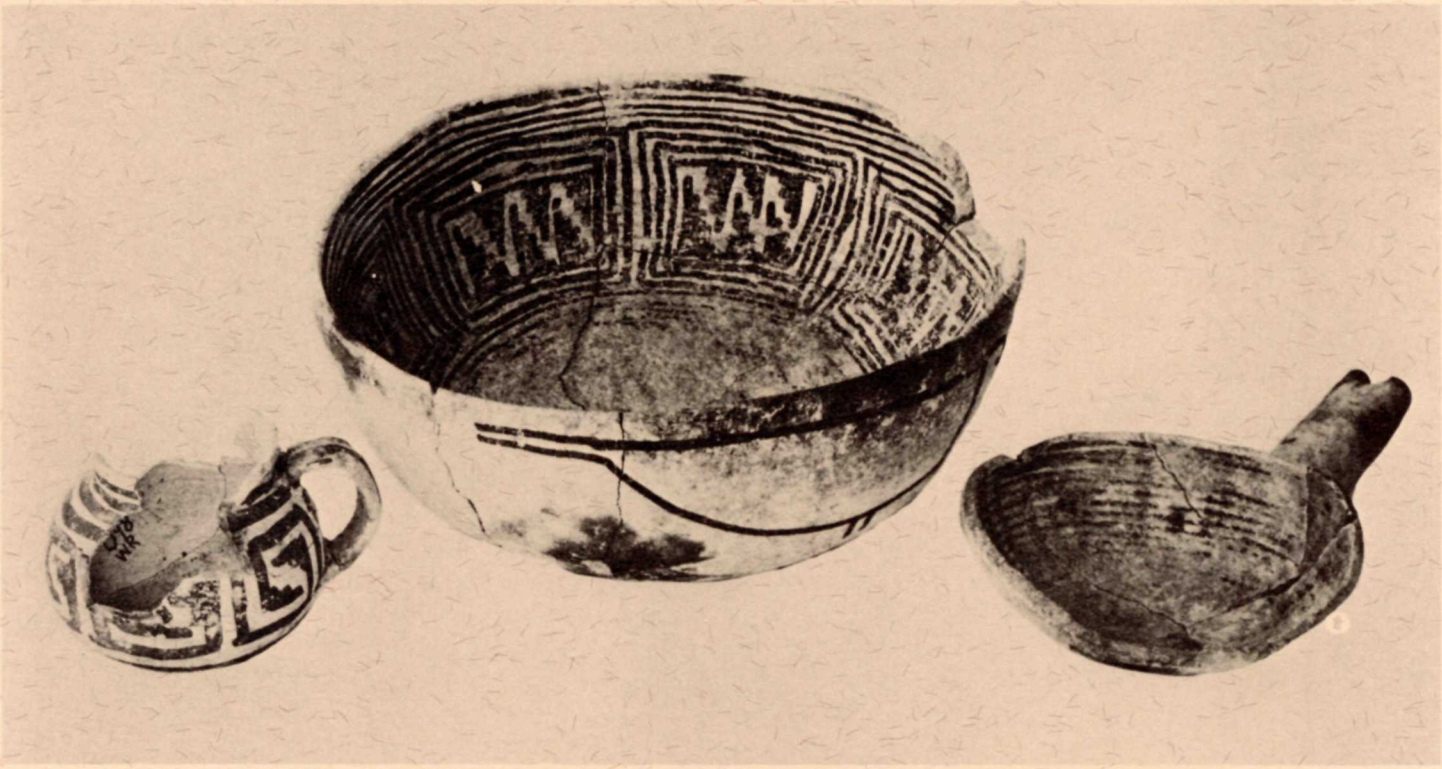
SOUTHWEST REGIONAL OFFICE

DIVISION OF ANTHROPOLOGY

WIDE REED RUIN

HUBBELL TRADING POST NATIONAL HISTORIC SITE

JAMES E. MOUNT
STANLEY J. OLSEN
JOHN W. OLSEN
GEORGE A. TEAGUE
B. DEAN TREADWELL



With Contributions By

DAVID M. BRUGGE *and* JAMES SCHOENWETTER

Southwest Cultural Resources Center

Professional Papers No. 51

Division of Anthropology
Southwest Cultural Resources Center
Southwest Region
National Park Service
Department of the Interior

As the nations principal conservation agency, the Department of the Interior has basic responsibilities to protect and conserve our land and water, energy and minerals, fish and wildlife, parks and recreation areas, and to ensure the wise use of all these resources. The Department also has major responsibility for American Indian reservation communities and for the people who live in island territories under U. S. administration.

WIDE REED RUIN

HUBBELL TRADING POST NATIONAL HISTORIC SITE

JAMES E. MOUNT
STANLEY J. OLSEN
JOHN W. OLSEN
GEORGE A. TEAGUE
B. DEAN TREADWELL

With Contributions By

David M. Brugge and James Schoenwetter

1993

SOUTHWEST CULTURAL RESOURCES CENTER
PROFESSIONAL PAPERS NO. 51

TABLE OF CONTENTS

LIST OF FIGURES . . . . . *vii*

LIST OF TABLES . . . . . *xi*

FOREWORD . . . . . *xiii*

1 INTRODUCTION *James E. Mount* 1
- GOALS AND PROCEDURES 1
- PROTECTION OF THE SITE 5
- VANDALISM 5
- FIELDWORK 6
- ANALYSIS 11

2 PREVIOUS WORK IN THE AREA *James E. Mount* 13

3 ARCHITECTURE *James E. Mount* 15
- ROOM AND AREA DESCRIPTIONS 20

4 CERAMICS *James E. Mount* 41
- DECORATED TYPES 41
- UTILITY WARES 51

5 TREE-RING DATES *James E. Mount* 61

6 POLLEN STUDIES *James E. Mount* 65

7 THE VERTEBRATE FAUNAL ANALYSIS OF WIDE REED RUIN
Stanley J. Olsen and John W. Olsen 69
- COMMENTS ON THE FAUNA AT WIDE REED
B. Dean Treadwell and James E. Mount 76

8 GROUND STONE *James E. Mount* 85
- MANOS 85
- METATES 90
- AXES 91
- HAMMERS 92
- MORTAR 93
- PESTLE 93
- OTHER GROUND STONE 94
- CONCLUSIONS 95

9 FLAKED STONE *George A. Teague* 97
INTRODUCTION 97
RATIONALE 97
TERMINOLOGY AND CLASSIFICATION 97
DESCRIPTION 98
INTRA-SITE DISTRIBUTIONS 103
EXPLANATION OF INTRA-SITE DISTRIBUTIONS 104
SUMMARY AND INTERPRETATION 105

10 SUMMARY AND CONCLUSIONS *James E. Mount* 107
INTRODUCTION 107
CULTURAL AFFILIATIONS 107
SITE FUNCTION 109
FUNCTIONAL AREAS WITHIN THE SITE 111
SOCIAL DIVISIONS 112
CONCLUSIONS 112

REFERENCES CITED 115

APPENDICES 119

APPENDIX I - TRADITIONAL HISTORY OF WIDE REEDS
David M. Brugge 121

APPENDIX II - POLLEN STUDIES AT WIDE REED RUIN
James Schoenwetter 125
COMMENTS ON THE POLLEN STUDY
James E. Mount 131

LIST OF FIGURES

FIGURE

1 Map Showing the Location of Wide Reed Ruin in Ganado, Arizona 2

2 Plan Map of Wide Reed Ruin Showing Areas of Excavation 3

3 River Bank Cut at Northwest Corner of Wide Reed Ruin 6

4 Northwest Corner of Site After Excavation Showing the Most Threatened Portion of the Site 7

5 View West and Downstream Along the Northwest Portion of the Site From the Area of Room 10 Before Excavation 7

6 View East Showing Screened Backdirt Being Deposited at the Base of the Bank Below the Northwest Corner of the Site 8

7 View of West Side of Ruin Showing Heavy Use by Men and Animals 8

8 Backfill Reinforcement Completed in Northwest Corner of Site 9

9 Clean Sand Reinforcement Over Backfill 9

10 West Plaza Showing Vandalized Floor Features 10

11 Room 14 Showing Vandalized Floor Features 11

12 Cross Section of Outer Wall of Room 4 16

13 View of South Interior Wall of Room 4 17

14 Masonry Detail of a Partition Wall, West Interior Wall of Room 4 17

15 Plan View of Floor Surfaces and Features, Floors I-III, West Plaza 18

16 Northwest Section of Site, West Plaza in Center, Storerooms in Background and Work and Habitation Rooms in Left Foreground 19

17 View West of Room 1 21

18 View Northwest of Room 2 21

19 View West of Room 3 22

20 View Northwest of Room 4 23

21 View Southwest of Room 5 24

22 View South of Room 7 25

23 View Southeast of Room 8 26

24 View Southeast of Room 9 27

25 View Southeast of Room 10 28

26 View South of Room 13 30

27 View South of Room 15 32

28 View North of Rooms 16 and 17 32

29 View Northwest of Rooms 18 (background) and 19 (foreground) 33

30 View Northeast With Room 10 (foreground), Floor II of East Plaza (center) and Rooms 18 and 19 (background) 34

31 West Plaza Excavated to Floor III. Floor II Level at Pedestalled Ground Stone. Subfloor Test to Middle Left. 35

32 South Half of Kiva Showing (left to right) Masonry Ventilator Shaft, Upright Deflector and Filled Hearth 37

33 View Southeast of Kiva Interior Toward Deflector and Ventilator Shaft. Note Darker Clay Lens in Lower Portion of Walls 38

34 North Edge of Site From West Plaza (foreground) Toward Room 17 (background) 38

35 Klageto Black-on-White Pitcher, Bowl and Dipper From Fill Above Floor II in West Plaza 42

36 Black-on-White Decorated Sherds 47

37 Typical Example of Sherd Designated Mesa Verde "Crude" Black-on-White 48

38 McElmo/Mesa Verde Black-on-White Bowl From Floor I of East Plaza 49

39 Bowl From East Plaza Exhibiting Characteristics of Mesa Verde Black-on-White Except Design Style 50

40 Sherds Identified as Sosi Black-on-White With Smudged Interiors 50

41 Examples of St. Johns Black-on-Red 51

42 Portions of Reconstructed Vessels of St. Johns Polychrome Bowls From Sherds Scattered Throughout the Site 52

43 Plate Made From the Bottom of a St. Johns Black-on-Red or Polychrome Bowl From Fill Above Floor III in West Plaza 53

44 Small Corrugated Jar From Beneath Room 1 Floor 54

45 View North Across Floor II of West Plaza Showing Corrugated Jars In Situ 55

46 Restored Corrugated Vessel From Floor II of West Plaza Just Outside of Room 4 56

47 Corrugated Sherd From Kiva Floor Showing Surface Treatment 57

48 Range of Variation in Utility Ware Sherds 57

49 Distribution of Decorated and Undecorated Ceramics by Architectural Provenience 58

50 View Southwest of Charred Roof Beams on Floor II of West Plaza 61

51 Selected Bone Artifacts 77

52 Pendants From Wide Reed Ruin 78

53 Unclassified Bone Artifact From Wide Reed Ruin 84

54 Grinding Facet Patterns on Manos 85

55 Cluster of Ground Stone Artifacts on Floor III of West Plaza Below Door to Room 3 90

56 Axes and Hammers From Wide Reed Ruin 92

57 Mortar From Floor I in West Plaza 93

58 Problematical Ground Stone Object From Room 9 94

Appendix II

1 Pollen Identifications and Frequencies at Wide Reed Ruin 128

LIST OF TABLES

TABLE

1 Ceramic Distribution by Individual Spatial Units 43

2 Tree-Ring Dates From Wide Reed Ruin 62

3 Wide Reed Pollen Distributions by Architectural Features 66

4 Vertebrate Faunal Remains by Species 70

5 Vertebrate Faunal Remains by Element and Species 71

6 Faunal Taxon Distribution by Provenience 79

7 Worked Bone From Wide Reed Ruin 80

8 Distribution of Ground Stone Artifacts by Provenience 86

9 Flaked Stone Tools by Class 101

10 Distribution of Stone Debitage Foci 104

11 Inferred Functional Classes 104

Appendix II

1 Observed Pollen From Wide Reed Ruin 127

2 Calculation of Adjusted Arboreal Pollen Frequency 130

FOREWORD

The natural threats to Wide Reed Ruin were obvious in 1972 when Jim Mount excavated the north portion of the site. Since that time, erosion control efforts have kept the site from further destruction. However, the placement of gabions within the wash on the north slope of Wide Reed Ruin redirected Pueblo Colorado Wash water downstream into the Sand Dune Site; the effect being accelerated erosion of that site in the intervening years--a reminder to us about cause and effect in attempting to alter nature. Because of the massive erosion at the Sand Dune Site, archeological testing in 1981 and 1985 was conducted, and complete excavation in 1987 has confirmed Brugge's statement on the Sand Dune Site as the location of an early Navajo occupation (see Brugge's discussion of Site 4 in Appendix I of this report).

Wide Reed Ruin still survives much as it did in 1972, but Mount's work, along with his colleagues contributions, was known only to those few aware of the manuscript dwelling in government file cabinets for over two decades. The information compiled has been quite useful to me in my archeological work at the Sand Dune Site and around the trading post and I hoped through the years to bring the manuscript to its final form. When I finally met Mr. Mount in the mid-1980s, I told him of my desire to someday make his manuscript available to a larger audience. He expressed his appreciation but, understandably, declined to invest more of his time in the matter.

I took it upon myself to get the manuscript to press, and, with apologies to Mr. Mount and his co-authors, took a few liberties as I went. I attempted to keep the report in much of its original form, with the following exceptions: 1) Mount's Appendix II (ROOM AND AREA DESCRIPTIONS) is incorporated into Chapter 3, while his Appendices III and IV (PROTECTION OF THE SITE and VANDALISM) are included in Chapter 1; 2) all line drawings are redrafted for better reproduction since I did not have access to the originals; 3) all tables are reformatted for consistency through the report; 4) past tense usage is changed to present tense where appropriate; 5) at the cost of some quality, all photographs are duplicated from those in the original manuscript since I did not have access to the original negatives; and 6) other minor editing was done to bring the text nearer to current style guidelines. The intent is to bring the report to a finished product for wider distribution and not to change any ideas or wording of the authors.

Although several other investigations have been completed in the Ganado area since Mount's work (some of which are mentioned in this volume), I believe this report contains pertinent information on an area and time period still little understood in the archeological profession today. Many questions remain about the polygonal-shaped pueblos of the region and the ceramic artifacts associated with them, particularly Klageto Black-on-White. Mount and his colleagues provide some useful insight into such questions and a point of departure for other investigators.

I would like to extend my appreciation to several people who made this production possible, including: Jim Mount and his colleagues for the initial work; Ronnie Hill at the Western Archeological and Conservation Center in Tucson for locating the original manuscript for loan (where all project artifacts and documentation are curated); Larry V. Nordby, Chief of the Division of Anthropology in Santa Fe for providing the funding and staff time to rework the manuscript; Jerry Livingston, Scientific Illustrator (Division of Anthropology) for the photographic reproductions; and especially Rose Ortiz and Patricia Turley (Division of Anthropology) for their extra effort in typing the manuscript and tables in time to meet the deadline.

JAMES E. BRADFORD
NATIONAL PARK SERVICE
SANTA FE
1993

CHAPTER 1

INTRODUCTION

James E. Mount

The decision to excavate at Wide Reed Ruin (Figure 1) was made by National Park Service authorities, including Superintendent Kevin McKibbin and Curator David Brugge of Hubbell Trading Post National Historic Site and officials from the Navajo Lands Group. Local tradition has it that part of the site had "long ago" been claimed by the Pueblo Colorado Wash. In 1972 it was plain that the northern portion was in imminent danger from further erosion. The northwest corner, for instance, was perched atop a 6 m vertical cut, which had been carved by Pueblo Colorado Wash.

GOALS AND PROCEDURES

Funds were allocated for excavation of the endangered area. It was decided in the field that excavation would be taken back away from the wash to a point where the bank would rest at a natural angle of repose. On the site map (Figure 2) this area is above, or north of, the solid black line. As fieldwork progressed, it was decided that most of the site could be preserved; therefore, the remainder of the site was not excavated since it was not in any apparent danger, and there were no other practical reasons for digging there. Our initial goals were to excavate and protect those parts of the site that were endangered by the wash.

Secondly, we were to thoroughly describe the cultural remains recovered in the course of this work. We also had to keep in mind that the main thing to be guarded against in emergency site salvage operations, such as ours at Wide Reed Ruin, is the collection of a mass of inert facts. Living people built the pueblo and it is our duty as archeologists and anthropologists to investigate, as thoroughly as possible, the life-ways of these thirteenth-century villagers. The restrictions placed on our area of excavation were very real, but it was felt that a valid research orientation could be devised and that significant archeological problem-solving could be carried out during the course of the project.

Initial concern centered on the standard archeological problems of culture-type and chronology; i.e., who built the site and when? We also wanted to determine the manner in which the builders of Wide Reed Ruin exploited the resources of the Ganado area for subsistence. Our research is, at least, a small contribution to the ecological history of the valley. It became apparent during excavation that the site was planned and built as a unit, and we were prompted to explain this phenomenon. Hypotheses came thick and fast and included the possibility of the migration of a social unit and the suggestion that Wide Reed was an early trade, agricultural or craft center; or a combination of all of these. Some theories died faster than others, but most were tested, at least tentatively, against the data.

Defining functional activity areas within the site was a central concern. Structures and areas in the site could be classified according to size, placement and associated features, such as mealing bins and hearths. Hypotheses were made about the use of structures in each category and tested against data on artifact assemblages and pollen profiles. We assumed there was purposeful behavior involved in the building and use of these areas, and hoped to elucidate the intent of the original occupants as much as possible. One interesting result of our studies was that we detected variation in the rigidity of prescribed use between categories over time. Activities in the kiva and West Plaza, for instance, did not change while other areas of the pueblo reflected much modification and change

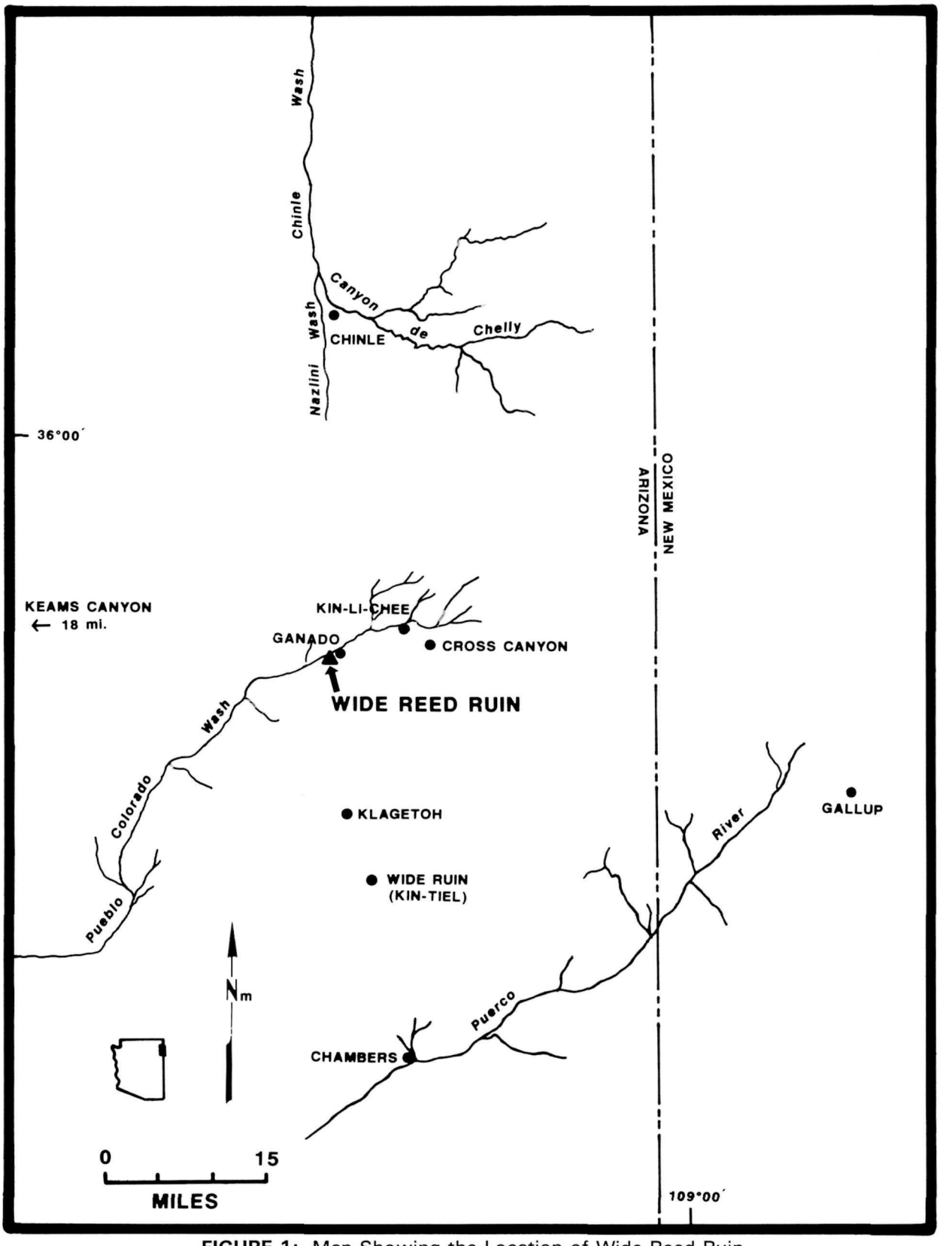


FIGURE 1: Map Showing the Location of Wide Reed Ruin in Ganado, Arizona.

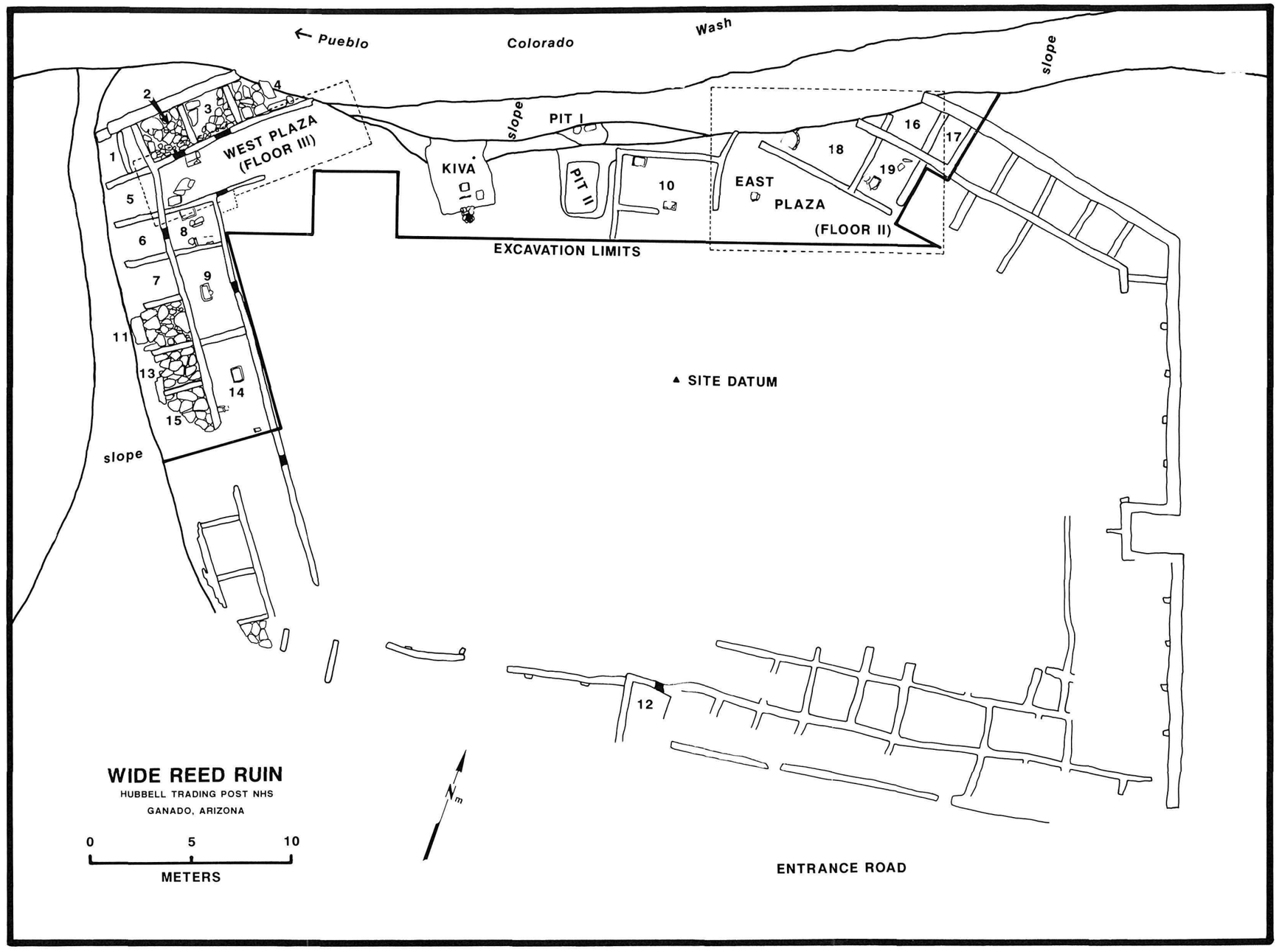


FIGURE 2: Plan Map of Wide Reed Ruin Showing Areas of Excavation.

in function. Since the site appears to have been occupied for a relatively short period of time, its plan presents an interesting baseline for comparative studies in function within a cooperating unit.

Attempts were made to discern at least a faint glimmer of extant social units. We started with the spatial distribution of architectural categories and then looked for variation in the stylistic treatment of artifacts, utility ware ceramics in particular.

The relative success and failure of these ventures is described in the appropriate sections and in the summary, along with suggestions for long-range goals of future study in the area.

PROTECTION OF THE SITE

Several nonscientific, but very necessary, tasks were performed at Wide Reed Ruin, in addition to standard excavation procedures. The motive for excavation was the retrieval of valuable archeological information being threatened by the Pueblo Colorado Wash.

It was felt that excavation should be carried out in the three main, continuous parts of the site being threatened and that as much of the site as possible was to be preserved. At first, it was thought that rooms 1-5 and part of the West Plaza were beyond saving from destruction. Figure 3 shows the condition of the river bank that supported these structures and illustrates why this was considered the most threatened part of the site. Figure 4 shows what would have been lost if preventive measures had not been taken.

Figure 5 shows the next most endangered area; the area of Room 10 (foreground) to Room 4. Most of the damage had already been done in this area. Trees at the bottom of the slope served to stabilize the situation. Figure 6 shows the same area, from the opposite direction, after excavation.

The western side of the site (Figure 7) had suffered some erosion and much human, sheep and goat traffic, in addition to an occasional bovine. The main route had been through the south portion of Room 14.

These, then, were our problem areas. In the course of excavation, screened backdirt was dumped and packed at the base of the northwest vertical bank. Sandstone blocks from wall rubble were used as a base and covering for the new slope (see Figure 6). Figure 8 shows this phase of protection completed.

When excavation was completed, and backdirt sources exhausted, clean sand was brought in to fill the excavated site and to complete the slope facing the river (Figure 9). Black polyethylene plastic was placed at the limits of all excavation to serve as protection and to serve as a guide in the event of future excavations. Figure 4 shows the condition of the site on June 23, 1972; the last day of our work at Wide Reed Ruin. Because further, planned, preventive measures were not taken, our sand and rock reinforcement was washed away by heavy rains during the winter of 1972-73.

VANDALISM

Sometime over the weekend of June 10 and 11, 1972, an unknown person or persons entered Wide Reed Ruin and did extensive damage to floor features in the northwest portion of the site. Figures 10 and 11 illustrate damage in the West Plaza and Room 14, respectively. Good relations with

Anglo and Navajo leaders in the area, even the most anti-government and anti-Anglo, were maintained at all times. No motive or explanation was ascertained.

FIGURE 3: River Bank Cut at Northwest Corner of Wide Reed Ruin.

FIELDWORK

Wide Reed Ruin is located 0.2 mi east of Hubbell Trading Post in Ganado, Arizona, between the trading post access road and Pueblo Colorado Wash (see Figure 1). Excavation, backfill and general site protection activities were carried out in the months of May and June 1972 under the field direction of James E. Mount, and the general supervision of Don P. Morris. Chauncey Marie Neboyia of Chinle, Arizona filled the role of crew foreman while on loan from the Antelope House Project (Canyon de Chelly). Crew members for the Wide Reed Ruin project were Kee Bahe Jake, Paul Begay, Raymond Kinlicheene, Ernest Shorty, Francis Tsosi and Fred Tsosi. Special field assistant to the archeologist was Ann McKibbin of Ganado, who helped in all phases of the operation. Cecelia Anderson, also of Ganado, was a valuable volunteer who excavated a number of features in the work areas.

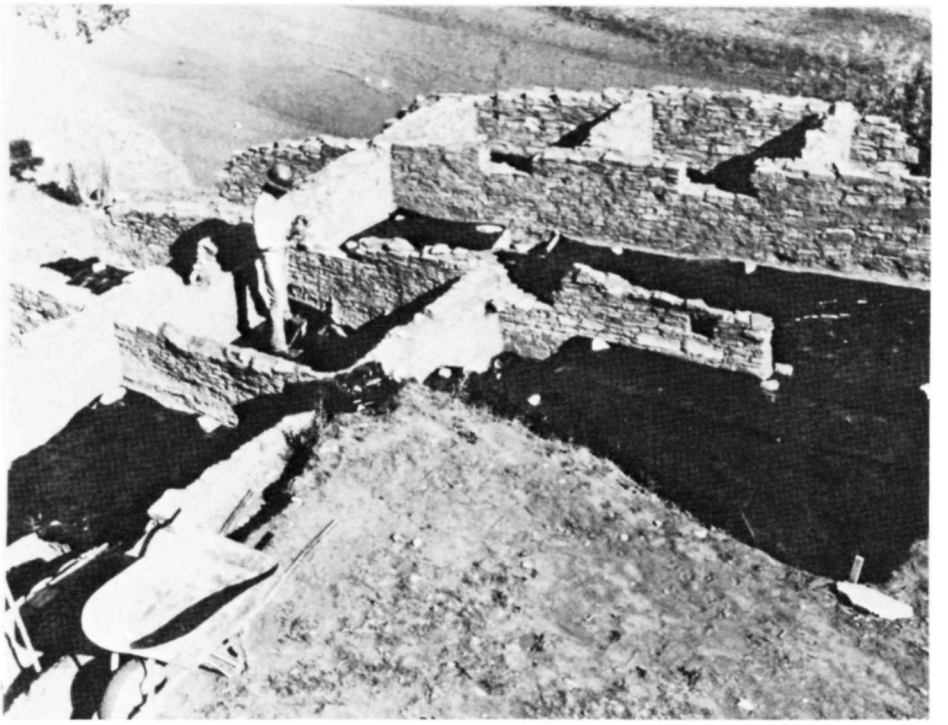


FIGURE 4: Northwest Corner of Site After Excavation Showing the Most Threatened Portion of the Site.

FIGURE 5: View West and Downstream Along the Northwest Portion of the Site From the Area of Room 10 Before Excavation.

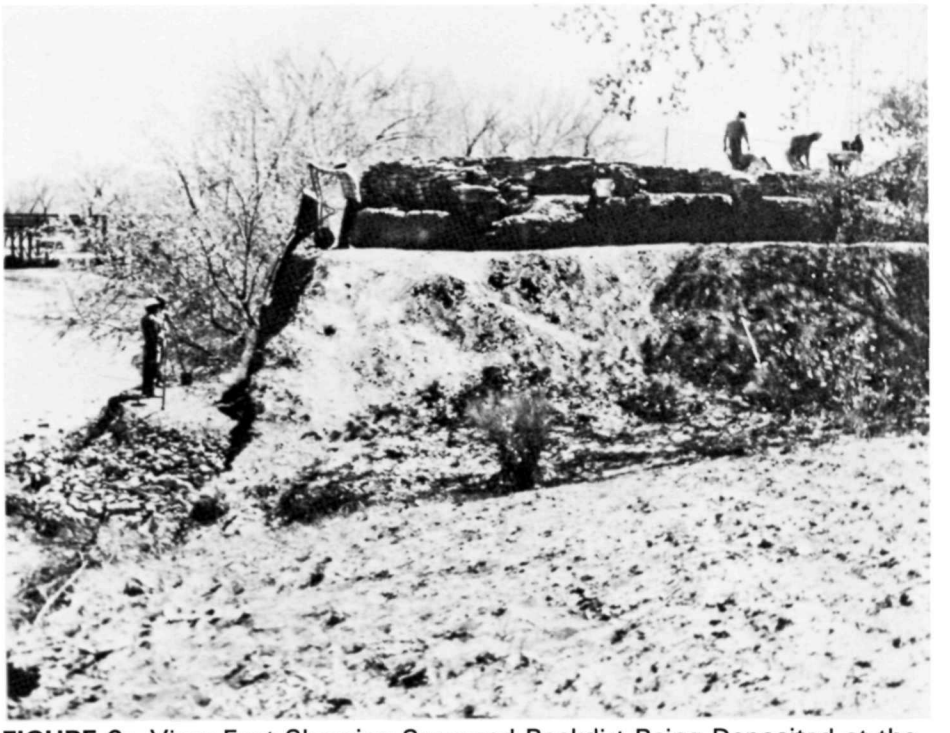


FIGURE 6: View East Showing Screened Backdirt Being Deposited at the Base of the Bank Below the Northwest Corner of the Site.

FIGURE 7: View of West Side of Ruin Showing Heavy Use by Men and Animals.

FIGURE 8: Backfill Reinforcement Completed in Northwest Corner of Site.

FIGURE 9: Clean Sand Reinforcement Over Backfill.

FIGURE 10: West Plaza Showing Vandalized Floor Features.

Nineteen rooms were excavated, along with two pit structures, a kiva and three plaza work areas. Wall outlines of 49 additional rooms in the southern and eastern parts of the site were uncovered and mapped. Twenty or more rooms are suspected to be present but as yet are undetected.

The entire site was capped by a 10-20 cm layer of blown sand and vegetation that covered tops of walls and obscured wall outlines. Our first job was to strip off this top level and to face-up the north profile, which had been created by river erosion. After these two things were done, a very good plan and profile view of the area to be excavated was obtained. The north profile disclosed only one major occupation level, which was covered by blown sand and the debris of its own architecture. The entire site rested on a thick clay lens that had only been disturbed in three places: the kiva and the two pits. For a detailed description of individual strata refer to Chapter 3. Where strata could be easily discerned, they were excavated by natural levels. Where there was doubt about a stratum, or one appeared extremely thick, digging was done in arbitrary 10 or 20 cm levels. Where the relationships of activity, use or floor levels were in doubt, as in the West Plaza, small trenches were sunk deep enough to clarify the situation.

All fill was sifted through ¼-inch mesh screen. Sifted soil was periodically checked for overlooked material. Since none was found, we are reasonably confident that recovery was complete.

During excavation architectural features, such as rooms, plazas, etc., were used as the largest, in-site provenience units. Smaller rooms, such as those around the outer perimeter, were dug down to floor level one half of the room at a time. Larger areas, such as the large rooms, kiva and plazas, were divided into one- meter-squares and excavation, along with provenience control, was carried out accordingly.

FIGURE 11: Room 14 Showing Vandalized Floor Features.

Even though control during excavation necessitated minute provenience breakdown and recordation, many units are "lumped" for report purposes. Wall, rubble and blown sand fill, for instance, were combined, after analysis, under the label of "Room Fill" when no significant difference in artifact class or type was found. In many instances the position of an artifact in the fill or on a surface was recorded in the field, but it is not included in the report. If such information is needed, it can be retrieved by interested parties.

ANALYSIS

Analysis was carried on from September 1972 to April 1973 at the National Park Service, Arizona Archeological Center in Tucson, Arizona.

Ceramic analysis was done by the author with Barrie Thornton assisting in all phases. Don P. Morris, Albert E. Ward, Keith Anderson and George J. Cattanach were consulted (bothered) on a regular basis in regard to pottery identification. The comparative pottery collections of the Arizona Archeological Center and the Arizona State Museum were referred to frequently. James T. Rock made the Grasshopper Field School collection available and offered many helpful comments. Alexander J.

Lindsay allowed us the use of collections at the Museum of Northern Arizona. Chuck and Kathy James and Pamela Haas of the Museum of Northern Arizona assisted in tracking down several ceramic types.

William J. Robinson of the University of Arizona Laboratory of Tree-Ring Research delivered valuable tree-ring dates. Analysis was done by Richard T. Warren and checked by Jeffrey S. Dean.

James Schoenwetter, Department of Anthropology, Arizona State University carried out the pollen studies (contract PO - PX810030028). His report is presented in Appendix II with author's comments following. Annita Harlan, Antelope House Project, Arizona Archeological Center, worked with our poorly preserved vegetal remains and offered valuable comments.

The analysis of animal bone material from Wide Reed Ruin progressed in two stages. Stanley J. Olsen and John W. Olsen, then at Florida State University and now at the University of Arizona, identified each specimen and tabulated their findings. Their report comprises the first part of Chapter 7. B. Dean Treadwell, Arizona Archeological Center, describes the bone artifacts and, along with the senior author, attempts to correlate these data with other intra-site data and provide insights on species present and their distribution in the general area and within the site.

Glenn Miller of the Arizona State Museum volunteered his geological expertise.

Anne, Karen and Blacky McKibbin, Douglas Brugge and Susan Mount assisted in field mapping while Scott Clemmans drafted the final copy.

Many people, both Navajo and Anglo, have passed by way of Wide Reed Ruin over the years and offered their own ideas concerning the site and its builders. It was felt that our report would be lacking if the traditional history of the site was not included. David M. Brugge took on the chore of compiling this information, included as Appendix I. His extra hours of effort are very much appreciated.

The entire staff at Hubbell Trading Post National Historic Site provided friendship, refreshment and inspiration.

CHAPTER 2

PREVIOUS WORK IN THE AREA

James E. Mount

One Saturday in May of 1972, David Brugge took me on an informal reconnaissance of the area west of Hubbell Trading Post along what is known as Rodeo Ground Road. In a matter of hours we located at least six distinct sites in the valley and on the buttes to the west.

The Ganado area has been known to have contained a dense prehistoric occupation since the days of initial European penetration. When Hubbell's became a popular stopping place for travelers it became even more well known. Casual observation of sites are too numerous to mention but include comments by those such as Fewkes (1904) and Mindeleff (1891).

Over time, sites in the area became popular sources of souvenir artifacts and building materials. One indication of the site density of the area is reflected in the fact that few, if any, building sites for roads, schools, power lines or sewer lagoons have been selected that have not contained extensive archeological material. In 1961, Thomas Lee, a graduate student at the University of Arizona, listed 799 archeological sites along drainages in the general area between Chinle, Houck, Ganado and Tohatchi (Lee 1966). Two years earlier David De Harport of Harvard University submitted a doctoral dissertation that inventories and describes 369 sites in Canyon de Chelly (De Harport 1959).

On the local level, large sites such as Klageto and Kin-Tiel (Wide Ruin) have been known for years but never thoroughly investigated. Emergency site salvage work has been done by the Navajo Tribe, the National Park Service and the Museum of Northern Arizona (Olson 1971). The Arizona State University maintained summer field schools north of Ganado for several years (Ruppé 1962). The Museum of Northern Arizona is currently doing sewer lagoon and highway salvage work in the immediate area. Excavations in the past have, of necessity, been restricted by the immediate requirements of salvage projects. Site selection and the long-range scope of programs have rarely been the product of the researcher's own interests or expertise. Consequently, overall problem oriented research goals have yet to be developed for the area as a whole. Despite this it was possible to do some inter-site comparison in an attempt to place Wide Reed Ruin in its prehistoric context. For this purpose Lee's (1966) thesis is useful; Olson's (1971) report on the Cross Canyon Group provides many interesting contrasts in time, architecture and artifact types; and Hargrave's work at Wide Ruin (Haury and Hargrave 1931) provides some very interesting similarities in tree-ring dates and architectural features, even though excavation there was quite limited.

Work currently under way by the Museum of Northern Arizona should greatly increase our knowledge of the manner in which prehistoric groups used the resources in the Wide Reed Ruin area, and how this site fits into the larger community of sites.

CHAPTER 3

ARCHITECTURE

James E. Mount

Wide Reed Ruin forms an irregular pentagon with a missing north corner. It measures roughly 50 m east-west and 30 m north-south. By tracing the direction of the outside walls on the east and west to a point where they would meet on the north, it is estimated that the wash has moved a good 10 m into the pueblo. The original north-south dimension, then, was at least 40 m.

The continuous outer and inner walls, the wall abutment pattern of the partitions and the tight cluster of tree-ring dates (at A.D. 1276) indicate the pueblo was planned and built as a unit. It was constructed on sandy, valley-bottom alluvium averaging 1.5 m thick at the site and covering a thick, extensive clay lens. The site's original distance from the wash is unknown, but the wash could not have been more than 400-500 m to the north since the valley is bounded by the higher plateau at that point. Sandstone blocks used in construction are not available at the site and had to be hauled from 200 m to the south.

Piñon and juniper were, and are, available in the immediate vicinity. The great majority of carbonized dendrochronological material recovered from the site is piñon.

The pattern of wall abutment and jointing, especially in the northwest section of the site, in the area of rooms 1, 2, 5 and the West Plaza, indicate the continuous outer wall was built first and dictated the layout for the rest of the site (see Figure 2). The two continuous inner walls were then constructed with room partitions added last.

The outside wall averages 55 cm in thickness and is made of large, roughly coursed, interlocking sandstone blocks. The practice of occasionally setting foundation stones on edge is shown in Figure 12. This trait occurs in all but the partition walls.

Figure 13 shows a side view of masonry typical of the inner and outer continuous walls. Note the irregular size and shape of the stones, the sparse use of mortar, the medium-smooth surface and the occasional use of chinking.

Inner continuous walls average 30-33 cm in thickness. The contrast between the masonry style of the continuous walls and the partition walls is apparent when Figures 13 and 14 are compared.

Partition walls average 20-25 cm in thickness. Generally, they are made with smaller stones, more mortar than the outer walls and were less skillfully executed. In many places there is a 1-2 cm gap between a partition and outer wall, which was originally filled with mortar.

Wide Reed Ruin contains six main types of architectural features, including store rooms, habitation and work rooms, the main plaza, small plazas, pits (which were probably clay sources) and a kiva.

STORE ROOMS: Rooms 1, 2, 3, 4, 5, 6, 7, 11, 13, 15, 16 and 17. These are roughly 2 m^2 and form a continuous outer ring of rooms. Floor paving with sandstone slabs appears to be in three-room clusters and alternately with three or four unpaved rooms. Where doors are found, they face the interior of the pueblo and open onto another room or a plaza area. Door sills are about 65 cm above floor surface and about 60 cm wide. Height could not be determined.

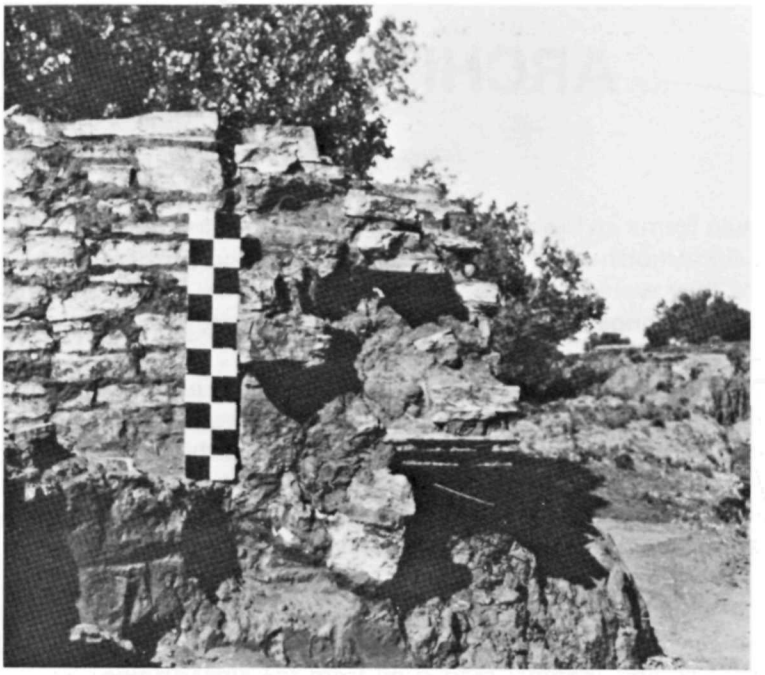


FIGURE 12: Cross Section of Outer Wall of Room 4.

Faint traces of wall plaster were found in some of these rooms, and it is likely that all room interiors were coated with clay mud. Size, presence of floor paving and lack of hearths and other features or artifacts were the criteria used in designating storage rooms.

HABITATION AND WORK ROOMS: Rooms 8, 9, 10, 14, 18 and 19. Dimensions for these range from roughly 2 m^2 for Room 8 to 2.34 m by 4 m for Room 10. Although there is a wide range of variability in size within this group, features are consistently shared and include at least traces of four enclosing walls in addition to slab-lined hearths and bins.

Room 8 might be a modified store room. Room 10 looks like it was added after the main pueblo was completed.

Rooms 8 and 19 might represent specialized work or non-habitation areas, as indicated by their small size, but artifacts and pollen distribution fail to show any substantive patterning. Excavation of the remaining site might answer such questions.

MAIN PLAZA: Defined as the open space in the middle of the pueblo. One kiva, certainly, and possibly more, is located here. Since this part of the site was left unexcavated (there was no danger from erosion), little can be said about its function.

SMALL PLAZAS: These include West and East plazas. Defining traits for small plazas include relatively larger size, numerous hearths, bins and food grinding stones, and utility ware pottery.

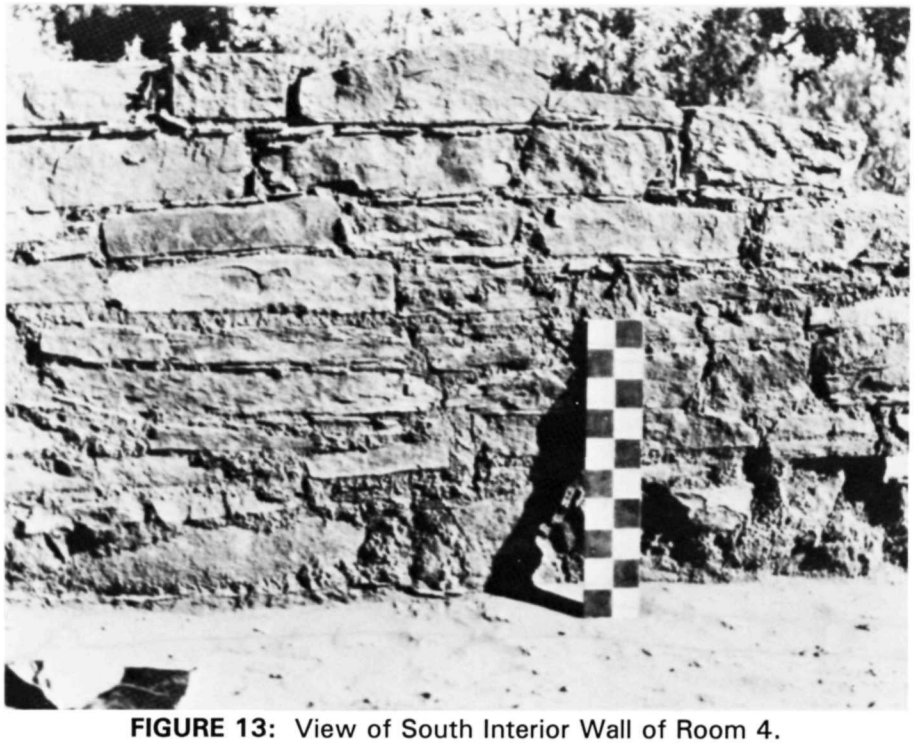


FIGURE 13: View of South Interior Wall of Room 4.

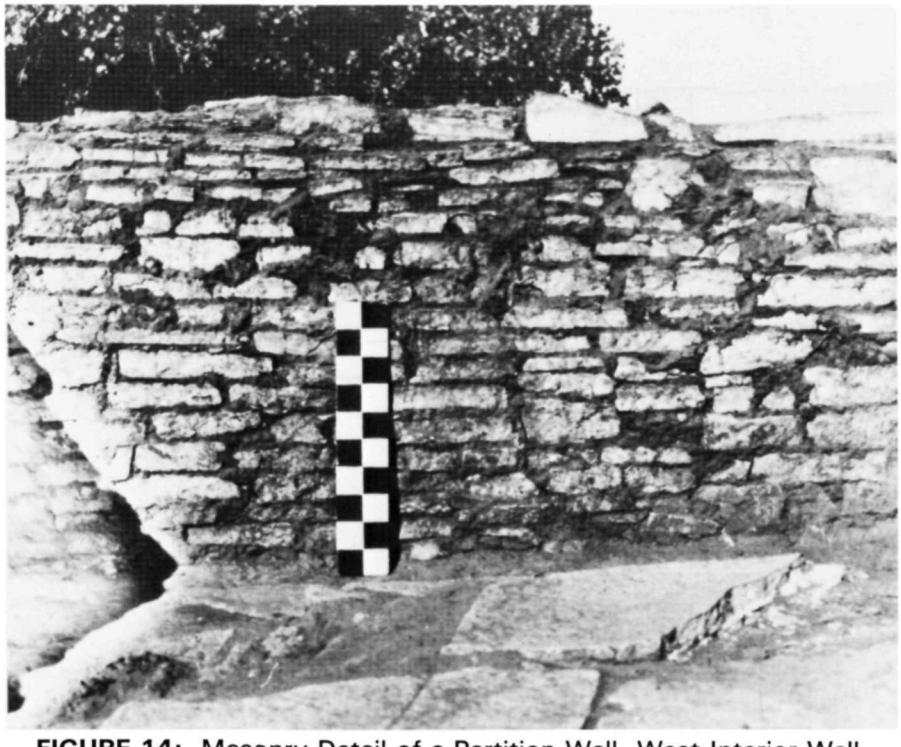
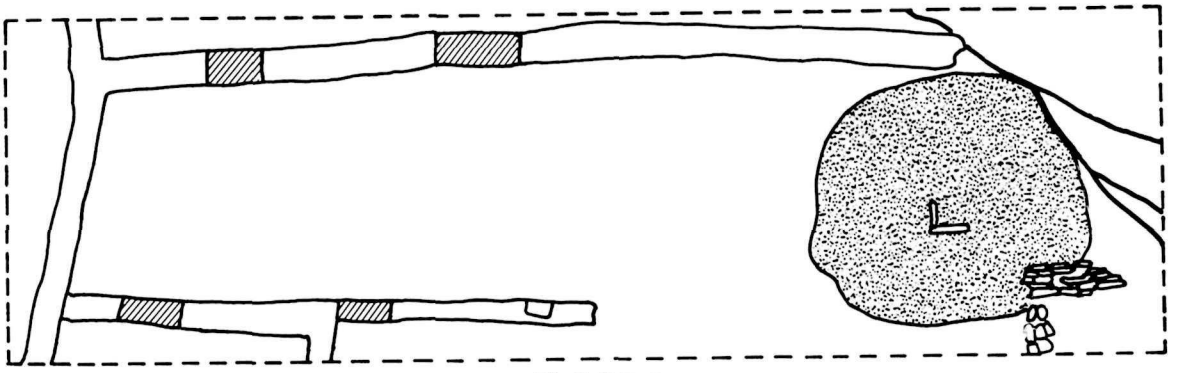
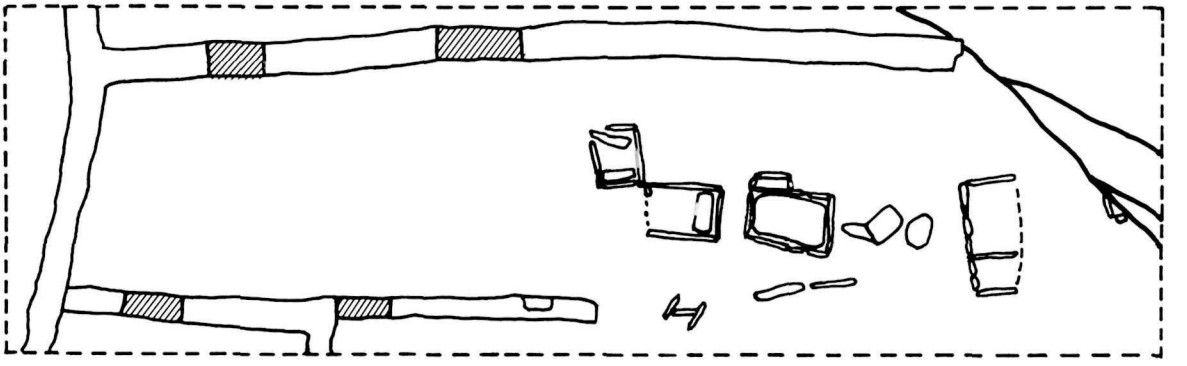


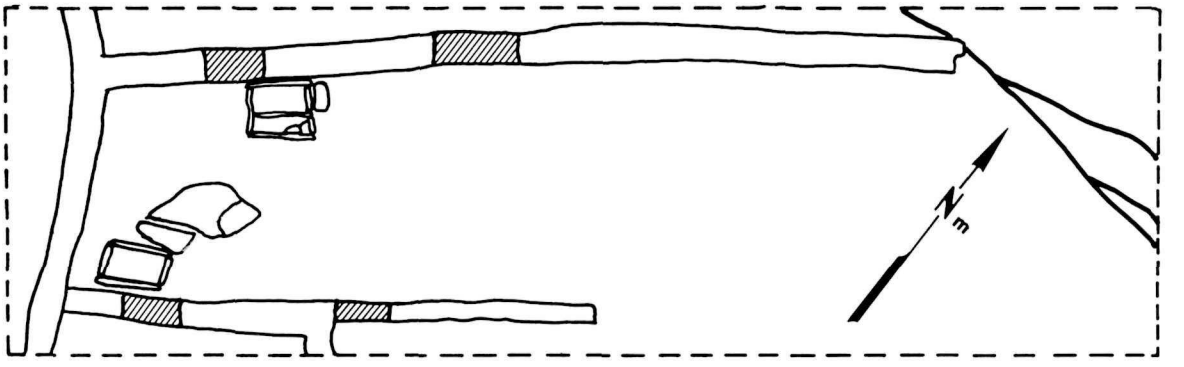
FIGURE 14: Masonry Detail of a Partition Wall, West Interior Wall of Room 4.



FLOOR I



FLOOR II



FLOOR III

FIGURE 15: Plan View of Floor Surfaces and Features, Floors I-III, West Plaza.

West Plaza has three distinct use surfaces (Figure 15). Floor I (bottom floor) has two slab-lined rectangular hearths associated with piki-type stones. The Floor II surface, which rests on sand fill 25 cm above Floor I, contains two mealing bins and three hearths, possibly indicating a communal work area. Floor III consists merely of an ashy layer and hearth remnants. It probably represents a much later and very temporary use surface.

Originally, East Plaza was bounded on the northeast by rooms 18 and 19. Before the upper use surface was established, however, the southern half of the west wall of Room 18, and the north, west and south walls of Room 19, were removed, except for foundation stones that were later covered with sand. The lower floor of East Plaza has one slab-lined hearth while the upper level contains three. Both plazas represent semi-sheltered food preparation areas.

ROOM TYPE DISTRIBUTION: Since only a small portion of the site was threatened and, therefore, excavated, little can be said about ratios of room types and functional areas. A rough pattern, however, is discernible and marked by the presence of one or two work and habitation rooms associated with 6-10 storage rooms and a plaza food preparation area. Reference is made to the northwest portion of the excavated site as shown on Figures 2 and 16.

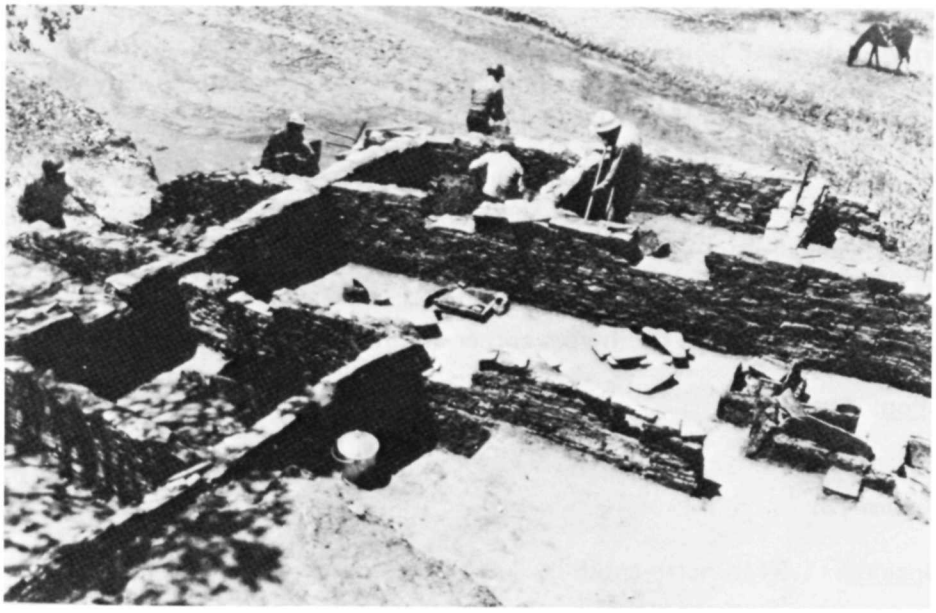


FIGURE 16: Northwest Section of Site, West Plaza in Center, Storerooms in Background and Work and Habitation Rooms in Left Foreground.

KIVA: The kiva is a rectangular structure that measures 3 m in width. The north-south dimension, presently, is 4 m, but the amount lost to erosion is unknown. The sand and clay walls are plastered and the only masonry apparent is in the southern ventilator shaft. An upright slab deflector was placed between the ventilator and the square, slab-lined hearth.

A circular, ashy ring on the surface of the plaza was the only indication of a subterranean structure. Another similar ashy ring is located 2 m to the west of the kiva and may indicate a second similar structure. This part of the site was not endangered by erosion and, hence, was not excavated.

The kiva roof burned at the time of abandonment or shortly thereafter and subsequently filled in with sand and trash. Since only small segments of roof beams were found, we have almost no information on how the original roof was constructed.

PITS: The two pits appear to have been used as clay sources. Pit II undercuts Room 10 and supports the idea that Room 10 was a later addition to the site. The high number of sherds and animal bones in the pits indicates their later use as trash deposit areas.

ROOM AND AREA DESCRIPTIONS

ROOM 1 (Figure 17)

Dimensions: 2.12 m north-south by 2.15 m east-west.

Fill: Height of 1.2 m from base of walls to top of fill. Fill from below the walls to 60 cm above the base of the walls is reddish sand with the various levels marked only by subtle color changes. There is no hard-pack floor surface. The only distinct strata in the sandy fill is 20 cm thick and contains charcoal flecks spread evenly throughout the sand. The bottom of this level consists of fine black ash, which is 30 cm above the base of the walls. A small hole had been dug from this level and a small, inverted corrugated jar placed within 25 cm below the ashy layer. Other than this the fill below the ashy layer is sterile. A single mano rests on the ash, along with utility ware and decorated sherds that are present in all of the fill up to 10 cm below ground level.

Overlying the sandy fill is a jumbled wall rubble level about 60 cm thick. A very crudely built masonry wall consisting of a single width of sandstone blocks (20 cm thick) overlies the sandy fill and rises about 50 cm above it. Except for the buried pot and the later partition, the fill of Room 1 is typical of all those excavated at the site.

Features: West wall and northwest corner are missing. No entrances are evident.

Function: Storage.

ROOM 2 (Figure 18)

Dimensions: 1.94 m north-south by 1.97 m east-west.

Fill: Height of 1.05 m from base of walls to top of fill. Sandstone flagging marks floor level 8 cm above base of walls. This is covered with 4 cm of yellow blown sand that is covered by 27 cm of blown sand mixed with charcoal flecks. The 33 cm above is filled with wall rubble, sand and pottery sherds. A bone awl was found resting on the floor.

Features: A paved floor and a door in the south wall. Paving consists of thin, flat sandstone slabs. The door is 64 cm above floor level and 60 cm wide.

Function: Storage.

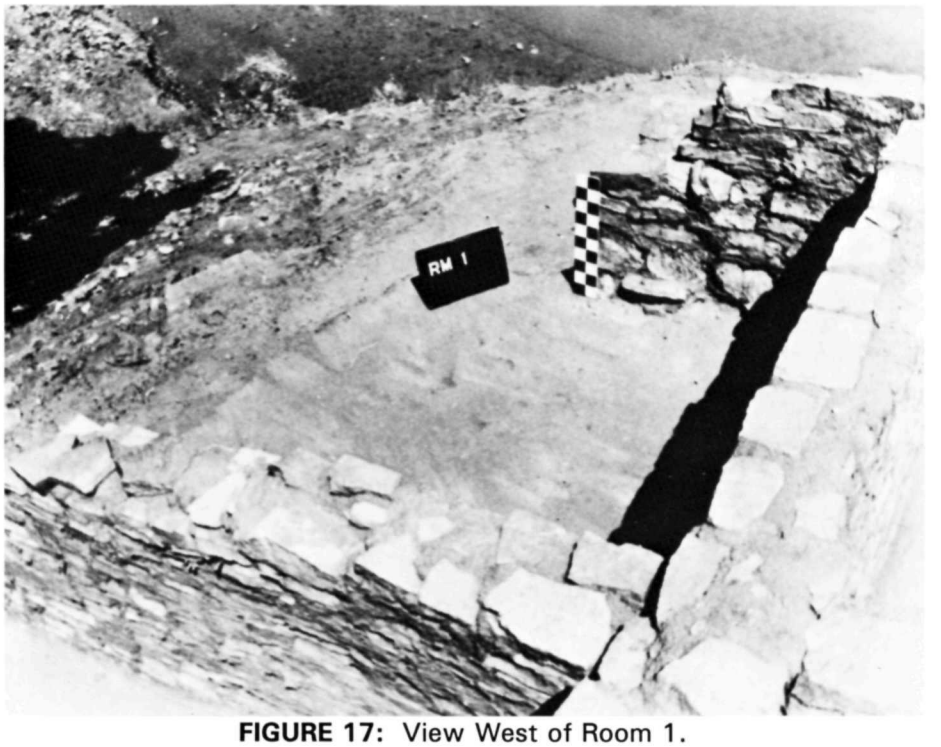


FIGURE 17: View West of Room 1.

FIGURE 18: View Northwest of Room 2.

ROOM 3 (Figure 19)

Dimensions: 1.99 m north-south by 1.93 m east-west.

Fill: Virtually identical to Room 2. Sandstone paving 10 cm above base of walls is covered with 24 cm of brown sand fill that contains unfired clay, lithic flakes, small bones and pot sherds. Fill above the sandy layer to the present wall tops consists of jumbled wall rubble.

Features: Sandstone flagging on the floor with a north-to-south diagonal strip, 20-50 cm wide, removed. There is a door in the south wall 60 cm above the floor and 70 cm wide.

Function: Storage.

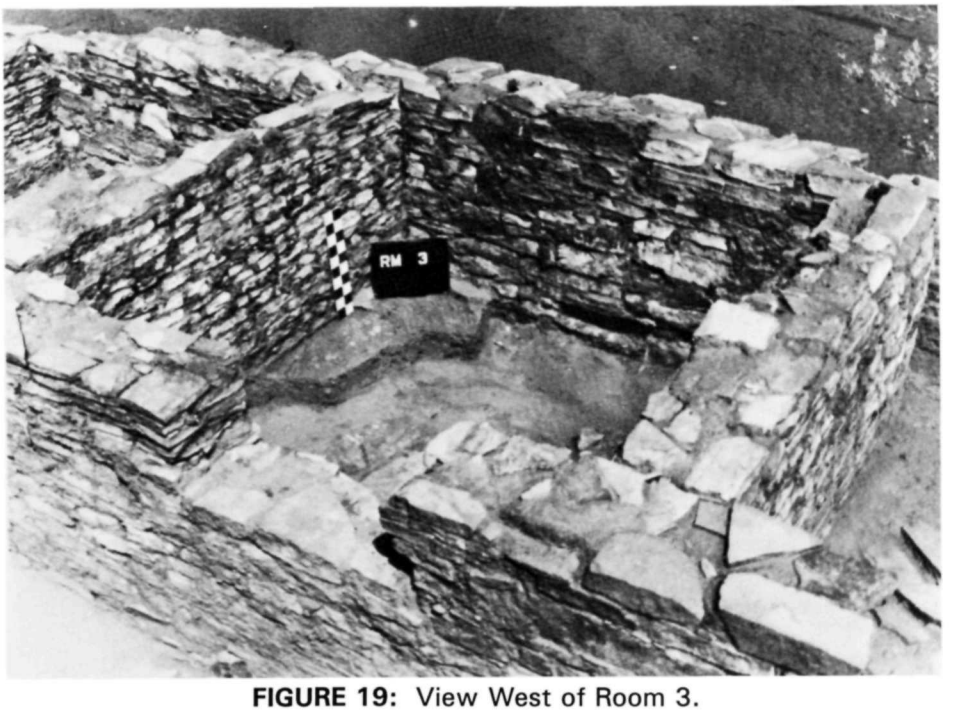


FIGURE 19: View West of Room 3.

ROOM 4 (Figure 20)

Dimensions: 1.99 m north-south by 2.3 m east-west.

Fill: Height is 80 cm from base to top of fill. There are at least two floors marked by sandstone flagging, resting directly on one another. The bottom floor contains a small hearth against the mid-south wall made by removing one of the flagstones and digging a small pit. It has the appearance of having been used only once, or very few times. Flagstone of the top floor covered the hearth.

Sandy fill above the floor is about 25 cm thick and contains charcoal flecks and a charred beam fragment, in addition to plain and redware sherds.

Features: There are no doors. The northeastern third of the room is missing due to erosion.

Function: Storage and temporary habitation.

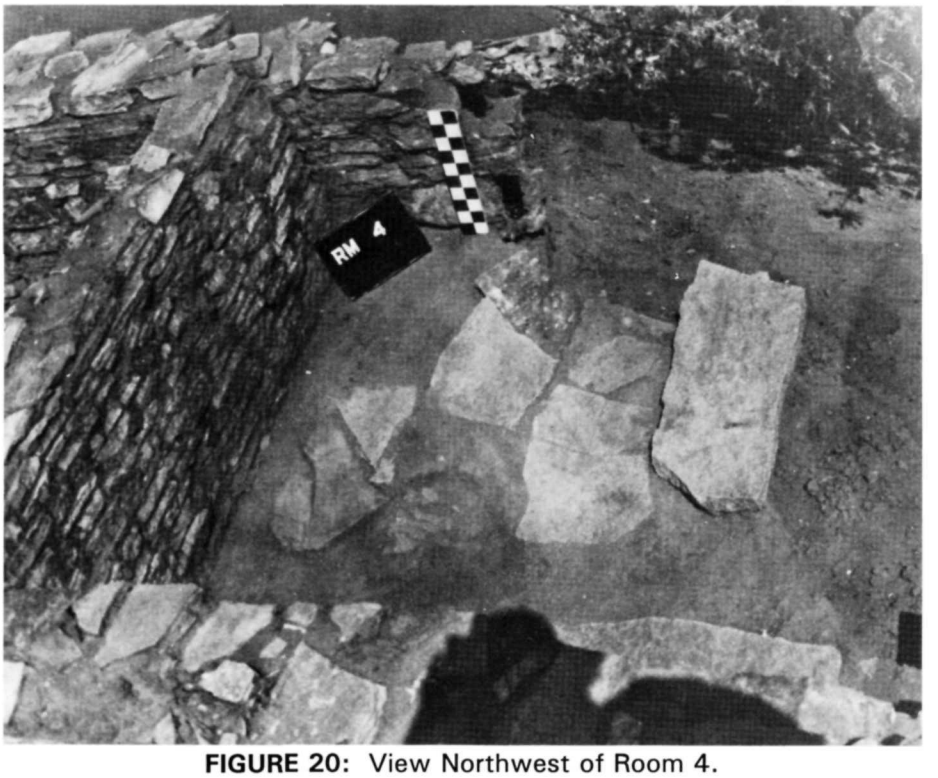


FIGURE 20: View Northwest of Room 4.

ROOM 5 (Figure 21)

Dimensions: 1.72 m north-south by 2.13 m east-west.

Fill: Thickness is 1 + m from base of wall to top of fill. Bottom level is sandy fill and measures 44 cm in thickness. This is covered with thick wall rubble.

Sand fill from base of walls to 23 cm above them is clean, yellow-red and contains broken stones and sherds. A black ash layer marks the top of this level and separates it from the level above, which contains charcoal flecks, sherds and lithic flakes. This upper level also contains a mano and metate, which appear to have been discarded and mixed in with the other debris in the fill.

Features: No floors or door in evidence. The western wall is missing due to erosion.

Function: Storage at first; subsequently used for trash deposit.

FIGURE 21: View Southwest of Room 5.

ROOM 6

Dimensions: 1.68 m north-south by 1.02 m east-west.

Fill: There is 1 m from base of walls to top of the fill. Sandy fill is 25 cm thick and overlain with thick wall rubble. Gray ash and sherds are abundant throughout the fill.

Features: West wall is missing. No floor evident. There is a door in the middle of the east wall 40 cm above the base of the wall that measures 25 cm wide at the base and 40 cm wide at the top of the remaining wall.

Function: Probably storage.

ROOM 7 (Figure 22)

Dimensions: 1.8 m north-south by 1.99 m east-west.

Fill: There is 1 m from the base of the walls to top of fill. Sand fill from base of walls is 24 cm thick and overlain with dense wall rubble. Sand fill yielded a mano, sherds and charcoal flecks.

Features: West wall is missing due to erosion. No floor or door is evident.

Function: Probably storage.

FIGURE 22: View South of Room 7.

ROOM 8 (Figure 23)

Dimensions: 1.83 m north-south by 2.26 m east-west.

Fill: Thickness is 80 cm from the base of the walls to top of fill. Floor level of semi-compacted sand is 10 cm above the base of the walls. Above this is 26 cm of sandy fill covered with thick, jumbled wall rubble.

Features: Floor features were vandalized before description could be recorded so are incomplete. There is a hearth and three bins.

The hearth is against the middle of the north wall and slab-lined on the three remaining sides. It measures 45 cm by 55 cm. There is no bottom lining. A small slab-lined mealing bin is at the southeast corner of the hearth. Two smaller slab-lined bins are against the middle south wall.

Wall features include a 45 cm-wide door in the middle of the north wall. This door is 65 cm above floor level and served as an opening into the plaza. Curiously, it is situated directly over the hearth. Another door leads into Room 6 on the west. A 25 cm-square opening is at the southern end of the east wall, 40 cm above floor level.

Function: This room appears to have been a storage room that was later converted into a food preparation area.

FIGURE 23: View Southeast of Room 8.

ROOM 9 (Figure 24)

Dimensions: 3.77 m north-south by 2.05 m east-west.

Fill: Thickness is 85 cm from the base of the walls to top of the fill. Cultural material, including corrugated sherds, smooth grooved stone and mano fragments, is present down to wall base level. This material is situated in a brown and gray sandy soil matrix 36 cm thick. The bottom 25 cm of this level contains the greater part of the material collected while the top 10 cm is fairly sterile.

Overlying the sandy fill is a jumbled wall rubble layer.

Features: Room 9, along with Room 10, is unique in size and its rectangular shape.

A rectangular slab-lined hearth measuring 65 cm by 38 cm is the only floor feature. A 39 cm-high vertical slab projection extends to the east from the northeast corner of the hearth. Slabs used in the hearth average 20 cm in height with 10 cm below floor level. There is no bottom lining.

Sandy fill containing cultural material extends down to the base of the walls and there is no hard-pack floor. There is also no color change to indicate a particular use level, except on the exterior of the hearth lining. This indicates the original floor had been close to the level of the base of the walls.

A door in the middle of the east wall, 54 cm above the wall base, measures 42 cm wide.

Function: A living room of sorts. Four adults could have slept in it at one time. The absence of bins, pits, etc. indicates that not much food processing was done in the room.

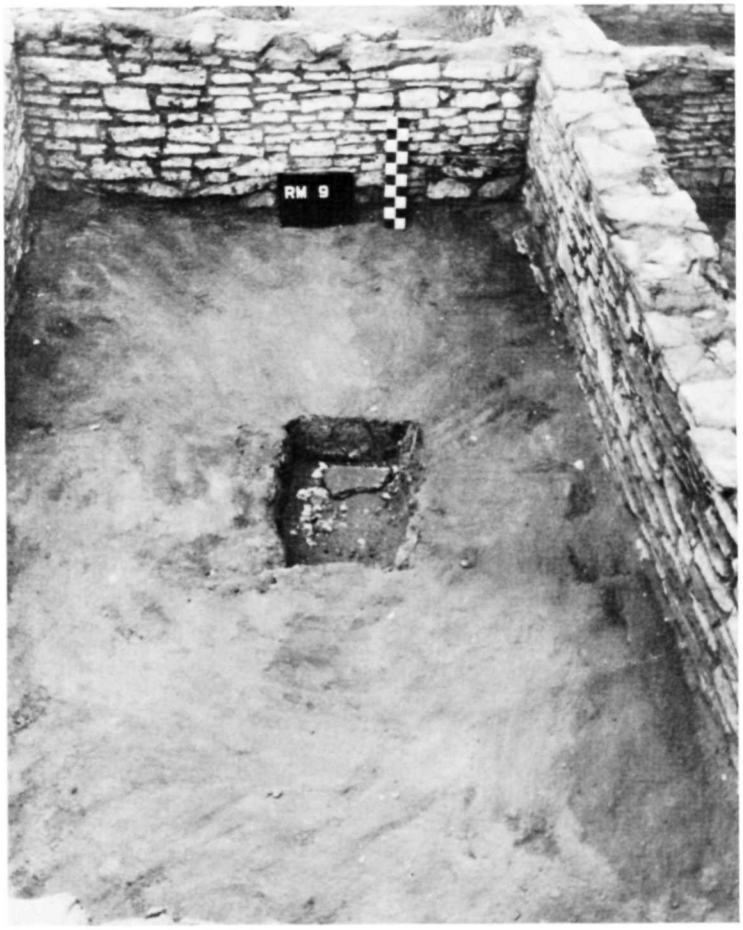


FIGURE 24: View Southeast of Room 9.

ROOM 10 (Figures 25 and 29)

Dimensions: 2.34 m north-south by 4.02 m east-west.

Room 10, along with the two plaza areas immediately to the east, shows signs of architectural modification after initial construction. The eastern half of the south wall is removed, leaving that part of the room essentially unprotected. The east wall (the base of which is 22 cm higher than that of the west wall) was initially straight and ran due north-to-south. The bottom 50 cm of it still remains. Above this level it is modified so as to form a curve trending towards the northeast.

Fill: Fill is 1 m thick from the base of the walls to the top of the fill. The bottom 10 cm consists of yellow, sterile sand covered by a sand-ash level containing charcoal flecks and pot sherds, and measures 18-20 cm in thickness. Pieces of wall rubble intrude into this level. Dense wall rubble is 50 cm thick and covers the entire room.

Features: Floor surface is barely discernible 2-3 cm below the ash layer. It is marked by a subtle and fugitive color change. There are no doors present, though the missing south wall section may have contained one.

There are two hearths, both slab-lined on the sides with bottoms of dirt. One is in the northwest corner and the other at the eastern end of the south wall section. The north hearth is filled only with fine gray ash while the southern one contains large round stone pot rests, in addition to the gray ash.

Function: Originally, probably a planned or actual living room later modified to a semi-outdoor work area.

Fill: This area was only partially excavated in order to preserve a tie-in profile for possible later excavation. The north-facing profile is 4.4 m south of the north wall of Room 14.

FIGURE 25: View Southeast of Room 10.

ROOM 11

Dimensions: 1.85 m north-south by 2.03 m east-west.

Fill: Height is 85 cm from base of walls to top of the fill. A flagstone paved floor is 10 cm above the base of the walls with approximately 20 cm of blown sand covering it. Over this is thick wall rubble. The fill is fairly sterile.

Features: Paved floor. No door was present.

Function: Storage.

ROOM 12

A previously pot-hunted room that had no south wall due to road building activity. It is located next to the road due south of the on-site bench mark. No cultural material was recovered. The only feature is the remnant of a doorway in the middle of the north wall. The remainder of the architecture is in too poor a condition to yield any definitive information.

ROOM 13 (Figure 26)

Dimensions: 1.77 m north-south by 1.93 m east-west.

Fill: Thickness is 85 cm from the base of the walls to the top of the fill. Paved floor is about 10 cm above base of the walls, with 25 cm of blown sand covering it. Thick wall rubble covers the sandy layer.

In the eastern half there are four layers of sandstone flagging laying directly on one another. A pestle was found in the southeast corner.

Features: Paved floor. No door was present.

Function: Storage.

ROOM 14

Dimensions: 4.4+ m north-south by 2.14 m east-west.

Fill: There is 80 cm of fill from the base of the walls to the top of the fill. The bottom main level is 19 cm thick and consists of yellow sandy fill. The bottom of this level is even with the wall bases and represents a floor surface containing a hearth and several flagstones against the west wall. The hearth measures 60 cm north-south and 45 cm east-west. It is lined with slabs on the sides but not on the bottom. There is no color change or hard-pack to mark the floor surface.

Overlying this bottom level is a second floor that is also marked by scattered flagstones, the only floor features. Above this is a 13 cm-thick red-brown sandy layer, containing black ash, charcoal flecks, bits of wall rubble, bone, lithic waste, several manos and a stone axe. Wall rubble became quite dense above, and continued to, the top of the fill.

Features: The bottom floor has a hearth and scattered flagstones. The top floor has only flagstones. There are no doors or other openings in the excavated area, although a door is present south of it in the east wall.

Function: The bottom floor probably was part of living room, while the top floor represents a general work area.

FIGURE 26: View South of Room 13.

ROOM 15 (Figure 27)

At least half of the room is missing due to erosion and a footpath that bisects it from southeast to northwest. It is probably identical to Room 13, however, measuring 1.77 m north-south and 1.93 m east-west.

Fill: Height is 70 cm from the base of the walls to top of the fill. There is a paved floor about 10 cm above the base of the walls overlain by 14 cm of sandy fill covered with jumbled wall rubble. There are three layers of sandstone flagging resting on one another.

Features: Very little left. The only feature is the multi-layered sandstone floor.

Function: Storage.

ROOM 16 (Figure 28)

Dimensions: 2 m northwest-southeast by 1.9 m northeast-southwest.

At least a third of the room on the north is missing due to erosion.

Fill: There are 70 cm of fill from the base of the walls to the top of the fill. The bottom 10 cm is sterile yellow sand. Above this is a gray sand layer, also about 10 cm thick. Above this is a mixed gray sand wall rubble level that gradually gives way to solid wall rubble. There is almost no cultural material in any of this fill.

Features: None.

Function: Storage.

ROOM 17 (Figure 28)

Dimensions: 2 m northwest-southeast by 1.2 m northeast-southwest.

Fill: There are 60 cm from the base of the walls to top of the fill. Sterile sand makes up the bottom 20 cm with wall rubble overlying it. The only item recovered is a very used metate on the same level as the base of the wall.

Features: None.

Function: Storage.

ROOM 18 (Figures 29 and 30)

Dimensions: 4.5+ m northwest-southeast by 2.5 m northeast-southwest.

Fill: Consists of 15-20 cm of gray-brown sand resting on sterile yellow sand and covered with mixed jumbled wall-face and blown sand. The bottom of the gray sand level is 2-3 cm above the base of the walls.

Floor level is about 10 cm above wall base level.

Features: A single, rectangular, side-slab-lined hearth filled with fine gray ash, clay and bright yellow-red sand, is at floor level.

Function: Originally a work/habitation room that was later modified, along with Room 19, and incorporated into the East Plaza.

ROOM 19 (Figures 29 and 30)

Dimensions: 2 m northwest-southeast by 2.5 m northeast-southwest.

Fill: Consists of 15-20 cm of gray-brown sand resting on sterile yellow sand and covered with mixed jumbled wall-fall and blown sand. The bottom of the gray sand level is 2-3 cm above the base of the walls.

Floor level is about 10 cm above wall base level.

Features: A baseball diamond-shaped bin near the center of the southwest wall is the main floor feature. It is slab-lined on each of the five sides. This bin is filled with a fine, green, clayey soil. Scattered around the bin are three flat stone slabs.

Function: Possibly a specialized work or storage room. It was modified, along with Room 18, and incorporated into the East Plaza.

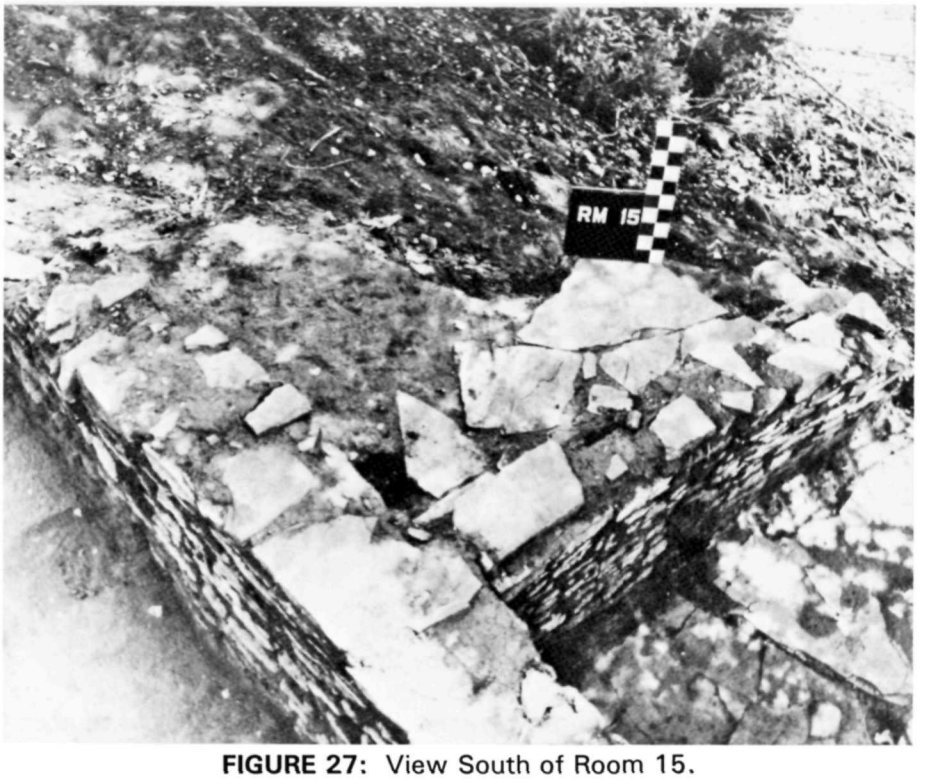


FIGURE 27: View South of Room 15.

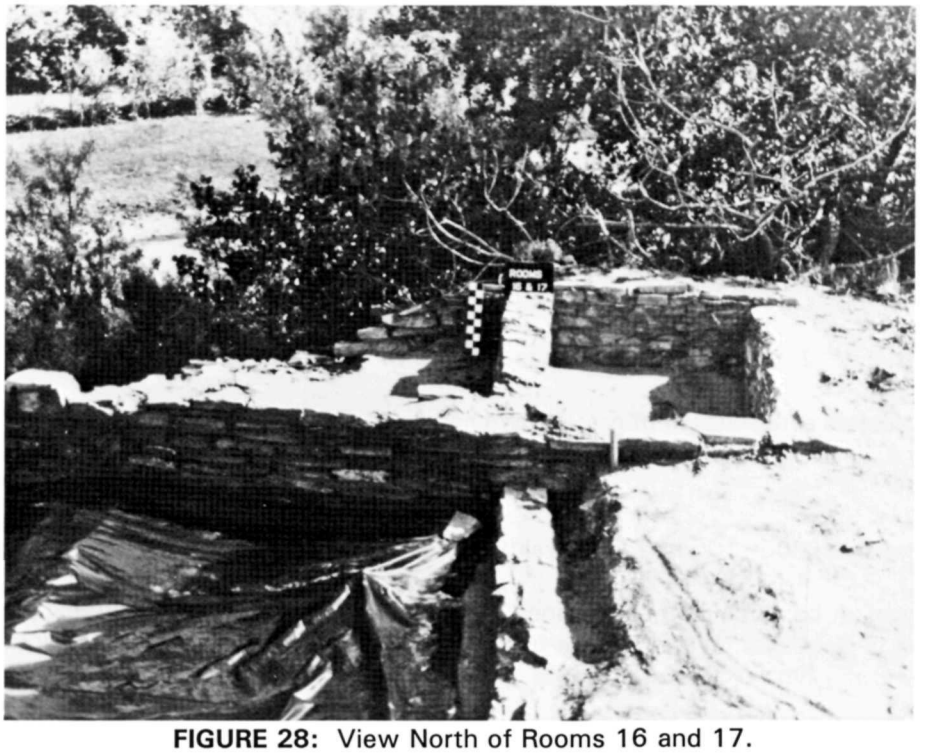


FIGURE 28: View North of Rooms 16 and 17.

FIGURE 29: View Northwest of Rooms 18 (background) and 19 (foreground).

WEST PLAZA (Figure 31)

The West Plaza is an area bounded on the north by rooms 2, 3 and 4; on the west by Room 5, and on the south by Room 8 and a 2.4 m-section of free-standing wall. The original eastern boundary is unknown as it has long since eroded away.

There are three distinct floor levels (see Figure 15); the bottom two belonging to the plaza proper. The top floor represents a very temporary and chance usage.

Dimensions: 1.9 m north-south by 4.86+ m east-west.

Fill: Over 1 m thick from the base of the walls to top of the fill. Floor III overlays sterile sand and is marked by a slight color shift towards gray. It is level with the base of the walls. The entire surface contains patches of black ash and charcoal flecks. Floor II rests on 25 cm of sand fill and is marked by a 3-4 cm-thick layer of charcoal ash. Floor I is 31 cm above Floor II and separated by sterile sand. The Floor I use surface is marked by a 2 m-diameter stain of gray ash surrounding a hearth remnant.

Features: (see Figures 10 and 15): Floor III (bottom floor) - two rectangular, slab-lined hearths are associated with this floor. One is in the extreme southwest corner and measures 37 cm north-south by 55 cm east-west. It is surrounded by three large piki-type stones. The other hearth is bifurcated along its east-west axis, is laid against the north wall, is 48 cm north-south by 58 cm east-west, and is situated 1.35 m from the west wall. Two large stones are within it and probably served as pot rests. Just below the door that opens into Room 3 is a stack of two metates, nine manos and a piki stone resting on a layer of charcoal ash (see Figure 55).

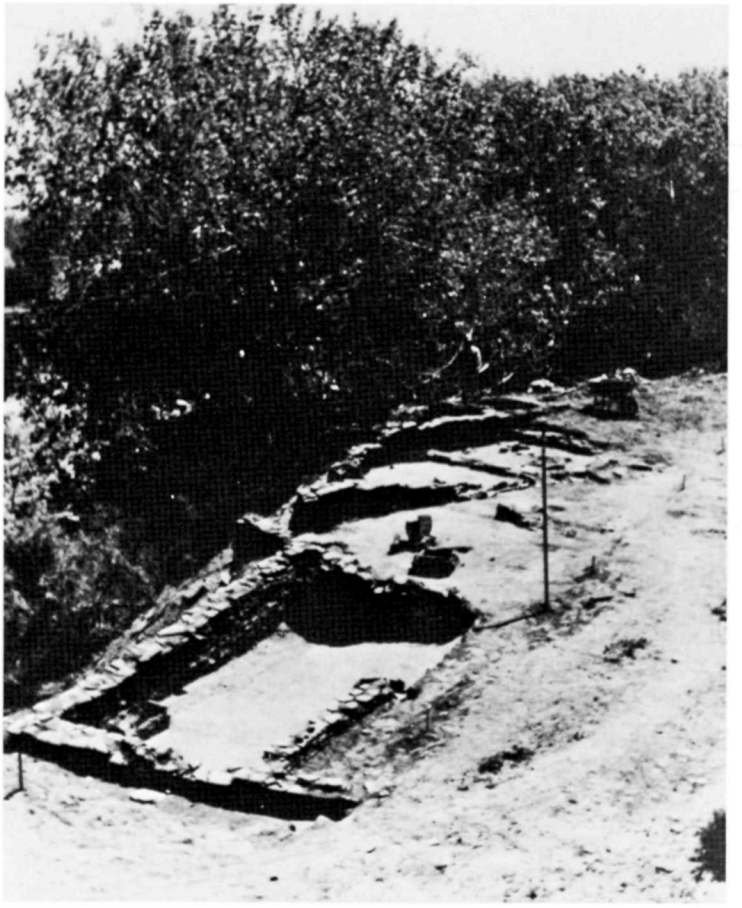


FIGURE 30: View Northeast with Room 10 (foreground), Floor II of East Plaza (center) and Rooms 18 and 19 (background).

Floor II - features include two mealing bins and three hearths; all located in the eastern half of the plaza. Also on this level are two corrugated jars placed against the eastern section of the north wall. One is upright, the other inverted (see Figure 45). Other material includes burnt and scattered roofing beams, manos, metates and several other grinding stones.

Floor I - Hearth remnants and an ash layer are the only features.

Wall features - doors are present that open into rooms 2, 3 and 8, in addition to a door at the western end of the free-standing, southern wall. A 25 cm-square hole, 25 cm above the wall base, is in the free-standing wall 45 cm from its east end.

Function: Floors II and III were semi-permanent food processing and meal preparation areas that were probably only partially roofed and open on the east and southeast sides. The roof or covering burned before the Floor I usage.

FIGURE 31: West Plaza Excavated to Floor III. Floor II Level at Pedestalled Ground Stone. Subfloor Test to Middle Left.

EAST PLAZA (Figures 29 and 30)

This area was originally bounded by rooms 18 and 19 on the east and Room 10 on the west. The southern limit is ill-defined but concentration of cultural material and floor surface color indicate that the East Plaza measures 4.5 m north-south.

At a later date, the East Plaza was expanded by removing the southern half of the west wall of Room 18, plus the north, west and south walls of Room 19. These walls were removed to the basal layer formed by two rows of sandstone blocks set on edge. The tops of the foundations are roughly even with the upper floor level. This made for a more-or-less continuous plaza floor stretching from Room 10 to rooms 16 and 17. It is possible that Room 10 was constructed during this modification, but extensive rodent-burrowing in the area makes it impossible to arrive at such a determination.

Fill: Bottom floor level is 30 cm above the base of the walls. Rodent-burrowing makes stratigraphic interpretation extremely difficult and use-surface is mainly defined by a slight color shift towards gray and concentration of artifacts on a single level. Cultural material consists of bone awls, grooved stones and sherds. The upper floor level bore almost no cultural material.

Features: The single feature of the bottom floor is a square hearth, slab-lined on the sides, situated in the center of the original plaza.

The upper floor surface has three rectangular, slab-lined hearths, all of which are situated over Room 18. One of these was built in, and above, the original Room 18 hearth. The hearth area of the modified plaza is partially protected by the remnant of the west wall of Room 18. There is no evidence for roofing.

Function: Semi-protected, outdoor food preparation area.

KIVA (Figures 32 and 33)

The kiva is a rectangular structure. North-south dimensions are unknown, since the northern portion was removed by erosion. The remaining floor surface measures about 4 m north-south and just under 3 m east-west.

The kiva pit was dug from a level even with the bottom floor of the West Plaza. During construction 50 cm of sand was removed and then 90 cm of very tough clay. There is no masonry save for that part of the ventilator shaft that passes through sand.

Very little of the pit outline is retained in the sand and dark gray-to-brown fill is the only indication of a pit above clay level. The clay part of the pit did retain much of its original shape, although wall plaster is rare and concentrated around the base of the ventilator shaft. Thick stone rubble at the top opening of the pit is the only trace of a possible retaining wall in the sandy layer.

Fill: Floor level is marked by an extremely hard-packed sand/clay/pebble mixture that is fairly level. Resting on the floor are four burnt beams in the southeast and southwest corners. There are also large fragments of a corrugated pot at the base of, and inside, the ventilator shaft, in addition to two very human looking bones.

Overlaying floor level are seven distinct trash filled levels:

Level I - 14 cm of red, sandy fill with ash streaks and sherds.

Level II - 11 cm of mixed clay and sand containing numerous sherds.

Level III - 20 cm of reddish-brown sand with some sherds.

Level IV - 10 cm of brown sand with ash flecks covering 2-20 cm of dense ash. This level protrudes outside the pit boundaries.

Level V - 20 cm of fairly clean, brown blown sand with large sandstone blocks intruding from the southwest. Also present are sherds and patches of black ash.

Level VI - 10-15 cm of light, yellow-red sand bounded on the bottom and sides by a jumble of sandstone blocks mixed with faint traces of ash.

Level VII - 50 cm of dark gray-to-black ash with jumbled rock intrusion from the southwest. The top of this lens is about 5 cm below ground level and shows up as a circle 3 m in diameter.

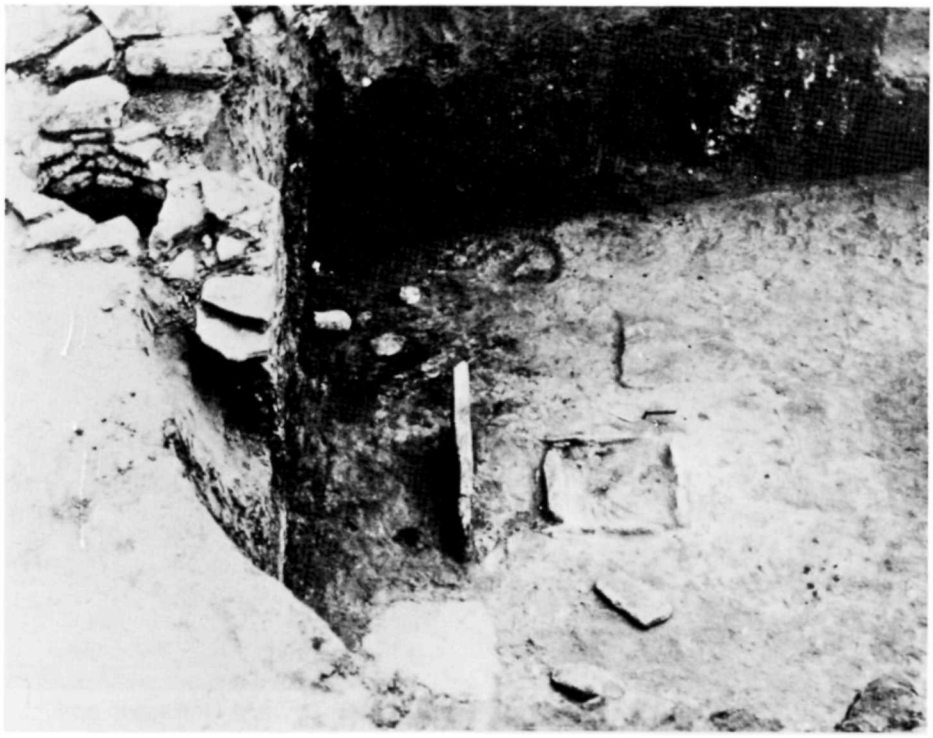


FIGURE 32: South Half of Kiva Showing (left to right) Masonry Ventilator Shaft, Upright Deflector and Filled Hearth.

No chronological difference in pottery styles is apparent between the levels. Jumbled rock intruding into levels V, VI and VII continues toward the west as far as Room 8. It averages 1 m in height by 1.5 m in width and is filled with gray ash and sand. It could be the result of purposeful destruction, possibly of the eastern end of the south plaza wall.

Features: A well-made, square hearth with slab lining on the sides and bottom is situated in the southern third of the kiva, 60 cm from the ventilator shaft. Between the shaft opening and the hearth is a single, vertical, sandstone slab deflector. The bottom half of the ventilator shaft and its opening at floor level were formed by digging through clay; there is no masonry lining. The part of the shaft that passes through sand is circular and lined with small blocks of sandstone. There is a masonry retaining wall between the shaft and the plastered interior of the kiva. Just to the east of the deflector is a flat metate imbedded into, and flush with, floor level. A shallow hole, about 8 cm in diameter, is found in the northeast part of the remaining floor.

Function: This structure was originally a kiva that burned immediately upon its abandonment. Subsequently, it served as a trash pit.

PITS (Figure 34)

Two pits are located immediately to the west of Room 10. Pit I appears in the eroded north face profile. Pit II is separated from Pit I by a 75 cm-thick column of clay and lies to the south of it. The exact nature of Pit II is unknown, since its complete excavation would have meant the destruction of Room 10.

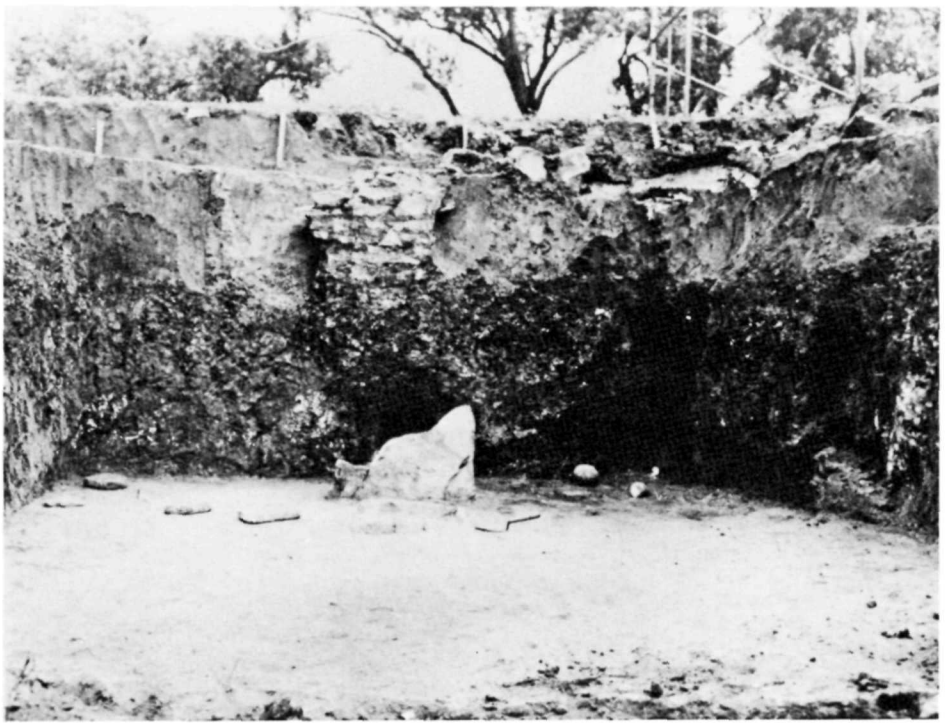


FIGURE 33: View Southeast of Kiva Interior Toward Deflector and Ventilator Shaft. Note Darker Clay Lens in Lower Portion of Walls.

FIGURE 34: North Edge of Site From West Plaza (foreground) Toward Room 17 (background).

Pit I - Fill consists of homogenous gray-brown sand that is distinct from the yellow-red sand surrounding it. The fill contains sherds, turkey bones and some well-preserved fibrous material. A hard-pack sand surface is encountered almost 1.6 m below the ground surface. This pit structure intrudes into the very hard clay level. A slab metate was found on the floor along with a roughly shaped circular sandstone slab of about the same size.

Pit II - The floor surface was formed by leveling the bottom of a hole dug into the clay lens. There are seven distinct levels of trash that are separated either by a thin ash lens or a slight color change. Most of the trash material consists of sherds and a rich assortment of bird and rodent bones. The fill matrix consists of gray sand that shows no appreciable difference in composition between levels. No significant difference in pottery types is present between levels.

CERAMICS

James E. Mount

One intact vessel was found in situ during excavation. This is a small, corrugated jar from Room 1 and is discussed below. The remainder of the collection represents, essentially, discards. Twelve fully or partially restorable vessels were recovered, in addition to 9,569 sherds. Of these sherds, 84 percent are utility wares and 16 percent decorated wares.

Comparative pottery collections used in the course of analysis include those listed in Chapter 1. The fact that these collections do not agree in all cases is partially reflected in the number of sherds classified only as to ware in this report. Table 1 accounts for all the pottery found except for pieces smaller than a dime (about 20 cm). Thus, many sherds were saved that may well have originally formed part of a decorated vessel, but which retained no decoration. These are classified as to ware and account for most of the ware "unclassified" categories.

Pottery types found at Wide Reed Ruin are listed below in alphabetical order along with bibliographic sources used for analysis. Full bibliographic information on type description may be found in Colton (1965).

DECORATED TYPES

AWATOBI YELLOW WARE: (Colton 1956:7A). Two sherds found on surface; one just south of West Plaza, the other just north of Room 1.

BIDAHOCHI BLACK-ON-WHITE: (Colton and Hargrave 1937:245; Colton 1955:8B-14). One sherd from Pit II.

BLACK MESA BLACK-ON-WHITE: (Colton and Hargrave 1937:208; Colton 1955:8B-2). One sherd from the West Plaza, fill above Floor II.

CHACO BLACK-ON-WHITE: (Hawley 1936:43). Ten sherds.

GALLUP BLACK-ON-WHITE: (Hawley 1936:32, 42). Eighteen sherds.

GILA POLYCHROME: (Colton and Hargrave 1937:66; Haury 1945:80-100; DiPeso 1958:97-98). Two sherds from Pit I fill.

KAYENTA BLACK-ON-WHITE: (Colton and Hargrave 1937:217; Colton 1955:8B-10). One sherd from Pit II fill.

KIET SIEL POLYCHROME: (Colton 1956:5B-12). Four sherds.

KINTIEL POLYCHROME: (Colton and Hargrave 1937:126; Colton; 1956:5B-19). Nine sherds.

KLAGETO BLACK-ON-WHITE: This "type" is represented by three vessels from the West Plaza fill above Floor III (Figure 35) and 176 sherds found scattered throughout the site, except for the kiva floor and Habitation and Work Room floors. Temper, paste and paint fit well into the Reserve-Tularosa-Pinedale-Klageto group as defined by Colton and Hargrave (1937), Martin and Rinaldo (1950), Rinaldo

FIGURE 35: Klageto Black-on-White Pitcher, Bowl and Dipper From Fill Above Floor II in West Plaza.

TABLE 1: Ceramic Distribution By Individual Spatial Units.

		TUSAYAN WHITE WARE						MESA VERDE WHITE WARE				LITTLE COLORADO WHITE WARE	CIBOLA WHITE WARE								TSEGI ORANGE WARE			AWATOBI YELLOW WARE	JEDDITO YELLOW WARE	SAN JUAN ORANGE WARE								ROOSEVELT RED WARE	SMUDGED RED WARE	UTILITY WARES COMBINED		
PROVENIENCE		BLACK MESA BLACK-ON-WHITE	SOSI BLACK-ON-WHITE	TUSAYAN BLACK-ON-WHITE	KAYENTA BLACK-ON-WHITE	BIDAHOCHI BLACK-ON-WHITE	UNCLASSIFIED	McELMO BLACK-ON-WHITE	MESA VERDE BLACK-ON-WHITE	MESA VERDE CRUDE	UNCLASSIFIED	UNCLASSIFIED	RED MESA BLACK-ON-WHITE	CHACO BLACK-ON-WHITE	GALLUP BLACK-ON-WHITE	RESERVE BLACK-ON-WHITE	TULAROSAN BLACK-ON-WHITE	KLAGETO BLACK-ON-WHITE	PINEDALE-SNOWFLAKE-RESERVE B/W	UNCLASSIFIED	TUSAYAN POLYCHROME	KIET SIEL POLYCHROME	UNCLASSIFIED	UNCLASSIFIED	SIKYATKI POLYCHROME	KINTIEL POLYCHROME	WINGATE POLYCHROME	ST. JOHNS BLACK-ON-RED	ST. JOHNS POLYCHROME	SPRINGERVILLE POLYCHROME	PINEDALE POLYCHROME	UNCLASSIFIED	GILA POLYCHROME	UNCLASSIFIED	CORRUGATED	RIPPLED	OTHER
ROOM 1	FILL																			1									4			1			208	42	1
	FLOOR																												2								
	SUBFLOOR										1							2																	16	3	
ROOM 2	FILL										3								1		1	1							9			5		5	29	83	16
	FLOOR																																		1	11	
	SUBFLOOR																																				
ROOM 3	FILL																	2														2			1		1
	FLOOR																																				
	SUBFLOOR																																		7	1	
ROOM 4	FILL																												4						2	2	
	FLOOR																																				
	SUBFLOOR																																				
ROOM 5	FILL										1			2						5								5	3			4			38	42	11
	FLOOR																																				
	SUBFLOOR																			2								1	2						5	5	4
ROOM 6	FILL																		2	1									1						185	197	5
	FLOOR																																				
	SUBFLOOR																																				
ROOM 7	FILL																												1						7	5	2
	FLOOR																																				
	SUBFLOOR																																				
ROOM 8	FILL																			1			1			2		5	19			2			228	10	
	FLOOR																											1	2						12		
	SUBFLOOR																																				
ROOM 9	FILL																	1				1		2		2		1	4					1	81	34	3
	FLOOR																							1				6	12			1		1	142	191	17
	SUBFLOOR																																				
ROOM 10	FILL																												11						2	3	1
	FLOOR						1			1	4							1	1	2	5								4			1			69	51	6
	SUBFLOOR																	1											4						27	18	
ROOM 11	FILL																	1										3	1						30	7	
	FLOOR																																		22	4	
	SUBFLOOR																																				
ROOM 12	FILL																																				
	FLOOR																																				
	SUBFLOOR																																				
ROOM 13	FILL																																		6	4	1
	FLOOR																																		4	1	
	SUBFLOOR																																				
ROOM 14	FILL																																				
	FLOOR										11					2		3	2	6							1	1	12			6			17	12	18
	SUBFLOOR																																				
ROOM 15	FILL																												1						12	26	
	FLOOR																																				
	SUBFLOOR																																				

TABLE 1: Ceramic Distribution By Individual Spatial Units (continued).

		TUSAYAN WHITE WARE						MESA VERDE WHITE WARE				LITTLE COLORADO WHITE WARE	CIBOLA WHITE WARE								TSEGI ORANGE WARE			AWATOBI YELLOW WARE	JEDDITO YELLOW WARE	SAN JUAN ORANGE WARE							ROOSEVELT RED WARE	SMUDGED RED WARE	UTILITY WARES COMBINED		
PROVENIENCE		BLACK MESA BLACK-ON-WHITE	SOSI BLACK-ON-WHITE	TUSAYAN BLACK-ON-WHITE	KAYENTA BLACK-ON-WHITE	BIDAHOCHI BLACK-ON-WHITE	UNCLASSIFIED	McELMO BLACK-ON-WHITE	MESA VERDE BLACK-ON-WHITE	MESA VERDE CRUDE	UNCLASSIFIED	UNCLASSIFIED	RED MESA BLACK-ON-WHITE	CHACO BLACK-ON-WHITE	GALLUP BLACK-ON-WHITE	RESERVE BLACK-ON-WHITE	TULAROSAN BLACK-ON-WHITE	KLAGETO BLACK-ON-WHITE	PINEDALE-SNOWFLAKE RESERVE B/W	UNCLASSIFIED	TUSAYAN POLYCHROME	KIET SIEL POLYCHROME	UNCLASSIFIED	UNCLASSIFIED	SIKYATKI POLYCHROME	KINTIEL POLYCHROME	WINGATE POLYCHROME	ST. JOHNS BLACK-ON-RED	ST. JOHNS POLYCHROME	SPRINGERVILLE POLYCHROME	PINEDALE POLYCHROME	UNCLASSIFIED	GILA POLYCHROME	UNCLASSIFIED	CORRUGATED	RIPPLED	OTHER
ROOM 16	FILL																			1									4						2	23	2
	FLOOR																	8											9			2			160	288	13
	SUBFLOOR																																				
ROOM 17	FILL																												3			3			29	82	8
	FLOOR																																				
	SUBFLOOR																																				
ROOM 18	FILL																																				
	FLOOR																																		188	122	14
	SUBFLOOR																																		9		
ROOM 19	FILL																																				
	FLOOR																																		4	9	
	SUBFLOOR																																				
WEST PLAZA	FILL										1							1		1			1					1				1			9	14	2
	FLOOR I						1							1		1		7		3									7			4			57	36	13
	FILL	1								7	4							3		4	10	2	3			3		4	4	14	1				68	169	12
	FLOOR II	5																1	2	3	1		1					1	7	3		4		1	73	25	
	FILL	9					1	1		3						2					10		2					4	33			7			521	354	20
	FLOOR III							1										1																			
EAST PLAZA	FILL									1						3		11		3			1					6	27			8			711	128	28
	FLOOR I																	1										1	1			1			4	4	1
	FILL																	7	1	1			1					1	1			2			23		
	FLOOR II																																				
KIVA	FILL		2				2	1	5	14	15			3	3	5	19	56	3	26			2				4	28	127	13	3	55			600	361	55
	FLOOR																7			1								1	8	1		3			148	96	28
PIT I	OVERBURDEN		2				2			6		1			4	8	1	16	1	15			2					5	22			16		1	127	123	47
	LEVEL I							1		1								3											12			3			14	24	2
	LEVEL II						1									1		3	2	5								1	6						14	14	2
	LEVEL III													1			1	1										1	7			2			21	8	
	LEVEL IV														2	2		1											3			1			9	5	
	SUB-PIT						2	2			1		1	2	1	1		5		7								8	15			8	2		89	85	36
PIT II	LEVEL I						1								2			1		6			1		1			2	5			5			23	34	2
	LEVEL II		1									1						2		1								4	9	1		1			42	25	5
	LEVEL III														1	2	1	1		1								1	6			1		1	18	17	4
	LEVEL IV		1	1			7				8					6	1	10	1	10			1					13	33	2		15			163	93	38
	LEVEL IV-V				1						2	3			1	1				1									9			2			39	40	12
	LEVEL V					1					2	3		1	2	5		4	1	5			5	6				11	35			20			50	57	10
	LEVEL VI		1								1			1	1			2											3			1			31	23	13
	LEVEL VII		3	1			3				1	6	1	1	1	2		6		9									9			4			88	14	37
	LEVEL I-VII MIX		1													1			1									1				1			6	1	6
TOTALS		15	11	2	1	1	21	6	5	33	55	14	2	12	18	42	30	162	18	121	27	4	21	9	1	7	5	117	504	34	4	192	2	10	4491	3026	498

DECORATED WARE SHERDS: 1503 UTILITY WARE SHERDS: 8015 TOTAL NUMBER OF SHERDS: 9518

and Bluhm (1956) and the *CIBOLA WHITE WARE CONFERENCE, 1958.* Many of the design elements are found on examples of Reserve and Tularosa Black-on-White as can be seen in Figure 36. Painting is more controlled and more skillfully executed than on the Reserve. Design elements are typically Tularosa but, as a rule, larger, with thicker lines and wider spaces between the lines and elements. The painting is "bigger" than Tularosa and carelessly executed in comparison.

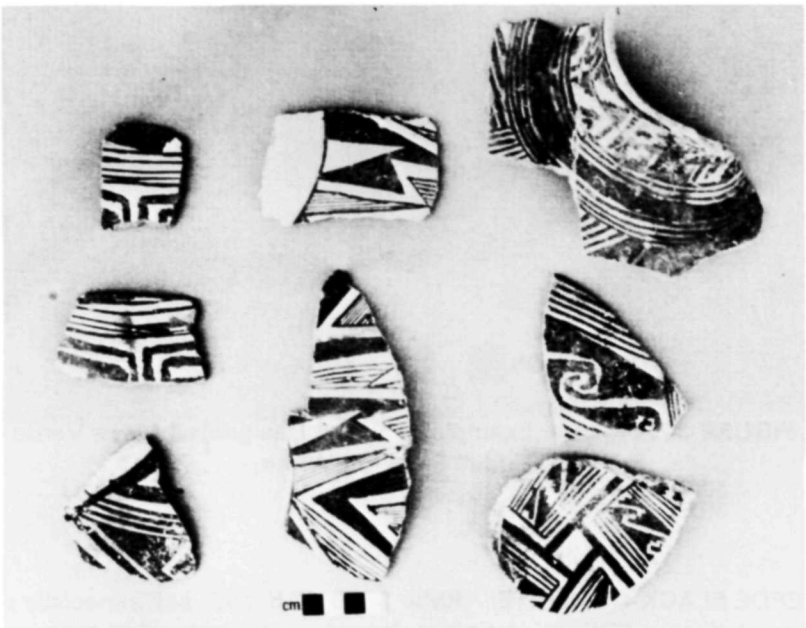


FIGURE 36: Black-on-White Decorated Sherds.

Final identification of the Klageto specimens was based on comparison with the comparative type collection at the Museum of Northern Arizona, which contains sherds described by Colton and Hargrave (1937:242). Danson, in Smith (1971:269), refers to Klageto Black-on-White as a "late version of Tularose Black-on-White." Breternitz (1966:81), echoing the sentiments of the *CIBOLA WHITE WARE CONFERENCE, 1958,* states "it is not only impossible to date this pottery type, but there is also some question of its identity as a type."

Analysis of the Wide Reed Ruin material has done little to clarify the type status of Klageto Black-on-White. The firmly associated cluster of tree-ring dates at A.D. 1276 does, at least, throw some light on the chronological setting of this ceramic complex.

LITTLE COLORADO WHITE WARE: (Colton and Hargrave 1937:234; Colton 1955:9B). Not enough design was present for a type designation. Fifteen sherds found in pits I and II fill.

McELMO BLACK-ON-WHITE: (Colton 1955:10B-1). Six sherds.

MESA VERDE BLACK-ON-WHITE: (Colton 1955:10B-2). Five sherds from kiva fill.

MESA VERDE "CRUDE" BLACK-ON-WHITE: This is not a new type. Thirty-three sherds that fit the temper, surface finish and paint description of Colton (1955:10B-2) have such non-descript decorative treatment that they could not be typed with confidence (Figure 37). Thirty-three sherds were found in the fill of West and East plazas and the kiva.

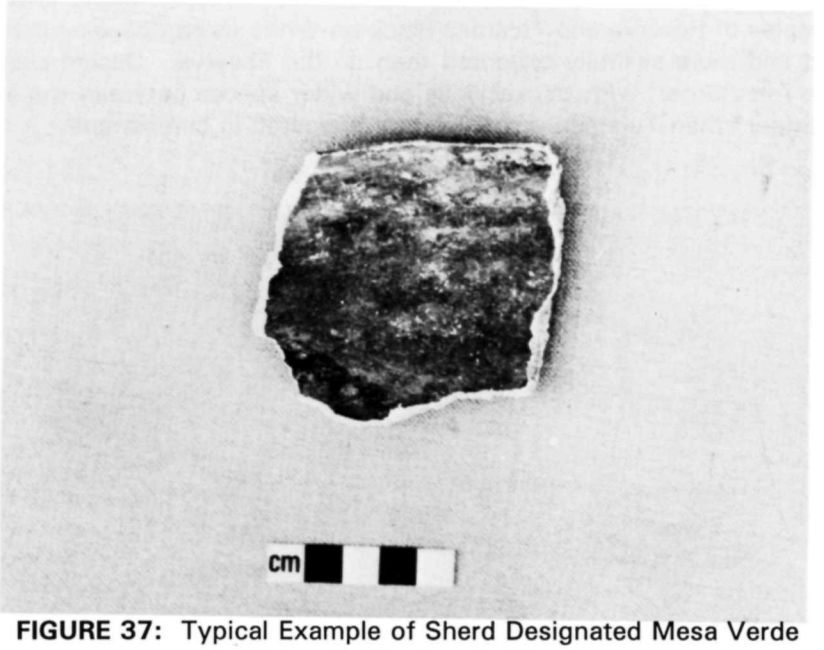


FIGURE 37: Typical Example of Sherd Designated Mesa Verde "Crude" Black-on-White.

McELMO-MESA VERDE BLACK-ON-WHITE: (Rohn 1971:145-186, see especially page 166). A bowl from East Plaza, Floor I (Figure 38) appears to represent an example of Rohn's category. Figure 39 shows a bowl from East Plaza, Floor I, Bin II, which also conforms to descriptions of Mesa Verde Black-on-White, except for design types. Its existence cannot be explained by this author.

PINEDALE POLYCHROME: (Carlson 1970:47). Five sherds.

PINEDALE-SNOWFLAKE-RESERVE BLACK-ON-WHITE: Sixteen sherds could not be typed any further than their designation implies. For description refer to Colton and Hargrave (1937:242), Colton (1941:62) and Martin and Rinaldo (1950:502-503).

RED MESA BLACK-ON-WHITE: (Martin and Rinaldo 1950; *CIBOLA WHITE WARE CONFERENCE, 1958).* Ninety-five sherds.

RESERVE BLACK-ON-WHITE: (Martin and Rinaldo 1950; *CIBOLA WHITE WARE CONFERENCE, 1958).* Ninety-five sherds (see Figure 36).

SIKYATKI POLYCHROME: (Colton 1956:7B-9). Six sherds.

SMUDGED RED WARE: These ten sherds remain unidentified. Exteriors are pale and gray-red. Interiors are smudged and semi-polished. Temper consists of smoothed quartz sand plus small amounts of crushed rock and sherd.

SOSI BLACK-ON-WHITE: (Colton and Hargrave 1937:219; Colton, 1955:8B-3). Eleven sherds. Five Sosi-like sherds display the interesting characteristic of having smudged interiors. See Figure 40 for comparison of these sherds before and after refiring.

FIGURE 38: McElmo/Mesa Verde Black-on-White Bowl From Floor I of East Plaza.

FIGURE 39: Bowl From East Plaza Exhibiting Characteristics of Mesa Verde Black-on-White Except Design Style.

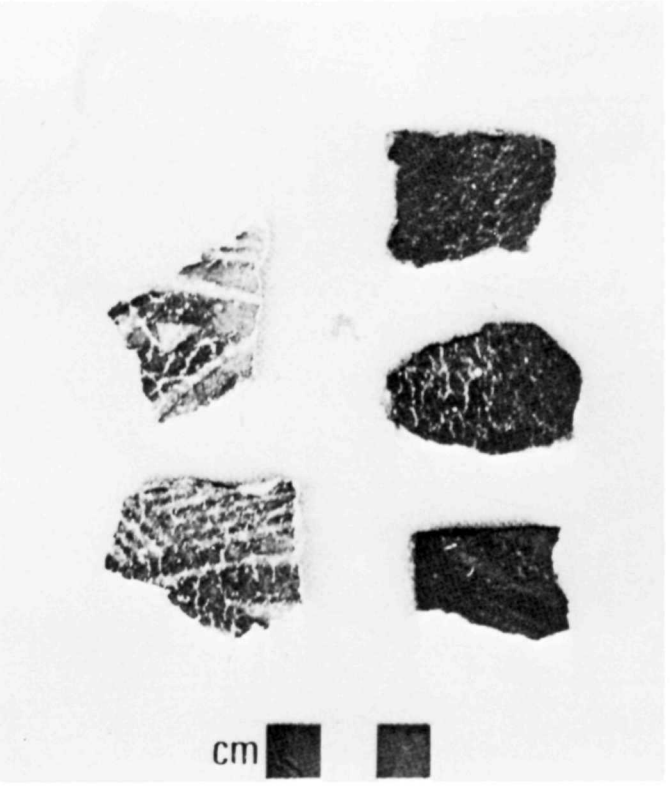


FIGURE 40: Sherds Identified as Sosi Black-on-White with Smudged Interiors.

SPRINGERVILLE POLYCHROME: (Carlson 1970:41). Twenty-one sherds.

ST. JOHNS BLACK-ON-RED: (Carlson 1970:29). One hundred seventeen sherds (Figure 41).

ST. JOHNS POLYCHROME: (Carlson 1970:31). The most numerous decorated type from Wide Reed Ruin with 493 sherds (Figure 42). An interesting artifact is the bottom of a St. Johns Black-on-Red or Polychrome bowl with edges ground down to form a plate. It is from the West Plaza fill above Floor III (Figure 43).

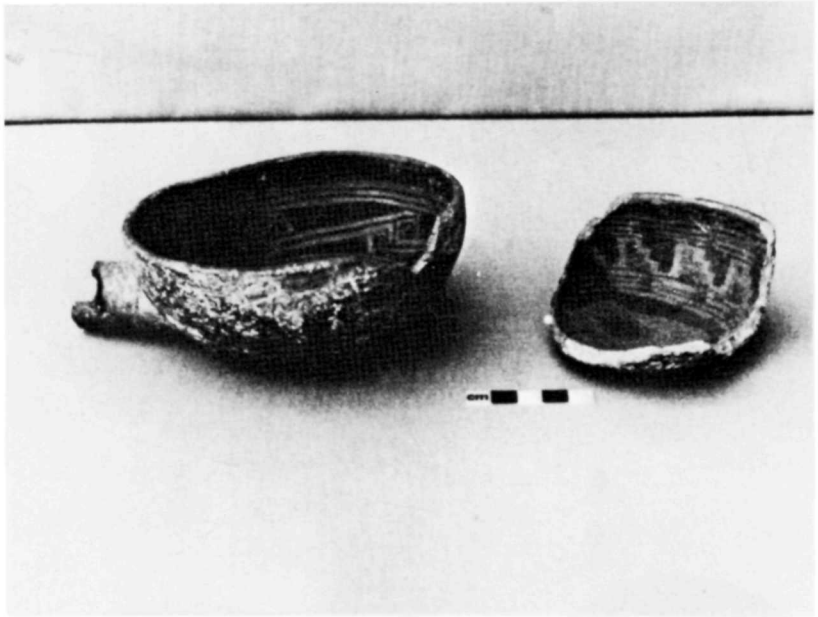


FIGURE 41: Examples of St. Johns Black-on-Red.

TULAROSA BLACK-ON-WHITE: (Rinaldo and Bluhn 1956; *CIBOLA WHITE WARE CONFERENCE, 1958).* Twenty-nine sherds (see Figure 36).

TUSAYAN BLACK-ON-WHITE: (Colton and Hargrave 1937:213; Colton 1955:8B-9). Three sherds from Pit II.

WINGATE POLYCHROME: (Carlson 1970:17). Five sherds; one from the floor of Room 14 and four from kiva fill.

UTILITY WARES

COMPLETE VESSELS

Utility ware sherds number 8,030 and amount to 84 percent of the total collection. Only one whole, and three restorable, utility ware vessels were found, thus excluding the possibility of studying the original range of variability in vessel size and shape. The single whole vessel (Figure 44) was found

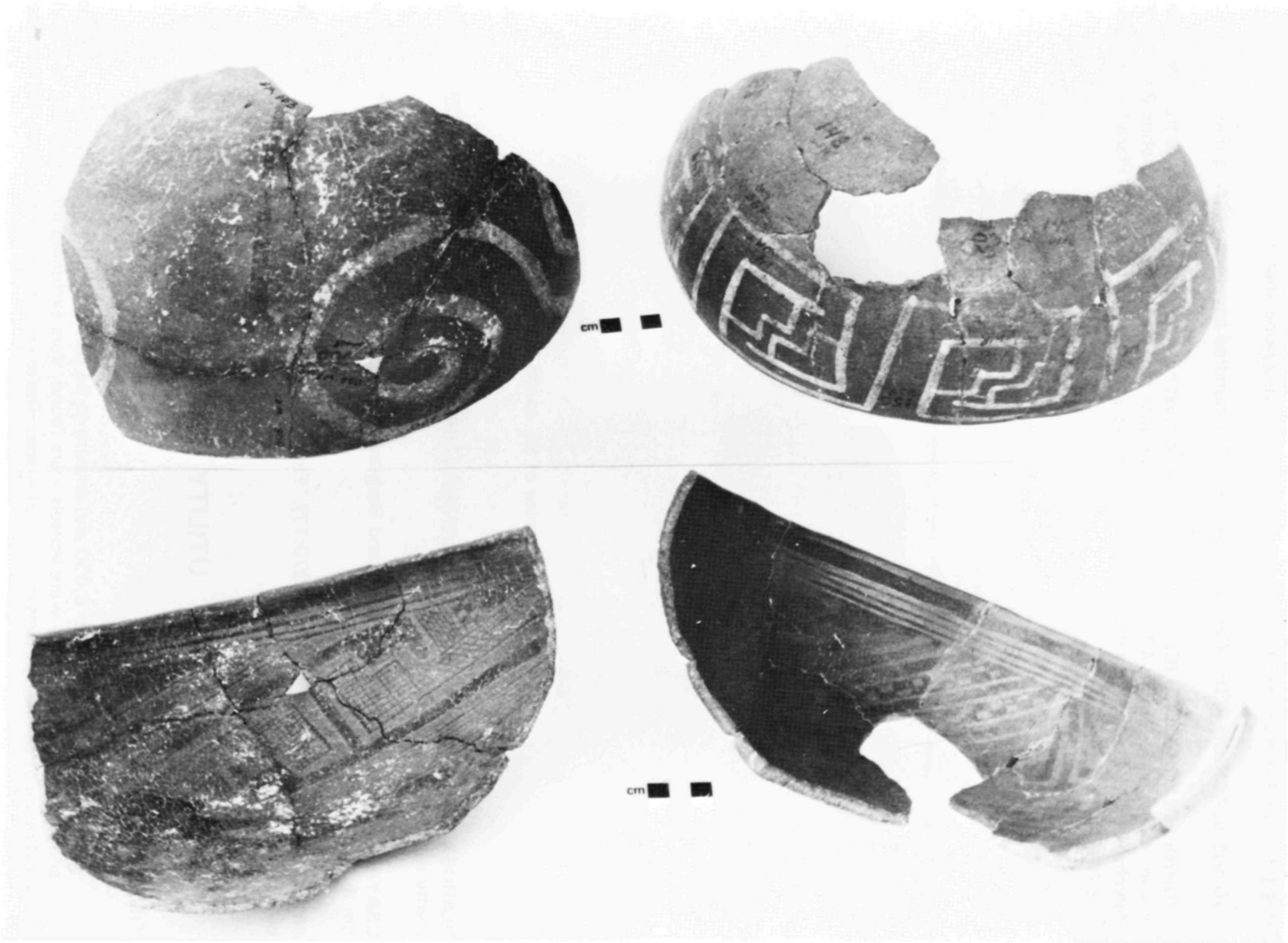


FIGURE 42: Portions of Reconstructed Vessels of St. Johns Polychrome Bowls From Sherds Scattered Throughout the Site.

FIGURE 43: Plate Made From the Bottom of a St. Johns Black-on-Red or Polychrome Bowl From Fill Above Floor III in West Plaza.

in an inverted position and buried beneath the floor of Room 1. This jar yielded the only uncharred vegetal remains uncovered and are probably of decomposed wood (Annita Harlan, personal communication). The jar measures 18 cm in height by 21 cm at its widest point. Corrugation has been smoothed over so that the coil lines are not visible while original indentations can still be seen. The vessel walls average 7 mm in thickness, contain abundant worn quartz sand temper and are quite weak and crumbly.

Two broken but restorable corrugated jars were found on the Floor II surface of West Plaza; one each just outside of rooms 3 and 4 (Figure 45). The jars appear to have been broken when burning roof beams fell on them.

A close-up of the jar found next to Room 4 is shown in Figure 46. This jar measures 34 cm by 34 cm and has the same surface treatment as the jar from Room 1, as well as the same worn quartz sand temper and wall thickness. The larger vessel has much stronger walls, however.

The other West Plaza jar is almost identical to the first, except the rather flat corrugations were not smoothed over and coil lines are visible. Further discussion on surface treatments is given below.

The fourth complete corrugated vessel was found on the kiva floor, and had been broken by falling, burning roof beams. It shares all the characteristics of the West Plaza vessels except surface treatment. Corrugations were alternated with groups of smoothed coils and formed with a small stick instead of the finger (Figure 47). It should be noted that such tool-depressed corrugations are not found on any other vessel or in the sherd collection from the rest of the site. This might indicate a special-use function for the vessel associated with kiva activities.

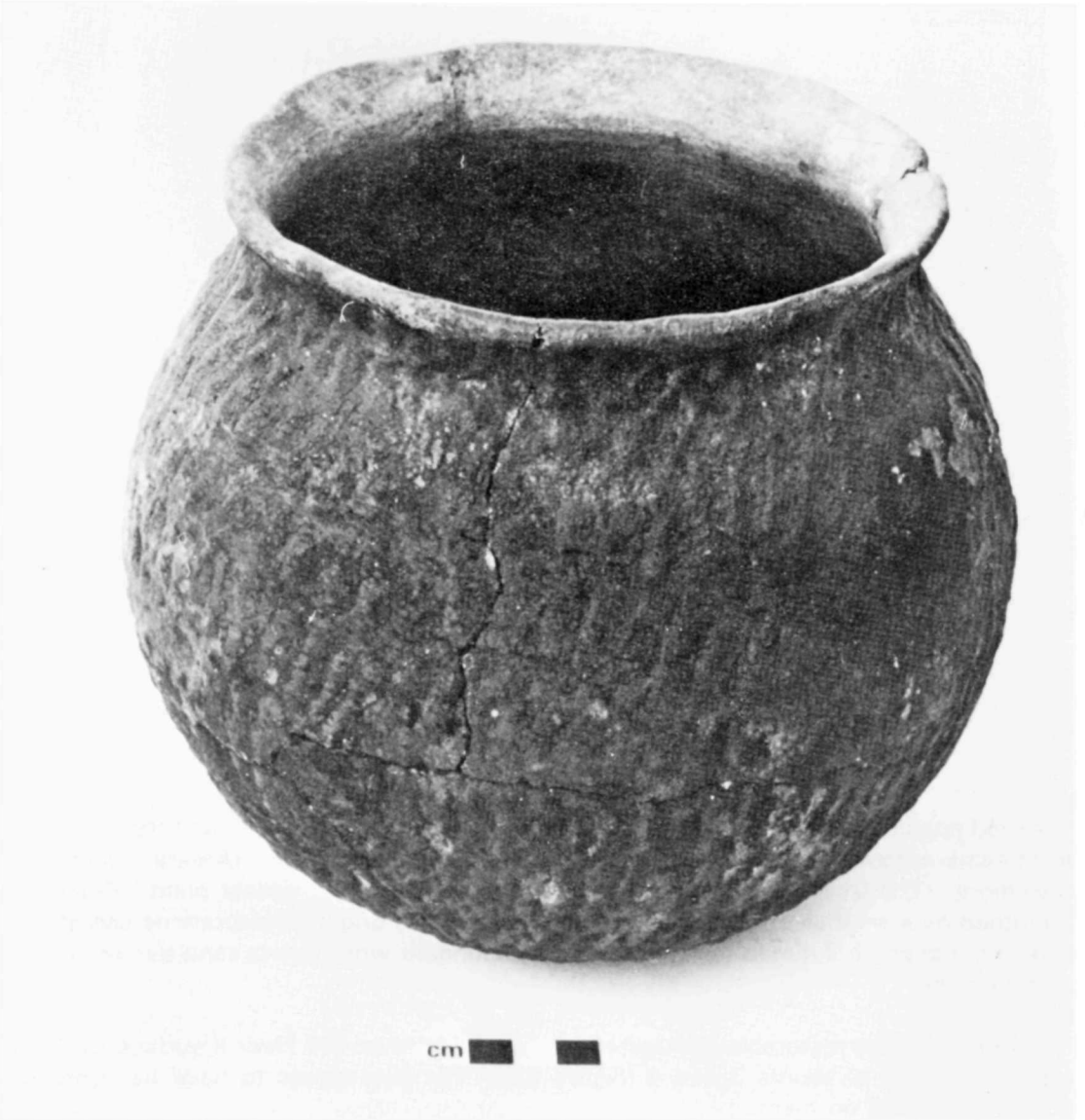


FIGURE 44: Small Corrugated Jar From Beneath Room 1 Floor.

SHERDS

An indigenous utility ware complex has yet to be defined in the Ganado area. Little or nothing has been written on utility wares associated with the main decorated wares from Wide Reed Ruin, i.e., Klageto Black-on-White and St. Johns Polychrome. Our sample of utility ware from the site is so small it precludes statements about representativeness. We are hesitant about pinning type labels on the utility ware sherds.

Worn or smooth quartz sand is present, to some degree, in all of the sherds and forms the principal tempering ingredient in most of them. Occasionally, inclusion of black, lustrous grains or cream-colored angular fragments can be discerned. These, however, are not associated with any particular variety of surface treatment or any other trait.

FIGURE 45: View North Across Floor II of West Plaza Showing Corrugated Jars In Situ.

In an attempt to discern some sort of distributional pattern of utility wares, exterior surface treatment seems the easiest trait to deal with, and the most likely to reflect any such existing pattern. The range of variation is shown in Figure 48. Most of the sherds (93 percent) fall into two main varieties we call "corrugated" and "rippled".

"Corrugated" makes up 54 percent of the utility sherds while "rippled" amounts to 40 percent. In general, our "corrugated" most closely resembles Tusayan Corrugated as illustrated in Beals, Brainard and Smith (1945:229). The main criteria used is that of "roundness" of coils and corrugation. Within this group six subdivisions are made on the basis of size, coil and corrugation.

"Rippled" more closely resembles Tusayan Corrugated as illustrated in Colton (1955:8A-11); sherds in this division display coils that are flattened and less pronounced corrugations, as illustrated in the sketch.

"Smoothed" (Figure 48a) most closely resembles Kiet Siel Gray, Navajo Mountain Variety as defined by Lindsay et. al. (1968:390-392). Vessel form, surface treatment and temper coincide with Lindsay's description except for the following:

1) None of the Wide Reed Ruin "smoothed" vessels or sherds display the yellowish-red and reddish-brown shades of the Navajo Mountain Variety. Comparison with Navajo Mountain Variety vessels at the Museum of Northern Arizona disclosed its paste texture is much more coarse and pitted than those from Wide Reed Ruin.

FIGURE 46: Restored Corrugated Vessel From Floor II of West Plaza Just Outside of Room 4.

2) "Dimpled" appears to be an exaggerated variety of "smoothed."

3) "Kana'a style" is identical to Kana'a Gray (Colton 1955:8A-5).

4) "Moenkopi style" and "smoothed with coil lines" both fit into the range of Moenkopi Corrugated (Colton 1955:8A-12).

5) "Grooved" has no known parallels.

6) "Plain" is represented by 219 small sherds scattered throughout the site and found mostly in fill. Color ranges from light to dark gray and quartz sand temper predominates.

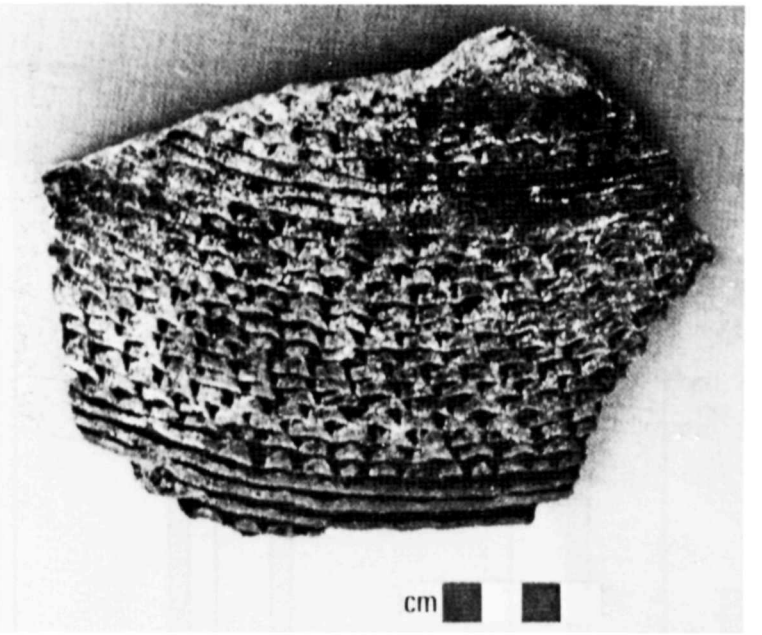


FIGURE 47: Corrugated Sherd From Kiva Floor Showing Surface Treatment.

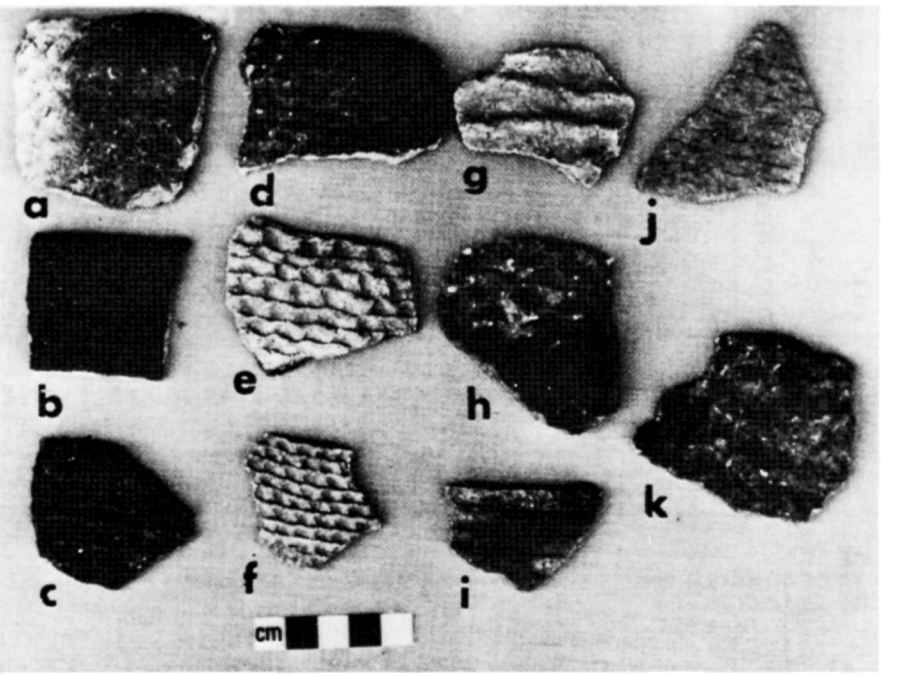


FIGURE 48: Range of Variation in Utility Ware Sherds.

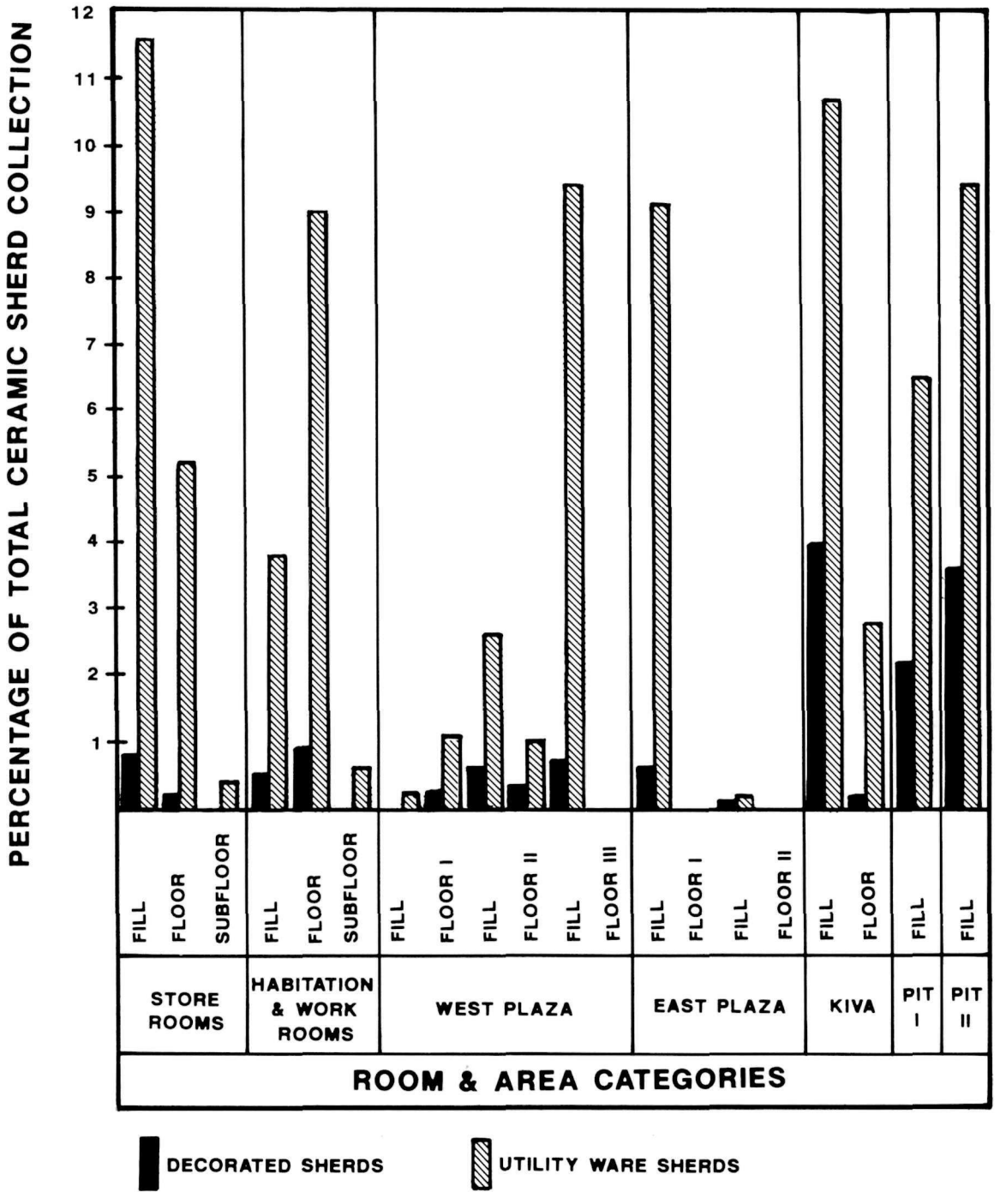


FIGURE 49: Distribution of Decorated and Undecorated Ceramics by Architectural Provenience.

After tabulating the number and distribution of sherds with surface treatments discussed above, it was found that no apparent distributional pattern is present (Figure 49). In other words, the ratio of various surface treatments in the rooms, plazas, etc., does not diverge significantly from the ratio reflected in the total collection. There is no correlation between the variation we see and site area type or function. The attempt to demonstrate intrasite variation is limited by the small area of the site excavated and the short period of occupation. We feel that the attempt was fruitful since the results represent a base line for variation of utility wares within sites. It is felt that such an approach will yield significant results when applied to larger excavated areas, larger sites and sites with longer occupation periods.

For utility sherds as a whole, there are areas of concentration. In store rooms the great majority are found in the fill, while in habitation and work rooms most are found on floor surfaces; in both plazas the majority were in the fill. This might indicate the habitation and work rooms were being used after the store rooms and plazas were no longer in service.

CHAPTER 5

TREE-RING DATES

James E. Mount

Wide Reed Ruin, being an open site, yielded almost no preserved vegetal material. It was only due to the fact that part of the pueblo burned that dateable specimens, in the form of charcoal, were saved for analysis.

Most of the charcoal logs were found on the floor surface of the West Plaza (Figure 50) and kiva, with smaller amounts on the floors of rooms 4 and 19 and the fill of Room 18 (Table 2). All are associated with gray, ashy contexts (see Figure 50). It seems fairly obvious that these sections of the site were burned immediately upon abandonment. The ramifications of this, along with evidence from artifact distribution, will be discussed in Chapter 10.

FIGURE 50: View Southwest of Charred Roof Beams on Floor II of West Plaza.

It appears that major construction took place between the summers of A.D. 1276 and 1277. Nearly all of the A.D. 1276 specimens have incomplete rings, suggesting they were cut during the growing season, i.e, July to September. Both of the A.D. 1277 dates are also incomplete and only two earlier cutting dates (A.D. 1275) occur in the material (William J. Robinson, personal communication). The A.D. 1277 dates represent minor additions to the plaza when Floor II was in use.

TABLE 2: Tree-Ring Dates.

PROVENIENCE	SPECIES	DATING		SPECIMEN NO.	REMARKS
		INSIDE	OUTSIDE		
Room 4, Floor	PNN	1143p	1276vv	41	Southwest corner of room
Room 18, Fill	PNN	1223p	1276r	3	
Room 19, Floor	PNN	1232p	1276r	44	
West Plaza Fill above Floor II	JUN	1238fp	1272vv	33	
	PNN	1200P	1277r	35	
	PNN	1239p	1276r	42	
Floor II	PNN	1210p	1276r	9	In front of Room 3
	PNN	1240p	1276r	17	In front of Room 3
	PNN	1251p	1276r	10	Bin I
	PNN	1237p	1276r	11	Bin I
	PNN	1234p	1276vv	20	In front of Room 4
	JUN	1187p	1276r	21	In front of Room 4
	PNN	1224p	1277r	29	In front of Room 4
	PNN	1244p	1276r	30	In front of Room 4
	PNN	1241p	1276r	31	In front of Room 4
	PNN	1245p	1276r	45	In front of Room 4
	PP	1232fp	1274+rB	23	
	PNN	1240p	1276r	25	
	PNN	1248fp	1276r	37	
	PNN	1249p	1276r	38	

TABLE 2: Tree-Ring Dates (continued).

PROVENIENCE	SPECIES	DATING		SPECIMEN NO.	REMARKS
		INSIDE	OUTSIDE		
West Plaza (continued) Fill above Floor III	PNN	1244p	1276r	26	
	PNN	1262p	1276r	27	
	PNN	1255p	1275r	28	
Floor III	PNN	1238p	1276rB	18	
	PNN	1231p	1276r	19	
Kiva - Floor	PNN	1145p	1275vv	1	
	JUN	1123+p	1271vv	2	20 cm west of hearth
	PNN	1171p	1272vv	4	
	PNN	1148p	1222vv	5	Southwest corner of floor
	PNN	1230p	1275r	6	Southwest corner of floor
	PNN	1242p	1273vv	7	Southwest corner of floor
	PNN	1193fp	1240vv	39	
	PNN	1208fp	1235vv	40	

p = Pith ring present.
fp = The curvature of the inside ring indicated that it is far from the pith.
r = Less than a full section is present, but the outermost ring is continuous around available circumference.
B = Bark present.
vv = There is no way of estimating how far the last ring is from the true outside.

These dates add strength, along with the architectural data, to the hypothesis that the site was planned and built as a unit. Abandonment may not have been as precipitous, however, as discussed below.

Kiva dates present a wider range of variation and are mostly *vv* dates. This could suggest the kiva was not constructed at the same time as the rest of the site. The one *r* date of A.D. 1275 (Specimen No. 6), however, indicates they were probably built at the same time. The radii of kiva beams falls neatly within the range of sizes from other parts of the site and the preponderance of piñon with a little juniper fits well with the general site pattern. Nothing, therefore, can be said about specialized wood material in kiva construction. As far as dating is concerned, it appears as if the wide range of dates is the result of poor preservation and incompleteness of the specimens recovered.

One interesting aspect of the cluster of dates from Wide Reed Ruin is that they correspond exactly with dates collected from kivas in Kin-Tiel (or Wide Ruin), which is a much larger site located approximately 15 mi south of Ganado (Mindeleff 1891; Fewkes 1901; Haury and Hargrave 1931). One of the two kivas (KT-1) excavated by Hargrave had no masonry walls. Other similarities between the sites are discussed further on in this report.

Analysis of the dendrochronological material shows that 41 out of the 45 specimens are piñon. The general area today is typically piñon-juniper-oak woodland and pollen profiles indicate a similar situation in the late A.D. 1200s (see Chapter 6). Even though all three species were abundant, piñon was sought as a favorite wood for building at Wide Reed Ruin.

CHAPTER 6

POLLEN STUDIES

James E. Mount

James Schoenwetter, Palynology Laboratory, Department of Anthropology, Arizona State University, was contracted to carry out the pollen analysis for Wide Reed Ruin. His report is presented in its entirety in Appendix II.

At the beginning of the project it was hypothesized that pollen profiles would reflect differential use patterns in various parts of the site (Table 3). A real breakdown based on architectural traits, room or area size, features such as hearths and bins, and artifact assemblages were the main variables used in inferring function. We had hoped to see a clustering of pollen types associated with categories of room form in a way similar to that of test results from Broken K Pueblo (Hill and Hevly 1968). As Schoenwetter states, however, at Wide Reed Ruin there was more variation within rooms than between them.

In our analysis, the term "domesticated plant pollen" was restricted to *Zea* (maize) and *Cucurbita* (squashes) since they are the only varieties represented that require cultivation. It should be noted that no sign of the usually omnipresent bean was found in the pollen record. This is not surprising since plants such as *Phaseolus* are insect-pollenated and thus would not be present in pollen rain.

Wild plants that were available in the area and which were, and are, used regularly by Pueblo and Athapascan peoples include *Cleome* (spider flower), Gramineae (grasses) and Cheno-am (goose-foot-amaranth composite). These plants are used heavily and are encouraged at times to the point of being semicultivated (Arthur Dennis and Annita Harlan, personal communication). Other wild plants that were, and are, used regularly as food sources include *Ribes* (currant), *Ephedra* (joint fir or Mormon tea) and *Celtis* (hackberry), in addition to trees such as *Quercus* (oak) and *Pinus edulus* (Colorado piñon). The pollen record from Wide Reed indicates these plants were available and very probably of economic importance. Well-preserved macro-vegetal remains from Antelope House in Canyon de Chelly National Monument reflect similar patterns of subsistence activities. Preserved vegetal remains from that site retain indications of the manner in which they were processed and used, and substantiate inferences made as to use of plants in the pollen profile from Wide Reed Ruin.

Tree-ring material preserved in the form of charcoal reflects heavy use of piñon with limited use of juniper and ponderosa pine as building material, as has already been noted (Chapter 5). Other plant varieties represented in the pollen rain are merely noted as being present in the area.

Even though the distribution of pollen varieties within the site does not correspond to our classification of room form and function, an analysis of variation between individual rooms proved interesting. Rooms 3, 4, 11 and 13, designated "Store Rooms" on the basis of size (average 2 m^2) and the absence of bins, hearths and other features, contained little or no pollen from cultivated plants at floor level. Relatively high counts of *Cleome* in rooms 3, 4 and 13 indicate storage of collected wild plants. Low counts of pollen from domesticates in storage rooms may also indicate storage of non-food items. Unfortunately, preservation was so poor as to preclude testing of this idea.

No positive indication of cultivated plants was found in rooms 8, 9 or 10, which were designated "Habitation and Work Rooms". This does not necessarily indicate the complete original absence of maize and squash in these areas. It is quite conceivable that food reaching these rooms

TABLE 3: Observed Pollen from Wide Reed Ruin.

SAMPLE NUMBER	PROVENIENCE	*Zea*	*Cucurbita*	*Leguminosae*	*Cleome*	Gramineae	Cheno-am	*Celtis*	*Ephedra Tor.*-type	*E. Nev.*-type	*Ribes*	*Pinus edulis*	*Quercus*	Unidentified *Pinus* thirds	*Juniperus*	*Pinus ponderosa*	Ambrosieae	Tubuliflorae	Liguliflorae	*Artemisia*	*Sarcobatus*	*Polygonum pers.*-type	*cf. Sphaeralcea*	*Cylindropuntia*	Psuedotsuga	Unknowns	Pollen sum	+ Ethnobotanic pollen
29	Rm. 1, Subfloor	2			4	6	46					47		15		1	24	27		18							200	+6
30	Rm. 2, Floor	7			2	5	36		16			46	7	21	22	6	16	15		22			1	1			200	+9
54	Rm. 2, Floor	3	1		3	2	41		5			49	8	24	19	2	13	18	1	33		1					200	+7
27	Rm. 3, Floor	1			4	5	37		4	2		44	6	33	23	4	26	24		13		1					200	+5
53	Rm. 3, Floor			1	4	4	55		3		3	41	4	16	26	6	25	14		4	1	2	1			5	200	+4
33	Rm. 4, Floor				1	11	122		6			81	8	22	50	6	45	28	1	24	5	1				5	400	+1
55	Rm. 4, Floor				5	4	40		2		3	63	2	15	19	12	27	8		12	3						200	+5
4	Rm. 8, Floor					5	39		1	1		27		23	24	6	43	33		13		1					200	
22	Rm. 8, Floor Bin	2			2	14	22			2		60	4	19	28	2	28	17		19							200	+4
6	Rm. 9, Floor					4	34		1			17		9	13	1	17	4		5							100	
7	Rm. 9, Floor				2	1	67		1			12	2	6	18		35	24		38							200	+2
9	Rm. 10, Floor					6	23	1			1	26		3	14	5	66	32		18	1					4	200	
31	Rm. 11, Floor					7	46		1			53		33	21	4	20	21		17							201	
56	Rm. 11, Floor				1	6	34		2	1		49	3	16	27	2	37	18		16							200	+1
58	Rm. 13, Floor				2	5	51		1			26	3	6	21	8	40	24		19		1					200	+2
59	Rm. 13, Floor	1			2	6	31		1			45	5	9	23	5	41	27		12							200	+3
61	Rm. 15, Floor	2				6	39		3			43	2	6	19	6	31	30		19							200	+2
20	W. Plaza, Floor III	3				5	24		2	1		32		19	18	14	30	10		6							148	+3
32	W. Plaza, Floor II, Bin 3	6				12	22		2			48	3	27	27	15	30	21		10		1					200	+6
43	E. Plaza, Floor II	2			1	4	40		4			49	1	15	16	13	26	16		22	1				1	2	200	+3

had been previously prepared in such a manner that pollen grains would not be distributed. An example would be corn gruel. The absence of certain types of pollen, then, would not be conclusive as regards original usage patterns.

A high count for *Zea* in Room 2 substantiates our view, based on architectural features, that it was a storage facility. More tentatively, the same can be said for rooms 15 and 18. The presence of some *Zea* in the West Plaza indicates a food preparation area, as surmised by the artifact collection and other features (Chapter 8).

Several important lessons were learned in the course of the Wide Reed pollen studies. Too many samples may prove inconvenient but are preferable to too few samples. Although much was gained by our study, it was felt by the author that more samples would have rendered greater flexibility in choosing and implementing pertinent tests of ideas concerning site area function and subsistence activities. We collected two or three samples from each floor surface and, usually, one from each feature such as mealing bin or hearth. Schoenwetter suggests that samples from fill, in addition to controlled sub-site and ground surface samples, would give a fuller contextual picture. More floor samples might substantiate interpretations made about their use, but it is doubtful that they would drastically change any of our views.

While it can be said that more samples would have been useful, we believe that enough data is at hand to state that pollen profiles do not necessarily reflect differential use of space. An interesting question for future workers to consider is: under what conditions are they valuable for use studies and when are they not?

CHAPTER 7

THE VERTEBRATE FAUNAL ANALYSIS OF WIDE REED RUIN

Stanley J. Olsen and John W. Olsen

A U.S. Geological Survey benchmark located near the site is at an altitude of 6332.07 feet above sea level. Wide Reed Ruin itself is located some three to five feet higher than this benchmark and can be placed in Arizona's Upper Sonoran Life-zone.

The information that can be made available to the archeologist through faunal analysis is indeed invaluable. This is especially true because the bulk of this information is not available from any other source. The significant data of this report is presented in Tables 4 and 5, which is more easily interpreted than if presented in a text discussion.

One of the first things one notices when working with the faunal material recovered from Wide Reed is the absence of aquatic vertebrates as either a source of food or of utilizing them in religious and other ceremonies.

Room 14 yielded an invertebrate (mollusk), possibly Permian or Triassic in age, which could conceivably have been used as a magical amulet or other form of bodily adornment. Room 14 also had the greatest abundance of bone, along with Pit II. At this time, there does not seem to be any correlation between depth of excavation and amount of material recovered. Room 14 was not the deepest room dug, nor was Pit II the deepest pit, although both were taken down to floor level. Pit II was not completely excavated due to the imminent danger of undermining another room. Perhaps when excavation is complete, generalizations and conclusions can be drawn about the area's purpose and perhaps explain why such an abundance of bone occurred there.

In terms of abundance, the Desert Cottontail (*Sylvilagus auduboni)* constitutes the bulk of animal bone recovered from Wide Reed. Although a total of 866 *Sylvilagus* bones was analyzed, this large number can be misleading in terms of actual food value represented.

An average three-pound cottontail only provides one pound of useable meat while a 170-pound Mule Deer (*Odocoileus hemionus*) will provide 85 pounds of useable meat. A close examination of recovered bone shows that a minimum of two deer, supplying at least 170 pounds of meat, were recovered from the site. At the same time, a minimum of 49 Desert Cottontails was recovered. However, the food supply from this source would only amount to about 50 pounds of useable meat. It appears that the Mule Deer and the Desert Cottontail were the animals of greatest importance to the Wide Reed Ruin Anasazi - the Mule Deer primarily because of its greater volume of useable food products, and the Desert Cottontail because of the fact that it is easily caught. While deer hunting demanded a great deal of skill, as well as stamina, the children and older residents of Wide Reed Ruin could trap and stone rabbits to provide a meager but stable source of food for the pueblo.

It is interesting to note that the only avian form present in the Wide Reed faunal list is the Wild Turkey *(Meleagris gallopavo).* There is an absence of the birds generally associated with religious ceremonies such as the woodpecker, parrot and eagle. No other bird bones, except an unidentified

TABLE 4: Vertebrate Faunal Remains by Species.

Species	Numbers of Bones of Individuals	Minimum Numbers of Individuals	Percent of Total of Each Individual
Lepus californicus - Black Tailed Jackrabbit	211	8	16.00
Sylvilagus auduboni - Desert Cottontail	866	49	65.66
Odocoileus hemionus - Mule Deer	74	2	5.61
Antilocapra americana - Pronghorn Antelope	5	1	0.38
Meleagris gallopavo - Wild Turkey	71	4	5.38
Citellus sp. - Ground Squirrel	7	1	
Canis sp. - Dogs and relatives	7	1	
Canis familiaris - Domestic Dog	1	1	6.97
Sigmodon sp. - Common Cotton Rat	2	1	
Lynx rufus - Bobcat	2	1	
Neotoma cf. albigula - White-throated Wood Rat	1	1	
Unidentifiable Fragments	72		
Total:	1,319	70	100.00

TABLE 5: Vertebrate Faunal Remains by Element and Species.

A. DESERT COTTONTAIL RABBIT					
Element	Left	Right	Indeter-minate	Fragment	Remarks
Skull			2	21	
Mandible	49	31		4	
Vertebra				8	
Cervical			1		
Thoracic					
Lumbar			27		1*
Scapula	17	20		9	
Sacrum			1		
Pelvis	30	25		9	3*
Femur	20	33		15	1*
Tibia	21	22		40	1*, 1w
Fibula					
Metatarsal/carpals			60		
Astragalus	3	2			
Calcaneum				2	
Humerus	17	21		13	
Ulna	35	33		14	
Radius	11	10		33	
Metapodial			6		
Ribs			32		
Phalanges			30		
Teeth			45		
Total Number of Bones: 866 (including 31 unidentifiable)					

TABLE 5: Vertebrate Faunal Remains by Element and Species (continued).

B. BLACK TAILED JACKRABBIT					
Element	Left	Right	Indeter-minate	Fragment	Remarks
Skull				11	
Mandible	6	5			
Vertebra					
Cervical					
Thoracic					
Lumbar			10		
Scapula	5	3		3	1*
Humerus	8	6		5	
Ulna	3	2		8	
Radius	1	1		4	1y
Sacrum			1		
Pelvis	5	5		3	
Femur	8	3		8	2*, 1y
Tibia	5	7		10	@2
Fibula					
Metatarsal/carpal			40		
Astragalus					
Calcaneum	4	1		1	
Metapodial					
Ribs			8		
Phalanges			1		
Teeth					
Total Number of Bones: 148					

TABLE 5: Vertebrate Faunal Remains by Element and Species (continued).

C. MULE DEER					
Element	Left	Right	Indeter-minate	Fragment	Remarks
Antler				1	
Skull				4	
Rib			1	12	
Vertebra					2E
Cervical					
Thoracic			4		1*
Lumbar			5		
Sacrum				1	
Phalanges			8		2t
General Limb Bones (unidentifiable)				13	8*
Femur		1		1	
Tibia				1	
Calcaneum	2	2			
Metapodial				3	@1
Carpal			2		
Sternabra			1		
Humerus				1	1*[1]
Radius				1	1*[1]
Sesamoid			1		
Astragalus			2		1*w
Total Number of Bones: 74					

D. PRONGHORN ANTELOPE					
Element	Left	Right	Indeter-minate	Fragment	Remarks
Mandible				1(rt)	
Metapodial				1	
Tibia				1(rt)	
Astragalus				1[1]	
Calcaneum				1[1]	
Total Number of Bones: 5					

TABLE 5: Vertebrate Faunal Remains by Element and Species (continued).

E. WILD TURKEY					
Element	Left	Right	Indeter-minate	Fragment	Remarks
Scapula	1				
Vertebra					
Cervical			4		
Rib			1		
Sternum				3	
Humerus		3		3	2*
Ulna	1			4	5*
Radius	1				1
Coracoid	2	2			
Wing Bone Fragments					5, 4*, 1y
Pelvis			1		
Limb Fragments				9	6*
Femur				2 (1 indiv.)	
Furculum				3 (1 indiv.)	
Carpometacarpus		4		4*	
Tarsometatarsus		1♀		2*	
Tibiotarsus				7	3 tubes
Fibula				1	
Cuneiforms			1		
Phalanges			6		
Total Number of Bones: 71					

F. DOMESTIC DOG					
Element	Left	Right	Indeter-minate	Fragment	Remarks
Humerus		1			1*
Total Number of Bones: 1					

TABLE 5: Vertebrate Faunal Remains by Element and Species (continued).

G. BOBCAT					
Element	Left	Right	Indeter-minate	Fragment	Remarks
Scapula	1	1			
Total Number of Bones: 2					
H. COMMON COTTON RAT					
Element	Left	Right	Indeter-minate	Fragment	Remarks
Femur				2	
Total Number of Bones: 2					
I. WHITE-THROATED WOOD RAT					
Element	Left	Right	Indeter-minate	Fragment	Remarks
Pelvis				1	
Total Number of Bones: 1					
J. "OTHER" AND UNIDENTIFIABLE BONE					
Total Number of Bones: 77					

Key to abbreviations in "Remarks":

* = Burned Bone

w = Worked Bone

E = Vertebral Epiphyses

@ = Bone Awl

y = Young Individual

[1] = Same Individual

♀ = Female

crow-sized passerine fragmentary ulna and the Wild Turkey remains, were found. Room 10 yielded quite a few *Meleagris* limb and wing remains, possibly indicating another food source. Most of these elements are burned, further substantiating this possibility.

The worked bone recovered from Wide Reed Ruin again reflects the important role that the Desert Cottontail played in the economic milieu of the Wide Reed Anasazi. Although in most Southwestern sites, awls made from *Sylvilagus* limb elements are comparatively rare; a high percentage of the awls excavated at Wide Reed Ruin were of this origin (Figure 51 a-d and f-k). The Black-tailed Jackrabbit (*Lepus californicus)* was also used extensively for this purpose. The elements most frequently utilized include the radius, ulna and tibia.

Pit II, Layer IV yielded a bone tube made from the proximal end of a *Meleagris* tibiotarsus. Several other tubes were recovered, indicating usage as bodily adornment or possibly as part of a medicine kit.

Perhaps the finest bone artifact excavated at Wide Reed Ruin was in the form of a small, delicately carved and drilled pendant (Figure 52b). It appears to have been fashioned from a humerus fragment of a large artiodactyla and has been carefully ground and drilled to its present shape. Because this ornament was also recovered from Pit II, one wonders if this area of the pueblo had special religious significance. As stated, Pit II has not been fully excavated and, for this reason, one can only speculate as to its intended function.

Much of the animal bone recovered from Wide Reed Ruin was burned and both old, as well as young, individuals were procured. Age of animal bones was determined by the degree of epiphysial fusion in the post-cranial elements.

Although the faunal material recovered from Wide Reed Ruin represents a broad range of animals, certain economic staples are clearly evident.

As stated, the bulk of the information gained from the faunal analysis of Wide Reed Ruin is presented in table form for easier reference and comparison.

COMMENTS ON THE FAUNA AT WIDE REED

B. Dean Treadwell and James E. Mount

The first thing noticed about the faunal collection was the lack of aquatic vertebrates, both fish and amphibian. We have practically no information on the availability of such species in the immediate area. If they were available, it is completely possible that they were consumed on the spot of capture. Other factors that could account for their absence is the poor preservation quality of the wet sand at Wide Reed Ruin. In addition to this, excavation techniques were such that aquatic vertebrate remains could have been missed. Since we were not looking specifically for such remains and used a ¼-inch screen for fill sifting, it is possible that such remains were missed, but not likely.

In addition to the comments above, it will be noted that there was general absence of riverine forms -- bear, raccoon, etc. There are no bighorn sheep, elk or definite coyote-fox types. Small rodents are represented only by a few ground squirrel types, one woodrat and a cotton rat. Because of the small amount of animal bone collected in the excavation area, the representativeness of our sample is in doubt.

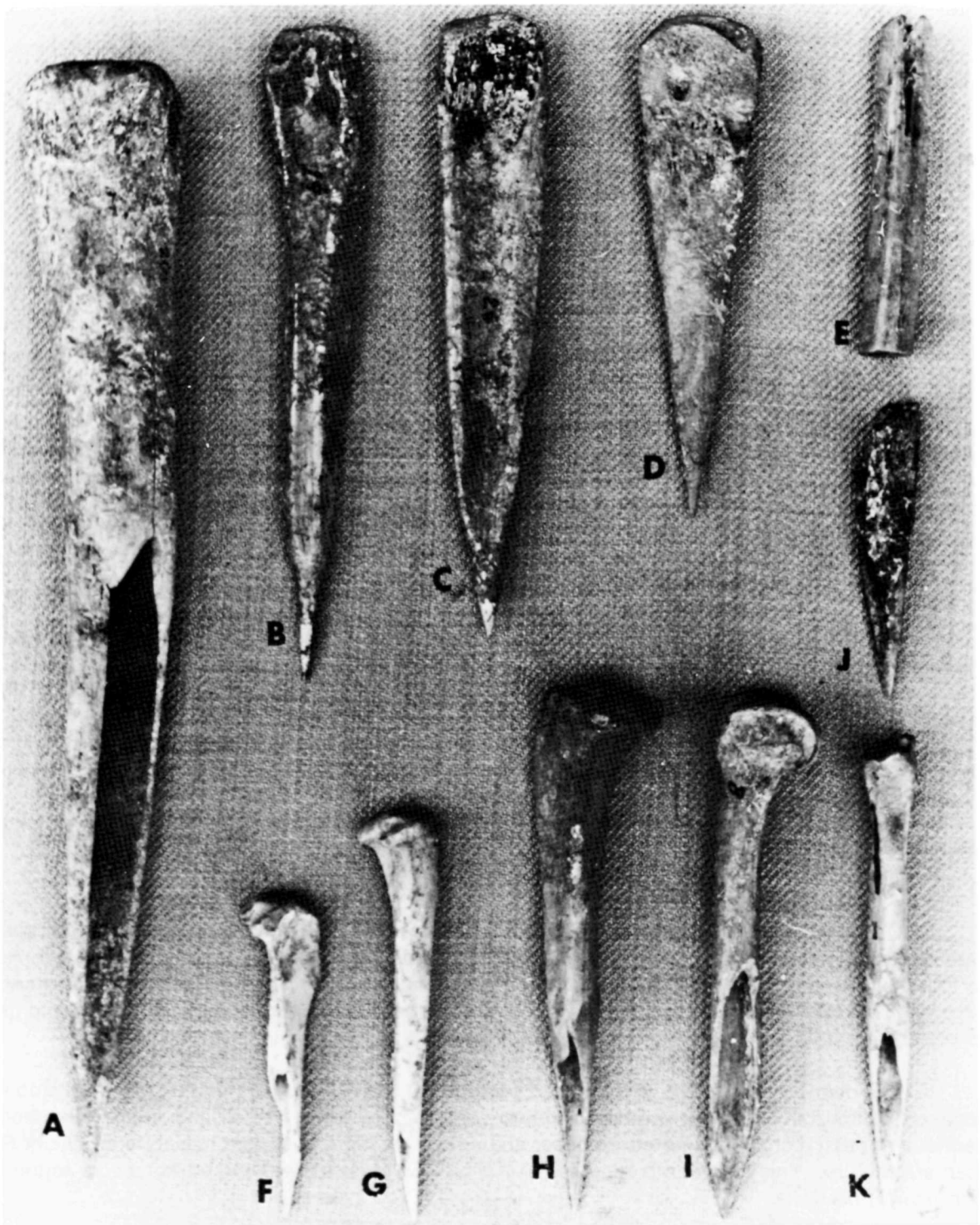


FIGURE 51: Selected Bone Artifacts: a, Whole Bone Awl of Fracture Construction; b-d, Splinter and Split Bone Construction; e, Bone Tube; f-i, Whole Bone Awls of Fracture Construction; j-k, Whole Bone Awls With Ground Points (j = rib fragment).

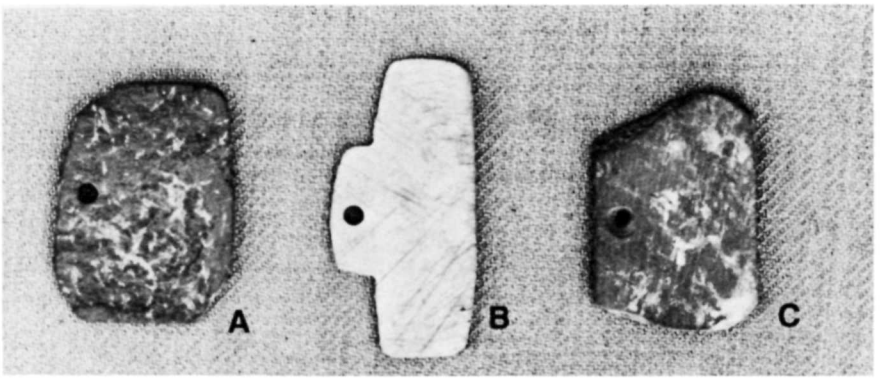


FIGURE 52: Pendants From Wide Reed Ruin.

Although many of the units excavated within the site represent areas where trash and faunal remains eventually wound up, we found no formal, exclusive trash area. We would suspect that such an area would have been located in or near the Pueblo Colorado Wash, which has since meandered southward, thus consuming a sizeable portion of the site. Even if the trash dump were intact, we would question statements about any species providing stability to a subsistence system. In brief, only a small portion of the site was excavated, thus further limiting an already limited sample. The most we can say at this moment is that hunting was used to supplement a vegetal diet.

The most abundant species - in terms of bone count - is the Desert Cottontail but, as noted, the high figure of 866 total bones may be misleading as regards food value. White (1953:396) notes that the average cottontail weighs 3.5 pounds, which includes only about 1.75 pounds of useable meat. On the other hand, the average 200-pound Mule Deer produces 100 pounds of meat. This means that it takes about 57 cottontails to provide the same amount of meat as a Mule Deer. Such variables are important to keep in mind when examining frequencies of bones shown on the chart.

Bird bones are restricted to Wild Turkey and one unidentifiable crow-sized passerine fragmentary ulna. Most of the turkey bone is from Room 10 and had been burned. It was not noted whether these bones bore butchering marks or signs of food preparation.

One find was extremely interesting. The presence of the cotton rat (*Sigmodon sp.)* was established on the basis of two femurs. The range of this animal today is from southeastern Arizona to Phoenix and probably up the Verde Valley. It extends west to the Colorado basin of southwest Arizona (Cockrum 1960:188). One can only speculate on how this anomalous species found its way to Wide Reed Ruin.

The distribution of bone material was patterned in several ways (Table 6). There is a complete absence of bone in the store rooms. Although the sample is very small and inferences should be cautious at best, it should be noted that deer and turkey are more abundant in Habitation-Work Rooms than are rabbits. This situation is reversed in the pit fill. Most of the worked bone was found in the two pits (Table 7).

Most of the bone material was found in the overburden above, and fill within, the kiva and two pits. There, proveniences, especially overburden, were quite jumbled and contained, beside bone material, heavy ash concentration along with masonry rubble. Stratigraphy was difficult to control in this area due to its jumbled nature and river erosion. Despite this, the upper levels seem to have been

TABLE 6: Taxon/Provenience Distribution of Faunal Remains.

PROVENIENCE		Invertebrate	*Sylvilagus audubonii*	*Lepus californicus*	*Citellus sp.*	*Neotoma cf albigula*	*Sigmodon sp.*	*Canis familiaris*	*Canis sp.*	*Lynx rufus*	*Odocoileus hemionus*	*Antilocapra americana*	Artiodactyla	Human	Mammalia	*Meleagris gallopavo*	Passerine	Unidentifiable	Totals - Unworked/Worked
Store Room	Fill																		
	Floor																		
	Subfloor																		
	Total																		
Habitation/ Work Rooms	Fill	1	5	5							7	3	3/1		4/1	4			32/2
	Floor			1							0/1		1/2	0/1	1	8/1			11/5
	Subfloor																		
	Total	1	5	5							7/1	3	4/3	0/1	5/1	12/1			40/7
West Plaza	Fill																		
	Floor I		3										2						5
	Fill			2												1			3
	Floor II		1								1				1			1	4
	Fill		1											5					6
	Floor III																		
	Total		5	2							1		2	5	1	1		1	18
East Plaza	Fill		1																
	Floor I		1												5			5	11
	Fill		1	1														7	9
	Floor II										2		2						4
	Total		3	1							2		2		5			12	25
Kiva	Overburden		95	34		1					11		6			9		19	125
	Floor		9	6									1/1		6	2			24/1
	Sub-surface		1	1				7					1			1			11
	Total		105	41		1		7			11		8/1		6	12		19	210/1
Pit I	Fill		13	12									0/1		5	5	1	11	47/1
	Total		13	12									0/1		5	5	1	11	47/1
Pit II	Fill		620/3	124/6			2		1	2	38		18/3		3	25/4		3	836/16
	Total		620/3	124/6			2		1	2	38		18/3		3	25/4		3	836/16

/ = Unworked/Worked

TABLE 7: Worked Bone from Wide Reed Ruin.

PROVENIENCE	TOOL TYPE	FAUNAL SOURCE (taxa-element-age/sex)	COMMENT
1. Pit I Level III	awl, splinter no articulation ground construction gradual taper point	Artiodactyla rib	point moderately polished with diagonal striations; rest of tool exfoliating length: 47.6 mm
2. Pit I east slope mixed fill	awl, splinter no articulation fracture construction gradual taper point	Leporidae "long bone"	exterior polished length: 37.4 mm
3. Pit II mixed fill	tube	*Meleagris gallopavo* tibiotarsus, right proximal section cf young aduld; female	only one end cut; moderate root etching length: 69.8 mm
4. Pit II Level III	awl, split modified articulation ground construction abrupt taper point	Artiodactyla metapodial distal end adult	edges and point polished; erratic striations; moderate root etching length: 80.2 mm
5. Pit II Level IV	tube	*M. gallopavo* tibiotarsus, right proximal end cf female	both ends cut; fibular crest ground off and polished; moderate root etchings length: 53.6 mm
6. Pit II Level IV	awl, split (fragment) no articulation fracture construction gradual taper point	*Lepus californicus* tibia medial fragment	dull point; erratic striations length: 77.6 mm

Definition of terminology:

Whole bone: Entire circumference present except at point.
Split bone: Generally one-half of circumference present; element purposely split along one major longitudinal axis.
Splinters: Any piece resulting from fracturing, a fragment is considered a piece of the original tool.

The articulation refers to the "head" end of the bone and can either be entire, modified or absent.

Construction method primarily considers the formation of the working end (point). A ground type is formed by friction against an abrasive object, the roughness is often polished from use, but characteristically both sides of the working end are rather symmetrical. A fracture type is just crudely broken into the desired shape. If the point is ground at all it is considered a ground type as usually all initial construction involves fracturing.

Point type: An abrupt taper point has concave sides; a gradual taper has convex; and an equi-taper is self-explanative.

TABLE 7: Worked Bone from Wide Reed Ruin (continued).

PROVENIENCE	TOOL TYPE	FAUNAL SOURCE (taxa-element-age/sex)	COMMENT
7. Pit II Level IV	awl, whole with articulation fracture construction gradual taper point	*L. californicus* radius, right distal end immature male	point irregular; little root etching length: 65.3 mm
8. Pit II Level IV	awl, whole with articulation fracture construction gradual taper point	*M. gallopavo* tibiotarsus, right distal end adult female	longitudinal striations; moderate root etching length: 84.8 mm
9. Pit II Level IV	awl, split no articulation fracture formed gradual taper point	Artiodactyla cf. *Odocoileus sp.* metapodial adult	blunt point; exfoliated and root etched length: 101.1 mm
10. Pit II Level V	awl, whole with articulation fracture formed gradual taper point	*Sylvilagus sp.* tibia, right proximal end adult	moderate polish and root etching length: 51.4 mm
11. Pit II Level V	awl, whole with articulation fracture construction gradual taper point	*Sylvilagus sp.* tibia, left proximal end adult	moderate polish with diagonal striations; moderate root etching length: 66.0 mm
12. Pit II Level V	awl, whole with articulation fracture construction gradual taper point	*Sylvilagus sp.* tibia, right proximal end immature male	point dull, moderate polish but no striations; moderate root etching lenght: 62.7 mm
13. Pit II Level V	awl, whole no articulation fracture construction gradual taper point	*Lepus sp.* tibia, right proximal end	point dull; root etched lenght: 92.9 mm
14. Pit II Level VII	unclassified	*Lepus sp.* tibia, left proximal end adult	proximal articulation drilled perpendicuar to shaft which is absent; perhaps a suspended awl
15. Pit II Level VII	tube	*M. gallopavo* tibiotarsus medial section	both ends cut; extensively root etched length: 62.7 mm

TABLE 7: Worked Bone from Wide Reed Ruin (continued).

PROVENIENCE	TOOL TYPE	FAUNAL SOURCE (taxa-element-age/sex)	COMMENT
16. Pit II Level VII	pendant	cf. artiodactyla "long bone"	not polished; striations cross-hatched and very prominent on one side
17. Pit II Level VII	awl, whole with articulation fracture construction gradual taper point	*Lepus sp.* tibia, right proximal end young adult	some diagonal striations; articulation weathered; moderate root etching length: 85.7 mm
18. Pit II Level VI	awl, whole with articulation ground construction gradual taper point	*Lepus sp.* tibia, right distal end adult	articulation weathered; moderate root etching length: 76.4 mm
19. Kiva bottom Layer II	awl, splinter modified articulation ground construction abrupt taper point	Artiodactyla metapodial adult	actual point about 20 mm; well polished; circumferential striations posterior of point 1.:105
20. Room 18 floor	awl, whole with articulation fracture-ground gradual taper point	*Odocoileus hemionus* tibia, right distal end immature male	partially mineralized?; very stout tool; root etched length: 176.8 mm
21. Room 18 floor	awl, whole with articulation ground construction gradual taper point	*M. gallopavo* tibiotarsus, right proximal section cf. female	very weathered length: 151.5 mm
22. Room 2 floor	awl, splinter no articulation ground construction abrupt taper point	Mammalia cf. *Homo sapien* "long bone"	weathered; root etched length: 74.6 mm
23. Room 4 floor	awl, splinter no articulation ground construction equi-taper point	Artiodaactyla "long bone"	root etched lenght: 57.2 mm
24. Room 8 floor	awl, splinter modified articulation ground construction equi-taper point	Artiodactyla "long bone"	very weathered, exfoliated; root etched length: 99.2 mm

TABLE 7: Worked Bone from Wide Reed Ruin (continued).

PROVENIENCE	TOOL TYPE	FAUNAL SOURCE (taxa-element-age/sex)	COMMENT
25. Room 9 fill	awl, splinter no articulation ground construction gradual taper point	Mammalia	very weathered; root etched length: 77.3 mm
26. Room 14 fill	awl, splinter modified articulation ground construction abrupt taper point	Artiodactyla cf. *Odocoileus sp.* metapodial cf. immature male	polished; weathered and etched length: 98.6 mm

Identifications: 1-18, 25 Olsen and Olsen; 19-24, 26 Treadwell; Worked bone data compiled by Treadwell.

associated with the hearth on Floor I of West Plaza. This whole area seems to have been re-used after initial abandonment by a somewhat temporary hunting group. It is important to note that faunal remains in these areas may not represent parts of the diet of the original occupants of the pueblo.

A total of 26 worked bones was recovered, of which awls make up the greatest part. Three bone tubes, one pendant and one possibly whole bone drilled for suspension (Figure 53) make up the remainder of the collection. Most of the information on these artifacts is contained in Figures 51-53, and Table 7.

Awl types were made from either whole, split or splintered bone. The most common method employed was fracturing with some grinding. Most appear to have been hurriedly made and heavily used. Almost all tools were made from bones of artiodactyla (Mule Deer?), leporid (both cottontail and jackrabbit) and turkey. The bone tubes are from turkey.

The amount of actual trash material retrieved was a function of: 1) the size of the pits, and 2) the situation of Room 10 over the trash. It is felt that the greater bulk of the trash produced by the inhabitants of the site has long since been washed away by the Pueblo Colorado Wash. Little can be said, then, about relative reliance on agricultural versus wild animal food sources. By analogy with modern pueblo groups, and by observing the amount of formalized space given to agricultural storage facilities, it is fairly certain that most of the food consumed was cultivated.

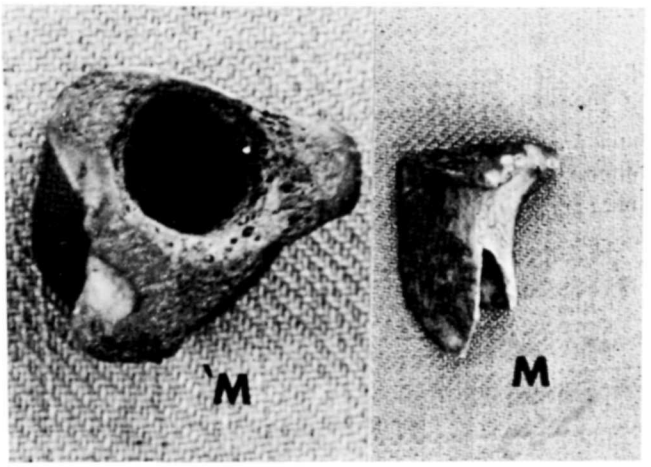


FIGURE 53: Unclassified Bone Artifact From Wide Reed Ruin.

GROUND STONE

James E. Mount

With two possible exceptions, ground stone artifacts at Wide Reed Ruin display purely utilitarian traits. All are made of sandstone readily available in the area. Manos and metates together make up almost 80 percent of the total collection and, in general, show signs of heavy and complete use. Distribution of ground stone artifacts is shown in Table 8.

MANOS

Most manos are large enough to be used with two hands. In this study, size requirements for manos is a length of 20-30 cm, a width of 10-15 cm, and a thickness of 3-5 cm. Any surface suitable for grinding was used, and the number of grinding surfaces on any single mano ranged from one to four (Figure 54).

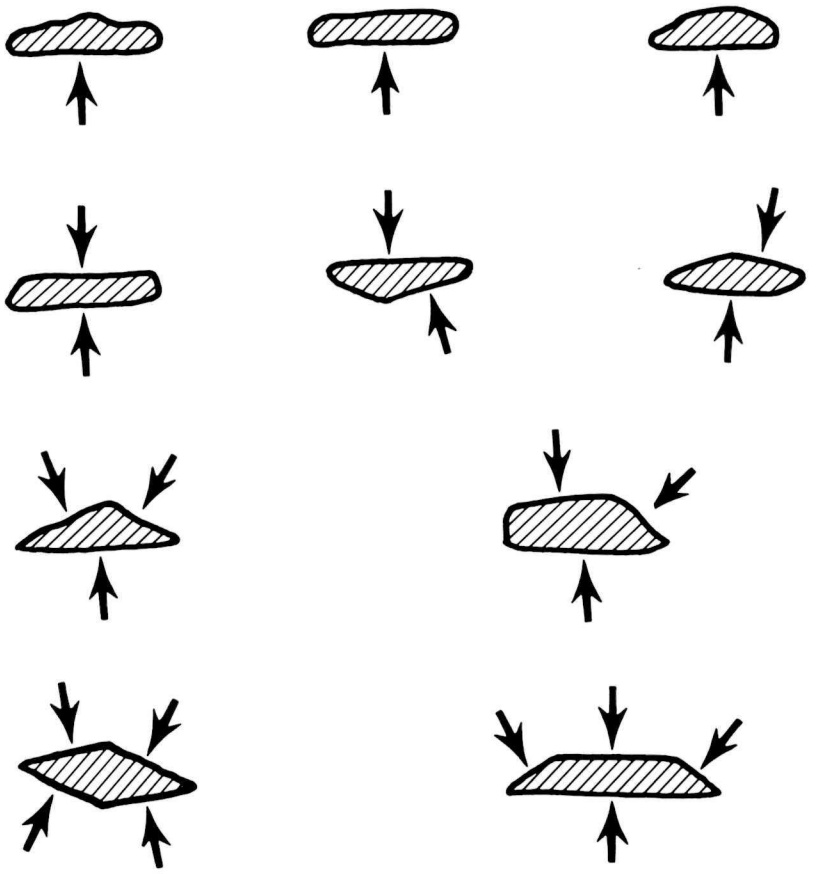


FIGURE 54: Grinding Facet Patterns on Manos.

TABLE 8: Distribution of Ground Stone Artifacts by Provenience.

PROVENIENCE		Manos	Metates	Axes	Hammers-grooved	Hammerstone	Grooved Stone	Mortar	Pestle	Other
Store Rooms 1,2,3,4,5,6,7, 11,13,15,16,17	Fill	4	1	1						1
	Floor	4								
	Subfloor	2								
Habitation and Work Rooms 8,9,10,14,18,19	Fill	2								1
	Floor	5	2						1	1
	Subfloor									
West Plaza	Fill									
	Floor I	1	1					1		
	Fill	3	3		1					1
	Floor II	3	2		1					
	Fill	13	1	1		1				2
	Floor III		3	1						
East Plaza	Fill	3								
	Floor I	3	1				1			
	Fill									
	Floor II									
Kiva	Fill									
	Floor	4								1
Pit I	Fill		1							
Pit II	Fill	1								
Totals		48	15	3	2	1	1	1	1	7

Measurements given below are length-x-width-x-thickness. Since the original long axis was easy to determine, even on fragments, 'length' was recorded as such even when it was shorter than width.

Room 1, Fill:	31 x 11.4 x 1.5 cm. Three grinding surfaces. Long rectangular shape with rounded ends. One longitudinal edge had many small chips removed.
Room 2, Floor:	12.7 x 11.7 x 3.75 cm. Fragment with one grinding surface.
	15.3 x 12.3 x 6.9 cm. Fragment with one grinding surface. Opposite side pecked but not used for grinding.
	10.2 x 11.6 x 3.3 cm. Fragment. Two grinding surfaces.
Room 3, Subfloor:	14.4 x 9.4 x 3.3 cm. Rectangular to oval shape. Three grinding surfaces.
Room 4, Floor:	17.7 x 12.3 x 1.9 cm. Rectangular with rounded ends. One grinding surface.
Room 5, Fill:	34.8 x 12 x 3.4 cm. Rectangular to oval. Two grinding surfaces on one side.
	9.3 x 10.8 x 2.9 cm. Fragment. Rough rectangular shape. Three grinding surfaces.
Room 5, Subfloor:	22 x 10.9 x 2.6 cm. Fragment. Rectangular with rounded ends.
Room 7, Fill:	29.6 x 11.8 x 3. Rectangular shape with rounded ends. Four grinding surfaces, two on each side.
Room 8, Floor:	10.7 x 9.1 x 1.8 cm. Fragment. Both sides are flat and pecked. Originally, probably part of a larger slab.
	15.3 x 11.6 x 1.8 cm. Fragment. Two slightly convex grinding surfaces.
Room 9, Floor:	17.3 x 11.7 x 3.9 cm. Fragment. Rectangular to oval shape. One grinding surface with opposite side pecked but not ground.
	17.4 x 13.2 x 5.1 cm. Fragment. Oval. Two grinding surfaces.
Room 9, Fill:	14.9 x 9.4 x 2.5 cm. Fragment. Rectangular with rounded ends.
	11.3 x 12.8 x 3.6 cm. Fragment. Two grinding surfaces.

Room 14, Floor:	19.2 x 11.6 x 2.5 cm. Rectangular with rounded ends. Three grinding surfaces.
	28.2 x 12.1 x 2 cm. Very rough rectangle with many chips removed from edge. Two grinding surfaces.
West Plaza, Fill above Floor III:	14.3 x 7.8 x 2.3 cm. Fragment. Two grinding surfaces on one side.
	31 x 11.7 x 1.65 cm. Rectangular with rounded ends. Two grinding surfaces on one side.
	34.6 x 12.9 x 2.6 cm. Rectangular with squared corners. Two grinding surfaces, one showing very limited use.
	32 x 12.4 x 2.3 cm. Rectangular with one end squared, the other rounded. One grinding surface.
	24.8 x 11.9 x 5.5 cm. Rough rectangle. One grinding surface showing very limited use.
	34 x 12.9 x 2.6 cm. Long rectangle with slightly rounded ends. Two grinding surfaces.
	29.7 x 12 x 3.5 cm. Rectangular with rounded ends. One grinding surface with pecking on opposite side.
	27.8 x 11.7 x 3.2 cm. Rectangular shape with very rounded ends. One grinding surface.
	28.7 x 11.5 x 3.2 cm. Rectangular to oval shape. Two grinding surfaces.
	22.9 x 11.5 x 5.6 cm. Rectangular with very rounded ends. One grinding surface.
	27.9 x 12.6 x 3.4 cm. Rectangular to oval shape with slight indentations in middle. One grinding surface with very rough (pitted) opposite side.
	28.7 x 11.45 x 3.25 cm. Rectangular to oval shape with two grinding surfaces.
	31.3 x 11.9 x 3 cm. Rectangular with one rounded end. Two slightly concave grinding surfaces.
West Plaza, Floor II, Bin:	12.9 x 8.2 x 2.5 cm. Fragment. Three grinding surfaces, two on one side.

	29.7 x 10.7 x 3.7 cm. Rectangular with slightly rounded end and slight indentations in middle of long edges. Two grinding surfaces.
West Plaza, Floor II:	10.7 x 8.2 x 4.1 cm. Oval with one slightly flattened end. One flat grinding surface with convex opposing side.
West Plaza, Fill above Floor II:	28.4 x 10.8 x 3.8 cm. Rectangular with very slightly rounded ends. One grinding surface.
	15.3 x 10.1 x 3.1 cm. Rectangular with rounded ends. Two grinding surfaces.
West Plaza, Floor I:	16.3 x 7.7 x 1.8 cm. Rough rectangle. Four grinding surfaces, two of which are formed by beveled edges.
West Plaza, Out of context:	2.75 x 13 x 4.1 cm. Rough rectangle. One grinding surface.
East Plaza, Floor I:	26.8 x 11.1 x 3.2 cm. Rectangle with slightly rounded ends. Three grinding surfaces, two of which are on one side.
	6.3 x 7.7 x 2.5 cm. Fragment. Three grinding surfaces, two of which are on one side.
East Plaza, Floor I, Bin:	16.6 x 12.5 x 3.5 cm. Fragment. Three grinding surfaces with two on one side.
East Plaza, Fill above Floor I:	12.4 x 10 x 3 cm. Fragment. Two grinding surfaces on one side.
	17.1 x 10.3 x 3.7 cm. Fragment. One concave grinding surface.
	8.6 x 10.95 x 2.9 cm. Fragment. Three grinding surfaces, two of which are on one side.
Kiva, Floor:	24.2 x 11.1 x 4.8 cm. Elongated oval. One grinding surface.
	24.1 x 12 x 3.2 cm. Rectangular with rounded ends. Two grinding surfaces.
	19.2 x 12.2 x 1.85 cm. Fragment. Three grinding surfaces, two on one side.
	21.3 x 13.2 x 3.7 cm. D-shaped with two parallel grinding surfaces.

Pit II, Level V:	9.3 x 8.5 x 2.2 cm. Fragment. Two grinding surfaces on one side.

METATES

Metates range from about 24-50 cm long, 24-40 cm wide and 4-8 cm thick. Besides their size, metates exhibit one fairly flat grinding surface to the user. Other than these, metates displayed no further requisites that could be deemed "standard". Figure 55 illustrates some representative metates.

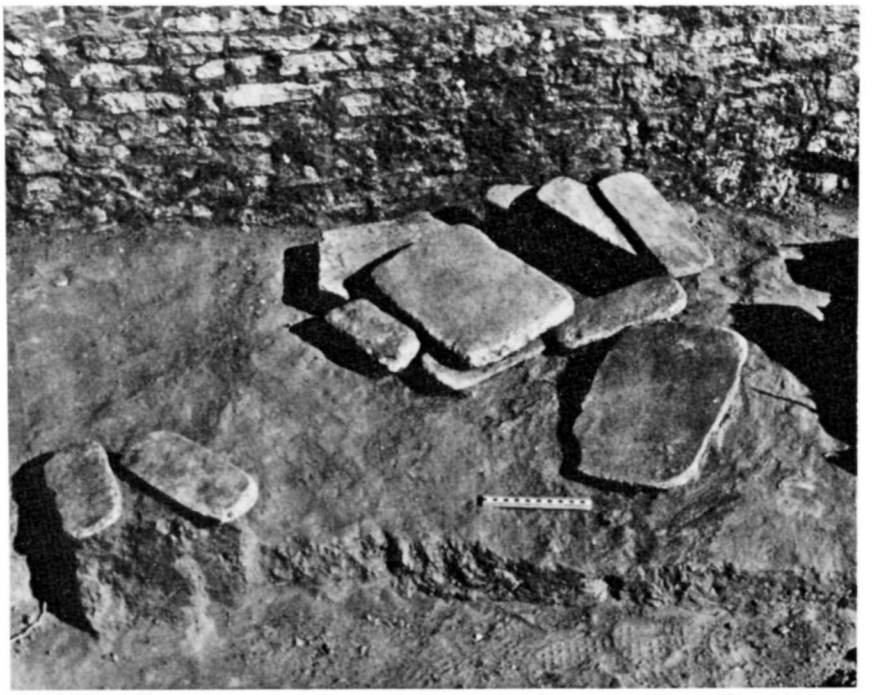


FIGURE 55: Cluster of Ground Stone Artifacts on Floor III of West Plaza Below Door to Room 3.

Room 5, Fill:	35.2 x 30.5 x 8.5 cm. Rough rectangle. Flat grinding surface.
Room 9, Floor:	23.6 x 24.5 x 4 cm. Fragment. Slightly concave grinding surface.
	17.7 x 12.7 x 4.3 cm. Fragment. Flat grinding surface.
West Plaza, Floor III:	41.8 x 28.7 x 4.3 cm. Rectangular. Slightly concave grinding surface.

West Plaza, Fill above Floor III:	38.5 x 30 x 4.33 cm. Grinding surface very rough, very limited use.
	40.9 x 30.1 x 7.5 cm. Rectangular. Flat grinding surface.
	30.6 x 15.7 x 7.4 cm. Fragment. Slightly concave grinding surface.
	41.5 x 31.3 x 7 cm. Rectangle. Flat grinding surface.
West Plaza, Fill above Floor II:	24.9 x 22.2 x 4.2 cm. Fragment. Flat grinding surface.
	38.2 x 28 x 6.3 cm. Rough rectangle. Extremely pitted and chipped grinding surface; slightly convex.
	36.2 x 28.4 x 5 cm. Rough rectangle. Flat grinding surface.
West Plaza, Floor I:	22.8 x 31.2 x 6.8 cm. Fragment. Flat grinding surface.
East Plaza, Floor II:	49 x 38.3 x 6.3 cm. Rough rectangle. Flat grinding surface with pecking covering it entirely.
Pit I, Level IV:	38.3 x 30.1 x 5.05 cm. Rough pentagon. Slightly concave grinding surface which is smooth in middle and pitted around outside edges.

Food grinding stones were found mostly on the floors and in the fill of West Plaza. Their presence in the rest of the site appears to be a function of trash deposition.

One interesting cluster of grinding stones rested on the West Plaza, Floor III surface in front of the entrance to Room 3 (see Figure 55). Manos and metates had been stacked neatly and were, for the most part, quite serviceable. This cluster may represent a cache reserved for future use.

Ground stone objects, other than those obviously used in food preparation, include axes, hammers, "grooved stone", a mortar, a pestle and problematical stones that show definite signs of finishing but whose function cannot be inferred.

AXES

Room 4, Fill:	12.6 x 9.8 x 0.8 cm. An extremely thin, hoe-like tool of sandstone (Figure 56a) that appears to have been fractured at the groove indentations. Its thickness precludes any axe-like function.
West Plaza, Floor III:	9.5 x 5.6 x 4.1 cm. Full-grooved, oval, single-bit axe of hard sandstone (Figure 56b). Flattened surface opposite the bit may have served as a hammer.

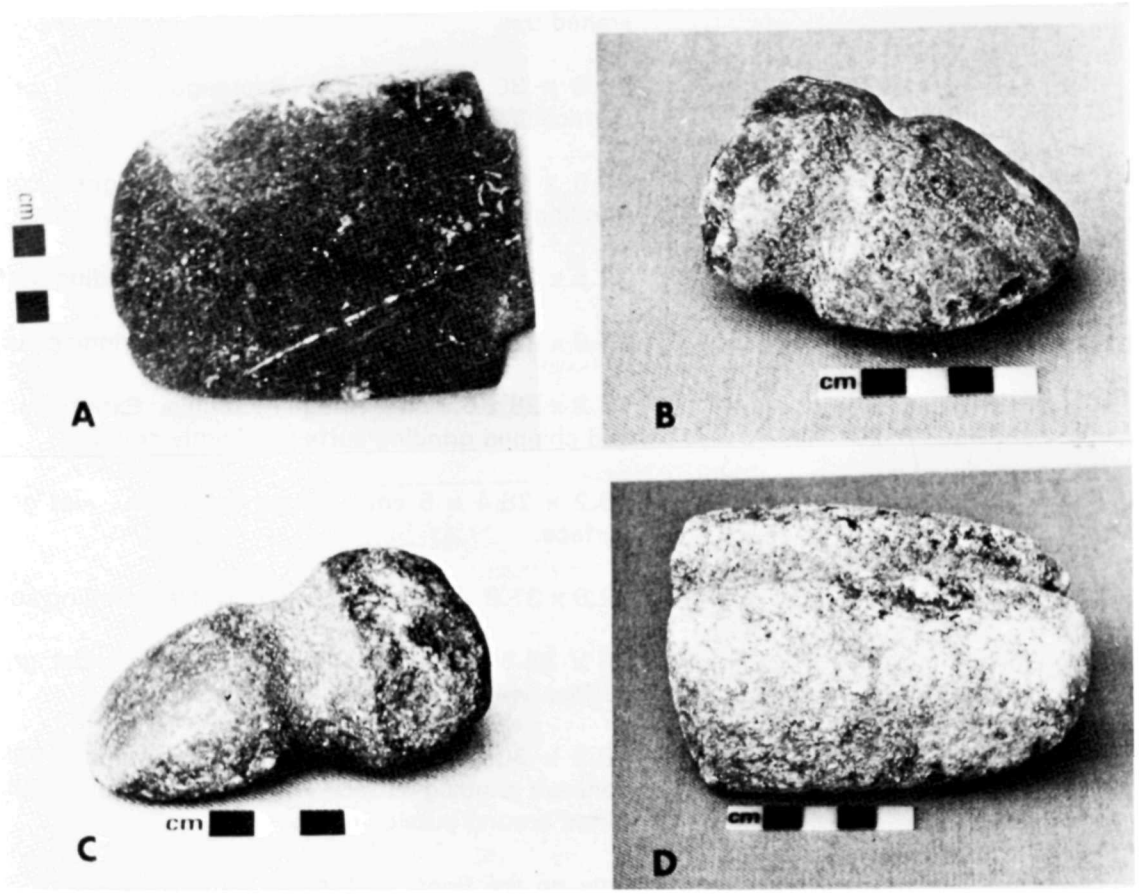


FIGURE 56: Axes and Hammers From Wide Reed Ruin.

West Plaza, Fill above Floor III: 8.54 x 6.33 x 4.92 cm. Full-grooved oval, single-bit axe of hard sandstone (Figure 56c) almost identical to the one from Floor III surface. Head shows signs of pounding.

HAMMERS

Only one complete hammer was recovered (Figure 56d). It was found in the fill above Floor II of the West Plaza, measures 11.6 x 9.7 x 5.8 cm and has a complete groove around the long axis. Evidence of pounding occurs on both sides of the groove. Material is a hard sandstone.

A fragment of a hammer broken along its long axis was recovered from the West Plaza, Floor II. Grooving had been restricted to the ends of the long axis. It is quite possible that the incomplete grooves indicate the hammer was broken in the process of manufacture. The fragment measures 12.2 x 6.9 x 6.9 cm.

MORTAR

A single mortar came from the Floor I surface of West Plaza (Figure 57). It is made from a very hard sandstone similar to that used for the axes and hammers and measures 13.2 cm in height, has an outside diameter of about 20 cm, is 10.3 cm deep and has walls averaging 4.5 cm in thickness. The inside is quite smooth (probably an indication of extended use), while the outside retains the pecking marks of original manufacture. It is quite symmetrical and round and shows a long and laborious period of work from its maker.

FIGURE 57: Mortar From Floor I in West Plaza.

PESTLE

One pestle fragment was found on the Floor I surface of Room 19. It is round in cross section, broken across its long axis and measures 9.5 x 6.3 cm.

OTHER GROUND STONE

Eight specimens of ground stone were recovered, the function of which remains undetermined.

Room 5, Fill: 13.3 x 10.1 x 4.5 cm. Oval in shape with a roughly rectangular cross section. One flat grinding surface. Possibly a one-hand mano.

Room 9, Fill (wall rubble): "Cupped stone" 7.5 x 6.5 cm. Figure 58 shows an enigmatic ground stone object similar to what Woodbury (1954:185) calls a "cupped stone." Its dimensions fall comfortably into the range described by Woodbury, including the depression at one end which is 2.1 cm deep. It is a biconical object that has been smoothed entirely and composed of a very hard sandstone. A small, smoothed quartz pebble had been placed in the conical depression. It is interesting to note that the few examples of this type of artifact are found in Pueblo IV contexts.

FIGURE 58: Problematical Ground Stone Object From Room 9.

The remaining ground stone objects are fragments showing signs of grinding or smoothing. They represent either discarded remnants of larger grinding stones or handy pieces of rough rock used for a temporary purpose.

CONCLUSIONS

A high number of manos and metates are associated with hearths and mealing bins in the plaza areas. The only unusual cluster of these food preparation grinding stores is the cache found in front of Room 3 in the West Plaza.

The greatest number of food processing and non-food processing stores are found in the fill above Floor III in the West Plaza. This, along with the other features found there, points to the West Plaza as being the focus of work activity over the longest period of time for the excavated part of the site.

As a whole, little of the collection was found in what could be claimed to be an intentional work situation placement. Unlike the ceramic collection, however, there were many useable pieces left behind upon abandonment. Since food processing stones exhibit little effort spent in their manufacture, and since the sandstone used is plentiful in the area, they were probably not considered valuable enough to transport.

FLAKED STONE

George A. Teague

INTRODUCTION

All flaked stone items collected from excavations at Wide Reed Ruin, including cores, debitage and tools, were analyzed. Certain metric and observational data were recorded, coded for retrieval purposes and transferred within the Selgem Program format to Arizona State Museum computer tapes numbers 6471 and 6473. An ax manuscript detailing conventions of measurement and description is on file at the National Park Service, Arizona Archeological Center, Tucson, Arizona.

RATIONALE

The purpose of the analysis is to delineate, among the various forms of archeological variability (Speth 1972:34), the technological and functional variability within the collection of flaked stone from Wide Reed Ruin. From the recognition of the patterns of distribution of this variability within the site universe, some facets of the lifeways of the inhabitants of the site may be reconstructed. More specifically, a scheme will be proposed in hypothetical form concerning the selection of raw materials and its routing within the site, the technical treatment of the material to produce stone tools, the function and use of the tools produced, the distribution and association of functionally specific tool sets, and the disposal of tools and their by-products. Hypotheses are generated for future testing regarding selected aspects of distribution and association.

TERMINOLOGY AND CLASSIFICATION

It is my belief that each archeological collection is sufficiently different from every other to require the provision that definitions be given in terms of the collection at hand. Hence, I must stress that qualifications and subjective judgments given herein will be specific to the Wide Reed Ruin collection.

As an example, the term "raw material" will be defined as stone which would be suitable as to size, shape and structural characteristics for modification into any of the flaked stone items found at Wide Reed Ruin.

A core is defined as a mass of raw material from which flakes have been forced, with the assumption that the flakes produced are intended for immediate use as, or modification into, tools. An item that is morphologically identical to the collection of cores, except for the addition of retouch or use wear, is classed as a core tool.

Primary flakes, then, are those that are produced for use as, or modification into, tools while secondary flakes are the retouch flakes forced from the primary flakes in the manufacture of these tools. For purposes of this analysis, primary flakes are further specified as having proportions that are consistent with the size of finished tools in the collection. In general, primary flakes often, but by no means necessarily, possess cortex and have few previous flake removals. It is fairly easy to distinguish

large, chunky, cortical flakes from tiny bifacial retouch flakes but, between the extremes, the distinction becomes tenuous and is arrived at subjectively by reference to the entire assemblage. As is apparent, a flake's functional potential is here used as a prime criterion of classification.

Utilized flakes are those whose unmodified characteristics allow immediate employment as evidenced by a variety of observable use-wear on the edges, especially micro-spalling, grinding, polish and striations.

Retouched flakes exhibit the casual edge resharpening that tends to follow the angle created by the flake's detachment from its core.

The formal classes of tools, on the other hand, present evidence of regular and extensive retouch that changed the angles of the working edges significantly from that which may be projected to have existed at initial flake detachment.

The classification of formal tools will follow closely Fitzhugh's (1972:71-72) scheme, centering on formal/functional inference. Further, emphasis will be placed on functional inference drawn from the form and characteristics of working-edge angles based on such studies as Gould et al. (1971) and Wilmsen (1970).

Projectile points are defined as objects whose primary function was to provide a sharp end for projectiles, even though they may have been put to other uses. They tend to be symmetrical and generally have been basally modified to facilitate hafting.

Knives are seen as flakes that have been retouched, possessing an acute angle on one or more edges. They are distinct from projectile points in their comparative lack of symmetry and formal provisions for hafting. Their function is inferred as primarily cutting.

Scrapers are similar to knives, except that obtuse edge angles have been produced, with a consequent inferred orientation to scraping. They are usually unifacially worked and may be retouched along an edge parallel to the long axis of the flake (side scraper), perpendicular to the long axis of the flake (end scraper) or on more than one side (multi-side scraper).

Notches are flakes whose edges have been modified to produce small, deep concavities. The presence of multiple retouch scars are required by this definition to preclude the inclusion of fortuitously retouched flakes. The inferred function is that of specialized wood or bone working.

Blanks are defined as flakes which have been grossly modified either bifacially or unifacially into an uncompleted semblance of one of the formal tool types. They have no intended mechanical function but may show evidence of use.

DESCRIPTION

CORES

Twenty-five cores were recovered and analyzed. Eighteen cores are of silicified wood, all of which possess remnants of the weathered natural exterior (cortex). Nine of these have been side struck (flakes forced off along the axis of thickness), while five were end struck and four were random struck; that is, both end and side striking occurred together with striking along, and perpendicular to, naturally occurring ridges which formed angles in excess of 90 degrees.

There are two quartzite cores, both with some cortical surface remaining. One is side struck, while the other is random struck. Four chert cores were analyzed, all of which are randomly struck, as was the one core of chalcedony.

It may be that the properties of the chert and chalcedony cores led them to be preferred as raw materials, as indicated by their smaller terminal site, greater number of flake scars and higher likelihood of being exhausted through use. In support of this, while chert and chalcedony cores represent only 20 percent of the total cores, 45 percent of the flakes are of these materials. Further, only silicified wood is available in the immediate locality.

CORE TOOLS

Core Tool I: A core chopper was found in Level IV of Pit II. It was fashioned from a quartzite pebble by removing three large flakes from one side and two from the other. The effective edge length is 75 mm with an edge angle of 55 degrees. The sharpened edge has been crushed along its length through use. Tool dimensions are 57 x 41 x 24 mm.

Core Tool II: A small (35 x 24 x 26 mm) chalcedony core from the kiva (general provenience) was used as a scraping tool. The parallel long edges show heavy microspalling on the flake removal faces. The angles of the two utilized edges are 72 degrees and 76 degrees, and the effective edge lengths are 22 mm and 25 mm, respectively.

FLAKED STONE DEBITAGE AND TOOLS

Three hundred sixty stone flakes and 67 flake tools were recovered and analyzed from Wide Reed Ruin. The collection was treated initially as a homogeneous unit whose attribute patterning might be recognized and compared to patterns of distribution within the site.

Of the flake items, nearly half (49 percent) are of silicified wood while another 45 percent are of chert and chalcedony. Four percent are of quartzite and the remaining artifacts are made of basalt or fine grained sandstone or shale. No obsidian was observed. Nearly one-quarter of the items (95) have been broken postdetachment. Calcium carbonate patination has formed on 46 specimens. No patterning of distribution is noted and no water wear or sand blasting was observed.

Of the objects, 319 are primary flakes, 87 are secondary flakes and 21 are indeterminate. The majority of the collection has remaining cortical surface and previous flake removals.

FLAKE TOOLS

Sixty-seven tools are recognized, including 39 utilized flakes, 13 retouched flakes, two unifacial knives, one bifacial knife, two endscrapers, three side scrapers, two multiside scrapers, one notch, two projectile points and two blanks.

Of the retouched items, 15 are retouched along the exterior flake surface, four are retouched along the interior surface, and seven are bifacially retouched. The retouch method was by percussion in 17 instances and by pressure in seven cases; the remainder being indeterminate. The retouch type in all cases is continuous and linear.

Use-wear is evidenced under the microscope primarily by the occurrence of microspalling and grinding. Polish or striations are seen only on five specimens. The use-wear occurred bifacially on 41 objects, on the exterior flake face of 14 items and on the interior of two items. The wear on the remaining tools is indeterminate.

The edge angles of all tools other than projectile points and blanks were measured. A plot of the values revealed a multi-modal curve of distribution with peaks at 35, 50, 68 and 80 degrees. On the basis of previous studies, the tool edge angles are ranked into three groups. Group I comprises the acute angles (less than 40 degrees), Group II has angles from 40-55 degrees, and Group III is of obtuse angles (greater than 60 degrees). Observation of tool morphology and use occurrence and type within the groups satisfied me that the following functional inferences might be made: Group I - cutting tools, Group II - specialized tools (chopping, smoothing) and Group III - scraping tools. A summary is presented in Table 9.

PROJECTILE POINTS

In addition to the above, two projectile points were found, both of chalcedony. Projectile Point I has dimensions of 49 x 18 x 4 mm. It is biconvex in cross section with a slightly convex blade and a convex base. Deep corner notching was performed by pressure technique. Thinning flakes are broad and shallow, and the edges are pressure retouched.

Projectile Point II was made by pressure edge trimming a thin percussion flake. The sides are straight, and the striking platform of the flake is at the apex of the triangular base. The midpoint is concavo-convex in cross section. The point tip has broken off. Dimensions are 18 x 12 x 02 mm.

TECHNOLOGY

The core analysis suggests that raw material was selected for proportions that made the stone amenable to flaking without initial preparation; that is, there is no evidence of splitting or quartering of nodules or pebbles to produce striking platforms. The character of the flake scars (dimensions, strong force rings and fissures, crushing and cracking at the point of impact, etc.) would indicate an entirely hard-hammer percussion, primary flake production technique. Bipolar striking was recognized on two flake specimens, but is considered random or accidental.

It is argued that the selection of striking techniques on the silicified wood is based more on the mechanical function of the stone than on any sort of cultural preference. The majority of the sample, the side-struck and end-struck cores, is composed of stone with a coarse, linear structural arrangement. In all cases of the above, the axis of flaking follows the axis of the linear structure of the stone. The random-struck cores, on the other hand, are of a more homogeneous and finer-grained version of silicified wood. The cores of other more highly microcrystalline stones tend to be random-struck as well.

Renewal and dressing of cores involved the crushing and grinding of the striking platform edges. This technique is in evidence on all nine of the side-struck silicified wood cores and on both of the quartzite cores.

Further technical data from the flakes themselves reveals that 116 of the flakes have prepared or specially treated striking platforms. In addition to grinding and crushing, 49 specimens show chipping back or stepping of the platforms; although a large number of these features were probably

TABLE 9: Flake Stone Tools by Class.

A. CUTTING TOOLS			
Formal Class	Effective Edge Length (mm)	Edge Angle (degrees)	Edge Plan
Bifacial Knife	50	24	Convex
Unifacial Knife	35	38	Convex
Unifacial Knife	51	29	Convex
Retouched Flake	16	28	Straight
Retouched Flake	61	38	Convex
Retouched Flake	44	29	Concave
Retouched Flake	99	33	Straight
Retouched Flake	37	15	Straight
Utilized Flake	47	38	Straight
Utilized Flake	31	33	Convex
Utilized Flake	19	39	Straight
Utilized Flake	23	32	Straight
Utilized Flake	24	33	Convex
Utilized Flake	36	21	Straight
Utilized Flake	82	38	Straight
Utilized Flake	55	14	Straight
Utilized Flake	18	40	Convex
Utilized Flake	21	26	Concave
Utilized Flake	17	33	Convex
Utilized Flake	12	26	Convex
Utilized Flake	18	29	Convex
Utilized Flake	40	27	Convex
Utilized Flake	92	26	Concave
Utilized Flake	44	38	Convex
Utilized Flake	22	18	Concave
Utilized Flake	25	36	Convex
Utilized Flake	15	23	Straight
Utilized Flake	40	36	Convex
Utilized Flake	48	12	Convex
Utilized Flake	59	30	Straight
Utilized Flake	30	39	Concave
Utilized Flake	36	18	Convex
Utilized Flake	12	12	Convex
Utilized Flake	42	37	Straight

TABLE 9: Flake Stone Tools by Class (continued).

B. SPECIALIZED TOOLS			
Formal Class	Effective Edge Length (mm)	Edge Angle (degrees)	Edge Plan
Notch	14	53	Concave
Multi-side Scraper	42	52	Concavo-convex
Utilized Flake	18	53	Concave
C. SCRAPING TOOLS			
Formal Class	Effective Edge Length (mm)	Edge Angle (degrees)	Edge Plan
Side Scraper	28	63	Concave
Side Scraper	38	80	Straight
Side Scraper	26	62	Convex
End Scraper	50	82	Convex
End Scraper	29	61	Straight
Retouched Flake	46	60	Convex
Retouched Flake	23	75	Straight
Retouched Flake	92	85	Straight
Retouched Flake	10	77	Concave
Retouched Flake	67	67	Convex
Retouched Flake	38	62	Concave
Utilized Flake	21	70	Straight
Utilized Flake	15	68	Straight
Utilized Flake	98	88	Straight
Utilized Flake	23	78	Straight
Utilized Flake	32	81	Straight
Utilized Flake	42	88	Straight
Utilized Flake	30	63	Straight

formed fortuitously. There are 21 instances of faceting, or renewal of the platform by the removal of a thin flake along the length of the platform edge. Fifteen flakes reveal evidence of a combination of the above techniques.

Of the 73.3 percent of the flakes possessing unbroken distal ends, 13.3 percent are detached at a hinge fracture point, giving some index to the degree of control exercised in flake removal.

Little emphasis was placed on regularity of flake removal. Within the collection it is less than two times more likely that the axis of a flake's detachment will correspond within 30 degrees to the axes of previous flake scars on the flake surface.

Further, there seems to have been no attempt to produce particular geometric flake forms; 33.3 percent of the flakes are irregular in form, while the majority (51.6 percent) are divided among elliptical, triangular or rectangular forms. The 4.4 percent of the collection that was in the form of true blades is considered random.

Six items have been subjected to heat, as indicated by glazing, "pot-lid" fracturing and crazing or cracking. Only one of the items, a utilized flake, had been used post-heat exposure. It is believed that heat treatment as a stone-working technique was not practiced at Wide Reed Ruin.

With the exception of two chert specimens, the cores were discarded or abandoned while the mechanical potential for further flake removal still existed.

INTRA-SITE DISTRIBUTIONS

CORES

Cores were found distributed in various levels of the kiva, West Plaza, Pit II and in the wall rubble of rooms 8 and 9, with no more than three occurrences in any one provenience unit. However, seven cores may be seen to form a horizontal cluster in the fill of rooms 2 and 3.

CORE TOOLS

Core Tool 1 was found in Level I of Pit II, while Core Tool II was found in the kiva (general).

DEBITAGE

The spatial distribution of waste flakes was plotted and the foci of horizontal clusters were defined subjectively by inspection (Table 10).

FLAKE TOOLS

A corresponding distribution of tools was noted (Table 11). The remaining tools were in Pits I and II and were not analyzed in terms of distribution. In addition, Projectile Point I was found on Floor II of East Plaza, while Projectile Point II was in the pit general provenience. Of the two blanks, one was on the kiva floor while the other was in Level IV of Pit II.

Table 10: Distribution of Stone Debitage Foci.

Provenience	Cluster Focus (CF)	Primary:Secondary Flake Ratio
Plaza Floor 3	Plaza West-Center (CFI)	1:2
Plaza Floor 2	Plaza West-West (CFII)	3:1
	Plaza West-East (CFIII)	3:1
	Plaza East-Center (CFIV)	3:1
Plaza Floor 1	Plaza West-East (CFV)	2:1
Plaza Fill	Plaza-West-South (CFVI)	10:1
Rooms-Fill	Northwest of West (CFVII) Room Block (Rooms 1,2,3,5,6,7,8,9)	10:1
Rooms-Floor	Southeast of West (CFVIII) Room Block (Rooms 8,9,14)	3:1
Kiva-Floor	(CFIX)	3:1

Table 11: Inferred Functional Classes.

Cluster Focus	Cutting	Scraping	Specialized
CFI	1	1	
CFIII	2		
CFIV	1		
CFVI	1	1	
CFVIII	6	6	2
CFIX	2	1	1

EXPLANATION OF INTRA-SITE DISTRIBUTION

Hypotheses for the explanation of intra-site flaked stone distributions are presented.

1. Given differential spatial staging in tool manufacture, there will be co-varying ratios, by task stage, of primary to secondary flakes.

In a hypothetical case, if initial core breakdown occurred in Area A of a site, while tool manufacture took place in Area B, and tool use and resharpening occurred in still other areas of the site, a disparity in primary to secondary flake ratios would obtain. This variance would be extractable from the archeological record, assuming sufficient control of occupational contemporaniety.

In the case of the Wide Reed Ruin lithics, however, a remarkable correspondence of primary to secondary flake ratios was seen within all lithic clusters of the site, with the exception of plaza fill and the fill of rooms in the northwest quadrant of the west room block, the latter of which may be assumed to be redeposited trash from an unknown provenience or proveniences.

This seems to suggest that throughout the occupation of the site primary knapping, tool manufacture and tool resharpening occurred at the locus of tool use rather than through a spatially distinct programmed series of stages.

2. Rooms abandoned during the occupation of a site will have a high ratio of fill artifacts to floor artifacts, while the reverse will obtain for the last occupied rooms. (This concept was presented independently by Reid 1973:131). As a postulate to the above, confer Schiffer (1972:160-161) for a discussion of refuse types.

In light of the artifact distribution presented in the last section, I suggest that at Wide Reed Ruin a shift in occupational focus occurred through time with the southeast quadrant of the west room block, along with the kiva, being the last occupied units.

Two apparent observations of distributional variation remain unexplained. Explanation of the lack of lithic-centered activity in the east room block requires correlation with further comparative data. Also, the functional specifics of tool kit contents in the west room block rooms remain undetermined due to sample size. The most that can be said is that there is no clear-cut dichotomy of tool kits by provenience, and that a broad based and generalized maintenance activity (Binford and Binford 1966:268-269) orientation is indicated. However, a hint of activity set (Struever 1968:287) correspondence is subjectively extracted from comparisons of tool class proportions within the last occupied units (cluster focii VIII and IX).

SUMMARY AND INTERPRETATION

An interpretive scheme of microcrystalline stone use at Wide Reed Ruin is offered, based on inferences drawn from data as reported in the body of this paper.

Chert and chalcedony, the preferred materials, were occasionally imported and used along with, and in the same fashion as, the locally available silicified wood. No attempt was made to stockpile materials or to process the materials through a formal manufacturing route; rather, the stone was modified and used at the site of specific extractive and maintenance activities on an ad hoc basis.

In comparison to earlier periods in the Southwest, a casual approach to technology is evidenced. Cores which are suited to flake removal without initial preparation were selected, used and then renewed by a simple process of platform crushing and grinding, with occasional faceting.

It seems that little emphasis was placed on obtaining regularity in flake production, but rather that a high percentage of primary flakes were removed in order to produce flakes that were functionally of a size and shape that called for little or no further modification.

The resulting tools were formally generalized and used for a variety of purposes. Tools were used for the task at hand and most often abandoned or discarded while the potential for further use still existed. Cores, tools and large flakes were removed from occupied room units and discarded in abandoned rooms or trash pits.

CHAPTER 10

SUMMARY AND CONCLUSIONS

James E. Mount

INTRODUCTION

The selection of Wide Reed Ruin for excavation was dictated by the erosion pattern of the Pueblo Colorado Wash. This limited the scope of our research to the threatened areas. In the course of excavation and analysis, however, several problem areas were defined and emphasized, which gave direction and meaning to our efforts. Initial research goals were mainly of a descriptive nature and were used to provide a context for more complex problems. Previous sections describe data categories and their distributions within the site and form the basis of usable information for more complex problem solving. The first part of this section places the site in its broad, area-wide context. The remainder of the section represents our attempts to formalize questions about the cultural affiliations of the inhabitants of Wide Reed Ruin, their subsistence base, and their work and social patterns. We feel this approach allows the reader to learn just what the investigator was trying to prove and provides a suitable format for testing hypotheses, propositions, intuitive thoughts and any feelings the writer had on the subject.

CULTURAL AFFILIATIONS

The list of comparable cultural traits from Wide Reed is short and restricted to the areas of architecture, ceramics and tree-ring dates.

The pueblo is in the shape of a pentagon with a thick, continuous outer wall enclosing two inner, continuous walls. Rooms were created by merely adding partitions at appropriate locations. Several sites in the area share one or two of these architectural attributes and are worth noting. Hargrave (in Haury and Hargrave 1931:81) describes Kin-Tiel Ruin, about 15 mi south of Wide Reed, thusly: "Unlike other known ruins in the district, the outer wall of Kin-Tiel was unbroken save for narrow passageways." Because of this and the general layout of the pueblo, the architecture impressed Hargrave as "Bonitan." Wall abutment patterns were not available for study since the site was used as a source of building stone in the late twenties. Mindeleff's map does indicate, however, that the continuous outer wall was symmetrical ("Butterfly shaped"), and that it formed a definite outer boundary for the pueblo. It should be noted that Kin-Tiel is a much larger site than Wide Reed Ruin.

One other site in the region has a similar outer wall, but lacks other similarities. It is known as Besh Bii toh by the local Navajo and was first noted by Mindeleff (1891:57-58). It is located several miles west of Steamboat, Arizona. The site is bounded by a 1 m-thick wall that approaches a height of 2 m in places and was built in the shape of an elongated oval. David Brugge (personal communication, 1973) sees it as late Pueblo III on the basis of masonry. Unfortunately, no other architecture or ceramics have been located or identified in or near the site.

Thus, we have three apparently late pueblo sites in northeastern Arizona that have symmetrical and continuous outer walls.

In 1929, Lyndon Hargrave, in Haury and Hargrave (1931), excavated two kivas at Kin-Tiel as part of a search for dateable structural wood. Both structures were discovered to be rectangular "Hopi type kivas", which are similar to the Wide Reed kiva in size, shape and several other features, excluding masonry. From the dateable wood collected, Hargrave determined construction took place in A.D. 1276; the same date determined for Wide Reed construction. Their proximity would tend to support the idea of some sort of mutual effort. More excavation at Kin-Tiel would be helpful but, for the present, ceramic data form the only other basis for comparison.

There is no completely quantified description of the pottery from Kin-Tiel Ruin. Pottery types recovered from that site are associated with the tree-ring dates and form the basis of several pottery types, including Kin-Tiel Black-on-Orange, Kin-Tiel Polychrome and Klageto Black-on-White. The ceramic collection from Wide Reed did, to the best of our ability to determine, contain a good number of Klageto Black-on-White sherds (see discussion in Chapter 4). As was noted, this type seems to be a variant of Tularosa Black-on-White. Its type status is still in doubt (Smith 1971:267-282), but it can be said with confidence that the specimens from Wide Reed resemble those from Kin-Tiel labeled Klageto Black-on-White more than they resemble Tularosa or Reserve. That Wide Reed and Kin-Tiel share this unusual brand of white ware is interesting and significant. Without more data on type ratios from Kin-Tiel, it would be dangerous to propose any sort of cultural bond between the two sites based on similarities of ceramics.

Watson Smith does offer insights on Klageto Black-on-White that would be worthy of testing in the field:

> "The particular specimens, nevertheless, did have elements in common, most of which may be summed up by the generalization that they seemed to combine certain major characteristics of Tularosa design with others of Tusayan derivation. In fact, it is this concatenation of features that constitutes the cultural significance of these specimens, since it gives point to the inference of contact and interchange between the inhabitants of Awatovi and whatever peoples may have been their contemporaries to the east and southeast in the thirteenth and early fourteenth centuries." (Smith 1971:271).

At this time, it is premature to try to fit Wide Reed into any of the major cultural traditions of the area. Its outer wall, kiva and ceramics tend to parallel those of Kin-Tiel, but more work at both sites is necessary before firm statements, one way or the other, can be made. There are other late Pueblo III sites in the vicinity but, as yet, none have been discovered that closely resemble Wide Reed in architecture and ceramics; although isolated types of ceramics and architectural traits are shared by many of these (see Olsen 1971 and, hopefully, future reports from the Museum of Northern Arizona).

High percentages of Cibola White Ware and St. Johns Polychrome are consistent with the geographical distribution of these wares. Interaction - probably trade - is indicated by the presence of wares such as Mesa Verde White Ware, Tusayan White Ware and even two sherds of Roosevelt Redware. Ceramically, at least, most affiliations are to the south and east.

The rectangular kiva at Wide Reed may indicate affiliation with the general Western Pueblo pattern. It is felt that Wide Reed represents, in part, a local manifestation of a distinctive tradition that can only be clarified and defined through further, selective excavation.

SITE FUNCTION

The somewhat unique architectural pattern of Wide Reed Ruin, as described above, prompted questions about possible specialized site function. These questions are presented in the form of hypotheses below. It is felt by this writer that such a procedure helps to clarify problem areas and renders questions, propositions, etc. suitable for testing. The hypotheses that evolved fall into two main groups, with the first group being concerned with aspects of the site as an entity; i.e., ideas that could be tested with data from Wide Reed alone. The second group concerns relations with other sites and other human populations and can only be dealt with after further work in the Ganado and surrounding area has been completed.

One of the first specialized functions suggested for Wide Reed was that of a trade center. The thick outer wall could have been a security measure. Further, the site is located on a good possible east-west route of travel.

HYPOTHESIS 1

If the site was a trade center, then one would expect: a) an unusually high percentage of storage rooms; b) a large number of portable goods that could be traded; and c) possibly exotic goods such as minerals, plants or ceramics.

In Chapter 3 it was stated that the general pattern in the excavated portion of the site is 6-10 small storage rooms associated with one or two work and habitation rooms and an outdoor food preparation area. When ratios of space are considered, we find no significant differences between Wide Reed and other pueblos of this period. The storage facilities would have been adequate for the agricultural produce of a village the size of Wide Reed. If the site had been a trade center, there were no architectural efforts made to accommodate such a function.

There was no unusually high number of any portable goods. While it can be argued that any such goods would not have been left behind, we would still expect some indication of their original presence at the site. Debitage from manufacturing, broken, spoiled or misplaced items, and other clues would be expected. None were apparent in the data.

We also have no indication of the presence of exotic goods. No exotic minerals were found, and the pollen record, likewise, shows nothing that could not be found in the local area. A small number of exotic pottery types may indicate nothing more than informal trade between individuals. There is nothing in the data from Wide Reed to indicate that it was a specialized trade site.

HYPOTHESIS 2

If the site were economically based on agriculture, then we would expect: a) signs of domestic plants in the work and storage areas; b) work areas with facilities for the processing of food from domesticated plants; c) good local farm land with a water supply adequate for farming; d) signs of year-round or, at least, seasonal occupation; e) high frequencies of domestic pollen as opposed to that of wild edible plants; and f) low frequencies of game animals.

Pollen of *Zea mays* (corn) was found in several storage rooms, habitation and work rooms, and the plazas. Signs of *Cucurbita* (squash) were only found in Room 2. We know that domesticated plants were used at Wide Reed. The relatively high counts of *Cleome* (Rocky Mountain Beeweed) in rooms 3, 4 and 13, however, also indicate a possibly strong reliance on wild plants. Further, profile ratios

of pollen, and not necessarily ratios of actual plants, present much less their relative importance to a village group. On the basis of the pollen data at hand, we can say no more than agriculture was practiced and wild plants were collected.

Work and habitation rooms and plazas did have domestic food processing features, such as mealing bins, hearths, manos, metates and piki stoves. While we know from analogy that such features are mainly used for the processing of domesticates, there is no reason why they could not have been used for wild plants also. Unfortunately, the features themselves tell us little about the specific plants they were used to prepare.

The land around Wide Reed is good for farming, as is evident by modern usage. Water is available from the Pueblo Colorado Wash. We must keep in mind, however, that such conditions also encourage the proliferation of wild food plants.

Wild animals were eaten at Wide Reed, but we have already mentioned (Chapter 7) that we cannot vouch for the representativeness of our sample.

The picture that emerges is one of a farming village that supplemented its diet with wild plants and animals. The situation of the site would have been optimum for all three food sources. Reference to work currently underway on vegetal material from Antelope House (Canyon de Chelly National Monument) and to Whiting's (1966) *Ethnobotany of the Hopi* indicates a wide range of food acquiring patterns even among predominantly agricultural groups. This appears to have been the case at Wide Reed Ruin.

HYPOTHESIS 3

The site was only occupied on a seasonal basis. Here we run into trouble. With seasonal use of the site, we would expect indications of the majority of plants that only grow in a particular season. The pollen profile would not indicate such seasonal use, since pollen rain occurs whether a site is occupied or not. No macro-vegetal remains are preserved. Since vegetal remains are critical to the forming of test implications about seasonality, we are stopped before we begin.

While seasonal use of the site is still in doubt, there are several lines of evidence indicating three and, possibly, four periods of occupation. There are three distinct, superimposed floor levels in the West Plaza (see Figure 15). Several of the flagstone floored storage rooms have two to three levels of flagging. Rooms 10, 18 and 19 show signs of being modified into outdoor or semi-sheltered work areas, thus indicating change in area use over a period of time. There are much higher frequencies of pottery sherds (all kinds) on the floors of rooms 9, 16, 18 and 19 than in the fill of these rooms; this is just the opposite of the case for the rest of the site. These various occupations or use periods were probably not spaced too far apart in time, as indicated by the ceramics and tree-ring dates. Burnt wood was recovered from rooms 4, 18, 19, the West Plaza (all three floors) and the kiva. These specimens came from below or within trash fill, indicating they burned long before abandonment. The kiva is the only structure that shows no signs of reuse or modification after burning. In short, we see distinct use periods for various parts of the excavated portion of the site, but no site-wide signs of complete abandonment and reoccupation. Artifact types certainly reflect no change in the cultural affiliation of Wide Reeders over time. This general problem, however, should be kept in mind by future excavators.

HYPOTHESIS 4

If the site were mainly ceremonial in function, then we would expect: a) an unusually high number of ceremonial structures; b) one large ceremonial structure; and c) a high number of ceremonial goods, shrines and similar features.

It can be briefly stated that nothing like the above was found at Wide Reed despite tracing of wall outlines outside the area of excavation and the trenching of a possible great kiva depression just west of the site.

From the above, we can conclude that Wide Reed had no unique or special function and that it can be characterized as a habitation site.

FUNCTIONAL AREAS WITHIN THE SITE

During excavation, rooms and areas within the site were classified according to size and associated features. Categories include habitation and work rooms, store rooms, the main plaza, small plazas, a kiva, and (probably) clay pits (see Chapter 4). One of our goals was the testing of this classification against artifact and pollen distribution. Pollen distribution did not correspond neatly to our functional analysis, and we offer several reasons why such profiles do not necessarily reflect activity patterns (see Chapter 6). It worked at Broken K Pueblo (Hill 1970) but not at Wide Reed.

As far as ceramics are concerned, our frequency chart (see Figure 49) indicates that decorated and utility wares maintain a fairly constant ratio wherever they were found in the site. A pattern of pottery distribution of all ceramic types in floor deposits emerged that generally fits with our room type classification. The highest percentages of floor context pottery is from the habitation and work rooms. Storage room floors are next. Surprisingly, the kiva floor has more sherds of all kinds than any of the floors in each of the plazas.

Ground stone, most of which consists of food preparation implements such as manos and metates, shows a similar distribution with some interesting variations. The floors of habitation and work rooms have more ground stone than floors in any other area of the site. These aggregates of manos and metates do indicate food processing areas. Most material comes from the fill above Floor III in the West Plaza. It is interesting to note that no ground stone was found on or above Floor II of the East Plaza or in the fill of the kiva.

We have already noted the almost complete restriction of faunal remains to the pit areas that appear to have been filled at once--probably as part of a general area clean-up of some sort.

While these distributional patterns are interesting and serve to elicit many thoughtful "hmm's" from colleagues, the limit of their usefulness in many cases should be recognized. It should be kept in mind that even floor contact specimens may be part of trash fill and, therefore, can skew our results. It should also be stressed that, unlike Egyptian tombs and other similar phenomenon, most of the cultural material recovered from archeological sites in the American Southwest represents what was no longer considered usable or worth carrying by the people who abandoned their former homes. We are dealing with trash for the most part and pristine, intact, slice-of-life prehistoric situations such as Pompeii are few and far between in this part of the world. We are not suggesting that the study of cultural discards is fruitless, rather that recovered material should be explicitly placed in its proper context. It is extremely important to differentiate between material that directly reflects an activity or activity set from that which represents trash. Further, it is important not to restrict our studies to

mere description of attributes and provenience. Our ultimate goal should be the elucidation of the cultural or social context of our recovered material (Schiffer 1972).

SOCIAL DIVISIONS

The clustering of room types described in Chapter 3 indicates the presence of social units whose exact nature cannot be defined at this time. The range of possible social units, however, possibly falls within the limits set by modern pueblo groups and most likely consisted of a nuclear family, i.e., a man and wife and their children.

While artifact distribution was unique to individual rooms, no significant differences are seen among room groups. Their similarities are much greater than their differences. It should be noted here that, if the entire site had been excavated, meaningful contrasts might have appeared. Also, areas of the site other than those excavated would have been chosen for the testing of hypotheses about activity areas and social divisions. As it was, our efforts were restricted to those areas of the site endangered by river erosion. Due to this fact, plus the shortage of time and money, statistical measures of correlation are not extensive. Such tests would be appropriate if other parts of the site could be sampled. The data remain available to anyone wishing to execute (and fund) further operations. It is felt, however, that only very subtle relations were missed and further testing would contribute little of value to the existing knowledge of this site and the general area.

CONCLUSIONS

Probably the most important results of our work at Wide Reed are: 1) the recording and description of a rather unique architectural layout for the pueblo site; 2) the contribution of more knowledge about the problematical Klageto Black-on-White and its chronological and cultural context; 3) the examination of an early Hopi-like (i.e., rectangular) kiva similar in many ways to the two at Kin-Tiel Ruin; and 4) that hypotheses can be formulated and tested and academic research-goal orientation can be maintained in the course of salvage archeology. We refer specifically to the section on site function.

More importantly, perhaps, we have a grasp on what is *not* known about the area. There is very little known about the prehistoric environment of Ganado. It is safe to say that many cultural phenomenon recognized in the Southwest, at least, are the result of peoples trying to deal with their environment. Tree-ring, pollen, botanical and zoological studies for the area as a whole would be useful to anyone studying its history or prehistory.

A survey with a research design for the area that includes test excavations would help to place individual sites in their proper perspective. To date, site selection for excavation has been dictated by the placement of modern roads and facilities. We have already argued that salvage work of this type can be extremely valuable when carried beyond mere description. Such selection methods, however, do not guarantee that the total range of site types in the area is discovered.

Many questions were raised during our work at Wide Reed that could serve to orient future research in an integrated manner. Few of these can be answered by further work at this site. Questions about the cultural context of Wide Reed and surrounding sites could be better answered by an intensive survey that should include controlled sample excavation at other sites such as Klageto and Kin-Tiel. Specifically, we are thinking of problems dealing with settlement patterns, the exploitation

of the environment, social relationships between communities and, finally, the cumulative effect of man on the natural environment of the Ganado Valley.

Many of the specific problems that concern us can easily be formalized and tested by future workers. We hypothesize, for instance, that the builders of Wide Reed formed a distinct social group and represent a "budding off" from a larger pueblo such as Kin-Tiel. Test excavations at that site would confirm or negate this. We would also like to know if other sites in the area share Wide Reed's apparently unique architectural layout and whether or not this type of structure comes about at a given period in time.

We know that the Ganado area is desirable for farming, but we have little comparative data from surrounding areas. It is possible that the Ganado area became desirable as other areas became depleted. Wide Reed, for instance, was constructed at a time of general abandonment of the Canyon de Chelly area to the north. The search for major population shifts during the late A.D. 1300s would be profitable.

Impressionistically, the Ganado area appears to have supported a dense population through time. Survey data on population density could be used in establishing carrying capacity for comparison with other areas.

Several large ceremonial sites are known from the area west of Hubbell trading post. It would be useful to know when these were built and if there is a correlation between the appearance of such sites and population density.

If, as we suspect, population and density increased over time, how do settlement patterns compensate, if they do, for the subsequent heavy use of resources? Do layout and new architectural features reflect new and different attempts at social control?

It is felt that questions such as these could serve to lead future work away from the accumulation of site-by-site descriptions to the more rewarding study of cultural history and development in the Ganado Valley.

REFERENCES CITED

Beals, R. L., G. W. Brainerd and W. Smith
1945 *Archaeological Studies in Northeastern Arizona.* University of California Publications in American Archaeology and Ethnology Vol. 44, No. 1, Berkeley and Los Angeles.

Binford, L. R. and S. R. Binford
1966 A Preliminary Analysis of Functional Variability in the Mousterian of Levallois Facies. In *Recent Studies in Paleoanthropology,* edited by J. D. Clark and F. C. Howell, special publication of the *American Anthropologist* Vol. 68, No. 2, Pt. 2, pp. 238-295.

Breternitz, D. A.
1966 *An Appraisal of Tree-Ring Dated Pottery in the Southwest.* Anthropological Papers of the University of Arizona No. 10, Tucson.

Carlson, R. L.
1970 *White Mountain Redware, A Pottery Tradition of East-Central Arizona and Western New Mexico.* Anthropological Papers of the University of Arizona No. 19, Tucson.

Cockrum, E. L.
1960 *The Recent Mammals of Arizona: Their Taxonomy and Distribution.* University of Arizona Press, Tucson.

Colton, H. S.
1941 *Winona and Ridge Ruin, Part II, Notes on the Technology and Taxonomy of the Pottery.* Museum of Northern Arizona Bulletin No. 19, Flagstaff.

1955 *Pottery Types of the Southwest.* Museum of Northern Arizona Ceramic Series 3B, Flagstaff.

1956 *Pottery Types of the Southwest.* Museum of Northern Arizona Ceramic Series 3C, Flagstaff.

1965 *Check List of Southwestern Pottery Types.* Museum of Northern Arizona Ceramic Series 2, Revised, Flagstaff.

Colton, H. S. and L. L. Hargrave
1937 *Handbook of Northern Arizona Pottery Wares.* Museum of Northern Arizona Bulletin No. 11, Flagstaff.

De Harport, D. L.
1959 An Archaeological Survey of Canyon de Chelly, Northeastern Arizona: A Puebloan Community Through Time. Unpublished Ph.D. dissertation, Harvard University, Cambridge.

Di Peso, C. C.
1958 *The Reeve Ruin of Southwestern Arizona: A Study of a Prehistoric Western Pueblo Migration into the Middle San Pedro Valley.* The Amerind Foundation No. 8.

Fewkes, J. W.
1904 Two Summers' Work in Pueblo Ruins. *Twenty-second Annual Report, Bureau of American Ethnology*, pp. 3-195, Washington.

Fitzhugh, W. W.
1972 *Environmental Archaeology and Cultural Systems in Hamilton Inlet. Labrador*, Smithsonian Contributions to Anthropology No. 16, Washington.

Gould, R. A., D. A. Koster, and A. H. L. Sontz
1971 The Lithic Assemblage of the Western Desert Aborigines of Australia. *American Antiquity* 36(2):149-169.

Haury, E. W.
1945 *The Excavation of Los Muertos and Neighboring Ruins in the Salt River Valley, Southern Arizona.* Papers of the Peabody Museum of American Archaeology and Ethnology, Harvard University Vol. 24, No. 1, Cambridge.

Haury, E. W. and L. L. Hargrave
1931 *Recently Dated Pueblo Ruins in Arizona.* Smithsonian Miscellaneous Collections Vol. 82, No. 11, Washington.

Hawley, F. M.
1936 *Field Manual of Prehistoric Southwestern Pottery Types.* The University of New Mexico Bulletin Anthropological Series Vol. 1, No. 4.

Hill, James N.
1970 *Broken K Pueblo: Prehistoric Social Organization in the American Southwest.* Anthropological Papers of the University of Arizona 18, Tucson.

Hill, J. N. and R. N. Hevly
1968 Pollen at Broken K Pueblo: Some New Interpretations. *American Antiquity* 33(2):200-210.

Lee, T. A.
1966 An Archaeological Reconnaissance of the Southwestern Portion of the Navajo Reservation. Unpublished Master's thesis, University of Arizona, Tucson.

Lindsay, A. J., Jr., J. R. Ambler, M.A. Stein and P. M. Hobler
1968 *Survey and Excavations North and East of Navajo Mountain, Utah, 1959-1962.* Museum of Northern Arizona Bulletin No. 45 - Glen Canyon Series No. 8, Flagstaff.

Martin, P. S. and J. B. Rinaldo
1950 *Sites of the Reserve Phase, Pine Lawn Valley Western New Mexico.* Fieldiana: Anthropology Vol. 38, No. 3, Chicago.

Mindeleff, V.
1891 A Study of Pueblo Architecture in Tusayan and Cibola. *Eighth Annual Report of the Bureau of American Ethnology*, pp. 3-228, Washington.

Olson, A. P.
1971 *Archaeology of the Arizona Public Service Company 345 KV Line.* Museum of Northern Arizona Bulletin No. 46, Flagstaff.

Reid, J. J.
1973 Growth and Response to Stress at Grasshopper Pueblo, Arizona. Unpublished Ph.D. dissertation, University of Arizona, Tucson.

Rinaldo, J. B. and E. A. Bluhm
1956 *Late Mogollon Pottery Types of the Reserve Area.* Fieldiana: Anthropology Vol. 36, No. 7, Chicago.

Rohn, A. H.
1971 *Mug House, Mesa Verde National Park, Colorado.* U.S. National Park Service Archeological Research Series 7-D, Washington, D.C.

Ruppé, R. J.
1962 A Preliminary Report of the Arizona State University Summer Session at Kin-Li-Chee Wash, Arizona. Ms on file, Arizona State University, Tempe.

Schiffer, M. B.
1972 Archaeological Context and Systemic Context. *American Antiquity* 37(2):156-165.

Smith, W.
1971 *Painted Ceramics of the Western Mound at Awatovi.* Peabody Museum of Archaeology and Ethnology, Harvard University Vol. 38, Cambridge.

Speth, J. D.
1972 Mechanical Basis of Percussion Flaking. *American Antiquity* 37(1):34-60.

Struever, S.
1968 Woodland Subsistence-Settlement Systems in the Lower Illinois Valley. In *New Perspectives in Archaeology,* edited by S. S. Binford and L. R. Binford. Aldine, Chicago.

White, T. E.
1953 A Method of Calculating the Dietary Percentage of Various Food Animals Utilized by Aboriginal Peoples. *American Antiquity* 18(4):396-398.

Whiting, A.
1966 *Ethnobotany of the Hopi.* Museum of Northern Arizona Bulletin No. 15, Flagstaff.

Wilmsen, E. N.
1970 *Lithic Analysis and Cultural Inference: A Paleo-Indian Case.* Anthropological Papers of the University of Arizona No. 16, Tucson.

Woodbury, R. S.
1954 *Prehistoric Stone Implements of Northeastern Arizona.* Peabody Museum Papers of American Archaeology and Ethnology, Harvard University Vol. 24, No. 6, Cambridge.

APPENDICES

APPENDIX I

TRADITIONAL HISTORY OF WIDE REEDS

David M. Brugge

A NOTE ON INTERVIEWS - Interviews cited by number only were conducted by Mr. Brugge and Roberta L. Tso in 1969-1973. Informants include seven Navajos and two Anglo-Americans. All but one of the Navajo interviews were conducted in Navajo. Eight of these interviews were done as part of an ethnohistory project supported by Southwest Parks and Monuments Association. Transcripts of the interviews are in the files of Hubbell Trading Post National Historic Site. The Navajo land claims data were supplied by J. Lee Correll of the Tribal Research Section, where files are maintained of the data. Thanks are hereby extended to both Southwest Parks and Monuments Association and the Navajo Tribe for their assistance.

Oral tradition from various sources gives some hints regarding the site of Wide Reeds. Two native names have been recorded. In Hopi it is called Wukopakabi which has been translated to "Great Reed or Arrow Place" (Fewkes 1901:608), an apparent reference to *Phragmites communis*, the carrizo or common reed that was used for arrow shafts. The common Navajo name, Lok'aa Ntiel, "Wide Reeds", refers to the same species of reed. A more complete descriptive name is sometimes cited, Lok'aataa Kindah Ntiel, "Big Wide House in the Midst of the Reeds" (Interview No. 16, 1972:8). In either case, the suggestion that *Phragmites* once grew in the marshy spots along the wash near the ruin is worth noting. These areas now support cattails (*Typha sp)* rather than reeds.

Fewkes speculated that Wide Reeds, for which he used the name Wukopakabi, had been occupied by people of the Pakab (Arrow) Clan and that this was the same as the Awata (Bow) Clan. He believed that they brought the Momtcita ceremony to Hopi and noted the great similarity of this ceremony to the rites of the Zuni Bow Priesthood. He therefore surmised that both Pueblo peoples obtained the ceremony from a common source and that Wide Reeds was a place of residence of some of the people who practiced the ceremony, some of whom founded the Arrow and Bow Clans among the Hopi. He believed that Awatobi was settled by these same people (Fewkes 1901:608-609).

Supplee, writing in 1966, states unequivocally that the site was occupied by the Hopi Reed Clan (same as Arrow Clan?) just prior to the founding of Awatobi and translates Wukopakabi as "Big Reed or Arrow House" (Supplee 1966:1). He suggests that excavation of the site might be significant should it produce evidence connecting the site with Awatobi (Supplee 1966:4).

Navajo tradition often lumps the ruin with other Anasazi ruins of the region and attributes its abandonment to destruction by wind and fire (Interview No. 45, 1972:2; Interview No. 31, 1972:1), these being due to supernatural causes. One story tells of people of Wide Reeds who moved to Zuni, stopping at Klagetoh, Wide Ruins (Kin-Tiel), Tsehnats'iil and Whoyodzi on the way, one of the latter two places being in the Manuelito area (Interview No. 31, 1972:1).

Thus, there are traditional data linking the descendants of the Wide Reeds occupants with both Zuni and Hopi.

The next event that involves the site took place long after abandonment. The Hano clans, in their immigration to Hopi shortly after the destruction of Awatobi, are said to have stopped there (Fewkes 1901:614). This would have been in the very early eighteenth century.

The ruins are next associated with certain events in Navajo traditional history for which more complete, if sometimes contradictory, data exists. There was a man named Jihaal ("Sound of a Rattle") who settled at or near the ruins (Interview No. 44, 1972:1; Interview No. 4, 1971:11-14 and 20-22; Interview No. 45, 1972:2; Interview No. 24, 1972:1-2; Interview No. 16, 1972:8; Navajo Land Claim Interview No. 289, 1959; Navajo Land Claim Interview No. 460, 1960; Navajo Land Claim Interview No. 527, 1960). Knowledge of the man and his life is quite spotty and it is only by comparing the various accounts that enough can be learned to allow any reconstruction. Most sources identify him as Navajo, although a few are uncertain, suggesting even that he might have been Hopi. Two accounts identify him as a member of the Taachii'nii Clan, which, if correct, may be especially significant. The Tachi'nii originated from survivors of the destruction of Awatobi who settled at Tachii, a spring near the eastern edge of Black Mesa almost due west of Chinle. That a descendant of these people, now quite Navajoized, should return to a site occupied by remote ancestors might be conceivable. There is far more to the story than just that, however.

Jihaal is consistently associated by the Navajos with such sites as Kinaazini between Wide Ruins and Klagetoh, Talahodijool on the east side of Ganado Mesa and the Nazlini pueblito. These are all sites that were built in the 1760s by emigrants from the Dinetah (Brugge 1972:9-11). These were people of mixed Apachean-Puebloan descent themselves. Thus Jihaal, who apparently was an adult during the third quarter of the eighteenth century, may have had both consanguineal and affinal connections with Navajos who numbered among their ancestors Pueblo refugees from diverse towns.

There has come to light no indication of Navajo occupation of Wide Reeds Ruin itself, however. Just west of the ruin across a small wash is a sandy knoll where occupational debris extends from Anasazi times to Navajo. Recorded as Site 4 or NA10546, the site has produced Navajo sherds of what I have called Dinetah Utility, Transitional Variety; a variety that is generally transitional in character between the Dinetah Utility of the early eighteenth century and Navajo Utility, which dates from about the beginning of the nineteenth century to the present. If Jihaal and his followers lived at Lok'aa Ntiel, Site 4 was probably their home rather than the old ruin itself. Indeed, one Navajo of the Ganado area, who has refused to be interviewed, is reported to have located Jihaal's hogan on this small rise and to have said that the remains of the hogan itself have been eroded away by the Pueblo Colorado Wash, which is currently undercutting still further at this site.

Descriptions of Jihaal are unanimous in depicting a very tall man with big feet who used a bow and arrows of larger than normal dimensions. He was a great runner and is said to have used a race course near Nazlini for training. His skill at running and with a bow made him also a leading hunter and warrior. He is remembered as the leader in the construction of an antelope corral just south of Jeddito Mesa. He is said to have taken part both in offensive actions, in particular against the Western Apaches, the Zunis and the Hopis, and defensive battles at Kinaazini and probably Talahodijool. Other defensive sites associated with him are the Nazlini pueblito and possibly defensive works said formerly to have been located on Round Top, a crag-like formation near Ganado; but whether these ever suffered attack is not known.

The greatest degree of uncertainty regarding him is whether or not he was a singer. Some sources state that he not only knew a number of ceremonies, including Blessingway, but that he was one of those who introduced certain new ceremonies to the tribe. Others deny that he had any ceremonial knowledge beyond perhaps some private prayers.

He is said to have had a number of wives and at least one son. The name was passed on in forms such as Jihaal Bighe' ("Jihaal's son") and Jihaal Binali (Jihaal's Paternal Grandson") through at least two generations and very probably more to Navajos of the present century living south and west of the Hopi villages. The name has been Anglicized to "Gee Hull" in more recent sources. It is not

unlikely that repetition of the name in succeeding generations has led to some fusing of data regarding more than one individual with the stories pertaining to the best known figure in the group.

At the other end of the tradition, there seems to be some confusion of Jihaal's story with the more tenuous tradition of Masido and Beibashdeeli, two alleged Anasazi occupants of Wide Reeds itself; the latter said to have been a man with 12 wives (Interview No. 21, 1972:28, 32). This last story lacks any real details. The names do not appear to be of Navajo origin and the source of the tale, very dim tradition at best, is not known, but it may go back to Puebloan origins.

After the death of Jihaal, according to one story killed by enemies on the rim of Canyon de Chelly, Wide Reeds again lapses as a place of significance for about a century. There is no certain mention of it in either Spanish, Mexican or Anglo-American military accounts. The placed called Cumaa by Escalante in 1775 and 1776 was obviously nearby but whether his "watering place" was the spring at Wide Reeds or another is quite uncertain. Escalante probably obtained the name Cumaa from his Zuni guides (Adams 1963:120-122; Bolton 1950:237-238). If Jihaal did not still roam the Pueblo Colorado Valley, he had not been gone long.

In 1839, Colonel Mariano Chavez camped in the valley during a campaign against the Navajos. His primary reference point was the Pueblo Colorado or Kinichii, a ruin a few miles up the valley from Wide Reeds, but he did spend some time at a place he called Carricito, "Little Reed", which might conceivably be Wide Reeds itself. If so, the use of the diminutive suffix might be indicative of environmental change.

Most references to the area mention only the name Pueblo Colorado and, by the time of the Carson campaign in 1863, it is apparent that it had come to have a general application tc the entire valley (Carson to AAG, July 29, 1863, NA, RWD, Record Group 98, DNM, LS, Old Book 124 bound as 76, pp. 5-6). That the valley was a center of Navajo settlement where there were hogans and cornfields and a place where dances were held is evident from numerous reports of the military, but the ruin escaped notice, or at least comment, until well after the Navajos returned from the exile at Fort Sumner.

In the summer of 1861 Captain John G. Bourke traveled through the valley on his way to the Hopi Snake Dance, spending the night at Barney Williams "trading ranch", probably near the site of the present J.L. Hubbell Trading Post. He called the wash the Pueblo Colorado and visited a ruin nearby. He identified the ruin as that from which the stream took its name. His description, however, better fits Wide Reeds than Kinichii:

> "The tracings of the inner and outer walls are perfectly distinct, and the material of construction blocks of friable sandstone of all shapes and sizes, from six to ten inches long, three to six wide, and one to four thick.
>
> The stones were uncut or unpecked, and placed in position just as they were taken from the adjacent mesa. The mud or clay which had once held them together was now washed away, and the walls reduced to piles of rock, but the general plan of the Pueblo could still be made out. It had evidently been shaped like a hollow square, the "placeta" [sic] in the center reserved for movements of religion, festivity, or public business. Two circular depressions marked the sites of Estufas, both within the square" (Bourke 1884:68).

Bourke's descriptions is sufficiently brief that his failure to mention some features of the site and his error in describing the pueblo as square could be merely the result of a very cursory

examination, although he may well have visited an entirely different ruin. None other that matches his text quite so well as Wide Reeds is known in the vicinity, however.

A number of informants mention the ruin as having been in better condition in the recent past, both from the point of view of having lost little to erosion by the wash and of having walls more clearly visible on the surface. It is said that during the period that C.N. Cotton was at Ganado, 1884 to sometime in the 1890s, some construction was done at Hubbell Trading Post with rock taken from the ruin (Interview No. 21, 1972:28-29). Even following this, there were walls still partially standing above the rubble (Interview No. 47, 1969:10; Interview No. 16, 1972:8). One reason for this may have been that as Navajos replaced Spanish-American masons in the area, they refused to haul rock from the ruin (Interview No. 18, 1972:2) and J.L. Hubbell came in time to value the remains and to try to preserve them (Interview No. 47, 1967:74). By the mid-1920s, however, there was little visible but a mound with some walls exposed along the more eroded sides. The rate of cutting by the Pueblo Colorado Wash is said to have varied, with the major losses to side-ward erosion of the wash having taken place in the 1890s and the losses between about 1925 and 1970 amounting to only 10-15 feet (Interview No. 63, 1972).

At least one older witness remembers seeing plentiful carrizo reed still growing in the valley (Interview No. 27, p. 8). By the mid-1920s little, if any, of this reed remained. At a subsequent date, cattails from Missouri were inadvertently introduced by a mission employee who disposed of dried spikes and was surprised to find that these soon sprouted and spread along the wash (Interview No. 63, 1972).

REFERENCES CITED

Adams, E. B.
1963 Fray Silvestre and the Obstinate Hopi. *New Mexico Historical Review* 38(2):97-138.

Bolton, H. E.
1950 *Pageant in the Wilderness.* Utah State Historical Society. Salt Lake City.

Bourke, J. G.
1884 *The Snake Dance of the Moquis of Arizona.* Charles Scribner's Sons, New York. (Re-issued by Rio Grande Press, Chicago, 1962.)

Brugge, D. M.
1972 *The Navajo Exodus.* Archaeological Society of New Mexico, Supplement 5. Las Cruces.

Fewkes, J. W.
1901 Tusayan Migration Traditions. *Nineteenth Annual Report, Bureau of American Ethnology.* Washington.

Supplee, C. B.
1966 The Need of Erosion Control and Stabilization of a Small Pueblo Ruin -- Wukopakli -- Hubbell Trading Post National Historic Site, Ganado, Arizona. Ms on file at Hubbell Trading Post National Historic Site, Ganado.

APPENDIX II

POLLEN STUDIES AT WIDE REED RUIN

James Schoenwetter
Arizona State University

In October of 1972 a series of 60 sediment samples was submitted to the Palynology Laboratory of the Department of Anthropology at Arizona State University for archaeological pollen analysis. The contracting agency, the Arizona Archaeological Center of the National Park Service, requested the accomplishment of such analyses as was possible in the equivalent of one month's research effort. No priorities were placed on individual samples. However, it was requested that maximal effort be directed toward the test of a specific hypothesis and that specific format of analysis be utilized insofar as this was possible.

Wide Reed Ruin is characterized by the occurrence of rooms of distinctive architectural character. Plaza areas, a kiva, large rooms and small rooms are among the architectural patterns which have been excavated. Small rooms, which constitute the majority of the architectural units, have various types of floor features; some have no floor features at all, some have bins in the floors, others have flagstone flooring surfaces. The hypothesis given priority for testing through pollen analysis is that variations in architectural patterns observed at Wide Reed Ruin are reflections of functional or use distinctions of the rooms, and that these distinctions may be recognized and identified by the variances they cause in pollen rains.

Evidence that the hypothesis is testable has been provided by the work of Hill and Hevly (1968) at Broken K Pueblo. At that site, palynological research allowed recognition of a close correlation of pollen rain patterns and architectural patterns. Interpretation of the pollen rains appeared to support the usage interpretations and functional interpretations of Broken K architectural patterns which were made on artifactual grounds. However, as has been pointed out by Schoenwetter (1970:39), these findings were serendipitous. No research program had been specifically designed to establish the correlation between pollen rain patterns of specific sorts and architectural patterns, nor was the palynological study designed to allow statistically acceptable tests of the correlation once it was established.

There exist two methods of approach applicable to the problem of establishing a correlation between pollen rain and architectural pattern which may be interpreted in terms of usage and function. The direct approach is to isolate a small series of samples representing the pollen rain of architectural features which are so distinctive that they are very unlikely to represent members of the same functional or usage category. For example, small rooms with floor bins as distinct from kivas. Samples of floor contact sediment from rooms of such distinctive architecture would be observed to isolate the pollen rain distinctions which exist, or to demonstrate statistically that *no* correlations between architecture and pollen rains occur. If the palynological distinctions were subtle, involving significant differences of less than 5 percent variation (which is not unlikely), observation of a sufficiently large number of pollen grains from each sample could be very time consuming. Since labor costs are high in pollen analysis, the direct approach to resolution of the problem could become very expensive. In any case, few samples would be observed.

The indirect approach is to obtain pollen spectra for a series of specimens representative of *potentially* functionally distinct categories of rooms. A large number of pollen grains are not observed in each sample, but a large number of samples are processed and analyzed. If correlations occur between patterns of pollen rains and patterns of architecture, an assessment can be made of the probability that the correlations are representative of functional distinctions among room types. This is particularly true if the time variable is held essentially constant. However, if no correlations between architectural and palynological patterns occur, the pollen analyst cannot conclude that no correlations exist. He can only point out that they do not exist in the data available to him. The indirect approach risks inconclusive results in order to obtain data from a greater number of samples.

It was felt judicious to use the indirect approach in the present instance. This was considered advisable because:

A) The amount of research that could be accomplished was limited by budget imperatives. If the fixed amount of funds available had been expended before the direct approach yielded sufficient data for resolution of the problem (that is, if a sufficiently large number of pollen grains could not be observed in the roughly one hundred hours available for research), nothing effective would have been accomplished at all. If the same amount were spent on the indirect approach there was more risk that the problem of room function would be unresolved, but a greater prospect that the data accumulated would be pertinent to the solution of other problems.

B) The indirect approach happened to be the one employed by Hill and Hevly in collecting data on Broken K. Utilization of the same approach would provide an essentially comparable format on pollen data.

C) It was hoped that the availability of more pollen records from the site would prove useful in assessing such other problems as intra-site chronology.

After discussion of the advantages and disadvantages of the two approaches with Mr. Mount, and after discussion of alternative hypotheses that could be tested through pollen analysis, Mr. Mount isolated the Wide Reed samples he had collected which he considered pertinent to the problem. Work was begun through the chemical processing of 40 sediment samples to extract such pollen as might be contained. Normal extraction procedures for archeological and terrestrial sediments (Schoenwetter 1962:207-9; Mehringer 1967:136-7) utilize a 75-150 cc volume of sample. Because the samples submitted were normally of less than 100 cc volume, all of the sample was used for the extraction. Thus no opportunity remains for independent analysis of the sediments by another investigator.

Time allowed observation of 33 of the 40 samples, of which 21 provided sufficient pollen for analysis. This (63 percent) is an unusually high frequency of "good" archaeological samples; the normal average is closer to 50 percent productivity (e.g., Schoenwetter 1967:93-97), and not infrequently is about 30 percent (e.g., Schoenwetter 1964:29-30). In 19 cases analyses proceeded until 200 pollen grains--exclusive of "ethnobotanic" types (Bohrer, 1966:2; Schoenwetter 1970:38) were recorded. In the remaining two cases 148- and 100-grain counts were accepted as adequate. This analytic format provided pollen frequencies roughly equivalent in statistical value to those reported by Hill and Hevly (1968).

Table 1 records all observations made, and Figure 1 presents these in the usual graphic form of a pollen diagram. The data justify two conclusions:

A) There is greater variation in the pollen record *within* a category of architectural form than occurs between such categories. Essentially, the productive samples fall into four architectural

TABLE 1: Observed Pollen from Wide Reed Ruin.

PROVENIENCE	Sample	*Pseudotsuga sp.*	*Pinus ponderosa*	*Pinus edulis*	Unidentified *Pinus* thirds	*Juniperus*	*Quercus*	*Celtis*	Cheno-am	Ambrosiae	Tubuliflorae	Liguliflorae	*Artemisia*	*Gramineae*	*Ephedra Tor.*-type	*E. Nev.*-type	*Sarcobatus*	*Polygonum pers.*-type	*Ribes*	*cf. Sphaeralcea*	*Leguminosae*	*Cylindropuntia*	*Zea*	*Cleome*	*Cucurbita*	Unknowns	Pollen sum	+ Ethnobotanic pollen
Rm 8, Floor	4		6	27	23	24			39	43	33		13	5	1	1		1									200	
Rm 9, Floor	6		1	17	9	13			34	17	4		5	4	1												100	
Rm 9, Floor	7			12	6	18	2		67	35	24		38	1	1									2			200	+2
Rm 10, Floor	9		5	26	3	14		1	23	66	32		18	6			1		1							4	200	
W. Plaza, Floor III	20		14	32	19	18			24	30	10		6	5	2	1							3				148	+3
Rm 8, Bin Floor	22		2	60	19	28	4		22	28	17		19	14		2							2	2			200	+4
Rm 3, Floor	27		4	44	33	23	6		37	26	24		13	5	4	2		1					1	4			200	+5
Rm 1, Subfloor	29		1	47	15				46	24	27		18	6									2	4			200	+6
Rm 2, Floor	30		6	46	21	22	7		36	16	15		22	5	16					1		1	7	2			200	+9
Rm 11, Floor	31		4	53	33	21			46	20	21		17	7	1												201	
W. Plaza, Floor II Bins	32		15	48	27	27	3		22	30	21		10	12	2			1					6				200	+6
Rm 4, Floor	33(A)		1	44	9	31	6		47	30	19		11	6			1	1						1			200	+1
	33(B)		5	37	13	19	2		75	15	9	1	13	5	6		4									5	200	
E. Plaza Floor II	43	1	13	49	15	16	1		40	26	16		22	4	4		1						2	1		2	200	+3
Rm 3, Floor	53		6	41	16	26	4		55	25	14		4	4	3		1	2	3	1	1			4		5	200	+4
Rm 2, Floor	54		2	49	24	19	8		41	13	18	1	33	2	5			1					3	3	1		200	+7
Rm 4, Floor	55		12	63	15	19	2		40	27	8		12	4	2		3		3					5			200	+5
Rm 11, Floor	56		2	49	16	27	3		34	37	18		16	6	2	1								1			200	+1
Rm 13, Floor	58		8	26	6	21	3		51	40	24		19	5	1			1						2			200	+2
Rm 13, Floor	59		5	45	9	23	5		31	41	27		12	6	1								1	2			200	+3
Rm 15, Floor	61		6	43	6	19	2		39	31	30		19	6	3								2				200	+2

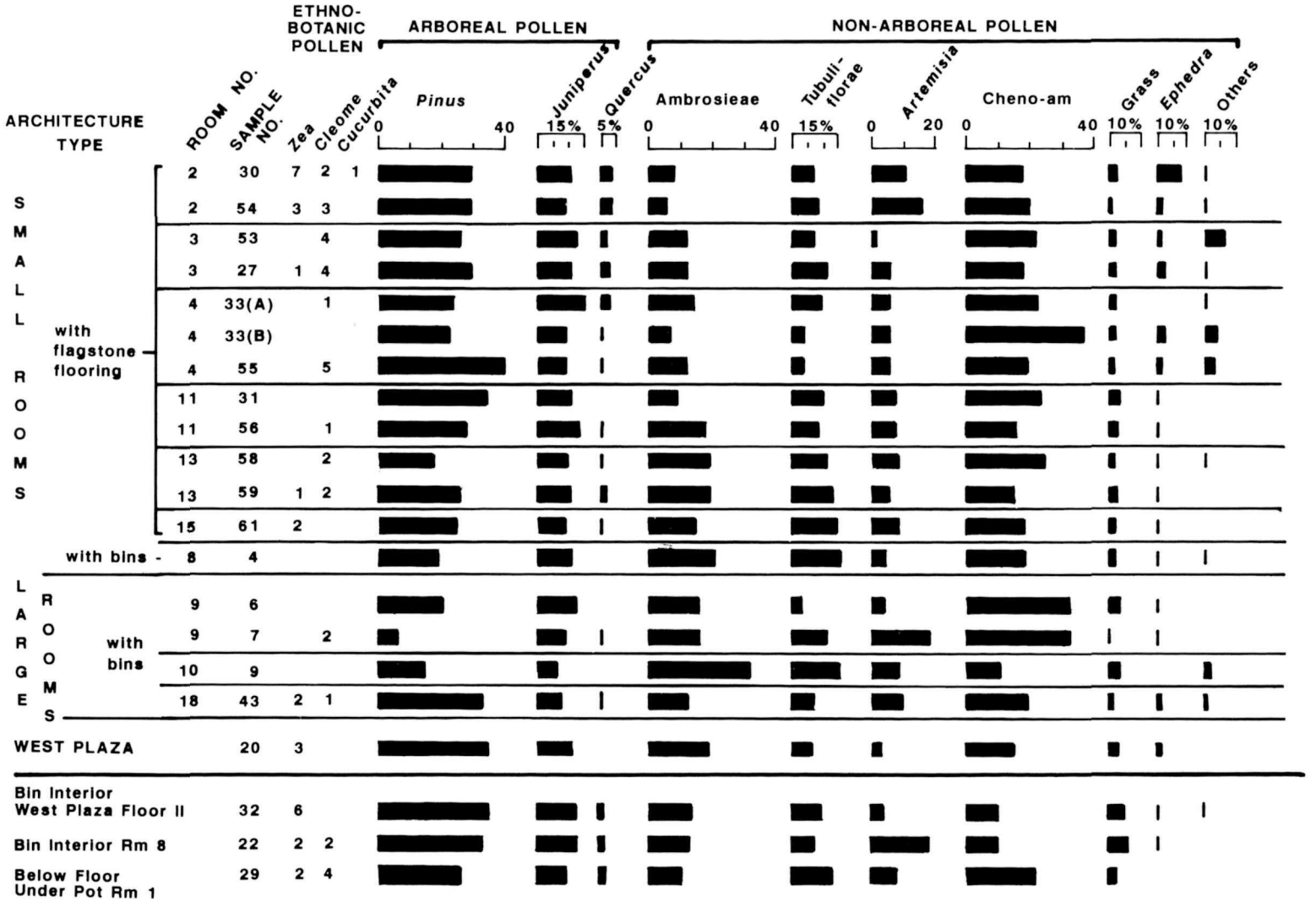


FIGURE 1: Pollen Identifications and Frequencies at Wide Reed Ruin.

categories: small rooms with flagstone flooring, small rooms with bins, large rooms with bins and plaza. Only one sample was analyzed from the second and fourth categories, however. Thus, there are actually only two architectural categories from which replicate data are available. Statistically significant variations were measured at the 95 percent confidence level by the confidence interval surrounding the binomial distribution. Significant variations occur in the pollen record, typified by the records of *Pinus* and Cheno-am pollen. Samples from the floor of the same room (e.g., Room 2) may show no significant distinction in any pollen category; or they may (e.g., Room 4) demonstrate significant distinctions in more than one pollen category. The general tendency is for the former situation to be more normal, but since the latter situation does occur, it is clear that a direct correlation between architectural form and pollen record cannot occur.

Further, where a number of samples are available for an architectural category, variation among the samples leaves no room for doubt regarding a lack of correlation. Each room in the "large room with bins" category provided a unique pollen record.

B) The sorts of palynological records obtained at Broken K Pueblo that allowed discrimination of room function do not occur at Wide Reed Ruin. At Broken K, architecturally distinctive rooms produced records of ethnobotanic pollen types that patterned as to both types and frequency relative to architecture. At Wide Reed, the number of different kinds of ethnobotanic pollen types is not as great as at Broken K, nor do statistically significant variations in the frequencies of these types occur. It is thus clear that the format of analysis used by Hill and Hevly (1968) to indicate the differential functions of architecturally distinctive rooms does not accomplish similar ends at Wide Reed Ruin. The limited amount of data provided on each sample (i.e., the 200-grain count) is inadequate to the task of providing clues to a potentially useful format of analysis for indicating the differential functions of architecturally distinctive rooms. In the present case, obviously, application of the indirect, in contrast to the direct, approach to analysis was a losing gamble.

An attempt was made to salvage some of the effort invested in the pollen work by calculating the arboreal pollen frequency relative to the adjusted pollen sum of Schoenwetter (1970:43). This pollen statistic is designed to allow chronological placement and paleoecological reconstruction in terms of a generalized Colorado Plateau pollen chronology. Table 2 shows the results of this exercise.

The data indicate that the floors of all of the rooms sampled are referent to paleoecological conditions of the same type, and apparently of the same age. The sample collected below the floor of Room 1 is referent to paleoecological conditions of a distinctive type, apparently of a period prior to the general construction at Wide Reed. However, since this sample contains maize and beeweed pollen it would apparently not pre-date occupation of the site. The samples collected as bin fills from the West Plaza (Floor II) and the contiguous Room 1 contain relatively more arboreal pollen than the room floor samples. The average arboreal pollen frequency of these samples (50.7 percent) is significantly distinct from the average frequency (39.2 percent) of the floor samples. This *could* be a function of the distinctive bin fill proveniences. I suggest, however, that the data are consistent with an interpretation of a distinct temporal assignment for the bin fill samples. This would be a period prior to the construction of the room floors, but after the time represented by the sample from the sub-floor at Room 1.

Assignment of absolute age to these three temporal units is complicated by a lack of surface sample control pollen records from the geographic district in which Wide Reed Ruin is located. If we presume that the pollen statistic accepted by Schoenwetter (1970:43) as indicating "modern" conditions would characterize surface pollen records at Wide Reed, dating may be attempted by reference to the Colorado Plateau pollen chronology. The most reasonable date for the sub-Room 1 samples that might be applied under this presumption is A. D. 1075-1125. The dates of A. D. 1240-

1275 are those that would be most reasonable for the other samples, with indications that Floor II of the West Plaza and the bin in Room 8 date earlier on this horizon.

It is recognized that dendrochronological assessments of the beams used in room construction offer dates following A. D. 1275 for Wide Reed (James Mount, personal communication). The presumptions regarding the character of the control pollen records, then, may be in error. Alternatively, the dates for the beginning of sediment accumulation on the room floor surfaces may indeed be somewhat earlier than the dates of beam cutting for roof construction, or the rooms dated by dendrochronology and those dated by pollen may be different rooms.

Table 2: Calculation of Adjusted Arboreal Pollen Frequency.

Room Number	Sample Number	Size of Pollen Sum	Adjusted Arboreal Pollen Frequency %
2	30+54	399	44.9
3	27+53	396	43.9
4	33A+33B+55	596	42.2
11	31+56	401	43.8
13	58+59	399	35.8
15	61	200	36.0
9	6+7	299	33.1
10	9	199	23.0
18	43	199	42.5
West Plaza Floor I	20	148	47.3
West Plaza Bin, Floor II	32	199	51.3
Room 8 Bin	22	200	50.0
Under Room I Floor	29	200	21.5

REFERENCES CITED

Bohrer, V. L.
1966 *Pollen Analysis of the Hay Hollow Site East of Snowflake, Arizona.* Interim Research Report No. 12. Geochronology Laboratories, University of Arizona, Tucson.

Hill, J. N., and R. H. Hevly
1968 Pollen at Broken K Pueblo: Some New Interpretations. *American Antiquity* 33(2):200-210.

Mehringer, P. J., Jr.
1967 Pollen Analysis of the Tule Springs Site. In *Pleistocene Studies in Southern Nevada,* edited by M. Wormington and D. Ellis, pp. 130-200. Nevada State Museum Anthropological Papers 13, Carson City.

Schoenwetter, J.
1962 Pollen Analysis of Eighteen Archaeological Sites in Arizona and New Mexico. In *Chapters in the Prehistory of Eastern Arizona, I,* by P. S. Martin et. al., pp. 168-209. Fieldiana: Anthropology, Chicago Natural History Museum, Chicago.

1964 Pollen Report. In *Third Annual Report: American Bottoms Archaeology,* edited by Melvin L. Fowler, pp. 29-33. The Illinois Archaeological Survey, Urbana.

1967 Pollen Survey of the Chuska Valley. In *An Archaeological Survey of the Chuska Valley and the Chaco Plateau, New Mexico, Part I: Natural Science Studies,* by A. H. Harris, J. Schoenwetter and A. H. Warren, pp. 72-103. Museum of New Mexico Research Records 4, Santa Fe.

1970 Archaeological Pollen Studies on the Colorado Plateau. *American Antiquity* 35(1)35-48.

COMMENTS ON THE POLLEN STUDY

James E. Mount

The following remarks are in reference to specific statements in Schoenwetter's report. In any healthy science there is disagreement and the following comments represent a contribution of alternate interpretations to be considered.

In reference to specific statements in the Schoenwetter report:

Reference to page 129; fourth paragraph. The sample from below the floor in Room 1 was taken from beneath a jar that had been deposited in a small pit down from floor level. This pit *is* contemporaneous with the rest of the site. Also, it is suggested that bin fill does represent distinctive proveniences (as opposed to floors). Although it cannot be tested, I would suspect that bin fill ratios would be close to those of fill above the floors. There is no stratigraphic evidence that the bins in the West Plaza and in Room 8 are earlier than the rest of the site.

Reference to page 130; first paragraph. Pollen and tree-ring samples do not overlap greatly, but both are present from Room 4, floor level, and West Plaza, Floor II level.

Reference to page 130; first paragraph. Pollen and tree-ring samples do not overlap greatly, but both are present from Room 4, floor level, and West Plaza, Floor II level.

Architectural and tree-ring evidence indicate that Wide Reed was pre-planned and built as a unit. Forty-five dendro-dates (22 of which are *v* dates) indicate that construction took place in A. D. 1276. All *vv* dates are slightly earlier. There is no evidence, other than pollen, that the site was occupied earlier.

PUBLISHED REPORTS
OF THE
SOUTHWEST CULTURAL RESOURCES CENTER

1. Larry Murphy, editor. *Submerged Cultural Resources Survey : Portions of Point Reyes National Seashore and Point Reyes-Farallon Islands National Marine Sanctuary.* Submerged Cultural Resources Unit, 1984.

2. Toni Carrell. *Submerged Cultural Resources Inventory: Portions of Point Reyes National Seashore and Point Reyes-Farallon Islands National Marine Sanctuary.* Submerged Cultural Resources Unit, 1984.

3. Edwin C. Bearss. *Resource Study: Lyndon B. Johnson and the Hill Country, 1937-1963.* Division of Conservation, 1984.

4. Edwin C. Bearss. *Historic Structures Report: Texas White House.* Division of Conservation, 1986.

5. Barbara Holmes. *Historic Resource Study of the Barataria Unit of Jean Lafitte National Historical Park.* Division of History, 1986.

6. Steven M. Burke and Marlys Bush Thurber. *Southwest Region Headquarters Building, Santa Fe. New Mexico: A Historic Structure Report.* Division of Conservation, 1985.

7. Toni Carrell. *Submerged Cultural Resources Site Report: NOQUEBAY, Apostle Islands National Lakeshore.* Submerged Cultural Resources Unit, 1985.

8. Daniel J. Lenihan, editor. *Submerged Cultural Resources Study: Isle Royale National Park.* Submerged Cultural Resources Unit, 1987.

9. J. Richard Ambler. *Archeological Assessment: Navajo National Monument.* Division of Anthropology, 1985.

10. John S. Speaker, Joanna Chase, Carol Poplin, Herschel Franks, R. Christopher Goodwin. *Archeological Assessment: Barataria Unit, Jean Lafitte National Historical Park.* Division of Anthropology, 1986.

11. James E. Ivey, Marlys Bush Thurber, James T. Escobedo, Jr., Tom Ireland. *The Missions of San Antonio: A Historic Structures Report and Administrative History.* Divisions of Conservation and History, 1987.

12. Roger E. Coleman. *The Arkansas Post Story.* Division of History, 1987.

13. Toni Carrell, editor. *Submerged Cultural Resources Site Report: Charles H. Spencer Mining Operation and Paddle Wheel Steamboat, Glen Canyon National Recreation Area.* Submerged Cultural Resources Unit, 1987.

14. Hal K. Rothman. *The Bandelier National Monument: An Administrative History.* Division of History, 1988.

15. James E. Ivey. *In the Midst of a Loneliness: The Architectural History of the Salinas Missions, Salinas Pueblo Missions National Monument Historic Structure Report.* Division of History, 1988.

16. Richard W. Sellars and Melody Webb. *An Interview with Robert M. Utley on The History of Historic Preservation in the National Park Service--1947-1980.* Division of History, 1988.

17. Laura S. Harrison and Beverley Spears, *Historic Structures Report. Chinle Trading Post, Thunderbird Ranch and Custodian's Residence, Canyon de Chelly National Monument, Arizona.* Division of History, 1988.

18. James P. Delgado and Stephen A. Haller. *Golden Gate National Recreation Area. Gulf of the Farallones National Marine Sanctuary and Point Reyes National Seashore.* Submerged Cultural Resources Unit, 1989.

19. Judith K. Fabry. *Guadalupe Mountains National Park: An Administrative History.* Division of History, 1988.

20. Peter J. McKenna and Scott E. Travis. *Archeological Investigations at Thunderbird Lodge.* Division of Anthropology, 1989.

21. Peter J. McKenna and James E. Bradford. *The T. J. Ruin, Gila Cliff Dwellings.* Division of Anthropology, 1989.

22. C. Patrick Labadie. *Pictured Rocks National Lakeshore.* Submerged Cultural Resources Unit, 1989.

23. Daniel J. Lenihan, editor. *USS Arizona Memorial and Pearl Harbor National Historic Landmark.* Submerged Cultural Resources Unit, 1989.

24. Robert H. and Florence P. Lister. *Aztec Ruins National Monument: Administrative History of An Archeological Preserve.* Division of History, 1990.

25. Jill-Karen Yakubik. *Archeological Investigations of Six Spanish Colonial Period Sites: Barataria Unit, Jean Lafitte National Historical Park and Preserve.* Division of Anthropology, 1989.

26. Herschel A. Franks and Jill-Karen Yakubik. *Archaeological Survey on 65 Acres of Land Adjacent to Bayou des Familles: Barataria Unit, Jean Lafitte National Historical Park and Preserve.* Division of Anthropology, 1989.

27. Walter K. Wait and Peter J. Mckenna. *Quarai Parking Lot Rehabilitation: Archeological Testing Program, Salinas National Monument.* Division of Anthropology, 1990.

28. Diane Traylor, Lyndi Hubbell, Nancy Wood, Barbara Fiedler. *The 1977 La Mesa Fire Study: An Investigation of Fire and Fire Suppression Impact on Cultural Resources in Bandelier National Monument.* Division of Anthropology. 1990.

29. Wesley R. Hurt. *The 1939-1940 Excavation Project at Quarai Pueblo and Mission Buildings, Salinas Pueblo Missions National Monument*, Division of Anthropology, 1990.

30. Roger E. Coleman. *Archeological Investigation for Construction of a Pedestrian Trail and Identification of Laundress Row*, Division of Anthropology, 1990.

31. James E. Ivey. *Presidios of the Big Bend Area.* Bilingual publication, English and Spanish. Division of History, 1990.

32. Neil C. Mangum. *In the Land of Frozen Fires: A History of Occupation in El Malpais Country.* Division of History, 1990.

33. Jack B. Bertram. *Archeological Investigations Along the Proposed Alibates Tour Road Improvement Construction Route Alibates Flint Quarries National Monument, Potter County, Texas.* Division of Anthropology, 1990.

34. Robert Wooster, Ph.D. *History of Fort Davis, Texas.* Division of History, 1990.

35. Bruce A. Anderson. *The Wupatki Archeological Inventory Survey Project: Final Report.* Division of Anthropology, 1990.

36. Toni L. Carrell, editor. *Submerged Cultural Resources Assessment of Micronesia*, Submerged Cultural Resources Unit, 1990.

37. James P. Delgado, Daniel J. Lenihan, Larry Murphy. *The Archeology of the Atomic Bomb: A Submerged Cultural Resources Assessment of the Sunken Fleet of Operation Crossroads at Bikini and Kwajalein Atoll Lagoons, Republic of the Marshall Islands*. Submerged Cultural Resources Unit, 1990.

38. George Sabo III, Randall L. Guendling, W. Fredrick Limp, Margaret J. Guccione, Susan L. Scott, Gayle J. Fritz, Pamela A. Smith. *Archeological Investigations at 3MR80-Area D in the Rush Development Area, Buffalo National River, Arkansas*. Division of Anthropology, 1990.

39. Larry E. Murphy. *8SL17: Natural Site-Formation Processes of a Multiple-Component Underwater Site in Florida*. Submerged Cultural Resources Unit, 1990.

40. Hal K. Rothman. *Navajo National Monument: A Place and Its People*. Division of History, 1991.

41. Leo E. Oliva. *Fort Union and the Frontier Army in the Southwest*. Division of History, 1993.

42. Liping Zhu. *Fort Union National Monument: An Administrative History*. Division of History, 1992.

43. Laura S. Harrison and James E. Ivey. *Of A Temporary Character: An Historic Structure Report and Historical Base Map of First Fort, Second Fort, and Arsenal, Fort Union, New Mexico*. Division of History, 1992.

44. Frances Levine, William Westbury, Lisa Nordstrum. *A History Of Archeological Investigations At Fort Union National Monument*. Division of History, 1992.

45. Larry Murphy, editor. *Dry Tortugas National Park, Submerged Cultural Resources Assessment*. Submerged Cultural Resources, 1993.

46. Albert Manchester and Ann Manchester. *Hubbell Trading Post National Historic Site: An Administrative History*. Division of History, 1992.

47. James E. Bradford. *Archeological Survey, Gila Cliff Dwellings National Monument*. Division of Anthropology, 1992.

48. Peter Russell. *Gila Cliff Dwellings National Monument: An Administrative History*. Division of History, 1992.

49. Frances J. Mathien, Charlie R. Steen, Craig D. Allen. *The Pajarito Plateau: A Bibliography*. Division of Anthropology.

50. Randall L. Guendling, George Sabo III, Margaret J. Guccione, Sandra L. Dunavan, and Susan L. Scott, *Acheological Investigations at 3MR80-Area D in the Rush Development Area, Buffalo National River, Arkansas*. Vol. 2. Division of Anthropology, 1992.

51. James E. Mount, Stanley J. Olsen, John W. Olsen, George A. Teague, and B. Dean Treadwell. *Wide Reed Ruin: Hubbell Trading Post National Historic Site*. Division of Anthropology, 1993.

☆U.S. GOVERNMENT PRINTING OFFICE: 1993-777-627/85082

NATIONAL
PARK
SERVICE

Department
of the Interior