that are complete (according to the original design) it is possible to compute population total estimates and confidence intervals for the materials they contain. The ultimate purpose for doing this is to use the population totals for materials as an auxiliary source of information on human population size and longevity of occupation, given reasonable estimates from ethnographic sources as to rates of deposition for various material types. The immediate reason for computing partial estimates is to see whether the size of the computed confidence intervals are small enough, relative to the population total estimates, that we can have some confidence that the population totals we ultimately compute will be useful. For each stratum, population totals are computed as –

$$\hat{X} = N\left(\frac{\sum_{i=1}^{i=n} x_i}{n}\right)$$

where $\hat{X}$ = estimated population total of element x;

x_i = sum of element x (e.g., total sherds) in grid square$_i$;

n = number of grid squares in the sample; and

N= number of grid squares in the population (Yamane 1967).

Confidence intervals are computed as –

$$\pm t\sqrt{\hat{V}(\hat{X})}$$

where t= value read from t-table at df-1 where df = number of grid squares in the sample;

$$\hat{V}(\hat{X}) = N^2\left(\frac{N-n}{N}\right)\left(\frac{s^2}{n}\right);$$

$$s^2 = \frac{1}{n-1}\sum_{i=1}^{i=n}\left(x_i - \bar{x}\right);$$

x_i =count of element x for grid square$_i$; and

$\bar{x}$ = average for element x in sample (Yamane 1967).

The sums of various categories of materials, and the means and standard deviations for each stratum used in computing the point estimates and confidence intervals, are shown in Table 9.1 for ceramics, Table 9.2 for debitage, Table 9.3 for chipped stone tools, and Table 9.4 for ground stone tools. Table 9.5 displays the resultant population total estimates and confidence intervals, based on these raw data and the formulae above.

Overall, the precision of the samples (as measured by the average ratios of the point estimates to the 80% confidence intervals) is highest in Area 2 Stratum 2, where the population total estimates average about 2.9 times the size of the confidence intervals. (Higher ratios indicate greater relative precision.) This is followed by a ratio of 2.2 for Area 1 Stratum 2, where the sample, although very small (n=3), was quite homogeneous. In Area 1 Stratum 4, where we have the largest sample (of n=6 squares) we have the poorest precision (the average point total

Table 9.1. Data for Population Total Estimates, Ceramics.

Area	Subarea	2 x 2 m unit	Jar sherds Rims	Jar sherds All	Bowl sherds Rims	Bowl sherds All	Other	TOTALS
1	2	86S 96E	146	2526	82	479	55	3060
		84S 96E	229	5384	123	879	72	6335
		90S 88E	212	5450	121	702	109	6261
Mean			196	4453	109	687	79	5219
Standard dev.			44	1699	23	200	28	1870
1	4	70S 82E	40	932	25	88	14	1041
		80S 74E	502	9422	147	1100	186	10708
		94S 112E	103	2798	75	455	214	3467
		102S 86E	114	3374	41	390	56	3820
		126S 94E	9	155	5	27	1	183
		132S 96E	6	180	3	18	2	200
Mean			129	2810	49	346	79	3237
Standard dev.			188	2423	55	414	97	3990
2	2	114S 140E	29	924	19	215	10	1149
		122S 114E	24	526	13	150	13	689
		128S 142E	50	1362	28	148	67	1577
		144S 134E	44	1197	21	171	7	1375
Mean			37	1002	20	171	24	1198
Standard dev.			12	365	6	31	29	381

estimate is only about 1.3 times higher than its matched confidence interval) due to the very high variability in the amounts of materials intercepted by the sampling units in this stratum. Clearly, excavating at least one additional unit in this stratum should be a high priority in the 1990 field season.

Even taking into account the uncertainties in the point estimates, in Area 1 there are far more materials of all types outside the roomblock than inside the courtyard; even though materials are densely deposited in the courtyard, the area is small. Very roughly, the courtyard contains only about 5% as many materials as the external stratum; of course, this does not take into the account the probably dense accumulation of materials in the kiva fill within the courtyard. Somewhat surprisingly, the external stratum in Area 2 contains somewhat more materials than the courtyard in Area 1, though far less than the external stratum in Area 1. When the two strata in Area 1 are summed together, they contain between six and nine times as many materials as the external stratum in Area 2.

In general, the kinds of materials recovered from the two subareas of Area 1 are similar but contrast rather markedly with those in Area 2. Table 9.6 demonstrates that Area 2 contains large amounts of ceramic materials relative to both chipped and ground stone tools, while at the same time Area 2 contains much higher ratios of debitage to all other material categories than does Area 1. Therefore, compared with Area 1, at least the external portions of Area 2 tend to be enriched with debitage, and to a lesser extent ceramics, but impoverished in all kinds of stone tools. Such relationships might be partly explainable by recycling of stone tools previously discarded in Area 2 by occupants of Area 1. The greater tendency to manufacture tools of nonlocal materials in Area 1 might also have resulted in more efficient usage of stone in Area 1, and

Table 9.2. Data for Population Total Estimates, Flaked Lithic Debitage.

Area	Subarea	2 x 2 m unit	--- Size Class --- > 1"	1/2 - 1"	1/4 - 1/2"	< 1/4"	TOTALS
1	2	86S 96E	0	85	153	0	238
		84S 96E	8	136	232	0	376
		90S 88E	18	119	297	7	441
Mean			9	113	227	2	352
Standard dev.			9	26	72	4	104
1	4	70S 82E	4	27	58	0	89
		80S 74E	16	245	557	22	840
		94S 112E	9	79	187	9	284
		102S 86E	5	72	336	8	421
		126S 94E	1	2	2	0	5
		132S 96E	2	2	2	0	6
Mean			6	71	190	7	274
Standard dev.			6	91	221	9	323
2	2	114S 140E	5	31	91	2	129
		122S 114E	0	19	12	0	31
		128S 142E	2	53	177	1	233
		144S 134E	1	46	167	4	218
Mean			2	37	112	2	153
Standard dev.			2	15	77	2	93

the small amount of debitage there relative to other material types in comparison with Area 2. Yet a third factor in the relative scarcity of stone tools in Area 2 relative to debitage and ceramics may be the length of its occupation, if it was not occupied long enough for the ratio of long use-life items to short use-life items to stabilize. Further analysis of this sort, based on division of the material types into various subclasses (such as those recognized in Tables 9.1 - 9.5) ought to await the completion of the sample.

CHRONOLOGY

Two methods of absolute dating have been used with some success at Burnt Mesa Pueblo. Three sets of archaeomagnetic samples were removed by Tom Windes (with assistance from Angela Linse) in Summer 1989; two samples from the hearth in Room 2 and one from the hearth in Room 4. Of these, only one of the sample sets from the Room 2 hearth could be dated with any confidence; the preliminary determination, reported over the phone by Daniel Wolfman in January 1990, was 1270 $\pm$ 30. Room 2 is also the only room with a cutting date (see below); the tree-ring date corroborates this general placement.

The three tree-ring determinations from 1988 and eight from 1989 are tabulated together in Table 9.7 by general provenience (see also Fig. 9.1). The clustering of dates from Area 1 in the 1260s and 1270s, despite the fact that these are non-cutting dates, would seem to place the period of main construction of the quadrangular pueblo in this period, or slightly later. The apparent early cluster of dates from Room 4 in Area 2, on the other hand, may be slightly misleading. They are so much earlier than the one cutting date from the same roomblock that it is tempting to consider them as reused from another location.

If we assume that the early dates in both areas are the result of either reuse of wood from elsewhere, or extreme underestimates of the true cutting dates, we are left with the impression that the difference in age between the two areas is not great. The sample from Room 2 is from the

Table 9.3. Data for Population Total Estimates, Flaked Lithic Tools.

			--- Grouped Morpho-Use Categories ---							
Area	Subarea	2 x 2 m unit	indet.[a]	util. flakes[b]	cores, cobble tools[c]	uni-faces[d]	spec. forms[e]	bi-faces[f]	proj. pts.[g]	TOTALS
1	2	86S 96E	2	4	6	3	1	3	2	21
		84S 96E	9	2	15	3	0	6	0	35
		90S 88E	18	4	9	3	0	5	2	41
Mean			10	3	10	3	0	5	1	32
Standard dev.			8	1	4	0	1	2	1	10
1	4	70S 82E	3	0	0	1	0	0	0	4
		80S 74E	21	1	19	5	0	4	2	52
		94S 112E	10	0	8	1	0	1	1	21
		102S 86E	9	1	11	1	0	7	0	29
		126S 94E	0	0	1	0	0	1	0	2
		132S 96E	0	0	0	0	0	0	0	0
Mean			7	0	7	1	0	2	1	18
Standard dev.			8	1	8	2	0	3	1	20
2	2	114S 140E	0	1	0	2	1	0	0	4
		122S 114E	0	0	1	1	0	0	0	2
		128S 142E	2	1	1	2	1	1	0	8
		144S 134E	2	0	1	1	0	0	1	5
Mean			1	1	1	2	1	0	0	5
Standard dev.			1	1	1	1	1	1	1	3

[a] indeterminate, and unifaces and bifaces too fragmentary to determine orientation (codes 00, 10, & 40 in Appendix C, Kohler, ed., 1989).
[b] used but apparently unworked flakes (code 02).
[c] unused cores, used cores (normally hammerstone-type use), and cobble tools (codes 03, 04, and 05).
[d] thick end-worked unifaces, thick side-worked unifaces, thick multiple-edge worked unifaces, thin end-worked unifaces, thin side-worked unifaces, and thin multiple-edge worked unifaces (codes 12-14 & 20-22).
[e] notches/spokeshaves, denticulates, burins, gravers/perforators, drills, flaked axes, or eccentrics/ornaments (codes 30-39).
[f] thick bifaces with partially or completely worked circumference, thin bifaces with or without obvious haft elements (not projectile points), with partially or completely worked circumference (codes 42, 43, 50-53).
[g] codes 60-99.

bottom of a post that was built into and anchored a deflector. The deflector itself was leveled at some point in the occupation of the room, perhaps at the same time that the doorway to the east was closed up. It is clear that the deflector was an original (or at least a very early) feature of the room. If we take A.D. 1250 to be a construction date for this room, and assume that the entire linear pueblo was built at once (due to the apparent continuous nature of the wall in back of the second tier of rooms) then this becomes the construction date for the pueblo in Area 2 as well (with the partial third tier of two rooms to the northeast being later additions).

If the roomblock in Area 2 was built in 1250, if the construction of the pueblo in Area 1 began in about A.D. 1270, and if the occupations did not overlap, then Area 2 would have been in use for some 20 years, a not implausible use-life estimate for a small pueblo.

Table 9.4. Data for Population Total Estimates, Nonflaked Lithic Tools.

			--- Grouped Morpho-Use Categories ---						
Area	Subarea	2 x 2 m unit	indet. & misc.[a]	hammer-stones[b]	manos[c]	metates[d]	hafted items[e]	orna-ments[f]	TOTALS
1	2	86S 96E	11	0	1	0	0	0	12
		84S 96E	11	3	3	1	3	0	21
		90S 88E	18	0	0	6	2	0	26
Mean			13	1	1	2	2	0	20
Standard dev.			4	2	2	3	2	0	7
1	4	70S 82E	3	1	0	2	2	0	8
		80S 74E	33	0	3	0	4	2	42
		94S 112E	11	0	0	3	2	1	17
		102S 86E	14	0	1	1	10	0	26
		126S 94E	0	0	0	0	0	0	0
		132S 96E	0	0	0	0	0	0	0
Mean			10	0	1	1	3	1	16
Standard dev.			13	0	1	1	4	1	16
2	2	114S 140E	2	0	0	0	0	0	2
		122S 114E	1	0	0	0	1	0	2
		128S 142E	2	1	2	0	2	0	7
		144S 134E	1	0	0	0	1	0	2
Mean			2	0	1	0	1	0	3
Standard dev.			1	1	1	0	1	0	3

[a] codes 00-17 (in Appendix D, Kohler, ed., 1989).
[b] codes 20-26
[c] codes 30-47
[d] codes 50-65
[e] codes 70-79
[f] codes 90-97

CERAMIC MATERIALS

As expected, given this probable chronological relationship between the two areas, Area 1 has slightly less Santa Fe B/w and Kwahe'e B/w than does Area 1, and slightly more of the various later service wares, including Wiyo B/W, Biscuits and glazewares. Although these differences are consistent across many different traditional types of service wares, they are small in size, suggesting that the mean date of occupation of the two areas was not greatly different.

The differences in relative frequencies between the two areas in utility wares again points to a slightly later occupation for Area 1, which contains more smeared-indented corrugated and less indented corrugated than does Area 2. Interestingly, the differences in relative frequencies of these utility wares are more marked than are any parallel differences in service wares, and the relative frequency of service wares in the total collection also decreased markedly in Area 1 times. It is not clear how such different patterns of change in utility and service wares should be interpreted, although it is tempting to suggest that the roles of pots as tools, in a narrow sense, may be changing more rapidly than the roles of pots as embodiments of social and ritual relations. Perhaps utility wares are "free" to vary more quickly

Table 9.5. Population Total Estimates ($\hat{X}$) and 80% Confidence Intervals for Completed Sampling Strata.

Material	--- Area 1 --- Stratum 2 $\hat{X}$	80% CI	Stratum 4 $\hat{X}$	80% CI	--- Area 2 --- Stratum 2 $\hat{X}$	80% CI
CERAMICS						
Jar rim sherds	6067	1721	120,099	115,405	12,365	3885
Total jar sherds	138,052	66,770	2,150,796	1,484,350	336,773	115,383
Bowl rim sherds	3370	908	45,898	33,507	6821	1958
Total bowl sherds	21,288	7874	322,405	253,783	57,456	9823
Other forms	2443	1084	73,084	59,173	8165	9034
Total sherds	161,723	73,465	3,013,182	2,443,799	402,394	120,468
DEBITAGE						
> 1"	279	354	5772	3430	672	695
1/2 - 1"	3512	1022	66,287	55,988	12,499	4801
1/4 - 1/2"	7046	2833	177,169	135,375	37,565	24,258
< 1/4"	71	157	6052	5329	605	537
Total	10903	4074	255,280	197,611	51,341	29,438
FLAKED LITHIC TOOLS						
indeterminate	301	314	6703	4900	336	379
utilized flakes	102	47	279	306	168	190
cores, cobble tools	310	181	6052	4717	269	158
unifaces	93	0	1210	1164	504	190
specialized forms	9	24	0	0	168	190
bifaces	146	59	2048	1715	101	158
projectile points	40	47	466	490	101	158
Total	1001	405	16758	12435	1613	790
NONFLAKED LITHIC TOOLS						
indeterminate	412	157	9496	7718	504	190
hammerstones	31	67	186	245	101	158
manos	40	59	652	735	168	316
metates	71	126	931	796	0	0
hafted items	53	59	2793	2266	336	253
ornaments	0	0	466	490	0	0
Total	611	279	14,524	10,046	1109	790

in response to changing circumstances than are service wares because they carry less symbolic baggage.

STONE TOOLS

Excluding the differences in ratios of tools and debitage noted above, the most marked difference between Areas 1 and 2 is in the much greater relative frequency of Pedernal chert in Area 1, accompanied by a lower relative frequency of basalt than in Area 2. Two kinds of explanations suggest themselves for this change. The first focuses on the possibility that the shift to Pedernal chert is due to the source areas for basalt becoming more *socially* distant by the mid-late 1200s. Modern Pueblo traditions speak of the origin of Keresan-speaking groups as in and south of Frijoles Canyon, with Tewa-speaking groups traditionally located north of the canyon (Hewett 1953). The source area for Pedernal is

Table 9.6. Ratios of Generalized Material Types across Strata, based on Point Estimates.

	--- Area 1 ---		--- Area 2 ---
Material Ratios	Stratum 2	Stratum 4	Stratum 2
Ceramics/debitage	14.8	11.8	7.8
Ceramics/flaked lithic tools	161.6	180.0	249.5
Ceramics/nonflaked lithic tools	215.6	207.4	362.8
Debitage/flaked lithic tools	10.9	15.2	31.8
Debitage/nonflaked lithic tools	17.8	17.6	46.3
Flaked lithic tools/nonflaked lithic tools	1.6	1.2	1.5

Table 9.7. Tree-ring Dates for Burnt Mesa Pueblo, 1988 and 1989 Seasons.

Provenience	Outer Ring	Lab symbol[a]	DD #/FS #	Species
Area 1				
Room 1	1267	vv	72/329	Douglas-fir
	1268	vv	6/4	Douglas-fir
	1275	vv	4/4	Douglas-fir
	1275	vv	7/4	Douglas-fir
Room 10	1272	vv	83/173	ponderosa
2 x 2 80S 74E	1189	vv	25/110	Douglas-fir
2 x 2 90S 88E	1271	vv	86/71	Douglas-fir
Area 2				
Room 2	1250	B	94/329	ponderosa
Room 4	1193	vv	33/268	ponderosa
	1204	vv	36/268	ponderosa
	1207	++vv	43/268	ponderosa

[a] vv: there is no way of estimating how far the last ring is from the true outside; ++: a ring count is necessary beyond a certain point in the series; B: bark is present.

located in the traditional Tewa territory, and if Tewa speakers were the occupants of Area 1 but not Area 2, while the basalt sources were controlled by non-Tewa groups, the more geographically distant but more socially accessible cherts may have been favored. A variant of this explanation, using the same logic, is that the occupations of both Area 1 and 2 were by Tewa speakers, but incursion of other groups (for example, Keresan speakers) in the mid-late 1200s who settled near to and controlled the basalt sources created an equally pronounced change in basalt accessibility for the occupants of Burnt Mesa.

A second kind of explanation focuses on the possible differential value of basalt versus Pedernal chert for different activities, the importance of which changed between the time the two areas of Burnt Mesa Pueblo were occupied. For example, Pedernal chert may have been much more useful for some kind of activity or tool that was in turn more important for the occupants of Area 1 than it had been for the occupants of Area 2. However, no differences in flaked lithic tool classes between the two areas present themselves as being as important as the switch in raw materials.

SUBSISTENCE

A chief difference in the macrobotanical assemblages in the two areas is that in Area 2, maize occurs in 21% (nine of 42) of the analyzed proveniences, whereas it is present in 44% (10 of 23) of the analyzed proveniences from Area 1. Bean, the only other cultigen present, also

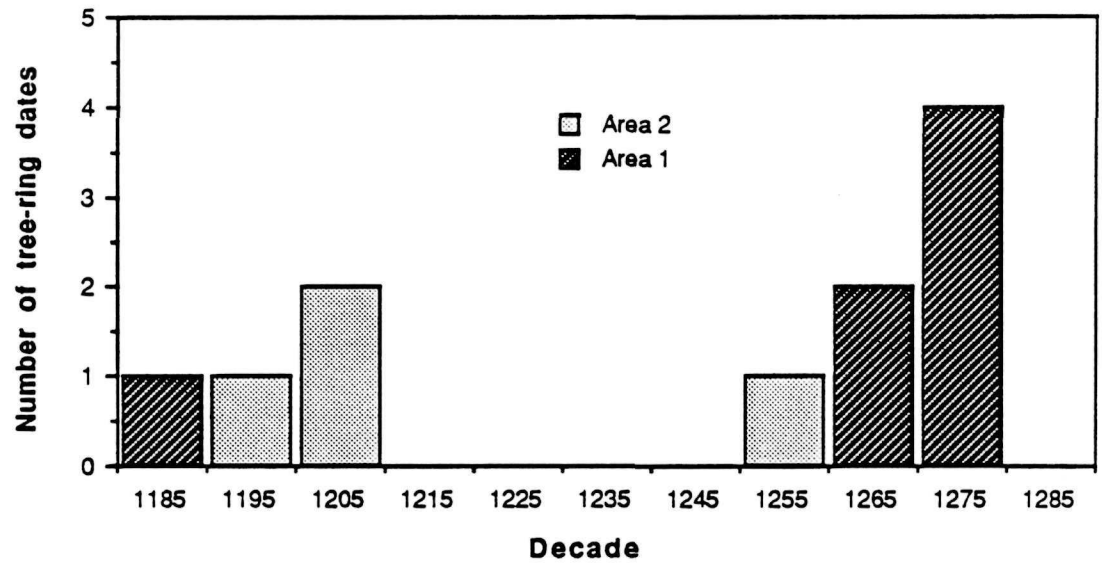


Fig. 9.1. Tree-ring dates for Burnt Mesa Pueblo, 1988 and 1989 seasons, by decade.

has a greater relative ubiquity in Area 1 (4%) than in Area 2 (2%), but the sample is extremely small (only one occurrence in each area). For maize, at least, some degree of agricultural intensification may be suggested by these results, although to be confident in this conclusion we would also have to rule out any changes in storage, processing, or discard practices that might interfere with these relative ubiquities as pure measures of dietary importance.

Interpretation of the differences between the faunal assemblages in the two areas is hindered by the fact that the assemblage from Area 1 (with 213 identifiable specimens; see Table 7.7) is more than 10 times as large as that from Area 2. It would be expected that relatively rare species would be better represented in the larger collection, so that without sophisticated analysis of expected diversities (such as developed by Kintigh 1984) it is best not to put too much weight on the fact that two large game species that probably would not have been locally available (bison and pronghorn) occur only in Area 1. Whereas it is difficult to differentiate long-distance large ungulate hunting from procurement through exchange (Driver 1990), it seems best to explain the single bison phalange and pronghorn metatarsal from Area 1 as imported along with hides.

It appears to this author, although Trierweiler in Chapter 7 does not reach this same conclusion, that there is some preliminary evidence for intensification of animal domestication in the comparison of the assemblages from the two areas. Calculated relative to the number of identifiable specimens, turkey accounts for 36% (52 of 213) of the assemblage in Area 1, but only 12% (2 of 17) of the Area 2 assemblage. If this distinction is eventually supported by other lines of evidence and methods of quantification on the data base to be acquired in 1990, intensification of both animal and plant domestication accompanied the occupation of Area 1.

One troublesome feature of the present faunal data base is the absence of wapiti (or elk) in both areas. Elk is common in the area today, and it seems incredible that it would not have been part of the prehistoric diet. Absence of elk may suggest that the faunal assemblage from both areas is still too small to be reliably interpreted.

PROPOSED SUMMER 1990 FIELDWORK

The majority of the excavation proposed for Summer 1990 will be directed towards Area 1 (the quadrangular pueblo) of LA 60372. Some additional work is also proposed for LA 3852, to complete the probability sample begun there in 1988, and in Area 2 of LA 60372.

LA 60372 Area 2

Limited additional operations to conclude excavations of the Area 2 (linear, southern)

roomblock at LA 60372 are proposed, as follows:

Subarea 1 (Roomblock)

- Remove the backfill from the central portions of Room 4 (the SE corner room) and conduct excavations under the upper floor, at which point excavations ceased last year. The purpose of these excavations is to test for possible remodeling of the floor features that will give information on longevity of structure use and possible changes in structure use, and to recover datable materials (as in the case of the only cutting date from Area 2, from a subfloor provenience in Room 2);

- Conduct limited testing at selected junctions of walls within the roomblock to establish bonding and abutting sequences, where these are not visible from the surface;

- Conduct limited superficial excavation along wall lines as necessary to arrive at a final, comprehensive plan map of the surface architecture of the roomblock.

Subarea 2 (External Area)

- To recover additional faunal materials, but also to improve the confidence intervals for the material population total estimates from this stratum, we plan to excavate one additional 2 x 2 m unit selected randomly as an addition to the probability sample.

LA 60372 Area 1

Subarea 1 (Roomblock)

- Remove half of the backfill from Room 10 (in the northern wing of the pueblo) and conduct subfloor excavations, as discussed for Room 4 of Area 2;

- Complete excavation of Room 1 in the western wing of the pueblo;

- Conduct excavations in two or three additional rooms;

- Conduct limited testing at selected junctions of walls within the roomblock to establish bonding and abutting sequences, where these are not visible from the surface;

- Conduct limited superficial excavation along wall lines as necessary to arrive at a final, comprehensive plan map of the surface architecture of the roomblock.

Subarea 3 (Possible kiva)

Excavation of the kiva will be initiated by drifting a 1-m-wide trench across the approximate middle of the structure, excavated only long and deep enough to locate the walls. Then a 2 x 2 m unit treated as a probability square (sediments screened; profiles drawn) will be excavated into the structure to roof fall. Once the size of the structure, its orientation, its depth, and its fill sequence are understood, we will confer with Park Service archaeologists to determine the best way to proceed.

Subarea 4 (External area)

- Excavate one or two additional 2 x 2 m units in this stratum to improve the confidence intervals for the population total estimates of materials from this stratum.

- Conduct limited augur testing as necessary to assist in reconstructing the paleo-topography.

LA 3852

The work proposed at this site is designed to complete the probabilistic sample begun in Summer 1988. The areas at this site are defined as follows: Area 1 is the roomblock; Area 2 is the courtyard excluding the kiva; Area 3 is the area of sheet trash outside the courtyard and the roomblock close to the site; and Area 4 is the kiva. All these areas refer to the habitation site component, and not the later fieldhouse component that is downslope and to the east.

Area 1 (Roomblock)

Goals for this area are as follows:

- Complete excavation of Room 10 (one-half excavated in Summer 1988).

- Conduct limited testing at selected junctions

of walls within the roomblock to establish bonding and abutting sequences, where these are not visible from the surface;

- Conduct limited superficial excavation along wall lines as necessary to arrive at a final, comprehensive plan map of the surface architecture of the roomblock.

- Excavate rooms 6, 4, and 8, as numbered on the plan (Carlson and Kohler 1989:17); these were randomly selected in that order.

Area 2 (Courtyard)

- Excavate two more randomly chosen 2 x 2 m units.

Area 3 (External area)

- Excavate 2 or 3 more 2 x 2 m units to complete the probabilistic sample.

Area 4 (Kiva)

It appears that the extent of the kiva can be confidently delimited from the surface. We propose to enter it with a 2 x 2 m unit towards the center, treated as a probability square (screened, etc.). Once the depth and the fill sequence are understood, we will confer with Park Service archaeologists to determine the best way to proceed.

APPENDIX
HUMAN REMAINS FROM 2 X 2 M UNIT 144S 136E, AREA 2

Markku Niskanen

In the Summer 1989 excavations on Burnt Mesa, human remains were encountered in three locations in Area 2. No human remains were intercepted in Area 1. This appendix deals with the only instance of remains that were both complete enough for study, and excavated. The two other instances of human remains in Area 2 were from Room 4. Here, one or more possible burials in the south-central portions of the room were completely avoided, and three fragmentary bones near the northeastern corner were excavated and reburied. The archaeological context of these is reported in Chapter 4, as is the archaeological context for the burial for which the physical anthropological characteristics are described in this appendix. Materials from the burial discussed here were also reburied during the field season in a location agreed to by the Park Service, and the analysis here represents what was possible to do in the field.

All of the skeletal material from this burial (Feature 2) were from one 40-45 year old male. The aging of this individual is based on entirely fused sagittal and almost entirely fused lambdoidal sutures. The determination of sex is based on a very tight sciatic notch.

CRANIAL CHARACTERISTICS

The cranium is medium-sized for a Pueblo Indian. Its left side is fully preserved with no apparent distortions. Most of the right side (parietal and temporal bones) was crushed. It was, however, possible to estimate the maximum parietal width at 146 mm, which is rather large. Neumann's (1952) sample of Southwest Indian males of Ashiwid type have an average cranial width of 134.5 mm. The minimum frontal width of this specimen, 97.5 mm, is also larger than the average of 93.55 mm for three Pueblo samples calculated from data published by Corruccini (1972). The supramastoid crest width, which was possible to measure directly, is also 146 mm. Maximum length and basion-bregma heights were measured as 178 mm and 136 mm respectively. The length is more or less average (Neumann's Ashiwids average 179.9 mm), but the height is above average (Ashiwids average 129.9 mm). The cranial index of this specimen is a little higher (82.02%) than that of the average prehistoric Tewa (79.5%, Hrdlicka 1935; Tewa groups today live not far to the east and north of Bandelier and recognize traditional territories on the Pajarito). The quite tall cranial height and average cranial length result in a high height-length index of 76.4% (in comparison to Neumann's Ashiwids, who average 72.6%). The cranial height-width index of 93.5% is low relative to the Ashiwids (97.1%); however, the cranial width is relatively large in relation to both the length and the height. The cranial capacity was calculated as 1481cc using the formula of Olivier et al. (1978). The muscle development of the cranium, as judged from the prominent temporal line and occipital ridge, is average by Amerindian standards. The supraorbital ridges are surprisingly pronounced for an individual of medium overall size; they are both strongly projecting and thick. The only pathological feature of the braincase is a 4 mm high bony growth, about 5 mm in diameter and roughly circular, projecting from the frontal bone about 38 mm above the nasion slightly right of the mid sagittal line. This might have been the result of a healed injury. The braincase was not

artificially deformed. There is one wormian bone along the left lambdoidal suture.

The face is still attached to the braincase, although rather loosely. The left zygomatic bone is partially separated from the maxilla, but was easily "rearticulated." The right zygomatic bone is completely missing. The left anterior tooth-bearing part and right posterior tooth-bearing parts are missing. The nasal region of the maxilla and the nasal bones were preserved. The measured upper facial height is 73 mm, while total facial height is 120 mm; these are average for Southwestern Indians. (These dimensions are 73.1 mm and 116.3 mm in Neumann's [1952] Ashiwids.) Due to the missing parts, no reliable measurements of facial widths were possible. However, as judged from the left zygomatic bone and the zygomatic processes of both temporals, the maximum facial width (zygomatic width) is estimated as 130 mm. This width is very close to Neumann's (1952) Ashiwid average of 132.4 mm. Upper part of the face was prognathic, and point nasion was located anterior to the most anterior point of the frontal bone (point ophrion) when the cranium was set on a Frankfurt plane. The lower part of the upper face (subnasal alveolar region) was orthognathic with no prognathism. This non-prognathism of the alveolar region in comparison to upper nasal region is seen in a comparison of the basion-nasion diameter of 102.5 mm (which is large relative to the Ashiwid average of 99 mm), and a basion-prosthion diameter of 89 mm (which is very small relative to the Ashiwid average of 97.1 mm), as well as in straight facial profile. (An imaginary line drawn between points nasion and prosthion is perpendicular to the Frankfurt plane). The alveolar clivus height of 20.5 mm is small in comparison to the 23.42 mm average for three Pueblo Indian samples as calculated from data in Corruccini (1972).

The nasal prominence and angle are average for Southwest Amerindian (an observation). The nasal index, calculated from the nasal height of 52.5 mm and a nasal width of 26 mm, is 49.52%. These nasal dimensions, especially height, are large in comparison to an average nasal height of 48.27 mm and average nasal width of 24.58 mm for the three Pueblo samples as calculated from data provided by Corruccini (1972).

The eye orbits are square in shape. An orbital height of 38.5 mm, and widths of 44 mm (maxillofrontal) and 41.5 mm (dacryon) were measured from the better preserved left orbit. Neumann's (1952) Ashiwids have an average orbital height of 34.3 mm, and width (dacryon) of 39.1 mm. This specimen, thus, has tall orbits resulting in a high orbital index of 92.8%. Ashiwids, for comparison, average 87.5%. (Both orbital indices are calculated from dacryon length).

The mandible, which lacks only the right mandibular condyle, is small- to medium-sized in comparison with average Pecos Pueblo males. Its maximum length is 100 mm as its bigonial width. For comparison, the average bigonial width of Pecos Pueblo mandibles is 102 mm (Hrdlicka 1940a, 1940b). Ascending ramus height is 54 mm, slightly less than the 57.3 mm average for Pecos Pueblo males calculated from Hrdlicka (1940b). The minimum ramus width of 34 mm is small in comparison to the 36.9 mm average for Pecos Pueblo (also according to Hrdlicka 1940b). Symphyseal height of 28.5 mm is also small (especially for generally deep-jawed Amerindians). This height averages 35.4 mm in Hrdlicka's (1940b) sample from Pecos Pueblo. The height of the mandibular body at the second molar is equal to the symphyseal height. The mandibular body thickness at the symphyses and at the second molar are also equal (14.5 mm); the average thickness of the mandibular body in Pecos Pueblo males is 16 mm (Hrdlicka 1940b). Gracility of the tooth-bearing parts of both the mandible and maxilla is indicated by the low heights of the tooth bearing parts of both the mandible (symphyses) and maxilla (alveolar clivus), as well as the thin mandibular body (at the 2nd molar), and is probably the reason for the lack of alveolar prognathism in this specimen mentioned earlier.

Fifteen teeth are intact; others were lost after death. All the preserved teeth are worn, having all dentin exposed. This tooth wear is normal considering the age of this individual (40-45 years). All preserved upper incisors are strongly shoveled in shape. No dental pathologies were observed.

POST-CRANIAL CHARACTERISTICS

The following postcranial bones or fragments were discovered:

- Midshaft of right clavicle.

- Capitus and shaft of right humerus.
- Midshaft pieces of left and right ulna.
- Midshaft of right radius.
- Complete left and right femurs.
- Shaft and proximal epicondyle of left tibia, and shaft of right tibia.
- Right glenoid fossa of scapula.
- Left and right acetabula and right ischium of pelvis.
- Complete right talus, and tibia-talar articulation surface of left talus
- Right calcaneum.

Accurate longbone length measurements could be taken from the femora only. Maximum lengths are 423 mm (L) and 425 mm (R). Humeral length was estimated as 307 mm by articulating capitus with shaft. These long bone lengths are similar to average femoral lengths of Pueblo Indian males. Average femoral and humeral lengths as calculated from Corruccini (1972) for three samples of Pueblo males are 429.54 mm and 310.36 mm respectively. The stature of this individual was thus normal for a Pueblo Indian male. Head diameter of both femora is 42 mm, close to the average of 43.3 mm for Pecos Pueblo males published by Trinkaus (1980). Dimensions of other articular surfaces (talar articular surface 37.5 x 30 mm; glenoid cavity of scapula 34 x 20 mm); the epicondylar width of the femur (80 mm); and midshaft circumferences of long bone shafts (minimal circumference of clavicle, 38 mm; minimum circumference of humerus, 60 mm; least circumference of ulna, 37 mm; femoral midshaft circumference, 81.5 mm; tibial least circumference, 80.5 mm) are also average. Muscular markings are medium-strong for an adult male. Overall, in build as well as in stature, this individual was of average size for a Pueblo male.

There is no evidence of disease, injury, and other pathologies in the postcranial skeleton apart a light case of osteoarthritis in a knee joint. Squatting facets and other developmental disorders were not observed.

SUMMARY

The physical characteristics of this 40-45 year old male are typical for a Pueblo Indian. The only morphological differences in the cranium relative to comparative Pueblo samples are large braincase widths (maximum parietal and minimum frontal widths), a rather tall braincase, and gracile tooth-bearing parts of the maxilla and mandible (low alveolar clivus and symphyseal heights, as well as rather thin mandibular body width at the second molar). Postcranially this specimen was medium in stature and build for a Pueblo male. Except for a small bony growth on the forehead and signs of a light case of osteoarthritis in a knee joint, no evidence of disease, other pathologies, or artificial deformation was observed.

BIBLIOGRAPHY

Adams, E. Charles
1983 The Architectural Analogue to Hopi Social Organization and Room Use, and Implications for Prehistoric Northern Southwestern Culture. *American Antiquity* 48:44-61.

Adams, Karen R.
1980 Relative Numbers of Native Macrofossils in Strata of Poor Preservation, with Emphasis on Flotation (in Salmon Ruin Ethnobotanical Report, by Vorsila Bohrer, Part 7). In *Investigations at the Salmon Site: The Structure of Chacoan Society in the Northern Southwest III*, edited by Cynthia Irwin-Williams and Phillip H. Shelley, pp. 251-301. Eastern New Mexico University, Portales.

Ahler, S. A.
1979 Functional Analysis of Nonobsidian Chipped Stone Artifacts: Terms, variables, quantification. In *Lithic Use-Wear Analysis*, edited by B. Hayden, pp. 301-328. Academic Press, New York.

Bandelier, Adolf F.
1916 *The Delight Makers*, 2nd edition. Dodd, Mead, New York.

Baugh, T. G., and C. V. Terrell
1982 An Analysis of Obsidian Debitage and Protohistoric Exchange Systems in the Southern Plains as viewed from the Edwards I Site (34Bk2) *Plains Anthropologist* 27:1-27.

Biella, Jan V.
1977 Previous Anthropological Research in the Cochiti Study Area. In *Archeological Investigations in Cochiti Reservoir, New Mexico, Volume I: A survey of Regional Variability*, edited by J. V. Biella and R. C. Chapman, pp. 105-149. Office of Contract Archeology, University of New Mexico, Albuquerque.

1979 Changing Residential Patterns Among the Anasazi, A.D. 750-1525. In *Archeological Investigations in Cochiti Reservoir, New Mexico 4: Adaptive Change in the Northern Rio Grande Valley*, edited by J. V. Biella and R. C. Chapman, pp. 103-144. Office of Contract Archeology, University of New Mexico, Albuquerque.

Biella, Jan V., and Richard C. Chapman
1979 A Program for Mitigation of Archeological Resources in the Flood Pool of Cochiti Reservoir. In *Archeological Excavations in Cochiti Reservoir, New Mexico, Volume 3: 1976-1977 Field Seasons*, edited by J. V. Biella, pp. 2-25. Office of Contract Archeology, University of New Mexico, Albuquerque.

Biella, Jan V., and Richard C. Chapman, editors
1979 *Archeological Investigations in Cochiti Reservoir, New Mexico. Volume 4: Adaptive Change in the Northern Rio Grande Valley.* Office of Contract Archeology, University of New Mexico, Albuquerque.

Bussey, Stanley D.
1968a Excavations at LA 6461, the Red Snake Hill Site. In The Cochiti Dam Archaeological Salvage Project, Part I: Report on the 1963 season, assembled by Charles H. Lange, pp. 4-12. Museum of New Mexico *Research Records* 6. Santa Fe.

1968b Excavations at LA 6462, The North Bank Site. In The Cochiti Dam Archaeological Salvage Project, Part I: Report on the 1963 season, assembled by Charles H. Lange, pp. 12-72. Museum of New Mexico *Research Records* 6. Santa Fe.

Burt, W. H., and R. P. Grossenheider
1964 *A Field Guide to the Mammals.* Houghton Mifflin, Boston.

Carlson, Ingrid K.
1990 Habitation Site Architecture of the Coalition Period on the Pajarito Plateau, New Mexico. M.A. thesis, Department of Anthropology, Washington State University, Pullman (in progress).

Carlson, Ingrid K., and Timothy A. Kohler
1989 LA 3852. In Bandelier Archaeological Excavation Project: Research Design and Summer 1988 Sampling, edited by T. A. Kohler, pp. 14-24. Washington State

University Department of Anthropology *Reports of Investigations* 61. Pullman.

Chapman, Richard C., and Jan V. Biella
1980 4,000 Years on the Southern Pajarito. In Bandelier National Monument: Geology, History, Prehistory. *Exploration*, edited by David G. Noble, pp. 6-11. School of American Research, Santa Fe.

Chapman, Richard C., and Jan V. Biella, with Stanley D. Bussey, editors
1977 *Archeological Investigations in Cochiti Reservoir, New Mexico, Volume 2: Excavations and Analysis 1975 Season.* Office of Contract Archeology, University of New Mexico, Albuquerque.

Cockrum, E. L.
1982 *Mammals of the Southwest.* University of Arizona, Phoenix.

Corruccini, R. S.
1972 The Biological Relationships of Some Prehistoric and Historic Pueblo Populations. *American Journal of Physical Anthropology* 37:373-388.

Crabtree, D. E.
1972 An Introduction to Flintworking. *Occasional Papers of the Idaho State University Museum* 28. Pocatello.

Cutler, H. C.
1966 Corn, Cucurbits, and Cotton from Glen Canyon. University of Utah *Anthropological Papers* 80. Salt Lake City.

Doebly, J. F., and V. Bohrer
1980 Maize. In *Investigations at the Salmon Site: The Structure of Chacoan Society in the Northern Southwest III*, edited by Cynthia Irwin-Williams and Phillip H. Shelley, pp. 175-220. Eastern New Mexico University, Portales.

Donaldson, M., and M. Struever
1981 Direct Evidence of the Prehistoric Effective Environment: Flotation Analysis. In *High Altitude Adaptations Along Redondo Creek: The Baca Geothermal Anthropological Project*, edited by Craig Baker and Joseph C. Winter, pp. 41-47. Office of Contract Archeology, University of New Mexico, Albuquerque.

Dozier, E. P.
1970 *The Pueblo Indians of North America.* Holt, Rinehart and Winston, New York.

Driver, Jonathan C.
1990 Bison Assemblages from the Sierra Blanca Region, Southeastern New Mexico. *The Kiva* 55:245-263.

Elmore, F. H.
1944 Ethnobotany of the Navajo. University of New Mexico *Monograph Series* 1, *Bulletin* 392. Albuquerque.

Folk, R. L.
1980 *Petrology of Sedimentary Rocks.* Hemphill, Austin.

Ford, Richard I.
n.d. Ethnobotanical Consequences of the La Mesa Fire, Bandelier National Monument. Appendix B in The La Mesa Fire Study: Investigation of Fire and Fire Suppression Impact on Cultural Resources in Bandelier National Monument, by Diane Traylor, Lyndi Hubbell, Nancy Wood and Barbara Fiedler, pp. 145-150. Ms. on file, National Park Service, Southwest Region, Santa Fe.

1968 *An Ecological Analysis Involving the Population of San Juan Pueblo, New Mexico.* Ph.D. dissertation, University of Michigan. University Microfilms International, Ann Arbor.

1984 Ecological Consequences of Early Agriculture in the Southwest. In *Papers on the Archaeology of Black Mesa, Arizona* III, edited by S. Plog and S. Powell, pp. 127-138. Southern Illinois University, Carbondale.

Ford, Richard I., Albert H. Schroeder, and Stewart L. Peckham
1972 Three Perspectives on Puebloan Prehistory. In *New Perspectives on the Pueblos*, edited by Alfonso Ortiz, pp. 20-39. University of New Mexico, Albuquerque.

Fretwell, Patricia H.
1954 Preliminary Report of Excavation of Fulton Site 190, Pajarito Plateau. Ms. on file, Laboratory of Anthropology, Museum of New Mexico, Santa Fe.

1959 Final Report, Excavation of Fulton Site 190, Pajarito Plateau. Unpublished Ms. on file at the Laboratory of Anthropology, Museum of New Mexico, Santa Fe.

Galinat, W. C., T. R. Reinhart, and T. R. Frisbie
1970 Early Eight-Rowed Maize from the Middle Rio Grande Valley, New Mexico. *Harvard*

University Botanical Museum Leaflets 22:313-331.

Gasche, H., and O. Tunca
1983 Guide to Archaeostratigraphic Classification and Terminology: Definitions and Principles. *Journal of Field Archaeology* 10:325-335.

Gasser, R. E.
1982 Anasazi Diet. In the Specialist's Volume: Biocultural Analyses, compiled by Robert E. Gasser, pp. 8-95. *Coronado Series* 4, *Museum of Northern Arizona Research Paper* 23.

Gasser, R. E., and E. C. Adams
1981 Aspects of Deterioration of Plant Remains in Archaeological Sites: The Walpi Archaeological Project. *Journal of Ethnobiology* 1:182-192.

Grayson, D. K.
1973 On the Methodology of Faunal Analysis. *American Antiquity* 39:432-439.

1978 Minimum Numbers and Sample Size in Vertebrate Faunal Analysis. *American Antiquity* 43:53-65.

Hantman, J. L., K. G. Lightfoot, S. Upham, F. Plog, S. Plog, and B. Donaldson
1984 Cibola Whitewares: A Regional Perspective. In Regional Analysis of Prehistoric Ceramic Variation: Contemporary studies of the Cibola Whitewares, edited by Alan P. Sullivan and Jeffery L. Hantman, pp. 17-35. Arizona State University *Anthropological Research Papers* 31. Tempe.

Hawley, F., M. Pijoan, and C. Elkin
1943 An Inquiry into Food Economy and Body Economy in Zia Pueblo. *American Anthropologist* 45:547-556.

Henderson, J., and J. P. Harrington
1914 Ethnozoology of the Tewa Indians. Bureau of American Ethnology *Bulletin* 56.

Hewett, E. L.
1906 Antiquities of the Jemez Plateau, New Mexico. Bureau of American Ethnology *Bulletin* 32. Washington, D.C.

1953 *Pajarito Plateau and its Ancient People.* University of New Mexico, Albuquerque.

Hill, James N., and W. Nicholas Trierweiler
1986 Prehistoric Responses to Food Stress on the Pajarito Plateau, New Mexico: Technical Report and Results of the Pajarito Archaeological Research Project, 1977-1985, submitted to the National Science Foundation in partial fulfillment of grant BNS-78-08118. University of California, Los Angeles.

Hill, W. W.
1982 *An Ethnography of Santa Clara Pueblo, New Mexico*, edited by Charles H. Lange. University of New Mexico, Albuquerque.

Honea, Kenneth H.
1968 Material Culture: Ceramics. In The Cochiti Dam Archaeological Salvage Project, Part I: Report on the 1963 season, assembled by C. H. Lange, pp. 111-169. Museum of New Mexico *Research Records* 6. Santa Fe.

Hrdlicka, A.
1935 The Pueblos. With comparative data on the bulk the tribes of the Southwest and western Mexico. *American Journal of Physical Anthropology* 20:235-460.

1940a Lower jaw. The gonial angle, i. The bigonial breadth, ii. *American Journal of Physical Anthropology* 27:281-308.

1940b Lower jaw: further studies. *American Journal of Physical Anthropology* 27:383-467.

Hubbell, Lyndi, and Diane Traylor, editors
1982 *Bandelier: Excavations in the Flood Pool of Cochiti Lake, New Mexico.* Interagency Archaeological Services Division, National Park Service, Denver.

Hunter-Anderson, Rosalind
1979 Observations on the Changing Role of Small Structure Sites in the Northern Rio Grande. In *Archeological Investigations in Cochiti Reservoir, New Mexico, Volume 4: Adaptive Change in the Northern Rio Grande Valley*, edited by J. V. Biella and R. C. Chapman, pp. 177-186. Office of Contract Archeology, University of New Mexico, Albuquerque.

Keepax, C.
1977 Contamination of Archaeological Deposits by Seeds of Modern Origin with Particular Reference to the Use of Flotation Machines. *Journal of Archaeological Science* 4:221-229.

Kintigh, Keith W.
1984 Measuring Archaeological Diversity by

Comparison with Simulated Assemblages. *American Antiquity* 49:44-54.

Kohler, Timothy A.
1989a Ceramic Materials. In Bandelier Archaeological Excavation Project: Research Design and Summer 1988 sampling, edited by T. A. Kohler, pp. 61-68. Washington State University Department of Anthropology *Reports of Investigations* 61. Pullman.

1989b Introduction. In Bandelier Archaeological Excavation Project: Research Design and Summer 1988 Sampling, edited by T. A. Kohler, pp. 1-13. Washington State University Department of Anthropology *Reports of Investigations* 61. Pullman.

1989c LA 60372, Burnt Mesa Pueblo. In Bandelier Archaeological Excavation Project: Research Design and Summer 1988 Sampling, edited by T. A. Kohler, pp. 26-36. Washington State University Department of Anthropology *Reports of Investigations* 61. Pullman.

1989d LA 60550. In Bandelier Archaeological Excavation Project: Research Design and Summer 1988 Sampling, edited by T. A. Kohler, pp. 38-48. Washington State University Department of Anthropology *Reports of Investigations* 61. Pullman.

Kohler, Timothy A., editor
1989 Bandelier Archaeological Excavation Project: Research Design and Summer 1988 Sampling. Washington State University Department of Anthropology *Reports of Investigations* 61. Pullman.

Kohler, Timothy A., and Eric Blinman
1987 Solving Mixture Problems in Archaeology: Analysis of ceramic materials for dating and demographic reconstruction. *Journal of Anthropological Archaeology* 6:1-28.

Lange, Charles H., assembler
1968 The Cochiti Dam Archaeological Salvage Project, Part I. Report of the 1963 season. Museum of New Mexico *Research Records* 6. Santa Fe.

Laumbach, Karl W., Toni Sudar-Murphy, Billy J. Naylor, and Shirley A. Rorex
1977 Description of Five Sites in White Rock Canyon: LA 5013, LA 5014, LA 12511, LA 12512, and LA 12522. In *Archeological Investigations in Cochiti Reservoir, New Mexico, Volume 2: Excavations and analysis 1975 season*, edited by R. C. Chapman and J. V. Biella with S. D. Bussey, pp. 29-79. Office of Contract Archeology, University of New Mexico, Albuquerque.

LeBlanc, S. L.
1975 Micro-seriation: A method for fine chronological differentiation. *American Antiquity* 40:22-38.

Lipe, William D., and Michelle Hegmon
1989 Historical and Analytical Perspectives on Architecture and Social Integration in the Prehistoric Pueblos. In The Architecture of Social Integration in Prehistoric Pueblos, edited by W. D. Lipe and M. Hegmon, pp. 15-34. *Occasional Paper* 1, Crow Canyon Archaeological Center, Cortez, Colorado.

Lopinot, N. H., and D. E. Brussell
1982 Assessing Uncarbonized Seeds from Open-Air Sites in Mesic Environments: An Example from Southern Illinois. *Journal of Archaeological Science* 9:95-108.

Matthews, Meredith H.
1985 *Agricultural Intensification and Multiple Cropping Practices: Testing Change in Exploitation of Pioneer Plant Resources.* Unpublished M.A. thesis, Department of Anthropology, University of Colorado, Boulder.

1989 Macrobotanical Analysis. In Bandelier Archaeological Excavation Project: Research Design and Summer 1988 Sampling, edited by T. A. Kohler, pp. 93-113. Washington State University Department of Anthropology *Reports of Investigations* 61. Pullman.

Maxon, J. C.
1969 *A Study of Two Prehistoric Pueblo Sites on the Pajarito Plateau New Mexico.* Unpublished Master's thesis, Department of Anthropology, University of Wisconsin, Madison.

McKenna, Peter J., and Judith Miles
1989 Ceramic manual for the Bandelier Archaeological Survey. Ms. on file, Bandelier National Monument, Los Alamos, New Mexico.

McKenna, Peter J. and Robert P. Powers
1986 Preliminary Report on the 1985 Test Survey of Bandelier National Monument, New Mexico. Ms. on file, Branch of Cultural

Research, National Park Service, Santa Fe.

Minnis, P. E.
1981 Seeds in Archaeological Sites: Sources and Some Interpretive Problems. *American Antiquity* 46:143-152.

Neumann, G. K.
1952 Archaeology and Race in the American Indian. *Yearbook of Physical Anthropology* 8:213-242.

Newman, J. R., and R. G. Nielson
1985 Initial Notes on the X-ray Fluorescence Sourcing of Northern New Mexico Obsidians. *Journal of Field Archaeology* 12:377-383.

Olivier, G., C. Aaron, G. Fully, and G. Tissier
1978 New Estimations of Stature and Cranial Capacity in Modern Man. *Journal of Human Evolution* 7:513-518.

Orcutt, Janet D.
1988 Changes in Settlement Organization on the Pajarito Plateau, New Mexico. Paper presented at the 53rd Annual Meeting of the Society for American Archaeology, Phoenix.

Phagan, Carl J.
n.d. Bandelier Archaeological Survey Lithics Analysis System. Ms. on file, Branch of Cultural Research, National Park Service, Santa Fe.

Phagan, Carl J., and T. R. Hruby
1984 Reductive Technologies Manual: Preliminary Analysis Systems and Procedures. *Dolores Archeological Project Technical Report* 150. Submitted to the U.S. Bureau of Reclamation, Salt Lake City.

Plog, Stephen
1980 *Stylistic Variation in Prehistoric Ceramics: Design Analysis in the American Southwest.* Cambridge University Press, New York.

Plog, Stephen, and Jeffery L. Hantman
1986 Multiple Regression Analysis as a Dating Method in the American Southwest. In *Spatial Organization and Exchange: Archaeological Survey on Northern Black Mesa*, edited by S. Plog, pp. 87-113. Southern Illinois University, Carbondale.

Poore, Anne V.
1981 Survey and Excavations at Pueblo Canyon Cliffs, Los Alamos, New Mexico. *The Artifact* 19(2):29-53.

Powers, Robert P.
1988 Final Archaeological Research Design for a Sample Inventory Survey of Bandelier National Monument. Ms. on file, Branch of Cultural Research, National Park Service, Santa Fe.

Preucel, Robert W.
1987 Settlement Succession on the Pajarito Plateau, New Mexico. *The Kiva* 53(1):3-33.

Redman, Charles L.
1977 The "Analytical Individual" and Prehistoric Style Variability. In *The Individual in Prehistory: Studies of Variability in Style in Prehistoric Technologies*, edited by J. N. Hill and J. Gunn, pp. 41-53. Academic Press, New York.

1978 Multivariate Artifact Analysis: A Basis for Multidimensional Interpretations. In *Social Archaeology: Beyond Subsistence and Dating*, edited by C. L. Redman, et al., pp. 349-372. Academic Press, New York.

Robbins, W. W., J. P. Harrington, and B. Freire-Marreco
1916 Ethnobotany of the Tewa Indians. Bureau of American Ethnology *Bulletin* 55. Washington, D.C.

Rock, James T.
1974 The Use of Social Models in Archaeological Interpretation. *The Kiva* 40(1-2):81-91.

Rohn, A. H.
1965 Postulation of Socio-economic Groups from Archaeological Evidence. In Contributions of the Wetherill Mesa Archaeological Project, assembled by D. Osborne, pp. 65-69. Society for American Archaeology *Memoirs* 19.

Root, Matthew J.
1989 Stone Artifacts. In Bandelier Archaeological Excavation Project: Research Design and Summer 1988 Sampling, edited by T. A. Kohler, pp. 69-84. Washington State University Department of Anthropology *Reports of Investigations* 61. Pullman.

Schiffer, Michael B.
1972 Archaeological Context and Systemic Context. *American Antiquity* 37:156-165.

Schorger, A. W.
1966 *The Wild Turkey: Its History and Domestication.* University of Oklahoma, Norman.

Schutt, J. A.
1979 Post-depositional Edge Damage on Lithic Artifacts: An Experiment in Screening and Laboratory Processing. In *Archeological Investigations in Cochiti Reservoir, New Mexico. Volume 4: Adaptive Change in the Northern Rio Grande Valley*, edited by J. V. Biella and R. C. Chapman, pp. 355-381. Office of Contract Archeology, University of New Mexico, Albuquerque.

Self, S., D. E. Kircher, and J. A. Wolff
1988 The El Cajete Series, Valles Caldera, New Mexico. *Journal of Geophysical Research* 93:6113-6127.

Snow, David H.
1971 The Excavation of Saltbush Pueblo, Bandelier National Monument, New Mexico. Laboratory of Anthropology *Note* 97. Santa Fe.

Soil Survey Staff
1984 *Soil Survey Manual.* U.S. Department of Agriculture, Soil Conservation Service, Washington D.C. (draft).

Sprunt, A.
1961 *Gamebirds: A Guide to North American Species and their Habitats.* Golden Press, New York.

Steen, Charlie R.
1977 *Pajarito Plateau Archaeological Survey and Excavations.* Publication LASL-77-4, Los Alamos National Laboratory, Los Alamos, New Mexico.

1982 *Pajarito Plateau Archaeological Surveys and Excavations* II. Publication LA-8860-NERP, Los Alamos National Laboratory, Los Alamos, New Mexico.

Stein, Julie K.
1989 Deposits for Archaeologists. *Advances in Archaeological Method and Theory* 11:337-395.

Stevenson, M. C.
1915 Ethnobotany of the Zuni Indians. In Bureau of American Ethnology *Annual Report* 30:31-102.

Stubbs, Stanley A., and W. S. Stallings, Jr.
1953 The Excavation of Pindi Pueblo, New Mexico. *Monographs of the School of American Research and the Laboratory of Anthropology* 18. Santa Fe.

Tierney, G. D.
1977 A Vegetative Survey of White Rock Canyon: 5280-5400' (1610-1646 m) Elevations. In *Archeological Investigations in Cochiti Reservoir, New Mexico Volume 1: A Survey of Regional Variability*, edited by J. V. Biella and R. C. Chapman, pp. 39-67. Office of Contract Archeology, University of New Mexico, Albuquerque.

1979 Native Edible Plant Resources Near Cochiti Reservoir, New Mexico. In *Archeological Investigations in Cochiti Reservoir, New Mexico Volume 4: Adaptive Change in the Northern Rio Grande Valley*, edited by J. V. Biella and R. C. Chapman, pp. 21-46. Office of Contract Archeology, University of New Mexico, Albuquerque.

Toll, M. S.
1983 At Last Some Substantive Evidence for Archaic Subsistence in the San Juan Basin, New Mexico. Paper presented at the 6th Annual Ethnobiology Conference, Norman.

1985 An Overview of Chaco Canyon Macrobotanical Materials and Analysis to Date. Castetter Laboratory for Ethnobotanical Studies, *Technical Series* 141. University of New Mexico, Albuquerque.

Train, P., J. R. Henrichs, and W. A. Archer
1957 *Medicinal Uses of Plants by Indian Tribes of Nevada.* Quarterman, Lawrence, MA.

Trierweiler, W. Nicholas
1987 *The Marginal Cost of Production in Subsistence Economies: An Archaeological Test.* Ph.D. dissertation, University of California – Los Angeles. University Microfilms International, Ann Arbor.

1989 Identification and Analysis of Faunal Specimens. In Bandelier Archaeological Excavation Project: Research Design and Summer 1988 Sampling, edited by T.A. Kohler, pp. 85-92. Washington State University Department of Anthropology *Reports of Investigations* 61. Pullman.

Trinkaus, E.
1980 Sexual Differences in Neanderthal Limb Bones. *Journal of Human Evolution* 9:377-397.

United States Department of Agriculture
1956 *Food Yields, Summarized by Different Stages of Preparation.* Government Printing Office, Washington, D.C.

Watt, B. K., and A. L. Merrill
1975 *Handbook of the Nutritional Content of Foods.* Prepared for the United States Department of Agriculture. Dover Publications, New York.

Wendorf, Fred, and Erik K. Reed
1955 An Alternative Reconstruction of Northern Rio Grande Prehistory. *El Palacio* 62:131-173.

Whiting, A. E.
1939 Ethnobotany of the Hopi. Museum of Northern Arizona *Bulletin* 15. Flagstaff.

Worman, Frederick C. V.
1967 *Archaeological Salvage Excavations on the Mesita del Buey, Los Alamos County, New Mexico.* Publication LA-3636, Los Alamos Scientific Laboratory, Los Alamos, New Mexico.

Worman, Frederick C. V., and Charlie R. Steen
1978 *Excavations on Mesita de los Alamos, Los Alamos County, New Mexico.* Publication LA-7043-MS, Los Alamos National Laboratory, Los Alamos, New Mexico.

Yamane, Taro
1967 *Elementary Sampling Theory.* Prentice-Hall, Englewood Cliffs.

Zier, Anne H.
1982 Architecture of Pueblo Sites. In *Bandelier: Excavations in the Flood Pool of Cochiti Lake, New Mexico*, edited by L. Hubbell and D. Traylor, pp. 31-112. Interagency Archeological Services Division, National Park Service, Denver.

Continued from back cover . . .

31 1964 Fryxell, Roald, and Richard D. Daugherty, *Demonstration of Techniques for Preserving Archaeological Stratigraphy: A Report to the Wenner-Gren Foundation.* (Out of Print; $2.40 xerox).

32 1965 Sprague, Roderick, *The Descriptive Archaeology of the Palus Burial Site, Lyons Ferry, Washington.* (Out of Print; $6.50 xerox).

33 1965 Rice, David G., *Archaeological Test Excavation in Fryingpan Rockshelter, Mount Rainier National Park.* (Out of Print; $1.70 xerox).

34 1965 Nelson, Charles M., *Archaeological Reconnaissance in the Lower Monumental and Little Goose Dam Reservoir Areas, 1964.* (Out of Print; $3.20 xerox).

35 1966 Kenaston, Monte Ray, *The Archaeology of the Harder Site, Franklin County, Washington.* (Out of Print; $14.50 xerox).

36 1965 Ackerman, Robert E., *Archaeological Survey: Glacier Bay National Monument, Southeastern Alaska. Part II.* (Out of Print; $8.00 xerox).

37 1966 Sprague, Roderick, and John D. Combes, *Excavations in the Little Goose and Lower Granite Dam Reservoir, 1965.* (Out of Print; $5.40 xerox).

38 1966 Larabee, Edward McM., and Susan Kardas, *Archaeological Survey of Grand Coulee Dam National Recreation Area. Part I: Lincoln County Above Normal Pool.* (Out of Print; $5.80 xerox).

39-I 1966 Nelson, Charles M., *A Preliminary Report on 45C01, A Stratified Open Site in the Southern Columbia Plateau.* (Out of Print; $10.40 xerox).

39-II 1966 Rice, David G., *An Archaeological Reconnaissance of the Wynochee Dam Reservoir, Greys Harbor County, Washington.* (Out of Print; $1.10 xerox).

40 1967 Daugherty, Richard, Barbara A. Purdy, and Roald Fryxell, *The Descriptive Archaeology and Geochronology of the Three Springs Bar Archaeological Site, Washington.* (Out of Print; $12.30 xerox).

41 1967 Walker, Deward E., Jr., *Mutual Cross-Utilization of Economic Resources in the Plateau An Example from Aboriginal Nez Perce Fishing Practices.* (Out of Print; $7.60 xerox).

42 1967 Chance, David H., *Archaeological Survey of Coulee Dam National Recreation Area. Part II: Spring Draw-Down of 1967.* (Out of Print; $8.70 xerox).

43 1967 Sprague, Roderick, *A Preliminary Bibliography of Washington Archaeology.* $2.00.

44 1968 Ackerman, Robert E., *The Archaeology of the Glacier Bay Region, Southeastern Alaska, Part III.* (Out of Print; $13.00 xerox).

45 1968 Rice, David G., *Archaeological Investigations in the Coulee Dam National Recreation Area, Spring 1968.* $2.00.

46 1969 Bernard, Russell, editor. *Los Otomies: Papers from the Ixmiquilpan Field School.* $3.00.

47 1969 Nelson, Charles M., *The Sunset Creek Site (45-KT-28) and Its Place in Plateau Prehistory.* (Out of Print; $43.60 xerox).

48-I 1971 Bernard, H. Russell and Michael Kenny, editors, *The Inland Empire: Papers from the Spokane Area Field School in Cultural Anthropology and Linguistics.* (Out of Print; $16.90 xerox).

48-II 1971 Irwin, H.T., D.J. Hurd, and R.M. LaJeunesse, *Description and Measurement in Anthropology. Computer Series I.* (Out of Print; $1.80 xerox).

49 1971 Leonhardy, Frank C., Gerald Schroedl, Judith Bense, and Seth Beckerman, *Wexpusnime (45-GA-61): Preliminary Report.* $2.00.

50 1972 Rice, David G., *The Windust Phase in Lower Snake River Region Prehistory.* $5.00.

51 1973 Schroedl, Gerald F., *The Archaeological Occurrence of Bison in the Southern Plateau.* $4.00.

52 1974 Croes, Dale, Jonathon Davis, and H.T. Irwin, *The Use of Computer Graphics in Archaoeology: A case Study from the Ozette Site, Washington.* $2.00.

53 1975 Adams, William H., Linda Gaw, and Frank C. Leonhardy, *Archaeological Excavations at Silcott, Washington: The Data Inventory.* $8.00.

54 1977 Adams, William H., *Silcott, Washington: Ethnoarchaeology of a Rural American Community.* $7.00.

55 1978 Bodley, John H., *Preliminary Ethnobotany of the Peruvian Amazon.* $5.00.

56 1979 Bodley, John H., and Foley C. Benson. *Cultural Ecology of Amazonian Palms.* $5.00.

57 1979 Brown, Christopher L., and Carl E. Gustafson, *A Key to Postcranial Skeletal Remains of Cattle/Bison, Elk and Horse* (reprinted 1990) $13.00.

58 1980 Croes, Dale R., and Eric Blinman, editors, *Hoko River: A 2500 Year old Fishing Camp on the Northwest Coast of North America.* (Out of Print; $35.40 xerox).

59 1981 Flenniken, J. Jeffery, *Replicative Systems Analysis: A Model Applied to the Vein Quartz Artifacts from the Hoko River Site.* $8.00.

60 1983 Knudson, Ruthann, *Organizational Variability in Late Paleo-Indian Assemblages.* $12.00.

61 1989 Kohler, Timothy A., editor, *Bandelier Archaeological Excavation Project: Research Design and Summer 1988 Sampling.* $13.25.

Reports of Investigations

1 1957 Stallard, Bruce, *An Archaeological Survey in the Wells Reservoir in the State of Washington.* (Out of Print; $1.50 xerox).

2 1958 Stallard, Bruce, *Preliminary Surveys for Highway Salavage Archaeology in the State of Washington: A Final Report.* (Out of Print; $3.50 xerox).

3 1959 Daugherty, Richard D., *Archaeological Excavations in the Ice Harbor Reservoir, 1959 Progress Report.* (Out of Print; $1.20 xerox).

4 1959 Newman, Thomas Stell, *Toleak Point - An Archaeological Site on the North Central Washington Coast.* (Out of Print; $13.80 xerox).

5 1959 Osborne, Douglas, *Archaeological Tests in the Lower Grand Coulee, Washington.* (Out of Print; $28.90 xerox).

6 1960 Sprague, Roderick, *Archaeology in the Sun Lakes Area of Central Washington.* Appendix by Roald Fryxell. (Out of Print; $5.80 xerox).

7 1961 Clinehens, Stephen S., *Further Archaeological Excavations in the Lower Grand Coulee of Central Washington.* (Out of Print; $7.80 xerox).

9 1961 Fryxell, Roald, *Geologic Field Examination of the Park Lake Housepit Site (45-GR-90), Lower Grand Coulee, Washington.* (Out of Print; $.90 xerox).

10 1961 Daugherty, Richard D., *Excavations in the Ice Harbor Reservoir, 1957-1960: A Preliminary Report.* (Out of Print; $1.90 xerox).

12 1961 Mallory, Oscar L., *An Archaeological Survey of Pacific Gas Transmission Company's Alberta to California Pipeline System: MP 108.0 to MP 722.0.* (Out of Print; $5.70 xerox).

13 1961 Combes, John D., *An Archaeological Survey of Pacific Gas Transmission Company's Alberta to California Pipeline System: MP 108.0 to MP 722.0. Phase II.* (Out of Print; $3.20 xerox).

14 1962 Mallory, Oscar L., *Continued Archaeological Appraisal of the Lower Coulee, Central Washington.* (Out of Print; $9.80 xerox).

15 1962 Ice, Dannie M., *Archaeology of the Lava Butte Site, Deschutes County, Oregon.* (Out of Print; $7.20 xerox).

16 1962 Guinn, Stanley J., *White Rock Village Archaeological Site: A Preliminary Report of Investigations.* (Out of Print; $3.20 xerox).

18–I 1963 Combes, John D., *A Report on the Excavations of a Late Indian Burial Site in the Ice Harbor Reservoir Region, Washington. Section 1.* (Out of Print; $6.10 xerox).

18-II 1962 Fryxell, Roald, *Geologic Examination of the Ford Island Archaeological Site (45-FR-47), Washington. Section II.* (Out of Print; $2.70 xerox).

19 1962 Daugherty, Richard D., *Archaeological Research in the Boundary Dam Reservior Area. Final Report.* (Out of Print; $.60 xerox).

20 1962 Combes, John D., *Excavations at Fort Spokane, Summer of 1962: A Preliminary Report.* (Out of Print; $1.90 xerox).

21 1962 Fryxell, Roald (in cooperation with Richard D. Daugherty), *Interim Report: Archaeological Salvage in the Lower Monumental Reservoir, Washington.* (Out of Print; $3.90 xerox).

22 1963 Guinn, Stanley J., *A Maritime Village on the Olympic Pennisula of Washington.* (Out of Print; $7.80 xerox).

23 1963 Fryxell, Roald (in cooperation with Richard D. Daugherty), *Late Glacial and Post Glacial Geological and Archaeological Chronology of the Columbia Plateau, Washington: An Interim Report to the National Science Foundation, 1962-1963.* (Out of Print; $2.70 xerox).

24 1963 Steen, Virgina, *A Study of the Chemical and Physical Characteristics of Pumice from Glacier Peak, Washington and Mt. Mazama (Crater Lake), Oregon: Report of Progress, June 16 to September 7, 1963.* (Out of Print; $.90 xerox).

25 1964 Barnes, Paul L., *Archaeology of the Dean Site: Twin Falls County, Idaho.* (Out of Print; $9.70 xerox).

26 1964 Ackerman, Robert E., *Prehistory in the Kuskokwim-Bristol Bay Region, Southwestern Alaska.* (Out of Print; $5.20 xerox).

27 1964 Fryxell, Roald, and Earl F. Cook, editors, *A Field Guide to the Loess Deposits and Channeled Scablands of the Palouse Area, Eastern Washington.* (Out of Print; $3.60 xerox).

28 1964 Ackerman, Robert E., *Archaeological Survey, Glacier Bay National Monument, Southeastern Alaska, Part 1.* (Out of Print; $3.70 xerox).

29 1964 Combes, John D., *Excavations at Spokane House-Fort Spokane Historic Site, 1962-1963.* (Out of Print; $10.30 xerox).

30 1964 Combes, John D., *A Preliminary Investigation at Old Military Fort Spokane, Washington.* (Out of Print; $6.60 xerox).

Continued inside back cover . . .