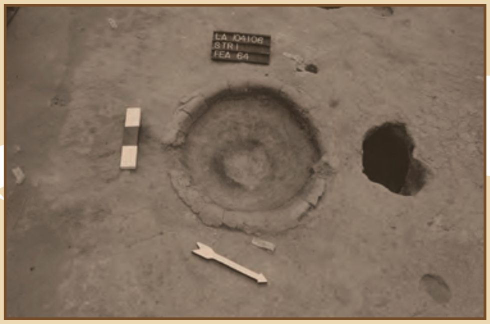
NMCRIS ACTIVITY NO. 64158

NMDOT PROJECT NO. NH-666-1(48)12

Triple Six at Twin Lakes

Data Recovery Results From Five Sites Along US 666 McKinley County, New Mexico

STEVEN A. LAKATOS



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Triple Six at Twin Lakes

Data Recovery Results from Five Sites along US 666, McKinley County, New Mexico

Steven A. Lakatos

with contributions by

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Principal Investigator

ARCHAEOLOGY NOTES 394

SANTA FE 2014 NEW MEXICO

NMCRIS INVESTIGATION ABSTRACT FORM (NIAF)

1. NMCRIS Activity No.:	**2a. Lead (Sponsoring) Agency**: US Department of Transportation Federal Highway Administration	**2b. Other Permitting Agency(ies):**	**3. Lead Agency Report No.:**
64158			NH-666-1(48)12

4. Title of Report: Volumes I and II *Triple Six at Twin Lakes: Data Recovery Results From Five Sites Along U.S. 666*, McKinley County, New Mexico.

Author(s) Steven A. Lakatos

5. Type of Report
☐ **Negative** ☒ **Positive**

6. Investigation Type
☐ Research Design ☐ Survey/Inventory ☐ Test Excavation ☒ Excavation ☐ Collections/Non-Field Study
☐ Overview/Lit Review ☐ Monitoring ☐ Ethnographic study ☐ Site specific visit
☐ Other

7. Description of Undertaking (what does the project entail?): Proposed improvements along U.S. 491 (666) consist of facilitating drainage, expanding the shoulder, and realigning drive lanes. Most of the data recovery efforts were contained within the existing and proposed right-of-way limits established by the NMSHTD. Although archaeological excavations were conducted within existing and proposed right-of-way limits, fieldwork also included documenting archaeological resources that extended beyond the area of potential effect. This included site mapping and categorizing the nature of the archaeological material through minimal subsurface tests and in-field artifact analysis.

8. Dates of Investigation: January 1, 1998 – March 15, 1998.

9. Report Date: December 15, 2014.

10. Performing Agency/Consultant: Office of Archaeological Studies
Principal Investigator: Eric Blinman
Field Supervisor: Steven A. Lakatos
Field Personnel Names: C. Dean Wilson, Raul Troxler, Richard Montoya, Phillip Alldritt, Dorothy Zamora, David Hayden, Laura Rick Henry Etsitty Sr., Vernon Foster, Marlene Owens, Leonard Perry, Fitzgerald Plummer, Roy King, and Truman Sam.

11. Performing Agency/Consultant Report No.: Archaeology Notes 394

12. Applicable Cultural Resource Permit No.: Permit No. ARPA-NAO-98-001

13. Client/Customer (project proponent): New Mexico Department of Transportation
Contact: Laurel Wallace
Cultural Resources Coordinator
Address: 1120 Cerrillos Road, Room 205-206

14. Client/Customer Project No.:
NH-666-1(48)12

Santa Fe, NM 87505-1842 **Phone:** Office: (505) 827-9899 Cell: (505) 490-2501	

15. Land Ownership Status *(<u>Must</u> be indicated on project map):*

Land Owner **Acres Surveyed** **Acres in APE**

TOTALS		

16 Records Search(es):

Date(s) of ARMS File Review 11/98.	**Name of Reviewer(s)** Steven A. Lakatos	OAS
Date(s) of NR/SR File Review 11/98.	**Name of Reviewer(s)** Steven A. Lakatos	OAS
Date(s) of Other Agency File Review	**Name of Reviewer(s)**	**Agency**

17. Survey Data:

a. Source Graphics ☐ **NAD 27** ☒ **NAD 83** **Note: NAD 83 is the NMCRIS standard**

X USGS 7.5' (1:24,000) topo map ☐ **Other topo map, Scale:**

☒ **GPS Unit** **Accuracy** ☒**<1.0m** ☐ **1-10m** ☐ **10-100m** ☐ **>100m**

b. USGS 7.5' Topographic Map Name **USGS Quad Code**

Twin Lakes	35108-F7

c. County(ies): McKinley

17. Survey Data (continued):

d. Nearest City or Town: Twin Lakes, NM.

e. Legal Description:

Township (N/S)	Range (E/W)	Section	¼ ¼ ¼
17 N	18 W		, , .
			, , .
			, , .
			, , .
			, , .
			, , .
			, , .
			, , .
			, , .

Projected legal description? ☐ **Yes** ☐ **No** ☒ **Unplatted**

f. Other Description (e.g. well pad footages, mile markers, plats, land grant name, etc.):

18. Survey Field Methods:

Intensity: ☐ 100% coverage ☐ <100% coverage

Configuration: ☐ block survey units ☐ linear survey units (l x w): ☒ other survey units (specify): Excavation

Scope: ☐ non-selective (all sites recorded) ☒ selective/thematic (selected sites recorded)

Coverage Method: ☐ systematic pedestrian coverage ☐ other method (describe)

Survey Interval (m): **Crew Size:** **Fieldwork Dates:** January 1, 1998 – March 15, 1998.

Survey Person Hours: **Recording Person Hours:** **Total Hours:**

Additional Narrative: Only portions within the ROW were excavated.

19. Environmental Setting (NRCS soil designation; vegetative community; elevation; etc.):

Pinon, Juniper, Silver sagebrush, narrow leaf yucca, snakeweed, rabbitbrush, Russian thistle, squirrel-tail grass, prickly pear cactus, Indian ricegrass, and other native grasses. Elevation: 6,380 feet.

20.

a. Percent Ground Visibility: 76% – 99%. **b. Condition of Survey Area (grazed, bladed, undisturbed, etc.):** Undisturbed and areas with disturbance from utility trenches and roads.

21. CULTURAL RESOURCE FINDINGS ☒ **Yes, see next report section** ☐ **No, Discuss Why:**	
22. Required Attachments (check all appropriate boxes): All of the information below is included in the attached report. ☒ **USGS 7.5 Topographic Map with sites, isolates, and survey area clearly drawn** ☒ **Copy of NMCRIS Mapserver Map Check** ☒ **LA Site Forms - new sites (*with sketch map & topographic map)*** ☐ **LA Site Forms (update) - previously recorded & un-relocated sites (*first 2 pages minimum)*** ☐ **Historic Cultural Property Inventory Forms** ☐ **List and Description of isolates, if applicable** ☐ **List and Description of Collections, if applicable**	**23. Other Attachments:** ☐ **Photographs and Log** ☐ **Other Attachments *(Describe)*:**
24. I certify the information provided above is correct and accurate and meets all applicable agency standards. **Principal Investigator/Responsible Archaeologist:** **Signature __________________ Date ___ Title (if not PI):**	
25. Reviewing Agency: **Reviewer's Name/Date** **Accepted ( ) Rejected ( )** **Tribal Consultation (if applicable):** ☐ **Yes** ☐ **No**	**26. SHPO** **Reviewer's Name/Date:** **HPD Log #:** **SHPO File Location:** **Date sent to ARMS:**

CULTURAL RESOURCE FINDINGS

[fill in appropriate section(s)]

1. NMCRIS Activity No.: 64158	**2. Lead (Sponsoring) Agency:**_US Department of Transportation Federal Highway Administration	**3. Lead Agency Report No.:** NH-666-1(48)12

SURVEY RESULTS:
Sites discovered and registered: 5
Sites discovered and NOT registered: 0
Previously recorded sites revisited (*site update form required*): 5
Previously recorded sites not relocated *(site update form required):*
TOTAL SITES VISITED:
Total isolates recorded: 5 **Non-selective isolate recording?** ☐
HCPI properties discovered and registered:
HCPI properties discovered and NOT registered:
Previously recorded HCPI properties revisited:
Previously recorded HCPI properties not relocated
TOTAL HCPI PROPERTIES (visited & recorded, including acequias):

MANAGEMENT SUMMARY:

IF REPORT IS NEGATIVE YOU ARE DONE AT THIS POINT.

SURVEY LA NUMBER LOG
Sites Discovered:

LA No.	Field/Agency No.	Eligible? (Y/N, applicable criteria)

Previously recorded revisited sites:

LA No.	Field/Agency No.	Eligible? (Y/N, applicable criteria)

MONITORING LA NUMBER LOG *(site form required)*

Sites Discovered (*site form required*) **:** **Previously recorded sites *(Site update form required):***

LA No.	Field/Agency No.	LA No.	Field/Agency No.

Areas outside known nearby site boundaries monitored? Yes ☐, No ☐ If no explain why:

TESTING & EXCAVATION LA NUMBER LOG (*site form required)*

Tested LA number(s)	Excavated LA number(s)
	LA 32964 LA 103446 LA103447 LA 104106 LA 116035

Administrative Summary

This report describes the archaeological data recovery results from five sites along US 666 (now US 491) near the modern town of Twin Lakes, McKinley County, New Mexico. Twin Lakes is situated in the southern Chuska Valley where the southwestern portion of the San Juan Basin abuts the southern extent of the Chuska Mountains. Given its proximity, this locality offers access to variety of micro-ecological zones including montane, piedmont, and alluvial plains. For over 5,000 years, the diversity of natural resources in this area has sustained hunters, foragers, agriculturalists, and pastoralists alike.

Data recovery at LA 32964 (NM-Q-18-123), LA 103446 (NM-Q-18-121), LA 103447 (NM-Q-18-122), LA 104106 (NM-Q-18-130), and LA 116035 was sponsored by the New Mexico State Highway and Transportation Department (NMSHTD, now the New Mexico Department of Transportation [NMDOT]) in advance of proposed improvements to this section of US 666 (US 491). Proposed improvements along this portion of roadway consist of facilitating drainage, expanding the shoulder, and realigning drive lanes. Most of the data recovery efforts were contained within the existing and proposed right-of-way limits established by the NMDOT. Although archaeological excavations were conducted within existing and proposed right-of-way limits, fieldwork also included documenting archaeological resources that extended beyond the area of potential effect. This included site mapping and categorizing the nature of the archaeological material through minimal sub-surface tests and in-field artifact analysis.

Archaeological investigations were conducted under the Navajo Nation Cultural Resources Investigation (NNCRI) Permit No. C9801 and Archaeological Resources Protection Act (ARPA) Permit: ARPA-NAO-98-001. The Principal Investigator was Eric Blinman, Ph.D., and the Project Director was Steven A. Lakatos. Project Field Assistants included C. Dean Wilson, Raul Troxler, Richard Montoya, Phillip Alldritt, Dorothy Zamora, David Hayden, and Laura Rick. Local laborers who contributed to the data recovery effort included Henry Etsitty Sr., Vernon Foster, Marlene Owens, Leonard Perry, Fitzgerald Plummer, Roy King, and Truman Sam.

Much of the fieldwork was conducted between January 6, 1998, and May 31, 1998, supplemented with sporadic field visits through June 18, 1998. Data recovery investigations within the proposed construction zone utilized both hand and mechanical excavation techniques, conducted systematically within an established Cartesian grid system. Of the five sites located within the proposed project area, two, LA 104106 and LA 32964, contained substantial intact cultural deposits consuming the majority of the excavation effort. The most robust evidence for occupation identified during this project was from the early Basketmaker II, late Basketmaker III, and pre-Bosque Redondo periods. In addition, evidence for Pueblo II–Pueblo III and post-Bosque Redondo periods of occupation were documented mainly outside the area of potential effect. Many of the sites investigated as part of this research project were multicomponent and spatially quite extensive. Spatially extensive residential or habitation sites were represented by rich artifact assemblages and structural remains. Although most of the sites are multicomponent, spatially and temporally discrete areas representing short-term limited-activity or special-use areas associated with hunting and gathering, lithic resource procurement, or herding were identified. During the course of the project, a total of 181 individuals visited the sites and inquired about the archaeological investigations.

NNCRI Permit No. C9801.
ARPA Permit No. ARPA-NAO-98-001.
MNM Project No. 41.659 (Emergency Highway Projects; Twin Lakes).
NMDOT Project No. NH-666-1(48)12, CN 2354.
NMDOT Joint Powers Agreement (JPA) No.: D04040.
NMCRIS Activity No. 64158.

Acknowledgments

The Twin Lakes data recovery project was completed with the involvement and cooperation of many people. I would like to acknowledge the dedicated field and laboratory personnel of the Office of Archaeological Studies (OAS) who maintained a high level of professionalism under adverse conditions. Staff members Stephen S. Post and Eric Blinman provided technical support and guidance in quantifying data and statistical interpretations. Carol Price unselfishly volunteered her skill and expertise in digital photography, drafting, and ceramic analysis, contributing greatly to the character of this report. The report was prepared by Robin Gould and Tom Ireland (editors) and Scott Jaquith (graphics) of the OAS production staff.

Timothy Kearns offered invaluable reference material and preliminary results from the then recently completed El Paso North System Expansion Project, helping to guide this research project. The residents of Twin Lakes graciously let us use their chapter house as a meeting location. Job Superintendent Cal McNatt of Twin Mountain Construction provided mechanical equipment and operators to remove noncultural strata from several of the sites. Finally, thanks to Gregory Rawlings, Steve Koczan, and Blake Roxlau of the NMDOT for supporting and funding this research.

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1 | Introduction

The temporal depth and diversity of human occupation in the southern Chuska Valley of New Mexico has been well established (Kearns 1998a; Damp 1999a; Stuart and Gauthier 1981; Peckham 1969). Results from the Twin Lakes US 666 data recovery investigations are no exception. Twin Lakes is located north of Gallup, New Mexico, in an area known as Tohatchi Flats (Figs. 1.1, 1.2, and Appendix 8). Tohatchi Flats represents the southwestern limit of the San Juan Basin and is one of the densest archaeological regions in the state with evidence of occupation spanning from the Early Archaic period through historic times. Although several early occupations have been reported in the vicinity of Twin Lakes, the most robust evidence for occupation identified during the Twin Lakes project was during the Basketmaker II, Basketmaker III, and more recently, early historic times. One reason this area may have attracted aceramic agriculturists, sedentary farmers, and pastoral populations in succession for over 5,000 years is its environmental setting.

Tohatchi Flats is a broad alluvial valley that slopes gradually toward the northeast, channeling seasonal runoff into numerous small drainages and larger washes or arroyos creating an ideal setting for flood water farming and graze land (Kearns 2000). Aptly named Tse'nahazoh (earth marked by rocks), the numerous mesas, benches, and ridges present in the Twin Lakes area provided geologic deposits suitable for building and the manufacture of chipped stone tools. Finally, tucked between the higher elevations of the Chuska Mountains to the north, Manuelito Plateau to the west, and Lobo Mesa to the south, this area also offers access to a wide of range environmental zones and their associated biotic resources making the Twin Lakes locality a nearly ideal location for transient subsistence-based societies (Appendix 8). Although this area offers a rich natural resource base and agricultural potential, extreme environmental conditions such as punctuated shifts in temperature and precipitation may have affected settlement patterns as reflected by temporal intervals with little evidence for human occupation. The changing environmental conditions and cultural setting of the project area present an opportunity to examine the archaeological record from a culturally enduring portion of New Mexico.

Scope and Location of the Project

This report presents the data recovery results from five archaeological sites located along US 666 near Twin Lakes, McKinley County, New Mexico. The Twin Lakes US 666 project was initiated by Mr. Gregory D. Rawlings of the Environmental Section of the NMDOT in December of 1997 in advance of planned road improvements. [Editor's note: US 666 is now known as US 491; however, this report retains the original US 666 designation, which was in effect during fieldwork, throughout.] The scheduled improvements consist of resurfacing and realigning approximately 4.5 miles (7.2 km) of roadway. This was accomplished by the removal and replacement of bridges, drainage structures, guard rails, and right-of-way fences. The project also required the use of construction maintenance easements, temporary construction permit locations, and the acquisition of additional right-of-way to realign contiguous curves and to smooth out slope for visibility.

The project area is located in northwest New Mexico, approximately 20 km (12.4 miles) north of Gallup, McKinley County, Township 17 N, Range

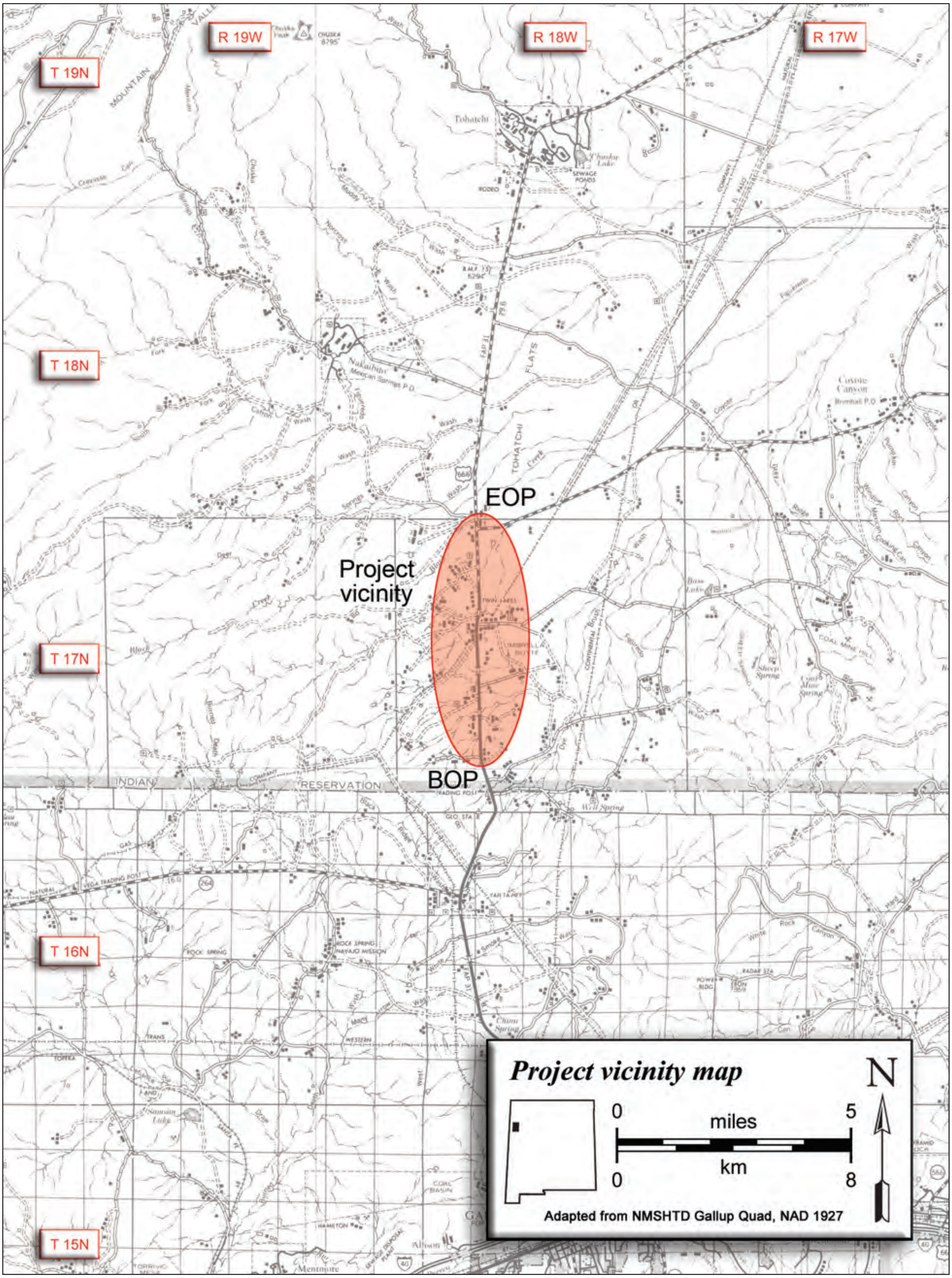


Figure 1.1. Project vicinity.

Figure 1.2. The Twin Lakes project area during excavation.

18 W, Section 29 (projected), Twin Lakes 7.5 minute series USGS quadrangle 1963 (photo revised 1979). The project area extends north approximately 4.5 miles (7.2 km) from the base of Corn Burned Hill (BOP) to slightly beyond the intersection of Navajo 9 (EOP) (Appendix 8). Highway plans show the BOP station as 614+49.94 and the EOP station as 856+00.00 which roughly correspond to mile marker 11 and mile marker 15.6, respectively. Positioned midway between the BOP and the EOP is the Twin Lakes Chapter House. Elevations range from 1,919 to 1,942 m (6,295 to 6,370 ft), with the lower elevations at the north end of the project area. Appendix 8 presents legal descriptions and UTM locations for the sites investigated as part of this project. This information is removed from copies that are in general circulation.

Administration and Field Schedule

Inventory activities conducted by the Navajo Nation Archaeology Department (NNAD) (Francisco 1994) and the Office of Archaeological Studies (Mensel 1997) identified five sites, LA 32964 (NM-Q-18-123), LA 103446 (NM-Q-18-121), LA 103447 (NM-Q-18-122), LA 104106 (NM-Q-18-130), LA 116035, within the proposed construction zone. Based on the survey results, a data recovery plan was prepared (Blinman 1997a) that outlined research orientation and the field and laboratory procedures for the treatment of archaeological material recovered within the construction zone.

Between January and June of 1998 the Office of Archaeological Studies (OAS), Museum of New Mexico, completed intensive field data recovery efforts at LA 32964, LA 104106, LA 116035, LA 103446, and LA 103447 along US 666 near Twin Lakes, New Mexico. All of the sites are on Navajo Tribal Trust Land, within the Twin Lakes Chapter. The excavations were conducted under the Navajo Nation Cultural Resources Investigation Permit No. C9801, Archaeological Resources Protection Act Permit: ARPA-NAO-98-001, and in compliance with the Antiquities Act of 1906 (Public Law 59-209), National Historic Preservation Act of 1966 as amended (Public Laws 89-102-575), and the Native American Graves Protection and Repatriation Act of 1990

(Public Law 101-6701). Although most data recovery investigations were contained within the existing and proposed NMDOT right-of-way, permit stipulations required defining site limits, soil depth, and documentation of archaeological features located outside the proposed project limit. These manifestations were mapped, described, and photographed in a similar way to the archaeological methods applied within the right-of-way, and provided comprehensive documentation useful for eligibility determinations and the interpretation of recovered archaeological material. To insure the safety and health of the field staff and visitors, precautions outlined in the Office of Archaeological Studies (OAS) safety manual were emphasized (OAS Staff 1995).

Archaeological manifestations within the proposed construction zone ranged from surface artifact scatters to well-defined habitation and activity areas. To effectively and efficiently treat these sites within the proposed construction schedule, sites were prioritized based on the frequency of visible surface manifestations within the proposed construction zone. Sites that displayed a limited amount of archaeological material were treated first followed by the sites that expressed relatively higher frequencies of cultural material. The former sites tended to be within the existing right-of-way limits and the later in areas that required the acquisition of additional right-of-way. Investigations were conducted in three stages. Stage 1 marked all acknowledged utilities, located all visible surface artifacts and features, mapped the sites, and established horizontal and vertical control. Stage 2 identified potential areas of intact cultural deposits and performed hand excavations to locate subsurface cultural deposits. Stage 3 expanded excavations by hand and mechanically in areas having intact cultural deposits to define the nature, depth, and extent of these deposits.

The field schedule consisted of five 8-hour days, beginning at 7:30 am, followed by two days off. Initially a crew of four, including Project Director Steven A. Lakatos, assisted by C. Dean Wilson, Raul Troxler, and Richard Montoya, investigated sites that did not contain a high volume of archaeological material and were expected to be relatively shallow based on surface and road cuts observations. Midway through the project two additional crew members, Henry Etsitty Sr. and Vernon Foster, were added. Philip Alldritt, Dorothy Zamora, David Hayden, and Laura Rick of the OAS and local crew members Marlene Owens, Leonard Perry, Fitzgerald Plummer, Roy King, and Truman Sam were added by the end of the project (Fig. 1.3). The excavation required a total of 126 work days to complete, of which only six were lost to inclement weather.

Report Structure

The report is organized into fifteen chapters. These provide background information, summarizing the modern and paleoenvironmental conditions, and outlining the culture history of the area; address the data recovery goals, field methods, and results including site descriptions and artifact presented as individual chapters; and present synthetic reports for specific artifact categories. Finally, a discussion of identified components and conclusions are presented at the end of the report. Individual chapters are supplemented by several appendixes containing specialist reports, raw data, and legal descriptions.

Figure 1.3. The Twin Lakes excavation crew, at LA 104106: Truman Sam, Henry Etsitty Sr., Vernon Foster, Philip Alldritt, Fitzgerald Plummer, Roy King, Marlene Owens, Richard Montoya, Steven Lakatos, Dean Wilson, Dorothy Zamora, and Raul Troxler.

2 | Natural and Cultural Setting

Steven A. Lakatos and Pamela J. McBride

This chapter draws heavily from three large-scale data recovery projects conducted relatively recently in the vicinity of Twin Lakes, New Mexico: the Transwestern Pipeline Expansion Project (ENRON), the N30–N31 Mexican Springs project (N30–N31), and the El Paso Natural Gas North System Expansion project (NSEP). The ENRON San Juan Lateral runs south from Bloomfield to Gallup, New Mexico. This pipeline transect is positioned approximately 32 km (20 miles) to the east of Twin Lakes. Here, between Segment 4 and Segment 7 of the pipeline, several Pueblo period and Navajo sites were defined (Amsden 1992; Sullivan 1994). Results from the N30–N31 project, located at Mexican Springs approximately 8 km (5 miles) northwest of Twin Lakes, were reported in 1999. Numerous Basketmaker III and Navajo sites were excavated as part of this project and provide a detailed culture history and geomorphological summary of the area (Damp 1999a; Sant et al. 1999). Finally, the NSEP project transects Tohatchi Flats, crossing the current project area just south of the Twin Lakes chapter house. This project defined several aceramic and Basketmaker III sites approximately 15 km (9.3 miles) northeast of the Twin Lakes project area (Baugh et al. 1998a; Yost 2000). Additional, overview material presented in the N33 Cove and Redrock Valley project located in the northern Chuska Mountains of Arizona was also used as a source for environmental and cultural background information, particularly on the Navajo occupation of the area (Reed and Hensler 1999). The numerous sites defined as part of these projects are contemporaneous with the findings of the Twin Lakes project. The reader is referred to these reports for supplemental environmental and cultural overview material of the southern Chuska Valley.

Natural Environment

The Twin Lakes project area is located in northwestern New Mexico within an area referred to as Tohatchi Flats. Tohatchi Flats is a broad alluvial valley that is bounded by the Chuska Mountains and Manuelito Plateau to the north and west, respectively, and Lobo Mesa to the southeast. These physiographic features give Tohatchi Flats its distinct “pocket” or basin-like appearance (Kearns 1998a:15). In general, Tohatchi Flats is characterized by broad alluvial valleys interrupted by mesas, benches, and ridges. Elevations range from 1,919 m (6,295 ft) at the northern end of the project area to 1,942 m (6,370 ft) at the south. Because this land form slopes gradually toward the northeast, seasonal runoff is channeled by numerous small drainages into larger washes or arroyos such as Dye Brush Wash, Figueredo Wash, Muddy Wash, and Red Willow Wash that ultimately feed into main tributaries of the San Juan River (Fig. 2.1).

As Kearns (1998b:1–5) points out, these drainages serve as natural canals channeling water to the deep alluvial deposits on the valley floor providing an optimum setting for runoff agriculture. There are no perennial water courses in the project area today. However, these washes may have had more continuous flow during more mesic periods of the prehistoric era (McVickar 1996a). Although occurring within a relatively short distance of each other, the sites are located in slightly different physiographic settings. The southernmost sites (LA 103446 and LA 104106) are nestled within the slightly more dissected topography of the Twin Lakes area, while the northern three sites (LA 116035, LA 103447, and

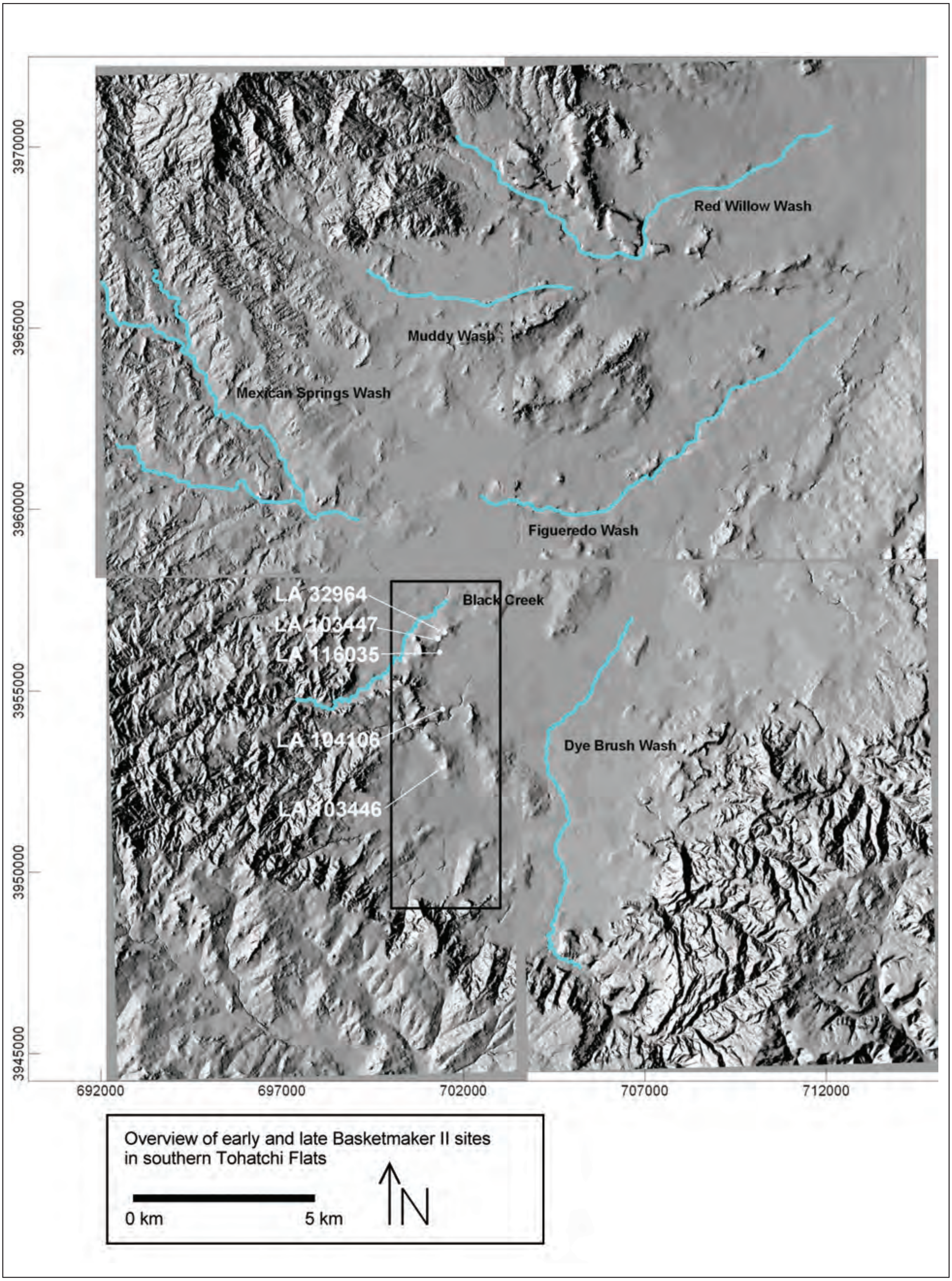


Figure 2.1. The project area and southern Tohatchi Flats.

LA 32964) are on more gently rolling terrain at the western margin of Tohatchi Flats.

Geology

The southern Chuska Mountains were formed, in part, by the Defiance Uplift during the Oligocene. This geologic event created a mountain piedmont, tilting and exposing the underlying Cretaceous deposits. The mesas, benches, and ridges characteristic of Tohatchi Flats are remnants of the uplifted Cretaceous Menefee Formation. The Menefee Formation contains deposits of sedimentary and metamorphic silts, sands, and cobbles used by subsequent human occupation for tools and building materials. Quaternary erosion formed drainage channels that deposited deep alluvial sediment characteristic of the valley floor (Harris et al. 1967). These alluvial deposits created a complex stratigraphic sequence represented by interbedded eolian silt and sand, overbank sediments of sand, silt and clay, and mixed and redeposited sediments recently summarized in detail by Sant and others (1999) for the Mexican Springs area.

Quaternary deposits are divided into two broad alluvial formations, the Gamerco and Nakaibito, formed during the Pleistocene and Holocene, respectively (Leopold and Snyder 1951). The division between these two formations is the Gamerco paleosol. The N30–N31 project expanded on the work of Leopold and Snyder (1951), further subdividing the Nakaibito Formation into upper and lower soil units (Sant et al. 1999). Episodic deposition and erosion of alluvial material during the Quaternary is marked by intermittent periods of stability promoting limited soil development.

Soil

Soils in the study area are broadly classified as entisols, which formed under grass or forest vegetation during the Pleistocene and Holocene (Morain 1979; Soil Survey Staff 1999). Entisols support plant life but display little evidence of pedogenesis. These soils tend to be moderately dark in color, have a low to moderate base saturation, and contain clay and calcium particles. Among the local Lohmiller-San Mateo Association soils, permeability and salinity vary, but generally these soils have moderate water-holding capacities suitable for agriculture and native vegetation (Maker et al. 1974a). Eolian and alluvial deposits from the degradation of underlying Menefee sandstones cover much of the area (USGS 1968). The deepest deposits, on slopes and in alluvial drainages, are moderately well drained, but low-lying areas support seasonal playas which give Twin Lakes its English name (Blinman 1997a; Lee et al. 2004). Typically, the surface layer is a light brown to brown noncalcareous fine sandy loam. The underlying layer is a light brown to reddish brown sandy clay loam that contains calcareous inclusions (Maker et al. 1974b).

Paleoenvironment

Paleoenvironmental data for the late Pleistocene and early Holocene periods of the southern Chuska Valley are somewhat limited, inferred from other areas of the Southwest, packrat middens, cave sites, ancient pollen samples, and lake sedimentation. This time interval is generally categorized as a period when cooler, wetter conditions prevailed relative to the modern climate (Anderson et al. 2000; Hafsten 1961; Oldfield and Schoenwetter 1975; Schoenwetter and Eddy 1964; Wendorf 1961). During this time Wisconsin glacial ice sheets reached their maximum southerly extent and subsequently retreated over a 2,000-year period. With the retreat of the glacial front, weather patterns previously dominated by long cold winters were replaced with mild winters and cool summers (Knox 1983). This shift also marks the Pleistocene to Holocene transition.

By 10,000 BP vast quantities of surface water supported wide spread forests, woodlands, and mesic grasslands with groves of deciduous trees (Pederson 2000; Wendorf 1961). Sporadic intervals of drier and wetter conditions trended toward the drier warmer conditions of the Holocene. An increase in annual temperature and a monsoonal precipitation pattern and drier, warmer, fluctuating environmental conditions of the early Holocene resulted in a dramatic change in flora and fauna communities (Betancourt et al. 1983; Pederson 2000). Glacial streams were reduced to open ponds flanked by clusters of brush and trees. Sedimentation and eolian deposition further reduced stream beds and ponds to marshland communities by the middle Holocene.

During the middle Holocene (8000–4500 BP) the climate continued to become increasingly drier punctuated by short periods of increased precipitation. Weather patterns shifted to warmer summers and cooler winters with most of the effective moisture occurring as summer monsoonal precipitation. Grassland habitats expanded into areas that previously supported woodland and marshland communities (Betancourt et al. 1983). Periods of localized drought are interpreted by some researchers as evidence for the Altithermal (as defined in the Great Basin region). However, moister conditions are interpreted for the San Juan Basin (Antevs 1955; Betancourt et al. 1983). Early and middle Holocene deposits correspond to the Lower Nakaibito soil described by Sant and others (1999) and are associated with Archaic occupations. Climatic conditions began to stabilize by the late Holocene.

Stability in environmental conditions during the late Holocene continued into the present. Woodland and forest communities responded by expanding across higher elevations and xeric grassland and desert scrub communities flourished at lower elevations (Anderson et al. 2000). Environmental conditions and biotic communities of this period, which essentially reflect that of modern conditions were in place by 4000 BP. Deposition during this time interval corresponds to the Upper Nakaibito soil described by Sant and others (1999) and is associated with Pueblo-period occupations. The sustained periods of above and below average precipitation over the past 2,000 years may have influenced human occupation of the southern Chuska Valley.

As an example of environmental conditions influencing occupation, Toll and Cully found an emphasis on local plant and wood resources in their study of Archaic subsistence in the Four Corners area. This led them to conclude that occupation by the Archaic populations of the area were short term. Fuel was derived entirely from immediate site environs and food resources related to a limited segment of the growing season. This is very different than later sites in the Chuska Valley, where corn was found at all but one and wood resources derive from the valley floor as well as the uplands, foothills, and the higher elevations of the Chuska Mountains. These patterns point to more long-term yet punctuated use of the Chuska Valley at least during the Basketmaker II and III and the Cabezon phase of the Navajo period.

Also, during periods of drought or poor climatic regimes, one might expect to see limited use or a hiatus occupation in the southern Chuska Valley such as during the AD 250–500 period when tree-ring records indicate a severe drought (Table 2.1; McVickar 1996a). However, when dry conditions coupled with a drastic drop in the water table and high temporal variability prevailed, beginning around AD 750 and remaining until around AD 900 (McVickar 1996a), occupation of the Tohatchi Flats and the Cove and Redrock Valley continued (Fig. 2.2, Grissino-Mayer et al. 1996). The data presented by McVickar also varies greatly among pollen, dendroclimatological, packrat midden, and hydrologic and geomorphic study results. For example, during the period of severe drought indicated by the El Malpais long chronology (Grissino-Mayer et al. 1996), Petersen's pollen studies (1988, cited in McVickar 1996a; Table 2.1) indicate warm, wet conditions. No matter what analysts conclude, the normal climatic conditions in the area seem to consist of a constant state of flux between short, wet periods and short and long-term droughts, or at least long periods of xeric conditions. In order to increase access to available moisture during periods of high aridity, prehistoric people probably employed adaptive strategies like planting crops at the base of dunes (see McBride and Toll, Chapter 14 for further discussion) or along drainage channels to optimize seasonal runoff from the mountains for flood-water farming.

Modern Environment

Modern climatic conditions in the Twin Lakes area can be categorized as semi-arid, with hot summers and cold winters. Prevailing winds are from the southeast during the fall and early summer, and from the west-southwest during the summer months. Wind speeds are 7 mph for most of the year with peak gusts averaging 63 mph (National Climate Data Center 1998). Annual temperature averages between 28 and 70 degrees F (-2.2 and 21.1 degrees C); temperatures during the summer months average between 65 and 70 degrees F (18.3 and 21.1 degrees C) and between 28 and 40 degrees F (-2.2 and 4.4 degrees C) in the winter months. Precipitation is less than 30 cm (11.8 in), averaging between 8 and 10 inches (20.3 and 25.4 cm) annually with most occurring between July and September

Table 2.1. Temperature and precipitation statistics for Gallup, New Mexico.

	Temperature (Degrees F) 2 Years in 10 Will Have						Precipitation (inches) 2 Years in 10 Will Have				
Month	**Average Daily Maximum**	**Average Daily Minimum**	**Average**	**Maximum Temper-ature >**	**Minimum Temper-ature <**	**Average No. of Grow Degree Days***	**Average**	**Less Than**	**More Than**	**Average No. of Days with 1 or More**	**Average Total Snow Fall**
January	44.2	13.3	28.8	62	-12	2	0.86	0.2	1.48	2	7.1
February	49.4	18.4	33.9	67	-6	12	0.71	0.3	1.07	2	6.1
March	55.8	22.7	39.2	73	4	62	0.91	0.24	1.63	3	4.6
April	64.4	27.5	46	80	11	206	0.53	0.11	0.82	1	2.7
May	73.7	36.4	55	89	20	467	0.64	0.1	1.14	2	0.9
June	84.5	44.6	64.6	96	28	738	0.47	0.03	0.87	1	0
July	87.3	53.2	70.3	97	38	938	1.55	0.51	2.61	4	0
August	85	52.5	68.7	95	40	891	2.02	1.06	2.76	5	0
September	78.7	43.8	61.3	90	25	638	1.12	0.42	1.83	3	0
October	67.6	30.3	48.9	83	11	292	1.08	0.25	1.92	3	0.8
November	54	19.9	36.9	72	-3	46	0.95	0.32	1.59	2	4.6
December	45.4	13	29.2	63	-13	3	0.72	0.16	1.16	2	6.1
Yearly:											
Average	65.8	31.3	48.6	–	–	–	–	–	–	–	–
Extreme	100	-34	–	98	-19	–	–	–	–	–	–
Total						4296	11.57	9.18	13.8	30	33

* Average number of days per year with at least 1 inch of snow on the ground: 21
TAPS Station: GALLUP FAA AP, NM3422
Start year 1973–End year 2000
Temperature: 28 years available out of 28 requested in this analysis
Precipitation: 28 years available out of 28 requested in this analysis

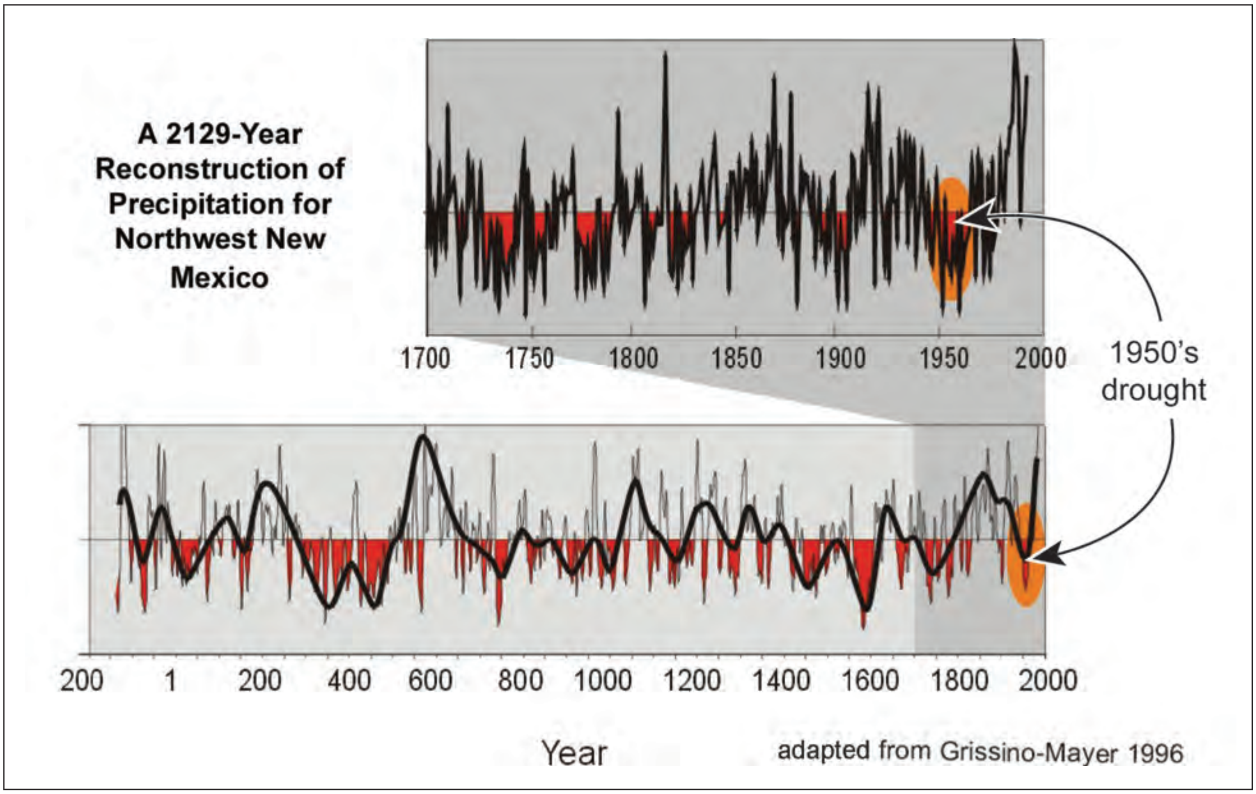


Figure 2.2. Palmer drought severity model for northwestern New Mexico (Grissino-Mayer et al. 1996).

as monsoonal moisture originating in the Gulf of Mexico (Maker et. al. 1974b; Tuan et al. 1973, Figs. 2, 9–12). Most snowfall occurs between December and February, leaving spring as the driest season of the year. The local climate results in a period of more than 160 frost-free days, on average (Tuan et al. 1973:Fig. 38), long enough to accommodate the less than 130-day growing season of most native corn varieties (Table 2.1; Bradfield 1971; Natural Resources Conservation Service 2000). This amount of precipitation is marginal for corn agriculture today, but the more mesic conditions during some periods of human occupation in the area would have provided more reliable moisture for farming (McVickar 1996a). Also, there is evidence for prehistoric water-control features in the Chuska Valley (Wiseman 1980:12). These features concentrate runoff and improved local agricultural potential as compared to reliance on rainfall alone.

Although mean climatic data suggest this region offers mild ambient conditions and adequate moisture, extremes in temperature, precipitation, and winds typify the area. Temperatures can rise to 100 degrees F (37.7 degrees C) in the summer and fall to -34 degrees F (-36.7 degrees C) during the winter (Table 2.1). Precipitation also fluctuates wildly month to month and year to year. Some months have little or no precipitation while others can receive over 2 inches (5.1 cm) of rain in a single storm. Evaporation of effective moisture exceeds precipitation, fostered by warm temperatures and consistent winds. Combined yearly fluctuations in precipitation for Gallup, Crownpoint, and Tohatchi, New Mexico, are illustrated in Figure 2.3. These data suggest that the average annual precipitation in the project area is more than 1.5 inches (3.8 cm) less than data reported from Gallup, New Mexico, which sits nearly 300 ft (91.4 m) higher in elevation. Not immediately apparent is the period of below-average precipitation during the 1950s and the 1970s and above average precipitation from 1980 to the present (Fig. 2.4).

The punctuated environmental characteristics of the modern climate support a wide range of biotic species. Plant communities in the project area are a mixture of Great Basin grasslands (D. Brown 1994a:107–141) and Great Basin scrub (Turner 1994:144–154) with Great Basin conifer woodland located on foothills and piedmont of the Chuska Mountains (D. Brown 1994b:52–56). For the El Paso Pipeline, Marmaduke (1998:15) noted a dominance of four-wing saltbush (*Atriplex canescens*) and greasewood (*Sarcobatus vermiculatus*) in the immediate project area. Other significant components of the shrubby vegetation include shadscale (*Atriplex confertifolia*), wolfberry (*Lycium pallidum*), snakeweed (*Gutierrezia sarothrae*), and rabbitbrush (*Chrysothamnus* sp.). Grasses vary according to the history of grazing, but genera such as gramas (*Bouteloua*), dropseed (*Sporobolus cryptandrus*), and ricegrass (*Oryzopsis hymenoides*) were supported by this biotic community in the past.

Adjoining ecozones provide additional variety in landscape and resources. In the Chuska Mountains to the northwest, ponderosa pine (*Pinus ponderosa*), Douglas fir (*Pseudotsuga menziesii*), and aspen (*Populus tremuloides*) can be found in the upper elevations, while Gambel oak (*Quercus gambelii*) grows in the foothills, and willow (*Salix* sp.) and cottonwood (*Populus* sp.) grow along washes and near springs at the base of the mountains. On elevated landforms surrounding the valley floor, narrow-leaf yucca (*Yucca* sp.), Mormon tea (*Ephedra* sp.), and occasional junipers (*Juniperus* sp.) join the grass and shrub taxa common to the valley floor.

Resources that were found with frequency at sites in the Chuska Valley would have come primarily from dry, sandy soils either on the Tohatchi Flats or uplands surrounding the valley floor (Table 2.2). Accordingly, resources that came from a greater distance or have a limited biotic niche such as mountain mahogany and lemonade berry were limited in occurrence. Some exceptions can be noted in Table 2.2. Stickleaf only occurs at five sites and would have been readily available growing at the foot of dunes and the sandy soils of the Tohatchi Flats. Four-wing saltbush appears as if there is a limited occurrence but saltbush seeds were recovered at five other sites, species unknown. Hedgehog cactus, wolfberry, and Mormon tea are limited in presence perhaps because hedgehog cactus can be elusive, wolfberry has very small fruits, and Mormon tea has a rather circumscribed use. Yucca may have low visibility because the fibers may have been used to a greater extent than the fruit, and fibers generally don't show up in flotation samples often. Prickly pear and cholla could be getting lost in the genus of *Opuntia*, which was identified at six sites, but, because of the non-specificity, does not appear in Table 2.2.

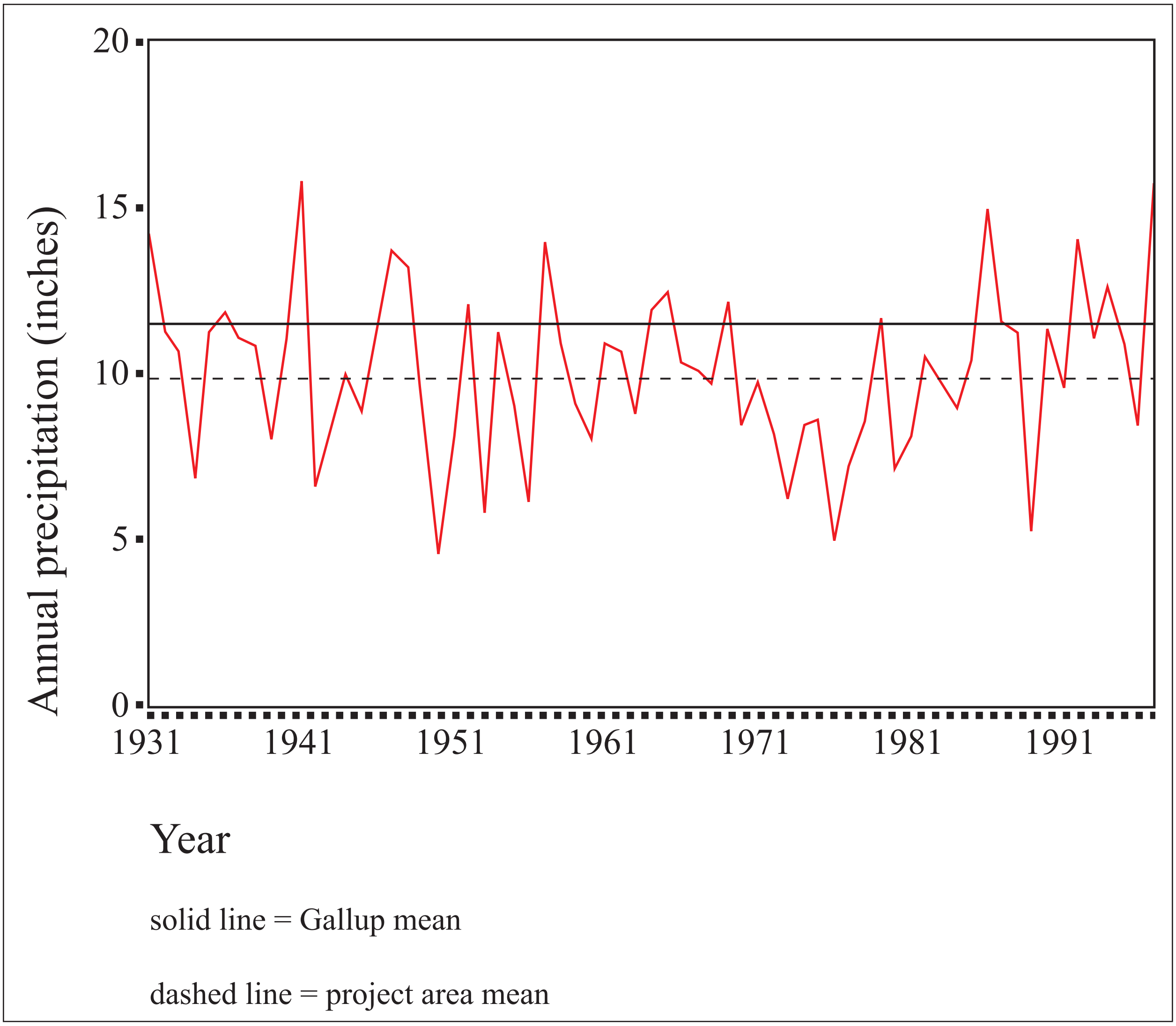


Figure 2.3. Annual precipitation for the Twin Lakes area from 1931 to 1997.

Plant communities are influenced by both climate and land use. Vegetation cover is modified by grazing in some areas to an annual weed barren zone (Whitford 1978, as adapted by Binford and Amsden 1992a:Fig. 5). In heavily grazed areas where native species are unable to exist, the annuals can consist largely of Eurasian imports like cheatgrass (*Bromus tectorum*), Russian thistle (*Salsola* sp.), filaree (*Erodium cicutarium*), and tumble mustard (*Sisymbrium altissimum*). Where grazing has been less intense, perennial grasses like galleta (*Hilaria jamesii*), rice grass (*Oryzopsis hymenoides*), bottlebrush squirreltail (*Sitanion hystrix*), and alkali sacaton (*Sporobolus airoides*) can be found in a widely scattered distribution.

The environmental setting and associated plant communities of the southern Chuska Valley provide habitat for numerous wildlife species including mule deer, pronghorn antelope, gray fox, and coyote. Small mammals including black-tailed prairie dog, black-tailed jack rabbit, spotted ground squirrel, kangaroo rat and several species of mouse are also common in the area. The diversity of biotic resources combined with seasonal and climatic variability attracted transient and sedentary groups of people to the area for over 5,000 years.

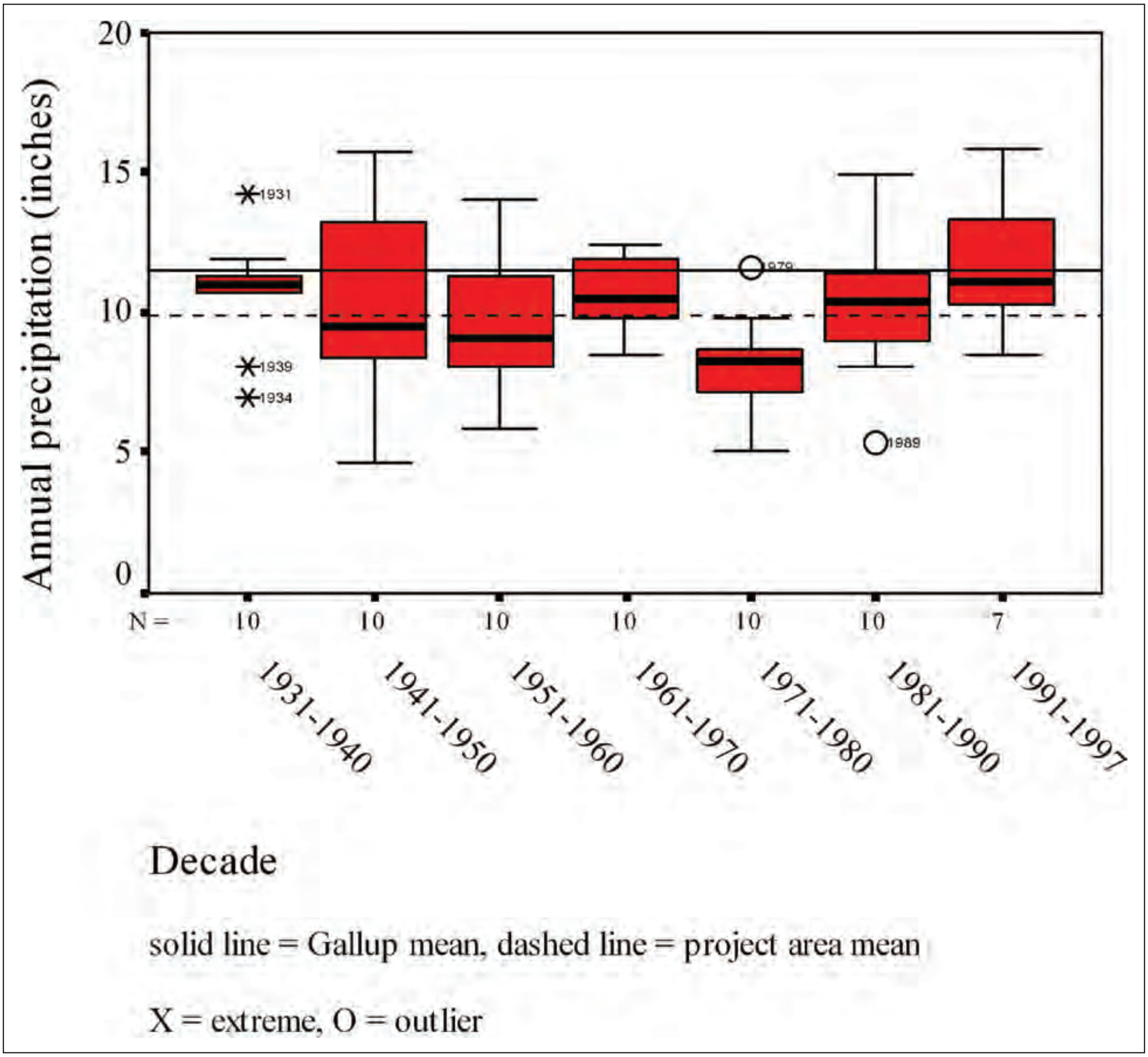


Figure 2.4. Box plot of precipitation by decade for project area.

Cultural Setting

Evidence for human occupation of the Southern Chuska Valley can be traced back over 5,000 years and broadly divided into four temporal periods including Paleoindian, Archaic, Pueblo, and historic (Cordell 1979, 1984). Based on regional and topical summaries (e.g., Binford and Amsden 1992b; Cordell 1984; Hogan and Winter 1983; Jennings 1968; Marshall et al. 1979; Matson 1991; Plog and Wait 1982; Stuart and Gauthier 1981; P. Reed 2000; Vierra 1994a; Wills 1988; Wills and Huckell 1994; Winter 1994), human use of the region prior to 800 BC focused on hunting and gathering. Evidence for more permanent, or at least more archaeologically visible, settlements in the Tohatchi Flats area during the Basketmaker II period (800 BC–AD 500) indicates a horticulture adaptation supplemented by foraging activities. During the Basketmaker III and Pueblo periods (AD 500–1300) an agricultural economy is coupled with sedentary villages, public architecture, and specialized craft production. Finally, continuous occupation by Navajo people from arguably AD 1300 (see Kelley and Francis 1998) highlights the enduring qualities of this area.

Table 2.2. Vegetation components and archeological presence.

Latin Name	Common Name	Occurrence in Present-day Landscape	Potential Usefulness	Archaeological Recovery	Remains
Annuals					
Amaranthus	Pigweed	open, dry slopes, disturbed areas along roadsides, habitations, agricultural fields	food (seeds, greens)	All sites compared for project except LA 32964; N30-N31:Period J[1]; LA 80986[2]; LA 11196 and LA 88766[3]	seed
Chenopodium/ Amaranthus	Cheno-Am	open, dry slopes, disturbed areas along roadsides, habitations, agricultural fields	food (seeds, greens)	All sites compared for project except LA 32964, Chaco:BM III/PI[4]; 104202[5]; Cortez CO[6]	embryo, seed
Chenopodium	Goosefoot	lower elevation sandy soils, disturbed areas along roadsides, habitations, agricultural fields	food (seeds, greens)	All sites compared except N30-N31:Period J[1]	embryo, seed
Corispermum	Bugseed	lower elevation sandy soils		LA 6444[7], 6448[8], 80419[9], 80986[2], 88526[3], 104106[10], Chaco:BMIII/PI[4], N33[5], Cortez CO[6], N30-31:Period A[1]	seed
Cycloloma	Winged pigweed	lower elevation sandy soils	food (seeds, greens)	LA 6444[7], 6448[8], 80419[9], 16029[1], 104106[10], 104202[1], Chaco BMIII/PI[4], N30-N31:Period A[1], Trunk S[11]	seed
Descurainia	Tansy mustard	dry open plains or slopes, agricultural fields	food (seeds)	LA 6444[7], 6448[8], 80419[9], 16029[1], 104106[10], 104202[1], Chaco BMIII/PI[4], Cortez CO[6], N33[5] Morris I[3], Trunk S[11]	seed
Helianthus	Sunflower	lower elevation sandy soils, disturbed areas along roadsides	food (seeds)	All sites compared except LA 104202, 16029, 80986, 88526, Chaco BMIII/PI[4], Cortez CO[6], N33[5] Morris I[3], Arkansas Loop[4]	seed
Mentzelia albicaulis	Stickleaf	dry, often sandy ground	food (seeds)	LA 16029[1], 104106[10], 104202[1], Arkansas Loop[4], Trunk S[11]	seed
Portulaca	Purslane	lower elevation sandy or saline soils, disturbed areas along roadsides, habitations, agricultural fields	food (seeds, greens)	All sites compared except LA 80986	embryo, seed
Cultivars					
Zea mays	Corn	agricultural fields	food; containers, linings (leaves)	All sites compared except Arkansas Loop[4]	cob, cupule, kernel
Grasses					
Gramineae	Grass family	primarily lower elevation sandy soils	Construction, stems, food (seed), tinder	LA 6444[7], 32964 and 104106[10], N33, N30-31:Period A[1], Arkansas Loop[4], Trunk S[11]	Caryopsis, embryo

(Table 2.2, continued)

Latin Name	Common Name	Occurrence in Present-day Landscape	Potential Usefulness	Archaeological Recovery	Remains
Oryzopsis	Ricegrass	lower elevation sandy soils	food (seeds)	All sites compared except LA 104202[1], Cortez CO[6], Morris I[3], Arkansas Loop[4]	*Caryopsis*
Phragmites	Common reedgrass	along streams or in wet ground near springs or impounded water	cigarettes, construction (stems)	N33[5], N30-31:Period A[1]	stem
Sporobolus airoides	Alkali sacaton	dry plains and slopes	food (seeds)	All sites compared except LA 80419[9], 88526[3], 104106[10], 104202[1], Chaco:BMIII/PI[4], Morris I[3], Arkansas Loop[4]	seed
			Other		
Salvia	Sage	dry plains, hills, and canyons		LA 104106[10]	seed
			Perennials		
Amelanchier	Antelope bush	rocky slopes, 6,000-7,500 ft.	fuel	LA 6444[7], N30-31:Period A[1], N33[5], Trunk S[11]	wood
Artemisia	Sagebrush	dry plains, mesas and rocky slopes, 4,500-10,000 ft.	fuel	LA 3296[4] and 104106[10], 80986[2], 88526[3], Arkansas Loop[4], BMIII/PI[4], Morris I[3], N33[5], Trunk S[11]	wood
Atriplex canescens	Four-wing saltbush	dry plains, 2,500-8,000 ft.	food / flavoring (seeds, leaves)	LA 6444[7], 6448[8], 80419[9], 104106[10]	embryo, fruit, seed
Atriplex/ Sarcobatus	Saltbush/ greasewood	dry plains and flat alkaline ground, 2,000-8,500 ft.	fuel	All sites compared except LA 80986[2], 104202[1], Morris I[3], Arkansas Loop[4]	wood
Cercocarpus	Mountain mahogany	foothills of Chuska Mountains, 3,000-6,500 ft.	fuel	LA 6444[7], 3296[4] and 104106[10], Morris I[3], N33[5], N30-31:Period A[1], Trunk S[11]	wood
Chrysothamnus	Rabbitbrush	dry slopes, mesas, and roadsides, 2,000-8,000 ft.	fuel	LA 6444[7], 6448[8], 80419[9], 104106[10], Chaco:BM III/PI[4], Morris I[3], N33[5], N30-31:Period A[1], Arkansas Loop[4]	wood
Cowania	Cliffrose	dry slopes, 3,000-8,000 ft.	fuel	LA 6444[7], 3296[4] and104106[10], N33[5], N30-31:Period A[1]	wood
Cylindropuntia	Cholla	dry plains and hillsides, 4,000-7,500 ft.	food (buds, fruits)	LA 104106[10]	seed
Echinocereus	Hedgehog cactus	uplands surrounding valley floor	food (fruits)	LA 88526[3], 104106[10], N30-31:Period A[1], Trunk S[11]	seed
Ephedra	Mormon tea	uplands surrounding valley floor	medicinal (stems)	N30-31:Period A[1], Arkansas Loop[4]	wood
Juniperus	Juniper	uplands surrounding valley floor	food/ flavoring (berries); fuel	LA 80986[2], 104106[10], Cortez CO (seed)[6]; all sites (wood)	seed, twig, wood
Lycium	Wolfberry	valley floor, foothills of the Chuska Mountains	food; fuel	LA 88526[3], 3296[4] and 104106 (seed)[10]; LA 6444[7], 6448[8], Chaco:BM III/PI[4], Trunk S[11] (wood)	seed, wood

(Table 2.2, continued)

Latin Name	Common Name	Occurrence in Present-day Landscape	Potential Usefulness	Archaeological Recovery	Remains
Pinus edulis	Piñon	uplands surrounding valley floor	food (nuts); fuel	All sites compared except LA 6448[8], 32964[10], 80986[2], LA 104202[1], Cortez CO[6], N33[5], Morris I[3], Transwestern CO[6], N33[5], Morris I[3], Transwestern (nutshell); except LA 6448[8], 80419[9], 80986[2], 88526[3] (wood)	needle, nutshell, wood
Pinus ponderosa	Ponderosa pine	upper elevations of Chuska Mountains	–	LA 32964[10], Arkansas Loop[4], Chaco:BM III/PI[4], Morris I[3], N30-31:Period A[1]	wood
Platyopuntia	Prickly pear cactus	valley floor, uplands surrounding valley floor	food (fruits, pads)	LA 3296[4] and 104106[10], Arkansas Loop[4], N30-31:Period A[1]	seed
Populus sp.	Cottonwood	along washes; near springs at base of mountains	fuel/manu-facturing (wood)	LA 80986[2], 104106[10], Trunk S[11]	wood
Quercus	Oak	foothills of the Chuska Mountains	fuel/manu-facturing (wood)	LA 6444[7], 6448[8], 80419[9], 104106[10], 88526[3], 104202[1], Arkansas Loop[4], N33, N30-31:Period A[1], Trunk S[11]	wood
Rhus	Lemonade berry	canyons, foothills of the Chuska Mountains	fuel/manu-facturing (wood)	Arkansas Loop[4], Trunk S[11](seed); LA 6444[7], 88526[3], N30-31:Period A[1] (wood)	seed, wood
Rosaceae	Rose family	foothills of the Chuska Mountains	fuel/manu-facturing (wood)	LA 6444[7], 3296[4], 10410[6], Chaco:BM III/PI[4], N33[5], Trunk S[11]	wood
Salicaceae	Willow family	along washes; near springs at base of mountains	fuel/manu-facturing (wood)	LA 6444[7], 6448[8], 80419[9], 104106[10], Chaco:BM III/PI[4], N33[5], N30-31:Period A[1], Trunk S[11]	wood
Yucca	Narrow-leaf yucca	uplands surrounding valley floor	Food (fruit); manufactur-ing (leaves, fiber)	LA 10420[2], Arkansas Loop, N33[5],N30-31:Period A[1], Trunk S[11]	seed

[1]Brandt 1999:Table 40.2; [2]Latady and Goff 1996:Table 17.11; [3]Toll and McBride 1997:Tables 1, 2; [4]Brandt 1994:Table 26-7; [5]Matthews 1996:Table F.2; [6]Toll 1985:Table II.12; [7]Freuden 1998c:Tables 9.22, 9.23, and 9.24; [8]Baugh et al. 1998b:Appendix B; [9]Freuden 1998b:Tables 8.24 and 8.25;[10]Current report, Tables; [11]Toll and McBride 1998:Tables 1, 9; Hammett and McBride 1993:Table 65; Current report, Tables. Freuden 1998b:Tables 8.24 and 8.25; McBride 1993:Tables 78, 79, 80.

Paleoindian Period (9500–6000 BC)

The early Paleoindian period is represented by Clovis culture (10000–8000 BC)(Hester 1972; Holliday 1985) succeeded by the Folsom culture of the middle Paleoindian period. Folsom components (11,000–10,000 BP) are more common than Clovis remains particularly in eastern New Mexico (Hester 1962, 1972; Boyd 1997). Folsom is differentiated from Clovis by a markedly different lithic tool kit and exploitation of different game animals that were adapting to increasingly drier conditions (Montgomery 1997). The late Paleoindian Period (8000–6000 BC) is poorly understood compared to the earlier Folsom and Clovis complexes and is represented primarily by diagnostic projectile points including Plainview, Agate Basin, Milnesand, and Firstview.

Interestingly, no Paleoindian sites or components have been documented in the immediate vicinity of the Twin Lakes project area (Francisco 1994), but one Paleoindian site is recorded in the vicinity of Peach Springs to the east of the project area (Skinner and Gilpin 1997:8). It is unclear if this area was uninhabited by Paleoindian groups or if evidence of use is obscured by the dynamic geomorphological processes characteristic of the area.

Archaic Period (5500 BC–AD 500)

The Archaic period in the San Juan Basin is generally referred to as the Oshara Tradition, which is divided into five phases, Jay (5500–4800 BC), Bajada (4800–3200 BC), San Jose (3200–1800 BC), Armijo (1800–800 BC), and the En Medio/Basketmaker II (800 BC–AD 500) (Irwin-Williams 1973). Based on projectile point styles, Kearns (1998a) suggests that Archaic sites in the San Juan Basin are a matrix comprised of Oshara, Northern Colorado Plateau, and Cochise traditions. Prior to the NSEP and Twin Lakes projects, few Archaic or Basketmaker II sites had been investigated in the southern Chuska Valley.

The Early Archaic (5500–3200 BC) corresponds temporally with the Pleistocene to Holocene transition and the extinction of megafauna. Early Archaic sites are temporally distinguished by the presence of Jay- and Bajada-style projectile points (Irwin-Williams 1973). Similar to the preceding Paleoindian period, Early Archaic sites are located in riverine environmental settings. One Early Archaic component (Jay phase) has been identified in the Twin Lakes locality through radiocarbon determinations (Freuden 1998a), and several Bajada phase components were identified in the northeast portion of Tohatchi Flats (Baugh 1998; Korgel 1998; McVickar 1998). At higher elevations, in the Mexican Springs area, charcoal samples suggest both Jay and Bajada occupations; however, the nature of these deposits precludes stating that they are the result of cultural activities (Morris and Kotyk 1999; Kotyk 1999).

The Middle Archaic (3200–1800 BC) is generally viewed as a period of unpredictable environmental conditions coupled with variable occupational strategies (see McVickar 1998). Middle Archaic populations were possibly occupying both the open plains and the intermountain basins, continuing to hunt big game, but increasingly relying on vegetal foods. This is reflected in a more varied lithic technology such as a decrease in projectile point size compared to earlier components, which suggests an increasing reliance on small mammal protein and more systematic wild plant foraging and processing.

Lithic technology in the Middle Archaic includes manufacture of a wide variety of smaller projectile points. Although San José components are more common than Early Archaic components (Vierra 1994a), they are relatively rare when compared to Late Archaic/Basketmaker II occupations in the San Juan Basin. Near the project area, one Middle Archaic component has been identified and two others have been identified in the northeastern portion of Tohatchi Flats (Baugh 1998; Freuden 1998a).

The Armijo phase of the Late Archaic period spans from 1800 BC to 800 BC, or up to the adoption of agriculture. With more favorable environmental conditions, populations expanded into a variety of environmental settings. The Armijo phase is important because it is during this time evidence for cultigens begin to be used as an economic staple in some parts of the Colorado Plateau. Armijo habitation sites consist of open camps, rock shelters, and pithouses with evidence for lithic tool maintenance and manufacture. In addition to chipped stone, one-hand manos and ovally depressed (basin) metates suggest a mixed hunting-gathering and agricultural economy. With continued reliance on agriculture came increased on-site storage and a reduction in seasonal mobility. These factors, along with an increase in population, fostered the transition to more sedentary Basketmaker II villages. Two Armijo components were identified in the Twin Lakes locality; several others are located in the northeast portion of Tohatchi Flats (Kearns 1998a).

The transition from aceramic nonagricultural Late Archaic to the aceramic agricultural En Medio-Basketmaker II phase occurred between BC 800 and AD 400. Two basic models address the mechanics and timing of this transition that resulted in sweeping changes to material culture patterns, which are in turn argued to be the origin of Anasazi culture (Matson 1991,1994). While a complete synthesis on the adoption of agriculture on the Colorado Plateau is not particularly warranted for the present discussion, a brief summary of these models is relevant to the findings of the current project. One model proposes that agriculture was introduced and subsequently adopted by incipient Archaic hunter and gatherer populations (Kidder 1924; Irwin-Williams 1973). This is contrasted by a model that proposes agricultural populations migrated on to the Colorado Plateau from the San Pedro River Valley of Arizona (Berry 1982; Matson 1991).

Depending on what part of the Colorado Plateau is being addressed, each of these models may be used. For example, Gilpin (1994) reports, based on the ubiquity of maize remains identified at two sites in the Chinle Valley of northeastern Arizona, that agriculture was an economic staple by 1000 BC. Cultigens, architecture, and storage appear to have been adopted as a suite in an area where there is little evidence for Archaic occupations. This implies that agricultural groups moved into this area. However, in grassland habitats where stronger evidence for Archaic occupations exist, including the San Juan Basin, Gilpin (1994) views agriculture as a transition zone adaptation, suggesting the adoption of agriculture by Archaic groups. This interpretation is supported by Vierra (1994b), who reports that the earliest evidence of agriculture came from sites in the upland margins of the San Juan Basin. Smiley (1992,1994) cautions, however, that chronometric control over early agricultural sites is insufficient for detecting the movement of this adaptation if only occurring over a few hundred years.

The earliest evidence of agriculture in the southern Chuska Valley was identified as part of the current project and at a nearby early Late Archaic/early Basketmaker II (900–700 BC) site identified as part of the EPNG project and (Kearns 1998a). These initial occupations mark the beginning of repeated use of the area by agricultural populations. Post 700 BC components are far more numerous and show a ubiquity of cultigens, increased storage capacity, and evidence for shallow pit structures, indicating a more sedentary lifestyle, at least during the growing season. Occupation in the Twin Lakes locality remained continuous until approximately AD 100, which was followed by an apparent 300-year hiatus. This hiatus ended with an increase in occupations with a suite of material culture traits, including ceramics, that signify the beginning of the Basketmaker III period.

Basketmaker III (AD 400–700)

Over the course of several centuries, beginning about AD 200, a brown ware pottery technology was incorporated into the agricultural complex of the Colorado Plateau (Wilson and Blinman 1994). This brown ware pottery technology was slowly modified to make use of shale clays of the Colorado Plateau, resulting in the development of the Anasazi pottery tradition by AD 600. Brown ware sites dating to this early Basketmaker III (Muddy Wash phase, AD 500–600) or transitional Basketmaker period are absent from the project area, but they have been identified both on survey and through excavation to the northeast in the vicinity of Coyote Canyon (Hammack 1963; Kearns 1996a; Skinner and Gilpin 1997). Muddy Wash phase Basketmaker III sites may be expressed as residential and limited-activity sites. Spatially associated residential structures suggest either the presence of a stable community or the sequential reoccupation of the same area by succeeding generations. Early Basketmaker III architecture consists of shallow pit structures and jacal surface rooms, with little or no use of masonry. Once eroded, few traces of these structures exist. Coupled with sparse material culture accumulations, early Basketmaker III habitations tend to leave only subtle traces of their presence.

The late Basketmaker III period or Tohatchi phase spans AD 600–725 in the southern Chuska Valley (Kearns 1996a). Population density increased, as reflected by larger numbers of both recorded and excavated sites. The late Tohatchi phase is marked by the appearance of deep subterranean structures associated with numerous extramural slab-lined storage features, and a shallow midden located to the south and southeast of the structure (E. Reed 1956:11). In some instances an arc of four or five contiguous surface rooms are present on the west or northwest side of the pit structure. Habitation sites are small hamlets of one or two pithouses, and hamlets can occur singly or in loose clusters or communities (cf. Chenault and Motsinger 2000:49; Damp and Kotyk 2000:98; Plog 1997:60; Schroeder 1979:8). Finally, oversized pit structures are reported from this period, often interpreted as socially integrative structures and evidence for early community formation. One community to the northeast of Tohatchi, New Mexico, includes an oversized pit structure with a central floor vault and paired sipapus (Kearns 1996a:5.8–5.9). Another oversized structure identified during the N30–N31 project near Mexican Springs, New Mexico, also contained a central floor vault in addition to having been significantly remodeled (Morris and Kotyk 1999). Similar feature complexes have been interpreted as evidence for intracommunity ritual integration in Pueblo I contexts (Wilshusen 1989). In addition to habitations, late Basketmaker III limited-activity sites have been identified. These include probable fieldhouse locations, as indicated by habitation-like refuse without evidence of residential architecture in settings adjacent to potential agricultural land.

Although considerable variation exists among Basketmaker III villages, a site plan generally consists of one or more contemporaneous residential units represented by three to five pit structures and numerous extramural features oriented along a single axis, typically northwest to southeast (Cordell 1979:134, 1997:240; E. Reed 1956:12; Plog 1997:61; Roberts 1935; Stuart and Gauthier 1981:91). Sites can occur as single residential units or in clusters of units referred to as a community or village (cf. Cordell 1984:147; Plog 1997:60; Roberts 1929; Rohn 1989:154). In some instances habitation locations are encircled by what are interpreted as stockades (Chenault and Motsinger 2000:50; Rohn 1975). At least ten likely Basketmaker III components have been identified in the immediate vicinity of the project area (Francisco 1994).

Pueblo I (AD 700–900)

The Pueblo I period is viewed as an extension of the preceding Basketmaker III period with a greater emphasis on maize agriculture and distinct architectural changes that include an increase in the use of stone and the construction of contiguous surface rooms (Cordell 1997:239; McGregor 1965:207). There is a trend for Pueblo I villages to be located in canyon bottoms but they are also common in environmental settings similar to Basketmaker III populations (Cordell 1997:191). Architecturally Pueblo I habitation sites show robust patterning in structural layout. On the north end of the residential suite is a room block comprised of a row of smaller contiguous surface rooms fronted by a row of larger rooms or ramadas to the south. To the south of this room block is a pit structure associated with each residential suite. Finally, a midden can be found at the most southerly extent of the residential suite (Cordell 1997:97; Varien and Lightfoot 1989:75).

Spatially associated clusters of room block groups are considered communities or villages. Some of the best known and studied Pueblo I villages including Alkali Ridge, McPhee village, and the Duckfoot site are found in the Northern San Juan area (Brew 1946; Lightfoot 1992; Varien and Lightfoot 1989:73-89; Wilshusen 1988a). In the southern Chuska Valley however, Pueblo I sites are not as common as Basketmaker III sites.

Pueblo II (AD 900–1100)

Pueblo II villages are reported across the San Juan Basin and Chuska Valley and include well-documented villages found in the Mesa Verde region and Chaco Canyon (e.g., Varien 2000; Lekson et al. 1983; Lister and Lister 1981; Marshal et al. 1979; Windes 1993).

With continued emphasis on maize agriculture, Pueblo II sites are located on ridges, mesa tops, and talus slopes increasing access to arable land (Cordell 1997:193). It is during this time that subregional variation in architecture appears to emerge, the Chaco system fluoresced, and large aggregated communities formed. Although subregional variation in architecture was emerging (for example, differences in southern recess configuration), similarities in site layout remain consistent with the previous period. Increased standardization in site plan and construction materials with rows of contiguous surface rooms and associated pit structure or kivas were increasingly constructed using stone and commonly referred to as a "unit pueblo" (Cordell 1997:97; Lipe 1989:54; Prudden 1903:235; Varien and Lightfoot 1989:75). Linear clusters of unit pueblos begin to aggregate into communities or villages such as Yellow Jacket Pueblo, Goodman Point Ruin, and Skunk Springs (Lipe 1989:61; Marshall et al. 1979:110; Ortman et al. 2000:132; Stuart and Gauthier 1981).

Pueblo III (AD 1100–1300)

Pueblo III villages are reported across the San Juan Basin; however, few are reported from the southern Chuska Valley. Pueblo III sites documented near the project area are categorized as limited-activity sites represented by artifact scatters and isolated features. During this period large aggregated settlements were constructed, in defensible locations such as mesa tops, in overhangs, and at the heads of canyons (Ortman et al. 2000). Some are reported to have a perimeter wall encircling the settlement. Material culture patterns during the early part of this period are more similar to the preceding Pueblo II period. Later in the period, site density deceases through increased aggregation and subsequent regional abandonment by AD 1300 (Adler 1996a).

Pueblo IV (AD 1300–1500)

The southern Chuska Valley appears to have been abandoned by Pueblo groups during this time, at least for habitation purposes. This location may have been used as a resource area for hunting and gathering activities or other archaeologically obscure activities such as a ceremonial or ritual events. From approximately AD 1300 until the arrival of Athabaskan speaking groups during the late seventeenth and early eighteenth century this area was abandoned.

Ethnohistoric Period (AD 1450–1700)

The time during which Athabaskan-speaking people inhabited the American Southwest is a matter of some debate sparked by contradictions in empirical data, oral tradition, and linguistic divergence (cf. Hester 1962; Kelley and Francis 1998; C. Schaafsma 1996; Towner and Dean 1996). While the initial appearance of these groups is an important research topic, most scholars agree that the Colorado Plateau was occupied by Shoshonean ancestors of the Utes and by the Athapaskan ancestors of the Navajo by AD 1500 (Bailey and Bailey 1986; Brugge 1986; Kearns 1998b; McVickar 1996b; Wilcox and Masse 1981).

The strongest early record of Navajo prehistory is in the Dinetah area of northwestern New Mexico in the Largo and Gobernador drainages near the New Mexico and Colorado border. These Dinetah phase (AD 1450–1630) sites are recognized archaeologically by ephemeral brush structures, forked-stick hogans, thermal features, and artifact scatters (G. Brown and Hancock 1992; P. Reed 1999a). Although this area has numerous sites dating to this period, Dinetah phase sites have also been reported from other parts of the San Juan Basin (Amsden 1992; Brugge 1986; Hayes et al. 1981). During this time, extensive trade and exchange systems were developed between the Navajo and the Eastern and Western pueblos. This symbiotic relationship provided Pueblo refugees a haven in the area settled by early Navajo groups during the intervening time from the Pueblo Revolt to the subsequent Reconquest by Spanish colonists (P. Reed and Reed 1996).

Gobernador phase Navajo sites are recognized by the presence of Gobernador polychrome in ceramic assemblages, in addition to numerous Pueblo trade ware types (Hester 1962). Reed (1999:42) dates this period from AD 1630 to 1755. With increased pressure from the Ute and Spanish, Navajo populations began to migrate from the Dinetah region to the west and south into the southern Chuska Valley (Hester 1962; Towner and Dean 1996). Perhaps as early as the late seventeenth century, Navajo people had moved west of the Chuska Mountains, and by the mid-eighteenth century there were large Navajo settlements and communities in that area (Gilpin 1996). Navajo economic pursuits included a commitment to agriculture combined with foraging and raiding. In the Dinetah region and San Juan Basin, Gobernador phase sites are represented by pueblitos, towers, and walled defensive habitation locations. Near the southern Chuska Valley, occupations dating to this period are represented by manifestations similar to that of the preceding Dinetah phase located in defensible, well-protected, or locations not easily navigated such as boulder fields or along talus slopes (Blinman 1997b).

Early Historic Period (AD 1700–1900)

The Cabezon phase, which dates from approximately 1750 to 1863 (Hester 1962), is distinguished from the preceding Gobernador phase by material remains identified by Keur (1941) on Big Bead Mesa. Limited synthesis of the material culture and its archaeological expression, however, have made this temporal distinction obscure. Cabezon phase sites are described as having circular stone walled hogans, Navajo polychrome ceramics, and trade wares from the Zuni-Acoma, Hopi, and Zia areas (Hester 1962). Brugge (1986) suggests that the discontinued use of rectilinear structures may be related to prohibitions associated with the Blessingway. In addition, there is a decrease in the use and manufacture of stone tools, basketry, and ceramics (Hester 1962). It is during this phase that herding was adopted as part of the Navajo economy and settlements became increasingly more common at lower elevations.

During the early nineteenth century, as Navajo herd sizes increased, so did the frequency of raiding, the inequity of wealth, and the influence of some headmen (Bailey and Bailey 1986; P. Reed 1999). Along the Chuska slope the principle headmen during this time were Narbona, Manuelito, and Zarcillos Largos who hailed from Sheep Springs and Black Creek. These headman and their bands used the higher elevations of the Chuska Mountains as strongholds and hunting territory while the lower piedmont and grasslands were used as summer range for their herds. It is possible that the pre-Bosque Redondo component identified during this project was one of the summer camps used by these headmen or their followers. Frequent raids and the western expansion of American populations by the 1860s led to punitive action against the Navajo. A full-scale military campaign led initially by James Carleton and later by Kit Carson resulted in the conquest of the Navajo in 1864. The subsequent forced march to and incarceration at Fort Sumner, New Mexico, known as the Long Walk, became an iconic event and a watershed in Navajo culture. Although over 8,000 Navajos were incarcerated at Fort Sumner, some escaped capture by hiding in isolated parts of the Chuska Mountains and Canyon de Chelley (Bailey and Bailey 1986).

At Fort Sumner it was hoped that the Navajos could be forced to become self-sufficient farmers, however crops failed due to drought and insects. Through public outcry about the Navajos suffering from hunger and disease, and the high cost to the US government in supporting a large dependent population, Navajo headmen signed a treaty, and in 1868 the Navajo were allowed to walk back to their homeland. Upon returning, it was promised that rations would be dispensed from Fort Wingate, but the Government failed to provide supplies and this destitute population began to spread out across the landscape returning to pre-Bosque Redondo subsistence practices of farming, hunting, and herding. By the late 1800s the railroad brought economic changes to the Navajo Reservation.

The railroad reached Gallup in 1881, facilitating the shipment of livestock and other materials to eastern markets. Livestock, silver jewelry, and wool could also be sold or used as barter and local trading posts provided access to commercially manufactured goods, integrating Navajos into the national economy. Economic opportunity in the form of wage labor and trading ushered in a major shift in Navajo culture from subsistence activities to reliance on a cash economy. The railroad also brought more Anglo settlers to the area and increased competition for off-reservation grazing land (Bailey and Bailey 1986). By the early twentieth century, a combination of commercial herding, farming, hunting, and wage labor was typical of the local Navajo economy.

Modern Period (1900–present)

In 1923, spurred by Anglo pressure to secure subsurface minerals, gas, and oil, the Navajo Tribal Council was established, formalizing and centralizing the headman system. Formalization of the Navajo government continued with the implementation of the local chapter system. The chapter system, made an official part of tribal government in 1955, helped distribute revenue accumulated through mineral and energy leases across the reservation for construction projects and administration costs.

Decades of commercial herding and ranching, coupled with drought, severely impacted range land during the early twentieth century. With more animals than range the government implemented the Stock Reduction program in 1933 which reduced Navajo livestock by 50 percent by 1935. With the reduction in livestock came a reduction in family income, pushing an already marginal economy back to a meager level of subsistence. Herd size was subsequently controlled by the Soil Conservation Service through a permitting process. Wage work filled the void left from the stock reduction and many Navajos, like other Americans, worked jobs provided by the Public Works Administration, Work Progress Administration, and the Civilian Conservation Corps until the beginning of World War II.

World War II not only increased the role of wage labor in the local economy, it also significantly changed the social and political relationship between Navajos and Anglos. It marked the beginnings of industrialization on the reservation and changes in tribal bureaucracy, including the development and expansion of tribally controlled economic endeavors (Poyer and Zimmerman 1999). In 1950, Congress passed the Navajo-Hopi Long Range Planning Act that fostered economic development through the distribution of funds to improve reservation infrastructure. The act funded the construction of schools, roads, and hospitals, the development of tribal enterprises, natural resource studies, and oversight money. Slyly, the act also included provisions to relocate Navajos and other Native American families to major cities in an effort to assimilate these cultural groups. During the 1950s and into the 1960s, energy development, particularly oil, gas, and uranium, not only created wage jobs on the reservation, but expanded and developed roadways connecting once remote camps to the outside world. With the increased exposure to Anglo life style, a cash economy, and improved roadways to off-reservation towns like Gallup, Farmington, and Flagstaff, the Navajo gained more choices in employment, education, and residential locations (Poyer and Zimmerman 1999).

Today the Navajo Nation is comprised of over 250,000 people and covers over 27,000 square miles in Arizona, New Mexico, and Utah. The Navajo Nation is the country’s largest tribal governmental body including of 88 tribal council members and 12 standing committee representing 110 local chapters. Two representatives from each chapter sit on the Navajo Council. The economy centers around four distinctive industries: tourism, energy development, agriculture and livestock, and manufacturing.

As early as 1929 the area between two seasonal lakes that gives the “Twin Lakes” chapter its English name, was permanently settled by Navajo families. During the 1930s, the community of Twin Lakes started to form with the construction of a government day school. This school was expanded by 1938. Prior to the construction of a chapter house, people from Twin Lakes met at the school’s boarding house. In 1942 the first chapter house was built and by the late 1950s the Twin Lakes community had grown sufficiently to be certified by the Tribal Council on February 14, 1956. The current chapter house was built during the early 1960s (Lee et al. 2004). Based on the 2000 census, the Twin Lakes community now consists of over 2,200 people.

Prior archaeological investigations in the immediate vicinity of the project area had identified 17 historic Navajo sites, including BIA structures along with traditional ceremonial locations (Francisco 1994). Several traditional-use sites and 38 in-use or occupied residential structures were also identified during a survey conducted by Francisco (1994:118–124). None of these sites, however, are within the proposed construction zone for the US 666 improvements.

3 | Research Design Summary

Archaeological investigations conducted by OAS along a 4.5-mile ((7.2 km) section of US 666 were guided by the principles and goals outlined in the research design and data recovery plan (Blinman 1997a). Initial characterization of the five sites was based on surface observations only, and the presence of Basketmaker III–Pueblo I and late Pueblo II habitation components were suspected at LA 104106 and LA 103447, respectively. As such, archaeological research was aimed at understanding prehistoric communities within the southern Chuska Valley. Although specific research objectives were geared more toward Anasazi components, they were broad enough to address similar aspects of the unanticipated Basketmaker II and late eighteenth-century Navajo occupations identified as part of this research project.

Processual in nature, the research design is concerned with understanding change through time in the economic and social dimensions of communities. These aspects of past human behavior can be interpreted through changes in the inferred functional elements of sites and components, the roles of those elements within the community, and ultimately the community's role in the broader regional organization. Site function, community role, and settlement patterns can be addressed through systematic data collection, chronometric sampling, artifact analysis, and the subsequent spatial examination of these materials. Temporal and spatial patterns observed in the archaeological data, at different scales, are used to identifying both consistency and change in these aspects of past human behavior.

Until relatively recently, the limited amount of archaeological excavation carried out in the southern Chuska Valley produced regional data inadequate for community synthesis. Although the NSEP and the N30–N31 projects have added considerably to our understanding of the human use of the southern Chuska Valley, data gaps remain. While the sites excavated as part of this project have contributed new information about the use of the area, it is important to consider that they are part of a narrow linear transect, and are not likely representative of the range of temporal and functional variation of their parent communities. Furthermore, excavation was limited to portions of the sites that overlap with the construction zone, so that site characterizations must be inferred from arbitrarily defined samples. Because of these constraints, research efforts of this project must focus on contributions to our understanding of generic community structure in the southern Chuska Valley as opposed to the characterization or identification of a specific community. As such, this data recovery effort builds on the efforts started for the region by the NSEP and N30–N31 projects.

Research Goals

This section is adapted from the original data recovery plan presented by Blinman (1997a). It is presented to address the Basketmaker II and pre-Bosque Redondo Navajo components identified as part of this archaeological project. Originally the data recovery plan, in anticipation of Basketmaker III–Pueblo I remains, was geared toward Anasazi settlement, subsistence, and community organization. Although a Basketmaker III habitation area was identified at LA 104106, all other Basketmaker III and Pueblo-period components were only represented by ceramic artifacts located outside the project area. Nonetheless, these research domains are applicable for interpreting the diverse temporal and cultural remains identified along this portion of US 666.

An underlying assumption of community

studies is that people pursue economic and social goals in patterns that have consistency in both spatial and temporal dimensions. Economic pursuits can be summarized in terms of resource catchments, extractive technology, scheduling, and labor organization (Benson 1984). Social pursuits can involve social and biological reproduction (Wobst 1974), integration (Adler 1990, 1996b; Johnson 1982), and interaction (exchange). The latter is an important dimension of community studies, encompassing the broad concepts of exchange, cooperation, and raiding as articulated by Ford (1972). Necessary elements of settlement pattern (community) studies include the establishment of contemporaneity, complementarity, and redundancy (Adler 1996c; Benson 1984; Chang 1972).

The demonstration of *contemporaneity* is a fundamental step in any community or settlement pattern study. This is especially true in dynamic contexts where community or residential change and stability are played out at different tempos (Hannaford 1993), often with residential mobility cycling at an extremely rapid pace. This is particularly apparent in Basketmaker and early Navajo settlement patterns (Ahlstrom 1985). *Complementarity* concerns the roles or functions of elements of the community and how those functions are related. Said another way, complementarity addresses the inferred function of a particular site or component and its place within the cultural matrix (e.g., ceremonial sites, habitations, field camps, and lithic procurement sites). Combined with contemporaneity, complementarity is important for inferring levels of community development, size, and integration. *Redundancy* is a necessary part of community studies in that partial or complete redundancy distinguishes the elements or territory of one community from another. The existence of communities is generally accepted at a theoretical level, but the degree of success in dealing with them at a practical level is subject to qualification (Toll 1993).

Chronology: Date and Duration

Two questions of chronology are important to the goals of the research design: (1) When did the activities take place that resulted in a particular component? and (2) How long a period of time (duration) is represented by the component? Answers to the former question can be used to establish contemporaneity between components or elements of a community, while answers to the latter contributes to both functional interpretations and interpretations of the stability of the community structure.

To address this domain, a wide variety of dating techniques were applied to the archaeological sites investigated during the US 666 project. Each has strengths and limitations within given contexts. Tree-ring dating is the most precise of the available dating techniques, but strong interpretations are dependent on the harvesting of fresh timbers for substantial architectural construction, the use of datable woods, and the preservation and recovery of samples of those timbers (Ahlstrom 1985). For example, earthen architecture (surface rooms and pit structures), such as that identified at the Basketmaker III component at LA 104106, was subject to decay and relatively rapid cycles of remodeling or abandonment, with minimal reuse of timbers. Also, tree-ring dating is less appropriate for nonarchitectural contexts such as isolated thermal features or activity areas where datable samples may be subject to some of the same "old wood" interpretive constraints that affect radiocarbon dates from similar materials (Schiffer 1986). These types of samples can likely predate the target cultural activity by as much as 500 years (Smiley 1985). Therefore, only samples collected from secure architectural contexts (construction elements) were submitted for tree-ring analysis.

Archaeomagnetic dating is applicable only to well-burned earthen structures or features that have not been physically displaced between the time of burning and the time of sampling (Wolfman 1984). This technique can be used in a wide range of contexts, and it is especially useful at nonarchitectural sites and sites where timbers have not been preserved. An additional strength of archaeomagnetic dating is that it provides "last use" dates, with the potential to inform about site use duration (Wolfman 1990). Dating resolution can be variable however, and at times when movement of the earth's geomagnetic pole is either slow or is in the process of reversing direction, error terms can be so large as to render dates unhelpful. Another limitation of archaeomagnetic dating is that more than one valid date interpretation is possible for an individual sample result if the calibration curves overlap. Because of this, archaeomagnetic dates were validated through some other source of chronology (i.e., radiocarbon, dendrochronological, or temporally diagnostic ceramics) to identify the relevant portion of the curve for the date interpretation.

Radiocarbon dating generally lacks the precision and accuracy required for the interpretation and discrimination of Basketmaker III contexts or younger because error terms for standard radiometric determinations usually span more than 120 years. In addition, questions exist concerning the relevance of the carbon within an individual sample to the context being dated (such as the prehistoric selection of old dead wood for fuel) (Schiffer 1986). Radiocarbon dating is, however, adequate for dating sites and contexts of the pre-ceramic Archaic and Basketmaker II periods. Given these limitations, charcoal was collected from well-defined contexts (i.e., lower fill levels of features) and sorted. Although annual plant materials can provide strong and defensible radiocarbon dates, these materials were not available from every context. Therefore, more ubiquitous perennial shrub species were also selected to provide comparability between dated contexts. This dating technique can also be used in conjunction with other dating methods to narrow the range of occupation for Basketmaker III and early Historic Navajo components.

Stone and ceramic artifacts can also be used to provide dating inferences based on diagnostic changes in style. Flaked and ground stone artifacts such as projectile point and metate styles have relatively discrete temporal implications and are most applicable to the coarse time frame of the preceramic or when no other dating method is available. Stone materials are only marginally useful in Anasazi contexts, but they can support identifications of earlier components. For example, an inherent problem in the use of projectile point typologies to place sites in a temporal period is that they were often recycled through reuse, resharpening, or reworking during the course of their use lives which removes them from their original context. Although resharpening may not affect the distal portions of projectile points, on which most typologies are based, they can be fashioned into other tools such as scrapers, obscuring diagnostic characteristics.

Most Anasazi artifact chronologies in the Southwest are based on ceramics, exploiting aspects of style and technology that are codified in pottery types (Blinman 1997c). Individual pottery types often have imprecise dating implications, but assemblages of types can support extremely fine temporal distinctions (such as described in Blinman [1988b]). The ceramic chronology for the southern Chuska Valley has recently been refined as part of NSEP investigations (Kearns 1996b:3.2; Reed and Hensler 1996). However, systemic weaknesses in ceramic dating include the confounding effects of component mixtures (Kohler and Blinman 1987) and weak inferences that result from small samples. Also, all artifact-based dating techniques have an inherent circularity in chronology construction, and the collection and curation of chronologically distinctive artifacts (especially projectile points) by later peoples has been well documented. Despite their weaknesses, pottery assemblages will be used as a source of dating inferences, including the detection of minor components.

Only rarely can duration be addressed by direct dating methods. Typically tree-ring samples can provide construction dates that can be contrasted with pottery, archaeomagnetic, or radiocarbon samples that provide closing dates. Another approach to duration studies involves the analysis of the accumulation of materials (Kohler and Blinman 1987; Varien and Mills 1997). Several common types of material culture, such as pottery vessels, have relatively rapid turnover in their cultural context. Discarded materials accumulate relatively predictably as part of the site fabric. These accumulations can then be used to infer occupation duration or intensity (expressed as household-years), independent of architectural or dating measures of the same values. Best suited to entire site excavation or to sampling based on probabilistic models, these approaches can still be applied to nonprobabilistic samples by establishing minimum values.

Function: Activities and Roles

Communities require functional differentiation in both social and economic activities. These different activities often correlate with geographic distributions of resources, resulting in discrete site types. Two questions of function are important to the goals of the research design: (1) What functions or activities took place at each particular location? and (2) How do suites of activities articulate to define the role of the site within the settlement system or community? The former question can encompasses specific activities such as a single lithic reduction episode or more general measures such as the capability to store foodstuffs. The latter question is complementarity, contrasting suites of activities with information from other sites or with models of social and subsistence organization. Both of these questions require control of time so that inferred functions can be related to particular components. Within the context of Basketmaker II and Navajo settlement patterns, function (role) is usually generalized within several recognized site types that include habitations, base camps, specialized activity loci, and ceremonial sites.

Distinctions between these site types are best viewed as arbitrary partitions of functional continua, patterns that hold as generalizations but that may deviate from the norm in many individual cases. Also, site functions need not have been consistent through time. This behavioral variability has been acknowledged through the concept of palimpsests, in which sites are formed by overlays of many activity episodes (Binford 1981). The archaeological perception of site function is further complicated by the recognition that the same place may play distinctly different roles in the same cultural system at different times, leading to palimpsests of disparate activity suites (Binford 1982). These within-component dynamics are further qualified in that geographic places may play different roles in different cultural systems or in sequential temporal components of the same system (Schlanger 1992). As an example, hunting and gathering activities may be overlain on abandoned habitation sites due to the attractiveness of the habitation refuse as a source of raw materials; or field camp use of a location may be superseded by the establishment of a fieldhouse as a community matures and land tenure relationships solidify. Dating information and stratigraphic relationships can be used to unravel some of these complications, but in other cases we must acknowledge our inability to differentiate fine-scale episodes. However, even if we cannot segregate some activities that were originally differentiated by year or by season within a component, the aggregate archaeological record still reflects the generalized role of the place or site within the community.

Habitation complexes are usually defined by the presence of substantial structures, indicating a relatively sedentary adaptation, on at least a seasonal basis. Investigations at habitations focus first on defining the architectural facilities of the component (including processing and storage features). These facilities define a basic range of potential activities at the site, and the fortuitous preservation of strong patterns of primary and defacto refuse can occasionally define instances of actual activities (activity areas) within these. However, despite poor resolution resulting from mixing, the best record of the relative intensity of particular activities is preserved in the characteristics of habitation refuse (Blinman 1988a:156–160; Varien and Mills 1997). As tools are used, wear and breakage occur. These materials then follow recycling and discard paths until they ultimately leave systemic context and are permanently deposited as refuse (Schiffer 1972). Refuse is often deposited in formal middens, but it also can be found in a variety of less formal fill and sheet trash contexts.

Base camps are defined as logistic residential locations (Binford 1980). Through a logistically mobile organizational system (collector), perennial economic strategies, focused on the extraction of wild biotic resources and horticultural, have left interpretable patterns in material culture. For example, this type of system is dependent on environmental conditions such as seasonal and regional weather patterns. These conditions directly relate to the availability of rainfall and surface water that can affect the repeated scheduling and use of arable land, the duration of occupation, and perhaps demographic pressure at various geographic locations (Kelly 1995). As residential locales that support long-distance logistical forays, numerous features and ephemeral structures are likely. Additionally, high artifact diversity and quantity, including broken or discarded tools, cores, ground stone, and late stage debitage, will be present.

The role of base camps within this type of settlement system is usually explained in terms of travel efficiency and economic benefit (Binford 1980; Kelley 1995:149). However, occupying a specific location along the Chuska slope may not be as critical to long-distance logistical foray activities as it is to crop security gained through seasonal residence near field locations (B. Moore 1978; Russell 1978; Wilcox 1978). This settlement characteristic may demonstrate that land tenure considerations are as important as economic efficiency and security. In contexts where there is competition for field space, base camps may serve as a physical validation of use rights over land, regardless of distance from other seasonal camps (Adler 1994:87; Kelley 1995:163).

Because these sites are likely the result of numerous specific tasks, definition of activity suites is more informative than architectural characteristics, which are more variable. These activity suites can then be used to refine our understanding of the role of the base camp in the broader settlement structure. Variables of interest include understanding the relationship between environmental context and temporal affiliation as it relates to land-use strategies, social group size, and group composition (Wenker and Herhahn 2004). Subsistence in base camp investigations include defining the range of activities, seasonality of use, intensity and duration of use, and range of logistical forays.

Limited-activity sites are the locations of specialized procurement and processing activities. Inferred from the large site area and the dispersion of features and artifacts, LA 116035 and LA 32964 appears to fall within this category. Sites located in proximity to arable land are expected to serve their communities as field camps or harvest processing areas. These limited-activity uses fall toward one end of a mobility continuum, which encompasses base camps and extends to year-round habitations. Several models have been proposed to explore this continuum (Kelley 1995; Kent 1992; J. Moore 1989, 1991), taking advantage of tool kit expectations based on decreasing mobility (increasing residence time and increasing activity diversity). Information of interest includes the range of activities, the redundancy or consistency in the use of space, dates of uses, and seasonality of use. Of particular interest are functional differences between the limited-activity and base-camp uses of the landscape within what appear to be the same community context.

Interaction: Intra- and Intercommunity

Two questions of interaction are important to the goals of the research design: (1) What was the geographic and social scale of the community of which each site is a part? and (2) What was the geographic and social scale of interaction between the community and other communities within the region? These questions presuppose a distinction in the scale of interaction between local and regional communities, a distinction that does not necessarily exist for all time periods. However, the N30–N31 and NSEP investigations in the southern Chuska Valley have demonstrated the probable existence of local communities within the Basketmaker III and early-middle Pueblo I period. Archaeological studies of Anasazi interaction are dominated by studies of exchange (Blinman and Wilson 1992, 1993; Mathien 1993), but they can include studies of style as well. Stylistic studies by themselves are ambiguous in their interpretation, but the data sets are complementary and together can yield insights into the inclusive vs. exclusive nature of intra- and intercommunity interaction (Hegmon 1995). The southern Chuska Valley is surrounded by several distinctive raw material sources for both flaked lithic tools and pottery (Washington or Narbona Pass chert, Jemez and Mt. Taylor obsidian, and trachyte basalt temper for Chuskan pottery). These allow the detection of changes in both volume and direction of exchange. Recent characterizations of exchange in the region have been developed for both the NSEP and ENRON projects (Reed and Hensler 1996; Winter 1994a), providing an excellent framework for the interpretation of interaction involving the US 666 sites and communities.

The sites included in the data recovery plan do not represent all elements of any single prehistoric community, and there are insufficient regional data to identify their specific community affiliations. This limits intracommunity interaction studies, but the proximity of the sites is close enough to assume that there may be contemporary elements of the same community adequate for gross comparisons. Under this assumption, contemporary components can be used to compare the effect of site role on the perception of community interaction. The sites are better suited to the investigation of the role of the regional community in intercommunity interaction. Data from the sites will be directly comparable to the diachronic trends noted for communities investigated as part of the N30–N31, NSEP, and ENRON studies.

The five sites investigated under this research design contain elements of least three temporal occupations: Basketmaker II, Basketmaker III, and early Historic Navajo. The systematic investigation and analysis of the material culture recovered during the current project offer new data contributing to our understanding of these occupations of the southern Chuska Valley. There are three broad interrelated research domains that provide a framework for interpreting the data. First, chronometric control over archaeological deposits is an essential first step providing temporal order to these remains. Temporal control has been obtained through several methods including dendrochronological, radiometric, archaeomagnetic, and artifact analysis. When available, all these dating techniques were applied to contexts to validate the occupation period and duration. Site function and role is addressed by examining the temporal and spatial relationships of material culture. The location of various types of accumulated remains provides structure to the site offering a means for identifying site function. Spatial analysis of artifact diversity and size combined with feature morphology and content provide an excellent foundation for interpreting the function of various temporal components and their role within the broader settlement system. This is particularly important for addressing change in the archaeological record through the adaptation of, and ultimate dependency on, cultigens. Finally, identifying the extent of a community's interaction sphere plays an important part in understanding development of broader regional systems. Extra-local ceramic, lithic, and exotic materials provide evidence that the inhabitants of the southern Chuska Valley did not live in isolation from surrounding populations of the Greater Southwest. Changes in the frequency and geographic source of these material may represent shifts in regional alliances or trade routes. These materials may also contribute to defining the role of a site within the broader community if the control or access to these items can be identified.

Data recovery investigations along this portion of US 666 had provided an opportunity to examine human occupation of a underinvestigated portion of the southern Chuska Valley. While a Basketmaker III habitation site was anticipated from initial surface inventory, the identification of Basketmaker II and late eighteenth-century Navajo occupations were unexpected. These components are important for documenting the beginnings of an agricultural complex that spans nearly 2,000 years and the poorly understood settlement and subsistence of practices of pre-Bosque Redondo Navajos. By integrating analysis information of material culture including lithic, ceramic, fauna, botanical remains with temporal, architectural, and spatial data change, and continuity in the economic and social dimensions of communities can be evaluated.

Summary of Data Recovery Results

Data recovery investigations along US 666 at Twin Lakes resulted in the documentation and collection of 24,145 artifacts and samples recovered from five sites located between mile marker 11 and mile marker 16. Investigations at three of these sites identified minimal material useful for addressing the data recovery plan. The remaining two sites, however, produced large volumes of material remains that can be used to answer the research questions.

The majority of the documented and recovered material remains from these five sites indicated that most are multicomponent, interpreted to be the result of discrete temporal occupations during the Basketmaker II, Basketmaker III, late Pueblo II–early Pueblo III, and historic Navajo periods. Although Basketmaker III ceramics were identified at many of the sites, Basketmaker II, late Pueblo II–early Pueblo III, and historic Navajo components were generally identified within spatially discrete areas of the sites.

At LA 32964, a robust Basketmaker II occupation identified in the project area was stratigraphically and spatially distinguished from the Pueblo II–early Pueblo III habitation area located outside the project limits. Site LA 103446 yielded evidence of a Pueblo II–early Pueblo III occupation and a 1930s Navajo camp. The Pueblo I–Pueblo II artifacts exposed in the spoil of a waterline trench outside the project area indicated buried deposits, but these deposits did not extend into the project area. In addition to the identification of a Basketmaker III habitation complex at LA 104106, a spatially discrete pre-reservation Navajo component was identified. While the Basketmaker III component at LA 104106 likely functioned as a habitation area, perhaps with a specialized role in the community, other discrete spatial and temporal components at this site appear to represent short–term limited activity or special-use areas associated with seasonal agriculture, hunting and gathering, lithic resource procurement, or herding. LA 116035 is a multicomponent artifact scatter that appears to be the result of periodic, short-term occupations during the Basketmaker III, Pueblo II–Pueblo III time. The inverse stratigraphic relationship between ceramic and lithic artifacts and the single thermal feature identified within the project area hint that an aceramic (Basketmaker II?) component may be present outside the project area.

4 | Field and Laboratory Methods

Five archaeological sites were investigated as part of the US 666 Twin Lakes project. Archaeological deposits varied in depth, nature, and extent from minimal amounts of surface artifacts to well-defined habitation and activity areas with structures and features. Materials recovered from this project add to our growing knowledge about the inhabitants of the southern Chuska Valley from the first agriculturists to the pastoral lifeways of the Navajos. This chapter describes the general field and laboratory techniques used during data recovery investigations. Since each site had unique characteristics, it was necessary to tailor investigative techniques to individual cases. This included determining which areas would yield the most information, the amount of excavation conducted within a given area (particularly around features), and when and where to use mechanical equipment for exposing cultural deposits. Details of the field methods used at each site are presented as part of individual site descriptions.

Field Procedures

Working from the survey results (Francisco 1994), data recovery investigations were conducted in three stages. The first stage was primarily administrative and began by notifying the Navajo Nation and all utility companies (Reference No. 98010209420107) that the OAS was commencing archaeological excavations. While utilities were being located, project area and site limits were established based on construction plans and through surface inventory. As all surface manifestations including identifying areas of high and low artifact density and locating features and structural remains were being inventoried, horizontal and vertical control for subsurface investigations was established from a main datum. From this datum a series of sub-datums were also established to facilitate site mapping. Due to the linear nature of the project area, a grid system was established parallel to the existing and proposed right-of-way. A series of pre-excavation photographs was also generated during the initial stage of investigation.

Using the information obtained from Stage 1, Stage 2 investigations aimed at identifying source areas for the surface manifestations. All surface artifacts within the proposed construction zone were collected in 1 by 1 m grid units. Artifact concentrations outside the proposed construction zone were subjectively sampled and analyzed in-field using 3 m diameter study areas. Surface manifestations helped guide the location of exploratory subsurface tests. Intact cultural deposits were detected through systematic auger tests and limited hand excavations. Finally, Stage 3 investigations defined the nature, depth, and extent of intact cultural deposits by expanding hand excavation in areas identified during Stage 2 investigations. Once the cultural and noncultural deposits were sufficiently evaluated, mechanical equipment was used to expose buried cultural deposits and verify their absence inferred from the results of Stage 1 and Stage 2 investigations. Following data recovery investigations, mechanical equipment was used to backfill all excavation areas.

General Field Methods

The general field methods presented in the data recovery plan (Blinman 1997a) were developed, in part, for the La Plata Highway project (Toll and

Blinman 1989). This methodology was later adapted by Boyer and Moore (n.d.), and Boyer and Lakatos (1997); see also Boyer, Moore, and Lakatos (2000) for data recovery investigations in Northern New Mexico. Archaeological excavations conducted during the Twin Lakes project followed the adapted field methodology presented below.

Horizontal proveniences. From a main site datum, a Cartesian grid system was imposed over sites to provide proveniences for cultural materials and features so that their original spatial relationships would be preserved for later study. In most cases, the main datum was located in an area that would not be affected by data recovery excavation. A working plan of the site was prepared by hand from the Cartesian coordinates, established using a transit and tape. This plan illustrated the locations of excavation areas, structures, features, and surface artifact concentrations and was updated during the data recovery process. Surface artifact collection and hand-excavation units were also linked to the Cartesian grid system and identified by the grid lines that intersect at their southwest corners. The basic excavation unit was a 1 by 1 m grid unit for initially examining subsurface deposits. Once intact cultural deposits were identified, 1 by 1 m grids, in some cases, were not the most efficient unit of excavation. This was particularly true when removing fill from structures and large features down to just above the floor where again 1 by 1 m grid units provided a greater level of horizontal and vertical control.

Vertical proveniences. Two methods were used to record the vertical position of material recovered from excavation units: strata and levels. Excavation by strata was considered optimal in cultural deposits because soil layers tended to represent specific depositional episodes. Strata were assigned unique numeric designations recorded on individual forms as they were encountered and described. In order to track the sequence of strata from one area to another, each vertical excavation unit was also assigned a level number, beginning with the surface. The surface, represented by an arbitrary layer with no thickness, was designated Stratum 0, Level 0 at each site. The first vertical excavation unit within each stratum was labeled Level 1, the second Level 2, and so on. Since stratum and level numbers represent two completely different series, stratum numbers were assigned to different areas of a site as excavations proceeded, and therefore were not always in numeric sequence for a particular grid unit. Level numbers however, were in sequence.

Just as the grid system was linked to the main datum, so were all vertical measurements. All measurements were made in meters below datum (mbd). Since it is often difficult to provide vertical control for an entire site with just one datum, subdatums were established across the site as needed. Horizontal and vertical control of these points was maintained relative to the main datum.

Before it was possible to delimit the extent and nature of sediment strata, it was necessary to examine them in cross section. This required the excavation of exploratory 1 by 1 m grid units excavated in arbitrary 10 cm vertical levels. Although recording vertical measurements in mbd was the preferred method, vertical levels in some exploratory units were measured below modern ground surface (MGS) from the southwest corner. Once unique strata were identified, using exploratory grid units, they became the main unit of vertical excavation. Exceptions included noncultural deposits and cultural strata that were very thick and needed to be subdivided in levels to provide greater provenience control.

Vertical treatment of deposits varied according to their nature. Cultural deposits were carefully excavated to preserve as much of the vertical relationship between material remains as possible. For example, cultural deposits required careful excavation to preserve the relationship between artifacts discarded at different times. Noncultural deposits tended to be jumbled, and the relationships between artifacts are almost always obscured because they were moved from their original contexts and redeposited. Although the relationship among artifacts in noncultural deposits is rarely meaningful, horizontal and vertical control was maintained when appropriate.

Augering. Auger tests were effectively used to examine areas, at depth, with minimal effort and impact on the archaeological record. Thus, this technique was used to determine whether buried cultural deposits, such as features, were present. Systematic auger transects, established along the Cartesian grid system, were used to examine parts of sites that exhibited no or ambiguous surface signs of structures or features. The interval between auger tests and the portions of sites investigated using this technique was determined, in part, by the size of the area to be investigated. When potential feature locations were encountered, more intensive augering techniques were applied to investigate them. Soil removed from auger holes was screened to determine whether cultural materials were present. Auger tests were recorded on individual forms.

Recording excavation units. A Grid Unit Excavation Form, which was completed for each hand-excavated level, documented the horizontal and vertical proveniences in addition to a narrative description of the soil or sediment matrix, an inventory of cultural materials recovered, and other observations considered important by the excavator or site supervisor. The description of the soil or sediment matrix included information on cultural and noncultural inclusions, presence of building rubble, evidence of disturbance, and how artifacts were distributed if variations were noticed.

Recovery of cultural materials. Most artifacts were recovered in two ways: visual inspection of fill layers as they were excavated, and screening though variable-sized mesh. Other materials were collected as bulk samples that were later processed in the laboratory. Regardless of how cultural materials were collected, they were all inventoried and recorded in the same way. Collected materials were assigned a field specimen (FS) number, which was listed in a catalog and recorded on all related excavation forms and bags of artifacts. Field Specimen numbers were tied to proveniences, so that all materials collected from the same horizontal and vertical proveniences units received the same FS number. For instance, if chipped stone, ceramic, and bone artifacts were recovered from the same level in the same grid unit or the same stratum in the same structure quadrant, they were all identified by the same FS number. Any samples taken from that level or stratum also received the same number. The FS number was the primary tool allowing for the maintenance and documentation of the spatial relationships between recovered materials.

Most artifacts were recovered by systematically screening sediment removed from excavation units. All sediment from exploratory grid units and features was passed through screens, as was at least a sample of soil from both cultural and noncultural strata in structures (detailed later). Two sizes of screen, 1/4-inch and 1/8-inch mesh, were most often be used. While most artifacts were usually large enough to be recovered by 1/4-inch mesh, some were too small to be retrieved by that size screen. These remains, such as small pieces of flake stone debitage, bone, and macrobotanical remains, also provided important clues about the activities that occurred at a site. At a minimum, all soil in certain types of features (such as hearths and ash pits) was screened through 1/8-inch mesh, as was all soil from floor or living surface contexts (see feature excavation below). Other potential locations where this recovery method was applied included culturally deposited strata and activity areas.

Cultural materials from certain types of strata were only recovered by visual inspection. As discussed in more detail later, only a sample of soil from noncultural strata was screened to recover cultural materials. Rather than simply ignoring artifacts from unscreened strata, cultural materials observed during excavation were collected for analysis. While data from these proveniences may not be useful for some statistical analyses, they were used to characterize site activities and spatial and temporal subdivisions of the site.

Other cultural materials, such as macrobotanical samples, were recovered from bulk soil samples. In general, samples for flotation analysis were collected from culturally deposited strata and features, and contained at least 1 liter of soil. Macrobotanical materials, such as corn cobs, piñon shells, wood samples for identification, and charcoal, were collected as individual samples whenever found.

Structures, Features, Extramural Areas, and Sensitive Materials

Methods of excavation varied depending upon whether a structure, a feature, or an extramural area was being examined. Most excavation was accomplished using hand tools. However, in some cases mechanical equipment was used to expedite the removal of noncultural deposits. This includes stripping noncultural overburden from buried extramural cultural strata, or was used in areas where surface remains were absent or fill sampled through exploratory units. Fill from structures, however, was removed by hand to avoid potential damage to remaining architectural elements.

Structures. Individual numeric designations were assigned to structures on a site, as well as to the rooms they contain. Excavation within rooms began by digging an exploratory trench completely across the room. The initial exploratory trench was excavated by arbitrary level in grid units to provide a control sample and cross sections of the deposits. In some cases, this procedure was repeated, perpendicular to the initial trench, to provide additional information on the filling processes. Profiles of the exploratory cross section(s) were mapped to scale and the nature of the fill defined. Remaining fill was excavated by quadrant. Quadrant boundaries were determined by the locations of grid lines or exploratory trench(es) and were not always same size.

At least one quadrant, whether cultural or noncultural in nature, was excavated by the defined strata. This method provided a sample of materials associated with these strata, allowing for a more comprehensive understanding of the filling sequence. The quadrant selected for sampling was assumed to provide the most information. Factors that determined quadrant selection included the presence of representative strata to obtain a sample of associated materials and the discretion of the site supervisor. Remaining fill was removed without screening, though artifacts were collected when observed.

Excavation was halted approximately 5 cm above the floor to prevent damage to its surface during excavation. At this time, the grid system was reestablished to permit more systematic sampling of materials near or in direct contact with the floor surface. This arbitrary layer, referred to as floor fill, was removed by grid unit and screened through 1/8-inch mesh. Finer control in recovering materials from these contexts, including collecting a flotation sample, was necessary because these materials are the most likely to have been deposited at or soon after the time of abandonment. Artifacts and samples in direct contact with the floor surface were mapped, collected, and assigned an FS number distinct from the floor fill level.

Following complete excavation of a structure, architectural details were recorded on a series of forms. Building elements encountered during excavation were also included. In particular, roof elements found during excavation were mapped, described, and sampled for species identification or chronometric analysis. Descriptions of individual rooms included information on wall dimensions, construction materials and techniques, and associated features. In addition, scaled plan and profile maps of each structure were drawn, detailing the locations of rooms and internal features, and any other details considered important. A series of 35 mm black-and-white photographs was completed for each structure showing its overall form, individual rooms, construction details, and the relationship of features with other architectural elements. In addition, photographs (including 35 mm color slides), were taken at the discretion of the site supervisor documenting the excavation process.

Features. Features constituted individual provenience units and were assigned sequential numbers as they were encountered at a site. Feature numbers were recorded on a Feature Log and feature excavation information was recorded on a Feature Form that described, in detail, feature shape, content, use history, construction detail, and inferred function. All features were photographed (using 35 mm black-and-white film), documenting the excavation process. Other photographs (35 mm color slides and digital images) were taken at the discretion of the excavator to document construction detail or in situ remains.

Features less than 2 m (6.6 ft) in diameter were excavated differently than features greater than 2 m (6.6 ft) in diameter. After defining the horizontal extent, features smaller than 2 m (6.6 ft) in diameter, such as a hearth or ash pit, were bisected. To efficiently define internal stratigraphy, one half of the feature was excavated in a single full-cut level and the fill was screened using 1/8-inch mesh. Once removed, a scale profile of the internal strata was drawn. Fill from the second half was removed by the defined internal strata. Flotation and pollen samples were recovered from each associated stratum and remaining soil from those strata was also screened through 1/8-inch mesh. After all the fill was removed, a second cross section perpendicular to the soil profile was drawn illustrating the feature's vertical morphology. In addition, a scale plan was drawn of the feature showing the grid location, size, and location of the profile lines.

Features greater than 2 m (6.6 ft) in diameter were not excavated using the same methods applied to features smaller than 2 m in diameter. Features greater than 2 m in diameter were excavated by grid unit. The number of excavated grid units was kept to a minimum and excavated by defined soil strata whenever possible. A sample of the feature fill, in this case from one or more grid units, was screened through 1/8-inch mesh to evaluate the nature of the cultural material; otherwise 1/4-inch mesh was used, particularly if the feature fill was determined to be the result of post abandonment site formation processes. At least two perpendicular scale profiles were drawn, and forms that describe, in detail, the shape and content were completed.

Extramural excavation areas. Areas outside structures and around thermal features like hearths, were often used as work zones. These areas were investigated to determine whether material remains were present and, if possible, what types of activities were performed there. Excavation in these zones proceeded by grid unit. Most soil encountered during these investigations was screened through 1/4-inch mesh, though a smaller-sized mesh was used to sample certain areas or to recover artifacts consistently smaller than 3 inches. Plans of each investigated extramural area were drawn, detailing the excavation limits and location of any features.

Sensitive materials. This category pertains to the discovery of culturally sensitive materials or objects of religious importance. Although we prepared a plan for treatment and disposition of human remains and religious objects, they were not encountered at any site investigated as part of this project. Burials, if encountered during data recovery investigations, would have been handled in accordance with the *Navajo Nation Policy for the Protection of Jishchaa': Gravesites, Human Remains, and Funerary Items* (8 February 1996 revision), the *Native American Graves Protection and Repatriation Act, and the Museum of New Mexico's Policy on Collection*, and *Display and Repatriation of Culturally Sensitive Materials*. Field excavation personnel would have followed the procedures outlined in section VII, C of the Navajo Nation policy. These include notification of the Navajo Nation Historic Preservation Department (NNHPD) upon the discovery of human remains, consultation on reburial location and specific treatment, disinterment, and reinterment of both human remains and any associated funerary objects. No samples would have be taken from the burial, and documentation and field cleaning would have been limited to basic descriptive reporting. Photographs would have been taken of funerary objects only for the management needs of NNHPD. The location of the reburial site and all documentation of the human remains would then be turned over to the NNHPD.

Laboratory Procedures

All artifacts and samples collected as part of these data recovery investigations were returned to the OAS offices and laboratories in Santa Fe, New Mexico, for analysis and for distribution to specialists. In general, most materials were cleaned in preparation for analysis. Ceramics were analyzed in accordance with standard practices for Anasazi collections in the region (such as Blinman 1997d; Blinman et al. 1984; Goff and Reed 1996b; Wilson 1988). Tradition and typology assignments followed the precedents set by Goetze and Mills (1993), Goff and Reed (1996a), and Wilson (1997). Technological attributes of temper, slip, surface manipulation, and paint were observed and recorded, along with vessel form and any evidence of use or modification. These attributes were used to support dating, functional interpretations, and exchange inferences necessary for addressing the goals of the research design.

Flaked and ground stone artifacts were analyzed following guidelines of the OAS *Standardized Lithic Artifact Analysis Manual* (OAS Staff 1994a) and *Standardized Ground Stone Artifact Analysis Manual* (OAS Staff 1994b). These analysis systems record information on raw material classification and form, production technology, maintenance, morphology, and use. These observations helped to support inferences related to function, mobility, and exchange presented in the research design.

Animal bone identifications were carried out using OAS and University of New Mexico comparative collections. Observations included taxonomy, body part, age, and evidence of processing including butchering, breakage, and heat alteration. This information offered data used to make inferences on hunting catchments and strategies, seasonality, butchering practices, and the intensity of nutrition extraction. These were then used to address important elements of the research goals pertaining to site function, mobility, and interaction.

Plant materials were collected that included macrobotanical samples, flotation samples, and pollen samples. Macrobotanical samples were submitted to the OAS Ethnobotany Laboratory for identification. In addition, collected flotation samples were processed at the OAS, and selected samples were submitted to the Ethnobotany Laboratory for either full sorting or analysis. Cultivars were identified and submitted to a detailed analysis intended to provide information on crop varieties. Seeds, fruits, and wood were identified to the most specific taxa possible. Charring and other characteristics were recorded to support inferences of cultural vs. natural origin for the materials.

Pollen samples were selected for submission to a specialist for analysis. Samples were processed after doping with a known quantity of tracer spores so that abundance could be quantified in absolute terms. Depending on the proveniences characteristics, some samples were submitted for economic taxa scans while others were submitted for full taxa analysis. Together, plant materials and pollen provided information useful for the describing local and regional vegetation, foodstuffs, food preparation techniques, and fuel use. This information was used to support a range of inferences contributing to the research goals, specifically diet, site function, economic catchment size, and seasonality.

Chronometric samples were selected and prepared for shipment to specialists for evaluation and dating. Tree-ring samples were submitted to the Laboratory of Tree-Ring Research at the University of Arizona for taxonomic identification and dating. Archaeomagnetic samples were processed at the OAS Archaeomagnetic Dating Laboratory. Radiocarbon samples selected for analysis were submitted first to the OAS Ethnobotany Laboratory for taxonomic identification, and then the appropriate materials were submitted for radiocarbon assay to Beta Analytic, Inc. Assays were by standard counting techniques and by accelerator mass spectrometry, warranted by the amount of material available for analysis.

After all archaeological materials were studied, analytical data were merged with proveniences and mapping data providing a data base for spatial analysis. Data were managed and analyzed in Statistical Package for the Social Sciences (SPSS) which facilitated statistical analysis and the creation of tables, charts, and graphs for display purposes. Certain types of data were aggregated, such as ceramic type, ware, or form, by weight or count and transferred to Surfer for generating density plots. Density plots were useful for isolating different temporal components, activity areas, and midden features. These plots were also helpful for interpreting intramural space use and structure function.

5 | Data Recovery at LA 32964 (NM-Q-18-123)

LA 32964 is a large multicomponent site situated on gentle southeast-facing slope along the eastern margin of the Chuska Valley overlooking Tohatchi Flats (see Fig. 2.1). Evidence for a Basketmaker II logistical camp, a Basketmaker III/early Pueblo I activity area, and a Pueblo II–early Pueblo III unit pueblo are present at this loca tion. Most of the site surface has been affected by eolian activity, including deflation of large areas to bedrock and both active and stabilized dunes. Deposits within the stabilized areas appear have a maximum depth of 1 m. These deposits may be obscuring additional cultural remains outside the proposed construction zone.

In addition to natural surface modification, at least five utilities, two active roads, and a single abandoned road are located within the site boundary. Utilities include three telephone cables, one telephone pole, and an abandoned pipe line. Active roads within the site limit include US 666 and a smaller two-track road located near the eastern site boundary. Abandoned roads located within the project area include "the old Crownpoint Road" located along the northern site boundary.

LA 32964 was originally recorded by the Bureau of Reclamation Albuquerque Area Office (ALB-158) in 1978 (Ferguson 1978) and re-recorded by the Navajo Nation Archaeology Department in 1994 (Francisco 1994). Francisco reported this site as a Pueblo I–III habitation area consisting of a low rubble mound associated with an artifact scatter. In addition, Francisco identified a deflated thermal feature, two nondescript sandstone concentration interpreted as a buried structure, and a light to moderate artifact scatter associated with these features. Diagnostic decorated ceramic types identified by Francisco included Gallup Black-on-white, Puerco/Escavada Black-on-white, and Wingate Black-on-red. The lithic assemblage consisted of limited amounts of silicified wood debitage and one projectile point. Ground stone was limited to a single two-hand mano and few non-diagnostic ground stone fragments.

The site, as originally defined, covered 16,000 sq m (172,222.6 sq ft). Upon reexamination of the site surface during data recovery investigations, the site boundary was expanded to include additional artifacts and features (29,000 sq m [312,153.4 sq ft]). For management purposes, the northeastern site limit was arbitrarily defined along a two-track road. Although artifacts were observed beyond this artificial boundary, they were widely dispersed. Reexamination of the rock concentrations and thermal feature identified by Francisco determined that these were noncultural manifestations located along the old Crownpoint road. Data recovery investigations confirmed the presence of the Pueblo II–III period habitation area and identified a robust Basketmaker II component. The proposed project area included the existing right-of-way which was expanded 50 ft (15 m) to the east. The majority of the site was located east of this proposed construction zone. In addition, evidence of Basketmaker III and early Navajo occupation are also present, particularly outside the project area (Fig. 5.1). A total of 70 individuals, including Malcolm Brenner of the *Gallup Independent* newspaper, visited the site during data recovery investigations.

Data recovery investigations began with an intensive surface examination from which an instrument map was produced illustrating the expanded site limit, proposed construction zone, and other surface manifestations. Surface artifacts located outside the proposed project area were sampled through in-field analysis using a series of 3 m diam-

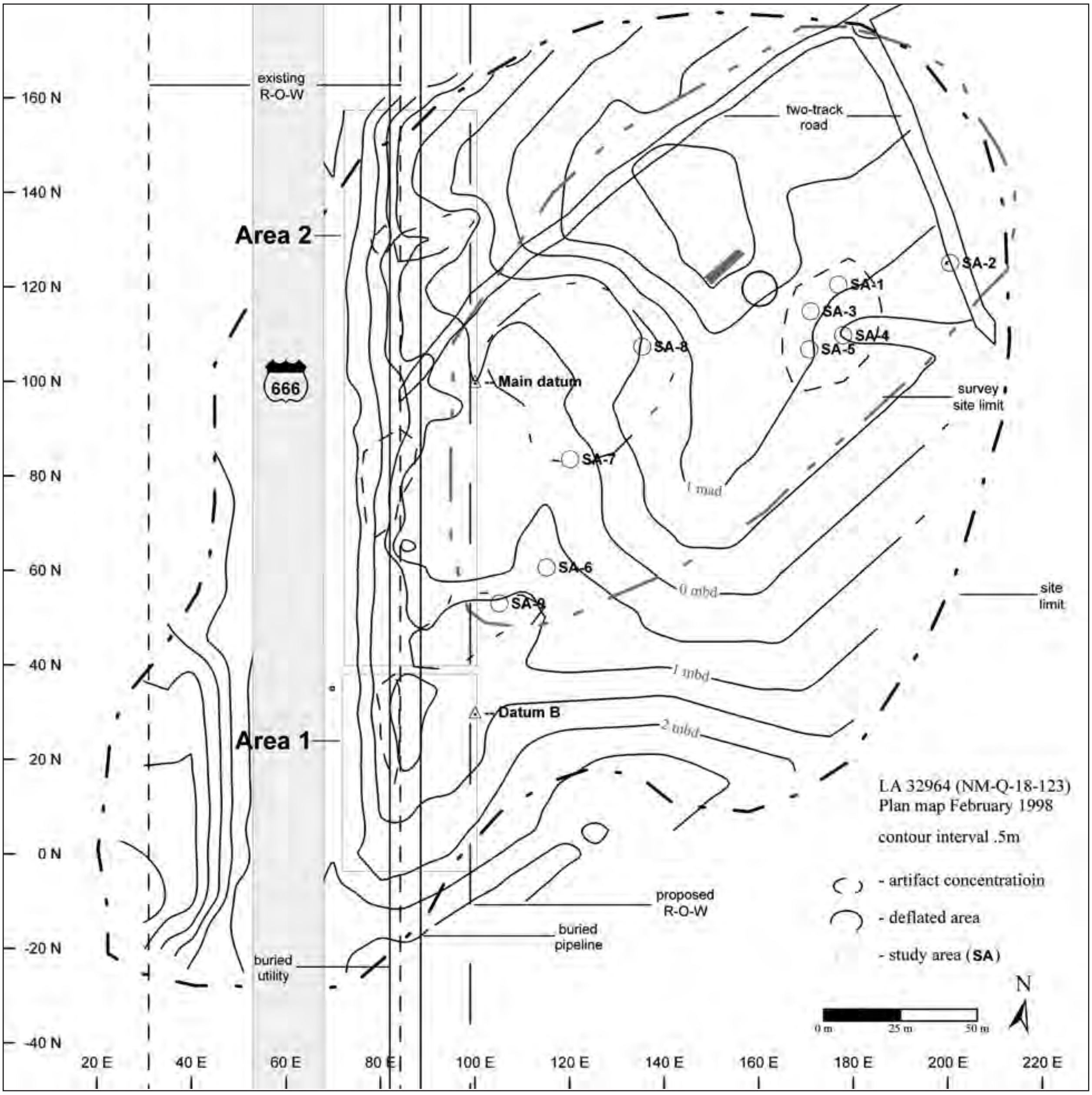


Figure 5.1. Site plan, LA 32964.

eter sample areas. In addition, a series of auger tests were conducted outside the proposed project area to verify the presence of any subsurface architecture associated with the Pueblo-period room block. Photographs were taken to document the setting prior to excavation (Fig. 5.2).

Due to the linear nature of the project area, a 1 by 1 m grid system was established parallel to the existing right-of-way, 14 degrees west of magnetic north. Horizontal control for data recovery efforts was maintained relative to a main datum located just east of the proposed construction zone as was vertical control in most cases. Exceptions include auger tests and exploratory grid units where vertical control was maintained relative to the modern ground surface. A grid north–south baseline was established at 5 m (16.4 ft) intervals from the main datum (Fig. 5.3). This facilitated the collection of surface artifacts within the proposed construction zone in 1 by 1 m grid units.

Figure 5.2. LA 32964 before excavation.

Results

Data recovery investigations resulted in the identification of four temporal components including Basketmaker II, late Pueblo II to early Pueblo III, and a dispersed artifact scatter containing Basketmaker III to Pueblo I and ethnohistoric Navajo ceramic types. In all, 64 1 by 1 m grid units and 105 systematic auger tests were used to define the extent, nature, and depth of the subsurface deposits. Fill from auger tests and exploratory grid units was removed in 10 cm levels to a maximum depth of 50 cm below modern ground service and screened through 1/4-inch mesh.

Intact cultural deposits within the proposed project area were associated with an early Basketmaker II occupation interpreted as a logistical camp. Designated Study Unit (SU) 1, these intact deposits were located south of the 40N base line. SU 2, located north of this base line, did not contain intact cultural deposits. SU 3 encompassed all fieldwork conducted outside the proposed project area. Artifacts and samples recorded or collected during data recovery investigations at LA 32964 totaled 5,610 (Table 5.1).

Although no intact Basketmaker III–Pueblo I deposits were identified during data recovery investigations within the project area, intact deposits are likely present outside the project limit based on the quantity of Basketmaker III and Pueblo I ceramics identified in the sample areas of SU 3. Given the active depositional environment, the source of these surface manifestations may be buried outside the proposed project area or masked by the later Pueblo-period habitation unit.

Stratigraphy

Excavation revealed a total of six stratigraphic units, four noncultural and two cultural. All noncultural strata are the result of geomorphological processes related to Quaternary climatic events and are similar if not identical to the geomorphological sum-

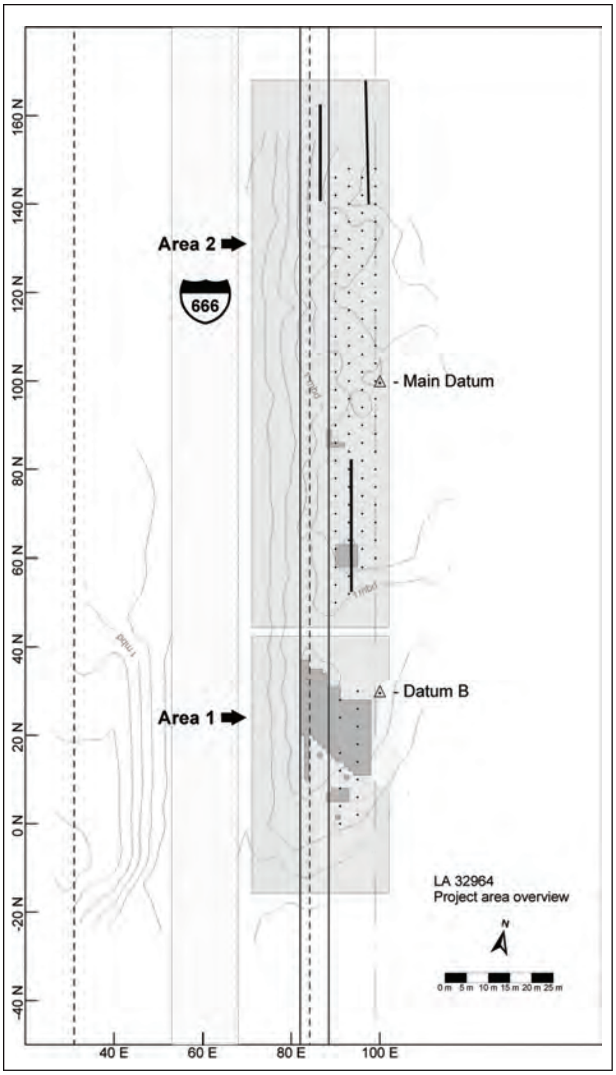


Figure 5.3. Plan of project area, LA 32964.

maries presented by Sant and others (1999) for the Mexican Springs area.

Stratum 1 was a modern, noncultural deposit that forms a 25 to 40 cm mantle over the entire project area. This homogeneous layer consisted of a post-occupation eolian deposit of very pale brown (10YR 7/3 dry) loose, silty loam. The stratum had been stabilized in some areas by vegetation and displayed evidence of cross bedding. Inclusions of small gravel, artifacts, and charcoal flecks were present in very low frequencies. Diagnostic artifacts associated with this layer included ceramics representative of the Basketmaker III, Pueblo, and historic Navajo periods

Stratum 2 was a discontinuous, noncultural deposit similar to the Upper Nakaibito formation described by Sant and others (1999). This homogeneous layer had a maximum thickness of 30 cm and consisted of a yellowish brown (10YR 5/4 dry) silty sand with inclusions of small gravel, artifacts, and charcoal flecks present in low frequencies. The boundary between Stratum 1 and Stratum 2 was clear and wavy. Diagnostic artifacts associated with this layer included ceramics representative of the Basketmaker III and Pueblo periods.

Stratum 3 was a discrete cultural deposit limited to a 6 by 6 m (19.7 by 19.7 ft) area within SU 1 (Feature 1). Tus layer of charcoal-impregnated soil had a maximum thickness of 25 cm. The deeply stained soil in the 4 by 4 m (13.1 by 13.1 ft) core of the feature graded to a faint halo around the perimeter. The boundary with Stratum 2 ranged from abrupt and wavy to smooth and diffuse, particularly in areas where the stain had migrated away from the core. Inclusions consisted of small gravel and numerous lithic, faunal, and macrobotanical remains. This deposit appears to have been the result of numerous depositional events associated with multiple occupations over a 600-year period before the subsequent Basketmaker III and Pueblo-period occupations.

Stratum 4 was a continuous, noncultural deposit similar to the Lower Nakaibito Formation described by Sant and others (1999). This homogeneous layer had a maximum thickness of 60 cm and consisted of a pale brown (10YR 6/3 dry) silty sand with inclusions of small gravel, sandstone spalls, artifacts, and charcoal flecks that gradually become less abundant with increased distance from Stratum 3. The sandstone spalls appear to have originated from the underlying bedrock surface. The boundary between Stratum 4 and Stratum 2 was clear and wavy as was the boundary between Stratum 4 and Stratum 3, in densely stained areas. This layer represents the old ground surface (OGS) of a Basketmaker II occupation.

Diagnostic artifacts associated with this layer included En Medio and Cochise style projectile points. The identification of a Basketmaker II occupation embedded in Lower Nakaibito Alluvial deposits support the observation by Sant and others (1999) that this deposit was formed prior to ceramic Basketmaker occupation of this area.

Stratum 5 was a deposit of noncultural sediment present across the entire project area, similar to

Table 5.1. LA 32964, artifact type by collection method and study unit.

			Artifact Type						
Study Unit	Study Unit Subdivision		Ceramic	Lithic	Ground Stone	Bone	Eggshell	Macro-botanical	Table Total
1	Feature	Count	–	789.00	19.00	240.00	–	1917.00	**2965.00**
		Row %	–	26.61	0.64	8.09	–	64.65	**100.00**
		Col %	–	28.27	76.00	53.57	–	98.51	**52.85**
	Point provenience	Count	–	14.00	5.00	–	–	–	**19.00**
		Row %	–	73.68	26.32	–	–	–	**100.00**
		Col %	–	0.50	20.00	–	–	–	**0.34**
	1x1 grid unit	Count	25.00	1941.00	–	167.00	3.00	29.00	**2165.00**
		Row %	1.15	89.65	–	7.71	0.14	1.34	**100.00**
		Col %	6.30	69.54	–	37.28	100.00	1.49	**38.59**
	Group Total	**Count**	**25.00**	**2744.00**	**24.00**	**407.00**	**3.00**	**1946.00**	**5149.00**
		Row %	**0.49**	**53.29**	**0.47**	**7.90**	**0.06**	**37.79**	**100.00**
		Col %	**6.30**	**98.32**	**96.00**	**90.85**	**100.00**	**100.00**	**91.78**
2	1x1 grid unit	Count	81.00	40.00	1.00	41.00	–	–	**163.00**
		Row %	49.69	24.54	0.61	25.15	–	–	**100.00**
		Col %	20.40	1.43	4.00	9.15	–	–	**2.91**
	Group Total	**Count**	**81.00**	**40.00**	**1.00**	**41.00**	–	–	**163.00**
		Row %	**49.69**	**24.54**	**0.61**	**25.15**	–	–	**100.00**
		Col %	**20.40**	**1.43**	**4.00**	**9.15**	–	–	**2.91**
3	Sample area	Count	291.00	7.00	–	–	–	–	**298.00**
		Row %	97.65	2.35	–	–	–	–	**100.00**
		Col %	73.30	0.25	–	–	–	–	**5.31**
	Group Total	**Count**	**291.00**	**7.00**	–	–	–	–	**298.00**
		Row %	**97.65**	**2.35**	–	–	–	–	**100.00**
		Col %	**73.30**	**0.25**	–	–	–	–	**5.31**
Table Total		**Count**	**397.00**	**2791.00**	**25.00**	**448.00**	**3.00**	**1946.00**	**5610.00**
		Row %	**7.08**	**49.75**	**0.45**	**7.99**	**0.05**	**34.69**	**100.00**
		Col %	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

the Gamerco Paleosol described by Sant and others (1999). This deposit consisted of light brownish gray (10YR 6/2 dry) weathered, laminated clay and light gray (10YR 7/2 dry) sandstone bedrock. The boundary between Stratum 5 and Stratum 4 was abrupt and irregular with isolated pockets of Stratum 3 identified in the core area of Feature 1.

Stratum 6 was an isolated cultural deposit, lightly charcoal-stained soil limited to a 1 by 1 m area located in the southern portion of SU 1. This mottled light gray (10YR 7/2 dry) deposit contained small gravel and few lithic artifacts.

Study Unit 1

Excavations within Study Unit (SU) 1 were initially conducted to identify the source of a dense lithic artifact concentration located within the existing right-of way. Units excavated to a maximum depth of 10 cm below modern ground surface produced cultural material including ceramics, lithics, and charcoal flecks. The quantity and variety of material recovered indicated intact cultural deposits were present. Seven 1 by 1 m grid units and 13 auger tests were conducted within the proposed project area to locate and evaluate the extent of any intact cultural deposits.

Five of seven test units and one auger test produced cultural material down to bedrock, 90 cm below modern ground surface. An intact cultural horizon was clearly visible, located between 40 and 60 cm below modern ground surface. This horizon was represented by a layer of lightly stained sediment associated with increased artifact counts. Test trenches were expanded north then east, to define the limits of this deposit. These units exposed a layer of charcoal-stained soil measuring 6 by 6 m across, located, on average, 50 cm below modern ground surface. This layer resembled feature fill and was sampled using 1/8-inch hardware cloth. Unit 24N/93E, Level 5 (40–50 cm below modern ground surface), produced a significant quantity of small cultural material including late stage lithic debitage, burned bone, and burned macrobotanical remains. Based on these systematic investigations, this layer was designated Feature 1, Stratum 3. The overlying strata, Stratum 1 and Stratum 2, were determined to be the result of post-abandonment processes. Samples of the materials associated with these upper strata were collected by excavating a total of 18 sq m (193.7 sq ft) by stratigraphic layer, thus exposing a large portion of Feature 1.

Based on the extent and depth of the cultural deposit, mechanical equipment was used to remove between 30 and 50 cm of the overlying deposits to define the limits of the cultural horizon within the proposed construction zone (Fig. 5.4). Following mechanical excavations, horizontal and vertical control points were re-established and hand excavations resumed. All fill was removed in 1 by 1 m grid units and screened through 1/8-inch hardware cloth. Hand excavations recovered 5,149 artifacts (Table 5.2) and identified a total of 13 cultural features (Fig. 5.5). Following the completion of hand excavations, mechanical equipment was used to remove 50 to 120 cm of noncultural sediment from unexcavated portions of SU 2; however, no additional cultural materials were observed within the proposed construction zone. During this process inadvertent scraping outside the proposed project area in SU 1 uncovered five additional cultural features. The location of these remains were mapped and then protected by a layer of backfill (Fig. 5.6).

Features. In all, 13 features were excavated during data recovery investigations at LA 32964, SU 1. Feature types included an unlined pit, thermally altered pits, ground stone caches, rock concentrations, and a midden or discard area (Table 5.3).

Feature 1 was the largest feature identified in Study Area 1 and represents the accumulation of

Figure 5.4. After mechanical removal of overlying deposits, Study Unit 1, LA 32964.

Table 5.2. LA 32964, Study Unit 1, artifact type by proveniences and collection method.

			Artifact Type						
Study Unit Subdivision	**Collection Method**		**Ceramic**	**Lithic**	**Ground Stone**	**Bone**	**Egg-shell**	**Macro-botanical**	**Table Total**
Feature	screened (1/4")	Count	–	28.00	–	2.00	–	2.00	**32.00**
		Row %		87.50		6.25		6.25	**100.00**
		Col. %		1.02		0.49		0.10	**0.62**
	screened (1/8")	Count	–	737.00	–	220.00	–	932.00	**1889.00**
		Row %		39.02		11.65		49.34	**100.00**
		Col. %		26.86		54.05		47.89	**36.69**
	screened (< 1/8")	Count	–	1.00	–	–	–	902.00	**903.00**
		Row %		0.11				99.89	**100.00**
		Col. %		0.04				46.35	**17.54**
	In situ	Count	–	8.00	19.00	–	–	–	**27.00**
		Row %		29.63	70.37				**100.00**
		Col. %		0.29	79.17				**0.52**
	flotation	Count	–	15.00	–	18.00	–	81.00	**114.00**
		Row %		13.16		15.79		71.05	**100.00**
		Col. %		0.55		4.42		4.16	**2.21**
Point provenience	In situ	Count	–	14.00	5.00	–	–	–	**19.00**
		Row %		73.68	26.32				**100.00**
		Col. %		0.51	20.83				**0.37**
1x1 grid unit	intensive surface collection	Count	10.00	12.00	–	–	–	–	**22.00**
		Row %	45.45	54.55					**100.00**
		Col. %	40.00	0.44					**0.43**
	screened (1/4")	Count	14.00	764.00	–	52.00	–	–	**830.00**
		Row %	1.69	92.05		6.27			**100.00**
		Col. %	56.00	27.84		12.78			**16.12**
	screened (1/8")	Count	1.00	1165.00	–	115.00	3.00	29.00	**1313.00**
		Row %	0.08	88.73		8.76	0.23	2.21	**100.00**
		Col. %	4.00	42.46		28.26	100.00	1.49	**25.50**
Table Total		**Count**	**25.00**	**2744.00**	**24.00**	**407.00**	**3.00**	**1946.00**	**5149.00**
		Row %	**0.49**	**53.29**	**0.47**	**7.90**	**0.06**	**37.79**	**100.00**
		Col. %	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

secondary refuse resulting from multiple occupations. This deposit measured 7.2 m north–south by 5.6 m east–west and ranged between 1 and 35 cm thick, and was positioned over exposed bedrock south and adjacent to a low sandstone escarpment (Fig. 5.7). The feature was composed of two parts: a central core area that grades into a peripheral area. The central area of the feature measured 5 m north–south by 3.75 m east–west and was defined by dense, charcoal-stained soil and high frequencies of material remains. Moving away from this core area, in all directions, the cultural deposits thin out, effectively forming a halo surrounding the central deposit (Fig. 5.8).

Feature 1 contained an abundant amount of cultural material accounting for just over 34 percent of all remains collected from SU 1 (Table 5.4). Lithic, bone, and macrobotanical remains were the dominant artifact categories with a mano and two metate fragments noted (Table 5.5). The metate fragment (PP 23) refits with a piece recovered from Feature 12 (PP 38). In most cases the remains recovered from Feature 1 were small, fragmentary, and burned. This was especially true for bone and macrobotanical artifact categories.

Lithic artifacts consisted primarily of debitage derived from local and nonlocal material types (Table 5.6). Artifact morphology was dominated by flake fragments (31 percent) followed by nearly equal percentages of biface flakes (20 percent) and

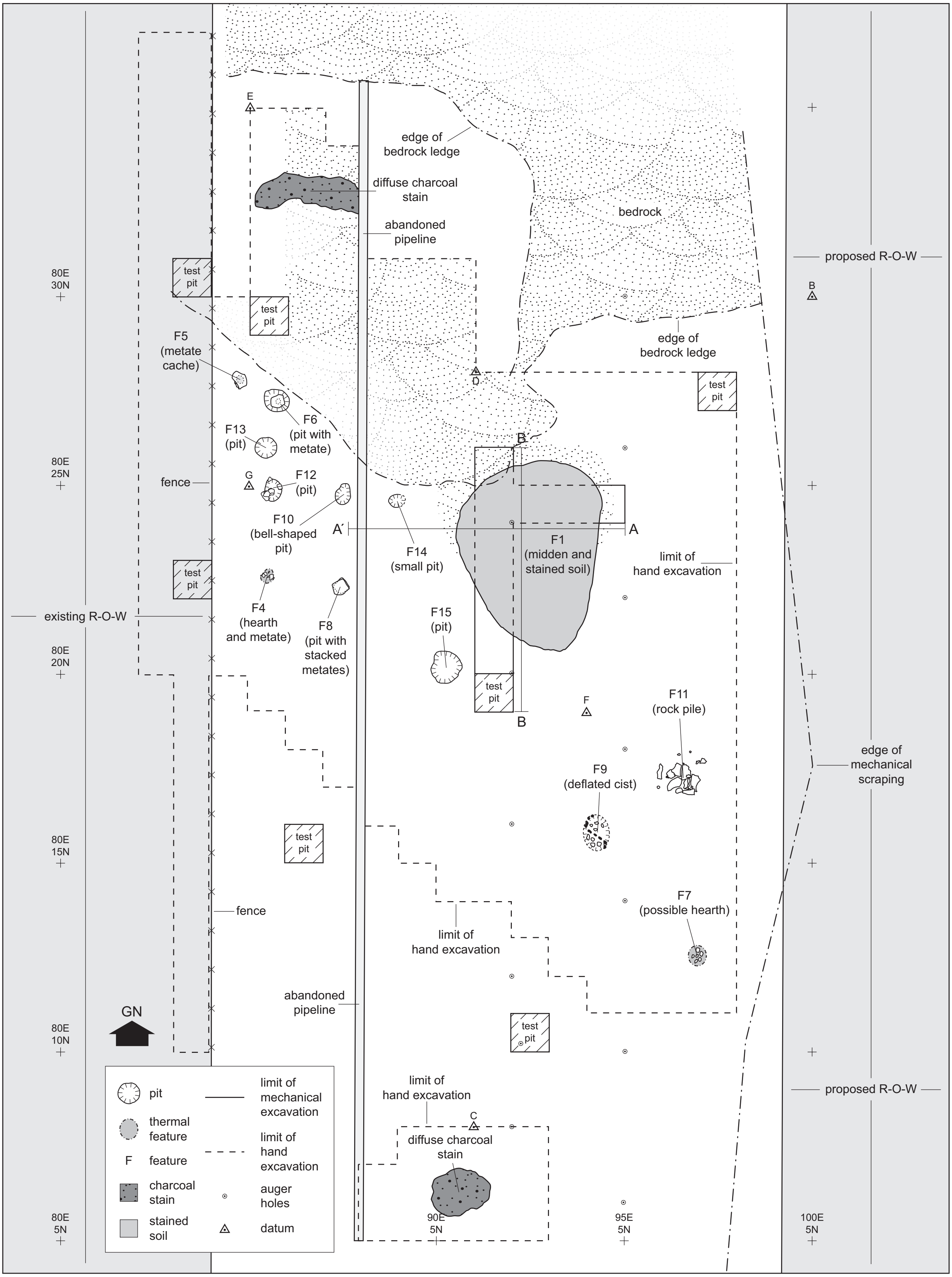


Figure 5.5. Study Unit 1, LA 32964, after hand excavation.

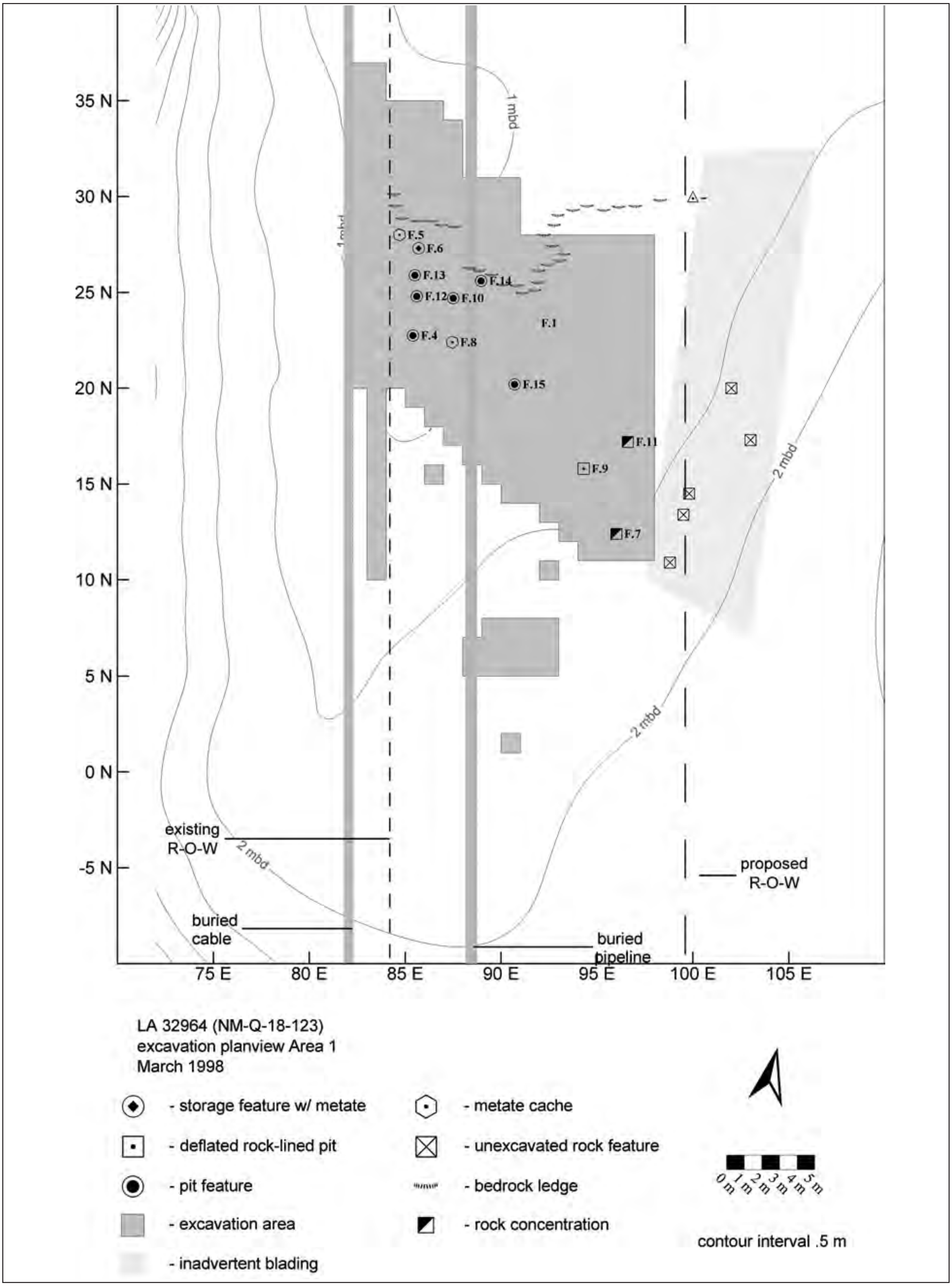


Figure 5.6. Study Unit 1, LA 32964, after additional mechanical blading.

Table 5.3. LA 32964, feature summary table.

Feature	Feature Type	Location[1]	Size (m)	Fill	Contents	Date[2]	Comments
1	Midden	23.50N/ 92.20E	N–S 3.90 x E–W 4.0 x .35 deep (core area)	Feature core homogeneous layer of charcoal impregnated soil grading to a faint halo where the stain has migrated away from the core. (Munsell 10YR 4/1 dark gray).	Numerous lithic, faunal, and macro-botanical remains	390 BC; *atriplex* 800 BC; *atriplex* 400 BC; *atriplex*	Deposit positioned over natural depression in sandstone bedrock
4	Thermally altered pit	22.75N/ 85.40E	N–S .42 x E–W .40 x .10 deep	Organic, sandy loam with inclusions of charcoal and sandstone (Munsell 10YR 5/2 grayish brown)	Ground stone	500 BC, 460 BC; and 430 BC; *atriplex*	Shallow-sided basin
5	Metate cache	28.00N/ 84.70E	N–S .56 x E–W .48 x .10 deep	N/A	Ground stone	N/A	Cache of stacked metates
6	Pit w/ cached metate	27.30N/ 85.70E	N–S .70 x E–W .70 x .25 deep	Loose, silty loam with charcoal staining. (Munsell 10YR 5/2 grayish brown).	Bone, lithics and ground stone	520 BC; *atriplex*	Shallow-sided, bell-shaped feature with cached metate
7	Rock concen-tration	12.40N/ 96.00E	N–S .50 x E–W .50 x 0.1	(Munsell 10YR 5/4) yellowish brown silty sand	N/A	N/A	Concentration of sandstone cobbles
8	Metate cache	22.40N/ 87.45E	N–S .38 x E–W .36	Thin organic layer between metates.	1 lithic and 2 ground stone.	N/A	Cache of stacked metates
9	Partially deflated cist?	15.80N/ 94.30E	N–S .98 x E–W .64 x .19 deep	Dark gray stain mixed with a consolidated, dry, silty sand. (Munsell 10YR 5/4 yellowish brown)	Ground stone construct-ion elements (18), 11 bone, 5 corn cobs, and 7 lithics	790 BC; *Zea mays*	Steep-sided, basin-shaped feature with sandstone slabs lining the edge
10	Thermally altered pit	24.70N/ 87.50E	N–S .64 x E–W .49 x .23 deep	Sandy, loam with charcoal (Munsell 10YR 6/4 dark grayish brown).	5 lithics	760 BC, 640 BC; and 560 BC; *atriplex*	Steep-sided, bell-shaped feature.
11	Rock concen-tration	17.20N/ 96.60E	N–S 90 x E–W 134 x .5 deep	N/A	Ground stone	N/A	Rock concentration with ground stone
12	Pit	24.80N/ 85.60E	N–S .66 x E–W .58 x .29 deep	Layer I: Silty sand (Munsell 10YR 5/4 yellowish brown dry). Layer II: silty sand with charcoal staining and mottles (Munsell 10YR 3/2 very dark grayish brown).	6 lithics and 3 ground stone fragments	820 BC; *atriplex*	Steep-sided, basin-shaped feature

(Table 5.3, continued)

Feature	Feature Type	Location[1]	Size (m)	Fill	Contents	Date[2]	Comments
13	Pit	25.80N/ 85.80E	N–S .61 x E–W .59 x .22 deep	Layer I: loose, silty, loam charcoal-stained soil (Munsell 10YR 4/2 dark grayish brown). Layer II: loose, silty sand with occasional charcoal flecks (Munsell 10YR 6/4 light yellowish brown).	Lithics, corn kernels and burned bone	750 BC, 700 BC; and 540 BC; *atriplex*	Shallow-sided, basin-shaped feature
14	Pit	25.60N/ 88.95E	N–S .31 x E–W .30 x .22 deep	Sandy loam with charcoal and sandstone fragments (Munsell 10YR 4/2 dark grayish brown).	2 lithics and 1 ground stone.	420 BC; *atriplex*	Shallow-sided, bell-shaped feature
15	Thermally altered pit	20.20N/ 90.20E	N–S .78 x E–W .75 x .12 deep	Compact to loose, fine brown, sandy loam with charcoal staining (Munsell 10YR 6/4 dark grayish brown).	2 lithics	760 BC, 640 BC; and 560 BC; *atriplex*	Shallow-sided, basin-shaped feature

[1]Feature center point
[2]Beta Analytic calibrated intercept data and dated material

Figure 5.7. Feature 1, LA 32964, after excavation.

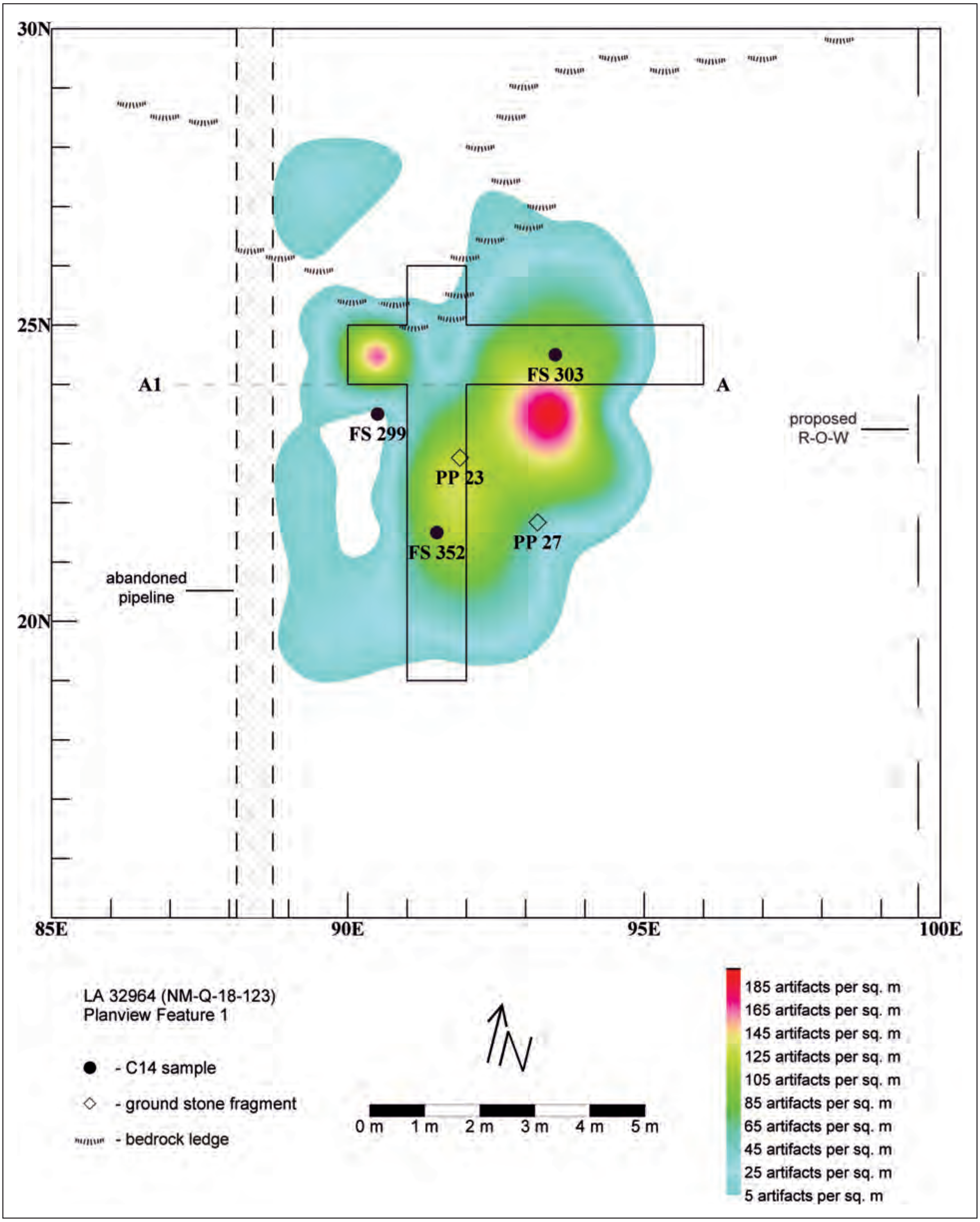


Figure 5.8. Plan of Feature 1, LA 32964.

Table 5.4. LA 32964, Study Unit 1, artifact type by feature number and type.

			Artifact Type						
Feature	**Feature Type**		**Ceramic**	**Lithic**	**Ground Stone**	**Bone**	**Egg-shell**	**Macro-botanical**	**Table Total**
0	Extramural area	Count	22	1990	3	161	3	29	**2208**
		Row %	1.00	90.13	0.14	7.29	0.14	1.31	**100.00**
		Col. %	100.00	72.55	12.50	39.56	100.00	1.49	**42.92**
1	Midden	Count	–	641	3	221	–	904	**1769**
		Row %		36.24	0.17	12.49		51.10	**100.00**
		Col. %		23.37	12.50	54.30		46.45	**34.38**
4	Thermally altered pit	Count	–	2	–	–	–	62	**64**
		Row %		3.13				96.88	**100.00**
		Col. %		0.07				3.19	**1.24**
5	Ground stone cache	Count	–	1	4	–	–	–	**5**
		Row %		20.00	80.00				**100.00**
		Col. %		0.04	16.67				**0.10**
6	Storage facility	Count	–	7	1	3	–	157	**168**
		Row %		4.17	0.60	1.79		93.45	**100.00**
		Col. %		0.26	4.17	0.74		8.07	**3.27**
7	Indeterminate cultural feature	Count	–	6	–	5	–	–	**11**
		Row %		54.55		45.45			**100.00**
		Col. %		0.22		1.23			**0.21**
8	Ground stone cache	Count	–	1	1	–	–	–	**2**
		Row %		50.00	50.00				**100.00**
		Col. %		0.04	4.17				**0.04**
9	Cist, not further specified	Count	–	10	8	11	–	3	**32**
		Row %		31.25	25.00	34.38		9.38	**100.00**
		Col. %		0.36	33.33	2.70		0.15	**0.62**
10	Thermally altered pit	Count	–	10	1	–	–	195	**206**
		Row %		4.85	0.49			94.66	**100.00**
		Col. %		0.36	4.17			10.02	**4.00**
11	Indeterminate cultural feature	Count	–	28	1	1	–	–	**30**
		Row %		93.33	3.33	3.33			**100.00**
		Col. %		1.02	4.17	0.25			**0.58**
12	Thermally altered pit	Count	–	22	2	2	–	259	**285**
		Row %		7.72	0.70	0.70		90.88	**100.00**
		Col. %		0.80	8.33	0.49		13.31	**5.54**
13	Thermally altered pit	Count	–	22	–	3	–	189	**214**
		Row %		10.28		1.40		88.32	**100.00**
		Col. %		0.80		0.74		9.71	**4.16**
14	Thermally altered pit	Count	–	2	–	–	–	81	**83**
		Row %		2.41				97.59	**100.00**
		Col. %		0.07				4.16	**1.61**
15	Thermally altered pit	Count	–	1	–	–	–	67	**68**
		Row %		1.47				98.53	**100.00**
		Col. %		0.04				3.44	**1.32**
Table Total		**Count**	**25**	**2744**	**24**	**407**	**3**	**1946**	**5149**
		Row %	**0.49**	**53.29**	**0.47**	**7.90**	**0.06**	**37.79**	**100.00**
		Col. %	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

Table 5.5. LA 32964, ground stone type and condition by feature number and type.

			Artifact Category					
Feature	**Feature Type**		**Ground Stone Fragment (nfs)**	**Mano Fragment**	**Metate Fragment**	**Metate**	**Grinding Slab**	**Table Total**
0	Extramural area	Count	2	–	1	–	–	**3**
		Row %	66.67		33.33			**100.00**
		Col. %	25.00		10.00			**12.50**
1	Midden	Count	–	1	2	–	–	**3**
		Row %		33.33	66.67			**100.00**
		Col. %		100.00	20.00			**12.50**
5	Ground stone cache	Count	2	–	–	2	–	**4**
		Row %	50.00			50.00		**100.00**
		Col. %	25.00			50.00		**16.67**
6	Storage facility	Count	–	–	–	1	–	**1**
		Row %				100.00		**100.00**
		Col. %				25.00		**4.17**
8	Ground stone cache	Count	–	–	–	1	–	**1**
		Row %				100.00		**100.00**
		Col. %				–		**4.17**
9	Cist, not further specified	Count	3	–	4	-	1	**8**
		Row %	37.50		50.00		12.50	**100.00**
		Col. %	37.50		40.00		100.00	**33.33**
10	Thermally altered pit	Count	1	–	–	–	–	**1**
		Row %	100.00					**100.00**
		Col. %	12.50					**4.17**
11	Indeterminate cultural feature	Count	–	–	1	–	–	**1**
		Row %			100.00			**100.00**
		Col. %			10.00			**4.17**
12	Thermally altered pit	Count	–	–	2	–	–	**2**
		Row %			100.00			**100.00**
		Col. %			20.00			**8.33**
Table Total		**Count**	**8**	**1**	**10**	**4**	**1**	**24**
		Row %	**33.33**	**4.17**	**41.67**	**16.67**	**4.17**	**100.00**
		Col. %	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

Table 5.6. LA 32964, Study Unit 1, lithic material source and material class by feature number and type.

			Lithic Source						
			Local				Nonlocal		
			Material Class						
Feature	**Feature Type**		**Silicified Wood**	**Chert**	**Sedi-mentary**	**Quartzite**	**Chert**	**Obsidian**	**Table Total**
0	Extramural area	Count	1285	391	33	11	29	241	**1990**
		Row %	64.57	19.65	1.66	0.55	1.46	12.11	**100.00**
		Col. %	74.02	67.18	80.49	78.57	65.91	73.93	**72.55**
1	Midden	Count	368	171	6	1	14	81	**641**
		Row %	57.41	26.68	0.94	0.16	2.18	12.64	**100.00**
		Col. %	21.20	29.38	14.63	7.14	31.82	24.85	**23.37**
4	Thermally altered pit	Count	–	2	–	–	–	–	**2**
		Row %		100.00					**100.00**
		Col. %		0.34					**0.07**
5	Ground stone cache	Count	1	–	–	–	–	–	**1**
		Row %	100.00						**100.00**
		Col. %	0.06						**0.04**
6	Storage facility	Count	4	2	–	1	–	–	**7**
		Row %	57.14	28.57		14.29			**100.00**
		Col. %	0.23	0.34		7.14			**0.26**
7	Indeterminate cultural feature	Count	2	2	2	–	–	–	**6**
		Row %	33.33	33.33	33.33				**100.00**
		Col. %	0.12	0.34	4.88				**0.22**
8	Ground stone cache	Count	1	–	–	–	–	–	**1**
		Row %	100.00						**100.00**
		Col. %	0.06						**0.04**
9	Cist, not further specified	Count	7	3	–	–	–	–	**10**
		Row %	70.00	30.00					**100.00**
		Col. %	0.40	0.52					**0.36**
10	Thermally altered pit	Count	9	–	–	–	1	–	**10**
		Row %	90.00				10.00		**100.00**
		Col. %	0.52				2.27		**0.36**
11	Indeterminate cultural feature	Count	22	3	–	–	–	3	**28**
		Row %	78.57	10.71				10.71	**100.00**
		Col. %	1.27	0.52				0.92	**1.02**
12	Thermally altered pit	Count	13	7	–	1	–	1	**22**
		Row %	59.09	31.82		4.55		4.55	**100.00**
		Col. %	0.75	1.20		7.14		0.31	**0.80**
13	Thermally altered pit	Count	21	1	–	–	–	–	**22**
		Row %	95.45	4.55					**100.00**
		Col. %	1.21	0.17					**0.80**
14	Thermally altered pit	Count	2	–	–	–	–	–	**2**
		Row %	100.00						**100.00**
		Col. %	0.12						**0.07**
15	Thermally altered pit	Count	1	–	–	–	–	–	**1**
		Row %	100.00						**100.00**
		Col. %	0.06						**0.04**
Table Total		**Count**	**1736**	**582**	**41**	**14**	**44**	**327**	**2744**
		Row %	**63.27**	**21.21**	**1.49**	**0.51**	**1.60**	**11.92**	**100.00**
		Col. %	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

core flakes (19 percent), angular debris (14 percent), and finally early to late stage flake stone tools. Dorsal cortex was identified on only 4 percent of the lithic artifacts recovered from Feature 1. These assemblage characteristics are consistent with the entire lithic assemblage recovered from this portion of the site (see below).

The faunal remains recovered from Feature 1 comprised approximately 13 percent of the artifacts associated with this feature. This, however, represents over 54 percent of the faunal remains recovered from all of SU 1. The assemblage was dominated by small to medium mammal and medium to large mammal. The assemblage also included rodents, cottontail, jack rabbit, and medium artiodactyl (Table 5.7). Species identification was limited because 96 percent of the faunal elements were less than 25 percent complete. Over 58 percent of the faunal remains recovered from this feature displayed evidence of thermal alteration with over 35 percent being heavily burned or calcined (Table 5.8).

Macrobotanical remains were dominated by perennial species the most common of which was greasewood/saltbush (57 percent), followed by nonconiferous wood (11 percent), and sagebrush (6 percent). low frequencies of juniper, piñon, and rose family perennial species were also identified (Table 5.9). Three charcoal samples recovered from different vertical and horizontal areas of this deposit were submitted for processing (Figure 5.8). FS 299 (Beta-164321), FS 303 (Beta-164322) and FS 352 (Beta-164324) yielded accelerated mass spectrometry (AMS) calibrated intercept dates of 390 cal BC, 800 cal BC, and 400 cal BC, respectively.

When calibrated using OxCal v3.8 Markov Chain Monte-Carlo (MCMC) Sampling method (Bronk Ramsey 2002; Stuiver et al. 1998), the FS 303 sample (Beta-164322; *Sarco/Atriplex* wood; δ^{13} = -11.8 o/oo) produced a 2-sigma date of 840-740 cal BC (p = .88). The FS 299 sample (Beta-164321; *Sarco/Atriplex* wood; δ^{13} = -11.3 o/oo) produced a single 2-sigma range of 550–350 cal BC (p = .93). Finally, the FS 352 sample (Beta-164324; *Sarco/Atriplex* wood; δ^{13} = -11.7 o/oo) produced a 2-sigma date, 550–370 cal BC (p = .92) (Table 5.10).

Based on its size, consideration was given to the possibility that Feature 1 may represent a surface or shallow pit structure since several small, contemporaneous surface structures have been identified in the surrounding area (cf. Freuden 1998b; Kearns et al. 1998a). These small structures were similar to Feature 1 in that they were relatively shallow and irregular in plan. However, unlike Feature 1, these structures contained one or more internal features. The lack of evidence for internal features coupled with the high frequency of small, fragmentary, and burned remains supports the interpretation of this deposit as a midden. The radiometric determinations and the density of burned, fragmentary remains suggest that Feature 1 is the result of multiple depositional events occurring between 840 cal BC and 370 cal BC.

Feature 2 and Feature 3 were cataloged as locations of stained sediment but upon investigation, these locations were determined to be noncultural manifestations, probably the result of rodent activity transporting charcoal-stained soil from other areas of the site.

Feature 4 was a shallow unlined basin with moderately steep sides that contained a single layer of charcoal-rich sediment (Fig. 5.9). Suspended in this layer were five small pieces of thermally altered tabular sandstone (see Table 5.3). Although charcoal was present in the fill, there was no evidence of oxidation or prolonged heat. All fill from this feature was recovered for flotation and yielded two core flakes of local chert (see Table 5.6) and a variety of botanical remains. The botanical assemblage was dominated by perennials (see Table 5.9) including saltbush (*Sarco/Atriplex*), followed by nearly equal amounts of juniper *(Juniperus),* nonconiferous wood, unknown taxon, and corn *(Zea mays*). Other taxon included ricegrass (*Oryzopsis*, n = 2, 3.2 percent), amaranth/goosefoot (*Chenopodium*, n = 2, 3.2 percent), and mountain mahogany (*Cercocarpum*, n = 3, 4.8 percent). A single charcoal sample (Beta-164325; *Sarco/Atriplex* wood; δ^{13} = -11.4 o/oo) yielded AMS calibrated intercept dates of 500 cal BC, 460 cal BC, and 430 cal BC. When calibrated using OxCal v3.8 this sample produced 2-sigma date ranges of 760–680 cal BC (p = .20), 670–400 cal BC (p = .76) (Table 5.10).

Feature 5 was a cache of ground stone tools, one of three features containing cached ground stone identified at LA 32964 (see Table 5.5). Feature 5 was comprised of four ground stone artifacts and a single lithic flake. Three ground stone slab fragments were stacked, one on top of another, on the OGS and capped with a complete basin metate (Fig. 5.10). The three ground stone slabs all refit into a

Table 5.7. LA 32964, Study Unit 1, faunal taxon group by feature number and type.

			Taxon Group										
Feature	**Feature Type**		**Domes-ticate**	**Rodent**	**Small–medium Mammal**	**Medium–large Mammal**	**Desert Cotton-tail**	**Black-tailed Jack Rabbit**	**Small–medium Artio-dactyl**	**Egg-shell**	**Small Mammal/ Medium–large Bird**	**Non-veno-mous Snake**	**Table Total**
0	Extramural area	Count	11	10	106	12	4	10	5	3	2	1	**164**
		Row %	6.71	6.10	64.63	7.32	2.44	6.10	3.05	1.83	1.22	0.61	**100.00**
		Col. %	100.00	37.04	40.00	22.22	20.00	52.63	62.50	100.00	100.00	100.00	**40.00**
1	Midden	Count	–	14	143	40	12	9	3	–	–	–	**221**
		Row %		6.33	64.71	18.10	5.43	4.07	1.36				**100.00**
		Col. %		51.85	53.96	74.07	60.00	47.37	37.50				**53.90**
6	Storage facility	Count	–	–	3	–	–	–	–	–	–	–	**3**
		Row %			100.00								**100.00**
		Col. %			1.13								**0.73**
7	Indetermi-nate cultural feature	Count	–	1	4	–	–	–	–	–	–	–	**5**
		Row %		20.00	80.00								**100.00**
		Col. %		3.70	1.51								**1.22**
9	Cist, not further specified	Count	–	2	5	–	4	–	–	–	–	–	**11**
		Row %		18.18	45.45		36.36						**100.00**
		Col. %		7.41	1.89		20.00						**2.68**
11	Indetermi-nate cultural feature	Count	–	–	–	1	–	–	–	–	–	–	**1**
		Row %				100.00							**100.00**
		Col. %				1.85							**0.24**
12	Thermally altered pit	Count	–	–	2	–	–	–	–	–	–	–	**2**
		Row %			100.00								**100.00**
		Col. %			0.75								**0.49**
13	Thermally altered pit	Count	–	–	2	1	–	–	–	–	–	–	**3**
		Row %			66.67	33.33							**100.00**
		Col. %			0.75	1.85							**0.73**
Table Total		**Count**	**11**	**27**	**265**	**54**	**20**	**19**	**8**	**3**	**2**	**1**	**410**
		Row %	**2.68**	**6.59**	**64.63**	**13.17**	**4.88**	**4.63**	**1.95**	**0.73**	**0.49**	**0.24**	**100.00**
		Col. %	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

single tool (Fig. 5.11). The single lithic artifact recovered from this location was a flake fragment of local silicified wood (see Table 5.6). A pollen sample recovered from between two of the milling stone fragments (PP 52 and PP 50) yielded evidence of *Chenopodium*/amaranth, Asteraceae, and *Artemisia,* among others (see Appendix 2). A similar feature was identified at AZ-K-7-18 (Site 442-12), which was investigated as part of the ENRON project (Redd 1994a).

Feature 6 was an unlined pit with slightly bell-shaped sides. The base of the feature consisted of friable sandstone bedrock that had been scoured to create the desired depth. Feature 6 was unburned and contained a basin metate and three small pieces of unburned tabular sandstone surrounded by a single layer of post abandonment fill (Fig. 5.12). The northwest edge of the metate rested on a triangular piece of tabular sandstone seated on the base of the feature. The southeast edge, however, was raised approximately 8 cm above the base of the feature. The pitch of this artifact suggests the higher southeast edge may have once been supported by perishable materials (Fig. 5.13).

Suspended in the fill were seven lithic and three bone artifacts, and a variety of macrobotanical remains. Lithic artifacts consisted primarily of flake fragments and angular debris derived from locally available chert, and silicified wood. One biface flake of local chert and two flake fragments of obsidian completed the lithic assemblage (see Table 5.6). Bone artifacts consisted of one burned and two unburned small to medium mammal fragments (see Tables 5.7 and 5.8). The botanical assemblage was dominated by perennial (see Table 5.9) saltbush (*Sarco/Atriplex*), followed by nearly equal amounts of juniper (*Juniperus*), nonconiferous wood, unknown taxon, and corn *(Zea mays*). Other taxon included ricegrass

Table 5.8. LA 32964, Study Unit 1, fauna condition and degree of burning by feature number and type.

			Fauna Condition							
			>25% complete		<25% complete					
			Degree of Burning							
Feature	**Feature Type**		**None**	**Light**	**None**	**Dry Burn**	**Light**	**Heavy**	**Calcined**	**Table Total**
0	Extramural area	Count	13	2	47	14	11	43	34	**164**
		Row %	7.93	1.22	28.66	8.54	6.71	26.22	20.73	**100.00**
		Col. %	54.17	66.67	30.92	26.92	61.11	43.00	55.74	**40.00**
1	Midden	Count	9	–	92	37	5	54	24	**221**
		Row %	4.07		41.63	16.74	2.26	24.43	10.86	**100.00**
		Col. %	37.50		60.53	71.15	27.78	54.00	39.34	**53.90**
6	Storage facility	Count	–	–	2	–	–	1	–	**3**
		Row %			66.67			33.33		**100.00**
		Col. %			1.32			1.00		**0.73**
7	Indeterminate cultural feature	Count	–	–	3	–	–	1	1	**5**
		Row %			60.00			20.00	20.00	**100.00**
		Col. %			1.97			1.00	1.64	**1.22**
9	Cist, not further specified	Count	2	1	8	–	–	–	–	**11**
		Row %	18.18	9.09	72.73					**100.00**
		Col. %	8.33	33.33	5.26					**2.68**
11	Indeterminate cultural feature	Count	–	–	–	–	–	–	1	**1**
		Row %							100.00	**100.00**
		Col. %							1.64	**0.24**
12	Thermally altered pit	Count	–	–	–	–	–	1	1	**2**
		Row %						50.00	50.00	**100.00**
		Col. %						1.00	1.64	**0.49**
13	Thermally altered pit	Count	–	–	–	1	2	–	–	**3**
		Row %				33.33	66.67			**100.00**
		Col. %				1.92	11.11			**0.73**
Table Total		Count	**24**	**3**	**152**	**52**	**18**	**100**	**61**	**410**
		Row %	**5.85**	**0.73**	**37.07**	**12.68**	**4.39**	**24.39**	**14.88**	**100.00**
		Col. %	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

(*Oryzopsis*, n = 2, 3.2 percent), amaranth/goosefoot (*Chenopodium*, n = 2, 3.2 percent), and (*Cercocarpum*, n = 3, 4.8 percent), which account for relatively low percentages of the entire assemblage. A single charcoal sample (Beta-164326; *Sarco/Atriplex* wood; δ^{13} = -11.8 o/oo) yielded an AMS midpoint calibrated date of 520 cal BC. When calibrated this sample produced 2-sigma date ranges included of 760–680 cal BC (p = .24) and 670–400 cal BC (p = .72) (see Table 5.10).

Based on size, condition, and contents, Feature 6 appears to have been used for short term or temporary storage, perhaps for processed food stuffs. Feature 6 was in close proximity to Feature 5, another location of cached ground stone artifacts. These two features and the surrounding extramural area contained many of the whole of complete ground stone tools recovered from SU 1. The high frequency of ground stone artifacts coupled with the presence of a small storage feature indicate that the western portion of the site may have functioned as a processing and storage location.

Feature 7 was a small concentration of unmodified angular sandstone fragments positioned on the occupation surface but did not appear to have been arranged in any definable pattern (Fig. 5.14). Feature 7 contained a total of 19 rocks ranging in size from 20 by 15 by 7 cm to 5 by 4 by 2 cm. Fill removed while defining the feature yielded six lithic and five bone artifacts. The lithic assemblage consisted primarily of angular debris and flake fragments derived from locally available chert and silicified

Table 5.9. LA 32964, Study Unit 1, botanical group by feature number and type.

			Botanical Group				
Feature	Feature Type		Annuals	Perennials	Grasses	Cultivars	Table Total
0	Extramural area	Count	–	12	–	17	**29**
		Row %		41.38		58.62	**100.00**
		Col. %		0.76		6.34	**1.49**
1	Midden	Count	48	712	–	144	**904**
		Row %	5.31	78.76		15.93	**100.00**
		Col. %	57.83	44.84		53.73	**46.45**
4	Thermally altered pit	Count	2	52	2	6	**62**
		Row %	3.23	83.87	3.23	9.68	**100.00**
		Col. %	2.41	3.27	28.57	2.24	**3.19**
6	Storage facility	Count	9	132	–	16	**157**
		Row %	5.73	84.08		10.19	**100.00**
		Col. %	10.84	8.31		5.97	**8.07**
9	Cist, not further specified	Count	1	–	–	2	**3**
		Row %	33.33			66.67	**100.00**
		Col. %	1.20			0.75	**0.15**
10	Thermally altered pit	Count	1	169	3	22	**195**
		Row %	0.51	86.67	1.54	11.28	**100.00**
		Col. %	1.20	10.64	42.86	8.21	**10.02**
12	Thermally altered pit	Count	3	240	2	14	**259**
		Row %	1.16	92.66	0.77	5.41	**100.00**
		Col. %	3.61	15.11	28.57	5.22	**13.31**
13	Thermally altered pit	Count	15	163	–	11	**189**
		Row %	7.94	86.24		5.82	**100.00**
		Col. %	18.07	10.26		4.10	**9.71**
14	Thermally altered pit	Count	3	59	–	19	**81**
		Row %	3.70	72.84		23.46	**100.00**
		Col. %	3.61	3.72		7.09	**4.16**
15	Thermally altered pit	Count	1	49	–	17	**67**
		Row %	1.49	73.13		25.37	**100.00**
		Col. %	1.20	3.09		6.34	**3.44**
Table Total		**Count**	**83**	**1588**	**7**	**268**	**1946**
		Row %	**4.27**	**81.60**	**0.36**	**13.77**	**100.00**
		Col. %	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

wood. One core flake and two biface flakes, also derived from local material, completed the assemblage (see Table 5.6). Bone artifacts spatially associated with Feature 7 included one heavily burned Gunnerson's prairie dog fragment and one calcined and three unburned small mammal fragments (see Tables 5.7 and 5.8). Feature 7 is considered a cultural feature based on the uncommon occurrence of sandstone rock throughout the excavation area and its spatial association with similar features such as Feature 11 and its similarity to contemporaneous Feature 9, identified on the NSEP at LA 80434, Area 2. Associated with this rock concentration were 13 small mammal bone fragments; 54 percent of which were heat altered (Freuden 1998a).

Feature 8 represented the third cache of ground stone tools identified at LA 32964 (see Table 5.5). Feature 8 consisted of a slab metate, comprised of two end fragments, and a single lithic artifact (Fig. 5.15). Similar to Feature 5, Feature 8 was constructed by stacking one ground stone fragment on top of another on the original ground surface. The two ground stone fragments refit to form a complete tool (Fig. 5.16). The fracture margins were worn suggesting

Table 5.10. LA 32964, radiometric determinations.

Provenience	Calibrated 1-Sigma Range	Calibrated 2-Sigma Range	MCMC* Calibrated 1-Sigma Range	MCMC Calibrated 2-Sigma Range
LA32964, F12	930 BC (68.2%) 790 BC	1060 BC (92.1%) 740 BC	860 BC (68.2%) 770 BC	910 BC (83.3%) 740 BC
		690 BC (1.3%) 660 BC		690 BC (3.7%) 660 BC
		650 BC (1.9%) 590 BC		650 BC (8.4%) 540 BC
LA32964, F1, FS303	820 BC (68.2%) 770 BC	900 BC (1.2%) 870 BC	815 BC (68.2%) 770 BC	840 BC (87.7%) 740 BC
		850 BC (85.7%) 740 BC		690 BC (4.9%) 660 BC
		690 BC (4.9%) 660 BC		640 BC (2.7%) 590 BC
		640 BC (3.6%) 590 BC		
LA32964, F9	810 BC (58.5%) 750 BC	820 BC (63.4%) 740 BC	810 BC (56.9%) 750 BC	830 BC (62.8%) 740 BC
	690 BC (9.7%) 660 BC	690 BC (12.0%) 660 BC	690 BC (10.5%) 660 BC	700 BC (12.9%) 660 BC
		650 BC (20.0%) 540 BC	610 BC (0.9%) 600 BC	650 BC (19.6%) 540 BC
LA32964, F15	770 BC (13.6%) 720 BC	780 BC (90.3%) 480 BC	770 BC (68.2%) 540 BC	790 BC (90.1%) 480 BC
	700 BC (54.6%) 540 BC	470 BC (5.1%) 410 BC		470 BC (5.3%) 420 BC
LA32964, F10	770 BC (13.6%) 720 BC	780 BC (90.3%) 480 BC	770 BC (12.8%) 720 BC	790 BC (90.8%) 480 BC
	700 BC (54.6%) 540 BC	470 BC (5.1%) 410 BC	710 BC (55.4%) 540 BC	470 BC (4.6%) 420 BC
LA32964, F4	730 BC (12.1%) 690 BC	760 BC (19.8%) 680 BC	730 BC (12.6%) 690 BC	760 BC (19.5%) 680 BC
	540 BC (56.1%) 400 BC	670 BC (9.5%) 610 BC	660 BC (3.0%) 650 BC	670 BC (75.9%) 400 BC
		600 BC (66.1%) 400 BC	550 BC (52.6%) 410 BC	

(Table 5.10, continued)

Provenience	Calibrated 1-Sigma Range	Calibrated 2-Sigma Range	MCMC* Calibrated 1-Sigma Range	MCMC Calibrated 2-Sigma Range
LA32964, F6	750 BC (20.4%) 680 BC	760 BC (23.0%) 680 BC	750 BC (21.6%) 680 BC	760 BC (23.7%) 680 BC
	670 BC (6.3%) 640 BC	670 BC (72.4%) 400 BC	670 BC (6.4%) 640 BC	670 BC (71.7%) 400 BC
	560 BC (41.4%) 410 BC		560 BC (25.7%) 480 BC	
			470 BC (14.5%) 410 BC	
LA32964, F13	760 BC (23.4%) 680 BC	770 BC (95.4%) 410 BC	760 BC (23.5%) 680 BC	770 BC (95.4%) 410 BC
	670 BC (18.7%) 610 BC		670 BC (44.7%) 510 BC	
	600 BC (26.1%) 510 BC			
LA32964, F14	720 BC (8.4%) 690 BC	760 BC (17.8%) 680 BC	730 BC (8.5%) 690 BC	750 BC (18.0%) 680 BC
	540 BC (59.8%) 400 BC	670 BC (6.8%) 610 BC	540 BC (59.7%) 400 BC	670 BC (7.0%) 610 BC
		600 BC (70.8%) 390 BC		600 BC (70.4%) 390 BC
LA32964, F1, FS299	410 BC (45.3%) 350 BC	520 BC (61.6%) 340 BC	510 BC (21.1%) 450 BC	730 BC (2.8%) 690 BC
	290 BC (22.9%) 230 BC	330 BC (33.8%) 200 BC	420 BC (47.1%) 370 BC	550 BC (92.6%) 350 BC
LA32964, F1, FS352	510 BC (28.8%) 430 BC	730 BC (3.3%) 690 BC	510 BC (38.1%) 430 BC	730 BC (3.8%) 690 BC
	420 BC (39.4%) 380 BC	550 BC (92.1%) 360 BC	420 BC (30.1%) 380 BC	550 BC (91.6%) 370 BC

*MCMC = Markov Chain Monte-Carlo sampling method

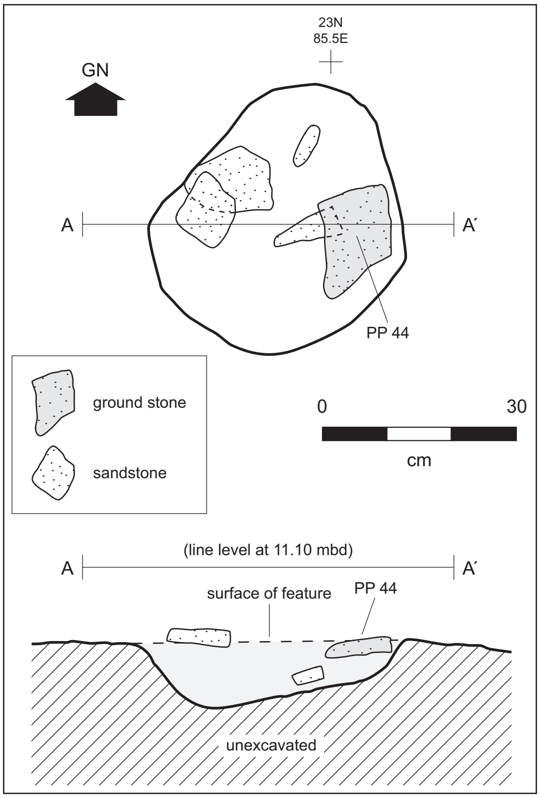


Figure 5.9. Plan and profile, Feature 4, LA 32964.

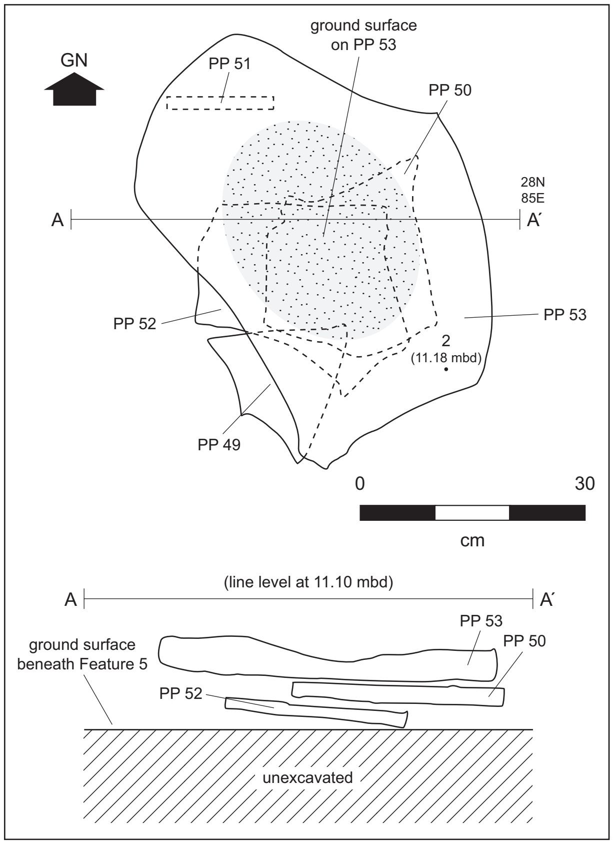


Figure 5.10. Plan and profile, Feature 5, LA 32964.

Figure 5.11. Cache of ground stone tools (Feature 5), LA 32964.

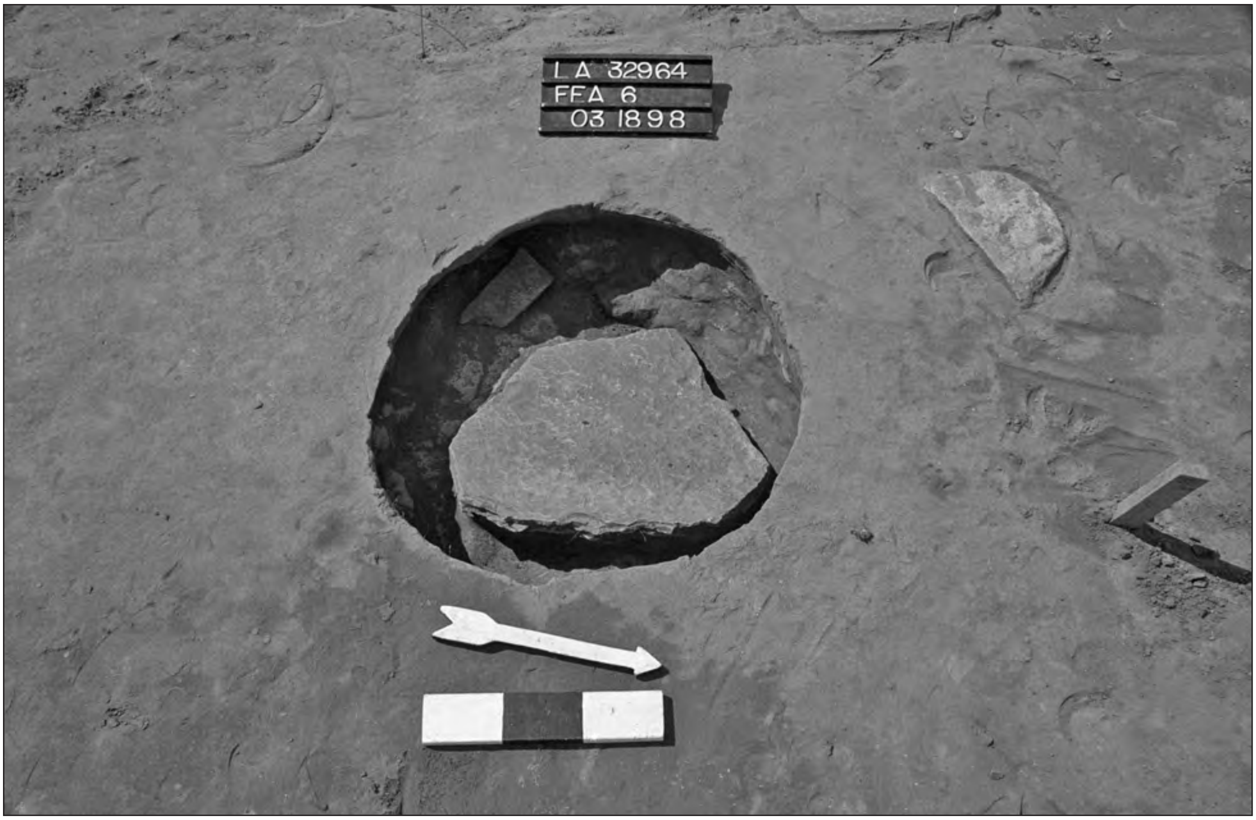


Figure 5.12. Feature 6, LA 32964.

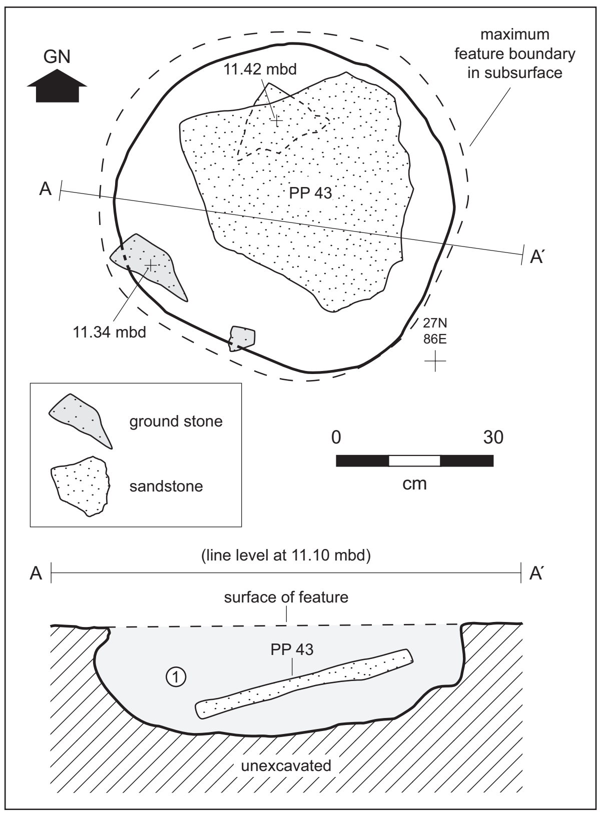


Figure 5.13. Plan and profile, Feature 6, LA 32964.

Figure 5.14. Feature 7, LA 32964.

that the tool was used as two conjoined pieces or as individual pieces. The single lithic artifact recovered from this location was a core flake derived from local silicified wood (see Table 5.6). A pollen sample recovered from between the two ground stone sections yielded evidence of *Chenopodium*/amaranth, Asteraceae, and Poaceae, among others (Appendix 2). A similar feature was identified at AZ-K-7-18 (Site 442-12) during the ENRON project (Redd 1994).

Feature 9 consisted of a partially deflated rock-lined feature. Of the three features containing a high density of rock at LA 32964, Feature 9 was the only one that displayed clear evidence of formal construction. Feature 9 was constructed by lining a shallow pit with a composite of unmodified and thermally altered sandstone fragments and ground stone tool fragments (Fig. 5.17). Six of the 10 ground stone fragments incorporated in feature construction were positioned horizontally around the perimeter of the feature base. The remaining two ground stone artifacts, along with five additional unmodified sandstone fragments, were positioned vertically at the inferred feature opening (Fig. 5.18). The intermediate areas were filled with numerous

Figure 5.15. Feature 8, LA 32964.

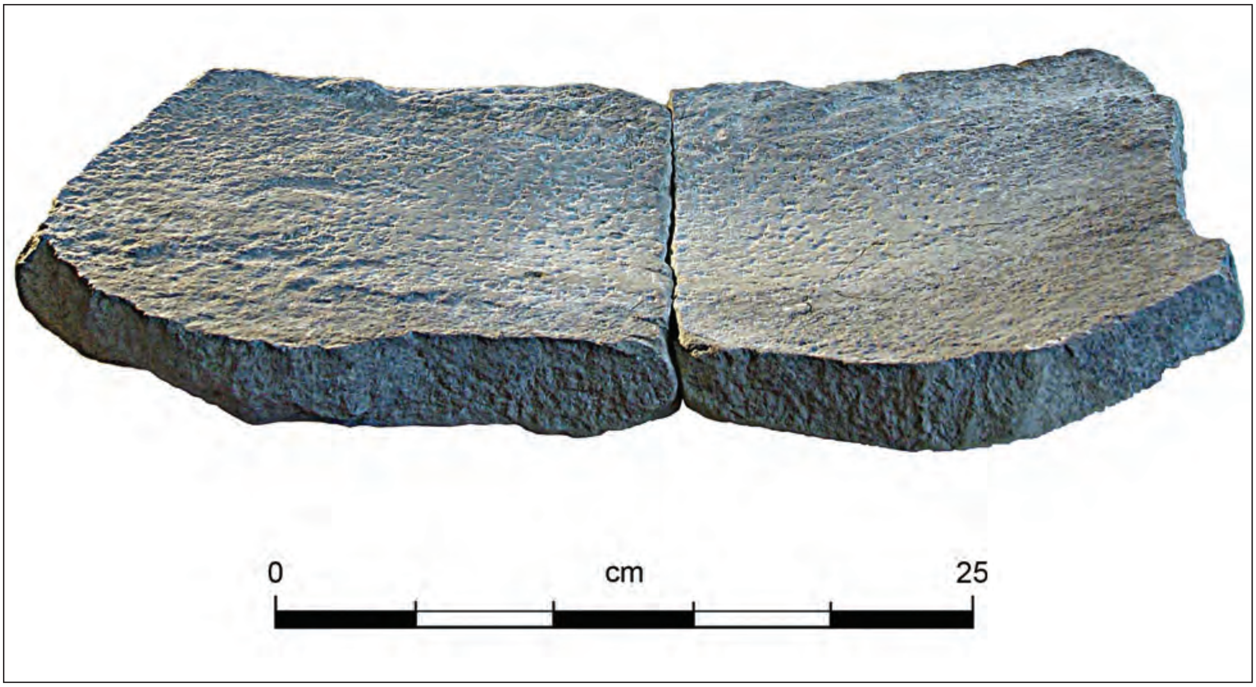


Figure 5.16. Refitted ground stone tool, Feature 8, LA 32964.

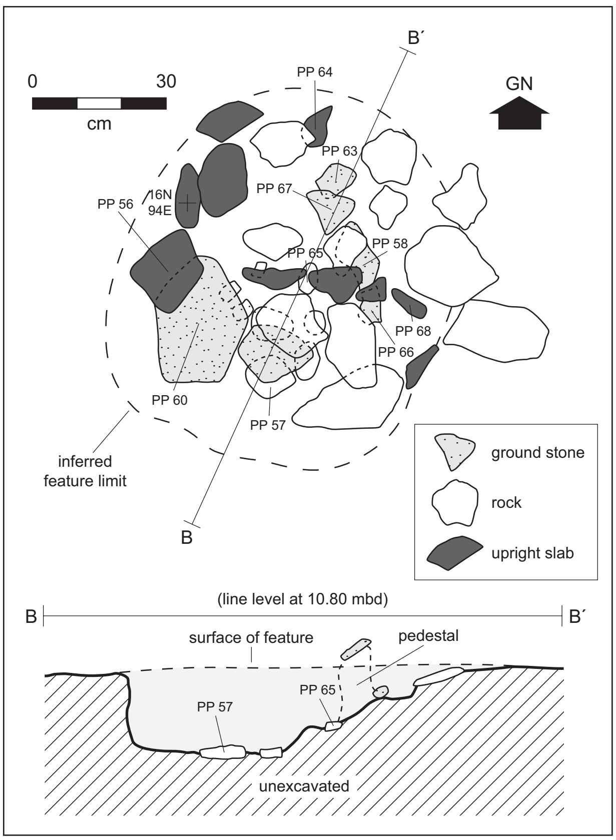


Figure 5.17. Plan and profile, Feature 9, LA 32964.

sandstone fragments, which defined the inferred interior limit.

Fill recovered from Feature 9 yielded lithics, bone, and a limited range of macrobotanical remains. The lithic artifact assemblage was dominated by core flakes, angular debris, and flake fragments derived from locally available chert and silicified wood. Biface flakes and hammerstones, also derived from locally available materials, complete the Feature 9 lithic inventory (see Table 5.6). Although few bone artifacts were recovered from Feature 9, they represented a variety of faunal species. The assemblage, dominated by unburned small mammal fragments, included a complete unburned Gunnerson's prairie dog elements, an unburned Mexican woodrat fragment, and unburned and lightly burned desert cottontail remains (see Tables 5.7 and 5.8). Macrobotanical remains were limited to annuals and cultivars including a single goosefoot seed and a cupule and cob fragment of maize (see Table 5.9). A single charcoal sample (Beta-164327; *Zea mays* cupule and cob fragments; δ^{13} = -11.1 o/oo) yielded an AMS midpoint calibrated date of 790 cal BC. This sample produced two 2-sigma date ranges of 830–740 cal BC (p = .63) and 700–660 cal BC (p = .13) when calibrated using OxCal v3.8 (see Table 5.10).

Figure 5.18. Feature 9, LA 32964.

Based on size and thermal alteration, ground stone fragments were recycled as feature construction elements toward the end of their use lives. Feature 9 appears to represent a partially deflated, rock-lined cist used for short term on-site storage perhaps to facilitate harvesting and processing. Although direct evidence for the caching of tools in Feature 9 is ambiguous, it is worth noting that two of three hammerstones identified from LA 32964 were recovered from this feature, which supports the interpretation that Feature 9 was a storage facility.

Feature 10 was a shallow unlined basin with steep to slightly bell-shaped sides excavated to the natural sandstone substrate (Fig. 5.19). Feature 10 contained a single layer of charcoal-rich sediment and displayed evidence of oxidation at the feature base and along the sides (see Table 5.3). Fill recovered from this feature yielded lithic artifacts, one ground stone artifact, and a variety of botanical remains. The lithic artifact assemblage, dominated by angular debris and flake fragments derived from locally available materials, includes two biface flakes of locally available material and one core flake of nonlocal chert (see Table 5.6). None of the debitage recovered from Feature 10 displayed evidence of thermal alteration suggesting they were deposited after the feature was in use. The ground stone artifact consisted of a small, indeterminate, heat-fractured fragment positioned along the perimeter of the feature opening (see Table 5.5).

The botanical assemblage was dominated by perennial species saltbush (*Sarco/Atriplex*), followed by equal amounts of corn *(Zea mays*), and nonconiferous wood. Sagebrush (*Artemisia*), juniper (*Juniperus*), coniferous wood, and mountain mahogany (*Cercocarpus*) were also present along with trace amounts of piñon, ponderosa, and composite species (see Table 5.9). A single charcoal sample was submitted for analysis (Beta-164328; *Sarco/Atriplex* wood; δ^{13} = -11.4 o/oo) that yielded an AMS calibrated intercept date of 760 cal BC, 640 cal BC and 560 cal BC. When calibrated using OxCal v3.8, this sample produced a 2-sigma date range of 790–480 cal BC (p = .91) (see Table 5.10). Based on thermal

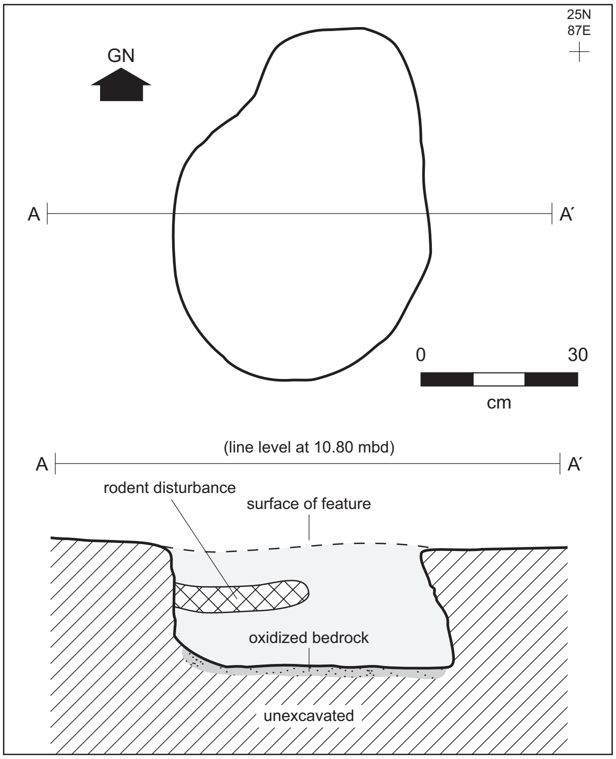


Figure 5.19. Plan and profile, Feature 10, LA 32964.

Figure 5.20. Feature 11, LA 32964.

alterations, Feature 10 appears to have functioned as a roasting or baking facility.

Feature 11 was a concentration of unmodified angular sandstone fragments located on the occupation surface (see Table 5.3). These stone fragments did not appear to have been positioned in any definable horizontal or vertical pattern (Fig. 5.20). Feature 11 contained a total of 18 rocks ranging in size from 40 by 25 by 10 cm to 18 by 12 by 5 cm (Fig. 5.21). Fill removed while defining the feature yielded lithic and ground stone artifacts. The lithic assemblage consisted primarily of core flakes, angular debris, and flake fragments derived from locally available chert and silicified wood. A single biface flake, also derived from local material, and one obsidian core and two biface flakes completed the assemblage (see Table 5.6). Ground stone consisted of a metate fragment (see Table 5.5). Feature 11 was considered a cultural feature because it was a concentration of sandstone rock within an area where this material was conspicuously absent, the presence of some cultural material, and it was spatially associated with a similarly constructed feature, Feature 7. A similar feature was also identified on the NSEP at LA 80434 (Freuden 1998a). However, unlike Feature 11 the later feature contained 13 small mammal bone fragments; 54 percent of the stones were heat altered.

Feature 12 was a shallow unlined basin with slightly bell-shaped sides excavated down to the natural sandstone substrate (see Table 5.3). Feature 12 contained a single layer of charcoal-rich primary fill mixed with post-abandonment deposits. This feature displayed evidence of low intensity burning (sooting) at the feature base and along the sides; however, no evidence of oxidation was present. Suspended in the fill were eight sooted tabular sandstone fragments (Fig. 5.22). Fill recovered from this feature yielded lithic artifacts, ground stone artifacts, and a variety of botanical remains. The lithic artifact assemblage was dominated by core flakes, angular debris, and flake fragments derived from locally available materials and include two biface flakes, also derived of locally available material and one obsidian core flake (see Table 5.3). None of the debitage recovered from Feature 12 displayed evidence of thermal alteration suggesting these items

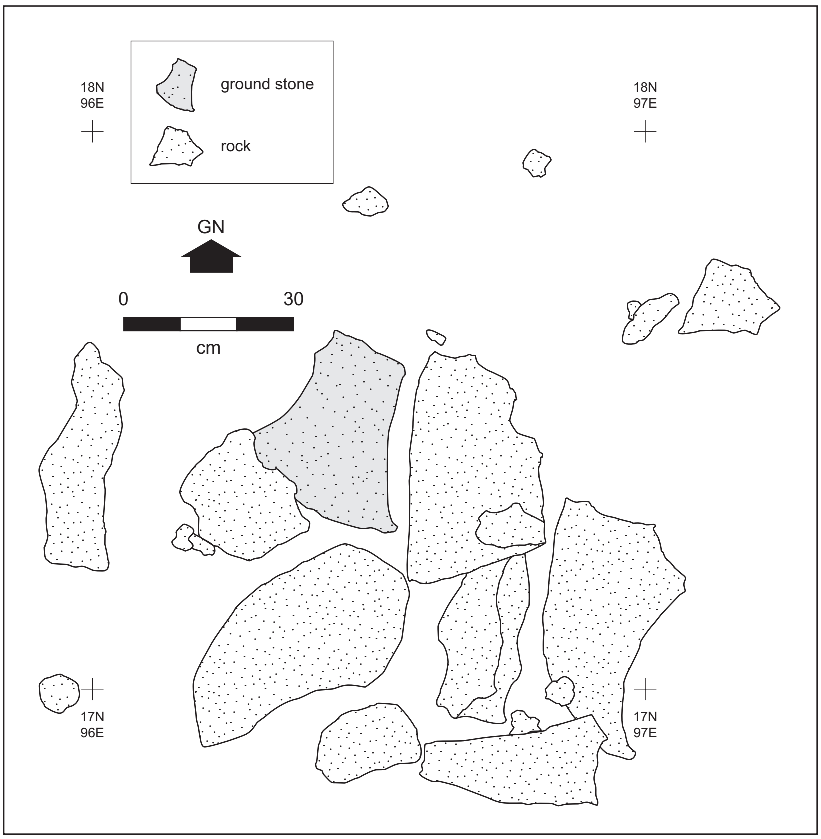


Figure 5.21. Plan of Feature 11, LA 32964.

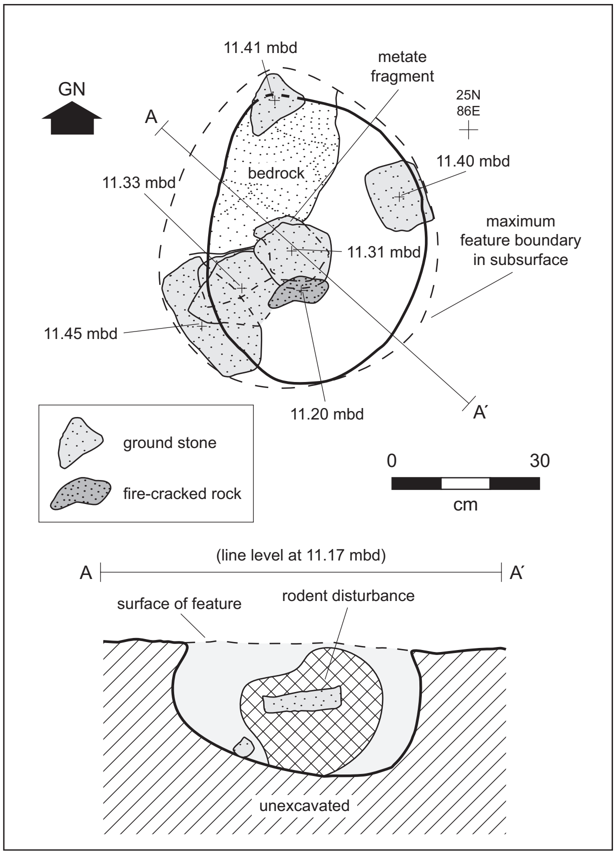


Figure 5.22. Plan and profile, Feature 12, LA 32964.

were secondary deposits. Ground stone consisted of small, indeterminate, heat-fractured or sooted fragments positioned along the perimeter of the feature opening (see Table 5.5). These artifacts are interpreted as primary deposits related to feature function.

The botanical assemblage was dominated by perennial species (see Table 5.9) including saltbush (*Sarco/Atriplex*), followed by equal amounts of corn (*Zea mays*), and nonconiferous wood. Sagebrush (*Artemisia*), juniper (*Juniperus*), coniferous wood, and mountain mahogany (*Cercocarpus*) were also present along with trace amounts of piñon (*Pinus edulis*), ponderosa (*Pinus ponderosa*), and composite species. A single charcoal sample (Beta-164329; *Sarco/Atriplex* wood; δ^{13} = -11.1 o/oo) yielded a standard extended count calibrated intercept date of 820 cal BC. When calibrated, this sample produced a 2-sigma date range of 910–740 cal BC (p = .83) (Table 5.10). Based on thermal characteristics and artifact assemblage, Feature 12 appears to have functioned as a processing facility used for roasting or baking biotic resources.

Feature 13 was a shallow unlined basin with slightly bell-shaped sides excavated down to the natural sandstone substrate (see Table 5.3). Feature 13 contains two layers of soil. Although the boundary was neither distinct or uniform, Layer 1 was distinguished from Layer 2 by its dark, homogeneous appearance. Layer 2 also contained charcoal-rich sediment; however, here the darker sediment was mottled in a lighter matrix. Feature 13 displayed evidence of oxidation at the feature base. Layer 1 consists of a charcoal-rich primary deposit mixed with post-abandonment deposits and Layer 2 consists of post-abandonment deposits mottled with charcoal-rich soil precipitating from Layer 1 (Fig. 5.23).

Fill recovered from Feature 13 contained lithic, bone, and macrobotanical artifacts. The lithic artifact assemblage was dominated by angular debris and flake fragments derived from locally available materials. In addition, a single biface flake, also derived of locally available material, and one obsidian

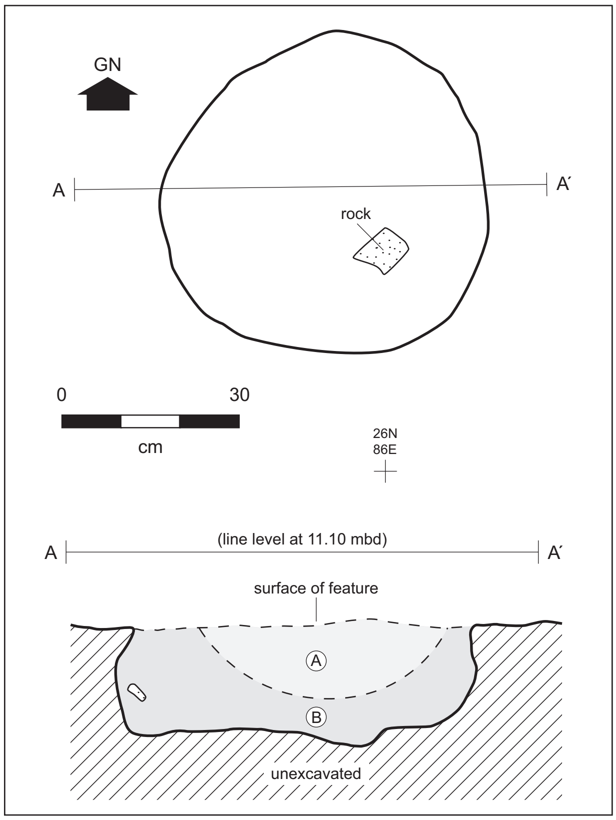


Figure 5.23. Plan and profile, Feature 13, LA 32964.

core flake were present (see Table 5.6). None of the lithic materials were thermally altered, suggesting they were deposited after the feature was used for thermal activity. Bone artifacts recovered from Feature 13 include the fragmentary remains of two small and one medium to large sized mammals. All bone artifacts, however, were thermally altered, including one dry, burned, example and two lightly burned examples (see Tables 5.7 and 5.8).

The charred botanical assemblage was dominated by perennials, including saltbush followed by sagebrush (*Artemisia*), nonconiferous wood, and corn (*Zea mays*). Piñon (*Pinus edulis*), rose family, coniferous wood, and an unknown taxon were also present along with trace amounts of juniper and wolfberry *(Lycium)* (see Table 5.9). A single charcoal sample (Beta-164330; *Atriplex* wood; δ^{13} = -11.3 o/oo) yielded AMS calibrated intercept dates of 750 cal BC, 700 cal BC, and 540 cal BC. When calibrated, this sample produced a 2-sigma date range of 770–410 cal BC (p = .95) (Table 5.10).

The majority of the artifacts identified with Feature 13 were recovered from the east half through a single, full-cut excavation. Although most were recovered from this context, excavation of Layer 1 in the west half produced a higher frequency of materials than Layer 2. In addition, the majority of macrobotanical remains were also recovered from this Layer 1. The presence of oxidation at the feature base and high artifact density associated with Layer 1 suggests that Feature 13 was constructed, used, then reused following the deposition of Layer 2. Based on thermal characteristics and artifact assemblage, Feature 13 appears to have functioned as a processing facility for roasting or baking biotic resources.

Feature 14 was an unlined basin with steeply sloped sides excavated down to the natural sandstone substrate (Fig. 5.24). Feature 14 contains a single charcoal-rich primary deposit mixed with post-abandonment deposits. Although the feature base and sides were sooted, no evidence of oxidation was identified. Fill recovered from Feature 14 contained one lithic artifact and a variety of macrobotanical remains. The lithic artifact is a piece of angular debris derived of locally available material (see Table 5.6). It was not thermally altered, suggesting it was deposited through post-abandonment processes.

The charred botanical assemblage was dominated by perennial species including saltbush (*Atriplex*), followed by corn (*Zea mays)*, and nonconiferous wood. Sagebrush (*Artemisia*) was also present along with trace amounts of coniferous wood and wolfberry (*Lycium*) (see Table 5.9). A single charcoal sample was submitted for analysis (Beta-164331; *Atriplex* wood; δ^{13} = -11.5 o/oo) that yielded an AMS calibrated intercept date of 420 cal BC. When calibrated, the 2-sigma date ranges included 600–390 cal BC (p = .70) and 750–680 cal BC (p = .18) (Table 5.10).

Feature 15 was a steep-sided unlined pit constructed into the friable sandstone bedrock. This feature contained a single lithic artifact and a variety of macrobotanical remains suspended in single layer of post abandonment fill (Figs. 5.25, 5.26). The perimeter and base of the feature were burned but not oxidized, indicating that this feature was used in conjunction with activities that required low level heat. The lithic artifact consisted of a piece of angular debris derived from locally available silicified wood (see Table 5.6). The botanical assemblage

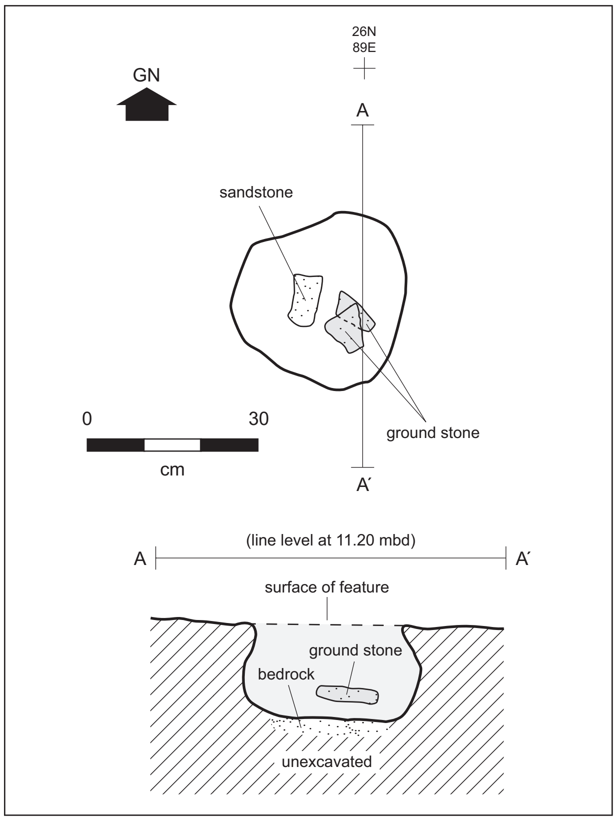


Figure 5.24. Plan and profile, Feature 14, LA 32964.

Figure 5.25. Feature 15, LA 32964.

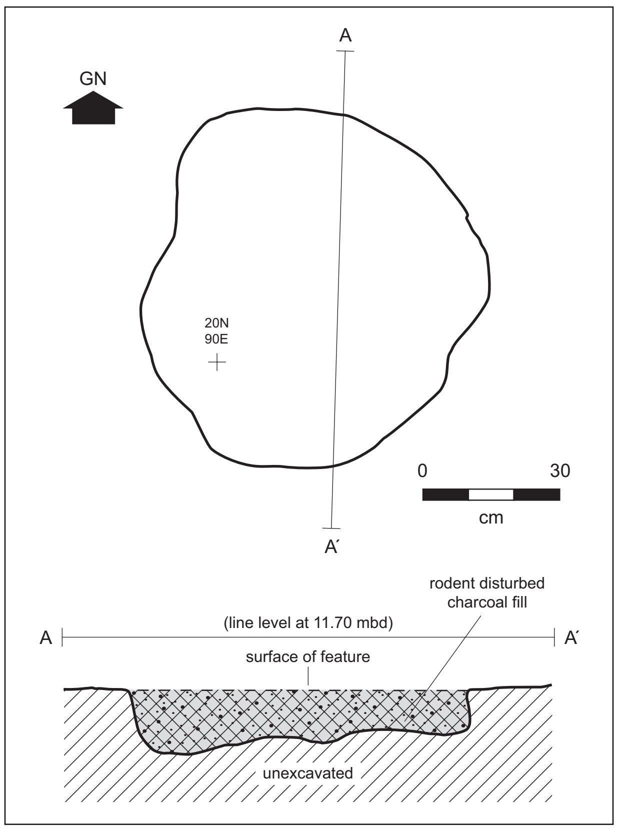


Figure 5.26. Plan and profile, Feature 15, LA 32964.

was dominated by corn (*Zea mays*) (see Table 5.9). Other taxon included saltbush (*Atriplex*), followed by nearly equal amounts of juniper (*Juniperus*), and nonconiferous wood. A single charcoal sample (Beta-164332; *Sarco/Atriplex* wood; δ^{13} = -12.0 o/oo) yielded an AMS calibrated intercept date of 760 cal BC, 640 cal BC, and 560 cal BC. When calibrated, a 2-sigma date range of 790–480 cal BC (p = .91) was produced (Table 5.10).

The area surrounding Feature 15 contained a high frequency of lithic and faunal remains suggesting that this feature may have been cleaned out following its last use and subsequent abandonment of the site. Based on evidence of thermal alteration and the limited presence of artifact and macrobotanical remains, Feature 15 appears to have been used as a small processing facility for plant and, perhaps, other resources.

Feature summary. Thirteen features were investigated at LA 32964, SU 1. Five broad feature categories were present that included unlined pits, thermally altered pits, cached ground stone tools, rock concentrations, and a midden or discard area (see Table 5.3). These feature types were identified in three spatially discrete areas within SU 1. Within each area, features displayed morphologically similar attributes suggesting some level of site structure. From west to east these areas are interpreted as a processing area (Features 4–6, 8, 10, and 12–15), disposal area (Feature 1), and staging area (Features 7, 9, and 11). Based on radiometric determinations, most features date between 700 and 500 cal BC and are from the same statistical population, suggesting they are roughly contemporaneous. Although this period is strongly represented in the radiometric samples, other samples suggest that this location was occupied from 910–300 cal BC.

The processing area, located in the western portion of SU 1, showed a close spatial relationship between pit features and ground stone artifacts (Fig. 5.27). Both burned and unburned pit features were present in this portion of the study unit. Although most pit features contained charcoal-rich soil, burned pit features were differentiated from unburned features by the presence of oxidation or sooting on interior feature limits. In general there were two types of pit features, steep-sided and slightly bell-shaped, with no apparent correlation to burning. Mean area for all features was 0.25 sq m (2.7 sq ft; SD 0.12) with a mean depth of 0.18 m (SD 0.05) and a mean estimated volume of 0.52 cu m (18.4 cu ft; SD 0.03). When area, depth, and volume are placed in a 3 by 3 matrix, three feature classes are represented by burned and unburned features alike indicating related feature functions requiring ground stone tools (Fig. 5.28).

Small features (Feature 4 and Feature 14) had a limited area and were shallow in depth resulting in a low volume. Mid-sized features (Feature 10, 12, and 13) were larger in area and depth compared to small features, resulting in a larger volume. Large features (Feature 6 and 15) were only larger in area compared to small or mid-sized features yielding the highest feature volumes. Similar to thermal alteration, feature morphology cross cuts feature size with bell-shaped and steep-sided features identified in all size classes. This was also true for economic plants recovered in pit features with rice grass, agrestals, and *Zea mays* identified in all feature size classes, morphological classes, and thermally altered conditions. The morphology, size, and condition of pit features identified at LA 32964, SU 1 combined with the temporal data indicate the construction of new processing and storage features within the processing area along with reuse discard in the midden area at times of site reoccupation. While this may be fortuitous, the close spatial proximity of similar types of facilities and the continued use of a defined discard area suggest the site was reoccupied by the same or related groups. Based on feature size and volume, storage of food surplus was not anticipated for extended periods of time. Feature data indicate that on site processing of cultivars and wild species occurred during the growing season, spring to fall months, with planned reoccupation evidenced by cached ground stone tools.

A second feature area, which included the largest feature (Feature 1), was located in the north central portion of SU 1 east of the procession area. Feature 1 is interpreted as a midden deposit that resulted from multiple Basketmaker II occupations. This interpretation is supported by the presence of highly charcoal-stained soil associated with a dense concentration of fragmentary artifacts including bone, lithics, macrobotanical remains, and the lack of internal features. Three discrete contexts in Feature 1 were sampled that produced radiometric determinations dating between 910 cal BC and 300 cal BC. This feature was an accumulation of discarded material positioned directly on sandstone bedrock

Figure 5.27. Pit feature complex, Study Unit 1, LA 32964.

adjacent to, and south of, a low ledge indicating that a portion of this outcrop was exposed during the initial site occupation.

A third feature area was located southeast and adjacent to Feature 1. Features associated with this area contained a high density of rock and include a rock-lined pit and two concentrations of unshaped sandstone (see Table 5.5). Formal construction was only identified in one feature, as evidenced by unmodified, thermally altered sandstone fragments, and ground stone tool fragments used to line a shallow basin. This later feature may represent a, rock-lined cist used for short term, on site storage. The remaining two features in this area were concentrations of 20 to 30 fist-sized, unmodified, angular sandstone fragments located on the occupation surface. These were considered to be cultural features based on the discrete spatial distribution of these materials and the absence of sandstone rock throughout the excavation area, in general. The function of these features is unclear, however they may represent cached material used to weight down the edges of temporary brush or hide structures.

Study Unit 2

Excavations within SU 2 began adjacent to a high density artifact concentration located in the central portion of the site in Units 85–88N/87E (see Fig. 5.3) These units were excavated in 10 cm levels to a maximum depth of 30 cm below modern ground surface. Limited amounts of cultural material were recovered from the subsurface context and excavations were terminated upon the identification of an unmarked, abandoned pipeline. A second trench, perpendicular to the first, was established to identify the source of the artifacts and to locate any intact subsurface cultural deposits. Units 85N/89E–91E were excavated following the same method described above to a maximum depth of 50 cm below modern ground surface and terminated upon exposure of the natural bedrock substrate. Three stratigraphic units were identified in this trench (Stratum 1, Stratum 2, and Stratum 5); however, no intact cultural deposits were encountered and excavations were terminated.

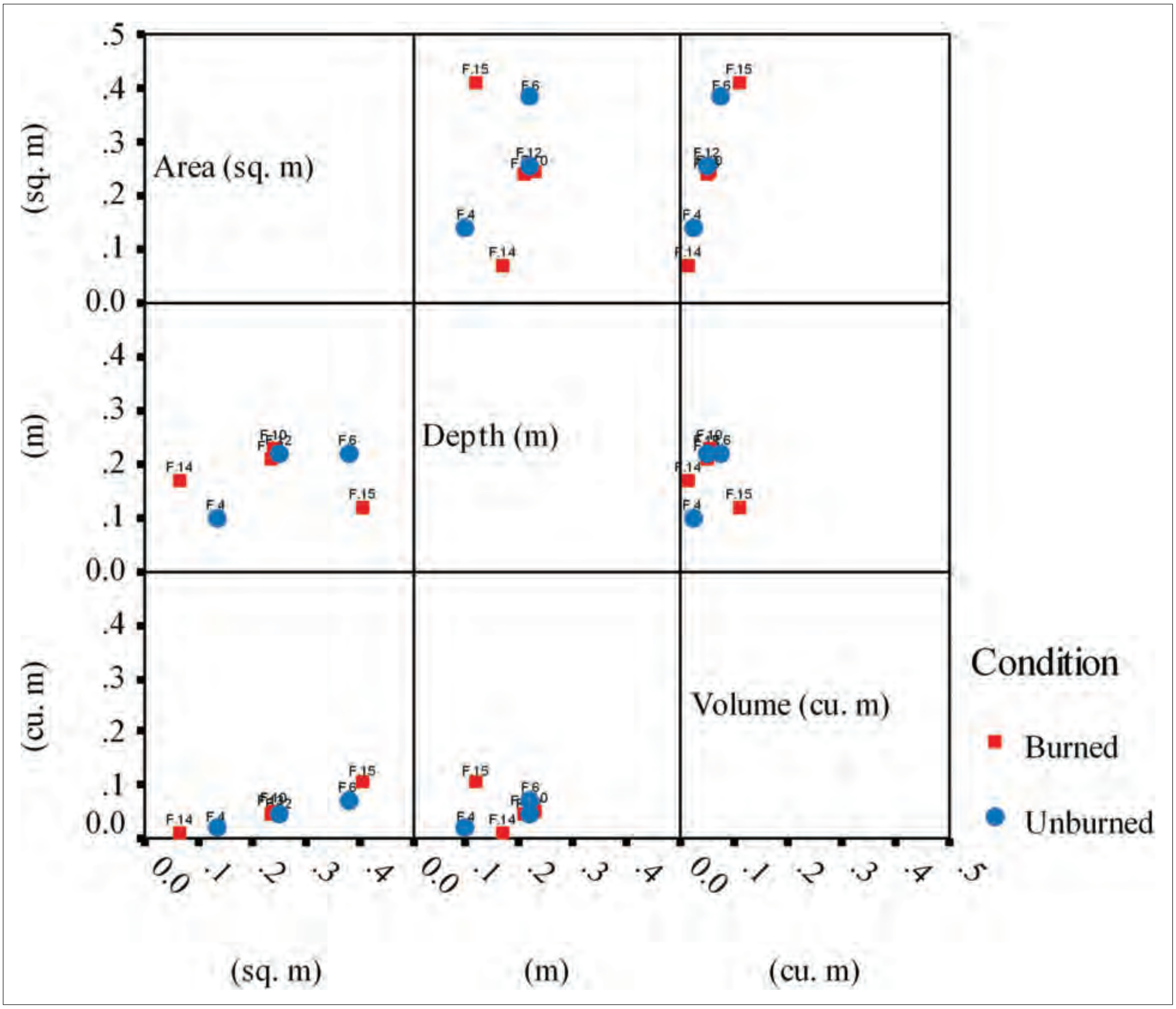


Figure 5.28. Scatter plot of pit feature dimensions by condition, LA 32964.

A second excavation locale was established in an area of low artifact density that contained a concentration of unshaped sandstone cobbles identified on survey. A 5 by 5 m excavation area (grid units 58–62N/90–94E) was placed over the sandstone concentration to identify the nature of the deposit. Each unit was excavated to a maximum depth of 20 cm below modern ground surface. In addition, Unit 61N/92E was excavated to a maximum depth of 40 cm below modern ground surface, exposing bedrock. After these excavations the sandstone cobble concentration was interpreted as a noncultural feature that yielded limited amounts of cultural material including modern roadside debris.

A series of auger transects within the proposed construction zone were excavated to verify the apparent shallowness and lack of intact cultural deposits. These tests confirmed the absence of cultural deposits and demonstrated that stabilized areas had a maximum depth of 1 m. Mechanical excavation within this area supported the results of the hand excavations.

Study Unit 3

SU 3 consisted of all cultural manifestations located outside the proposed project area. These deposits were mapped, photographed, and sampled through a series of study areas (see Fig. 5.1). Intact cultural deposits east of the proposed project area included a late Pueblo II to Pueblo III residential unit and a widely dispersed scatter of Basketmaker III and early Pueblo I artifacts.

The Pueblo II–Pueblo III residential unit measured approximately 1,500 sq m (16,145.9 sq ft) in size and is comprised of four to six masonry surface rooms, a subterranean structure (approximately 6 m in diameter and 1.5 m in depth), and a dense artifact concentration or midden. The subterranean structure was defined using a series of auger tests and the midden sampled using four study areas. Four additional study areas were placed in various locations within high density artifact locations to help define the temporal components present at this site (Tables 5.11, 5.12). Although no clear source for the Basketmaker III or early Pueblo I artifacts could be ascertained, one is likely based on the quantity of associated material culture. Possibly the later Pueblo component has obscured any architectural surface manifestations of the preceding periods.

Material Culture

Artifacts, macrobotanical, faunal remains, and pollen samples recovered from LA 32964 are summarized in the following section. The material culture aspect of this site is quite robust (see Table 5.1). Artifact categories include ceramic, lithic, and ground stone materials, in addition to faunal and botanical remains. The ceramic assemblage is fairly limited and is comprised mainly of Basketmaker III types with limited frequencies of Pueblo and ethnohistoric types. Chipped stone debitage and tools dominate the artifact assemblage and are the result expedient flake production and biface tool manufacture and maintenance. Ground stone artifacts include complete and whole basin and slab metates and numerous indeterminate tool fragments. The faunal assemblage is diverse and represents the exploitation of small to medium-sized mammals. Botanical remains were recovered from all sampled context. Although the botanical assemblage is dominated by carbonized *Atriplex*, *Zea mays*, nonconiferous wood, along with numerous other species represented in low frequencies. Pollen data complement the botanical remains and give insight into the paleoenvironmental setting being less arid with evidence for more riparian species.

Ceramics

In all, 397 ceramic artifacts were recorded at LA 32964; however, only 106 were recovered during data recovery investigations (see Table 5.1). These ceramics comprise only 7 percent of the total artifact assemblage and only 6 percent of the assemblage recovered from SU 1. The majority of the ceramic artifacts are located outside the proposed project area in SU 3. All ceramic periods common to the southern Chuska Valley were represented in the assemblage, including ethnohistoric Navajo ceramics (Table 5.13). Not surprisingly, ceramic artifact density was highest near the Pueblo II–Pueblo III habitation area and decrease in frequency with distance. The low frequency of ethnohistoric Navajo ceramic artifacts may reflect periodic use of this location related to the procurement and processing of locally or seasonally available resources, particularly during the Gobernador through Cabezon phases.

The majority of ceramics recorded at this site were located on the modern ground surface (Fig. 5.29) or recovered from upper fill levels (Stratum 1 and Stratum 2). Stratigraphic placement of ceramic artifacts diagnostic of the Basketmaker III, Pueblo, and historic Navajo periods supports the geomorphological study conducted by Sant and others (1999) as ceramics representative of only the Basketmaker III and Pueblo periods were recovered from Stratum 2. This deposit correlates to the Upper Nakaibito formation (Sant et. al. 1999). Excavation of Stratum 4, positioned below Stratum 2, did not identify a single ceramic artifact indicating the deposition of Stratum 4 occurred prior to the ceramic periods (Fig. 5.30). Dated contexts associated with Stratum 4 suggest this deposit was formed by 2300 BP, which closely corresponds to the Gallo Unit and Chaco Unit interface identified by Hall (1977).

Lithics

In all, 2,784 lithics artifacts were recovered during data recovery investigations at LA 32964. Lithic artifacts represent 50 percent of the total artifact assemblage with nearly 99 percent of these artifacts were recovered from SU 1 (Table 5.14). These items were associated with two broad temporal components, Basketmaker II and a mixed Basketmaker

Table 5.11. LA 32964, Study Unit 3, ceramic type by sample area.

		Sample Area									
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**Table Total**
Plain body	Count	68	30	20	36	16	27	13	15	3	**228**
	Row %	29.82	13.16	8.77	15.79	7.02	11.84	5.70	6.58	1.32	**100.00**
	Col. %	83.95	81.08	62.50	72.00	76.19	84.38	86.67	88.24	50.00	**78.35**
Indented corrugated	Count	3	1	4	10	2	4	1	1	2	**28**
	Row %	10.71	3.57	14.29	35.71	7.14	14.29	3.57	3.57	7.14	**100.00**
	Col. %	3.70	2.70	12.50	20.00	9.52	12.50	6.67	5.88	33.33	**9.62**
Unpainted, polished white ware	Count	2	–	–	–	1	–	–	–	–	**3**
	Row %	66.67				33.33					**100.00**
	Col. %	2.47				4.76					**1.03**
Mineral paint, undifferentiated	Count	2	2	–	–	–	–	–	–	–	**4**
	Row %	50.00	50.00								**100.00**
	Col. %	2.47	5.41								**1.37**
Red Mesa Black-on-white	Count	–	–	–	–	1	–	–	–	–	**1**
	Row %					100.00					**100.00**
	Col. %					4.76					**0.34**
Escavada Black-on-white (solid designs)	Count	–	–	2	–	–	–	–	–	–	**2**
	Row %			100.00							**100.00**
	Col. %			6.25							**0.69**
La Plata Black-on-white	Count	–	–	1	–	1	–	1	1	–	**4**
	Row %			25.00		25.00		25.00	25.00		**100.00**
	Col. %			3.13		4.76		6.67	5.88		**1.37**
Pueblo III, indeterminate organic	Count	3	–	–	–	–	1	–	–	–	**4**
	Row %	75.00					25.00				**100.00**
	Col. %	3.70					3.13				**1.37**
Wingate Black-on-red	Count	1	–	–	1	–	–	–	–	1	**3**
	Row %	33.33			33.33					33.33	**100.00**
	Col. %	1.23			2.00					16.67	**1.03**
Puerco Black-on-red	Count	1	1	–	–	–	–	–	–	–	**2**
	Row %	50.00	50.00								**100.00**
	Col. %	1.23	2.70								**0.69**
White Mountain Red (unpainted, undifferentiated)	Count	–	3	1	–	–	–	–	–	–	**4**
	Row %		75.00	25.00							**100.00**
	Col. %		8.11	3.13							**1.37**
Wingate Polychrome	Count	1	–	–	–	–	–	–	–	–	**1**
	Row %	100.00									**100.00**
	Col. %	1.23									**0.34**
Mesa Verde Black-on-white	Count	–	–	1	–	–	–	–	–	–	**1**
	Row %			100.00							**100.00**
	Col. %			3.13							**0.34**
Nava Black-on-white	Count	–	–	–	1	–	–	–	–	–	**1**
	Row %				100.00						**100.00**
	Col. %				2.00						**0.34**
Chuska Black-on-white	Count	–	–	2	–	–	–	–	–	–	**2**
	Row %			100.00							**100.00**
	Col. %			6.25							**0.69**
Toadlena Black-on-white	Count	–	–	1	2	–	–	–	–	–	**3**
	Row %			33.33	66.67						**100.00**
	Col. %			3.13	4.00						**1.03**
Table Total		**81**	**37**	**32**	**50**	**21**	**32**	**15**	**17**	**6**	**291**
		27.84	**12.71**	**11.00**	**17.18**	**7.22**	**11.00**	**5.15**	**5.84**	**2.06**	**100.00**
		100.00	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

Table 5.12. LA 32964, Study Unit 3, in-field lithic analysis by sample area.

Sample Area	Material Type	Texture	Morphology	Cortex	Condition	Platform Type	Length (mm)	Width (mm)	Thickness (mm)
1	red petrified wood	fine	core flake	0	distal	N/A	20.0	15.0	4.0
4	red petrified wood	fine	angular debris	0	N/A	N/A	23.0	20.0	4.0
4	tan petrified wood	fine	core flake	0	distal	N/A	8.0	7.0	3.0
5	tan petrified wood	fine	bidirectional core	0	whole	N/A	55.0	50.0	10.0
7	gray/red petrified wood	fine	biface	40%	whole	cortical	23.0	17.0	4.0
8	tan petrified wood	fine	core flake	0	whole	multifaceted	35.0	30.0	5.0
9	tan petrified wood	fine	core flake	0	whole	single faceted	40.0	28.0	6.0

III through early historic Navajo. SU 1 contained a total of 2,744 lithic artifacts, including 2,722 pieces of debitage and 22 flaked or battered tools. The majority of these items, however, were associated with a Basketmaker II occupation (Fig. 5.31). Therefore, debitage categorizations reflect the Basketmaker II occupations with component-based discussions offered following the debitage summary section.

Lithic debitage. The lithic debitage category for LA 32964 includes 2,761 unutilized, utilized, or retouched pieces of flake stone dominated by unutilized flakes and to a lesser extent utilized or retouched debitage. Both derived from locally available and nonlocal raw material types (Table 5.15). Flake morphology category displayed a near 1 to 1 ratio of biface to core flakes indicating that a portion of the assemblage was the result of biface maintenance or manufacture. This is supported by the presence of outrepassé and edge-bite flakes (Table 5.16).

Just over 94 percent of the debitage recovered from LA 32964 lacked dorsal cortex. When present, dorsal cortex was commonly identified on locally available raw material types (Table 5.17) indicating both a limited amount of early stage core reduction of these materials occurred on site and the transportation of already reduced local and nonlocal materials to the site. Mean measurements from whole flakes show that the majority of the debitage are small, averaging 11.5 mm in length, 9.9 mm in width, 2.3 mm in thickness, and 0.8 g in weight. The relatively small size combined with a high frequency of biface flakes and low frequency of dorsal cortex suggest these items are the result of late stage reduction associated with biface maintenance and manufacture (Table 5.18).

Local raw material types. The majority of the debitage was the result of reduction of locally available raw material types including silicified wood, chert, sedimentary, and finally quartzite. Nearly 90 percent of the materials are fine grained and flawed or fine grained in texture (Table 5.19). Of the morphological categories, flake fragments were most common followed by core flakes, and near even percentages of biface flakes and angular debris; most (94 percent) lack dorsal cortex (Tables 5.20, 5.21).

Most flakes lack platforms due to the fragmentary nature of the assemblage (Table 5.22). When present, complex or prepared platforms (multifaceted, abraded, or retouched platforms) were followed by broken platforms (crushed, collapsed, or broken in manufacture) and finally simple platforms (cortical and single faceted platforms) (Table 5.23).

Mean measurements, with the exception of sedimentary and quartzite materials, which are larger, show that whole core flakes derived from local cryptocrystalline materials are between 11 and 15 mm long, 10 and 13 mm wide, 3 and 4 mm thick, and 0.5 and 1.5 g in weight. Biface flakes are smaller, averaging between 8.5 and 9.5 mm long, 6.5 and 7.0 mm wide, 1.0 and 1.5 mm thick, and 0.2 and 1.5 g in weight (Table 5.23). Based on overall measurements, reduction of small cores and the manufacture or maintenance of bifacial tools from locally available material was common.

Silicified wood dominated the local material category, displaying a range of textures and colors. Material texture ranged from fine to coarse and color ranged from light to dark with red and chalcedonic variants identified. As to be expected fine-grained/ flawed and fine-grained materials were

Table 5.13. LA 32964, ceramic type by provenience.

Ceramic Type		Study Unit			
		1	2	3	
		1 x 1 Grid Unit	1 x 1 Grid Unit	Sample Area	Table Total
Plain rim	Count	–	1	–	**1**
	Row %		100.00		**100.00**
	Col. %		1.23		**0.25**
Plain body	Count	18	52	228	**298**
	Row %	6.04	17.45	76.51	**100.00**
	Col. %	72.00	64.20	78.35	**75.06**
Indented corrugated	Count	–	–	28	**28**
	Row %			100.00	**100.00**
	Col. %			9.62	**7.05**
Plain corrugated	Count	1	18	–	**19**
	Row %	5.26	94.74		**100.00**
	Col. %	4.00	22.22		**4.79**
Unpainted, polished white ware	Count	–	2	3	**5**
	Row %		40.00	60.00	**100.00**
	Col. %		2.47	1.03	**1.26**
Mineral paint (undifferentiated)	Count	3	–	4	**7**
	Row %	42.86		57.14	**100.00**
	Col. %	12.00		1.37	**1.76**
Red Mesa Black-on-white	Count	–	–	1	**1**
	Row %			100.00	**100.00**
	Col. %			0.34	**0.25**
Escavada Black-on-white (solid designs)	Count	1	–	2	**3**
	Row %	33.33		66.67	**100.00**
	Col. %	4.00		0.69	**0.76**
Gallup Black-on-white	Count	1	–	–	**1**
	Row %	100.00			**100.00**
	Col. %	4.00			**0.25**
White Mound Black-on-white	Count	–	1	–	**1**
	Row %		100.00		**100.00**
	Col. %		1.23		**0.25**
La Plata Black-on-white	Count	–	–	4	**4**
	Row %			100.00	**100.00**
	Col. %			1.37	**1.01**
Pueblo III (indeterminate organic)	Count	–	–	4	**4**
	Row %			100.00	**100.00**
	Col. %			1.37	**1.01**
White Mountain Red (painted, undifferentiated)	Count	–	2	–	**2**
	Row %		100.00		**100.00**
	Col. %		2.47		**0.50**
Wingate Black-on-red	Count	–	–	3	**3**
	Row %			100.00	**100.00**
	Col. %			1.03	**0.76**
Puerco Black-on-red	Count	–	–	2	**2**
	Row %			100.00	**100.00**
	Col. %			0.69	**0.50**
White Mountain Red (unpainted, undifferentiated)	Count	–	–	4	**4**
	Row %			100.00	**100.00**
	Col. %			1.37	**1.01**

(Table 5.13, continued)

Ceramic Type		Study Unit			
		1	2	3	
		1 x 1 Grid Unit	**1 x 1 Grid Unit**	**Sample Area**	**Table Total**
Wingate Polychrome	Count	–	–	1	**1**
	Row %			100.00	**100.00**
	Col. %			0.34	**0.25**
Tallahogan Red (red slip over white paste)	Count	–	1	–	**1**
	Row %		100.00		**100.00**
	Col. %		1.23		**0.25**
Mancos Black-on-white (solid and hachured)	Count	1	–	–	**1**
	Row %	100.00			**100.00**
	Col. %	4.00			**0.25**
Mesa Verde Black-on-white	Count	–	–	1	**1**
	Row %			100.00	**100.00**
	Col. %			0.34	**0.25**
Nava Black-on-white	Count	–	–	1	**1**
	Row %			100.00	**100.00**
	Col. %			0.34	**0.25**
Chuska Black-on-white	Count	–	–	2	**2**
	Row %			100.00	**100.00**
	Col. %			0.69	**0.50**
Toadlena Black-on-white	Count	–	–	3	**3**
	Row %			100.00	**100.00**
	Col. %			1.03	**0.76**
Dinetah Gray	Count	–	4	–	**4**
	Row %		100.00		**100.00**
	Col. %		4.94		**1.01**
Table Total		**25**	**81**	**291**	**397**
		6.30	**20.40**	**73.30**	**100.00**
		100.00	**100.00**	**100.00**	**100.00**

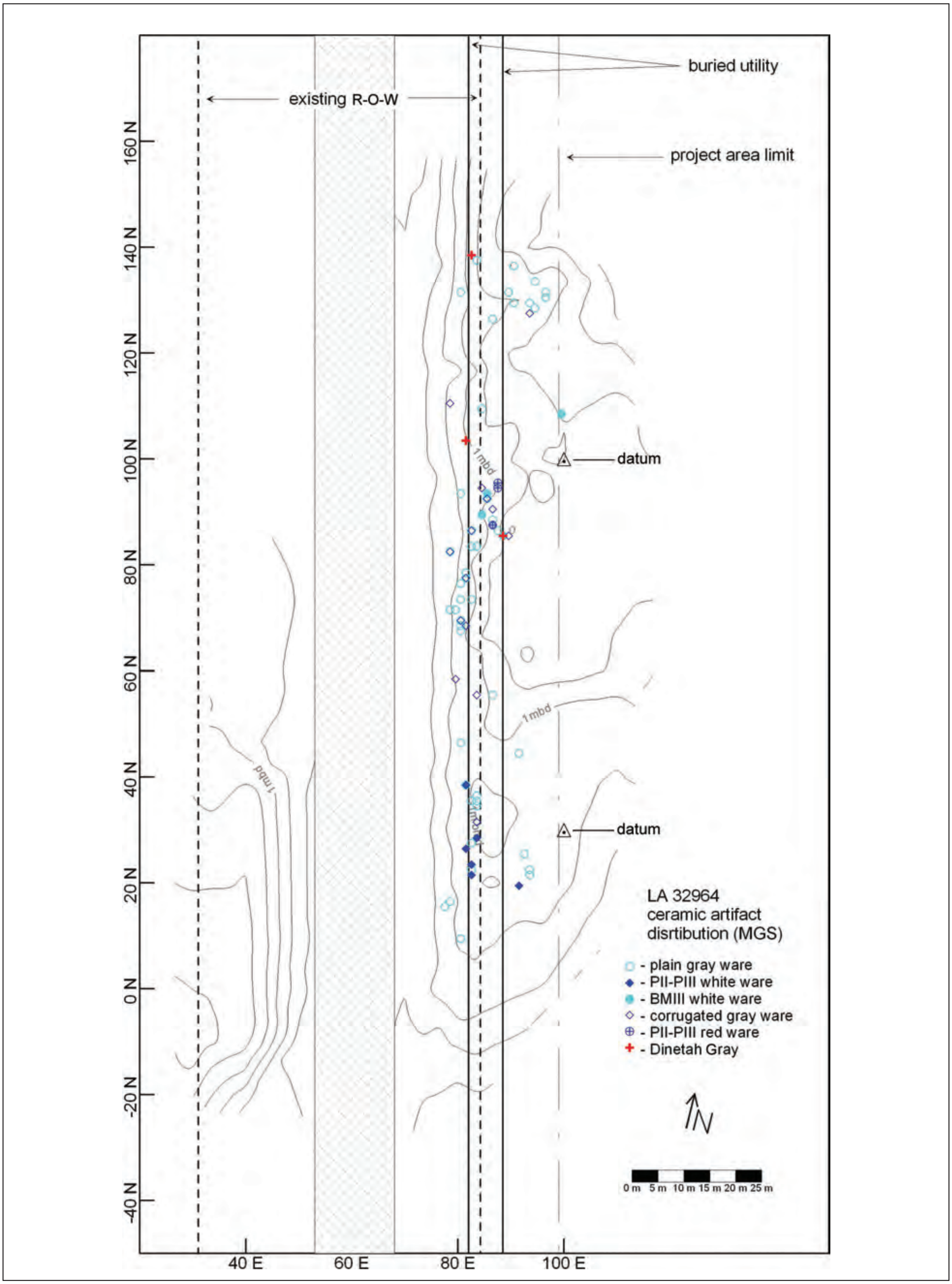


Figure 5.29. Ceramic artifact distribution, LA32964.

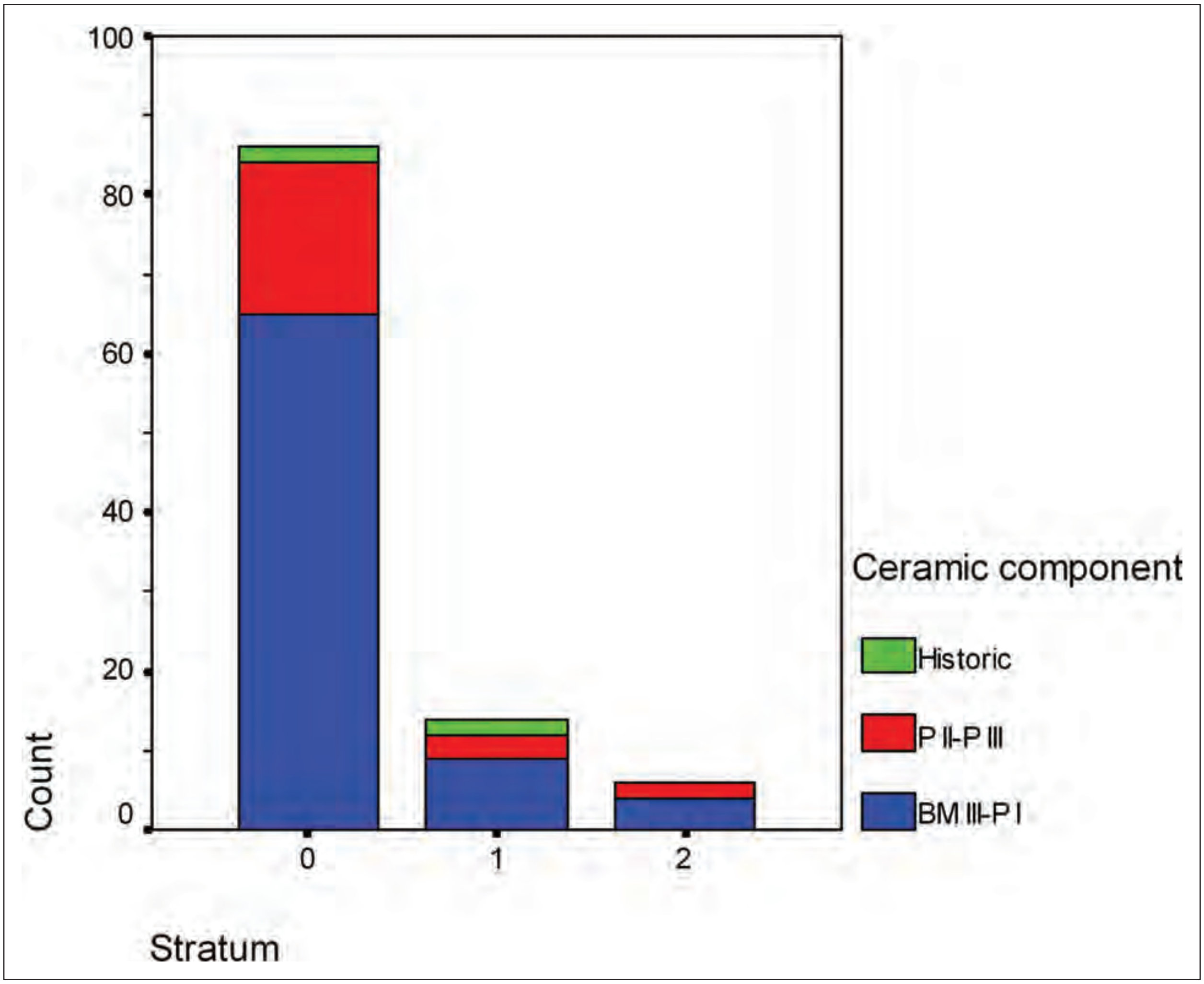


Figure 5.30. Ceramic artifact type by stratum, LA 32964.

the most common texture and quality in this material class with low frequencies of medium-grained, flawed, medium-grained and coarse grained materials in the silicified wood material (Table 5.19). Darker colored silicified wood was slightly more common than lighter colors followed by red and chalcedonic varieties.

Flake fragments represented just over 35 percent of the debitage morphology followed by core flakes, angular debris, and finally biface flakes (Table 5.20). Flake morphology is related to material texture with 90 percent (n = 384) of all core flakes and 97 percent (n = 299) of all biface flakes derived from fine grained or fine grained and flawed silicified wood. When present, striking platforms complex platforms were represented in higher frequencies than simple and broken platforms (Table 5.23) indicating pressure flaking was a common reduction technology. Of the all silicified wood flakes, whole core flakes and whole biface flakes each comprise roughly 38 percent of flake morphology and portion lending to the durability of this material type (Table 5.22). In addition, just over 87 percent of all silicified wood flakes lacked dorsal cortex (Table 5.21). Mean measurements from whole silicified wood flakes (n = 279) show that the majority of the debitage are small (Table 5.24). Interestingly, whole light colored silicified wood flakes are 3 mm smaller in size and 1 g lighter in weight than all other silicified wood colors suggesting that lighter colored materials may be of higher quality or selected to produce different types of tools than darker colors.

Table 5.14. LA 32964, lithic material source and material class by study unit.

Material Source		Study Unit 1	Study Unit 2	Study Unit 3	Table Total
Local					
Silicified wood	Count	1736	24	7	**1767**
	Row %	98.25	1.36	0.40	**100.00**
	Col. %	63.27	60.00	100.00	**63.31**
Chert	Count	582	12	–	**594**
	Row %	97.98	2.02		**100.00**
	Col %	21.21	30.00		**21.28**
Sedimentary	Count	41	1	–	**42**
	Row %	97.62	2.38		**100.00**
	Col %	1.49	2.50		**1.50**
Quartzite	Count	14	1	–	**15**
	Row %	93.33	6.67		**100.00**
	Col %	0.51	2.50		**0.54**
Non-local					
Chert	Count	44	–	–	**44**
	Row %	100.00			**100.00**
	Col %	1.60			**1.58**
Obsidian	Count	327	2	–	**329**
	Row %	99.39	0.61		**100.00**
	Col %	11.92	5.00		**11.79**
Table Total	**Count**	**2744**	**40**	**7**	**2791**
	Row %	**98.32**	**1.43**	**0.25**	**100.00**
	Col %	**100.00**	**100.00**	**100.00**	**100.00**

The local chert material category includes chert, chalcedony, and fossiliferous chert. This material category mimics the trends identified in the silicified wood material class. Fine-grained and flawed, fine-grained materials were most common followed by medium-grained and flawed, medium-grained materials (Table 5.19). Flake fragments represented over 38 percent of the chert debitage morphology followed by near equal percentages of biface flakes and core flakes, and finally angular debris (Table 5.16). As with silicified wood, most chert flakes were derived from high quality material with 90 percent (n = 126) of all core flakes and 96 percent (n = 136) of all biface flakes recorded as fine grained or fine grained/flawed chert. Platforms were absent from 40 percent of the local chert debitage. When present, broken platforms were slightly more common than complex platforms which were, in turn, represented in higher frequencies than simple platforms (see Table 5.23), indicating that platform preparation was geared toward pressure and soft percussion reduction methods. Of all local chert debitage recovered from SU 1, whole core flakes comprise 30 percent and whole biface flakes 28 percent of the whole flake types from this material class (Table 5.22). Similar to other local materials most chert debitage lacked dorsal cortex (see Table 5.19). Whole flake measurements for this material class are slightly smaller, on average, compared to whole flake measurements from the silicified wood material class (Table 5.24). In the local chert material class, mean dimensions from whole chert flakes are larger than mean dimensions of chalcedony flakes yet smaller in overall size compared to fossiliferous chert flakes. This may be related to the size or type of the tool being produced rather than material quality since all are derived from fine-grained materials.

Locally available sedimentary and quartzite materials included tan siltstone, limestone, sandstone, metaquartzite, and orthoquartzite. This mate-

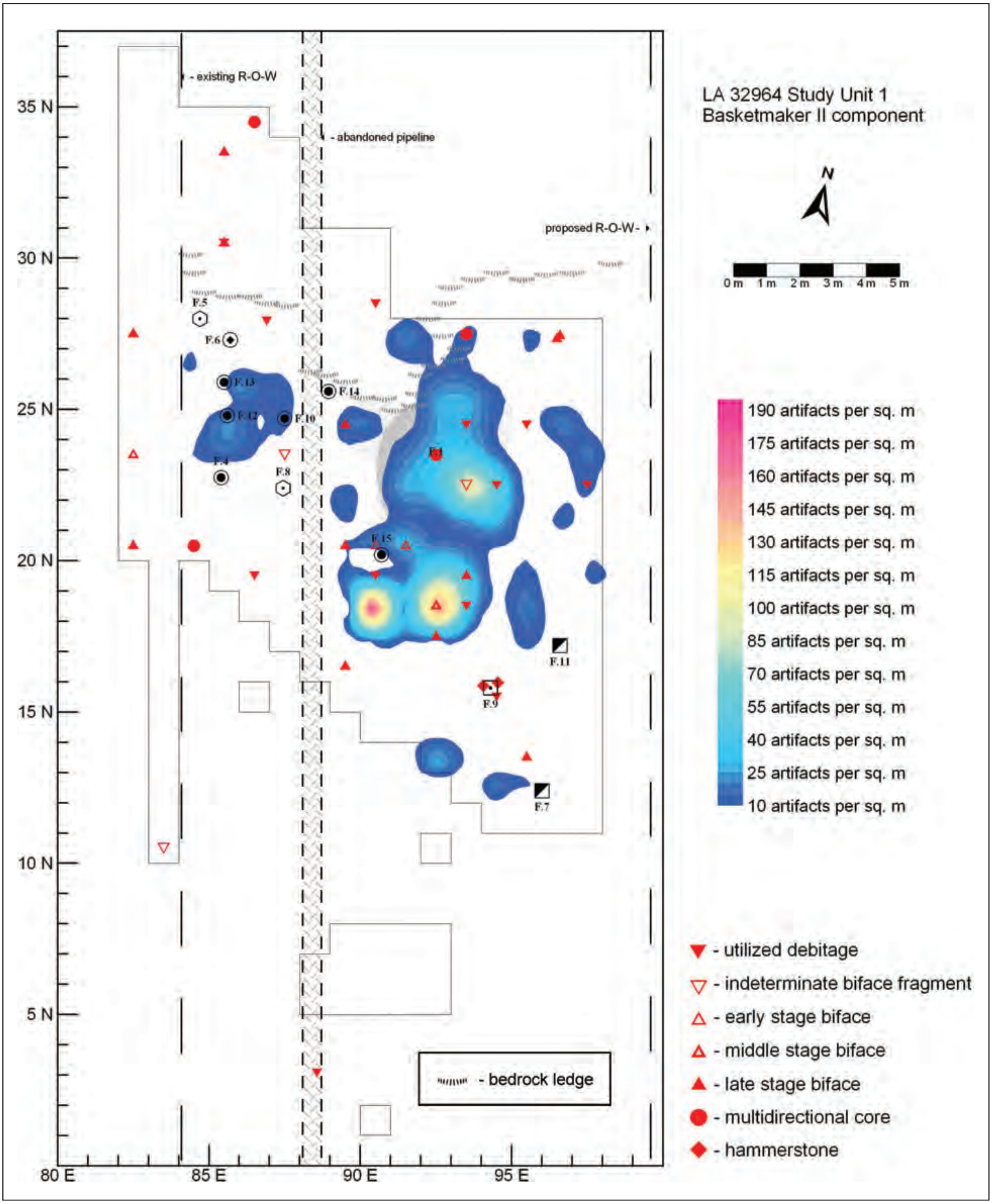


Figure 5.31. Chipped stone debitage aggregated by count, Study Unit 1, LA 32964.

Table 5.15. LA 32964, lithic material source and material class by artifact function.

			Artifact Function		
Lithic Source	Material Class		Unutilized Debitage	Utilized/ Retouched Debitage	Table Total
Local	Silicified wood	Count	1737	13	**1750**
		Row %	99.26	0.74	**100.00**
		Col. %	63.42	59.09	**63.38**
	Chert	Count	585	2	**587**
		Row %	99.66	0.34	**100.00**
		Col. %	21.36	9.09	**21.26**
	Sedimentary	Count	41	–	**41**
		Row %	100.00		**100.00**
		Col. %	1.50		**1.48**
	Quartzite	Count	13	1	**14**
		Row %	92.86	7.14	**100.00**
		Col. %	0.47	4.55	**0.51**
	Group Total	**Count**	**2376**	**16**	**2392**
		Row %	**99.33**	**0.67**	**100.00**
		Col. %	**86.75**	**72.73**	**86.64**
Non-local	Chert	Count	42	1	**43**
		Row %	97.67	2.33	**100.00**
		Col. %	1.53	4.55	**1.56**
	Obsidian	Count	321	5	**326**
		Row %	98.47	1.53	**100.00**
		Col. %	11.72	22.73	**11.81**
	Group Total	**Count**	**363**	**6**	**369**
		Row %	**98.37**	**1.63**	**100.00**
		Col. %	**13.25**	**27.27**	**13.36**
Table Total		**Count**	**2739**	**22**	**2761**
		Row %	**99.20**	**0.80**	**100.00**
		Col. %	**100.00**	**100.00**	**100.00**

rial category displayed different trends compared to the silicified wood and local chert material classes. Flake fragments represented over 51 percent of the debitage morphology followed by core flakes with low frequencies of biface flakes and angular debris (see Table 5.20). Although the sample size is small, flake types also appear to be related to material quality and texture with 56 percent (n = 10) of all core flakes and 100 percent (n = 4) of all biface flakes derived from fine grained or fine grained/flawed materials. Platforms were absent from 56 percent (n = 28) of the sedimentary and quartzite debitage. Simple platforms were the most common platform type identified followed by low frequencies of complex and broken platforms (see Table 5.23). Over 89 percent (n = 48) of all sedimentary and quartzite debitage lacks dorsal cortex (see Table 5.21).

Based on a small sample, mean core whole flake measurements for this material class are dissimilar to the previous two, likely reflecting a different reduction pattern. Whole sedimentary and quartzite core flakes show a difference in size being larger compared to the whole core flake dimensions of cryptocrystalline materials. However sedimentary biface flakes are similar in size to cryptocrystalline material types particularly fine-grained siltstone and limestone materials suggesting similar reduction strategies (see Table 5.24). Although measures of flake morphology, material texture, and frequency of dorsal cortex are consistent with other local lithic categories, mean size of sedimentary and quartzite core flake debitage suggest a differed reduction strategy, perhaps geared toward the shaping of ground stone or cobble tools resulting in larger flake dimensions.

Nonlocal raw material types. Nonlocal material

Table 5.16. LA 32964, lithic material source by material class and artifact morphology.

		Artifact Morphology							
		Angular Debris	**Core Flake**	**Biface Flake**	**Pot Lid**	**Flake Fragment**	**Biface Fragment, Edge-bite Flake**	**Biface Fragment, Overshoot Flake**	**Table Total**
Local									
Silicified wood	Count	384	441	305	3	613	3	1	**1750**
	Row %	21.94	25.20	17.43	0.17	35.03	0.17	0.06	**100.00**
	Col. %	74.27	66.92	54.56	75.00	60.33	60.00	100.00	**63.38**
Chert	Count	94	144	143	1	203	2	–	**587**
	Row %	16.01	24.53	24.36	0.17	34.58	0.34		**100.00**
	Col. %	18.18	21.85	25.58	25.00	19.98	40.00		**21.26**
Sedimentary	Count	2	14	4	–	21	–	–	**41**
	Row %	4.88	34.15	9.76		51.22			**100.00**
	Col. %	0.39	2.12	0.72		2.07			**1.48**
Quartzite	Count	2	5	–	–	7	–	–	**14**
	Row %	14.29	35.71			50.00			**100.00**
	Col. %	0.39	0.76			0.69			**0.51**
Group Total	**Count**	**482**	**604**	**452**	**4**	**844**	**5**	**1**	**2392**
	Row %	**20.15**	**25.25**	**18.90**	**0.17**	**35.28**	**0.21**	**0.04**	**100.00**
	Col. %	**93.23**	**91.65**	**80.86**	**100.00**	**83.07**	**100.00**	**100.00**	**86.64**
Non-local									
Chert	Count	1	6	18	–	18	–	–	**43**
	Row %	2.33	13.95	41.86		41.86			**100.00**
	Col. %	0.19	0.91	3.22		1.77			**1.56**
Obsidian	Count	34	49	89	–	154	–	–	**326**
	Row %	10.43	15.03	27.30		47.24			**100.00**
	Col. %	6.58	7.44	15.92		15.16			**11.81**
Group Total	**Count**	**35**	**55**	**107**	**–**	**172**	**–**	**–**	**369**
	Row %	**9.49**	**14.91**	**29.00**		**46.61**			**100.00**
	Col. %	**6.77**	**8.35**	**19.14**		**16.93**			**13.36**
Table Total	**Count**	**517**	**659**	**559**	**4**	**1016**	**5**	**1**	**2761**
	Row %	**18.73**	**23.87**	**20.25**	**0.14**	**36.80**	**0.18**	**0.04**	**100.00**
	Col. %	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

classes included obsidian and chert. The obsidian material class includes items derived from the Jemez Mountains (Appendix 3) and Mount Taylor areas of New Mexico. Nonlocal chert types were identified as Washington Pass chert (Narbona Pass chert), San Andres chert, and Zuni Mountain chert.

Obsidian flake morphology was dominated by flake fragments followed by biface flakes, core flakes, and finally angular debris (Table 5.25). The ratio between core flakes and biface flakes is .53 to 1 indicating there was more biface reduction of this material type compared to local materials. Striking platforms, when present, were broken or complex with a low frequency of simple platforms identified, supporting the observation that biface reduction of this material type through pressure or soft hammer percussion was common (Table 5.26).

The texture and quality of the obsidian material class, not surprisingly, ranged from glassy to glassy and flawed (Table 5.27). As with the local material classes, the vast majority (98 percent) of the obsidian recovered lacked dorsal cortex (Table 5.28). Whole flake measurements for this material class, although limited, show that the majority of the debitage are smaller than other nonlocal and local material types (Table 5.29). This may be related to the

Table 5.17. LA 32964, lithic material source by percent of dorsal cortex

Material Source		Dorsal Cortex Retention			
		Lacks Cortex	1–50 %	51–100 %	Table Total
Local					
Silicified wood	Count	1623	81	46	**1750**
	Row %	92.74	4.63	2.63	**100.00**
	Col. %	62.42	75.70	85.19	**63.38**
Chert	Count	566	16	5	**587**
	Row %	96.42	2.73	0.85	**100.00**
	Col. %	21.77	14.95	9.26	**21.26**
Sedimentary	Count	39	2	–	**41**
	Row %	95.12	4.88		**100.00**
	Col. %	1.50	1.87		**1.48**
Quartzite	Count	10	2	2	**14**
	Row %	71.43	14.29	14.29	**100.00**
	Col. %	0.38	1.87	3.70	**0.51**
Group Total	**Count**	**2238**	**101**	**53**	**2392**
	Row %	**93.56**	**4.22**	**2.22**	**100.00**
	Col. %	**86.08**	**94.39**	**98.15**	**86.64**
Non-local					
Chert	Count	42	1	–	**43**
	Row %	97.67	2.33		**100.00**
	Col. %	1.62	0.93		**1.56**
Obsidian	Count	320	5	1	**326**
	Row %	98.16	1.53	0.31	**100.00**
	Col. %	12.31	4.67	1.85	**11.81**
Group Total	**Count**	**362**	**6**	**1**	**369**
	Row %	**98.10**	**1.63**	**0.27**	**100.00**
	Col. %	**13.92**	**5.61**	**1.85**	**13.36**
Table Total	**Count**	**2600**	**107**	**54**	**2761**
	Row %	**94.17**	**3.88**	**1.96**	**100.00**
	Col. %	**100.00**	**100.00**	**100.00**	**100.00**

Table 5.18. LA 32964, lithic material source by mean whole flake measurements.

	Length (mm)	Width (mm)	Thickness (mm)	Weight (g)
Local				
Mean	11.78	10.31	2.45	0.85
N	370	370	370	370
Standard deviation	7.85	7.08	2.41	3.67
Non-local				
Mean	9.43	6.81	1.49	0.14
N	37	37	37	37
Standard deviation	3.93	3.12	0.69	0.11
Total				
Mean	**11.57**	**9.99**	**2.36**	**0.79**
N	**407**	**407**	**407**	**407**
Standard deviation	**7.60**	**6.89**	**2.32**	**3.51**

Table 5.19. LA 32964, local lithic material class and type by texture.

Material Class	Material Type		Material Quality: Fine-grained	Fine-grained and Flawed	Medium-grained	Medium-grained and Flawed	Coarse-grained	Table Total
Silicified wood	Silicified wood, light colors	Count	394	205	57	34	1	**691**
		Row %	57.02	29.67	8.25	4.92	0.14	**100.00**
		Col %	27.27	29.12	36.08	42.50	20.00	**28.89**
	Silicified wood, dark colors	Count	446	270	35	28	2	**781**
		Row %	57.11	34.57	4.48	3.59	0.26	**100.00**
		Col %	30.87	38.35	22.15	35.00	40.00	**32.65**
	Silicified wood, red and mottled red	Count	99	66	13	4	–	**182**
		Row %	54.40	36.26	7.14	2.20		**100.00**
		Col %	6.85	9.38	8.23	5.00		**7.61**
	Silicified wood, chalcedonic	Count	63	32	–	1	–	**96**
		Row %	65.63	33.33		1.04		**100.00**
		Col %	4.36	4.55		1.25		**4.01**
	Group Total	**Count**	**1002**	**573**	**105**	**67**	**3**	**1750**
		Row %	**57.26**	**32.74**	**6.00**	**3.83**	**0.17**	**100.00**
		Col %	**69.34**	**81.39**	**66.46**	**83.75**	**60.00**	**73.16**
Chert	Chert	Count	227	62	37	11	–	**337**
		Row %	67.36	18.40	10.98	3.26		**100.00**
		Col %	15.71	8.81	23.42	13.75		**14.09**
	Chalcedony	Count	146	64	5	1	–	**216**
		Row %	67.59	29.63	2.31	0.46		**100.00**
		Col %	10.10	9.09	3.16	1.25		**9.03**
	Fossiliferous chert (tan/gray)	Count	32	2	–	–	–	**34**
		Row %	94.12	5.88				**100.00**
		Col %	2.21	0.28				**1.42**
	Group Total	**Count**	**405**	**128**	**42**	**12**	**–**	**587**
		Row %	**68.99**	**21.81**	**7.16**	**2.04**		**100.00**
		Col %	**28.03**	**18.18**	**26.58**	**15.00**		**24.54**
Sedi-mentary	Tan siltstone	Count	27	2	2	–	–	**31**
		Row %	87.10	6.45	6.45			**100.00**
		Col %	1.87	0.28	1.27			**1.30**
	Limestone	Count	3	–	2	–	–	**5**
		Row %	60.00		40.00			**100.00**
		Col %	0.21		1.27			**0.21**
	Sandstone	Count	1	–	1	1	2	**5**
		Row %	20.00		20.00	20.00	40.00	**100.00**
		Col %	0.07		0.63	1.25	40.00	**0.21**
	Group Total	**Count**	**31**	**2**	**5**	**1**	**2**	**41**
		Row %	**75.61**	**4.88**	**12.20**	**2.44**	**4.88**	**100.00**
		Col %	**2.15**	**0.28**	**3.16**	**1.25**	**40.00**	**1.71**
Quartzite	Meta-quartzite	Count	6	1	4	–	–	**11**
		Row %	54.55	9.09	36.36			**100.00**
		Col %	0.42	0.14	2.53			**0.46**
	Ortho-quartzite	Count	1	–	2	–	–	**3**
		Row %	33.33		66.67			**100.00**
		Col %	0.07		1.27			**0.13**
	Group Total	**Count**	**7**	**1**	**6**	**–**	**–**	**14**
		Row %	**50.00**	**7.14**	**42.86**			**100.00**
		Col %	**0.48**	**0.14**	**3.80**			**0.59**
Table Total		**Count**	**1445**	**704**	**158**	**80**	**5**	**2392**
		Row %	**60.41**	**29.43**	**6.61**	**3.34**	**0.21**	**100.00**
		Col %	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

Table 5.20. LA 32964, local lithic material class and type by artifact morphology.

			Artifact Morphology							
Material Class	**Material Type**		**Angular Debris**	**Core Flake**	**Biface Flake**	**Pot Lid**	**Flake Fragment**	**Biface Fragment, Edge-bite Flake**	**Biface Fragment, Overshoot Flake**	**Table Total**
Silicified wood	Silicified wood, light colors	Count	161	151	124	1	253	–	1	**691**
		Row %	23.30	21.85	17.95	0.14	36.61		0.14	**100.00**
		Col. %	33.40	25.00	27.43	25.00	29.98		100.00	**28.89**
	Silicified wood, dark colors	Count	171	219	117	2	269	3	–	**781**
		Row %	21.90	28.04	14.98	0.26	34.44	0.38		**100.00**
		Col. %	35.48	36.26	25.88	50.00	31.87	60.00		**32.65**
	Silicified wood, red and mottled red	Count	39	44	38	–	61	–	–	**182**
		Row %	21.43	24.18	20.88		33.52			**100.00**
		Col. %	8.09	7.28	8.41		7.23			**7.61**
	Silicified wood, chalcedonic	Count	13	27	26	–	30	–	–	**96**
		Row %	13.54	28.13	27.08		31.25			**100.00**
		Col. %	2.70	4.47	5.75		3.55			**4.01**
	Group Total	**Count**	**384**	**441**	**305**	**3**	**613**	**3**	**1**	**1750**
		Row %	**21.94**	**25.20**	**17.43**	**0.17**	**35.03**	**0.17**	**0.06**	**100.00**
		Col. %	**79.67**	**73.01**	**67.48**	**75.00**	**72.63**	**60.00**	**100.00**	**73.16**
Chert	Chert	Count	46	78	84	1	127	1	–	**337**
		Row %	13.65	23.15	24.93	0.30	37.69	0.30		**100.00**
		Col. %	9.54	12.91	18.58	25.00	15.05	20.00		**14.09**
	Chalcedony	Count	47	57	50	–	62	–	–	**216**
		Row %	21.76	26.39	23.15		28.70			**100.00**
		Col. %	9.75	9.44	11.06		7.35			**9.03**
	Fossiliferous chert (tan/gray)	Count	1	9	9	–	14	1	–	**34**
		Row %	2.94	26.47	26.47		41.18	2.94		**100.00**
		Col. %	0.21	1.49	1.99		1.66	20.00		**1.42**
	Group Total	**Count**	**94**	**144**	**143**	**1**	**203**	**2**	**–**	**587**
		Row %	**16.01**	**24.53**	**24.36**	**0.17**	**34.58**	**0.34**		**100.00**
		Col. %	**19.50**	**23.84**	**31.64**	**25.00**	**24.05**	**40.00**		**24.54**
Sedimen-tary	Tan siltstone	Count	1	8	4	–	18	–	–	**31**
		Row %	3.23	25.81	12.90		58.06			**100.00**
		Col. %	0.21	1.32	0.88		2.13			**1.30**
	Limestone	Count	–	3	–	–	2	–	–	**5**
		Row %		60.00			40.00			**100.00**
		Col. %		0.50			0.24			**0.21**
	Sandstone	Count	1	3	–	–	1	–	–	**5**
		Row %	20.00	60.00			20.00			**100.00**
		Col. %	0.21	0.50			0.12			**0.21**
	Group Total	Count	2	14	4	–	21	–	–	**41**
		Row %	4.88	34.15	9.76		51.22			**100.00**
		Col. %	0.41	2.32	0.88		2.49			**1.71**
Quartzite	Metaquartzite	Count	1	5	–	–	5	–	–	**11**
		Row %	9.09	45.45			45.45			**100.00**
		Col. %	0.21	0.83			0.59			**0.46**
	Orthoquartzite	Count	1	–	–	–	2	–	–	**3**
		Row %	33.33				66.67			**100.00**
		Col. %	0.21				0.24			**0.13**
	Group Total	**Count**	**2**	**5**	**–**	**–**	**7**	**–**	**–**	**14**
		Row %	**14.29**	**35.71**			**50.00**			**100.00**
		Col. %	**0.41**	**0.83**			**0.83**			**0.59**
Table Total		**Count**	**482**	**604**	**452**	**4**	**844**	**5**	**1**	**2392**
		Row %	**20.15**	**25.25**	**18.90**	**0.17**	**35.28**	**0.21**	**0.04**	**100.00**
		Col. %	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

Table 5.21. LA 32964, local lithic material class by percentage of dorsal cortex.

			Dorsal Cortex Retention			
			Lacks Cortex	**1–50 %**	**51–100 %**	**Table Total**
Silicified wood	Silicified wood, light colors	Count	662	17	12	**691**
		Row %	95.80	2.46	1.74	**100.00**
		Col. %	29.58	16.83	22.64	**28.89**
	Silicified wood, dark colors	Count	706	50	25	**781**
		Row %	90.40	6.40	3.20	**100.00**
		Col. %	31.55	49.50	47.17	**32.65**
	Silicified wood, red and mottled red	Count	171	7	4	**182**
		Row %	93.96	3.85	2.20	**100.00**
		Col. %	7.64	6.93	7.55	**7.61**
	Silicified wood, chalce-donic	Count	84	7	5	**96**
		Row %	87.50	7.29	5.21	**100.00**
		Col. %	3.75	6.93	9.43	**4.01**
	Group Total	**Count**	**1623**	**81**	**46**	**1750**
		Row %	**92.74**	**4.63**	**2.63**	**100.00**
		Col. %	**72.52**	**80.20**	**86.79**	**73.16**
Chert	Chert	Count	320	13	4	**337**
		Row %	94.96	3.86	1.19	**100.00**
		Col. %	14.30	12.87	7.55	**14.09**
	Chalce-dony	Count	215	1	–	**216**
		Row %	99.54	0.46		**100.00**
		Col. %	9.61	0.99		**9.03**
	Fossili-ferous chert, (tan/gray)	Count	31	2	1	**34**
		Row %	91.18	5.88	2.94	**100.00**
		Col. %	1.39	1.98	1.89	**1.42**
	Group Total	**Count**	**566**	**16**	**5**	**587**
		Row %	**96.42**	**2.73**	**0.85**	**100.00**
		Col. %	**25.29**	**15.84**	**9.43**	**24.54**
Sedimentary	Tan siltstone	Count	31	–	–	**31**
		Row %	100.00			**100.00**
		Col. %	1.39			**1.30**
	Limestone	Count	4	1	–	**5**
		Row %	80.00	20.00		**100.00**
		Col. %	0.18	0.99		**0.21**
	Sandstone	Count	4	1	–	**5**
		Row %	80.00	20.00		**100.00**
		Col. %	0.18	0.99		**0.21**
	Group Total	**Count**	**39**	**2**	**–**	**41**
		Row %	**95.12**	**4.88**		**100.00**
		Col. %	**1.74**	**1.98**		**1.71**
Quartzite	Meta-quartzite	**Count**	**9**	**2**	**–**	**11**
		Row %	**81.82**	**18.18**		**100.00**
		Col. %	0.40	1.98		**0.46**
	Ortho-quartzite	Count	1	–	2	**3**
		Row %	33.33		66.67	**100.00**
		Col. %	0.04		3.77	**0.13**
	Group Total	**Count**	**10**	**2**	**2**	**14**
		Row %	**71.43**	**14.29**	**14.29**	**100.00**
		Col. %	**0.45**	**1.98**	**3.77**	**0.59**
Table Total		**Count**	**2238.00**	**101.00**	**53.00**	**2392.00**
		Row %	**93.56**	**4.22**	**2.22**	**100.00**
		Col. %	**100**	**100**	**100**	**100**

Table 5.22. LA 32964, local lithic material class and artifact morphology by artifact portion.

Material Class	Artifact Morphology		Portion							
			Indeter-minate Fragment	Whole	Proxi-mal	Medial	Distal	Lateral	Edge Bite	Table Total
Silicified wood	Angular debris	Count	384	–	–	–	–	–	–	**384**
		Row %	100.00							**100.00**
		Col. %	78.69							**16.05**
	Core flake	Count	1	165	174	–	–	101	–	**441**
		Row %	0.23	37.41	39.46			22.90		**100.00**
		Col. %	0.20	44.59	33.08			17.47		**18.44**
	Biface flake	Count	–	117	177	–	–	11	–	**305**
		Row %		38.36	58.03			3.61		**100.00**
		Col. %		31.62	33.65			1.90		**12.75**
	Pot lid	Count	3	–	–	–	–	–	–	**3**
		Row %	100.00							**100.00**
		Col. %	0.61							**0.13**
	Flake fragment	Count	–	–	–	138	168	307	–	**613**
		Row %				22.51	27.41	50.08		**100.00**
		Col. %				74.19	70.00	53.11		**25.63**
	Biface fragment, edge-bite flake	Count	–	–	–	–	–	–	3	**3**
		Row %							100.00	**100.00**
		Col. %							75.00	**0.13**
	Biface fragment, overshoot flake	Count	–	–	–	–	1	–	–	**1**
		Row %					100.00			**100.00**
		Col. %					0.42			**0.04**
	Group Total	**Count**	**388**	**282**	**351**	**138**	**169**	**419**	**3**	**1750**
		Row %	**22.17**	**16.11**	**20.06**	**7.89**	**9.66**	**23.94**	**0.17**	**100.00**
		Col. %	**79.51**	**76.22**	**66.73**	**74.19**	**70.42**	**72.49**	**75.00**	**73.16**
Chert	Angular debris	Count	94	–	–	–	–	–	–	**94**
		Row %	100.00							**100.00**
		Col. %	19.26							**3.93**
	Core flake	Count	–	44	67	1	–	32	–	**144**
		Row %		30.56	46.53	0.69		22.22		**100.00**
		Col. %		11.89	12.74	0.54		5.54		**6.02**
	Biface flake	Count	–	39	96	–	–	8	–	**143**
		Row %		27.27	67.13			5.59		**100.00**
		Col. %		10.54	18.25			1.38		**5.98**
	Pot lid	Count	1	–	–	–	–	–	–	**1**
		Row %	100.00							**100.00**
		Col. %	0.20							**0.04**
	Flake fragment	Count	–	–	–	40	62	101	–	**203**
		Row %				19.70	30.54	49.75		**100.00**
		Col. %				21.51	25.83	17.47		**8.49**
	Biface fragment, edge-bite flake	Count	1	–	–	–	–	–	1	**2**
		Row %	50.00						50.00	**100.00**
		Col. %	0.20						25.00	**0.08**
	Group Total	**Count**	**96**	**83**	**163**	**41**	**62**	**141**	**1**	**587**
		Row %	**16.35**	**14.14**	**27.77**	**6.98**	**10.56**	**24.02**	**0.17**	**100.00**
		Col. %	**19.67**	**22.43**	**30.99**	**22.04**	**25.83**	**24.39**	**25.00**	**24.54**

(Table 5.22, continued)

Material Class	Artifact Morphology		Portion							
			Indeter-minate Fragment	Whole	Proxi-mal	Medial	Distal	Lateral	Edge Bite	Table Total
Sedi-mentary	Angular debris	Count	2	–	–	–	–	–	–	**2**
		Row %	100.00							**100.00**
		Col. %	0.41							**0.08**
	Core flake	Count	–	2	8	–	–	4	–	**14**
		Row %		14.29	57.14			28.57		**100.00**
		Col. %		0.54	1.52			0.69		**0.59**
	Biface flake	Count	–	2	2	–	–	–	–	**4**
		Row %		50.00	50.00					**100.00**
		Col. %		0.54	0.38					**0.17**
	Flake fragment	Count	–	–	–	6	5	10	–	**21**
		Row %				28.57	23.81	47.62		**100.00**
		Col. %				3.23	2.08	1.73		**0.88**
	Group Total	**Count**	**2**	**4**	**10**	**6**	**5**	**14**	**–**	**41**
		Row %	**4.88**	**9.76**	**24.39**	**14.63**	**12.20**	**34.15**		**100.00**
		Col. %	**0.41**	**1.08**	**1.90**	**3.23**	**2.08**	**2.42**		**1.71**
Quartzite	Angular debris	Count	2	–	–	–	–	–	–	**2**
		Row %	100.00							**100.00**
		Col. %	0.41							**0.08**
	Core flake	Count	–	1	2	–	–	2	–	**5**
		Row %		20	40			40		**100**
		Col. %		0.27027	0.3802			0.346021		**0.209**
	Flake fragment	Count	–	–	–	1	4	2	–	**7**
		Row %				14.29	57.14	28.57		**100.00**
		Col. %				0.54	1.67	0.35		**0.29**
	Group Total	**Count**	**2**	**1**	**2**	**1**	**4**	**4**	**–**	**14**
		Row %	**14.29**	**7.14**	**14.29**	**7.14**	**28.57**	**28.57**		**100.00**
		Col. %	**0.41**	**0.27**	**0.38**	**0.54**	**1.67**	**0.69**		**0.59**
Table Total		**Count**	**488**	**370**	**526**	**186**	**240**	**578**	**4**	**2392**
		Row %	**20.40**	**15.47**	**21.99**	**7.78**	**10.03**	**24.16**	**0.17**	**100.00**
		Col. %	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

Table 5.23. LA 32964 local lithic material class and type by platform type.

			Platform Class				
Component	**Material Class**		**Absent**	**Simple**	**Complex or Prepared**	**Platform Breakage**	**Table Total**
Basketmaker III–Pueblo III	Silicified wood	Count	105	63	68	43	**279**
		Row %	37.63	22.58	24.37	15.41	**100**
		Col. %	12.76	20.72	16	12.15	**14.64**
	Chert	Count	19	8	13	8	**48**
		Row %	39.58	16.67	27.08	16.67	**100**
		Col. %	2.31	2.63	3.06	2.26	**2.52**
	Sedimentary	Count	7	4	1	2	**14**
		Row %	50	28.57	7.14	14.29	**100**
		Col. %	0.85	1.32	0.24	0.56	**0.73**
	Quartzite	Count	1	2	–	2	**5**
		Row %	20	40		40	**100**
		Col. %	0.12	0.66		0.56	**0.26**
	Chalcedony	Count	3	2	5	8	**18**
		Row %	16.67	11.11	27.78	44.44	**100**
		Col. %	0.36	0.66	1.18	2.26	**0.94**
	Group Total	**Count**	**135**	**79**	**87**	**63**	**364**
		Row %	**37.09**	**21.70**	**23.90**	**17.31**	**100**
		Col. %	**16.40**	**25.99**	**20.47**	**17.80**	**19.10**
Basketmaker II	Silicified wood	Count	493	151	244	196	**1084**
		Row %	45.48	13.93	22.51	18.08	**100**
		Col. %	59.90	49.67	57.41	55.37	**56.87**
	Chert	Count	116	45	53	61	**275**
		Row %	42.18	16.36	19.27	22.18	**100**
		Col. %	14.09	14.80	12.47	17.23	**14.43**
	Sedimentary	Count	14	5	4	2	**25**
		Row %	56	20	16	8	**100**
		Col. %	1.70	1.64	0.94	0.56	**1.31**
	Quartzite	Count	6	1	–	–	**7**
		Row %	85.71	14.29			**100**
		Col. %	0.73	0.33			**0.37**
	Chalcedony	Count	59	23	37	32	**151**
		Row %	39.07	15.23	24.50	21.19	**100**
		Col. %	7.17	7.57	8.71	9.04	**7.92**
	Group Total	**Count**	**688**	**225**	**338**	**291**	**1542**
		Row %	**44.62**	**14.59**	**21.92**	**18.87**	**100**
		Col. %	**83.60**	**74.01**	**79.53**	**82.20**	**80.90**
Table Total		**Count**	**823**	**304**	**425**	**354**	**1906**
		Row %	**43.18**	**15.95**	**22.30**	**18.57**	**100**
		Col. %	**100**	**100**	**100**	**100**	**100**

Table 5.24. LA 32964, mean whole flake measurements by artifact morphology and material type.

Material Type	Artifact Morphology		Length (mm)	Width (mm)	Thickness (mm)	Weight (g)
Silicified wood	Core flake	Mean	13.34	12.92	3.24	1.33
		N	165	165	165	165
		SD	9.45	8.02	2.95	5.03
	Biface flake	Mean	9.54	7.03	1.45	0.18
		N	117	117	117	117
		SD	4.78	3.55	0.66	0.22
	Total	**Mean**	**11.76**	**10.48**	**2.50**	**0.85**
		N	**282**	**282**	**282**	**282**
		SD	**8.07**	**7.16**	**2.46**	**3.89**
Chert	Core flake	Mean	13.23	12.14	2.95	1.10
		N	44	44	44	44
		SD	7.54	7.46	2.38	3.08
	Biface flake	Mean	9.36	6.41	1.26	0.14
		N	39	39	39	39
		SD	3.26	2.55	0.50	0.13
	Total	**Mean**	**11.41**	**9.45**	**2.16**	**0.65**
		N	**83**	**83**	**83**	**83**
		SD	**6.21**	**6.36**	**1.95**	**2.28**
Sedimentary	Core flake	Mean	16.50	17.00	4.00	1.10
		N	2	2	2	2
		SD	2.12	5.66	0.00	0.14
	Biface flake	Mean	8.00	4.50	1.00	0.10
		N	2	2	2	2
		SD	2.83	0.71	0.00	0.00
	Total	**Mean**	**12.25**	**10.75**	**2.50**	**0.60**
		N	**4**	**4**	**4**	**4**
		SD	**5.32**	**7.93**	**1.73**	**0.58**
Quartzite	Core flake	Mean	46.00	33.00	13.00	18.20
		N	1	1	1	1
		SD	–	–	–	–
	Total	**Mean**	**46.00**	**33.00**	**13.00**	**18.20**
		N	**1**	**1**	**1**	**1**
		SD	**–**	**–**	**–**	**–**
Total	**Core flake**	**Mean**	**13.50**	**12.89**	**3.23**	**1.36**
		N	**212**	**212**	**212**	**212**
		SD	**9.28**	**7.98**	**2.90**	**4.79**
	Biface flake	**Mean**	**9.47**	**6.84**	**1.40**	**0.17**
		N	**158**	**158**	**158**	**158**
		SD	**4.42**	**3.32**	**0.63**	**0.20**
	Total	**Mean**	**11.78**	**10.31**	**2.45**	**0.85**
		N	**370**	**370**	**370**	**370**
		SD	**7.85**	**7.08**	**2.41**	**3.67**

SD = Standard Deviation

size of the tool being produced, parent core size, or degree of maintenance rather than material quality since all are derived from glassy materials. The low frequency of angular debris, the high frequency of biface flakes, and the lack of dorsal cortex suggest late stage core reduction and small biface maintenance or manufacture occurred at this location. The relatively high frequency of flake fragments and broken platforms may also be the result of tool production or could reflect the fragile nature of this material type. Potentially, flakes may have been broken during periods of site reoccupation.

A total of 12 obsidian samples were submitted to Steven Shackley, Ph.D., at the Berkeley Archaeological X-ray fluorescence analyses (XRF) Lab for source determination (Appendix 3). The energy-dispersive X-ray fluorescence analyses (EDXRF) determined that all but one artifact, were derived from the Valles rhyolite obsidian source in the Valles Caldera, Jemez Mountains, New Mexico. The Valles obsidian source is spatially discrete and does not occur outside the caldera proper, therefore, these materials must have been originally procured from this location (Shackley 2003). This strong pattern indicates the lithic procurement strategies of the site occupants in part may be aligned with the eastern portion of the San Juan Basin.

Forty three nonlocal chert artifacts were collected from SU 1 including Washington Pass chert (n = 36), Zuni Mountain chert (n = 5), and San Andres chert (n = 2). Trends in this material category are similar to those identified in the local chert material class. Fine-grained and flawed, fine-grained materials were used exclusively (see Table 5.25). Of all nonlocal chert debitage, core flakes comprised 14 percent and whole biface flakes 42 percent of the flake morphology and portion from this material class, resulting in a ratio of almost .5 to 1, similar to the obsidian materials type (see Table 5.26) were commonly absent due to the high frequency of flake fragments present in the assemblage. When present, striking platforms, were broken or complex with a low frequency of simple platforms identified (see Table 5.27). Also, over 96 percent of all chert debitage lacked dorsal cortex (see Table 5.28). Although limited, mean measurements from whole nonlocal chert flakes are similar to whole flake measurements of local materials (see Table 5.29). Based on the high frequency of biface flakes, lack of dorsal cortex, and platform types, nonlocal chert debitage appears to be the result of late stage core reduction associated with biface maintenance and manufacture.

Debitage summary. In all, 2,761 pieces of lithic debitage were recovered from LA 32964. Included in the lithic debitage category were 2,739 unutilized and only 22 utilized or retouched pieces of debitage. Most debitage at LA 32964 was recovered from SU 1 (n = 2,722) of which 2,246 artifacts or 81.3 percent of the entire assemblage are interpreted to be the result of repeated Basketmaker II occupations. The remaining 515 or 18.7 percent of the lithic debitage artifacts are interpreted to be the result of Basketmaker III to Pueblo III and possibly early historic Navajo occupations, which were subsequently redeposited through natural processes.

Debitage interpreted to be associated with the mixed Basketmaker III to early historic Navajo occupations was recovered from the modern ground surface, Stratum 1, and Stratum 2. Below Stratum 2, ceramic artifacts were conspicuously absent indicating there was little mixing with the preceding Basketmaker II deposits. Post-Basketmaker II lithic debitage was dominated by unutilized debitage (n = 506) followed by utilized or retouched debitage (n = 9). These items were produced most frequently from locally available material types including silicified wood, chert, sedimentary, and quartzite. Also present were small amounts of nonlocal chert and obsidian (Table 5.30).

Local materials were dominated by core flakes followed by flake fragments, angular debris, and finally biface flakes. Nonlocal materials are dominated by flake fragments followed by core flakes, biface flakes, and angular debris (Table 5.31). The core flake to biface flake ratio was 6.5 to 1 for local material types and 1.5 to 1 for the nonlocal material indicating differential treatment in the reduction of these material types. Dorsal cortex ranged from 1 percent to 100 percent and was identified on 15 percent (n = 71) of the local debitage and on 8 percent (n = 4) of non local material types from these later components (Table 5.32). In general, platform class for flake debitage was evenly distributed between material groups associated with these components. However, there was a lower frequency of simple platforms (cortical and single facet platforms), and a higher frequency of complex or prepared platforms (multifaceted and abraded platforms) among the nonlocal material group (Table 5.33).

Based on mean measurements, flakes derived from local material types are larger than those derived from non local material types. Also, the combined mean whole flake measurements associated with these later components are larger than whole flakes recovered from the Basketmaker II component at LA 32964, SU 1 (Table 5.34). Based on the high core flake to biface flake ratio (5:1) combined with a low percentage of dorsal cortex, and similar frequencies of simple and complex platform classes, expedient reduction of previously reduced middle to late stage cores appear to have been common. Flake morphology, cortex, platform types, and size suggest local material suggest more early stage to middle stage core reduction of local material and more late stage core reduction and biface maintenance and manufacture of non local material.

A comparison of lithic debitage assemblages associated with the mixed post-Basketmaker II component and Basketmaker II component was performed to identify if the temporal variation in core reduction strategies implied in the debitage summaries was valid. Given the difference in collection methods used to recover materials between these two components, only debitage with a length and width greater than or equal to 3 inches (7.6 cm) were included.

In general, there was no significant difference (χ^2 = .668, df = 1, p = .414, 0 cells [0 percent] with expected counts < 5; Fisher's Exact [2-sided] p = .432) in the frequency between locally and non locally derived raw material associated with the mixed post-Basketmaker II deposits and the Basketmaker II deposits. However, whole flakes associated the mixed deposits tended to be larger than whole flakes from Basketmaker II contexts (see Table 5.33). Furthermore, the ratio of core flakes to biface flakes increased from just under 1:1 for the Basketmaker II component to a ratio of nearly 5:1 for the post-Basketmaker II deposits (see Table 5.31). Retention of dorsal cortex also differed between components with debitage recovered from the younger deposits displaying more cortex than the debitage recovered from the Basketmaker II deposits (see Table 5.32). Finally, platform class observations show that simple and complex types are more common among younger deposits while broken platforms and flakes lacking platforms are more common in the Basketmaker II sample (see Table 5.33).

Differences in debitage characteristics may reflect, in part, the fragmentary nature of the Basketmaker II assemblage, but are more likely the result of different reduction strategies between these two temporal components. While reduction strategies of local material associated with Basketmaker III to Pueblo III occupations appear to have focused more on early to middle stage core reduction through hard hammer percussion, the Basketmaker II reduction strategies of local material appear to have focused on biface production or maintenance through pressure flaking (see below). In both cases non local material was preferred for biface maintenance and manufacture. This is particularly true for the Basketmaker II component indicating more reliance on or access to nonlocal materials, a broader range of mobility, or specialized tool function and production strategies discussed below. The later is supported by the low frequency expedient tools such as retouched or utilized flakes identified in the Basketmaker II debitage assemblage.

Finally, a comparison between debitage associated with mixed post-Basketmaker II components at LA 32964 and debitage recovered from the near by LA 116035 was conducted to determine if these assemblages were the result of similar reduction strategies. This study identified no significant difference in biface flake or bifacial tool frequencies between these two contexts (χ^2 = 1.714, df = 1, p = .190 1 cells [25%] with expected counts < 5; Fisher's Exact [2-sided] p = .249), no significant differences in material type frequencies (χ^2 = 2.039, df = 1, p = .153; Fisher's Exact [2-sided] p = .225), and no significant difference in mean whole flake weight (F = .202, p = .654). These similarities across sites suggest possible similarities in both site function and time of occupation. The reader is referred to the site description of LA 116035 (Chapter 9) for a discussion of this study.

Flaked Stone Tools

Chris T. Wenker

Surface collections and excavations at LA 32964 recovered 45 whole and fragmentary flaked stone tools. These included formal shaped tools such as projectile points and bifaces as well as informal or unshaped items such as used/retouched flakes, cores, and hammerstones. Six additional biface flakes actually represent broken biface-edge fragments from manufacturing errors. These flakes contain information about biface morphology and

Table 5.25. LA 32964, non-local lithic material class and type by artifact morphology.

			Artifact Morphology				
Material Class	**Material Type**		**Angular Debris**	**Core Flake**	**Biface Flake**	**Flake Fragment**	**Table Total**
Chert	Washington Pass chert	Count	1	5	17	13	**36**
		Row %	2.78	13.89	47.22	36.11	**100.00**
		Col. %	2.86	9.09	15.89	7.56	**9.76**
	Zuni Mountain chert	Count	–	–	1	4	**5**
		Row %			20.00	80.00	**100.00**
		Col. %			0.93	2.33	**1.36**
	San Andres chert	Count	–	1	–	1	**2**
		Row %		50.00		50.00	**100.00**
		Col. %		1.82		0.58	**0.54**
	Group Total	**Count**	**1**	**6**	**18**	**18**	**43**
		Row %	**2.33**	**13.95**	**41.86**	**41.86**	**100.00**
		Col. %	**2.86**	**10.91**	**16.82**	**10.47**	**11.65**
Obsidian	Obsidian	Count	33	45	84	151	**313**
		Row %	10.54	14.38	26.84	48.24	**100.00**
		Col. %	94.29	81.82	78.50	87.79	**84.82**
	Jemez obsidian	Count	1	3	4	3	**11**
		Row %	9.09	27.27	36.36	27.27	**100.00**
		Col. %	2.86	5.45	3.74	1.74	**2.98**
	Grants Ridge obsidian	Count	–	1	1	–	**2**
		Row %		50.00	50.00		**100.00**
		Col. %		1.82	0.93		**0.54**
	Group Total	**Count**	**34**	**49**	**89**	**154**	**326**
		Row %	**10.43**	**15.03**	**27.30**	**47.24**	**100.00**
		Col. %	**97.14**	**89.09**	**83.18**	**89.53**	**88.35**
Table Total		**Count**	**35**	**55**	**107**	**172**	**369**
		Row %	**9.49**	**14.91**	**29.00**	**46.61**	**100.00**
		Col. %	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

Table 5.26. LA 32964, non-local lithic material class by platform.

Component	**Material Class**		Platform Class				
			Absent	**Simple**	**Complex or Prepared**	**Platform Breakage**	**Table Total**
Basketmaker III–Pueblo III	Chert	Count	2	–	1	2	**5**
		Row %	40		20	40	**100**
		Col. %	1.19		1.69	2.17	**1.50**
	Obsidian	Count	18	2	10	7	**37**
		Row %	48.65	5.41	27.03	18.92	**100**
		Col. %	10.71	13.33	16.95	7.61	**11.08**
	Group Total	**Count**	**20**	**2**	**11**	**9**	**42**
		Row %	**47.62**	**4.76**	**26.19**	**21.43**	**100**
		Col. %	**11.90**	**13.33**	**18.64**	**9.78**	**12.57**
Basketmaker II	Chert	Count	15	–	8	14	**37**
		Row %	40.54		21.62	37.84	**100**
		Col. %	8.93		13.56	15.22	**11.08**
	Obsidian	Count	133	13	40	69	**255**
		Row %	52.16	5.10	15.69	27.06	**100**
		Col. %	79.17	86.67	67.80	75	**76.35**
	Group Total	**Count**	**148**	**13**	**48**	**83**	**292**
		Row %	**50.68**	**4.45**	**16.44**	**28.42**	**100**
		Col. %	**88.10**	**86.67**	**81.36**	**90.22**	**87.43**
Table Total		**Count**	**168**	**15**	**59**	**92**	**334**
		Row %	**50.30**	**4.49**	**17.66**	**27.54**	**100**
		Col. %	**100**	**100**	**100**	**100**	**100**

Table 5.27. LA 32964, non-local lithic material and type by texture.

			Material Quality				
Material Class	**Material Type**		**Glassy**	**Glassy and Flawed**	**Fine-grained**	**Fine-grained and Flawed**	**Table Total**
Chert	Washington Pass chert	Count	–	–	32	4	**36**
		Row %			88.89	11.11	**100**
		Col. %			82.05	100	**9.76**
	Chinle chert	Count	–	–	5	–	**5**
		Row %			100		**100**
		Col. %			12.82		**1.36**
	San Andres chert	Count	–	–	2	–	**2**
		Row %			100		**100**
		Col. %			5.13		**0.54**
	Group Total	**Count**	**–**	**–**	**39**	**4**	**43**
		Row %			**90.70**	**9.30**	**100**
		Col. %			**100**	**100**	**11.65**
Obsidian	Obsidian	Count	302	11	–	–	**313**
		Row %	96.49	3.51			**100**
		Col. %	95.87	100			**84.82**
	Jemez obsidian	Count	11	–	–	–	**11**
		Row %	100				**100**
		Col. %	3.49				**2.98**
	Grants Ridge obsidian	Count	2	–	–	–	**2**
		Row %	100				**100**
		Col. %	0.63				**0.54**
	Group Total	**Count**	**315**	**11**	**–**	**–**	**326**
		Row %	**96.63**	**3.37**			**100**
		Col. %	**100**	**100**			**88.35**
Table Total		**Count**	**315**	**11**	**39**	**4**	**369**
		Row %	**85.37**	**2.98**	**10.57**	**1.08**	**100**
		Col. %	**100**	**100**	**100**	**100**	**100**

Table 5.28. LA 32964, non-local lithic material class and type by percent of dorsal cortex.

			Dorsal Cortex Retention			
			Lacks Cortex	1–50 %	51–100 %	Table Total
Chert	Washington Pass chert	Count	36	–	–	**36**
		Row %	100.00			**100.00**
		Col. %	9.94			**9.76**
	Chinle chert	Count	5	–	–	**5**
		Row %	100.00			**100.00**
		Col. %	1.38			**1.36**
	San Andres chert	Count	1	1	–	**2**
		Row %	50.00	50.00		**100.00**
		Col. %	0.28	16.67		**0.54**
	Group Total	**Count**	**42**	**1**	**–**	**43**
		Row %	**97.67**	**2.33**		**100.00**
		Col. %	**11.60**	**16.67**		**11.65**
Obsidian	Obsidian	Count	309	4	–	**313**
		Row %	98.72	1.28		**100.00**
		Col. %	85.36	66.67		**84.82**
	Jemez obsidian	Count	10	1	–	**11**
		Row %	90.91	9.09		**100.00**
		Col. %	2.76	16.67		**2.98**
	Grants Ridge obsidian	Count	1	–	1	**2**
		Row %	50.00		50.00	**100.00**
		Col. %	0.28		100.00	**0.54**
	Group Total	**Count**	**320**	**5**	**1**	**326**
		Row %	**98.16**	**1.53**	**0.31**	**100.00**
		Col. %	**88.40**	**83.33**	**100.00**	**88.35**
Table Total		**Count**	**362**	**6**	**1**	**369**
		Row %	**98.10**	**1.63**	**0.27**	**100.00**
		Col. %	**100.00**	**100.00**	**100.00**	**100.00**

Table 5.29. LA 32964, non-local lithic material by mean whole flake measurements.

Material Type	Artifact Morphology		Length (mm)	Width (mm)	Thickness (mm)	Weight (g)
Chert	Core flake	Mean	10.67	12.00	2.33	0.27
		N	3	3	3	3
		SD	5.86	5.57	1.15	0.21
	Biface flake	Mean	12	6.75	1.75	0.1
		N	4	4	4	4
		SD	2.58	0.96	0.50	0.00
	Total	Mean	11.43	9.00	2.00	0.17
		N	7	7	7	7
		SD	3.91	4.32	0.82	0.15
Obsidian	Core flake	Mean	8.83	7.83	1.50	0.15
		N	6	6	6	6
		SD	3.71	2.56	0.84	0.08
	Biface flake	Mean	9.00	5.92	1.33	0.12
		N	24	24	24	24
		SD	3.97	2.52	0.56	0.10
	Total	Mean	8.97	6.30	1.37	0.13
		N	30	30	30	30
		SD	3.85	2.60	0.61	0.10
Total	Core flake	Mean	9.44	9.22	1.78	0.19
		N	9	9	9	9
		SD	4.25	4.02	0.97	0.14
	Biface flake	Mean	9.43	6.04	1.39	0.12
		N	28	28	28	28
		SD	3.91	2.36	0.57	0.09
	Total	Mean	9.43	6.81	1.49	0.14
		N	37	37	37	37
		SD	3.93	3.12	0.69	0.11

SD = Standard Deviation

Table 5.30. LA 32964, lithic material source and material class by artifact function by component.

Component	Lithic Source	Material Class		Artifact Category		
				Unutilized Debitage	Utilized/ Retouched Debitage	Table Total
Basketmaker III–Pueblo III	Local	Silicified wood	Count	366	6	**372**
			Row %	98.39	1.61	**100.00**
			Col. %	13.33	27.27	**13.44**
		Chert	Count	77	1	**78**
			Row %	98.72	1.28	**100.00**
			Col. %	2.81	4.55	**2.82**
		Sedimentary	Count	16	–	**16**
			Row %	100.00		**100.00**
			Col. %	0.58		**0.58**
		Quartzite	Count	7	–	**7**
			Row %	100.00		**100.00**
			Col. %	0.26		**0.25**
	Non-local	Chert	Count	6	–	**6**
			Row %	100.00		**100.00**
			Col. %	0.22		**0.22**
		Obsidian	Count	40	2	**42**
			Row %	95.24	4.76	**100.00**
			Col. %	1.46	9.09	**1.52**
Basketmaker II	Local	Silicified wood	Count	1377	7	**1384**
			Row %	99.49	0.51	**100.00**
			Col. %	50.16	31.82	**50.02**
		Chert	Count	508	1	**509**
			Row %	99.80	0.20	**100.00**
			Col. %	18.51	4.55	**18.40**
		Sedimentary	Count	25	–	**25**
			Row %	100.00		**100.00**
			Col. %	0.91		**0.90**
		Quartzite	Count	6	1	**7**
			Row %	85.71	14.29	**100.00**
			Col. %	0.22	4.55	**0.25**
	Non-local	Chert	Count	36	1	**37**
			Row %	97.30	2.70	**100.00**
			Col. %	1.31	4.55	**1.34**
		Obsidian	Count	281	3	**284**
			Row %	98.94	1.06	**100.00**
			Col. %	10.24	13.64	**10.26**
Table Total			**Count**	**2745**	**22**	2767
			Row %	**99.20**	**0.80**	100.00
			Col. %	**100.00**	**100.00**	100.00

Table 5.31. LA 32964, lithic material source and class by artifact morphology.

				Artifact Morphology							
Component	**Lithic Source**	**Material Class**		**Angular Debris**	**Core Flake**	**Biface Flake**	**Pot Lid**	**Flake Frag- ment**	**Biface Fragment, Edge-bite Flake**	**Biface Fragment, Overshot Flake**	**Table Total**
Basketmaker III–Pueblo III	Local	Silicified wood	Count	88	154	22	–	105	3	–	**372**
			Row %	23.66	41.40	5.91		28.23	0.81		**100.00**
			Col. %	16.99	23.23	3.93		10.33	60.00		**13.44**
		Chert	Count	12	35	9	–	22	–	–	**78**
			Row %	15.38	44.87	11.54		28.21			**100.00**
			Col. %	2.32	5.28	1.61		2.17			**2.82**
		Sedi- mentary	Count	2	7	–	–	7	–	–	**16**
			Row %	12.50	43.75			43.75			**100.00**
			Col. %	0.39	1.06			0.69			**0.58**
		Quartzite	Count	2	4	–	–	1	–	–	**7**
			Row %	28.57	57.14			14.29			**100.00**
			Col. %	0.39	0.60			0.10			**0.25**
	Non- local	Chert	Count	1	1	2	–	2	–	–	**6**
			Row %	16.67	16.67	33.33		33.33			**100.00**
			Col. %	0.19	0.15	0.36		0.20			**0.22**
		Obsidian	Count	5	11	7	–	19	–	–	**42**
			Row %	11.90	26.19	16.67		45.24			**100.00**
			Col. %	0.97	1.66	1.25		1.87			**1.52**
Basketmaker II	Local	Silicified wood	Count	297	291	284	3	508	–	1	**1384**
			Row %	21.46	21.03	20.52	0.22	36.71		0.07	**100.00**
			Col. %	57.34	43.89	50.71	75.00	50.00		100.00	**50.02**
		Chert	Count	82	109	134	1	181	2	–	**509**
			Row %	16.11	21.41	26.33	0.20	35.56	0.39		**100.00**
			Col. %	15.83	16.44	23.93	25.00	17.81	40.00		**18.40**
		Sedi- mentary	Count	–	7	4	–	14	–	–	**25**
			Row %		28.00	16.00		56.00			**100.00**
			Col. %		1.06	0.71		1.38			**0.90**
		Quartzite	Count	–	1	–	–	6	–	–	**7**
			Row %		14.29			85.71			**100.00**
			Col. %		0.15			0.59			**0.25**
	Non- local	Chert	Count	–	5	16	–	16	–	–	**37**
			Row %		13.51	43.24		43.24			**100.00**
			Col. %		0.75	2.86		1.57			**1.34**
		Obsidian	Count	29	38	82	–	135	–	–	**284**
			Row %	10.21	13.38	28.87		47.54			**100.00**
			Col. %	5.60	5.73	14.64		13.29			**10.26**
Table Total			**Count**	**518**	**663**	**560**	**4**	**1016**	**5**	**1**	**2767**
			Row %	**18.72**	**23.96**	**20.24**	**0.14**	**36.72**	**0.18**	**0.04**	**100.00**
			Col. %	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

Table 5.32. LA 32964, dorsal cortex by component and material type.

				Dorsal Cortex Retention			
Component	**Lithic Source**	**Material Class**		**Lacks Cortex**	**1–50%**	**51–100%**	**Table Total**
Basketmaker III–Pueblo III	Local	Silicified wood	Count	313	36	23	**372**
			Row %	84.14	9.68	6.18	**100.00**
			Col. %	12.02	33.33	42.59	**13.44**
		Chert	Count	70	6	2	**78**
			Row %	89.74	7.69	2.56	**100.00**
			Col. %	2.69	5.56	3.70	**2.82**
		Sedimentary	Count	14	2	–	**16**
			Row %	87.50	12.50		**100.00**
			Col. %	0.54	1.85		**0.58**
		Quartzite	Count	4	2	1	**7**
			Row %	57.14	28.57	14.29	**100.00**
			Col. %	0.15	1.85	1.85	**0.25**
	Nonlocal	Chert	Count	5	1	–	**6**
			Row %	83.33	16.67		**100.00**
			Col. %	0.19	0.93		**0.22**
		Obsidian	Count	39	3	–	**42**
			Row %	92.86	7.14		**100.00**
			Col. %	1.50	2.78		**1.52**
Basketmaker II	Local	Silicified wood	Count	1315	46	23	**1384**
			Row %	95.01	3.32	1.66	**100.00**
			Col. %	50.48	42.59	42.59	**50.02**
		Chert	Count	496	10	3	**509**
			Row %	97.45	1.96	0.59	**100.00**
			Col. %	19.04	9.26	5.56	**18.40**
		Sedimentary	Count	25	–	–	**25**
			Row %	100.00			**100.00**
			Col. %	0.96			**0.90**
		Quartzite	Count	6	–	1	**7**
			Row %	85.71		14.29	**100.00**
			Col. %	0.23		1.85	**0.25**
	Nonlocal	Chert	Count	37	–	–	**37**
			Row %	100.00			**100.00**
			Col. %	1.42			**1.34**
		Obsidian	Count	281	2	1	**284**
			Row %	98.94	0.70	0.35	**100.00**
			Col. %	10.79	1.85	1.85	**10.26**
Table Total			**Count**	**2605**	**108**	**54**	**2767**
			Row %	**94.15**	**3.90**	**1.95**	**100.00**
			Col. %	**100.00**	**100.00**	**100.00**	**100.00**

Table 5.33. LA 32964, lithic material source and class by platform class.

				Platform Class				
Component	**Lithic Source**	**Material Class**		**Absent**	**Simple**	**Complex or Prepared**	**Platform Breakage**	**Table Total**
Basketmaker III–Pueblo III	Local	Silicified wood	Count	108	65	69	43	**372**
			Row %	37.89	22.81	24.21	15.09	**100.00**
			Col. %	10.87	20.25	14.23	9.64	**13.44**
		Chert	Count	22	10	18	16	**78**
			Row %	33.33	15.15	27.27	24.24	**100.00**
			Col. %	2.21	3.12	3.71	3.59	**2.82**
		Sedimentary	Count	7	4	1	2	**16**
			Row %	50.00	28.57	7.14	14.29	**100.00**
			Col. %	0.70	1.25	0.21	0.45	**0.58**
		Quartzite	Count	1	2	-	2	**7**
			Row %	20.00	40.00		40.00	**100.00**
			Col. %	0.10	0.62		0.45	**0.25**
	Non-local	Chert	Count	2	-	1	2	**6**
			Row %	40.00		20.00	40.00	**100.00**
			Col. %	0.20		0.21	0.45	**0.22**
		Obsidian	Count	18	2	10	7	**42**
			Row %	48.65	5.41	27.03	18.92	**100.00**
			Col. %	1.81	0.62	2.06	1.57	**1.52**
Basketmaker II	Local	Silicified wood	Count	493	151	244	196	**1384**
			Row %	45.48	13.93	22.51	18.08	**100.00**
			Col. %	49.60	47.04	50.31	43.95	**50.02**
		Chert	Count	175	68	90	93	**509**
			Row %	41.08	15.96	21.13	21.83	**100.00**
			Col. %	17.61	21.18	18.56	20.85	**18.40**
		Sedimentary	Count	14	5	4	2	**25**
			Row %	56.00	20.00	16.00	8.00	**100.00**
			Col. %	1.41	1.56	0.82	0.45	**0.90**
		Quartzite	Count	6	1	-	-	**7**
			Row %	85.71	14.29			**100.00**
			Col. %	0.60	0.31			**0.25**
	Non-local	Chert	Count	15	-	8	14	**37**
			Row %	40.54		21.62	37.84	**100.00**
			Col. %	1.51		1.65	3.14	**1.34**
		Obsidian	Count	133	13	40	69	**284**
			Row %	52.16	5.10	15.69	27.06	**100.00**
			Col. %	13.38	4.05	8.25	15.47	**10.26**
Table Total			**Count**	**994**	**321**	**485**	**446**	**2767**
			Row %	**44.26**	**14.29**	**21.59**	**19.86**	**100.00**
			Col. %	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

Table 5.34. LA 32964, lithic source and material, component, source, and class by mean whole flake measurements.

Component	Lithic Source	Artifact Morphology		Length (mm)	Width (mm)	Thickness (mm)	Weight (g)
Basketmaker III–Pueblo III	Local	Core flake	Mean	16.21	15.21	4.14	1.79
			N	73	73	73	70
			SD	8.13	7.37	3.50	6.92
		Biface flake	Mean	15.62	12.15	2.00	0.32
			N	13	13	13	12
			SD	7.62	6.56	1.15	0.31
		Total	**Mean**	**16.12**	**14.74**	**3.81**	**1.57**
			N	**86**	**86**	**86**	**82**
			SD	**8.01**	**7.30**	**3.34**	**6.41**
	Non-local	Core flake	Mean	13.00	8.00	1.00	0.10
			N	1	1	1	1
			SD	–	–	–	–
		Biface flake	Mean	9.33	6.00	1.67	0.10
			N	3	3	3	3
			SD	3.51	1.73	0.58	0.00
		Total	**Mean**	**10.25**	**6.50**	**1.50**	**0.10**
			N	**4**	**4**	**4**	**4**
			SD	**3.40**	**1.73**	**0.58**	**0.00**
	Total	Core flake	Mean	16.16	15.11	4.09	1.76
			N	74	74	74	71
			SD	8.08	7.36	3.49	6.87
		Biface flake	Mean	14.44	11.00	1.94	0.27
			N	16	16	16	15
			SD	7.38	6.40	1.06	0.29
		Total	**Mean**	**15.86**	**14.38**	**3.71**	**1.50**
			N	**90**	**90**	**90**	**86**
			SD	**7.95**	**7.34**	**3.30**	**6.26**
Basketmaker II	Local	Core flake	Mean	12.32	11.80	2.79	1.15
			N	142	142	142	142
			SD	9.79	8.10	2.41	3.28
		Biface flake	Mean	9.10	6.53	1.37	0.16
			N	146	146	146	146
			SD	4.16	3.07	0.61	0.19
		Total	**Mean**	**10.69**	**9.13**	**2.07**	**0.65**
			N	**288**	**288**	**288**	**288**
			SD	**7.65**	**6.63**	**1.88**	**2.36**
	Non-local	Core flake	Mean	9.00	9.38	1.88	0.20
			N	8	8	8	8
			SD	4.31	4.27	0.99	0.14
		Biface flake	Mean	9.44	6.04	1.36	0.12
			N	25	25	25	25
			SD	4.02	2.46	0.57	0.10
		Total	**Mean**	**9.33**	**6.85**	**1.48**	**0.14**
			N	**33**	**33**	**33**	**33**
			SD	**4.03**	**3.26**	**0.71**	**0.11**

(Table 5.34, continued)

Component	Lithic Source	Artifact Morphology		Length (mm)	Width (mm)	Thickness (mm)	Weight (g)
Total		Core flake	Mean	12.15	11.67	2.74	1.10
			N	150	150	150	150
			SD	9.60	7.96	2.36	3.20
		Biface flake	Mean	9.15	6.46	1.37	0.15
			N	171	171	171	171
			SD	4.13	2.99	0.60	0.18
		Total	Mean	10.55	8.89	2.01	0.60
			N	321	321	321	321
			SD	7.37	6.40	1.80	2.24

SD = Standard Deviation

production and are treated as tool fragments in this section (although they are included in the discussion of debitage as well).

Forty-six of the 51 total tools derive from SU 1, and 33 derived from the buried deposits in that study unit that can be attributed solely to the Basketmaker II period of occupation (Table 5.35). The remaining 18 tools were recovered from SU 1 and 2 in shallow, undifferentiated, ceramic-bearing sediments that represent a mix of more recent occupations ranging from Basketmaker III to Navajo in age. These tools are evaluated separately as a composite assemblage.

In the following discussion, parametric tests in SPSS[7] (such as t-tests and one-way analysis of variance [ANOVA]) were used to compare sample means whenever normally distributed data were available. Some samples were heavily skewed away from normal distributions (usually, heavily toward the left with many extreme outliers to the right), as confirmed by one-sample Kolmogorov-Smirnov tests. Non-parametric Mann-Whitney U tests were used to compare samples in these instances. Sample means are still reported for continuity and ease of interpretation, however, even though the Mann-Whitney U test uses the ranks of the cases rather than the sample means.

Basketmaker II flaked stone tools. Formally shaped bifaces or fragments thereof (n = 14) and informal used/retouched flakes (n = 13) constitute the two most numerous Basketmaker II tool classes at LA 32964 (Table 5.36). Cores (n = 3), hammerstones (n = 2), and a core/hammerstone make up the remainder of the assemblage. Locally available stone types predominate all tool classes. Imported chert or obsidian was only present among the bifaces and used/retouched flakes.

Given the lengthy period of sequential Basketmaker II occupations at this site, and considering the relatively large volume of feature and midden fill that was excavated and sifted through 1/8-inch mesh, the Basketmaker II flaked stone tool assemblage appears fairly small. Kearns (1996b:4.5), however, reports similarly low counts of formal and informal stone tools from nearby Basketmaker II sites, including camps and pithouse habitations. Tool richness and diversity, measured simply by the counts of tools in different functional classes, are also relatively limited at this and other nearby Basketmaker II sites (Kearns 1996c:4.5).

Many Basketmaker II tools and flakes are retouched from shaping or sharpening (Table 5.37), but many lacked signs of use wear, even under low-power magnification. Accordingly, the function(s) of most of the retouched items cannot be evaluated, except for projectile points (based on their morphology).

Used/retouched flakes. Among the 13 tools that were classified as used or retouched flakes, functionally diagnostic use wear was apparent on 10 items, regardless of the presence or absence of retouch. Flakes that show wear such as rounding, stri-

Table 5.35. LA 32964, summary of flaked stone tools.

		Study Unit		
		1	**2**	**Subtotal**
All Post-Basketmaker II Contexts				
Tool Type	Used/retouched debitage	7	2	9
	Biface flake (tool fragment)	1	2	3
	Core	1	1	2
	Biface	2	0	2
	Projectile point	2	0	2
Subtotal		13	5	18
All Basketmaker II Contexts				
Tool Type	Used/retouched debitage	13	0	13
	Hammerstone	2	0	2
	Core-hammerstone	1	0	1
	Core	3	0	3
	Biface flake (tool fragment)	3	0	3
	Biface	9	0	9
	Projectile point	2	0	2
Subtotal		33	0	33
Site Total		**46**	**5**	**51**

Table 5.36. LA 32964, flaked stone tools and stone types from Basketmaker II contexts.

	Stone Type					
Tool Type	**Chert, Local**	**Silicified Wood**	**Quartzite**	**Chert, Non-local**	**Obsidian**	**Total**
Used/retouched debitage	1	7	1	1	3	**13**
Hammerstone	0	2	0	0	0	**2**
Core-hammerstone	0	0	1	0	0	**1**
Core	1	2	0	0	0	**3**
Biface flake (tool fragment)	2	1	0	0	0	**3**
Biface	2	3	0	1	3	**9**
Projectile point	2	0	0	0	0	**2**
Total	**8**	**15**	**2**	**2**	**6**	**33**

ations, or microflaking, singly or in combination, were classified into either unidirectional (n = 5) or bidirectional (n = 5) use categories. Unidirectional use occurred perpendicular to the tool edge, and is inferred to represent scraping, shaving, or planing activities. Bidirectional use occurred parallel with the tool edge, and is inferred to represent cutting or sawing activities. Although the mean used edge angles differed between the two use categories (unidirectional use, mean = 30.8 degrees; bidirectional use, mean = 38.2 degrees), the difference was not significant in a t-test (t = -1.129, p = .292). Further, the edge angle of unworn, retouched flakes (mean = 29.3 degrees) did not differ from all worn flakes in an ANOVA test (F = 1.088, p = .374).

Most used/retouched flakes (n = 9) were made of locally available silicified wood, chalcedony, and quartzite, but three of these tools were made of obsidian and one is of Zuni Mountain chert. Stone material types show no correlation with use wear direction.

Few of the used/retouched flakes show sufficient wear to allow conclusive functional determinations of individual items. A single, large, fine-grained silicified-wood core flake (FS 222) displays extensive unidirectional retouch and substantial edge rounding and abrasive smoothing along its entire 2.2 cm wide distal end and a 4 cm long adjacent portion of one lateral edge. The flake morphology and the use wear on this item indicate it functioned as a combination end-side scraper that may have been hafted.

Bifaces. Fourteen bifaces constitute the Basketmaker II assemblage. Two whole or nearly whole projectile points are present (discussed below). Of the remaining 12 bifaces, 10 were represented by small unorientable edge fragments (including possible projectile point shoulder or tang fragments), one was a lateral edge fragment, and one consisted of an outrepassé pressure flake that removed the distal end of a small pointed tool (probably another projectile point). No bifaces showed identifiable use wear beyond retouch flaking, but a single middle-stage biface did show evidence of platform preparation (discussed below).

Nine of the bifaces were late-stage pressure-flaked items and one was an early-stage pressure-flaked preform. The two middle-stage bifaces represent the only tools produced by percussive reduction. As noted above, obvious projectile points were relatively uncommon (n = 2), but the morphology of many of the remaining late-stage fragments suggests that most also represent small hafted bifaces (probably projectile points). Biface fracture patterns (discussed below) show no certain evidence of use-induced breakage (such as impact burination scars). No significant differences in mean edge angles exist between the pressure (mean = 36.2 degrees) and percussion flaked bifaces (mean = 36.2 degrees) in a t-test (t = .042, p = .967,). Similarly, an ANOVA test shows no differences among the early (n = 1, 45 degrees), middle (mean = 36.0 degrees), and late stage bifaces (mean = 35.1 degrees; F = 1.062, p = .390, biface flakes excluded). No functional differences in the assemblage are indicated by these measures. Small sample sizes or the comminuted condition of the biface assemblage may have influenced these equivocal results.

The two whole or nearly whole projectile points were made of local chert. One (FS 419) is a side-notched point with a broad stem and convex base (Fig. 5.32:b). This tool matches well with Kearns and Silcock's (1999:6–12, 6–16) Type 1504 points, which they report from Archaic/ Basketmaker II to late Basketmaker III sites. Following R. Moore and Brown's key (2002), this tool would be typed as an En Medio side-notched point.

The other point (FS 565) is corner-notched with a concave base (Fig. 5.32:a). This item matches well with points associated with the En Medio phase (Irwin-Williams 1973:Figure 6i), but in R. Moore and Brown's key (2002) the concave base dictates that it be typed as an Armijo corner-notched point. This point also matches several attributed to Basketmaker II sites by Chapman (1977) and Simmons (1982a), as well as K. Brown's (1993:392–402) AIVB style, which occurs almost exclusively at Archaic-period sites. Kearns and Silcock (1999) report no similar large corner-notched, concave-base points from Tohatchi Flats sites.

Two silicified wood hammerstones and a single quartzite core/hammerstone were present in the Basketmaker II assemblage. All are fairly small (ranging from 182.6 to 248.5 g in weight and 6.4 to 8.3 cm in maximum length), suggesting light-duty use as flintknapping percussors (instead of shaping ground stone tools or construction stones, for example).

Basketmaker II tool production. Some aspects of site function at the LA 32964 Basketmaker II com-

Table 5.37. LA 32964, tool use wear or edge modification types from Basketmaker II contexts.

		Use-wear or Edge Modification Type					
Tool Type	**Stone Type**	**Unidirectional Use**	**Bidirectional Use**	**Retouch Only**	**Battering**	**Manufacturing Preparation**	**Total**
Used/Retoubhed Artifacts:							
Core flake	Obsidian	0	0	1	0	0	**1**
	Quartzite	0	1	0	0	0	**1**
	Silicified wood	2	1	0	0	0	**3**
	Local chert	0	1	0	0	0	**1**
Biface flake	Silicified wood	2	0	0	0	0	**2**
Flake fragment	Silicified wood	0	0	2	0	0	**2**
	Obsidian	1	1	0	0	0	**2**
	Non-local chert	0	1	0	0	0	**1**
Core-hammerstone	Quartzite	0	0	0	1	0	**1**
Hammerstone	Silicified wood	0	0	0	2	0	**2**
Early-stage pressure-flaked biface	Obsidian	0	0	1	0	0	**1**
Middle-stage percussion-flaked biface	Silicified wood	0	0	1	0	1	**2**
Late-stage pressure-flaked biface (including projectile points)	Silicified wood	0	0	2	0	0	**2**
	Local chert	0	0	6	0	0	**6**
	Non-local chert	0	0	1	0	0	**1**
	Obsidian	0	0	2	0	0	**2**
Total		**5**	**5**	**16**	**3**	**1**	**30**

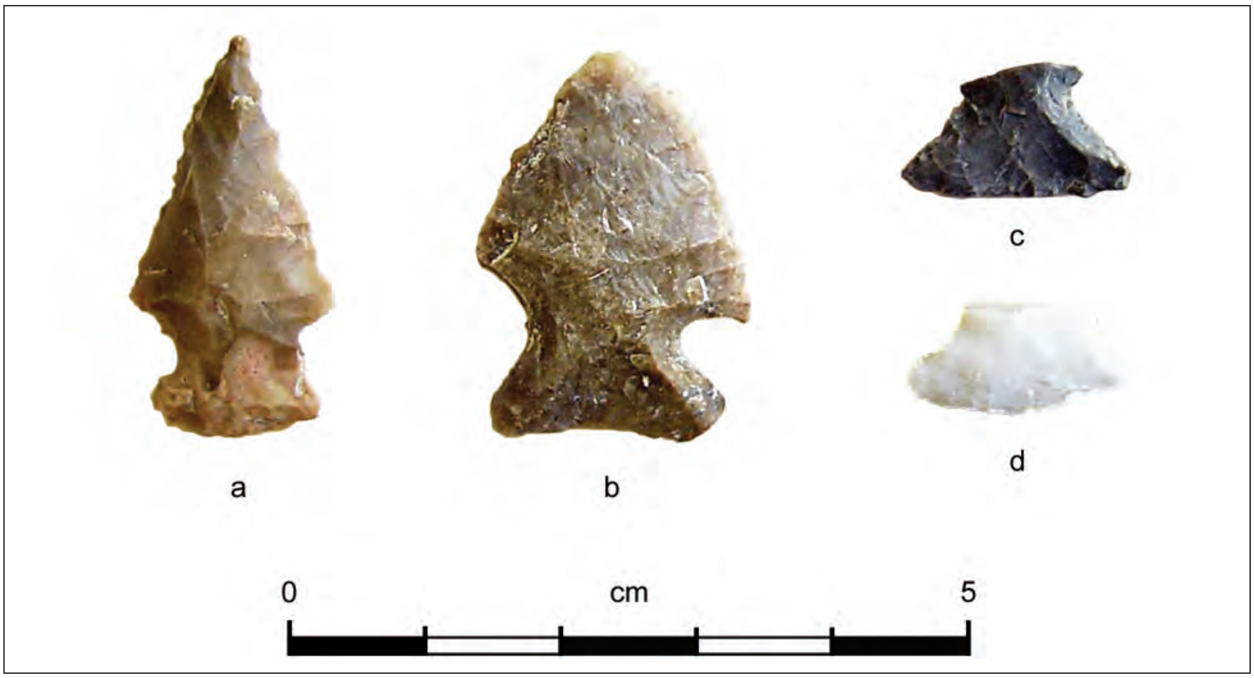


Figure 5.32. Projectile points (a–d), Study Unit 1, LA 32964. The two nearly whole points (a–b) are Basketmaker II; the two basal point fragments (c–d) are from the "late" composite assemblage.

ponent may be illuminated by examining the technological aspects of tool production. Whole and fragmentary tools, as well as flaking debris derived from tool production, provide the data sources to examine flaked stone tool production strategies.

Locally available silicified wood, chert, and chalcedony account for over 70 percent (n = 10) of the bifaces (including both projectile points; Table 5.36). A single early-stage and two late-stage bifaces were made of obsidian, and one late-stage biface was of Narbona Pass chert. As noted above, only two fragmentary middle-stage bifaces (of local material) show evidence of extensive percussive reduction.

Fracture types observed among the fragmentary bifaces provide some evidence of on-site pressure-flaked biface production (Table 5.38). Although bending breaks can derive from either use-related or production-related events, fractures such as perverse breaks and flaking errors such as outrepassé flake terminations and "edge-bite" biface flakes provide fairly certain evidence of on-site production activities (e.g., Johnson 1979; J. Moore 2001). Edge-bite flakes derive from biface edges; they proximally exhibit a section of the tool edge and a snapped distal termination, indicating a fracture-propagation failure.

The four tools that exhibit production-caused fracture types are pressure-flaked items. The three late-stage bifaces that show production failures are of local materials but the single early-stage production failure was made of obsidian. The two percussion-flaked bifaces, and all the remaining bifaces, display fractures of indeterminate origin that provide no certain insight into production or use. One of the percussion-flaked middle-stage fragments does exhibit edge preparation in the form of platform abrasion, however, indicating that it, too, was probably broken during manufacture.

The Basketmaker II flaking debris assemblage contains 523 flakes classified as biface flakes or biface fragment flakes (23 percent of the entire debitage sample; see Table 5.31). No notching flakes are present. Admittedly, there is never a strict, one-to-one correlation between flake type and reduction technique, but the relationship is probabilistic (Shott 1994:77; Teltser 1991). During analysis, a conservative set of criteria was used to identify biface flakes (OAS Staff 1994a), so the presence of biface flakes is taken as a strong indicator of biface reduction (Ahler 1989; Hayden and Hutchings 1989; Newcomer 1971; A. Reed et al. 1997). At the risk of ignoring other debris types that may have been produced during biface reduction, and given the assumptions listed above, the following discussion evaluates only the biface flakes to further explore aspects of on-site biface production.

Local siliceous materials including silicified wood, chert, and chalcedony accounted for 81 percent (n = 421) of biface flakes, and some local siltstone is also present (n = 4). Exogenous materials included Narbona Pass chert (n = 15), Zuni Mountain chert (n = 1), and obsidian (n = 82). The raw material proportions among the debitage fairly mirror the raw material proportions of Basketmaker II bifaces (see Table 5.36), although no siltstone or Zuni Mountain chert bifaces were recovered. Only two biface flakes exhibit dorsal cortex; these flakes are made of local silicified wood.

The unbroken biface flake sample (n = 171) exhibits an exceptionally low mean weight (mean = 0.15 g), and nearly 92 percent of the unbroken biface flakes weighed 0.2 g or less, indicating few heavy outliers (see Fig. 5.31). This pattern is mirrored in the entire broken and unbroken biface flake assemblage as well (mean = 0.15 g), and the heaviest (but broken) biface flake weighed merely 2.2 g. Similarly, the whole biface flakes are relatively short (mean = 9 mm). Seventy-five percent of the unbroken biface flake sample measure 10 mm or less in length, and fully 90 percent measure 14 mm or less in length, again indicating few large outliers. The overwhelmingly small size of the biface flake assemblage suggests that much of the debitage classified as biface flakes may have been produced during the latest stages of biface reduction (Amick et. al 1988; Newcomer 1971; Stahle and Dunn 1982). This observation, combined with the low count of percussion-flaked bifaces, suggests that the Basketmaker II tool production efforts focused on small, late-stage, pressure-flaked bifaces, and that percussion-flaked bifaces were not frequently produced or used at LA 32964.

Six of the 13 used/retouched flake tools were made from core flakes; 5 were of flake fragments, and only 2 were made of biface flakes. The mean weights of used/retouched core flakes (mean = 9.8 g), flake fragments (mean = 1.7 g), and biface flakes (mean = 0.8 g) differ significantly in an ANOVA test ($F = 5.340$, $p = .026$). The small size of the two used/

Table 5.38. LA 32964, biface fracture types observed in the Basketmaker II assemblage.

		Biface Fracture Type						
Tool Type	**Stone Type**	**None**	**Bending**	**Perverse**	**Outrepasse Flake**	**Edge-bite Flake**	**Indeterminate**	**Total**
Early-stage pressure-flaked biface	Obsidian	0	0	1	0	0	0	**1**
Middle-stage percussion-flaked biface	Silicified wood	0	0	0	0	0	2	**2**
Late-stage pressure-flaked biface (including projectile points)	Silicified wood	0	1	0	1	0	0	**2**
	Local chert	1	0	0	0	2	3	**6**
	Non-local chert	0	0	0	0	0	1	**1**
	Obsidian	0	1	0	0	0	1	**2**
Total		**1**	**2**	**1**	**1**	**2**	**7**	**14**

retouched biface flakes (made of silicified wood) corresponds well with the size of unused biface flakes in the overall assemblage (see above). Hence, these flake tools could have been taken opportunistically from the overall collection of biface flakes. No evidence exists to indicate that biface flake production was aimed at the manufacture of large flake blanks destined for further use (cf. Kelly 1988:719–720). This observation further underscores the emphasis on small pressure-flaked biface production and use in this Basketmaker II component.

Most of the used/retouched core flakes and flake fragments presumably were derived from cores that were reduced on-site. Four multidirectional cores were present in the flaked stone assemblage. All were of local materials; one was of chert, two were made of silicified wood, and a single core/hammerstone was of quartzite. The chert and silicified wood cores weigh between 8 and 67 g, but the quartzite core (which was reused as a percussor) is markedly heavier at 215 g. The smallest core (of silicified wood) completely lacks cortex, but all remaining cores exhibit some waterworn cortex, indicating their origin in local stream beds. Only two of the silicified wood used/retouched flakes exhibit dorsal cortex (which is also waterworn).

No obsidian cores were present in the assemblage, despite the presence of two used/retouched obsidian flake fragments and a used/retouched core flake, all of which lack cortex. The mean weight of the used/retouched obsidian flakes (mean = 1.4 g) greatly exceeds that of the general assemblage of unused obsidian core flakes and fragments (mean = 0.2 g). Further, all three obsidian used/retouched flakes also display extensive, randomly oriented striations across their dorsal and ventral faces. These marks are suggestive of abrasive wear resulting from storage or repeated contact with other stone tools (i.e., "pouch wear"), indicating that they were probably curated and brought to the site from elsewhere. The observation that all of the used/retouched obsidian flakes are probably curated items indicates that large obsidian flake-blank production did not occur on-site.

Although this Basketmaker II flaked stone assemblage contains fairly numerous used/retouched flakes made from cores of local material, their production does not appear to have been conducted with appreciable concern for core efficiency. All cores are classified as unpatterned, multidirectional cores, a type that Torres (1999) observes is common at early Anasazi assemblages such as this. Later Anasazi assemblages show more use of unidirectional cobble cores. This change is attributed to an increase in the efficiency of flake-blank production in later periods (Torres 1999:752–754). Overall, the absence of large biface flake blanks or patterned core reduction at LA 32964 emphasizes the general expediency of flake-blank production.

Post-Basketmaker II flaked stone tools. Tables

5.35 and 5.39 summarize the flaked stone tools recovered from the modern surface and upper ceramic-bearing deposits at LA 32964. Because these tools cannot be attributed to any specific occupational period, they are discussed here as a composite, late sample. Some of these tools could have originally been part of the Basketmaker II assemblage, although the lack of obvious intrusive material in the lower Basketmaker II deposits suggests little mixing between the two general components.

The late tool sample constitutes 35 percent (n = 18) of the site's overall flaked stone tool assemblage. Because little insight would be gained by detailing the specific functional and technological aspects of an undatable assemblage, this discussion compares and contrasts the late sample with the Basketmaker II assemblage to evaluate any gross differences between the two that may indicate changes in site function.

Post-Basketmaker II tool types and functions. As in the Basketmaker II assemblage, the late sample was dominated by two broad tool classes: used/retouched flakes (n = 9) and bifaces (n = 7). Two cores (one unidirectional and one multidirectional) complete the assemblage.

Among the late used/retouched flake assemblage, far fewer tools show signs of use-wear than in the Basketmaker II sample (one shows unidirectional use and two have bidirectional use). The majority of flake tools simply exhibit retouch scars from shaping or sharpening (n = 6).

Similarly, the bifaces lack signs of use wear. The late biface sample contains fewer pressure-flaked than percussion-flaked bifaces, however (Table 5.40). Two base fragments of large, untyped projectile points represent the only formally shaped bifacial tools (see Fig. 5.32). One early-stage percussion-flaked biface is complete, but all remaining bifaces consist of edge fragments (including three production-failure flakes). Of the projectile points from LA 32964, FS 419 and 565 are from Basketmaker II contexts; FS 110 and 132 are from the "late" composite assemblage.

Post-Basketmaker II tool production. The biface sample contained early equal amounts of percussion-flaked and pressure-flaked items (Table 5.40). No pressure-flaked production failures were present, but evidence of on-site percussive biface reduction was evidenced by several "edge-bite" flakes.

Biface flakes (n = 39) constituted a much smaller proportion of the overall flake assemblage (8 percent) than in the earlier deposits. Mann-Whitney U tests show that the late assemblage of whole biface flakes (n = 15) is significantly heavier (mean = 0.27 g; $Z = -2.410$, $p = .016$) and longer (mean = 13 mm; $Z = -3.354$, $p = .001$) than the Basketmaker II biface flakes. Based on these patterns, on-site reduction of larger, percussion-flaked bifaces appears to have occurred in the later occupations. These characteristics differ substantially from the biface production strategies inferred for the underlying Basketmaker II assemblage, which focused almost exclusively on pressure-flaked items. Raw material types among the late biface flakes generally reflect a preference toward local materials, but two biface flakes of Narbona Pass chert and seven of obsidian indicate some use of exotic stone types not represented in the fin-

Table 5.39. LA 32964, flaked stone tools and stone types from post-Basketmaker II contexts.

	Stone Type				
Tool Type	**Chert, Local**	**Silicified Wood**	**Sandstone**	**Obsidian**	**Total**
Used/retouched debitage	1	6	0	2	**9**
Core	0	1	1	0	**2**
Biface flake (tool fragment)	0	3	0	0	**3**
Biface	0	2	0	0	**2**
Projectile point	2	0	0	0	**2**
Total	**3**	**12**	**1**	**2**	**18**

Table 5.40. LA 32964, production characteristics of post-Basketmaker II bifaces.

		Biface Fracture Type			Total
Tool Type	**Stone Type**	**None**	**Bending**	**Edge-bite Flake**	
Early stage percussion-flaked biface	Silicified wood	1	0	0	**1**
Middle stage pressure-flaked biface	Silicified wood	0	1	0	**1**
Middle stage percussion-flaked biface	Silicified wood	0	0	3	**3**
Late stage pressure-flaked biface	Local chert	0	2	0	**2**
Total		**1**	**3**	**3**	**7**

ished or broken bifacial tool assemblage. These characteristics suggest that the large biface reduction strategy inferred above was not oriented toward the production of flake blanks, but rather toward the production and shaping of bifacial tools (cf. Kelly 1988:719–720). Evidence of biface reduction of Narbona Pass and obsidian suggests ready-made tools were transported to and from this location.

Among the used/retouched flakes, more tools were made of pieces of angular debris (n = 3) and flake fragments (n = 3) than biface flakes (n = 2) or core flakes (n = 1). Of the two obsidian used/retouched flakes, one was a relatively small core-flake fragment. The other, a biface flake, showed pouch wear in the form of extensive random striations on both dorsal and ventral faces. This item was also by far the largest obsidian flake in the entire post-Basketmaker II assemblage, but its curated status, as evidenced by pouch wear, suggests that it was produced off site. The only other used/retouched biface flake, made of silicified wood, does not differ in size from the overall unused biface flake assemblage.

The silicified wood unidirectional core in the late assemblage is substantially larger (184 g) than those in the Basketmaker II assemblage. The second core in the late assemblage is a large (584 g) bifacially flaked sandstone cobble. Four unused sandstone flakes were also present in this assemblage, but the motives for flaking this coarse-grained, fairly intractable type of stone remain unclear.

In sum, the flaked stone tool assemblage contained in the mixed upper deposits of LA 32964 was broadly similar to the Basketmaker II assemblage in its composition of raw material types and frequency and proportions of tool classes. Sufficient subtle differences exist among bifaces and bifacial debitage, however, to suggest a shift in general site activities. Specifically, the late assemblage shows far fewer signs of on-site biface production, but when it did occur, the manufacture of percussion-flaked bifaces was more prevalent than the manufacture of pressure-flaked bifaces. Small sample sizes among other tool classes preclude any further meaningful inter-assemblage comparisons.

Ground Stone
Jesse B. Murrell

LA 32964 yielded a total of 25 ground stone artifacts (Fig. 5.33). With the exception of FS 52, an indeterminate ground stone fragment recovered from the surface of SU 1, all were recovered from the SU 1 Basketmaker II component (see Table 5.1). A total of eight whole and fragmentary basin metates were recovered from five features. Of these, five were recovered from Features 6 and Feature 9, which contained burned corn cupules. The consistency of the morphological configuration of these artifacts coupled with the association of corn suggests that during the early Basketmaker II-period shallow basin metates manufactured from thin slabs of sandstone were involved in the processing of agricultural produce. Additionally, they were most likely utilized in the processing of wild vegetal resources. The three basin metates appear to have been cached for an anticipated future use, considered a seasonal settlement behavior.

Indeterminate ground stone fragments. Indeterminate ground stone fragments are defined as pieces of ground stone tools with an unknown func-

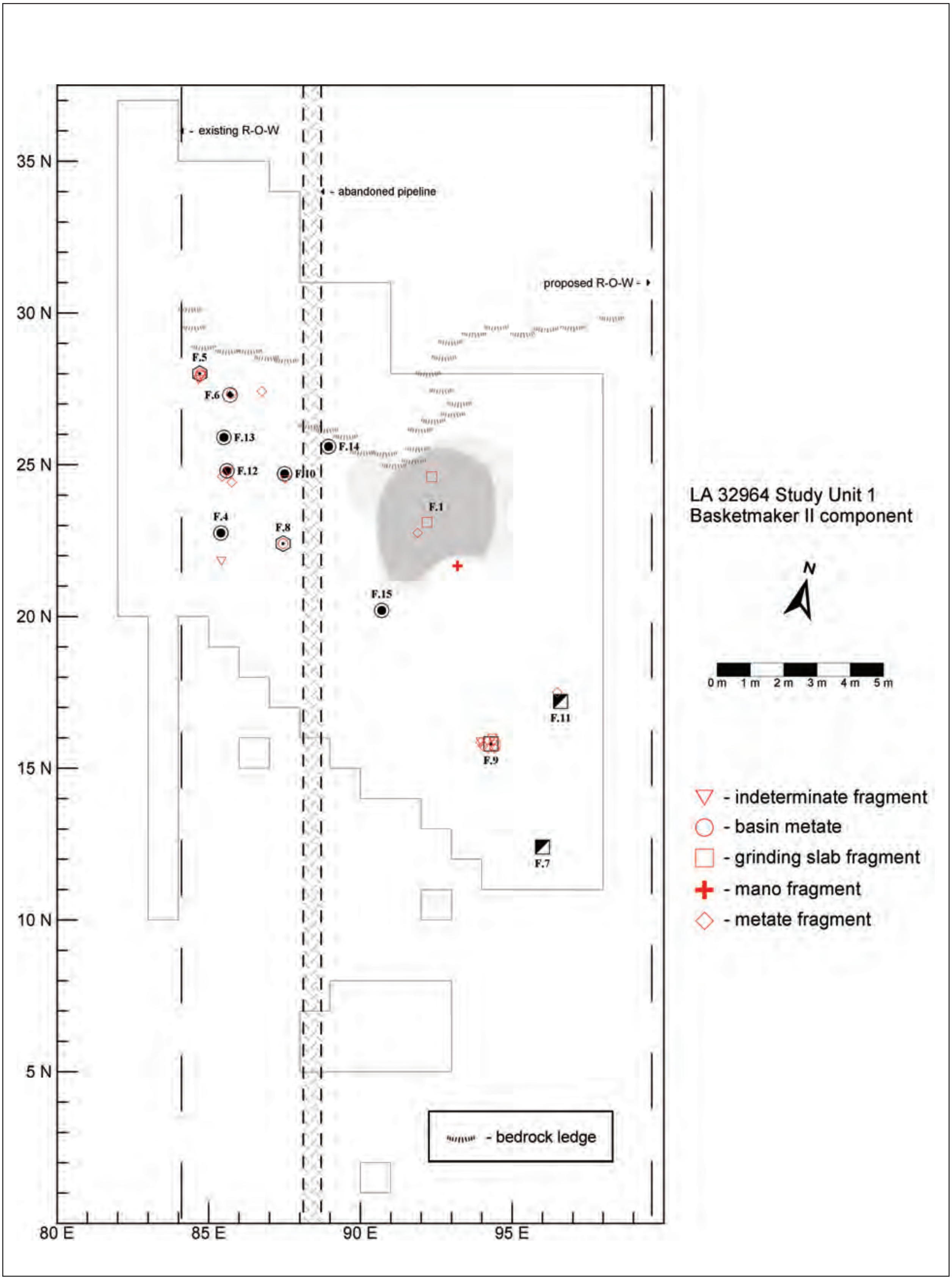


Figure 5.33. Ground stone tool distribution, Study Unit 1, LA 32964.

tion. A total of seven indeterminate ground stone fragments were recovered from LA 32964. All are of fine-grained sandstone and exhibit a single flat use surface. None manifest evidence of production input. Only FS 340 is considered a formal tool fragment because it was maintained through sharpening of the use surface. The artifact is relegated to the indeterminate ground stone fragment type because of its flat use surface. With the exception of FS 483, which exhibits multidirectional linear striations, all exhibit grinding/faceting wear. FS 353 is sooted over both faces and its fractured margins suggesting thermal alteration after breakage. Table 5.41 presents a select attribute summary.

These fragments were recovered from a variety of archaeological contexts, the least secure being FS 52, which was recovered from the modern ground surface in SU 1 and considered secondary refuse. Fragments FS 340 and FS 353 were recovered from more secure contexts, located in close proximity to the SU 1 processing area. Given the inferred nature of this area and the relatively high frequency of ground stone tools recovered, these items are considered primary refuse. Another indeterminate fragment, FS 483, is also considered primary refuse and appears to have been used in conjunction with Feature 12, perhaps as part of a cover used to retained heat. Finally FS 542, FS 544, FS 559 were secondarily used as construction elements in Feature 9.

Mano fragment. FS 432, recovered from the midden, is fragmentary in nature and precludes classification as a one-hand or two-hand mano. It was manufactured by pecking the margins of a cobble or slab of medium-grained orthoquartzite. This edge fragment exhibits a single convex use surface with grinding/faceting wear but was no evidence of maintenance. Although the entire site was not excavated, it is interesting to note that no whole manos were recovered. Whether this represents an abandonment behavior, whereby tools are transported by the site occupants to another location for use, cannot be ascertained, although this seems likely.

Metate fragments. LA 32964 yielded a total of nine metate fragments made from fine-grained sandstone. All are edge fragments that do not refit and exhibit a single concave use surface with grinding/faceting wear that suggests they were part of shallow basin metates. Metate fragments were recovered from several archaeological contexts. Four fragments (FS 509, FS 543, FS 55, and FS 554) were recovered from Feature 9, a partially deflated cist feature. FS 496 was recovered from Feature 11, which was a rock concentration that may represent discarded refuse or rock cached for a later anticipated use. FS 227 were located in close proximity to the SU 1 features and facilities and the sooted fractured margins suggest thermal alteration after breakage therefore. This item is considered primary refuse based on its context and the common use of fragmentary ground stone in features at this location. FS 339 and FS 491 are also thermally altered, located in the inferred processing area within SU 1, near Feature 12, and considered primary refuse. Although spatially related, Feature 12 is older than other samples' features, suggesting these items were used in conjunction with nearby features constructed during a subsequent occupation.

Slab metates. Feature 5 was a discrete stack of three ground stone fragments (FS 517, FS 518, and FS 520), topped by a complete basin metate (FS 521) positioned on the occupation surface in proximity to other processing facilities. As individual pieces, these items were analyzed as grinding slab fragments; however, they refit into a single slab metate (Fig. 5.34). The context of these items indicates they were used in conjunction with other ground stone tools and processing facilities identified nearby and cached at the time of site abandonment for anticipated future use.

Shaped slab. A shaped slab was also identified from three individual fragments (FS 614 and FS 299) that refit into a single tool (Fig. 5.35). Two of the three slab fragments were thermally altered suggesting this tool had broken prior to being used perhaps as a feature cover to retain heat. Heating left this material friable which may be why it was discarded in the midden. These grinding slab fragments were recovered from different areas within Feature 1.

Basin metates. Three whole or reconstructible shallow basin metates were recovered from LA 32964. These items were manufactured from thin slabs of fine-grained sandstone by removing a series of flakes from along the margins. All metates display a single concave use surface with grinding/faceting wear and evidence of maintenance through sharpening or rejuvenation.

The metates were recovered from three separate features. FS 618 and FS 619 were excavated as Fea-

Table 5.41. LA 32964, ground stone tools, selected attribute summary.

					Thermal Alteration					
					None		Fractured or Sooted		Reddened and Sooted	
Artifact Function	**FS**	**Portion**	**Shaping**	**Use Surface Mainten-ance**	**Grinding/ Faceting**	**Striations**	**Polishing**	**Grinding/ Faceting**	**Grinding/ Faceting**	**Total**
Indet. fragment	52	indet.	none	no	1	–	–	–	–	**1**
	483	edge fragment	none	no	–	1	–	–	–	**1**
	544		flaking	–	–	–	1	–	–	**1**
	542		indet.	yes	1	–	–	–	–	**1**
	353	internal fragment	none	no	1	–	–	–	–	**1**
	559		indet.	–	–	–	–	1	–	**1**
	340		none	yes	–	–	–	1	–	**1**
Mano fragment	432	edge fragment	pecking	no	–	–	–	1	–	**1**
Metate fragment	509	edge fragment	flaking	no	1	–	–	–	–	**1**
	227		none	yes	–	–	–	1	–	**1**
	339		none	–	–	–	–	1	–	**1**
	491		flaking	yes	–	–	–	1	–	**1**
	496		flaking	–	1	–	–	–	–	**1**
	543		flaking	–	–	–	–	1	–	**1**
	551		flaking	–	1	–	–	–	–	**1**
	554		flaking	–	1	–	–	–	–	**1**
	347	internal fragment	indet.	yes	–	–	–	–	1	**1**
Basin metate	512	whole	flaking	yes	1	–	–	–	–	**1**
	521		flaking	–	1	–	–	–	–	**1**
	618	conjoined fragments (complete)	flaking	yes	1	–	–	–	–	**1**
	619		flaking	yes	1	–	–	–	–	**1**
Slab metate	517	conjoined fragments (incomplete)	none	no	1	–	–	–	–	**1**
	518		none	–	1	–	–	–	–	**1**
	520		none	–	1	–	–	–	–	**1**
Grinding slab	558	conjoined fragments (complete)	flaking	yes	–	–	–	1	–	**1**
Shaped slab	299	conjoined fragments (incomplete)	flaking	no	–	–	–	–	1	**1**
	614	edge fragment	none	absent	1	–	–	–	–	**1**
Table Total					**15**	**1**	**1**	**8**	**2**	**27**

indet. = indeterminate

ture 8, where two fragmentary portions of the same metate were stacked. The conjoined fragments exhibit a subrectangular outline in plan (see Fig. 5.16). FS 512 and FS 521, irregular in plan, were recovered from Feature 6 and Feature 5, respectively. FS 512, which was shaped along one edge, was cached within Feature 6 with its use surface inverted (Fig. 5.36). FS 521 was among the discrete stack of ground stone artifacts composing Feature 5 (Fig. 5.37). Features 5 and 8 are located on the occupational ground surface in close proximity to processing other facilities and likely represent locations where ground stone was cached in anticipation of its future use.

Fauna

In all, 451 bone and eggshell artifacts were recovered from LA 32964. Bone and eggshell artifacts represent 8.1 percent of the total artifact assemblage recovered from LA 32964 and 8.0 percent of the artifact assemblage recovered from SU 1 (see Table 5.1). As previously discussed, the vast majority of these remains were recovered from SU 1, therefore, the following discussion will focus on that portion of the site. For a synthetic discussion on the faunal assemblage recovered from LA 32964 the reader is referred to Chapter 13.

SU 1 contained a total of 407 faunal and three eggshell artifacts. The majority of elements recovered from this area are fragmentary elements, meaning they were less than 25 percent complete. Several domestic species are present in the assemblage including dog, cat, sheep/goat, and chicken. These species were all recovered from post-Basketmaker II contexts and are interpreted as the result of modern roadside activity. While Stratum 2 yielded the fewest faunal remains, this pattern may be the result of sampling rather than an accurate reflection of the total archaeological record from that provenience. The identification of specific species is limited due to the fragmentary and burned nature of the assemblage. Species identified include a variety of rodents, desert cottontail and black-tailed jack rabbits. In addition to these species, larger quantities of small to medium mammal, medium to large mammal, and small to medium artiodactyl remains were identified. The most robust and contextually sound faunal assemblage was associated with Stratum 3 (Feature 1), Stratum 4 (the OGS), and

Figure 5.34. Refitted ground stone tool, Feature 5, LA 32964.

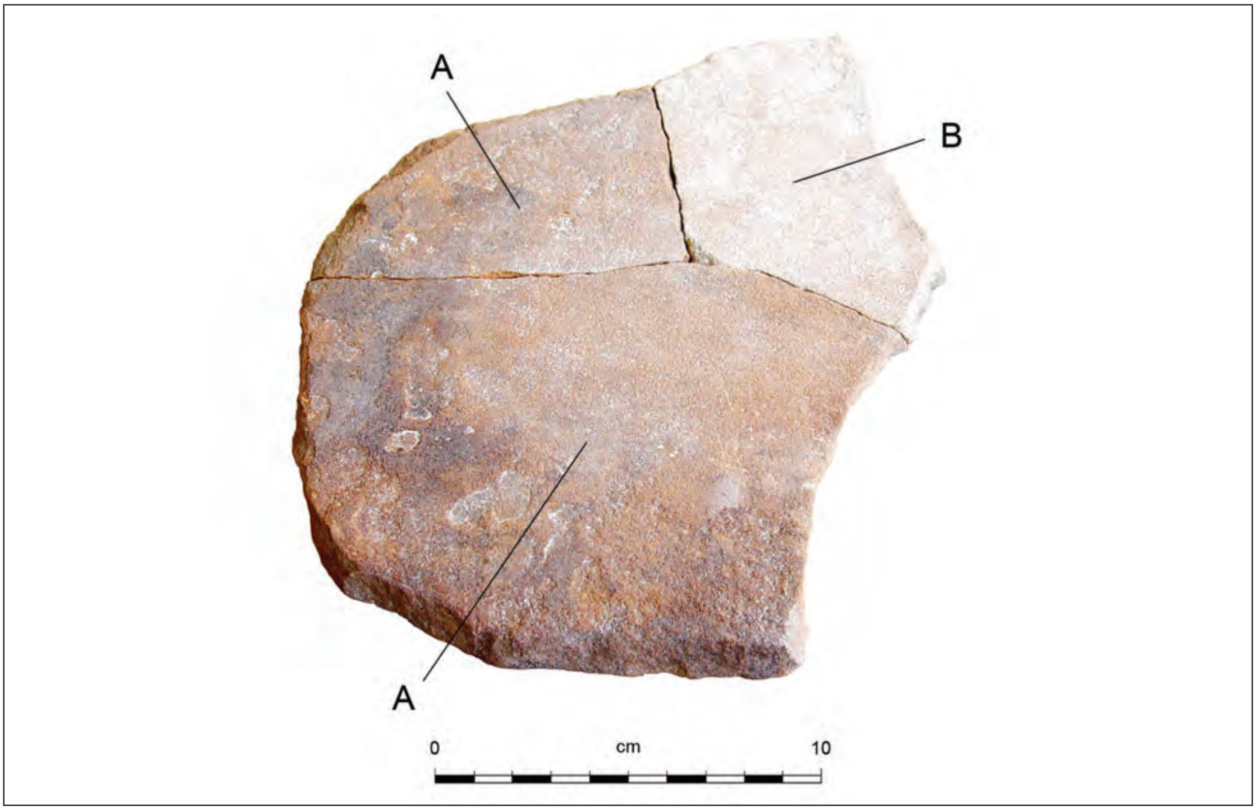


Figure 5.35. Refitted ground stone tool, Feature 1, LA 32964. The two pieces marked "A" are thermally altered.

Figure 5.36. Metate, Feature 6, LA 32964.

Figure 5.37. Metate, Feature 5, LA 32964.

other features interpreted to be the result of a numerous Basketmaker II occupations (Table 5.42).

Much of the bone recovered from the Basketmaker II component of SU 1 displays some degree of burning (Table 5.43). Burning ranges from light to calcined with the dry burn category including bone that had dried prior to being subjected to heat. Spatially burned bone was recovered in higher frequencies from the south-central and northeast portion of Feature 1 and from an area south of Feature 15. Unburned bone was recovered most frequently from the central portion of Feature 1 and from Feature 9 (Fig. 5.38). The fragmentary nature of the assemblage combined with the high frequency of burning suggests that processing small to medium sized faunal resources was an activity the site occupants were engaged in for economic benefit.

Macrobotanical Remains

Macrobotanical remains are well represented in the artifact assemblage and were only recovered from SU 1 (Table 5.1). For a synthetic discussion on the macrobotanical assemblage of LA 32964, the reader is referred to Chapter 14. A total of 1,946 pieces of carbonized and uncarbonized plant remains were recovered from features and intervening areas associated with multiple Basketmaker II occupations. However, 95 percent (n = 1,848) of these remains are carbonized and are clearly cultural (Table 5.44).

Annual species are relatively rare when compared to perennial and cultivar species and include goosefoot, indeterminate composite family species, and sunflower. A wide variety of perennial shrubs and trees are common in the assemblage with just over 60 percent of the culturally derived species represented by saltbush. Sagebrush and piñon/juniper are the next most common species identified; however, they only account for 5.4 percent

Table 5.42. LA 32964, fauna type and stratum by element completeness.

		Completeness of Element			
Stratum	**Common Name**	**Complete**	**99–25% Complete**	**<25% Complete**	**Table Total**
1	Small mammal	–	–	1	**1**
	Small–medium mammal	–	–	4	**4**
	Medium–large mammal	–	–	6	**6**
	Large mammal	–	1	2	**3**
	Dog	2	3	3	**8**
	Domestic cat	1	2	4	**7**
	Small–medium artiodactyl	–	–	10	**10**
	Domestic sheep or goat	3	–	2	**5**
	Domestic chicken	–	1	–	**1**
	Group Total	**6**	**7**	**32**	**45**
2	Small mammal	–	–	3	**3**
	Medium–large mammal	–	1	3	**4**
	Large mammal	–	–	4	**4**
	Black-tailed jackrabbit	–	–	2	**2**
	Small–medium artiodactyl	–	–	1	**1**
	Domestic sheep or goat	2	–	–	**2**
	Group Total	**2**	**1**	**13**	**16**
3	Small mammal	–	–	136	**136**
	Small–medium mammal	–	–	7	**7**
	Medium–large mammal	–	–	38	**38**
	Large mammal	–	–	2	**2**
	Large squirrels	–	1	4	**5**
	Gunnison's prairie dog	–	–	3	**3**
	Botta's pocket gopher	1	1	–	**2**
	Ord's kangaroo rat	1	1	–	**2**
	Woodrats	1	–	1	**2**
	Desert cottontail	–	1	11	**12**
	Black-tailed jackrabbit	1	1	7	**9**
	Small–medium artiodactyl	–	–	1	**1**
	Medium artiodactyl	–	–	2	**2**
	Group Total	**4**	**5**	**212**	**221**
4	Small mammal/medium–large bird	–	–	2	**2**
	Small mammal	–	–	97	**97**
	Small–medium mammal	–	–	2	**2**
	Medium–large mammal	–	–	3	**3**
	Large mammal	–	–	9	**9**
	Large squirrels	–	–	1	**1**
	Gunnison's prairie dog	–	1	4	**5**
	Botta's pocket gopher	1	1	–	**2**
	Ord's kangaroo rat	–	1	–	**1**
	Peromyscus sp.	–	1	–	**1**
	Desert cottontail	–	–	4	**4**
	Black-tailed jackrabbit	1	2	5	**8**
	Small–medium artiodactyl	–	–	4	**4**
	Medium artiodactyl	–	–	1	**1**
	Eggshell	–	–	3	**3**
	Nonvenomous snakes	1	–	–	**1**
	Group Total	**3**	**6**	**135**	**144**

(Table 5.42, continued)

		Completeness of Element			
Stratum	**Common Name**	**Complete**	**99–25% Complete**	**<25% Complete**	**Table Total**
Feature 6	Small mammal	–	–	3	**3**
Feature 7	Small mammal	–	–	4	**4**
	Gunnison's prairie dog	–	–	1	**1**
Feature 9	Small mammal	–	–	5	**5**
	Gunnison's prairie dog	1	–	–	**1**
	Mexican woodrat	–	–	1	**1**
	Desert cottontail	1	1	2	**4**
Feature 11	Large mammal	–	–	1	**1**
Feature 12	Small mammal	–	–	2	**2**
Feature 13	Small mammal	–	–	2	**2**
	Medium–large mammal	–	–	1	**1**
	Group Total	**2**	**1**	**22**	**25**
Table Total		**17**	**20**	**414**	**451**

Table 5.43. LA 32964, temporal component by faunal element condition and degree of burning.

			Degree of Burning					
Temporal Component	**Condition**		**None**	**Dry Burn**	**Light**	**Heavy**	**Calcined**	**Table Total**
Basketmaker III–Historic	Complete	Count	8.0	–	–	–	–	**8.0**
		Row %	100.0	–	–	–	–	**100.0**
		Col. %	4.0	–	–	–	–	**1.9**
	99–25% complete	Count	8.0	–	–	–	–	**8.0**
		Row %	100.0	–	–	–	–	**100.0**
		Col. %	4.0	–	–	–	–	**1.9**
	<25% complete	Count	41.0	–	–	3.0	1.0	**45.0**
		Row %	91.1	–	–	6.7	2.2	**100.0**
		Col. %	20.3	–	–	3.1	1.7	**10.5**
	Group Total	**Count**	**57.0**	**–**	**–**	**3.0**	**1.0**	**61.0**
		Row %	**93.4**	**–**	**–**	**4.9**	**1.6**	**100.0**
		Col. %	**28.2**	**–**	**–**	**3.1**	**1.7**	**14.3**
Basketmaker II	Complete	Count	6.0	–	1.0	–	–	**7.0**
		Row %	85.7	–	14.3	–	–	**100.0**
		Col. %	3.0	–	5.6	–	–	**1.6**
	99–25% complete	Count	10.0	–	1.0	–	–	**11.0**
		Row %	90.9	–	9.1	–	–	**100.0**
		Col. %	5.0	–	5.6	–	–	**2.6**
	<25% complete	Count	129.0	51.0	16.0	95.0	58.0	**349.0**
		Row %	37.0	14.6	4.6	27.2	16.6	**100.0**
		Col. %	63.9	100.0	88.9	96.9	98.3	**81.5**
	Group Total	**Count**	**145.0**	**51.0**	**18.0**	**95.0**	**58.0**	**367.0**
		Row %	**39.5**	**13.9**	**4.9**	**25.9**	**15.8**	**100.0**
		Col. %	**71.8**	**100.0**	**100.0**	**96.9**	**98.3**	**85.7**
Table Total		**Count**	**217.0**	**52.0**	**21.0**	**100.0**	**61.0**	**451.0**
		Row %	**48.1**	**11.5**	**4.7**	**22.2**	**13.5**	**100.0**
		Col. %	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

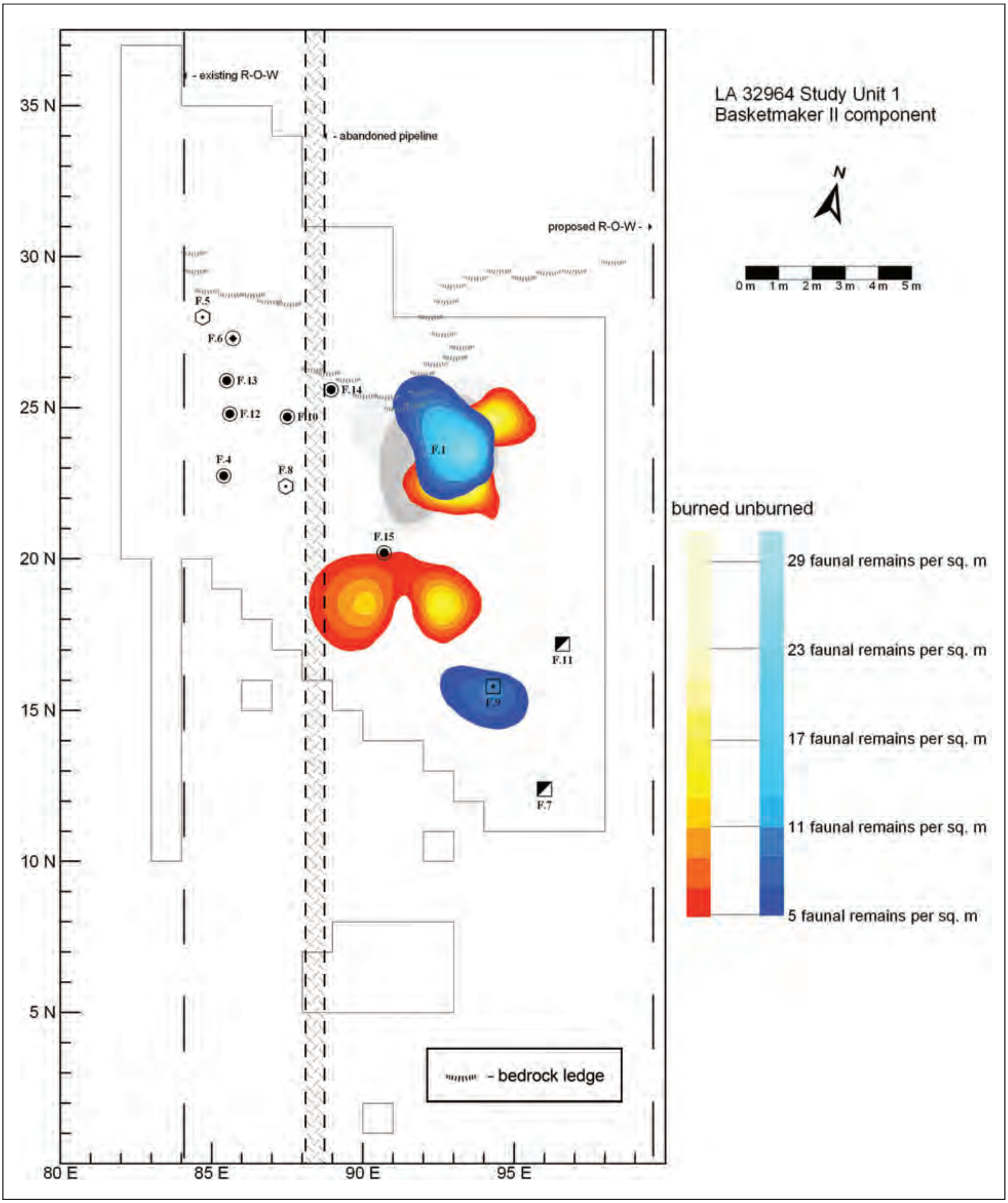


Figure 5.38. Burned and unburned faunal densities aggregated by count, Study Unit 1, LA 32964.

Table 5.44. LA 32964, botanical group and plant name by charring state.

		Charring State			
Common Name		**Carbonized**	**Partially Charred**	**Unburned**	**Table Total**
		Annuals			
Goosefoot	Count	4	–	69	**73**
	Row %	5.48		94.52	**100**
	Col. %	0.22		72.63	**3.75**
Composite family	Count	6	–	–	**6**
	Row %	100			**100**
	Col. %	0.32			**0.31**
Spurge	Count	–	–	1	**1**
	Row %			100	**100**
	Col. %			1.05	**0.05**
Sunflower	Count	2	–	–	**2**
	Row %	100			**100**
	Col. %	0.11			**0.10**
Purslane	Count	1	–	–	**1**
	Row %	100			**100**
	Col. %	0.05			**0.05**
		Perennials			
Unidentifiable seed	Count	1	–	–	**1**
	Row %	100			**100**
	Col. %	0.05			**0.05**
Sagebrush	Count	101	1	–	**102**
	Row %	99.02	0.98		**100**
	Col. %	5.47	33.33		**5.24**
Mountain mahogany	Count	7	–	–	**7**
	Row %	100			**100**
	Col. %	0.38			**0.36**
Rabbitbrush	Count	1	–	–	**1**
	Row %	100			**100**
	Col. %	0.05			**0.05**
Cliff rose	Count	7	–	–	**7**
	Row %	100			**100**
	Col. %	0.38			**0.36**
Juniper	Count	56	–	18	**74**
	Row %	75.68		24.32	**100**
	Col. %	3.03		18.95	**3.80**
Wolf-berry	Count	3	–	–	**3**
	Row %	100			**100**
	Col. %	0.16			**0.15**
Piñon	Count	18	–	–	**18**
	Row %	100			**100**
	Col. %	0.97			**0.92**
Ponderosa pine	Count	2	–	–	**2**
	Row %	100			**100**
	Col. %	0.11			**0.10**
Rose family	Count	14	–	–	**14**
	Row %	100			**100**
	Col. %	0.76			**0.72**

(Table 5.44, continued)

Common Name		Charring State Carbonized	Partially Charred	Unburned	Table Total
Willow family	Count	3	–	–	**3**
	Row %	100			**100**
	Col. %	0.16			**0.15**
Greasewood/ saltbush	Count	1141	–	–	**1141**
	Row %	100			**100**
	Col. %	61.74			**58.63**
Coniferous wood	Count	21	–	–	**21**
	Row %	100			**100**
	Col. %	1.14			**1.08**
Nonconiferous wood	Count	168	–	–	**168**
	Row %	100			**100**
	Col. %	9.09			**8.63**
Unknown wood	Count	1	–	–	**1**
	Row %	100			**100**
	Col. %	0.05			**0.05**
Unknown taxon	Count	25	–	–	**25**
	Row %	100			**100**
	Col. %	1.35			**1.28**
Grasses					
Ricegrass	Count	–	–	7	**7**
	Row %			100	**100**
	Col. %			7.37	**0.36**
Cultivars					
Corn	Count	266	2	–	**268**
	Row %	99.25	0.75		**100**
	Col. %	14.39	66.67		**13.77**
Table Total	**Count**	**1848**	**3**	**95**	**1946**
	Row %	**94.96**	**0.15**	**4.88**	**100**
	Col. %	**100**	**100**	**100**	**100**

and 4.5 percent of the culturally derived species respectively. The remaining 30 percent of perennial species include low frequencies of plants found in higher elevation such as mountain mahogany, cliff rose, willow family, and ponderosa pine. Rice grass was the only species of grass identified. Similarly corn was the only cultivar identified, represented by various plant parts (Table 5.44).

Spatially, macrobotanical remains were more common in the inferred processing area and midden than in the inferred staging area to the southeast. Perennial trees and shrubs were common in pit features with discrete concentrations identified in Feature 1. Among the pit features the highest frequencies of these remains were concentrated in and around Features 10, 12, and 13, which represent the central portion of the pit feature complex interpreted as a processing area. Interestingly, these three features are all similar in size, volume, and condition (see Fig. 5.28), suggesting similar functional roles related to the processing of biotic resources. To understand if the distribution was biased by the use of a different collection method (i.e., flotation versus 1/8-inch mesh), a subsample of remains collected from only 1/8-inch mesh was selected. While frequencies differed between the two data sets, the spatial distribution of macrobotanical types generated by the 1/8-inch subset was similar to the overall assemblage, suggesting that collection method does not drive the spatial distributions (Fig. 5.39).

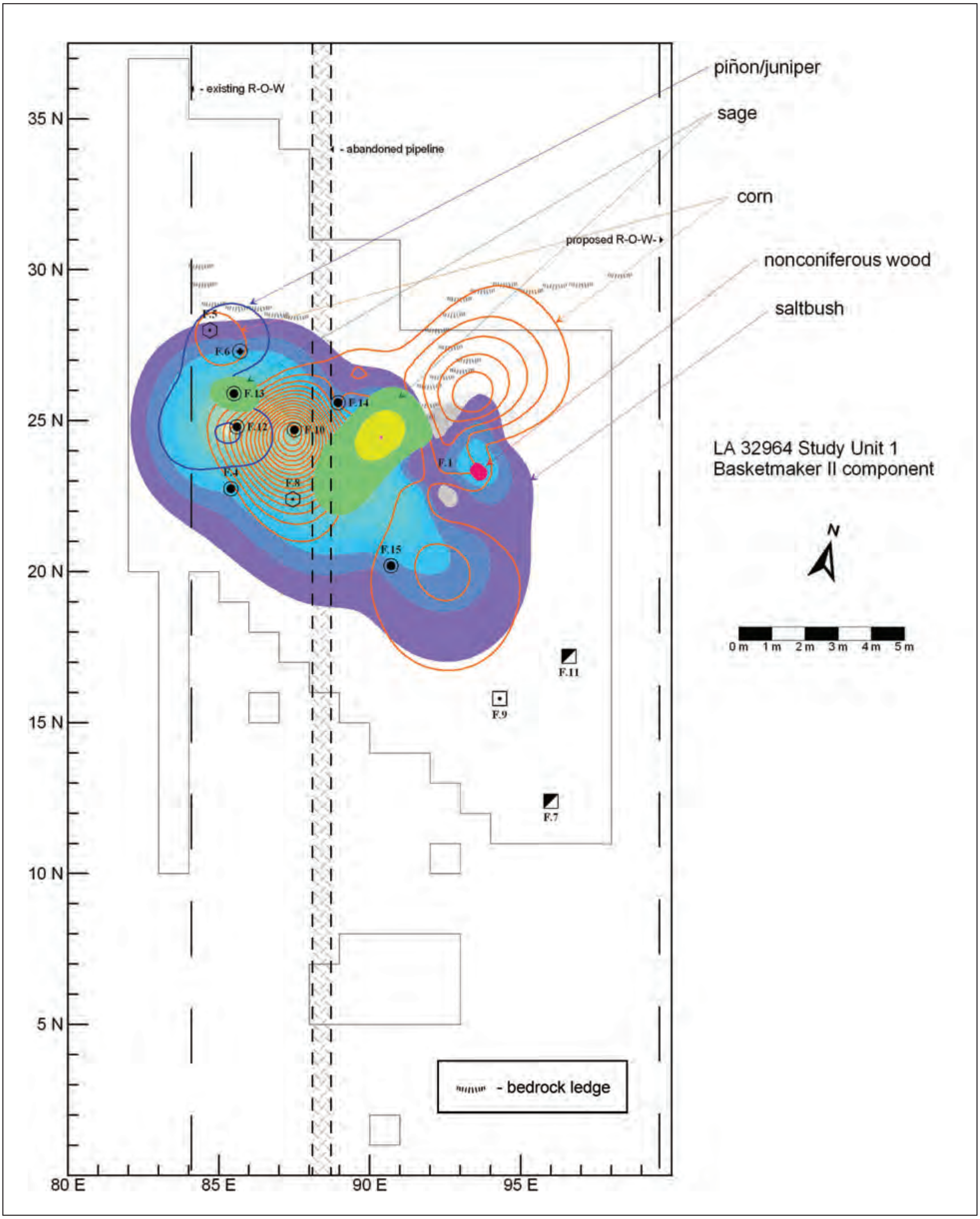


Figure 5.39. Macrobotanical remains aggregated by weight, Study Unit 1, LA 32964.

Saltbush was ubiquitous among features, the intervening areas, and in Feature 1, indicating its relative importance to subsistence activities particularly for fuel and possibly ephemeral brush structures. Similar to saltbush, corn remains were also ubiquitous, with the highest concentration recovered from Feature 10 and the northeast portion of Feature 1. Lower frequencies of corn remains were recovered from Feature 6 and the extramural area east of Feature 15.

Sagebrush was recovered from Feature 13, however the highest frequency of this species was recovered from the northwest portion of Feature 1. Nonconiferous wood, recovered predominantly from Feature 12, was also recovered in high frequencies from the southeast portion of Feature 1. Coniferous species, including piñon and juniper, were recovered in high frequencies from Feature 12, Feature 6, and the southwest portion of Feature 1. Finally, species found at higher elevations today including mountain mahogany and ponderosa pine were recovered from all pit features, except Feature 14 and Feature 15, and the western portion of Feature 1.

The overall ubiquity and close spatial relationship between saltbush and corn remains suggests that the processing of corn included the use of saltbush, perhaps as fuel or culinary ash. Using additives enhances the metabolic process of corn, offering greater nutritional value. Also, the spatial relationship between the botanical assemblage and features suggests, in addition to building new features at times of occupation, some facilities were cleaned out, fill discarded in the midden, then reused. Overall, the identification of discrete botanical remains recovered from primary processing and secondary discard contexts alike indicates occupation activities were patterned. Staging/processing and disposal of macrobotanical remains, as with other cultural material at the site, the same or related groups possessing knowledge of the site structure repeatedly used this location for seasonal activities related to corn agriculture.

Research Questions

LA 32964 is a spatially extensive multicomponent site. Although temporal components included Basketmaker II, Basketmaker III/early Pueblo I, Pueblo II–III, with limited evidence for early historic Navajo use, the dominant component within the project area was Basketmaker II. Multiple features and cached ground stone artifacts spatially associated with a high frequency of material culture were the result of repeated occupations during the early Basketmaker II period. Systematic data collection, chronometric sampling, artifact and feature analysis, and the subsequent spatial examination of these data were used to address the questions presented in the research design, which focused on site function, community role, and settlement and subsistence patterns. Site function and subsistence are combined to identify consistency and change in economic pursuits and levels of interaction with surrounding communities and the natural environment. These in turn can be used to address the role of LA 32964 within the community and overall settlement patterns. Fundamental to the later two questions, however, is establishing time and duration of use through chronometric control over the archaeological deposits.

Chronology

Data recovery resulted in the identification of 12 features, including a midden deposit, and 85 ceramic artifacts. Stratigraphically, ceramic artifacts were superimposed over the aceramic component including features and occupation surface. While the context of the ceramic artifacts is less than ideal, generalizations can be made about periods of site occupation. Carbonized material recovered from the features provided radiocarbon samples used to refine site occupation and duration of use for the aceramic component. The following section outlines the results of the radiometric and ceramic dating of LA 32964.

Radiocarbon dating. Radiocarbon samples were selected based on context and the taxon of the macrobotanical remain. Carbonized *Atriplex* was chosen for radiocarbon dating over other botanical remains for two main reasons. First, *Atriplex* was recovered from most contexts and its use thereby reduces the amount of variability in sample types. Second, *Atriplex* has a relatively short (30–50 years) life span as compared to longer living coniferous species and its use for dating may provide finer temporal resolution on periods of site occupation.

When *Atriplex* was not available, *Zea mays* was used. In most cases, small (≈ 1 g) composite samples, derived through flotation, required the use of the AMS dating method.

In all, 11 samples from LA 32964 were submitted to Beta Analytic, Inc., for analysis (Beta-164321–Beta-164332) (Appendix 4a). Date calibration was done using OxCal v3.8 Markov Chain Monte Carlo (MCMC) Sampling method (Bronk Ramsey 2002; Stuiver et al. 1998). Chronometric data recovered from carbonized remains and, by association, features indicates an occupation range for the aceramic component starting between 970–710 cal BC (2 sigma) (905–760 cal BC [1 sigma]) and ending between 490 cal BC–0 (2 sigma) (410–240 cal BC [1 sigma]). Most dated contexts, however, fell between 790–350 cal BC (2 sigma) (760–385 cal BC [1 sigma]). Combined dated contexts indicate the aceramic component of SU 1 was repeatedly occupied from the Late Archaic–early Basketmaker II period through the late Ear Rock phase (Kearns 1996b).

Using radiocarbon data from other Basketmaker II occupations in the area, the dates form LA 33964 fall into three statistical groups with the strongest evidence for occupation during the Ear Rock phase. Although it is unclear if SU 1 represents the slow accumulation of material over a 600-year period of time or if this site represents short acute occupations that generated high frequencies of refuse within the shorter 400-year Ear Rock phase time span. It is interesting to note, however, that the three radiocarbon samples recovered from the midden (Feature 1) bracket all but one dated context from this site suggesting this was a favorable location for centuries with punctuated periods of occupation (Fig. 5.40). The fact that these occupations were not stratigraphically discrete indicates that one reason this location remained favorable its that it was geomorphologically stable.

Ceramic dating. A total of 397 ceramic artifacts were recovered or recorded at LA 32964. Ceramic types included Basketmaker III–early Pueblo I and Pueblo II–early Pueblo III gray wares, white wares, and red wares. In addition, a limited number of ethnohistoric Navajo gray ware sherds were identified. Spatially, Basketmaker III–early Pueblo I types, and ethnohistoric types were more prevalent within the project area and Pueblo II–Pueblo III types were more commonly identified in sampled surface artifacts outside the project area. Based on manufacture dates, the Basketmaker III–early Pueblo I and late Pueblo II–Pueblo III periods were well represented; however, the frequency of types manufactured during the Pueblo I period was conspicuously low, perhaps indicating a hiatus in occupation during this time.

Mean manufacture dates from this limited assemblage suggest that the Basketmaker III–Pueblo I component dates between approximately AD 600 and AD 850 (Fig. 5.41). Although data recovery within the proposed construction zone only identified redeposited ceramic artifacts, ceramic artifact data indicate that there are spatially extensive intact Basketmaker III–early Pueblo I deposits present beyond the project limit. Following the occupation was a Pueblo II–late Pueblo III period of occupation. Materials associated with the latter were more spatially discrete, compared to the Basketmaker III–early Pueblo materials, and associated with a unit pueblo located outside the project limits. Mean manufacture dates of diagnostic ceramic types associated with this component indicate that the unit pueblo was occupied between AD 1000 and AD 1250. Finally, the limited number of ethnohistoric Navajo ceramics identified within the project area suggests this area was reoccupied between AD 1550 and AD 1750. Due to the limited number of these items, the range of manufacture is not included in Figure 5.41.

Summary. Results of the radiocarbon and ceramic data indicate a long and complex occupational history at LA 32964. Based on a suite of statistically similar radiocarbon determinations, this location initially occupied during the Ear Rock phase (800–300 cal BC). The Basketmaker II occupation appears to be followed by an occupational hiatus that lasted until approximately AD 600–700, ending with the Basketmaker III–early Pueblo I reoccupation of the area. The Basketmaker III–Pueblo I occupation lasted until approximately AD 850 and was followed by another short laps in occupation. This location was again reoccupied during the Pueblo Period (AD 1000–1250), again abandoned, then continuously occupied by Navajo groups beginning during the ethnohistoric period (AD 1550–1650).

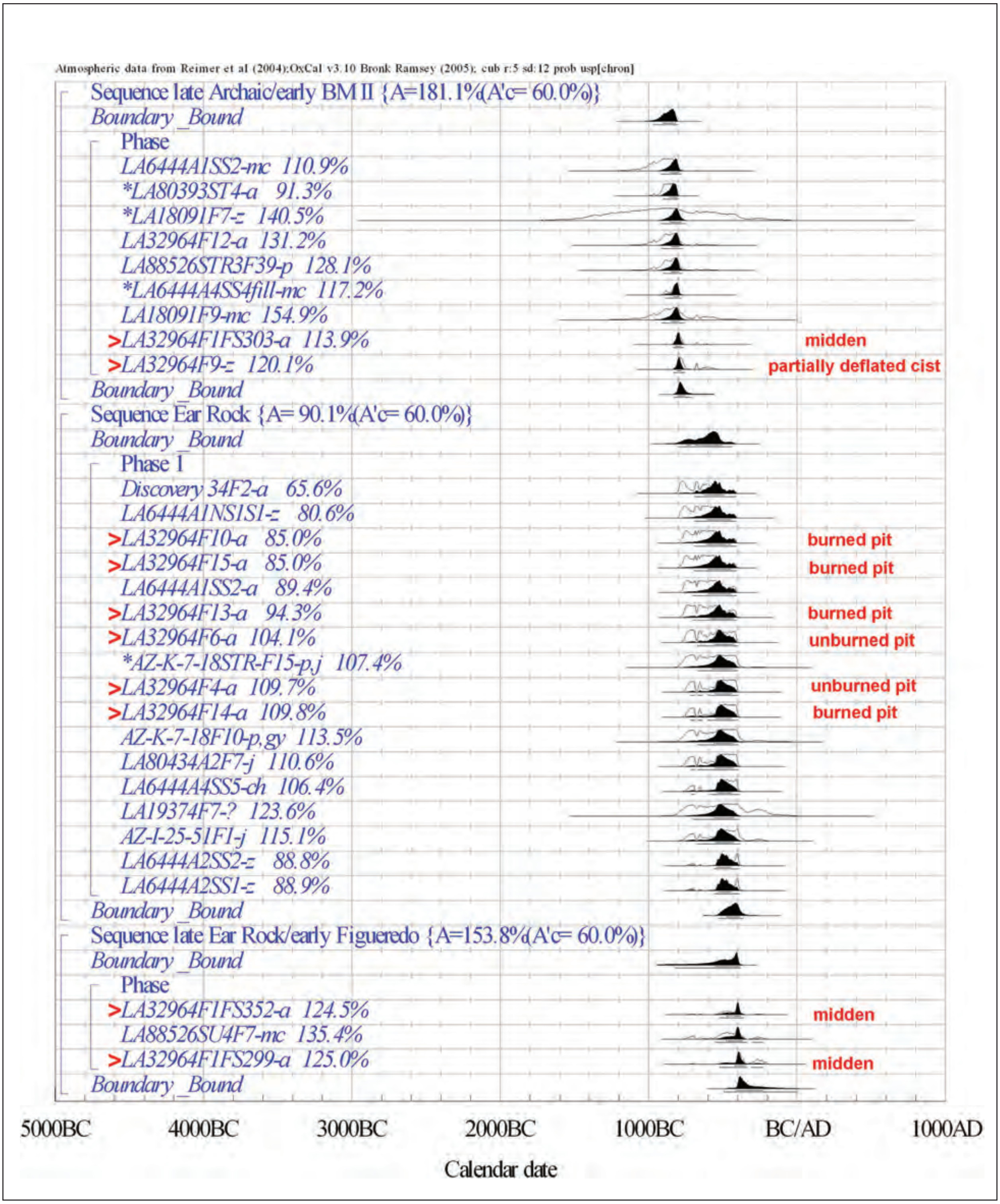


Figure 5.40. Calibrated radiocarbon dates recovered from late Archaic/early Basketmaker II contexts in the southern Chuska Valley, including Study Unit 1, LA 32964.

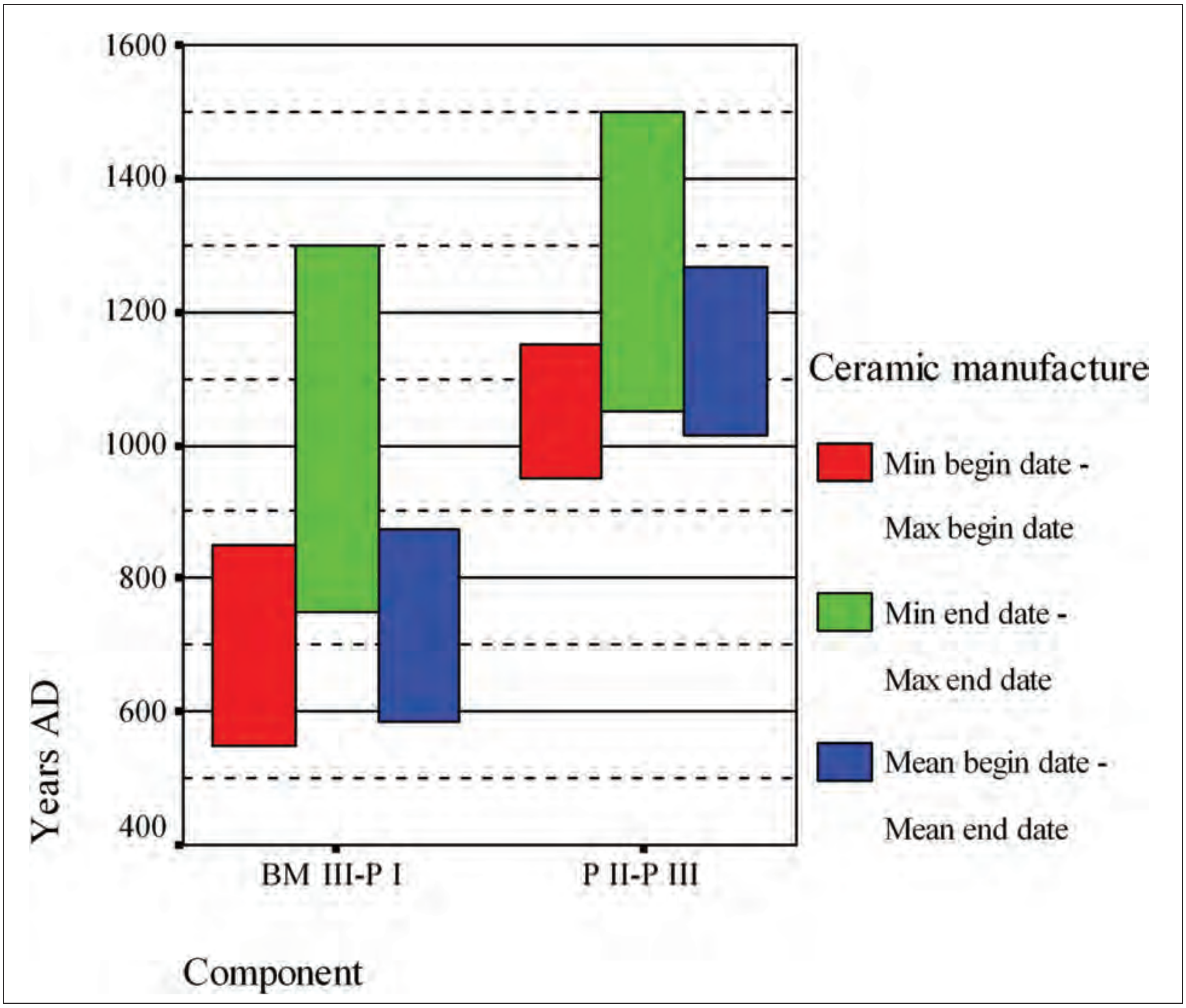


Figure 5.41. High-low plot of temporally diagnostic ceramics, LA 32964.

Site Activities and Function

Site activities and, in turn, site function can be interpreted from spatial and temporal patterns in artifact types, artifact attributes, and feature data. Stratigraphically these data were segregated, representing a Basketmaker II occupation underlying a general ceramic-period horizon, with little to no mixing noted. Primary and secondary refuse deposits associated with the Basketmaker II component were spatially patterned while material associated with post-Basketmaker II occupations were mixed and redeposited. The spatial patterning of material remains and the chronometric data from the early Basketmaker II horizon provides an excellent reference point from which to examine site activities and inferred site function for this period. These patterns can be compared to patterns observed in post-Basketmaker II artifact assemblage to identify changes in subsistence practices and site function.

Site activities. The Basketmaker II component at LA 32964 was spatially discrete, located at the southwest portion of the site limit and defined as SU 1. Three separate feature areas were identified within SU 1, and each displayed morphologically similar features. The western portion of SU 1 contained six of seven pit features identified and all the cached ground stone tools recovered from this site. Both burned and unburned pit features were present in this portion of the study unit. Burned pit features were centrally located among this feature complex with unburned pit features positioned immediately to the north and south. In addition, artifact types were also differentially distributed across this portion of the site. Large ground stone tools including basin metates and grinding slabs were either cached within pit features or carefully stacked on the OGS at the northern and southern limits of this feature complex. In addition, many of the smaller metate fragments and indeterminate ground stone tools were spatially associated with these features especially among the burned features in the central portion of the cluster. Macrobotanical remains, dominated by carbonized *Atriplex* and *Zea mays*, were well represented among the pit features with the highest frequencies recovered from the central feature area.

In contrast to the relative ubiquity of ground stone and macrobotanical remains recovered from pit features and intervening areas, there were relatively few chipped stone or bone artifacts identified compared to other portions of SU 1. For example, among the cluster of pit features, unutilized flake stone debitage was identified in frequencies of ≤10 artifacts per sq m. These artifacts, which tended to be small (≤5.0 g) were secondarily deposited and likely represent the scattering of debris associated with processing activities. Utilized debitage and flaked stone tools were also identified in low frequencies in this portion of SU 1. Unutilized debitage was more common in the central feature area while utilized debitage and chipped stone tools were more common near the perimeter of the feature cluster. This pattern was similar to that displayed in large ground stone tools. Burned and unburned bone were rarely identified (≤3 artifacts per sq m) among pit features and the surrounding extramural area. When present, these items were located in the central cluster of burned features.

The spatial distribution of features and artifact types in the western portion of SU 1 suggests this area was used to process and temporarily store biotic resources. A centralized area with thermal features, carbonized plant remains, and a higher frequency of debitage, bone, and fragmentary ground stone tools appears to be where the initial processing of subsistence resources occurred. The contents and condition of these central features indicates that saltbush and corn parts were used as fuel to roast or dry biotic resources, including corn and small mammals. Beyond this central area the space was relatively free of debris indicating it was maintained or kept clear of detritus. With its unburned pits and cached metates, the perimeter of the processing area appears to be where grinding and temporary site storage of processed materials occurred. Although flaked stone tools were identified in the surrounding area, their role in processing activities remains unclear (Fig. 5.42).

To the east of this processing area was Feature 1, a midden deposit, that resulted from the accumulation of debris from numerous Basketmaker II occupations. This feature contained the majority of chipped stone debitage and bone recovered from this site. Based on the high frequency of fragmentary artifacts, the lack of internal features and presence of rich charcoal-stained soil this area of the site appears to represent centralized discard area. A second area of high artifact frequency, comprised mostly of flake stone debitage and fragmentary bone, was located to the south of Feature 1. Although this area contained artifact frequencies similar those identified in Feature 1, it lacked the abundance of carbonized plant remains and charcoal-stained soil characteristic of the midden deposit. Based on these characteristics, this area may represent the early stages of midden formation or possibly a biface reduction location.

Debitage recovered from the eastern portion of SU 1 included a high frequency of pressure-flaked biface manufacturing debris, a low frequency of flake-cores, and an exceptionally low proportion of cortical material indicating that well reduced lithic material was transported to the site. Once on site, this material was reduced even further to produce small bifacial tools. Flaked stone tools, including bifaces and used/retouched flakes, were relatively uncommon compared to the debitage frequencies and were recovered primarily from secondary contexts to the east and south of Feature 1. Based on the density and complexion of the lithic assemblage, activities in the eastern site area appear to have focused on the disposal of plant processing debris, the production and maintenance flaked stone tools, and processing of meat. This last inference is suggested by the prevalence of faunal bone in the eastern site area.

After chipped stone, bone artifacts are the most frequent artifact type recovered from the eastern portion of the site area. All bone artifacts were small and fragmentary in nature indicating that the crushing or pounding of faunal resources for marrow extraction occurred as part of on-site subsistence activities, perhaps to extract marrow. Burned and unburned bone, recovered in relatively equal frequencies from the midden, were disproportionally recovered from the adjacent areas and the feature area to the southeast. Burned bone was common south of Feature 15 and unburned bone was most common in Feature 9. The spatial distributions of burned and unburned bone suggest that the portion of the site south of Feature 15 was discard from processing game.

Unlike the western feature area, features associated with the eastern area contained a high density of rock including a probable rock-lined pit (Feature 9). Formal evidence of construction was only found in one feature where unmodified, thermally altered sandstone fragments, and ground stone tool fragments were used to line a shallow basin. The remaining two features in this area were concentrations of 20 to 30 fist-sized, unmodified, angular sandstone fragments positioned on the occupation surface. These are considered cultural features based on the discrete spatial distribution of these materials and the absence of sandstone rock throughout the remaining excavation area. The function of these features is unclear, however they may represent cached material used to weigh down the edges of brush or hides to construct temporary shelters.

Site function. Feature and artifact condition, frequency, and distribution indicate a high level of organization in on-site activities. These activities occurred repeatedly between 700 and 400 BC, and indicate that the Basketmaker II component of this site functioned as an agricultural complex, presumably occupied during the growing season or spring to fall. Feature data indicate that on-site processing of cultivars and wild plant species occurred in the western portion of the site, with planned reoccupation evidenced by cached ground stone tools. Based on pit feature size and volume, storage of food surplus was not anticipated for extended periods of time. Furthermore, evidence of thermal alteration indicates that low level heat was required in most of the processing activities. The high frequency of fragmentary burned and unburned bone suggests that the harvesting and processing of small game animals also occurred at this location. Together the apparent repeated harvesting and processing of cultivars and small mammals over time clearly point to a well established forager-farmer settlement pattern and biannual mobility.

Patterns in artifact type and distribution indicate the Basketmaker II component also functioned as a location where small bifacial tools were produced and maintained. Few whole transportable tools such as projectile points and manos were recovered; however, the caching of less transportable tools including metates and grinding slabs suggests the inhabitants anticipated to return to this particular location to pursue similar economic endeavors as part of their seasonal round. Importantly, the condition and distribution of the lithic artifacts showed that reduced raw material was repeatedly transported to this location indicating that this site may have functioned as part of a larger established settlement regime. The patterned disposal of chipping debris indicates that site structure was maintained despite repeated occupation over a 400-year period of time. These anticipated and maintained patterns were also reflected in the feature array with plant processing pit features occurring in the western portion of the site and an inferred staging area occurring in the southeastern portion of the site. Presence of a centrally located midden feature used throughout the occupation history is further evidence that on-site activities on the part of the site occupants were well patterned and planned.

The patterned feature and artifact distribution signal that the Basketmaker II occupants at LA 32964 anticipated and pursued agriculturally based subsistence activities from spring until fall followed by a shift or gearing-up for a subsequent emphasis on stored foodstuff and hunting-based subsistence strategies during the winter months. Also, consistency in feature and artifact type, condition, and distribution strongly indicate that the site structure was maintained throughout the occupation history of this site. If so, this location was likely reoccupied by the same group or related social group that followed the same processing and disposal patterns, all pointing to a larger seasonally mobile community and maybe the early formation of land tenure practices (Kearns 1996c:4.18).

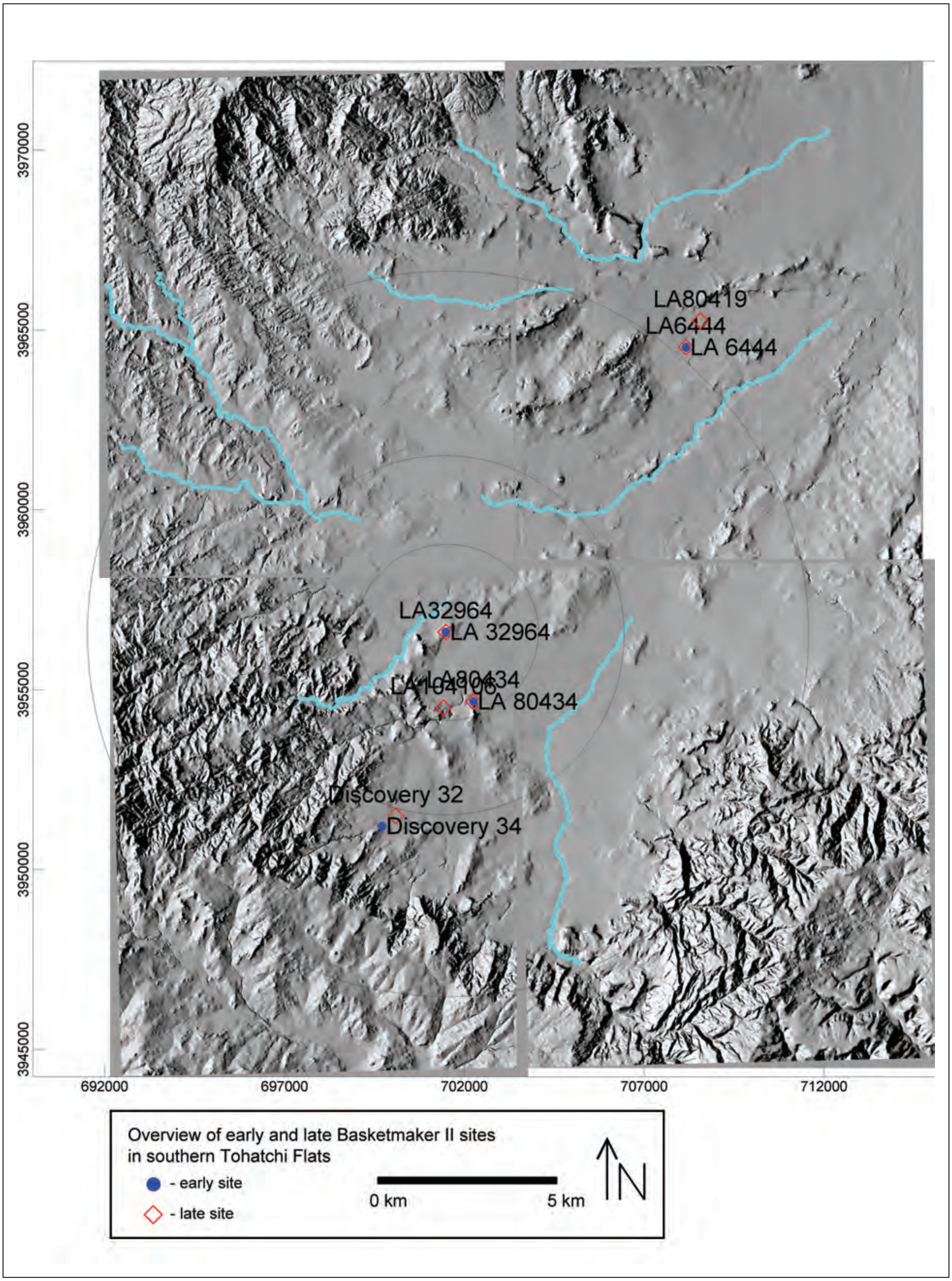


Figure 5.42. Distribution of Basketmaker II sites in the southern Chuska Valley.

Community Interaction

The geographic and social scale of intra- and intercommunity interaction for residential mobile groups, such as the Basketmaker II occupants of the southern Chuska Valley, can be examined through the spatial distribution of contemporaneous dated contexts and the identification of exogenous cultural material. Given that chronometric controls are inadequate to distinguish between multiple intergenerational occupations of residentially mobile groups, both intra- and intercommunity interactions of Basketmaker II communities in the southern Chuska Valley are considered together.

Much of what is known about Basketmaker II communities is inferred from well-protected caves or rock shelter sites located in the northern Colorado Plateau such as those found on Cedar Mesa, Black Mesa, and the Rainbow Plateau. Recently, several Basketmaker II open-air sites have been identified offering a broader perspective on the settlement and subsistence patterns during this period. These patterns have important bearing on the community formation and organization for Basketmaker II and later occupation in the southern Chuska Valley and San Juan Basin.

Late Archaic/early Basketmaker II. The earliest dated contexts at LA 32964 came from Feature 9, Feature 12, and within the midden (Feature 1). The MCMC modeled radiometric determinations placed these samples at the end of the Late Archaic/Basketmaker II transition phase (1200–800 cal BC) defined here by the presence macrobotanical samples of corn. While not the earliest dated cultigens in the Southwest, they are statistically contemporaneous with dates recovered from rock shelter sites including Bat Cave, Fresnal Shelter, and Jemez Cave (Smiley 1994:174). The inferred contemporaneity of these occupations indicates the growing importance of corn agriculture in subsistence practices over a spatially extensive area by 800 cal BC. The variety of locations that agricultural products were being produced, processed, and stored indicates some type of cultural, functional, or seasonal differentiation between these various locations

In the southern Chuska Valley and San Juan Basin, dated Late Archaic/Basketmaker II phase sites are few. They include LA 18091 located northeast of the Chaco River (Simmons 1982b:530–562), LA 80393 located near Ear Rock (Kearns 1998a:103–113), and LA 6444 located in northeastern Tohatchi Flats (Freuden 1998c:223–300) (see Fig. 5.40). Distances between dated sites in the southern Chuska Valley range between 2 km and 20 km (1.2 and 12.4 miles), fitting well within reported ethnographic foraging ranges (Adler 1994; Binford 1982; Kelly 1995:133). Although differences in the site structure, feature array, and artifacts distribution are noted, some similarities exist between these sites. Differences may be functionally related to specialized or anticipated activities (Kelley 1995) while similarities may reflect the technological manipulation of resources required to pursue generalized subsistence strategies and horticultural practices.

LA 6444 (Freuden 1998c) was also a multicomponent site. Excavation of Area 1 and Area 4 yielded several shallow pit structures and few extramural features. Pit structures with intramural thermal features were interpreted as habitations and the remaining structures were interpreted as storage or food processing locations. While no extramural features were identified in Area 1, the extramural feature array in Area 4 consisted of two clusters of shallow pits, two of which displayed evidence of patchy oxidation. Material culture was diverse but not prolific. Lithic artifacts include few flake and battered tools and a high proportion of core flakes, all were derived of locally available raw materials. Ground stone consisted of fragmentary items and milling slabs, some conjoin to form single tools, and a variety of locally available minerals were interpreted as pigment. The faunal assemblage was dominated by burned, fragmentary, small mammal bones and the macrobotanical assemblage was largely comprised of burned perennial shrubs and trees, and contained wild seeds, corn, and squash. Although radiocarbon determination places these contexts in the Late Archaic/Basketmaker II phase, other contexts from this site date to the subsequent Ear Rock and Figueredo phases.

At LA 18091 (Simmons 1982b), five extramural features were excavated. Most were shallow circular or oval basins; however, low frequencies of large bell-shaped pits and areas of charcoal-stained sediment were also identified. Many of the features were thermally altered, evidenced by patchy oxidation to well-reddened feature perimeters, especially among bell-shaped pit features. Material culture was limited, however there was strong evidence for biface maintenance and manufacture along with core reduction centralized in one area to the east of the features. The majority of these items were derived from local material types with some Jemez Mountain obsidian also identified. Few flaked, battered, or ground stone tools were recovered but included a basin and slab metates and a one-hand mano. Macrobotanical remains were not systematically sampled but charred corn cobs were reported. Based on artifact type and frequencies, Simmons (1982b) suggests that the tools had been curated and debris cleared from activity areas prior to abandonment. During investigations at LA 80393, Kearns (1998a) identified evidence for the exploitation of nondomestic seed resources and woody perennial species. Limited excavation data from this site is not adequate for comparison.

Importantly, most of these sites also have components dating to the subsequent Ear Rock and Figueredo phases. Subsequent reoccupation of sites based on suites of statistically similar radiometric samples indicates a continuum in seasonal habitation that may be related to the location of prime agricultural plots. The transition from Late Archaic/Basketmaker II to the Ear Rock phase is represented by an increase in corn within macrobotanical samples and in the frequency of statistically similar dated contexts.

Ear Rock phase. In addition to the sites described above, contexts dating to the subsequent Ear Rock phase (800–400 [300] cal BC) were identified at Discovery 34 (Kearns 1998c:571–579) located just southwest of the project area, LA 80434 (Freuden 1998a:477–582) located to the east of the project area in Tohatchi Flats, AZ-K-7-18 (Redd 1994:209–228) located in along Wide Ruin Wash, AZ-I-25-51 (P. Reed 1999b:439–433) located along Standing Redrock Wash in the northern Chuska Mountains, LA 19374 (Hogan and Winter 1983) located in the northern San Juan Basin, and LA 88526 (Redd et al. 1994:125–156) located on the north slope of Lobo Mesa to the southeast.

Similar to Late Archaic/early Basketmaker II sites described above, the Ear Rock component at LA 6444 was represented by shallow pit structures with few internal or extramural features, if any. Burned fragmentary small mammal bone, limited chipped stone assemblages of locally available material, and evidence for reliance on woody perennial, wild annual, and cultigens species was typical.

One radiocarbon date for LA 80434, Area 2, Feature 7 fell within the Ear Rock phase; however, this sample of juniper likely represents old wood and overestimates the actual age of occupation. This is supported by a second sample from *Atriplex,* which produced a younger date, and strongly suggests that this context dates to the subsequent Figueredo phase.

Discovery 34 and AZ-I-25-51 were represented by isolated features. An unburned slab-lined pit and an in situ thermal event were identified at Discovery 34. The slab-lined feature was devoid of material culture indicating it had been cleaned out after its last use. This feature was indirectly dated by the radiocarbon determination obtained from the remains of associated thermal activity.

AZ-I-25-51 consisted of a shallow oxidized basin with tabular sandstone and no corn or artifacts. Based on the a sample of juniper, this context was likely occupied during the subsequent Figueredo phase. AZ-K-7-18, Area 2, which was classified as an Archaic component, contained a shallow pit structure with intramural features, numerous extramural features, and a large spatially discrete area of charcoal-stained soil. Most intra- and extramural features were small unburned shallow basins of which most were less than 40 cm in depth with a few larger and deeper slightly bell-shaped pits (maximum depth of 80 cm) found. A relatively high frequency of lithic, ground stone tools, and bones were recovered. The chipped stone artifact assemblage included various cores and tested cobbles, a high frequency of core flakes, and few flaked stone or battered tools. Ground stone tools included several cached basin and slab metates, one-hand manos, several non diagnostic fragments, and a shaped stone tablet. The faunal assemblage consisted of burned and unburned small mammal species and included bone tools and ornaments. Macrobotanical remains were dominated by perennial woody shrubs and trees along with trace amounts of wild annual seeds and corn. Similar to AZ-I-25-51, the radiocarbon determinations from AZ-K-7-18, Area 2 were derived from piñon/juniper wood that may overestimate the age of this occupation.

Finally, the late Ear Rock/early Figueredo component at LA 88526 was represented by numerous extramural features, all less than 25 cm deep and cylindrical or basin shaped in profile. Two of these features were superimposed, one contained fire-cracked rock, the other was deeply oxidized. Material culture was limited to low frequencies of core, biface flakes, ground stone tools, and small polishing stones derived from locally available material types. There were, however, high frequencies of fragmentary, burned small mammal bone recovered from several of the features. Macrobotanical data show limited evidence of woody perennial, wild annual, and cultigens species.

Data recovery at LA 88526 also identified shallow pit structures and a spatially associated activity area that contained several extramural features. What remained of Structure 3, which was truncated by pipeline construction, included two thermal features and four unburned intramural features. These features were all less than 40 cm deep and cylindrical or basin shaped in profile. Material culture was limited to low frequencies of chipped stone core flakes derived from locally available material types, fragmentary and burned small mammal bone, and a small polishing stone. No flotation samples were processed and no ground stone was recovered. Based on the limited amount of material culture recovered from the structure and associated extramural area, this portion of the site was also interpreted to have been cleared of debris prior to abandonment, possibly in anticipation for future use.

Summary. Early Basketmaker II sites in the Chuska Valley and San Juan Basin, while spatially extensive, appear to cluster or aggregate in particular locations (Fig. 5.42). In the southern Chuska Valley the Tohatchi Flats area contains one of the highest site densities for this time period, although this may be partly the result of sampling error related to the high volume of cultural resource management projects conducted in this area. Early Basketmaker II sites in Tohatchi Flats are represented by a wide range of site configurations that are interpreted to be the result a relatively narrow range of site functions and associated activities. Material culture patterns associated with these sites reflect at least two distinct suites of activities, processing and production and habitation. Although differences in site activities are suggested by these material culture patterns, there are some general similarities that likely reflect basic modes of subsistence behavior.

The limited amount and diversity of refined or reduced exogenous lithic material suggests that Basketmaker II communities in the southern Chuska Valley were stable, had a limited range of annual mobility, and periodically interacted with contemporaneous communities to trade or barter for exotic materials. Based on the presence of cached ground stone tools, evidence for the manufacture of small bifacial tools, the introduction of well-reduced local and nonlocal lithic material types, the transportation of portable tools away from sites, and evidence for maintained living and processing areas, subsistence activities appear to have been planned and anticipated. This points to a well organized and predictable social and environmental setting. If so, then community organization and roles of community members were also likely well predictable and well defined.

6 | Data Recovery at LA 103446 (NM-Q-18-121)

LA 103446 is a multicomponent limited-activity and possible habitation site situated on a low north to south trending ridge overlooking Umbrella Butte to the east (see Fig. 2.1). The site surface has been affected by natural and mechanical disturbance. Natural disturbance consists of eolian activity represented by active dunes and deflated areas. Stabilized areas appear to have a maximum depth of 1 m, which may be obscuring additional cultural features outside the proposed construction zone. Sources of mechanical disturbance included a buried telephone cable, a water line, US 666, and a two-track road. The site was visited by 10 people while the OAS conducted data recovery investigations.

This site was originally described by Francisco (1994) as a Pueblo I–Pueblo II habitation site consisting of a low rubble mound associated with a moderate to dense artifact scatter covering just over 1,800 sq m (19,375.0 sq ft). The rubble mound consisted of a tabular sandstone concentration covering a 10 by 7 m area associated with a moderately dense artifact scatter (Francisco 1994). During data recovery investigations these features were relocated and the site boundary expanded to include additional artifacts and features, increasing the total site area to approximately 2,750 sq m (29,600.8 sq ft).

Field examinations began by creating an instrument map illustrating the expanded site limit, proposed construction zone, and other surface manifestations. Due to the linear nature of the project area a 1 by 1 m grid system was established parallel to the existing right-of-way, 15 degrees east of magnetic north. Vertical and horizontal control was maintained relative to a main datum, designated 100N/100E, located just outside the proposed construction zone. All surface artifacts in the proposed construction zone were point located and collected within the established grid system (Fig. 6.1). Surface artifacts located outside the proposed project area were recorded using five 2 m (6.6 ft) diameter sample areas (Table 6.1). A series of photographs was taken to document the setting prior to excavation (Fig. 6.2).

In all, 19 1 by 1 m grid units and 41 systematic auger tests were used to define the extent, nature, and depth of the deposits within the project area. In addition, 13 auger tests were used to determine soil depth and to identify potentially buried structures outside the proposed project area. Hand excavations were conducted in 1 by 1 m grid units and ranged in depth between 10 and 40 cm below modern ground surface. Fill was removed in 10 cm levels and screened through 1/4-inch mesh. Vertical control was maintained relative to the modern ground surface and the main datum. Following hand excavations and auger tests the project area was mechanically bladed to confirm the absence of cultural manifestations.

Results

Data recovery investigations resulted in the identification of two artifact concentrations associated with structural remains, two upright slab alignments, two petroglyph panels, and a small stone enclosure. A combined total of 201 ceramic and lithic artifacts were sampled or collected from the site. Of the 201 documented artifacts, only 12 were recovered from surface and subsurface contexts within the proposed construction zone (Table 6.1). The majority of evidence for occupation was located outside the

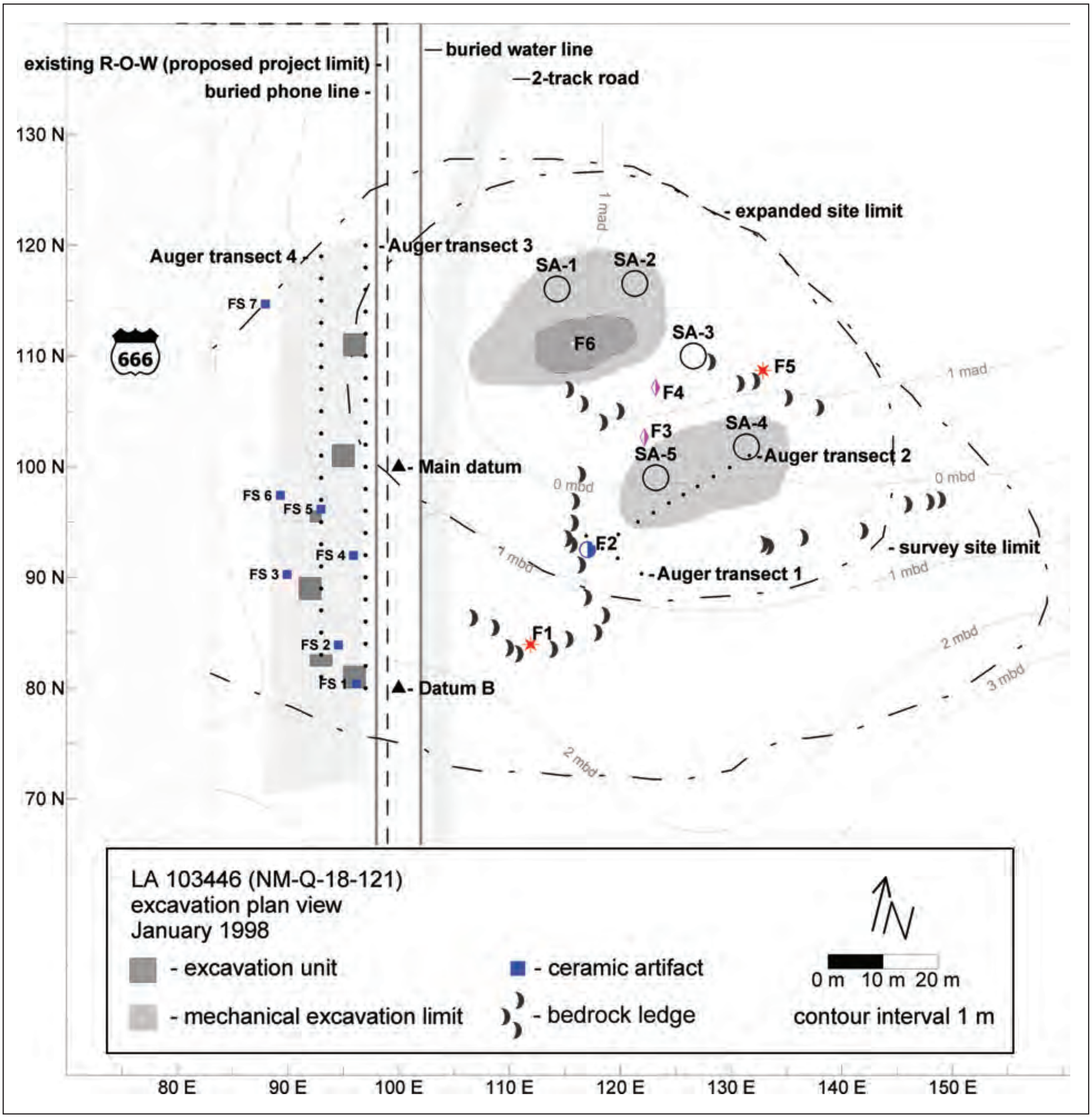


Figure 6.1. Plan of LA 103446.

Table 6.1. LA 103446, artifact type by collection method.

		Collection Method			
Artifact Type		**In-field Analysis**	**Intensive Surface Collection**	**Screened (1/4")**	**Table Total**
Ceramic	Count	181	10	2	**193**
	Row %	93.78	5.18	1.04	**100.00**
	Col. %	95.77	100.00	100.00	**96.02**
Lithic	Count	8	–	–	**8**
	Row %	100.00	–	–	**100.00**
	Col. %	4.23	–	–	**3.98**
Table Total	**Count**	**189**	**10**	**2**	**201**
	Row %	**94.03**	**4.98**	**1.00**	**100.00**
	Col. %	**100.00**	**100.00**	**100.00**	**100.00**

Figure 6.2. LA 103446, before excavation.

proposed project area. Three temporal components, Basketmaker III, Pueblo II–Pueblo III, and early twentieth-century Navajo, were represented among the features and artifact assemblages.

A total of six features were identified at LA 103446. All features were located outside the proposed project area (Fig. 6.3) and appear to be the result of a late Pueblo II–early Pueblo III habitation and an early twentieth-century Navajo occupation. Features possibly associated with the Pueblo II–Pueblo III Anasazi occupation included two upright slab alignments (Feature 3 and Feature 4) and a concentration of small sandstone fragments (Feature 6). Features associated with the twentieth-century Navajo component included a petroglyph panel (Feature 5) and a stone enclosure (Feature 2). Due to the lack of temporal diagnostic material associated with one of the petroglyph panels (Feature 1), no relationship with the identified components could be determined.

Feature 1 was located in the south-central portion of the site. This feature consisted of a small crescent image, open to the east, pecked into a 12 by 13 cm area on top of a sandstone escarpment (Fig. 6.4). This clearly defined crescent was associated with many indistinguishable scratches and peck or pock marks. Although these faint alterations are spatially associated with Feature 1, they may be the result of natural weathering.

Feature 2 was also located in the south-central portion of the site, on the east side of a sandstone escarpment. This feature consisted of five to ten unshaped sandstone cobbles stacked two courses high, arranged in an arc. This arc of stones incorporated the sandstone escarpment to the west forming an enclosure measuring 3 m in diameter. This enclosure may represent a ephemeral structure or a small livestock pen. Artifacts associated with this feature included key-opened meat cans and knife-opened fruit or vegetable cans.

Feature 3 was located in the central portion of the site. This feature consisted of three unshaped,

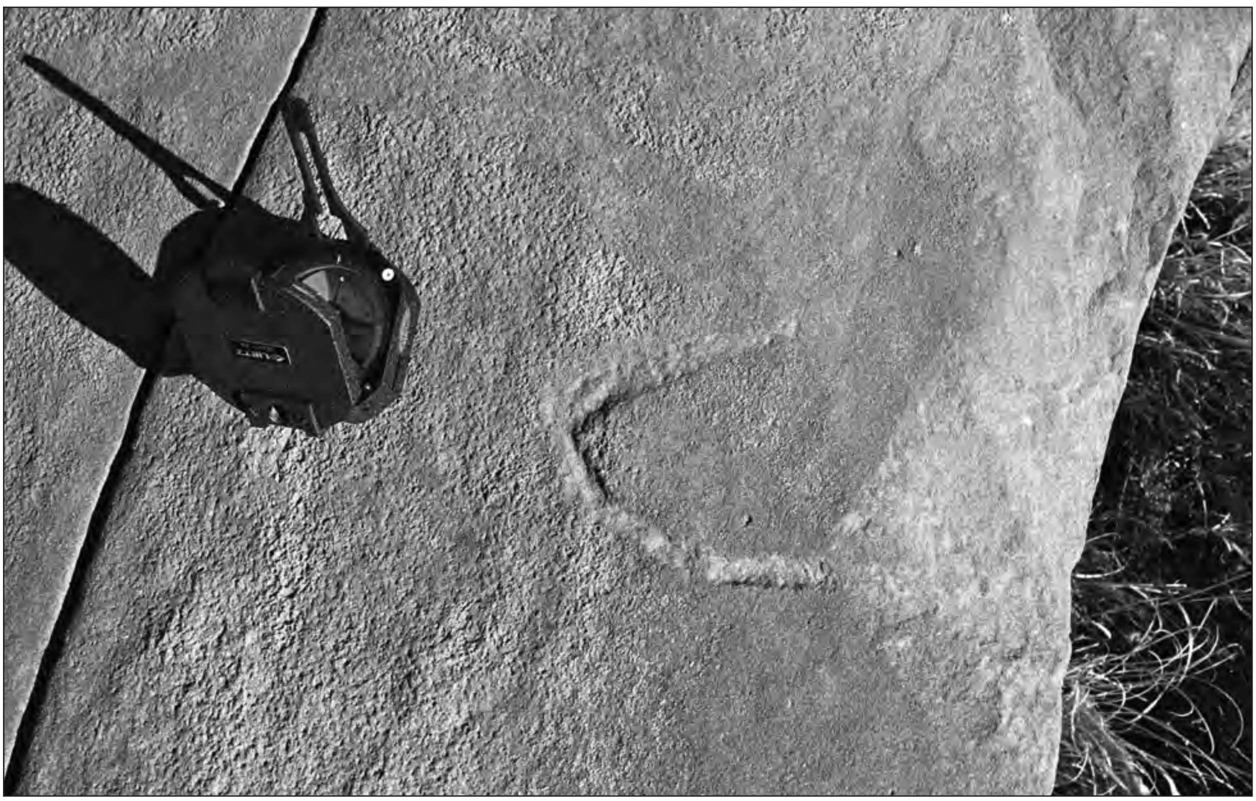


Figure 6.3. Feature 1, LA 103446.

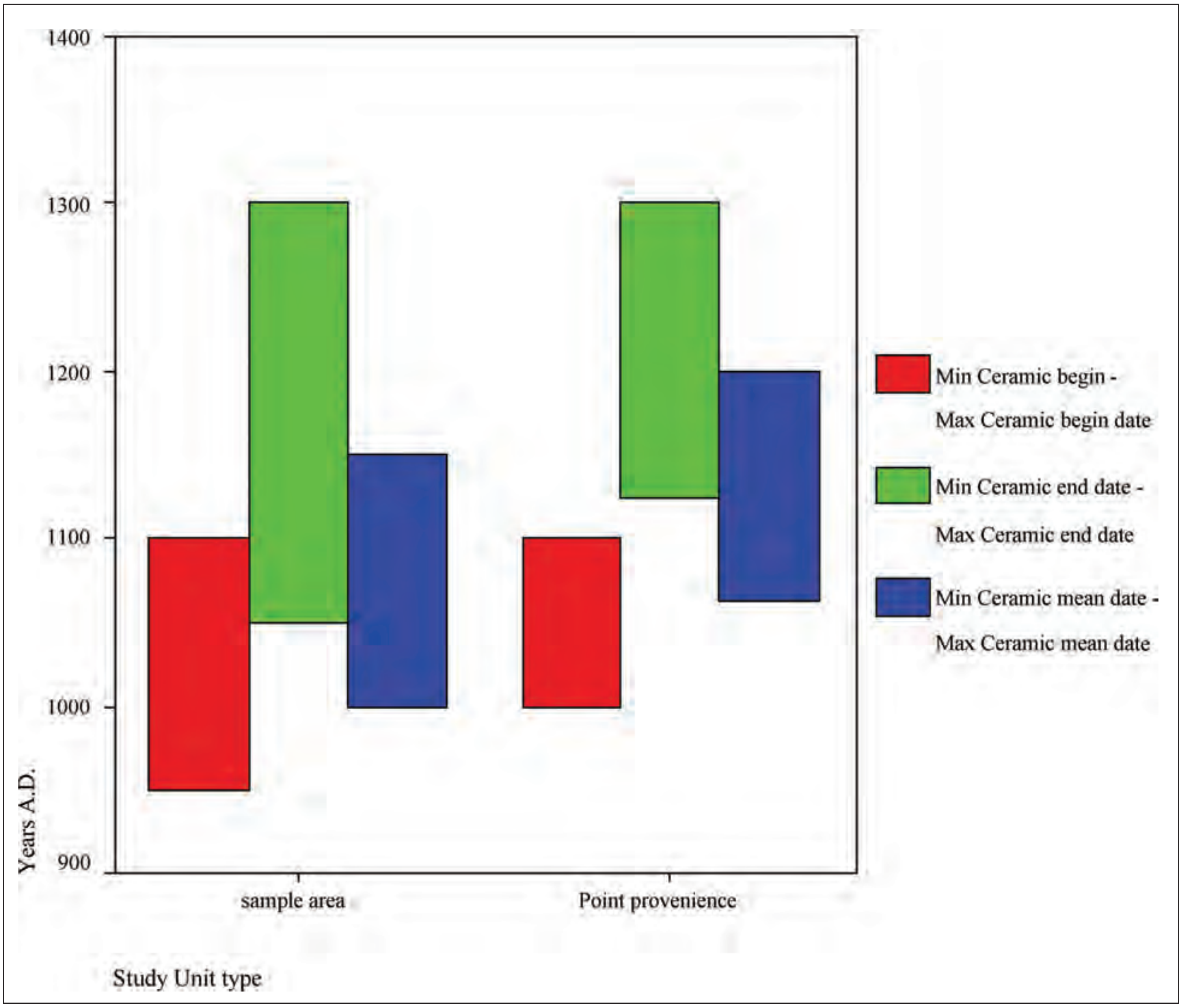


Figure 6.4. High-low distribution of temporally diagnostic ceramic artifacts, LA 103446.

upright sandstone slabs, each 30–45 cm long and 5–10 cm thick. Two of the slabs were positioned end to end with the third arranged perpendicular to the western end forming an L. This arrangement measured 80 cm wide by 140 cm long and was constructed perpendicular to the slope. Deposition may be obscuring other elements of this feature. Based on construction details, this feature appears to be related to the Anasazi occupation and may represent a slab-lined storage feature or the foundation of a surface structure.

Feature 4 was located in the central portion of the site 7 m north-northwest of Feature 3. Similar to Feature 3 in construction and materials, Feature 4 consisted of four upright sandstone slabs, each 30–45 cm long and 5–10 cm thick. The slabs were positioned end to end with one arrange perpendicular to the western end forming an L. Deposition also may also be obscuring additional elements of this feature which appears to represent a slab-lined storage feature or surface structure foundation similar to those described for Basketmaker III or Anasazi occupation in the area.

Feature 5 was located in the northern portion of the site. This feature consisted of numerous calendar dates and initials pecked into the south face of a sandstone escarpment. Dates include 1933, 1951, and 1961. Associated with the 1951 inscription are what appear to be the initials "AC A J," and associated with a 1961 inscription are the initials "AW. J. R." A scatter of meat cans and fruit or vegetable cans was identified around these inscriptions. These artifacts were of similar age to the dates inscribed on the panel.

Feature 6 was located in the west-central portion of the site and consisted of numerous small sandstone fragments covering an area approximately 10 by 7 m (32.8 by 23.0 ft). This debris scatter was located within the western artifact concentration and may represent the remains of a small room block (Francisco 1994).

Material Culture

Ceramics

Twelve ceramic artifacts were recovered from surface and subsurface contexts within the proposed project area and an additional 181 were recorded through in-field analysis (Table 6.1). Ceramic artifacts within the proposed project area were identified on the modern ground surface and in upper fill levels. These artifacts appear to be redeposited based on the lack of associated cultural features and the shallow context from which they were recovered. Ceramic artifacts recovered from the proposed project area likely originated from the dense artifact concentrations identified outside the proposed project area.

Ceramics located outside the proposed project area were sampled using five 2 m diameter sample areas (see Fig. 6.2). Pueblo II-period ceramics dominated the assemblage followed by Basketmaker III types and trace amounts of Pueblo III types. Evidence of a Basketmaker III component was limited to the identification of plain gray body sherds. Although plain gray body sherds are a characteristic of the Basketmaker III period, their presence does not directly equate to a Basketmaker III occupation. Plain gray body sherds could be derived from portions of corrugated or neckbanded vessels. The ratio of corrugated sherds to plain gray sherds is 7:1 (Table 6.2). This ratio suggests that some of the plain gray sherds were derived from smooth portions of mostly corrugated vessels. Ceramic artifact types and density identified at LA 103446 suggest this site was the result of a short-term residential occupation or intense intermittent occupations during the Basketmaker III and late Pueblo II–early Pueblo III periods.

Lithics

Eight lithic artifacts were identified at LA 103446. None were recovered from the proposed project area. The lithic assemblage included of four core flakes, a piece of angular debris, a core, a hammerstone, and a biface (Table 6.3). Seven of the lithic artifacts were derived from silicified wood with a single core flake of siltstone identified. Silicified wood is abundant in the area, and ranges in quality from flawless to flawed, medium-grained cryptocrystalline texture. The dominance of silicified wood is common, apparent from other sites excavated as part of this project and those in the vicinity (Kearns et al. 1999; Skinner 1999a).

Research Questions

Data recovery efforts at LA 103446 provided limited data for addressing research questions presented in the data recovery plan related to chronology, duration of occupation, site function, and geographic distribution of communities. LA 103446 appears to be the result of short-term residential occupation or frequent, possibly seasonal, reuse of this location during the Basketmaker III and Pueblo II–III periods. Following a 600-year hiatus, this location was again sporadically reoccupied by pastoral Navajo groups during the early to mid-twentieth century.

Chronology

The earliest component identified at LA 103446 dates to the Basketmaker III period, represented by a few plain gray ceramics. The Pueblo-period component is more robust, represented by ceramic types manufactured between AD 950 and AD 1300. The limited ceramic data suggest that the most frequent or prolonged occupations occurred during the late Pueblo II–early Pueblo III period with, perhaps, a brief occupation occurring during the Basketmaker III period (Fig. 6.4). Based on the inscriptions and domestic refuse identified at this location, the historic Navajo component dates between AD 1933 and AD 1961.

Table 6.2. LA 103446, ceramic type by sample area.

				Study Unit Type							
				Sample Area					Point Proven-ience	Grid Unit, 1 x 1	Table Total
Tradition	**Ware**	**Pottery Type**		**1**	**2**	**3**	**4**	**5**	**1**	**1**	
Indeter-minate	Gray	plain body	Count	2	3	2	3	4	–	–	**14**
			Row %	14.29	21.43	14.29	21.43	28.57	–	–	**100.00**
			Col. %	6.06	7.14	8.33	13.64	6.67	–	–	**7.25**
		indented corrugated	Count	19	22	12	14	33	–	–	**100**
			Row %	19.00	22.00	12.00	14.00	33.00	–	–	**100.00**
			Col. %	57.58	52.38	50.00	63.64	55.00	–	–	**51.81**
	White	unpainted, polished, white ware	Count	4	–	2	1	10	–	–	**17**
			Row %	23.53	–	11.76	5.88	58.82	–	–	**100.00**
			Col. %	12.12	–	8.33	4.55	16.67	–	–	**8.81**
		mineral paint (undifferentiated)	Count	1	5	–	–	–	–	–	**6**
			Row %	16.67	83.33	–	–	–	–	–	**100.00**
			Col. %	3.03	11.90	–	–	–	–	–	**3.11**
Cibola	Gray	plain corrugated	Count	–	–	–	–	–	3	1	**4**
			Row %	–	–	–	–	–	75.00	25.00	**100.00**
			Col. %	–	–	–	–	–	30.00	50.00	**2.07**
	White	unpainted, polished white ware	Count	–	–	–	–	–	–	1	**1**
			Row %	–	–	–	–	–	–	100.00	**100.00**
			Col. %	–	–	–	–	–	–	50.00	**0.52**
		mineral paint (undifferentiated)	Count	–	–	–	–	–	5	–	**5**
			Row %	–	–	–	–	–	100.00	–	**100.00**
			Col. %	–	–	–	–	–	50.00	–	**2.59**
		Red Mesa Black-on-white	Count	–	–	–	1	1	–	–	**2**
			Row %	–	–	–	50.00	50.00	–	–	**100.00**
			Col. %	–	–	–	4.55	1.67	–	–	**1.04**
		Escavada Black-on-white (solid designs)	Count	4	8	4	1	4	–	–	**21**
			Row %	19.05	38.10	19.05	4.76	19.05	–	–	**100.00**
			Col. %	12.12	19.05	16.67	4.55	6.67	–	–	**10.88**
		Gallup Black-on-white	Count	3	3	4	2	5	1	–	**18**
			Row %	16.67	16.67	22.22	11.11	27.78	5.56	–	**100.00**
			Col. %	9.09	7.14	16.67	9.09	8.33	10.00	–	**9.33**
		Chaco McElmo Black-on-white	Count	–	–	–	–	1	–	–	**1**
			Row %	–	–	–	–	100.00	–	–	**100.00**
			Col. %	–	–	–	–	1.67	–	–	**0.52**
	Red	White Mountain Red (painted, undifferentiated)	Count	–	1	–	–	1	–	–	**2**
			Row %	–	50.00	–	–	50.00	–	–	**100.00**
			Col. %	–	2.38	–	–	1.67	–	–	**1.04**
Chuskan	White	Chuska Corrugated	Count	–	–	–	–	–	1	–	**1**
			Row %	–	–	–	–	–	100.00	–	**100.00**
			Col. %	–	–	–	–	–	10.00	–	**0.52**
		Toadlena Black-on-white	Count	–	–	–	–	1	–	–	**1**
			Row %	–	–	–	–	100.00	–	–	**100.00**
			Col. %	–	–	–	–	1.67	–	–	**0.52**
Table Total			**Count**	**33**	**42**	**24**	**22**	**60**	**10**	**2**	**193**
			Row %	**17.10**	**21.76**	**12.44**	**11.40**	**31.09**	**5.18**	**1.04**	**100.00**
			Col. %	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

Table 6.3. LA 103446, lithic material type, morphology, and portion by sample area.

				Study Unit Type				
				Sample Area				Table Total
Material Type	**Morphology**	**Portion**		**1**	**2**	**4**	**5**	
Silicified wood	Core flake	Whole	Count	–	2	–	1	**3**
			Row %	–	66.67	–	33.33	**100.00**
			Col. %	–	66.67	–	100.00	**42.86**
	Hammer-stone	Whole	Count	–	1	–	–	**1**
			Row %	–	100.00	–	–	**100.00**
			Col. %	–	33.33	–	–	**14.29**
	Biface	Whole	Count	–	–	1	–	**1**
			Row %	–	–	100.00	–	**100.00**
			Col. %	–	–	50.00	–	**14.29**
	Core	Whole	Count	–	–	1	–	**1**
			Row %	–	–	100.00	–	**100.00**
			Col. %	–	–	50.00	–	**14.29**
Siltstone	Core flake	Distal	Count	1	–	–	–	**1**
			Row %	100.00	–	–	–	**100.00**
			Col. %	100.00	–	–	–	**14.29**
Table Total			**Count**	**1**	**4**	**2**	**1**	**8**
			Row %	**12.50**	**50.00**	**25.00**	**12.50**	**100.00**
			Col. %	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

Site Function

Based on the architectural remains and associated artifacts, the Pueblo-period component appears to be result of seasonal or periodic short-term occupations related to the procurement or processing of locally available biotic resources. Lithic data indicate partially reduced raw materials and formal tools were transported to this location for further reduction and use. The function of the historic component at LA 103446 may have also been transient in nature, perhaps representing a temporary field camp used for tending sheep and goats during the early to middle twentieth century.

Community Interaction

Date recovery investigations yielded little information useful for addressing community interaction. Although numerous Pueblo II and historic Navajo sites are present in the surrounding area, the excavation data are not adequate for interpreting the role within a community or level of community interaction between this and other contemporaneous sites in the area.

7 | Data Recovery at LA 103447 (NM-Q-18-122)

LA 103447 was a single component limited-activity site located on a broad southeast-trending slope at the margin of Tohatchi Flats and the southern Chuska Mountains (see Fig. 5.1). Most of the site surface has been affected by natural or mechanical disturbance. Natural disturbances include eolian activity reflected by the presence of active dunes and deflated areas. Sources of mechanical disturbance included a buried telephone cable, buried waterline, power pole, and US 666.

This site was originally described by Francisco (1994) as a Pueblo I to Pueblo II artifact scatter. These components were represented by a light artifact scatter restricted to the spoil zone of a water line trench. No surface artifacts were observed outside of the spoil area, suggesting the water line trench encountered buried cultural deposits. The majority of the surface materials were located west of the proposed construction zone. The possibility that intact cultural deposits existed within the project area was based on artifacts observed in the excavated spoil of a water line. The original site size was reported to cover approximately 1,575 sq m (16,953.2 sq ft), which was confirmed by data recovery investigations.

Data recovery investigations began following an intensive surface examination. An instrument map was produced illustrating the site limit, proposed construction zone, and other surface manifestations identified during the surface investigation (Fig. 7.1). Surface artifacts located outside the proposed project area were sampled through in-field analysis (Table 7.1). A series of photographs were taken to document the setting prior to excavation (Fig. 7.2).

Due to the linear nature of the project area, a 1 by 1 m grid system was established parallel to the existing right-of-way, 14 degrees east of magnetic north. Horizontal control was maintained relative to a main datum, designated 100N/100E, located outside the proposed construction zone. Vertical control was maintained relative to modern ground surface. A total of 32 systematic auger tests and one backhoe trench were used to define the extent, nature, and depth of the deposits. Fill was removed in 10 cm levels and screened through 1/4-inch mesh.

Results

All cultural material was restricted to the spoil of a utility trench. Data recovery investigations resulted in the identification a two dispersed artifact scatters. Systematic auger tests verified the depth of the cultural deposit and extent of disturbance. Mechanical excavation within the project area removed 50 to 70 cm of modern deposit (Stratum 1 and Stratum 2), exposing the underlying bedrock.

Stratigraphy

Mechanical excavation within the proposed construction zone revealed a total of two noncultural stratigraphic units. Both strata are likely the result of geomorphological processes related to Quaternary climatic events and are similar if not identical to the geomorphological summaries presented for LA 32964.

Stratum 1 was a modern, noncultural deposit that formed a 15 to 25 cm mantle over the entire project area. This homogeneous layer consisted of a post-occupation eolian deposit of very pale brown (10YR 7/3 dry) loose, silty loam. Soil had been sta-

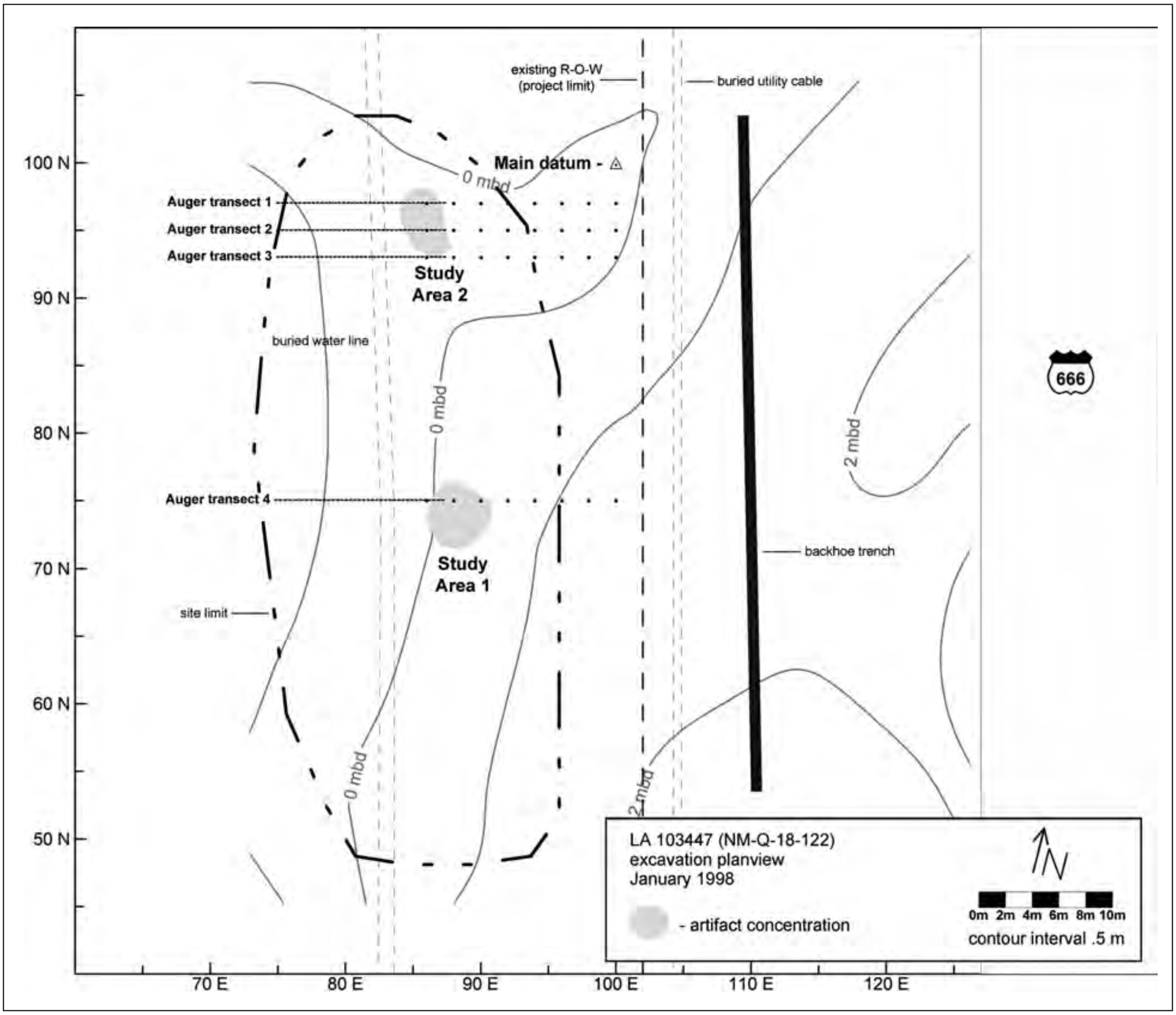


Figure 7.1. Plan of LA 103447.

Table 7.1. LA 103447, in-field ceramic analysis by study area.

Ceramic Type	Study Area 1, Count	Study Area 2, Count	Total Count
Plain gray	2	0	**2**
Corrugated body	12	12	**24**
Gallup Black-on-white	7	3	**10**
Chaco Black-on-white	1	1	**2**
Puerco/Escavada Black-on-white	2	3	**5**
Indeterminate Pueblo II white ware	0	2	**2**
Polished white ware	10	2	**12**
Total	**34**	**23**	**57**

Figure 7.2. LA 103447, before excavation.

bilized in some areas. Inclusions of small gravel, artifacts, and charcoal flecks were present in very low frequencies. No artifacts were associated with this layer.

Stratum 2 was a noncultural deposit similar to the Upper Nakaibito Formation described by Sant and others (1999). This homogeneous layer had a maximum thickness of 40 cm and consisted of a yellowish brown (10YR 5/4 dry) silty sand with inclusions of small gravel and charcoal flecks present in low frequencies. The boundary between Stratum 1 and Stratum 2 was clear and wavy. No artifacts were associated with this layer (Fig. 7.3).

Research Questions

The excavation of LA 103447 yielded minimal information useful for addressing the questions presented in the research design concerning duration of occupation and role of the site within the settlement system. Auger and mechanical excavation failed to produce evidence of a buried cultural horizon, which was suggested by the occurrence of artifacts identified in the spoil of a utility trench. This is not to say that a buried cultural horizon is not present, merely that one was not identified in the immediate area of the surface artifacts or in proposed construction zone. Buried cultural deposits are not uncommon in this area. For example, the NSEP identified intact deposits over a meter below the modern ground surface (Kearns 1998c:572). The lack of intact deposits at LA 103447 combined with minimal amounts of material culture make addressing the research questions a matter of speculation.

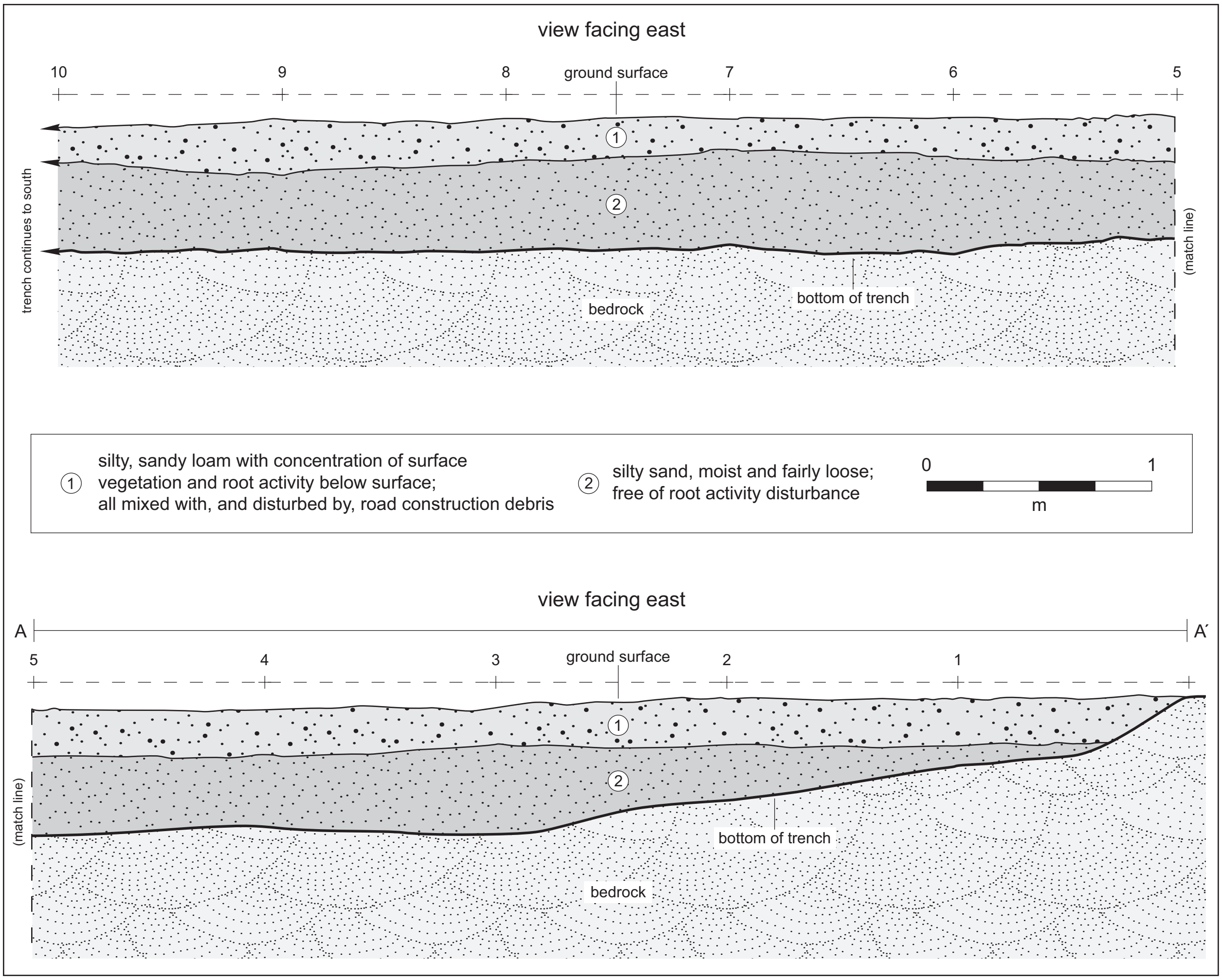


Figure 7.3. Soil profile, LA 103447.

8 | Data Recovery at LA 104106 (NM-Q-18-130)

LA 104106 is a large multicomponent site situated along the eastern margin of the Chuska slope on gentle southeast-facing ridge overlooking Tohatchi Flats (see Fig. 5.1). Evidence for a Basketmaker II limited-activity area, a Basketmaker III habitation area, and an early historic or Cabezon phase Navajo logistical camp were present at this location. Much of the site surface has been affected by eolian activity, including the development of both active and stabilized dunes. Deposits within the stabilized areas appear have a maximum depth of over 2 m. These deposits may be obscuring additional cultural deposits outside the proposed construction zone. In addition to natural surface modifications, three utilities have been installed within the site boundaries including one telephone cable, an overhead phone line, and an pipeline of unknown function. Other sources of surface modification include the present location of US 666 and frequently used two-track roads.

LA 104106 was described by Francisco (1994). He reported the site as a Pueblo I–Pueblo II habitation area consisting of a scatter of sandstone rocks associated with a low density surface artifact scatter and a single thermal feature, covering approximately 2,100 sq m (22,604.2 sq ft). Francisco's inventory of surface artifacts identified one Lino Black-on-gray sherd, one San Juan Red Ware and 60 Cibola Plain gray ware sherds. Lithic artifacts included limited amounts of silicified wood debitage and one piece of Oso Ridge chert (Zuni Mountain chert). Ground stone artifacts included three mano fragments and one nondiagnostic ground stone fragment. Reexamination of the site surface during data recovery investigations expanded the site boundary to include additional artifacts and features that may have been exposed since the preliminary survey (Fig. 8.1). The proposed project area included expanding the existing right-of-way 30 to 50 ft (10–15 m) to the west. Based on surface manifestations, the majority of the site appeared to be located within the proposed construction zone. During the course of data recovery investigations, no fewer than 100 individuals stopped at this site.

Field data recovery methods followed those outlined in the data recovery plan and Chapter 3 (Blinman 1997a). The proposed data recovery strategy was designed in three phases. Phase I involved preliminary investigations including site preparation and intensive surface investigations. Phase II aimed at expanding investigations through systematic augering and hand excavations in areas believed to contain cultural deposits, including features, structures, and extramural areas. Phase III investigations involved the use of mechanical equipment to remove noncultural strata and to confirm that no additional cultural manifestations were present within the proposed project area.

Phase I operations began by establishing a grid system across the entire site. Due to the linear nature of the project area the grid system was established parallel to the existing highway right-of-way, 14 degrees west of magnetic north. The main datum was located within the proposed construction zone in the northern portion of the site and was assigned an arbitrary horizontal provenience of 100N/100E and an arbitrary vertical elevation of 0 mbd. All vertical and horizontal proveniences controls were tied to a grid system and grid units were identified by their southwest corner (Fig. 8.2). All surface artifacts within the proposed construction zone were collected in 1 by 1 m grid units.

Phase II investigations began using a series of auger tests to define site stratigraphy and locate

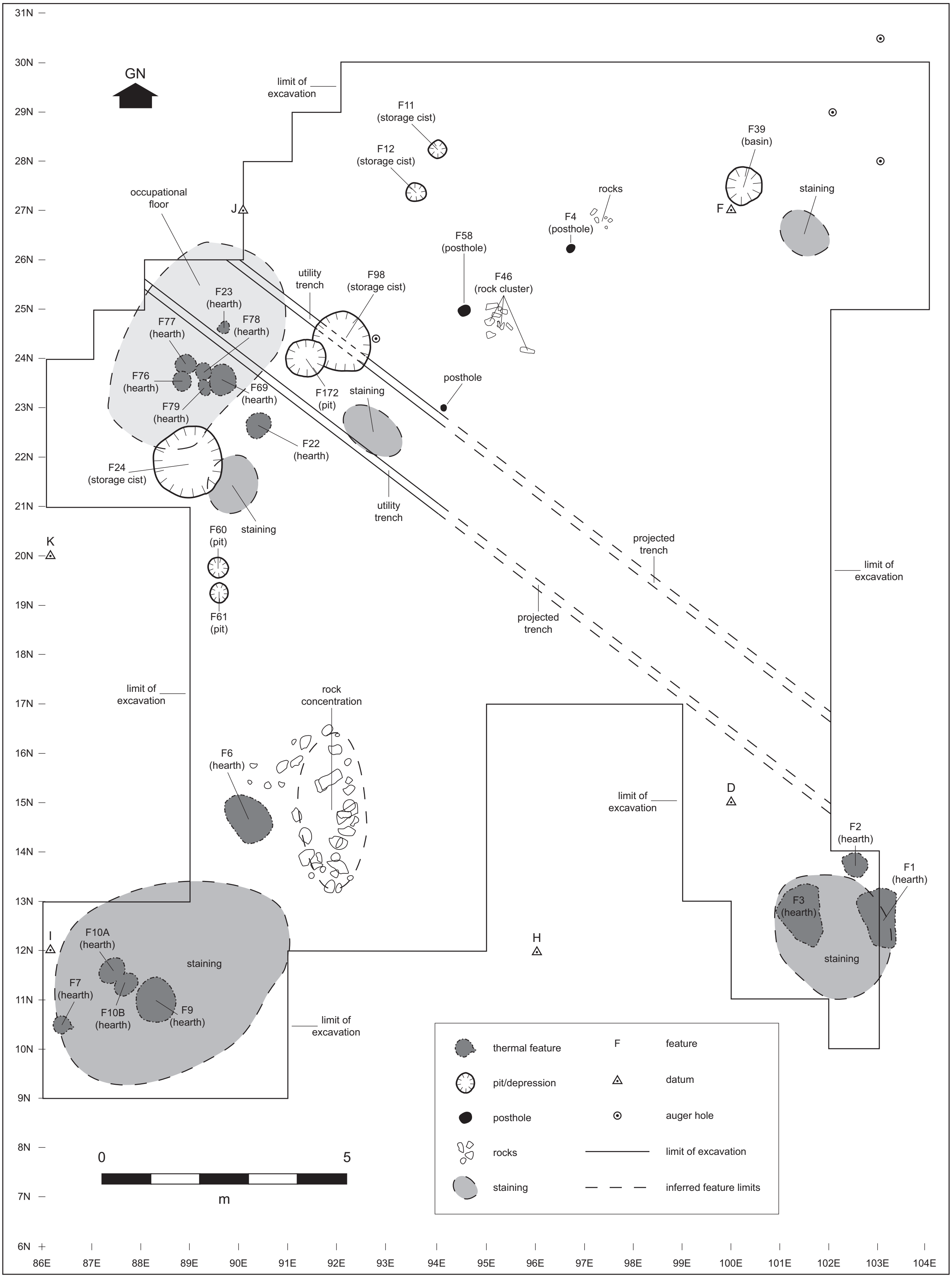


Figure 8.1. Plan of LA 104106.

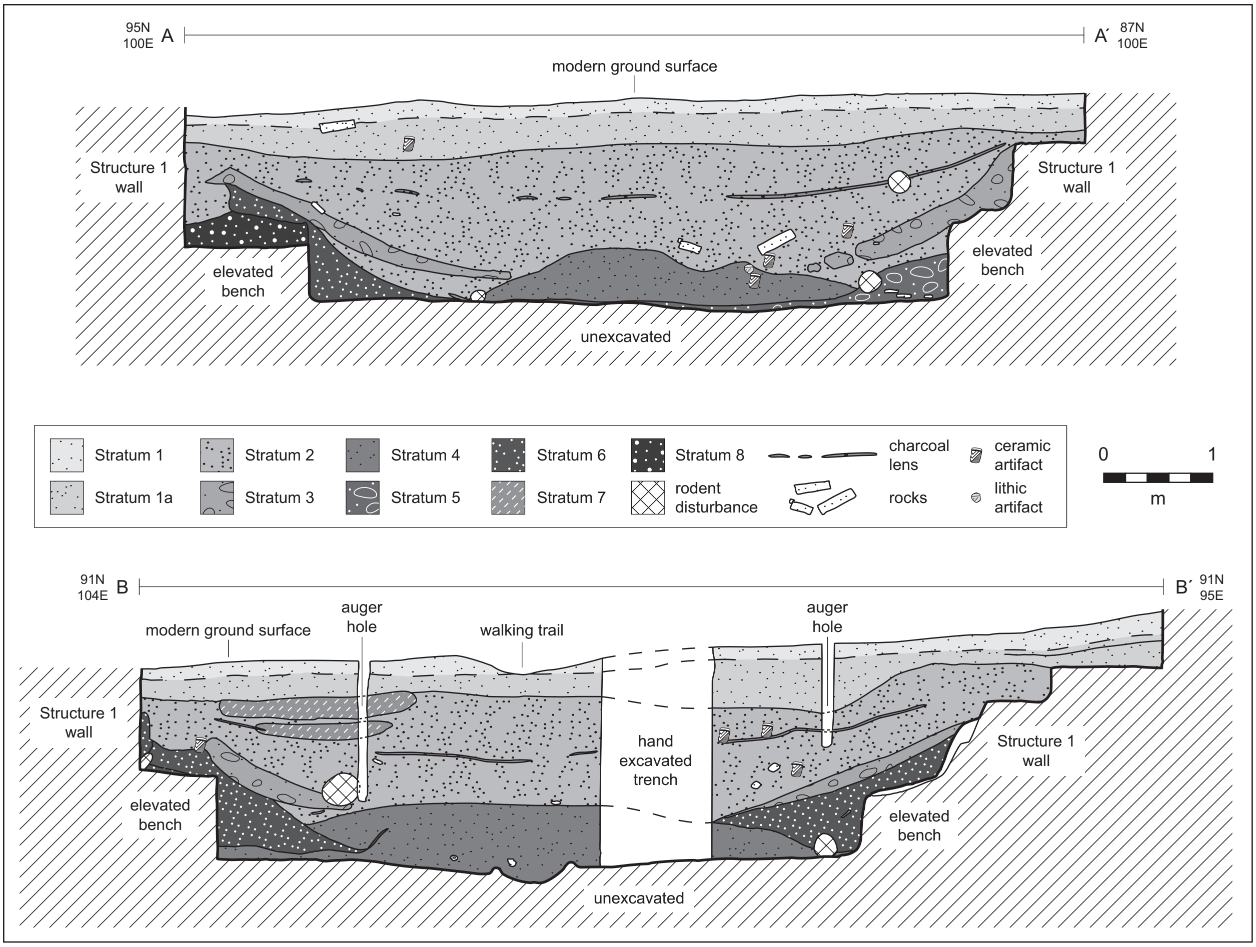


Figure 8.2. Profile, Structure 1, LA 104106.

subsurface deposits. Guided by the results of surface mapping and auger tests, hand excavations expanded in locations where surface artifacts were visible or where auger tests indicated buried cultural deposits. Hand excavations were used to evaluate the nature and depth of cultural deposits and help define site stratigraphy. Phase III investigations included additional mechanical stripping and the excavation of seven backhoe trenches to confirm the absence of any additional cultural remains.

Hand excavations were generally conducted in 1 by 1 m units removing fill in arbitrary 10 cm levels, 10 cm surface-strip levels, or entire natural stratigraphic layers. Initially, all soil and sediment was screened through 1/4-inch mesh hardware cloth. The results of this procedure, combined with profiles of excavated units, were used to demarcate cultural horizons, allowing for removal of noncultural and natural strata without screening.

When a feature was encountered or the presence of one was suspected, an effort was made to define its horizontal extent. This usually entailed excavation of contiguous, surrounding grid units to a similar depth to determine the complete horizontal extent of the feature. Specific methods for excavation of features depended upon their size. Small features became the unit of excavation and, when possible, one half was excavated in a single, full-cut, vertical level to define the nature and extent of the fill. A profile of the exposed wall was drawn, and the remaining half of the feature was excavated by internal strata. Large features were excavated by strata or 10 cm levels in grid units. Depending upon the size and internal complexity of the feature and the specific methods used for examination, profiles and photographs were produced at various stages of excavation, documenting the feature in more detail.

Results

Excavation identified 7 structures and 34 extramural features that appear to be the result of Basketmaker II limited-activity, Basketmaker III habitation, and early historic Navajo occupations. Archaeological materials recovered from within the proposed construction zone were counted and cataloged (Table 8.1). Through the examination of 740 sq m (7,965.3 sq ft), Phase I and Phase II investigations identified areas of high and low artifact density and a pit structure in the northern portion and proved inconclusive in the southern portion of the site. Mechanical stripping of approximately 2,000 sq m (7,965.3 sq ft) in the southern portion of the site exposed intact portions of an original ground surface and a series of cultural features. Based on the distribution of surface artifacts and features, the original site boundary was expanded to include the additional material.

Stratigraphy

Excavation revealed a total of nine stratigraphic units, three cultural and six noncultural. Cultural strata were the result of site abandonment processes and structural collapse. Nonstructural strata included structure fill from post-abandonment geomorphological processes. Strata 2, 3, 4, 5, 6, and 7 were isolated to the intramural area of Structure 1 (Fig. 8.2) while Stratums 1, 8, and 9 were present across the entire site and represent geomorphological strata similar, if not identical to, the geomorphological summaries presented by Sant and others (1999) for the Mexican Springs area.

Stratum 1 was a modern, noncultural deposit that formed a 25 to 50 cm mantle over the entire project area. This homogeneous layer consisted of a post-occupation eolian deposit of very pale brown (10YR 7/3 dry) loose, silty loam. Inclusions of small gravel, artifacts, and charcoal flecks were present in very low frequencies. Diagnostic artifacts associated with this layer included ceramics representative of the Basketmaker, Pueblo, and historic Navajo periods.

Stratum 2 was a noncultural deposit of post-abandonment fill present within most excavated structures. This light yellowish brown (10YR 6/4 dry) eolian deposit of fine sandy loam range between 80 and 120 cm thick. Sediments were loosely consolidated and sorted exhibiting numerous eolian and alluvial microstratigraphic lenses. Inclusions included artifacts, small fragments of sandstone, and charcoal flecks. Ceramic types diagnostic of the Basketmaker III to early Pueblo I periods were associated with this stratum. In Structure 1, the majority of the artifacts associated with this stratum were recovered from lower levels, toward the center of the structure. This pattern of recovery resulted from erosional processes transporting material into the structure following the deterioration of the upper walls. The boundary between Stratum 1 and Stratum 4 was abrupt and irregular with isolated pockets of Stratum 3 suspended in the fill.

Stratum 3 was a noncultural colluvial deposit with structural collapse represented as wall fall. This yellow (10YR 7/6 dry) deposit had a maximum thickness of 30 cm and consisted of a consolidated adobe material with inclusions include coarse sand, small fragments of sandstone, and charcoal flecks. Stratum 3 appears to have been deposited following some initial filling with Stratum 2. Based on stratigraphic placement, the northern section of wall degenerated prior to the southern wall. Both wall sections become discontinuous toward the center of the structure. The boundary between Stratum 3 and Stratum 4 was clear and abrupt with isolated pockets of Stratum 3 suspended in Stratum 2.

Stratum 4 was a cultural deposit representing roof fall. This light yellowish brown (10YR 6/4 dry) deposit formed a dome near the center of the structure with a maximum thickness of 60 cm. Stratum 4 was comprised of a similar matrix as Stratum 3; however, its distinctive characteristic was an increased frequency and size of the sandstone fragments. This consolidated deposit was more dispersed toward the south and terminated more abruptly to the north where it rested directly on the floor of Structure 1. Stratum 4 represents the intentional dismantlement of the collapsed material to retrieve salvageable elements of the superstructure. Based on distribution of this layer, it appears that the southern portion of the superstructure was retrieved first, allowing the remaining closing material to slid into the southern half of the structure.

Stratum 5 was a cultural deposit representing roof closing material and wing-wall debris. This

Table 8.1. LA 104106 study unit and architectural unit number by artifact type.

			Artifact Type										
Study Unit	**Archi-tectural Unit**		**Ceramic**	**Lithic**	**Ground Stone**	**Bone**	**Pollen**	**Macro-botanical**	**Chrono-logic Sample**	**Orna-ment, nfs**	**Bulk Sample**	**Mineral, nfs**	**Table Total**
1	Extramural area	Count	4363	1269	10	102	9	233	1	3	–	14	**6004**
		Row %	72.67	21.14	0.17	1.70	0.15	3.88	0.02	0.05	–	0.23	**100.00**
		Col. %	48.44	42.63	10.87	10.99	6.25	4.87	1.61	14.29	–	14.43	**33.11**
	Structure 1:												
	main chamber	Count	1192	288	44	240	82	2759	27	8	4	33	**4677**
		Row %	25.49	6.16	0.94	5.13	1.75	58.99	0.58	0.17	0.09	0.71	**100.00**
		Col. %	13.23	9.67	47.83	25.86	56.94	57.61	43.55	38.10	28.57	34.02	**25.80**
	bench	Count	327	83	3	21	11	30	2	3	1	6	**487**
		Row %	67.15	17.04	0.62	4.31	2.26	6.16	0.41	0.62	0.21	1.23	**100.00**
		Col. %	3.63	2.79	3.26	2.26	7.64	0.63	3.23	14.29	7.14	6.19	**2.69**
	ante-chamber	Count	907	269	5	155	7	50	–	5	8	34	**1440**
		Row %	62.99	18.68	0.35	10.76	0.49	3.47	–	0.35	0.56	2.36	**100.00**
		Col. %	10.07	9.04	5.43	16.70	4.86	1.04	–	23.81	57.14	35.05	**7.94**
	Structure 2	Count	509	73	7	106	9	295	1	1	1	–	**1002**
		Row %	50.80	7.29	0.70	10.58	0.90	29.44	0.10	0.10	0.10	–	**100.00**
		Col. %	5.65	2.45	7.61	11.42	6.25	6.16	1.61	4.76	7.14	–	**5.53**
	Structure 3	Count	348	78	3	35	3	69	7	–	–	–	**543**
		Row %	64.09	14.36	0.55	6.45	0.55	12.71	1.29	–	–	–	**100.00**
		Col. %	3.86	2.62	3.26	3.77	2.08	1.44	11.29	–	–	–	**2.99**
	Structure 5	Count	105	13	2	1	7	5	–	–	–	–	**133**
		Row %	78.95	9.77	1.50	0.75	5.26	3.76	–	–	–	–	**100.00**
		Col. %	1.17	0.44	2.17	0.11	4.86	0.10	–	–	–	–	**0.73**
	Structure 6	Count	51	23	2	16	–	–	–	–	–	–	**92**
		Row %	55.43	25.00	2.17	17.39	–	–	–	–	–	–	**100.00**
		Col. %	0.57	0.77	2.17	1.72	–	–	–	–	–	–	**0.51**
	Structure 7	Count	155	50	3	46	8	284	1	1	–	1	**549**
		Row %	28.23	9.11	0.55	8.38	1.46	51.73	0.18	0.18	–	0.18	**100.00**
		Col. %	1.72	1.68	3.26	4.96	5.56	5.93	1.61	4.76	–	1.03	**3.03**
	Group Total	**Count**	**7957**	**2146**	**79**	**722**	**136**	**3725**	**39**	**21**	**14**	**88**	**14927**
		Row %	**53.31**	**14.38**	**0.53**	**4.84**	**0.91**	**24.95**	**0.26**	**0.14**	**0.09**	**0.59**	**100.00**
		Col. %	**88.34**	**72.09**	**85.87**	**77.80**	**94.44**	**77.78**	**62.90**	**100.00**	**100.00**	**90.72**	**82.33**
2	Extramural area	Count	993	822	11	204	8	877	20	–	–	9	**2944**
		Row %	33.73	27.92	0.37	6.93	0.27	29.79	0.68	–	–	0.31	**100.00**
		Col. %	11.02	27.61	11.96	21.98	5.56	18.31	32.26	–	–	9.28	**16.24**
	Structure 9	Count	35	8	1	–	–	133	1	–	–	–	**178**
		Row %	19.66	4.49	0.56	–	–	74.72	0.56	–	–	–	**100.00**
		Col. %	0.39	0.27	1.09	–	–	2.78	1.61	–	–	–	**0.98**
	Group Total	**Count**	**1028**	**830**	**12**	**204**	**8**	**1010**	**21**	**–**	**–**	**9**	**3122**
		Row %	**32.93**	**26.59**	**0.38**	**6.53**	**0.26**	**32.35**	**0.67**	**–**	**–**	**0.29**	**100.00**
		Col. %	**11.41**	**27.88**	**13.04**	**21.98**	**5.56**	**21.09**	**33.87**	**–**	**–**	**9.28**	**17.22**
3	Extramural area	Count	7	–	–	–	–	12	2	–	–	–	**21**
		Row %	33.33	–	–	–	–	57.14	9.52	–	–	–	**100.00**
		Col. %	0.08	–	–	–	–	0.25	3.23	–	–	–	**0.12**
	Group Total	**Count**	**7**	**–**	**–**	**–**	**–**	**12**	**2**	**–**	**–**	**–**	**21**
		Row %	**33.33**	**–**	**–**	**–**	**–**	**57.14**	**9.52**	**–**	**–**	**–**	**100.00**
		Col. %	**0.08**	**–**	**–**	**–**	**–**	**0.25**	**3.23**	**–**	**–**	**–**	**0.12**
4	Extramural area	Count	15	1	1	2	–	42	–	–	–	–	**61**
		Row %	24.59	1.64	1.64	3.28	–	68.85	–	–	–	–	**100.00**
		Col. %	0.17	0.03	1.09	0.22	–	0.88	–	–	–	–	**0.34**
	Group Total	**Count**	**15**	**1**	**1**	**2**	**–**	**42**	**–**	**–**	**–**	**–**	**61**
		Row %	**24.59**	**1.64**	**1.64**	**3.28**	**–**	**68.85**	**–**	**–**	**–**	**–**	**100.00**
		Col. %	**0.17**	**0.03**	**1.09**	**0.22**	**–**	**0.88**	**–**	**–**	**–**	**–**	**0.34**
Table Total		**Count**	**9007**	**2977**	**92**	**929**	**144**	**4789**	**62**	**21**	**14**	**97**	**18132**
		Row %	**49.67**	**16.42**	**0.51**	**5.12**	**0.79**	**26.41**	**0.34**	**0.12**	**0.08**	**0.53**	**100.00**
		Col. %	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

nfs = not further specified

brownish yellow (10YR 6/6 dry) deposit was concentrated along the southern wall of the main chamber tapering off to the north. Stratum 5 was positioned in contact with the floor and comprised consolidated masses of adobe possessing wood impressions intermixed with large pieces of tabular sandstone, ash, and oxidized adobe. The combination of adobe, tabular sandstone, and ash suggest this layer represents dismantled roofing material and demolished sections wing-wall material. The jumbled nature of Stratum 5 indicates this deposit may represent the initial step in salvaging construction materials and gaining access to the southern portion of the superstructure.

Stratum 6 was a mixed deposit representing roof fall (Stratum 4) and post-abandonment fill (Stratum 2). This deposit of light yellowish brown (10YR 6/4 dry) loose to moderately consolidated silty sand was present on the floor along the north, east, and west walls of the main chamber tapering off toward the center of the structure. Stratum 6 contained ash, charcoal, adobe artifacts, and oxidized soil and appears to represent a mixed deposit formed through the salvaging of construction materials and natural filling processes. Stratum 6 was positioned over Stratum 4 in the eastern portion of the structure while interfingered on the west and abutting Stratum 4 on the north. The variation in vertical placement of Stratum 6 suggests this deposit was forming soon after the abandonment process. This is supported by the presence of a small thermal feature (Feature 177) positioned above this stratum (see Figure 8.2). A similar post-abandonment feature, although more formal in nature, was identified in Structure 2 at LA 80410 (Lobeig 2000:255).

Stratum 7 was an isolated deposit of construction material deposited through post-abandonment processes. This gray (10YR 6/1 dry) layer of adobe had a maximum thickness of 20 cm and was only identified in the western portion of the structure suspended in the upper fill of Stratum 2. Stratum 7 contained numerous charcoal flecks and may represent closing material deposited around the perimeter of the structure during the abandonment process, the remains of a surface structure associated with Structure 1, or the remains of a later structure.

Stratum 8 was a continuous noncultural deposit similar to the Upper Nakaibito Formation described by Sant and others (1999). This homogeneous layer had a maximum thickness of 30 cm and consisted of a yellowish brown (10YR 5/4 dry) silty sand with inclusions of small gravel, artifacts, and charcoal flecks present in low frequencies. The boundary between Stratum 1 and Stratum 8 was clear and wavy. Diagnostic artifacts associated with this layer included ceramics representative of the Basketmaker III and Pueblo periods.

Stratum 9 was a continuous, noncultural deposit similar to the Lower Nakaibito Formation described by Sant and others (1999). This homogeneous layer had a maximum thickness of 60 cm and consists of a pale brown (10YR 6/3 dry) silty sand with inclusions of small gravel, artifacts, and charcoal flecks present in low frequencies in areas located away from the site occupation. The boundary between Stratum 8 and Stratum 9 was clear and wavy. The sandstone spalls appear to have originated from the bedrock surface. The identification of cultural features embedded in the Lower Nakaibito support the observation by Sant and others (1999) that this deposit was formed prior to the ceramic Basketmaker occupation of this area.

Excavation Areas

To manage the increased site size, LA 104106 was partitioned into four spatially defined study units. SU 1 was located north of the 60N grid line. SU 2 was located between the 0N line and the 40N grid line, SU 3 was located between the -20N line and the 0N grid line, and SU 4 was located between the 40N line and the 60N line (see Fig. 8.1). Although one or more temporal components are represented, the general distribution of cultural manifestations encountered in each area provides the temporal and spatial basis for this discussion. Therefore, each study unit will be described separately.

SU 1 contained a late Basketmaker III habitation complex. Although Pueblo-period ceramics were present in this area, they appear to have been the result of a short-term occupation or the Navajo occupation identified in SU 2 (see discussion of ceramics for SU 2). SU 2 is partially the result of a Basketmaker II occupation with evidence for a later Basketmaker III occupation limited to ceramics. These earlier occupations are both superimposed by an early historic or Cabezon phase (Hester 1962:65) Navajo occupation. SU 3 is also the result of an early historic Navajo occupation, while SU 4 displays limited evidence for an aceramic Archaic or Basketmaker II and III occupations.

Study Unit 1

Excavation of SU 1 identified a late Basketmaker III habitation complex with limited evidence of Pueblo-period use, both of which were represented exclusively by diagnostic ceramics. A total of 567 sq m (6,103.1 sq ft) was investigated during data recovery in SU 1, and this area included 439 sq m (4,725.4 sq ft) excavated by hand and 128 sq m (1,377.8 sq ft) stripped mechanically. These investigations identified a large Basketmaker III pit structure (Structure 1), five smaller satellite structures (Structure 2, Structure 3, Structure 5, Structure 6, and Structure 7), and numerous extramural features (Fig. 8.4). In all, 14,927 samples and artifacts were recovered using a variety of methods (Table 8.2). The most robust evidence for occupation in this SU was during the late Basketmaker III period or Tohatchi phase (AD 600–725) (Kearns 1996b, Table 3.2). Although Basketmaker III was the dominant temporal component, Pueblo II–Pueblo III periods were also identified. The post-Basketmaker III occupations manifested as a veneer of diagnostic ceramic types limited vertically to the upper fill layers and spatially to discrete clusters, respectively. No features or structures were identified dating to this later component.

Structure 1 (AUN 1.01–1.03). Structure 1 was a large, deep, subrectangular pit structure with an associated bench and detached antechamber. Structure 1 was initially identified through a series of auger tests. Excavations began by bisecting the structure using 1 by 1 m grid units excavated by hand in 10 cm levels (Hand Trench 1). This method clearly identified the presence of a structure and offered an exposure to evaluate the stratigraphic filling sequence (see Fig. 8.1). The filling sequence indicated the structure was dismantled by the site occupants at the time of abandonment and left to fill naturally. Results of post-occupational cultural activity were limited to upper fill levels and consisted of ceramic types diagnostic of the Pueblo II to Pueblo III periods (Fig. 8.5).

A second trench, perpendicular to the first, was excavated in one full-cut level down to floor fill and not screened (Hand Trench 2). The two trenches partitioned the structure into four quadrants and confirmed that the structure contained predominantly noncultural fill. The four quadrants defined by the hand trenches were excavated in one level to approximately 5 cm above floor. Floor fill was excavated by grid unit and screened through 1/8-inch mesh. Floor contact artifacts were mapped as they were uncovered. Pollen and flotation samples were taken systematically using alternating grid units at floor contact. After the floor was cleared, all features were defined, excavated, profiled, mapped, photographed, and described in detail.

Burned features were evaluated and sampled for archaeomagnetic dating as appropriate. After the floor and walls of Structure 1 were documented, select portions were removed to identify if any previous surfaces of structures were present. This was done using two units positioned within the initial stratigraphic trenches. These investigations did not produce any additional cultural materials and excavations were terminated within the structure. The antechamber was excavated in a similar fashion as the main chamber. The bench was excavated in quadrants defined by the initial 1 by 1 m hand trenches excavated across the main chamber.

Structure 1 was constructed by excavating a subrectangular pit 6.90 m long by 6.15 m wide and 60 cm deep down through native Stratum 8 and Stratum 9. Excavation of a smaller subrectangular pit, measuring 5.55 m long by 5.45 m wide and 90 cm deep, continued in the south-central portion of the former, creating the main chamber and bench that extended horizontally beyond the limits of the main chamber (Fig. 8.6). The sides and base of the aboriginal excavation formed the walls and floor of the structure. The floor and walls below the bench of the main chamber were lined or sealed by floating the native sterile sediment, creating a smooth, defined surface. In addition to floating, the floor surface was compacted through use, resulting in a well preserved, durable surface. The floated floor and wall surface appeared as a continuous layer, becoming increasingly more diffuse toward the top of the walls. A similar treatment may have been applied to the bench surface and upper walls that subsequently eroded after abandonment.

A circular pit measuring 2.55 m by 2.40 m by 1.95 m deep was excavated 1.75 m southeast of the bench excavation. This circular pit, interpreted as an antechamber, articulated with the main chamber by means of a linear horizontal tunnel. Again, the sides and base of the aboriginal excavation form the

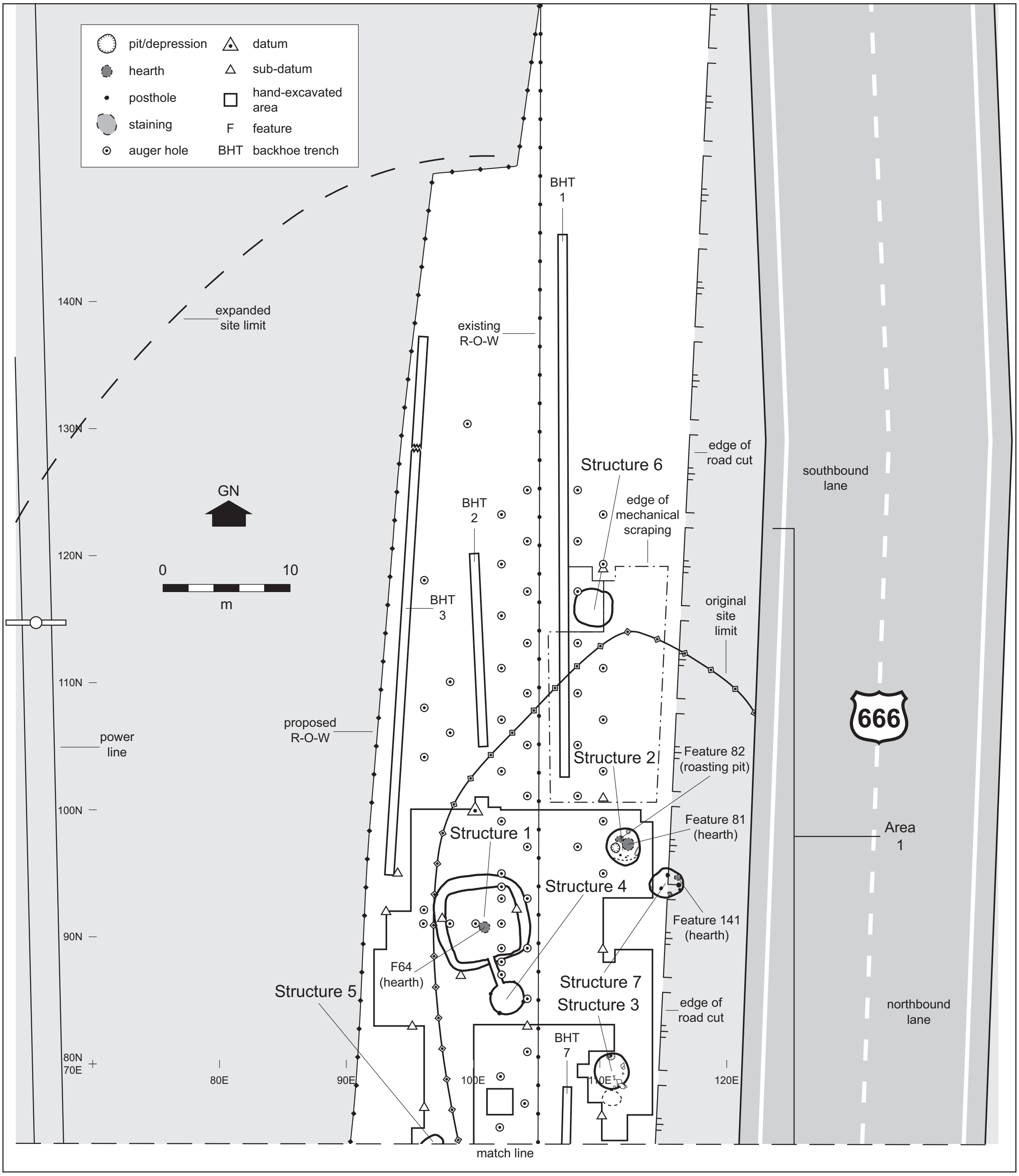
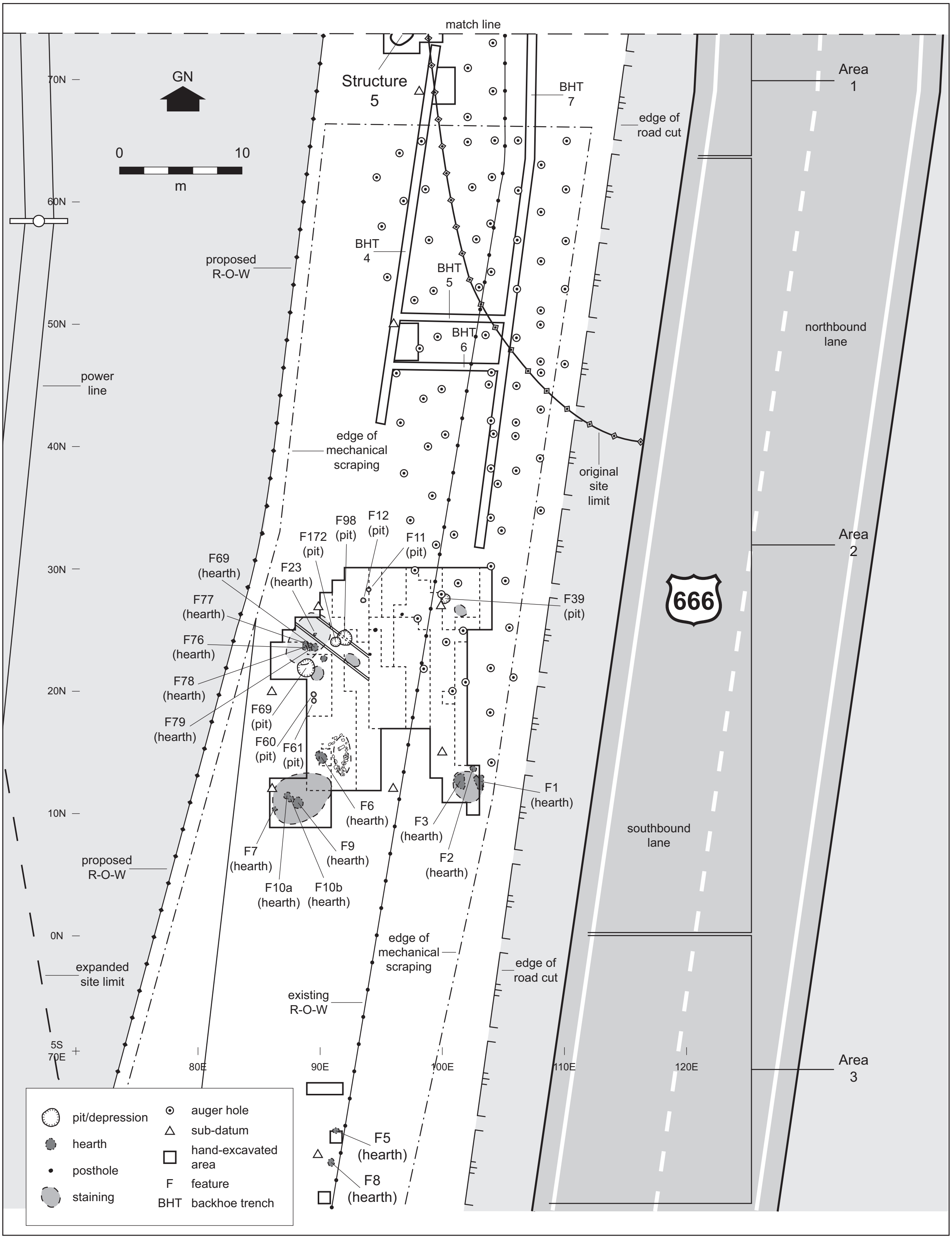


Figure 8.4. Plan of Study Unit 1 excavation, LA 104106.



(Figure 8.4, continued)

Table 8.2. LA 104106, Study Unit 1, study unit type, and collection method by artifact type.

			Artifact Type										
Study Unit Type	**Collection Method**		**Ceramic**	**Lithic**	**Ground Stone**	**Bone**	**Pollen**	**Macro-botanical**	**Chrono-logic sample**	**Orna-ment, nfs**	**Bulk Sample**	**Mineral, nfs**	**Table Total**
Pit structure	Non-intensive, shoveled	Count	406	67	26	32	–	–	–	1	–	1	**533**
		Row %	76.17	12.57	4.88	6.00	–	–	–	0.19	–	0.19	**100.00**
		Col. %	5.10	3.12	32.91	4.43	–	–	–	4.76	–	1.14	**3.57**
	Intensive, troweled	Count	–	–	–	–	127	–	1	–	–	–	**128**
		Row %	–	–	–	–	99.22	–	0.78	–	–	–	**100**
		Col. %	–	–	–	–	93.38	–	2.56	–	–	–	**0.86**
	Screened (1/4")	Count	2721	516	17	261	–	–	5	4	8	47	**3579**
		Row %	76.03	14.42	0.47	7.29	–	–	0.14	0.11	0.22	1.31	**100.00**
		Col. %	34.20	24.04	21.52	36.15	–	–	12.82	19.05	57.14	53.41	**23.98**
	Screened (1/8")	Count	249	125	2	286	–	–	31	9	6	23	**731**
		Row %	34.06	17.10	0.27	39.12	–	–	4.24	1.23	0.82	3.15	**100.00**
		Col. %	3.13	5.82	2.53	39.61	–	–	79.49	42.86	42.86	26.14	**4.90**
	Total contents collected	**Count**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**1**	**1**
		Row %	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**100**	**100**
		Col. %	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**1.14**	**0.01**
	In situ	Count	217	166	24	15	–	–	1	5	–	3	**431**
		Row %	50.35	38.52	5.57	3.48	–	–	0.23	1.16	–	0.70	**100.00**
		Col. %	2.73	7.74	30.38	2.08	–	–	2.56	23.81	–	3.41	**2.89**
	Flotation	Count	1	3	–	26	–	3492	–	–	–	1	**3523**
		Row %	0.03	0.09	–	0.74	–	99.12	–	–	–	0.03	**100.00**
		Col. %	0.01	0.14	–	3.60	–	93.74	–	–	–	1.14	**23.60**
	Group Total	**Count**	**3594**	**877**	**69**	**620**	**127**	**3492**	**38**	**19**	**14**	**76**	**8926**
		Row %	**40.26**	**9.83**	**0.77**	**6.95**	**1.42**	**39.12**	**0.43**	**0.21**	**0.16**	**0.85**	**100.00**
		Col. %	**45.17**	**40.87**	**87.34**	**85.87**	**93.38**	**93.74**	**97.44**	**90.48**	**100.00**	**86.36**	**59.80**
Extra-mural area	Intensive surface collection	Count	144	13	3	1	–	–	–	–	–	–	**161**
		Row %	89.44	8.07	1.86	0.62	–	–	–	–	–	–	**100.00**
		Col. %	1.81	0.61	3.80	0.14	–	–	–	–	–	–	**1.08**
	Non-intensive, shoveled	Count	4	3	–	–	–	–	–	–	–	–	**7**
		Row %	57.14	42.86	–	–	–	–	–	–	–	–	**100.00**
		Col. %	0.05	0.14	–	–	–	–	–	–	–	–	**0.05**
	Intensive, troweled	Count	–	–	–	–	9	–	–	–	–	–	**9**
		Row %	–	–	–	–	100.00	–	–	–	–	–	**100.00**
		Col. %	–	–	–	–	6.62	–	–	–	–	–	**0.06**
	Screened (1/4")	Count	4182	1226	5	92	–	–	–	2	–	12	**5519**
		Row %	75.77	22.21	0.09	1.67	–	–	–	0.04	–	0.22	**100.00**
		Col. %	52.56	57.13	6.33	12.74	–	–	–	9.52	–	13.64	**36.97**
	Screened (1/8")	Count	20	25	1	6	–	–	1	–	–	–	**53**
		Row %	37.74	47.17	1.89	11.32	–	–	1.89	–	–	–	**100.00**
		Col. %	0.25	1.16	1.27	0.83	–	–	2.56	–	–	–	**0.36**
	In situ	Count	13	1	1	–	–	–	–	–	–	–	**15**
		Row %	86.67	6.67	6.67	–	–	–	–	–	–	–	**100.00**
		Col. %	0.16	0.05	1.27	–	–	–	–	–	–	–	**0.10**
	Flotation	Count	–	1	–	3	–	233	–	–	–	–	**237**
		Row %	–	0.42	–	1.27	–	98.31	–	–	–	–	**100.00**
		Col. %	–	0.05	–	0.42	–	6.26	–	–	–	–	**1.59**
	Group Total	**Count**	**4363**	**1269**	**10**	**102**	**9**	**233**	**1**	**2**	**–**	**12**	**6001**
		Row %	**72.70**	**21.15**	**0.17**	**1.70**	**0.15**	**3.88**	**0.02**	**0.03**	**–**	**0.20**	**100.00**
		Col. %	**54.83**	**59.13**	**12.66**	**14.13**	**6.62**	**6.26**	**2.56**	**9.52**	**–**	**13.64**	**40.20**
Table Total		**Count**	**7957**	**2146**	**79**	**722**	**136**	**3725**	**39**	**21**	**14**	**88**	**14927**
		Row %	**53.31**	**14.38**	**0.53**	**4.84**	**0.91**	**24.95**	**0.26**	**0.14**	**0.09**	**0.59**	**100.00**
		Col. %	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

nfs = not further specified

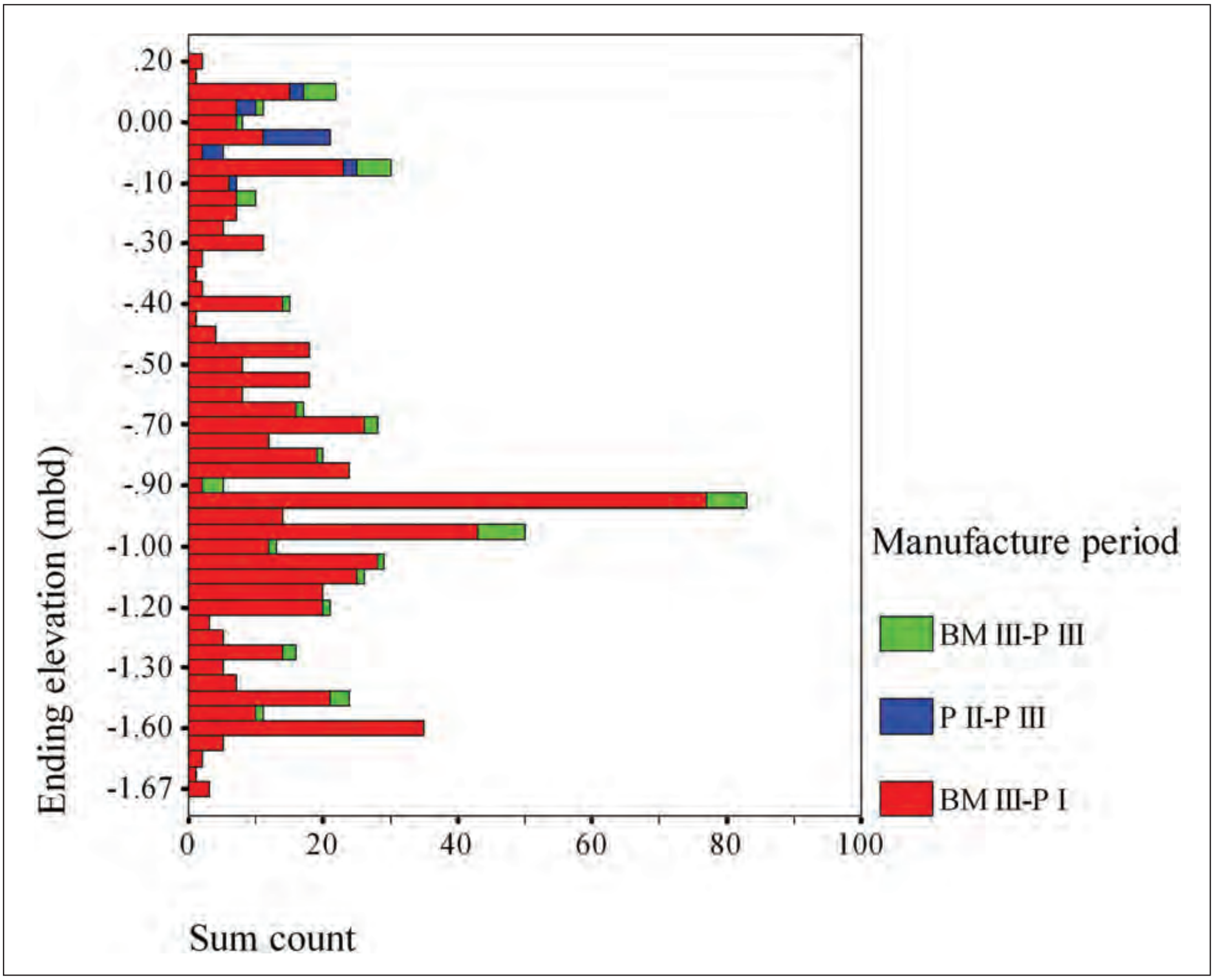


Figure 8.5. Ceramic component by ending elevation, Hand Trench 1, Structure 1, LA 104106.

walls and floor of the antechamber; however, unlike the main chamber, only a thin layer of adobe plaster was used to seal the floor. Both the main chamber and antechamber provided evidence for a superstructure supported by four main posts with evidence of supplementary support posts located on the bench encircling the main chamber.

In all, 106 features were associated with the bench, main chamber, and antechamber of Structure 1; however, the vast majority of these features were located within the main chamber in association with a single floor surface. Although only one physical surface was documented, the identification of several sealed floor features and maintenance episodes ostensibly resulted in two excavation surfaces (see Fig. 8.6). Table 8.3 provides feature summary data while the corresponding plan and profile views of features are presented in Appendix 5.

Structure 1, bench (Architectural Unit Number [AUN] 1.02). The bench of Structure 1 was positioned between 70 and 90 cm above the floor and extended out horizontally between 10 and 110 cm beyond the limits of the main chamber. Excavation recovered 487 artifacts and samples and identified a total of 17 features associated with the surface of this architectural element. The majority (n = 15) are interpreted as postholes based on position, contents, or morphology (Table 8.4). Postholes were positioned around the center and interior edge of the bench surface. These features ranged in size between 8 and 22 cm in diameter and between 4 and 43 cm deep. Morphologically these features were

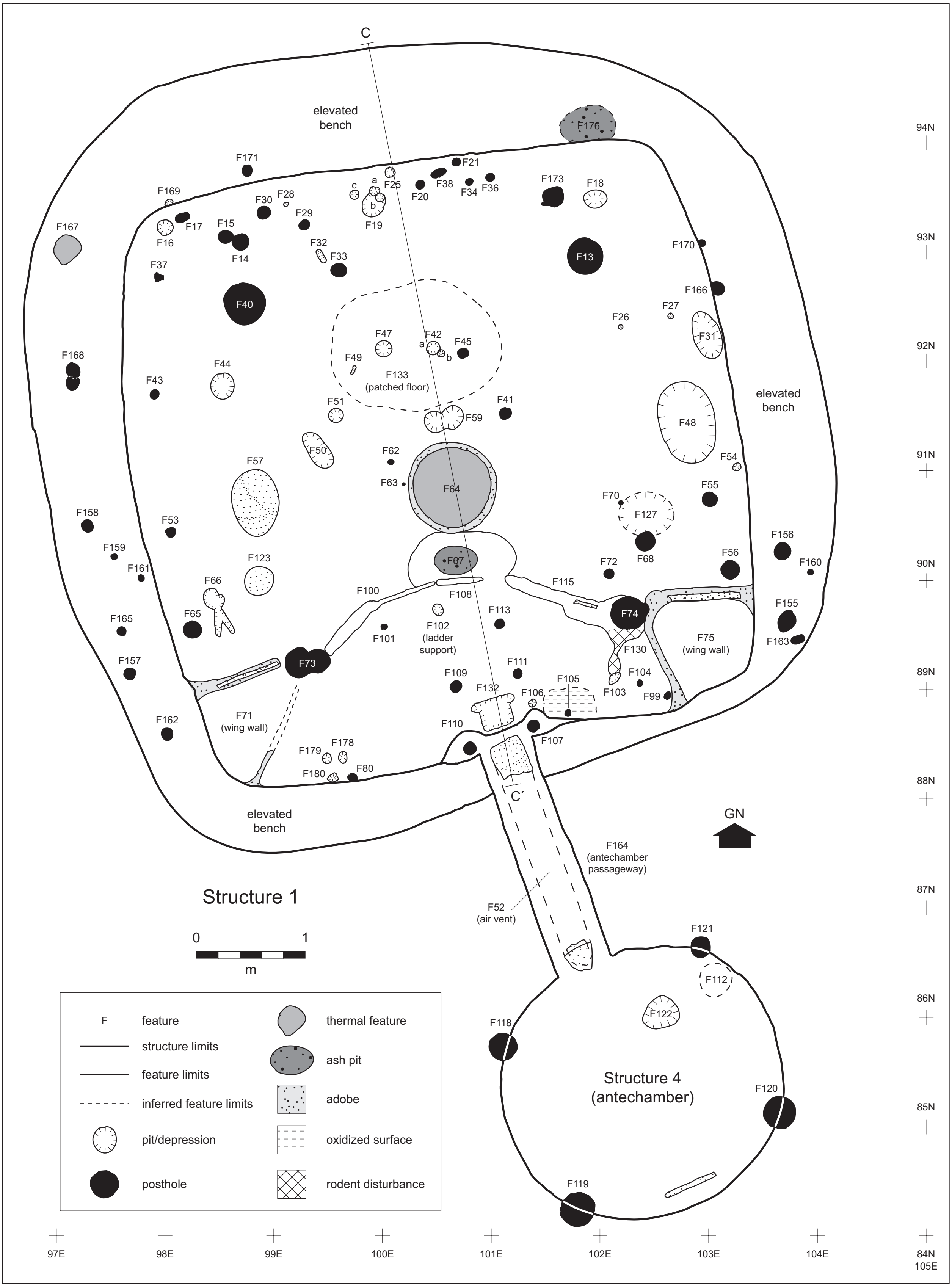


Figure 8.6. Plan of Structure 1, LA 104106.

Table 8.3. LA 104106, Structure 1, feature summary data.

Feature	Feature Type	Architectural Unit	Location[1]	Size (cm) L x W x D	Shape (Plan/Profile)	Fill	Contents	Comments
13	Posthole	1.01 (Structure 1, main chamber)	92.97N/101.82E	32 x 38 x 70	circular, cylindrical	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with inclusions of charcoal flecks. Layer 2 (Munsell 10YR 5/1 gray) raw, unprocessed clay.	Macrobotanical	Deep cylindrical, adobe-lined posthole with large Fragment of ground stone at the base. Lower portion filled with clay.
14	Pit, nfs	1.01 (Structure 1, main chamber)	93.10N/98.66E	10 x 15 x 41	oval, cylindrical	Layer 1 (Stratum 4, top 5 cm). Layer 2 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with charcoal flecks uncommon.	Lithic, bone, and macrobotanical	Deep, cylindrical adobe-lined posthole. Articulates with Feature 15.
15	Pit, nfs	1.01 (Structure 1, main chamber)	93.12N/98.53E	9 x 9 x 18	circular, cylindrical	Layer 1 (Stratum 4, top 2 cm). Layer 2 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with charcoal flecks.	N/A	Moderately deep, cylindrical, adobe-lined feature. Articulates with Feature 14.
16	Shallow basin, nfs	1.01 (Structure 1, main chamber)	93.22N/98.00E	14 x 12 x 3	circular basin	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with charcoal flecks.	N/A	Shallow, gentle-sided basin.
17	Pit, nfs	1.01 (Structure 1, main chamber)	93.32N/98.12	9 x 12 x 8	oval, conical	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with charcoal flecks.	N/A	Shallow steep-sided, adobe-lined basin.
18	Shallow basin, nfs	1.01 (Structure 1, main chamber)	93.96N/101.88E	19 x 26 x 6	oval basin	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with charcoal flecks.	N/A	Shallow, gentle-sided basin.
19a	Sipapu	1.01 (Structure 1, main chamber)	93.56N/99.92E	8 x 8 x 25	circular, cylindrical	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with charcoal flecks.	Green mineral, obsidian, shell ornament, abraded pebbles, macrobotanical, and pollen including Brassicaceae, Cleome, Liliaceae, and Onagraceae	Deep, cylindrical, adobe-lined feature. Multiple use south lobe remodeled with adobe. Articulates with Feature 19b.
19b	Shallow basin, nfs	1.01 (Structure 1, main chamber)	93.40N/99.86E	22 x 24 x 7	oval basin	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with charcoal flecks.	Macrobotanical	Shallow, gentle-sided, basin. Articulates with Feature 19a.
19c	Pit, nfs	1.01 (Structure 1, main chamber)	93.48N/99.72E	8 x 8 x 16	circular, cylindrical	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand.	Macrobotanical	Deep, cylindrical, adobe-lined feature.
20	Pit, nfs	1.01 (Structure 1, main chamber)	93.62N/100.30E	10 x 10 x 20	circular, cylindrical	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with charcoal flecks.	N/A	Deep, cylindrical adobe-lined feature.
21	Pit, nfs	1.01 (Structure 1, main chamber)	93.78N/100.66E	11 x 9 x 17	circular, cylindrical	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with charcoal flecks.	N/A	Deep, cylindrical adobe-lined feature.
25	Pit, nfs	1.01 (Structure 1, main chamber)	93.72N/100.03E	8 x 8 x 17	circular, cylindrical	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with charcoal flecks.	N/A	Deep, cylindrical adobe-lined feature.
26	Stick impress-ion	1.01 (Structure 1, main chamber)	92.19N/102.06E	6 x 5 x 4	circular conical	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with charcoal flecks.	N/A	Shallow, steep-sided, adobe-lined feature.
27	Stick impress-ion	1.01 (Structure 1, main chamber)	92.32N/102.60E	7 x 5 x 7	circular conical	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with charcoal flecks.	N/A	Shallow, steep-sided, adobe-lined feature.
28	Stick impress-ion	1.01 (Structure 1, main chamber)	93.42N/99.05E	5 x 5 x 3	circular conical	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with charcoal flecks.	N/A	Shallow, steep-sided, adobe-lined feature.

(Table 8.3, continued)

Feature	Feature Type	Architectural Unit	Location[1]	Size (cm) L x W x D	Shape (Plan/Profile)	Fill	Contents	Comments
29	Pit, nfs	1.01 (Structure 1, main chamber)	93.22N/99.15E	12 x 12 x 35	circular, cylindrical	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with charcoal flecks.	N/A	Deep, cylindrical adobe-lined feature. Sides of feature scored.
30	Pit, nfs	1.01 (Structure 1, main chamber)	93.38N/98.85E	11 x 10 x 12	circular conical	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with charcoal flecks.	N/A	Shallow, steep-sided, adobe-lined feature.
31	Storage facility	1.01 (Structure 1, main chamber)	92.26N/103.00E	40 x 18 x 15	oval basin	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with charcoal flecks.	Ceramic and macrobotanical	Moderately deep, steep-sided basin.
32	Shallow basin	1.01 (Structure 1, main chamber)	92.94N/99.40E	5 x 12 x 7	subrectangular basin	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with charcoal flecks.	N/A	Shallow, gentle-sided, adobe-lined basin.
33	Pit, nfs	1.01 (Structure 1, main chamber)	92.84N/99.58E	13 x 15 x 17	circular conical	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with charcoal flecks.	N/A	Deep, steep-sided, adobe-lined feature.
34	Pit, nfs	1.01 (Structure 1, main chamber)	93.62N/100.78E	7 x 8 x 19	circular, cylindrical	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with charcoal flecks.	N/A	Deep, cylindrical, adobe-lined feature.
36	Pit, nfs	1.01 (Structure 1, main chamber)	93.66N/100.94E	7 x 8 x 19	circular, cylindrical	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with charcoal flecks.	N/A	Deep, cylindrical, adobe-lined feature.
37	Pit, nfs	1.01 (Structure 1, main chamber)	92.77N/97.90E	12 x 15 x 27	irregular cylindrical	Layer 1 (Munsell 7.5YR 6/4 7/4 light brown/pink) consolidated adobe with charcoal and caliche.	N/A	Deep, cylindrical adobe-lined feature. Sealed at floor surface.
38	Pit, nfs	1.01 (Structure 1, main chamber)	93.70N/100.49E	9 x 14 x13	oval conical	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with charcoal flecks.	N/A	Moderately deep, steep-sided basin.
40	Posthole	1.01 (Structure 1, main chamber)	92.54N/98.74E	36 x 34 x 63	circular, cylindrical	Layer 1 (Stratum 4) Roof fall with a lens of oxidized adobe and charcoal. Layer 2 (Munsell 10YR 6/4 6/6 light yellowish brown brownish yellow) adobe mixed with fine sorted sand. Layer 3 (Munsell 10YR 5/1 Gray) Raw, unprocessed clay.	Ground stone, bone, and macrobotanical	Deep, cylindrical, adobe-lined feature with a large ground stone fragment positioned at the base. Clay used to fill lower portion of feature.
41	Shallow basin, nfs	1.01 (Structure 1, main chamber)	91.59N/101.07E	11 x 10 x 3	circular basin	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with charcoal flecks uncommon.	N/A	Shallow, gentle-sided, adobe-lined basin.
42	Pit, nfs	1.01 (Structure 1, main chamber)	92.10N/100.44E	22 x 24 x 28	bifurcated cylindrical	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with charcoal flecks.	Lithic and pollen including Cleome, *Ephedra*, and Liliaceae.	Deep, cylindrical adobe-lined feature. Multiple use. Adjacent floor surface remodeled.
43	Pit, nfs	1.01 (Structure 1, main chamber)	91.68N/97.86E	8 x 8 x 15	circular, cylindrical	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with charcoal flecks.	N/A	Deep, cylindrical adobe-lined feature.
44	Storage facility	1.01 (Structure 1, main chamber)	91.82N/98.52E	25 x 22 x 34	circular bell-shaped	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with charcoal flecks.	Lithic, shell bead fragment, and unfired pottery coil.	Deep, bell-shaped storage feature.
45	Pit, nfs	1.01 (Structure 1, main chamber)	92.08N/100.68E	8 x 10 x 12	circular, cylindrical	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with charcoal flecks.	Bone	Shallow, cylindrical adobe-lined feature. Adjacent floor surface remodeled.
47	Shallow basin, nfs	1.01 (Structure 1, main chamber)	92.10N/99.96E	15 x 15 x 5	circular basin	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with charcoal flecks.	N/A	Shallow, steep-sided, adobe-lined basin. Adjacent floor surface remodeled.
48	Lateral floor vault/ warming pit	1.01 (Structure 1, main chamber)	91.46N/102.80E	74 x 54 x 17	oval basin	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with charcoal flecks and adobe. Layer 2 (Munsell 10YR 6/4 light yellowish brown) similar to Layer I with the absence of adobe. Layer 3 (Munsell 10YR 4/2 dark grayish brown) loose, fine sand with large pieces of charcoal.	Ceramic, lithic, bone, red mineral, macrobotanical, and wood	Deep, steep-sided, adobe-lined basin. Upper eastern and western margins oxidized. Dendrochronology sample (n/a), and archaeomagnetic sample (n/a).

(Table 8.3, continued)

Feature	Feature Type	Architectural Unit	Location[1]	Size (cm) L x W x D	Shape (Plan/Profile)	Fill	Contents	Comments
49	Shallow basin, nfs	1.01 (Structure 1, main chamber)	91.86N/99.60E	8 x 3 x 1	oval basin	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with charcoal flecks.	N/A	Shallow, gentle-sided, basin. Adjacent floor surface remodeled.
50	Storage facility	1.01 (Structure 1, main chamber)	91.21N/99.35E	16 x 58 x 26	oval bell-shaped	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with charcoal flecks and adobe.	Bone, lithic, and pollen including cleome and *ephedra.*	Deep, steep-sided, bell-shaped storage pit.
51	Shallow basin, nfs	1.01 (Structure 1, main chamber)	91.45N/99.49E	13 x 13 x 5	circular basin	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with charcoal flecks.	N/A	Shallow, gentle-sided basin.
52	Vent opening	1.01 (Structure 1, main chamber)	86.70N/101.80E	39 x 38 x 30	oval, rectangular	(Stratum 2) Loose to moderately consolidated silty sand with charcoal flecks, artifacts, tabular sandstone, and charcoalstained soil.	N/A	Vent opening positioned above floor and protruding. Defined with adobe coping and posts.
53	Pit, nfs	1.01 (Structure 1, main chamber)	90.05N/98.01E	8 x 10 x16	subrectangular, conical	Layer 1 (Munsell 10YR 6/6 brownish yellow) consolidated adobe.	N/A	Shallow, steep-sided, conical feature. Sealed at floor surface.
54	Pit, nfs	1.01 (Structure 1, main chamber)	91.02N/103.26E	8 x 8 x 8	circular, cylindrical	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with charcoal flecks.	Lithic (4 refit)	Shallow gentle-sided, shallow, adobe-lined basin.
55	Pit, nfs	1.01 (Structure 1, main chamber)	90.75N/102.97E	11 x 14 x 12	circular, conical	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with charcoal flecks.	N/A	Shallow, cylindrical adobe-lined feature.
56	Pit, nfs	1.01 (Structure 1, main chamber)	90.10N/103.16E	13 x 15 x 23	circular, cylindrical	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with charcoal flecks.	N/A	Deep, cylindrical adobe-lined feature.
57	Lateral floor vault/ warming pit	1.01 (Structure 1, main chamber)	90.64N/98.84E	61 x 46 x 30	oval basin	Layer 1 (Stratum 4, top 5 cm). Layer 2 (Munsell 10YR 7/4 6/4 very pale brown / light yellowish brown) adobe mixed with consolidated silty sand.	Pollen including *Artemisia* and Cleome.	Deep, steep-sided basin. Sealed at floor surface.
59	Pit, nfs	1.01 (Structure 1, main chamber)	91.50N/100.54E	31 x 40 x 33	bifurcated, cylindrical	Layer 1 (Munsell 10YR 6/2 brownish gray) semiconsolidated, fine sand with charcoal fleck. Layer 2 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with charcoal flecks.	Ceramic, lithic, bone, red pigment mineral, and macrobotanical.	Deep, cylindrical adobe-lined feature with terraced interior. Possible pole ladder support.
62a	Pit, nfs	1.01 (Structure 1, main chamber)	90.08N/100.04E	9 x 9 x 7	circular, cylindrical	Layer 1 (Munsell 10YR 6/4 light yellowish brown) Loose, fine sand with charcoal flecks uncommon.	N/A	Shallow, cylindrical feature.
62b	Stick impres-sion	1.01 (Structure 1, main chamber)	90.02N/100.07E	2 x 2 x 6	circular, cylindrical	Layer 1 (Munsell 10YR 6/4 light yellowish brown) Loose, fine sand with charcoal flecks uncommon.	N/A	Shallow, cylindrical feature.
63	Stick impres-sion	1.01 (Structure 1, main chamber)	89.87N/100.13E	2 x 2 x 5	circular, cylindrical	Layer 1 (Munsell 10YR 6/4 light yellowish brown) Loose, fine sand with charcoal flecks uncommon.	N/A	Shallow, cylindrical feature.
64	Central hearth	1.01 (Structure 1, main chamber)	90.84N/100.60E	80 x 84 x 26	circular, conical	All layers consisted of a loose, fine sand with charcoal flecks. Layer 1 (Munsell 10YR 6/4 light yellowish brown) with pieces of adobe. Layer 2 (Munsell 10YR 5/2 grayish brown). Layer 3 (Munsell 10YR 4/2 dark grayish brown). Layer 4 (Munsell 5YR 4/6 yellowish red).	Ceramic, lithic (including a projectile point), bone, macrobotanical	Deep, conical, adobe-lined basin defined at floor surface with a segmented adobe collar. Dendrochronological sample (n/a), archaeomagnetic sample (AD 635–705)[2], and ^{14}C sample (AD 770)[3] *Zea mays*
65	Pit, nfs	1.01 (Structure 1, main chamber)	89.55N/98.24E	12 x 12 x 20	circular, cylindrical	Layer 1 Loose, fine sand (Munsell 10YR 6/4 light yellowish brown) with charcoal flecks uncommon.	N/A	Deep, cylindrical, adobe-lined feature.

(Table 8.3, continued)

Feature	Feature Type	Architectural Unit	Location[1]	Size (cm) L x W x D	Shape (Plan/Profile)	Fill	Contents	Comments
66	Indet. cultural feature	1.01 (Structure 1, main chamber)	89.72N/98.44E	52 x 46 x 10	irregular basin	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with charcoal flecks.	N/A	Deep, steep-sided basin. Two stick impressions noted at base of feature.
67	Ash pit	1.01 (Structure 1, main chamber)	90.22N/100.70E	38 x 98 x 5	oval basin	Layer 1 (Munsell 7.5YR 5/0 gray) loose gray ash	Macrobotanical	Shallow gentle-sided, adobe-lined basin. Incorporated into the construction of deflector and wing wall complex.
68	Shallow basin, nfs	1.01 (Structure 1, main chamber)	90.36N/102.40E	21 x 18 x 6	circular basin	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with charcoal flecks uncommon.	Burned, shaped tabular sandstone	Shallow, gentle-sided, adobe-lined basin.
70	Pit, nfs	1.01 (Structure 1, main chamber)	90.72N/102.15E	7 x 8 x 8	circular, cylindrical	Layer 1 (Munsell 10YR 6/4 light yellowish brown) Loose, fine sand with charcoal flecks uncommon.	Macrobotanical.	Shallow, adobe-lined cylindrical feature. Terrace interior.
71	Bin	1.01 (Structure 1, main chamber)	88.80N/98.90E	86 x 112 x 88	triangular, vertical sides	Layer 1 (Munsell 10YR 6/4 6/6 light yellowish brown brownish yellow) roof fall and wing wall collapse mixed with sand.	Pollen including *Artemisia,* Asteraceae, Cleome, *Quercus,* and *Zea mays*	The north wall constructed with upright slabs set in the floor. The south wall constructed with adobe coping. These two vertical elements articulate with the SW posthole forming an enclosure.
72	Pit, nfs	1.01 (Structure 1, main chamber)	92.04N/102.04E	10 x 9 x 8	circular, cylindrical	Layer 1 (Munsell 10YR 6/4 light yellowish brown) Loose, fine sand with charcoal flecks uncommon.	N/A	Shallow, adobe-lined cylindrical feature.
73	Posthole	1.01 (Structure 1, main chamber)	89.26N/99.30E	26 x 40 x 76	bifurcated, cylindrical	Layer 1 (Stratum 4) roof fall and wing wall collapse. Layer 2 (Munsell 10YR 6/4 6/6 light yellowish brown brownish yellow) adobe mixed with wind blown sand. Layer 3 (Munsell 10YR 5/1 Gray) Raw unprocessed clay.	Ground stone	Deep, cylindrical posthole. Large ground stone fragment positioned at base of west lobe. Raw unprocessed clay filled the lower west and east lobes of feature. East lobe likely the result of a remodeling event.
74	Posthole	1.01 (Structure 1, main chamber)	89.68N/102.25E	41 x 32 x 70	circular, cylindrical	Layer 1 (Munsell 10YR 6/4 6/6 light yellowish brown brownish yellow) roof fall and wing wall collapse mixed sorted sand. Layer 2 (Munsell 10YR 5/1 Gray) Raw unprocessed clay.	N/A	Deep, steep-sided, adobe-lined posthole with raw unprocessed clay fill in lower portion of feature.
75	Bin	1.01 (Structure 1, main chamber)	89.40N/103.00E	90 x 132 x 104	subrectangular, vertical sides	Layer 1 Floor fill (Munsell 10YR 6/4 6/6 light yellowish brown brownish yellow) roof fall and wing wall collapse mixed with sorted sand.	Partial ceramic vessel	The north wall constructed using upright, shaped sandstone slab and vertical posts faced with adobe. West wall constructed using adobe and linear trench for vertical slab. These two vertical elements articulate with the SE posthole forming an enclosure.
80	Posthole	1.01 (Structure 1, main chamber)	88.34N/99.26E	12 x 12 x 21	circular, conical	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with charcoal flecks uncommon.	Macrobotanical	Moderately deep, steep-sided posthole with in situ post.
99	Pit, nfs	1.01 (Structure 1, main chamber)	88.86N/102.57E	8 x 10 x 34	circular, conical	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with charcoal flecks uncommon.	Pollen including Brassicaceae, Cleome, Ephedra, Fabaceae, and Onagraceae.	Steep-sided, cylindrical-shaped, adobe-lined feature.

(Table 8.3, continued)

Feature	Feature Type	Architectural Unit	Location[1]	Size (cm) L x W x D	Shape (Plan/Profile)	Fill	Contents	Comments
100	Wing wall	1.01 (Structure 1, main chamber)	89.76N/99.86E	11 x 116 x 20	linear, vertical	Layer 1 (Stratum 4) roof fall and wing wall collapse mixed with (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with charcoal flecks.	Ceramic, lithic and macrobotanical	Deep, steep-sided trench. In situ vertical tabular sandstone fragments.
101	Posthole	1.01 (Structure 1, main chamber)	89.58N/99.98E	5 x 7 x 20	oval, cylindrical	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with charcoal flecks uncommon.	N/A	Deep, cylindrical adobe-lined feature. Feature mat be a secondary wing wall support.
102	Pit, nfs	1.01 (Structure 1, main chamber)	89.72N/100.54E	13 x 11 x 10	circular, conical	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with charcoal and ash.	N/A	Shallow, steep-sided conical feature. Possible ladder rest.
103	Posthole	1.01 (Structure 1, main chamber)	89.08N/102.16E	16 x 25 x 23	oval, cylindrical	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with charcoal flecks uncommon.	Bone and shell bead	Shallow, adobe-lined cylindrical feature. Terraced interior. Dendrochronologic sample (AD 486-616 +vv[4]).
104	Pit, nfs	1.01 (Structure 1, main chamber)	89.06N/102.35E	8 x 6 x 6	circular, cylindrical	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with charcoal flecks uncommon.	N/A	Shallow, steep-sided, adobe-lined basin.
105	Ancillary hearth	1.01 (Structure 1, main chamber)	89.24N/101.39E	10 x 8 x 6	rectangular basin	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with charcoal flecks uncommon.	Ground stone	Shallow, conical, adobe-lined basin associated with oxidized portions of the structure wall and floor. Ground stone fragment positioned on south wall. Archaeomagnetic sample (AD 615–680)[2].
106	Shallow basin, nfs	1.01 (Structure 1, main chamber)	88.88N/101.38E	13 x 12 x 3	circular basin	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with charcoal flecks uncommon.	N/A	Shallow, gentle-sided basin.
107	Posthole	1.01 (Structure 1, main chamber)	89.32N/101.66E	12 x 16 x 50	circular, conical	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with charcoal flecks uncommon.	Ceramic and bone.	Deep, cylindrical adobe-lined feature incorporated into ventilator opening construction.
108	Deflector socket	1.01 (Structure 1, main chamber)	90.01N/100.66E	9 x 42 x11	linear, vertical	Layer 1 (Stratum 4) roof fall and wing wall collapse mixed with (Munsell 10YR 6/4 light yellowish brown) loose, fine sand containing ash and charcoal.	N/A	Shallow, steep-sided linear trench. Slab removed and placed along the south wall of the structure.
109	Pit, nfs	1.01 (Structure 1, main chamber)	88.99N/100.65E	8 x 8 x10	circular, cylindrical	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with charcoal flecks uncommon.	N/A	Shallow, cylindrical, adobe-lined feature.
110	Posthole	1.01 (Structure 1, main chamber)	88.49N/100.80E	11 x 11 x 50	circular, conical	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with charcoal flecks uncommon.	N/A	Deep, cylindrical, adobe-lined feature incorporated into construction ventilator opening.
111	Pit, nfs	1.01 (Structure 1, main chamber)	89.12N/101.22E	8 x 8 x 9	circular, cylindrical	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with charcoal flecks uncommon.	N/A	Shallow, cylindrical, adobe-lined feature.
112	Ceramic con- tainer	1.03 (Structure 1, ante- chamber)	86.34N/103.06E	20 x 48 x 12	irregular, irregular	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with charcoal flecks mixed with primary cultural materials.	Ceramic, lithic (including hammerstone), ornaments, bone, and pollen including Brassicaceae, Cleome, *Ephedra*, and Liliaceae.	Ceramic vessel with cached objects. (5 cm above floor).

(Table 8.3, continued)

Feature	Feature Type	Architectural Unit	Location[1]	Size (cm) L x W x D	Shape (Plan/Profile)	Fill	Contents	Comments
113	Pit, nfs	1.01 (Structure 1, main chamber)	89.54N/101.08E	10 x 11 x 14	circular, cylindrical	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with charcoal flecks uncommon.	Ceramic	Shallow, adobe-lined feature.
115	Wing wall	1.01 (Structure 1, main chamber)	89.82N/101.70E	25 x 103 x 12	linear, vertical	Layer 1 (Stratum 4) roof fall and wing wall collapse mixed with (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with charcoal flecks.	Bone and macrobotanical	Deep, steep-sided linear trench.
118	Posthole	1.03 (Structure 1, ante- chamber)	86.15N/101.30E	22 x 31 x 53	circular, cylindrical	Layer 1 (Stratum 2, Munsell 10YR 6/4 light yellowish brown) loose, fine sandy loam with charcoal flecks.	Egg shell	Deep, cylindrical posthole.
119	Posthole	1.03 (Structure 1, ante- chamber)	84.15N/101.70E	32 x 23 x 30	circular, cylindrical	Layer 1 (Stratum 2, Munsell 10YR 6/4 light yellowish brown) loose, fine sandy loam with charcoal flecks.	Lithic	Deep, cylindrical posthole.
120	Posthole	1.03 (Structure 1, ante- chamber)	84.76N/103.56E	29 x 29 x 42	circular, cylindrical	Layer 1 (Stratum 2, Munsell 10YR 6/4 light yellowish brown) loose, fine sandy loam with charcoal flecks.	Lithic and ceramic	Deep, cylindrical posthole.
121	Posthole	1.03 (Structure 1, ante- chamber)	86.75N/102.95E	40 x 29 x 40	circular, cylindrical	Layer 1 (Stratum 2, Munsell 10YR 6/4 light yellowish brown) loose, fine sandy loam with charcoal flecks.	N/A	Deep, cylindrical posthole.
122	Pit, nfs	1.03 (Structure 1, ante- chamber)	86.20N/102.60E	32 x 39 x 11	circular basin	Layer 1 (Stratum 2, Munsell 10YR 6/4 light yellowish brown) loose, fine sandy loam with charcoal flecks.	Hammerstone	Moderately deep, steep-sided basin
123	Storage facility	1.01 (Structure 1, main chamber)	89.96N/98.84E	28 x 26 x 14	circular basin	Layer 1 (Munsell 10YR 6/6 brownish yellow) adobe patch. Layer 2 (Munsell 10YR 6/4 light yellowish brown) Loose, fine sand with charcoal flecks.	Lithic, bone, macrobotanical, and pollen including Cleome, Eriogonum, and Onagraceae	Shallow, steep sided, adobe-lined basin. Terraced interior. Tabular sandstone suspended horizontally in fill. Feature sealed at floor surface.
127	Shallow basin	1.01 (Structure 1, main chamber)	90.58N/102.40E	42 x 57 x 6	oval basin	Layer 1 (Munsell 10YR 6/6 brownish yellow) adobe patch. Layer 2 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with charcoal flecks uncommon.	Bone and macrobotanical	Shallow, gentle-sided basin. Sealed at floor surface.
130	Adobe floor patch	1.01 (Structure 1, main chamber)	89.26N/102.04E	40 x 27 x 17	irregular basin	Layer 1 (Munsell 10YR 6/6 brownish yellow) adobe patch. Layer 2 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with charcoal flecks uncommon.	N/A	Shallow, steep-sided basin. Sealed at floor surface. Remodeling episode spatially associated with Features 103, 115 and 74.
132	Damper socket	1.01 (Structure 1, main chamber)	88.80N/101.00E	34 x 46 x 24	irregular basin	Layer 1 Loose, fine sand (Munsell 10YR 6/4 light yellowish brown) with charcoal flecks uncommon. Layer 2 (Munsell 10YR 6/3 pale brown) loose sand mixed with adobe.	Ceramic, bone, and macrobotanical	Shallow, steep-sided, adobe-lined basin. Damper slot?
133	Adobe floor patch	1.01 (Structure 1, main chamber)	92.26N/100.40E	116 x 154 x 5-7	oval basin	Layer 1 (Munsell 10YR 6/4 light yellowish brown) compacted adobe.	N/A	Adobe floor patch used to repair a worn and pitted area north of hearth.
155	Posthole	1.02 (Structure 1, bench)	89.68N/104.24E	21 x 16 x 10	oval, conical	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, silty sand with charcoal and caliche.	N/A	Shallow, steep sided basin
156	Posthole	1.02 (Structure 1, bench)	90.22N/104.36E	18 x 16 x 15	oval, conical	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, silty sand with inclusions of charcoal, caliche, and green clay.	N/A	Shallow, steep sided basin

(Table 8.3, continued)

Feature	Feature Type	Architectural Unit	Location[1]	Size (cm) L x W x D	Shape (Plan/Profile)	Fill	Contents	Comments
157	Posthole	1.02 (Structure 1, bench)	89.25N/97.68E	14 x 16 x 38	circular, conical	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with inclusions of adobe and wood.	wood	Steep-sided, cylindrical-shaped, adobe-lined posthole. Dendrochronological sample (n/a)
158	Posthole	1.02 (Structure 1, bench)	90.47N/97.24E	22 x 20 x 8	circular, conical	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with inclusions of adobe and charcoal flecks.	N/A	Gentle-sided, shallow, adobe-lined basin
159	Posthole	1.02 (Structure 1, bench)	90.26N/97.46E	8 x 8 x 8	circular, cylindrical	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand.	Shell bead	Shallow, gentle-sided, adobe-lined basin
160	Posthole	1.02 (Structure 1, bench)	90.06N/104.07E	8 x 11 x 13	circular, cylindrical	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand and charcoal.	N/A	Angled, shallow, cylindrical posthole.
161	Posthole	1.02 (Structure 1, bench)	90.10N/97.72E	11 x 12 x 4	oval basin	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand and charcoal.	N/A	Shallow, gentle-sided, adobe-lined basin.
162	Posthole	1.02 (Structure 1, bench)	88.43N/97.70E	14 x 12 x 14	circular, conical	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand and charcoal.	Macrobotanical	Angled, shallow, cylindrical posthole.
163	Posthole	1.02 (Structure 1, bench)	89.48N/104.16E	13 x 20 x 10	circular, cylindrical	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand and charcoal.	Macrobotanical	Angled, shallow, cylindrical posthole.
164	Vent tunnel	1.01 (Structure 1, main chamber) 1.03 (Structure 1, ante- chamber)	87.60N/101.44E	195 x 45 x 50	linear, subrec-tangular	Stratum 2 (Munsell 2.5YR 5/4 light olive brown) mixed loose, silty sand with charcoal flecks and artifacts.	Ceramic, lithic, and ground stone.	Tunnel connecting Structure 1 (main chamber) with Structure 1 (antechamber).
165	Posthole	1.02 (Structure 1, bench)	89.63N/97.60E	12 x 12 x 9	circular, cylindrical	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand and charcoal.	Macrobotanical and wood	Deep, steep-sided, cylindrical-shaped, adobe-lined posthole. Dendrochronological sample (AD 541-592 vv[4])
166	Posthole	1.02 (Structure 1, bench)	92.66N/103.04E	14 x 14 x 14	circular, cylindrical	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand and charcoal.	Macrobotanical	Angled, shallow, cylindrical posthole.
167	Pit, nfs	1.02 (Structure 1, bench)	93.06N/97.04E	50 x 35 x 10	oval basin	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with inclusions of charcoal flecks.	Bone tool and macrobotanical	Shallow, gentle-sided, adobe-lined basin
168	Posthole	1.02 (Structure 1, bench)	92.46N/97.14E	34 x 18 x 43	bifurcated cylindrical	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with inclusions of charcoal flecks.	Macrobotanical	Deep, cylindrical feature. Terraced interior.
169	Posthole	1.02 (Structure 1, bench)	93.43N/98.00E	8 x 10 x 4	oval basin	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with inclusions of charcoal flecks.	N/A	Shallow, gentle-sided, adobe-lined basin
170	Posthole	1.02 (Structure 1, bench)	93.05N/102.92E	10 x 8 x 10	circular, conical	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with inclusions of charcoal flecks.	N/A	Shallow, steep-sided, cylindrical
171	Posthole	1.02 (Structure 1, bench)	93.74N/98.72E	12 x 13 x 6	circular, conical	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with inclusions of charcoal flecks.	Macrobotanical	Shallow, gentle-sided basin
173	Pit, nfs	1.01 (Structure 1, main chamber)	93.44N/101.54E	20 x 22 x 28	circular, cylindrical	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand and charcoal.	N/A	Deep, cylindrical adobe-lined feature.
176	Thermal feature, nfs	1.02 (Structure 1, bench)	94.20N/101.85E	30 x 50 x 3	irregular, irregular	Layer 1 (Munsell 10YR 8/2 dark gray brown) Silty charcoalstained soil with inclusions of charcoal and ash.	Macrobotanical	Amorphous concentration of burned vegetation associated with patchy oxidation at margins. Post occupational?

(Table 8.3, continued)

Feature	Feature Type	Architectural Unit	Location[1]	Size (cm) L x W x D	Shape (Plan/Profile)	Fill	Contents	Comments
177	Thermal feature, nfs	1.01 (Structure 1, main chamber)	92.60N/99.80E	30 x 20 x 10 (inferred)	irregular, irregular	Oxidized and charcoal stained adobe mixed with ash, charcoal, Stratum 4, and Stratum 6.	Ceramic and macrobotanical	Hearth deposited during abandonment process. Post occupational?
178	Shallow basin, nfs	1.01 (Structure 1, main chamber)	88.37N/99.47E	12 x 12 x 3	circular basin	Layer 1 Floor fill (Munsell 10YR 6/4– 6/6 light yellowish brown brownish yellow) adobe mixed with wind blown sand.	N/A	Shallow, gentle-sided basin.
179	Shallow basin, nfs	1.01 (Structure 1, main chamber)	88.43N/99.73E	11 x 11 x 3	circular basin	Layer 1 Floor fill (Munsell 10YR 6/4– 6/6 light yellowish brown– brownish yellow) adobe mixed with wind blown sand.	N/A	Shallow, gentle-sided basin.
180	Shallow basin, nfs	1.01 (Structure 1, main chamber)	88.24N/99.53E	6 x 7 x 2	circular basin	Layer 1 Floor fill (Munsell 10YR 6/4 6/6 light yellowish brown– brownish yellow) adobe mixed with wind blown sand.	N/A	Shallow, gentle-sided basin.

[1]Feature center point; [2]oval center point; [3]intercept radiocarbon age [4]vv = estimated date; true outer ring missing; indet. = indeterminate,; nfs = not further specified

Table 8.4. LA 104106, Structure 1, feature type by proveniences.

	Architectural Unit			
Feature Type	**Structure 1 (Main Chamber)**	**Structure 1 (Bench)**	**Structure 1 (Antechamber)**	**Table Total**
Indeterminate cultural feature	1	–	–	**1**
Floor or wall patch	2	–	–	**2**
Pit, nfs	33	1	1	**35**
Bin, nfs	2	–	–	**2**
Storage facility	4	–	–	**4**
Hearth	1	–	–	**1**
Ash receptacle	1	–	–	**1**
Post hole	9	15	4	**28**
Wing wall	2	–	–	**2**
Vent tunnel	–	–	1	**1**
Vent opening	1	–	–	**1**
Ceramic container	–	–	1	**1**
Sipapu	1	–	–	**1**
Lateral floor vault	2	–	–	**2**
Stick impression	5	–	–	**5**
Shallow basin, nfs	14	–	–	**14**
Thermal feature, nfs	1	1	–	**2**
Ancillary hearth	1	–	–	**1**
Deflector socket	2	–	–	**2**
Table Total	**82**	**17**	**7**	**106**

nfs = not further specified

cylindrical and oriented either vertically or angled. Based on the angle of smaller posts, they appeared to be projecting up toward the center of the structure. These features are interpreted to have functioned as tertiary or leaner posts used to support earthen cover materials. Fill consisted of loose, fine sand with inclusions of adobe, charcoal flecks, and unburned wood. Artifacts recovered from the bench postholes included a shell bead fragment (Feature 159) (see Ornament section below) and macrobotanical remains, including trace amounts of cultivars identified in Feature 162, Feature 163, Feature 166, Feature 168, and Feature 171 (Table 8.5). Dendrochronological samples recovered from Feature 165 produced a non-cutting date of AD 616 +vv (Appendix 6). In addition to postholes, three shallow basins, one pit, and one thermal feature were identified on the bench surface.

The pit feature (Feature 167) was located on the northwest side of the bench surface along the exterior margin while the thermal feature was located on the northeast portion of the bench along the interior margin. Morphologically, the pit feature was an oval basin containing loose, fine sand with inclusions of adobe, charcoal flecks, and artifacts. Artifacts included a bone awl (see Akins, Chapter 13), bone fragments, and macrobotanical remains. Bone artifacts also included two unburned fragments of medium to large mammal (Table 8.6). The macrobotanical assemblage was dominated by burned perennial species followed by unburned annuals, grasses, and finally trace amounts of corn (Table

Table 8.5. LA 104106, Structure 1 bench, macrobotanical data by feature number.

				Study Unit/Architectural Unit Vertical Type							
				Full Cut	**Surface or Floor**						
				Intra-mural Area	**Posthole**					**Thermally Altered Pit**	
				Feature	**Feature**					**Feature**	**Table**
Charring State	**Botanical Group**	**Common Name**		**0**	**162**	**163**	**166**	**168**	**171**	**167**	**Total**
Carbonized	Perennials	Juniper	Count	–	–	–	–	–	–	8	**8**
			Row %	–	–	–	–	–	–	100.00	**100.00**
			Col. %	–	–	–	–	–	–	40.00	**26.67**
		Piñon	Count	–	–	–	–	–	–	1	**1**
			Row %	–	–	–	–	–	–	100.00	**100.00**
			Col. %	–	–	–	–	–	–	5.00	**3.33**
		Grease-wood/ saltbush	Count	–	–	–	–	–	–	1	**1**
			Row %	–	–	–	–	–	–	100.00	**100.00**
			Col. %	–	–	–	–	–	–	5.00	**3.33**
	Cultivars	Corn	Count	–	2	1	1	3	1	1	**9**
			Row %	–	22.22	11.11	11.11	33.33	11.11	11.11	**100.00**
			Col. %	–	66.67	100.00	100.00	100.00	100.00	5.00	**30.00**
	Unidentified	Unidenti-fiable seed	Count	1	1	–	–	–	–	–	**2**
			Row %	50.00	50.00	–	–	–	–	–	**100.00**
			Col. %	100.00	33.33	–	–	–	–	–	**6.67**
Unburned	Annuals	Goosefoot	Count	–	–	–	–	–	–	3	**3**
			Row %	–	–	–	–	–	–	100.00	**100.00**
			Col. %	–	–	–	–	–	–	15.00	**10.00**
	Perennials	Piñon	Count	–	–	–	–	–	–	6	**6**
			Row %	–	–	–	–	–	–	100.00	**100.00**
			Col. %	–	–	–	–	–	–	30.00	**20.00**
Table Total			**Count**	**1**	**3**	**1**	**1**	**3**	**1**	**20**	**30**
			Row %	**3.33**	**10.00**	**3.33**	**3.33**	**10.00**	**3.33**	**66.67**	**100.00**
			Col. %	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

Table 8.6. LA 104106, Structure 1 bench, faunal data by feature number.

		Study Unit/			
		Level	Floor Fill	Surface or Floor	
		Intramural Area		Thermally Altered Pit, FS 167	Table Total
Medium–large mammal	Count	–	–	1	**1**
	Row %	–	–	100.00	**100.00**
	Col. %	–	–	50.00	**4.76**
Large mammal	Count	–	–	1	**1**
	Row %	–	–	100.00	**100.00**
	Col %	–	–	50.00	**4.76**
Gunnison's prairie dog	Count	2	–	–	**2**
	Row %	100.00	–	–	**100.00**
	Col %	25.00	–	–	**9.52**
Permyscus sp.	Count	–	1	–	**1**
	Row %	–	100.00	–	**100.00**
	Col %	–	9.09	–	**4.76**
Bushy-tailed woodrat	Count	–	1	–	**1**
	Row %	–	100.00	–	**100.00**
	Col %	–	9.09	–	**4.76**
Desert cottontail	Count	3	6	–	**9**
	Row %	33.33	66.67	–	**100.00**
	Col %	37.50	54.55	–	**42.86**
Black-tailed jackrabbit	Count	2	–	–	**2**
	Row %	100.00	–	–	**100.00**
	Col %	25.00	–	–	**9.52**
Medium–large artio-dactyl	Count	1	–	–	**1**
	Row %	100.00	–	–	**100.00**
	Col %	12.50	–	–	**4.76**
Medium–large bird	Count	–	3	–	**3**
	Row %	–	100.00	–	**100.00**
	Col %	–	27.27	–	**14.29**
Table Total	**Count**	**8**	**11**	**2**	**21**
	Row %	**38.10**	**52.38**	**9.52**	**100.00**
	Col %	**100.00**	**100.00**	**100.00**	**100.00**

8.5). Based on its size, morphology, and content, this feature was interpreted as a storage facility.

The thermal feature (Feature 176) consists of a concentration of burned and partially consumed vegetation producing patchy oxidation along the feature margins. This feature yielded an archaeomagnetic sample that unfortunately produced a high α_{95} value insufficient for accurately measuring a calendar date (see Blinman and Cox, Appendix 7, this report). Based on the materials present, this feature may have been related to the abandonment processes of Structure 1 or to those of a subsequent occupation.

Ceramic artifacts recovered from near or on the bench surface all consisted of plain gray body sherds. Lithic and ground stone artifacts associated with this surface included core flakes of local silicified wood and sandstone, a grinding slab, and a two-hand mano fragment.

Structure 1, main chamber (AUN 1.01). Data recovery yielded 4,678 artifacts and samples from the main chamber of Structure 1 (Table 8.1) The floor of Structure 1, main chamber, was located just under 2 m below the original ground surface and was positioned approximately 70 cm below the bench. A total of 82 features were associated with the floor surface in the main chamber, including 69 in-use features and five sealed floor features. In-use features associated with Floor 1 included a central hearth, ash pit, wing walls, postholes, floor vaults, a sipapu, a ventilator system, and numerous cylindrical pits (Table 8.3). Given the number and variety of features associated with this surface, the following feature descriptions will be grouped based on inferred function.

Postholes. Four postholes (Features 13, 40, 73, and 74), inferred as the primary supports for the superstructure of Structure 1, were positioned equidistant from the wall of the main chamber and from each other. Each of these large, deep, vertical pits were similar in size, content, and fill sequence. These postholes ranged in size between 26 and 41 cm in diameter and 63 and 76 cm deep, and in three cases contained a thick stone or ground stone fragment located at the base of the feature. In all cases, a 10–30 cm layer of gray-green, raw, unprocessed clay was present in the bottom of these features, surrounding the ground stone artifact. Overlying the clay was a layer of fine, sorted sand, mixed with adobe fragments. Finally, these features were filled with a mix and roof fall and structural collapse. Figure 8.7 illustrates the construction style and fill sequence of these features. In addition to ground stone, the primary post support features contained macrobotanical and faunal remains. Macrobotanical remains recovered from Feature 40 were dominated by carbonized perennials followed by trace amounts of cultigens and unburned taxon (Table 8.7). Bone artifacts recovered from Feature 40 and Feature 74 consisted a single unburned element of small mammal in each (Table 8.8). The stone or ground stone fragment at the base of these features may have prevented the post from settling while the clay may have been used to prevent cant.

Evidence of remodeling or maintenance was present in the southwestern post support feature that indicated the installation of a secondary or supplemental support adjacent to the initial post. Lack of a ground stone fragment at the base of the eastern lobe supports this interpretation. In addition, two smaller posts (Feature 80 and Feature 103) were identified. Feature 80 was located along the southern wall of the structure west of the vent opening while Feature 103 was located on the east side of the vent opening. Feature 80 contained a trace of unburned annuals (Table 8.7) while Feature 103 contained three unburned bone fragments and a small shell ornament (Table 8.8). A dendrochronology sample recovered from Feature 103 yielded a non-cutting data of AD 486–616+vv (Appendix 6). Both the southwest and southeast post support features and Feature 103 were incorporated in the construction of wing wall complex.

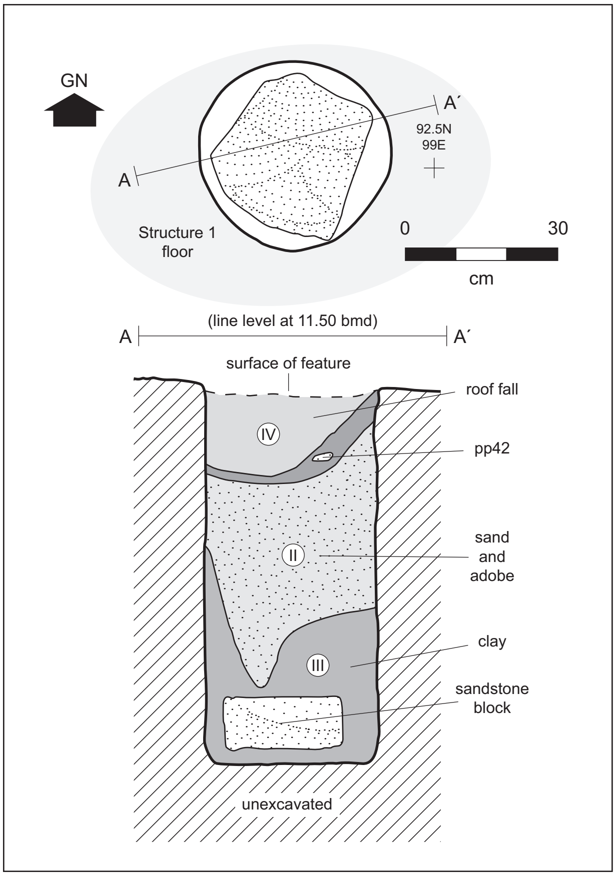


Figure 8.7. Plan and profile, Feature 40, Structure 1, LA 104106.

Wing walls. The wing wall complex (Features 100 and 115) segregates the southern third of the structure from the remaining floor surface. These features articulated the deflector/ash pit complex near the center of the structure with the southwest and southeast post supports and finally with corner bins. Each feature was just over 1 m in length, narrower near the center of the structure, expanding to a maximum of 25 cm at the post support junction (Figs. 8.8, 8.8.1, 8.8.2). Fill consisted of structural collapse and roofing material including adobe, small fragments of tabular sandstone, and artifacts. Artifacts recovered from Feature 100 were a single gray jar body sherd, and a bipolar core (Tables 8.9, 8.10). Macrobotanical remains were predominantly carbonized perennial species with trace amounts un-

Table 8.7. LA 104106, Structure 1, main chamber, macrobotanical data by feature number.

		Study Unit/Architectural Unit Vertical Type																										
		Lower Fill below Roof	Roofing Material		Floor Fill	Surface or Floor																				Sealed Floor Feature		
		Intra-mural Area	Therm-ally Altered Pit	Intra-mural Area	Intra-mural Area	Floor or Wall Patch	Pit, nfs						Storage Facility	Hearth	Ash Recep-tacle	Heating Pit	Posthole				Wing Wall		Sipapu	Shallow Basin (nfs)	De-flector Socket		Storage Facility	Shallow Basin (nfs)	Table Total
		FS 0	FS 177	FS 0	FS 0	FS 130	FS 14	FS 21	FS 59	FS 102	FS 111	FS 173	FS 31	FS 64	FS 67	FS 48	FS 13	FS 40	FS 74	FS 80	FS 100	FS 115	FS 19.01	FS 18	FS 108	FS 132	FS 123	FS 127	
Carbonized																													
Annuals	Amaranth	–	1	–	7	–	–	–	–	–	–	–	–	38	–	–	–	4	–	–	–	–	–	–	1	–	–	–	51
	Goosefoot	–	1	–	5	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	1	–	8
	Cheno-Am	–	2	–	3	–	–	–	–	–	–	–	–	5	–	–	–	–	–	–	–	–	–	–	1	–	–	–	11
	Sunflower	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
	White-stemmed stickleaf	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
	Purslane	–	–	–	3	–	–	–	–	–	–	–	–	8	–	–	–	–	–	–	–	–	–	–	–	–	–	–	11
	Goosefoot family	–	4	17	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	21
Perennials	Serviceberry	–	–	–	3	–	–	–	–	–	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	6
	Four-wing saltbush	–	58	–	–	–	–	–	–	–	–	–	–	–	–	–	3	290	–	–	–	2	–	–	–	–	–	–	353
	Mountain mahogany	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	1
	Cliff rose	–	–	–	14	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	15
	Juniper	–	–	–	132	16	–	–	6	–	11	–	13	10	12	18	13	3	18	-	17	14	–	–	8	–	17	–	308
	Wolf-berry	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
	Pine	–	–	–	–	–	–	–	–	–	–	–	–	58	1	–	–	–	–	–	–	–	–	–	–	–	–	–	59
	Piñon	–	3	–	61	4	–	–	2	–	2	–	3	4	7	–	4	3	1	–	1	5	–	–	3	–	1	–	104
	Rose family	–	–	–	2	–	–	–	1	–	–	–	4	2	2	1	–	–	–	–	–	–	–	–	1	–	–	–	13
	Oak	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	1
	Willow family	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	1
	Greasewood/ saltbush	19	–	–	25	–	–	–	11	–	5	–	1	4	1	-	2	17	1	–	1	1	–	–	5	–	2	–	95
	Coniferous wood	–	–	–	9	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	9
	Nonconiferous wood	–	1	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2
	Unknown taxon	–	–	–	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2
Grasses	Grass family	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
	Ricegrass	–	–	–	–	–	–	–	–	–	–	–	–	29	–	–	–	–	–	–	–	–	–	–	–	–	–	–	29
Cultivars	Corn	–	2	–	39	1	2	–	1	3	2	–	1	177	3	2	2	2	3	–	3	2	1	–	3	2	3	2	256
Unidentified	Unknown	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
	Unidentifiable seed	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2	–	–	–	3
Other	Sage	–	–	–	–	–	–	–	–	–	–	–	–	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3

(Table 8.7, continued)

		Study Unit/Architectural Unit Vertical Type																											
		Lower Fill below Roof	Roofing Material		Floor Fill	Surface or Floor																				Sealed Floor Feature		
		Intra-mural Area	Therm-ally Altered Pit	Intra-mural Area	Intra-mural Area	Floor or Wall Patch	Pit, nfs						Storage Facility	Hearth	Ash Recep-tacle	Heating Pit	Posthole				Wing Wall		Sipapu	Shallow Basin (nfs)	De-flector Socket		Storage Facility	Shallow Basin (nfs)	Table Total
		FS 0	FS 177	FS 0	FS 0	FS 130	FS 14	FS 21	FS 59	FS 102	FS 111	FS 173	FS 31	FS 64	FS 67	FS 48	FS 13	FS 40	FS 74	FS 80	FS 100	FS 115	FS 19.01	FS 18	FS 108	FS 132	FS 123	FS 127	
Partially Charred																													
Perennials	Juniper	–	–	–	–	–	–	–	–	–	–	–	–	29	–	–	–	–	–	–	–	–	–	–	–	–	–	–	29
	Piñon	–	–	–	–	–	–	–	2	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	3
Unburned																													
Annuals	Amaranth	–	–	–	2	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	5
	Goosefoot	–	–	–	201	–	2	–	–	5	-	3	5	2	–	3	–	1	212	2	2	4	414	–	–	91	79	–	1026
	Cheno-Am	–	–	–	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3
	Bugseed	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
	Tansy mustard	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	93	–	–	–	–	–	–	–	1	–	94
	Spurge	–	–	–	11	–	–	–	–	–	–	–	–	–	–	–	5	–	–	4	–	–	–	–	–	1	5	–	26
	Sunflower	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	10	–	–	–	–	–	–	–	–	–	10
	Stickseed	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	1
	White-stemmed stickleaf	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	98	–	–	–	–	–	–	–	2	–	101
	Purslane	–	–	–	11	–	–	–	–	–	–	11	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	23
	Seepweed	–	–	–	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2
Perennials	Chamae-saracha	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	1
	Juniper	–	–	–	15	–	–	1	–	–	–	–	1	–	–	–	1	1	–	–	–	–	1	1	–	1	–	–	22
	Bulrush	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	1
	Globemallow	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	1
Grasses	Ricegrass	–	–	–	–	–	–	–	–	–	–	–	–	29	1	2	–	–	–	–	–	–	–	–	–	–	–	–	32
Other	Sedge family	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	1
	Evening primrose	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	7	–	–	–	–	–	–	–	–	–	7
	Sage	–	–	–	–	–	–	–	–	–	–	–	–	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3
Table Total		**19**	**73**	**17**	**558**	**23**	**4**	**1**	**23**	**8**	**22**	**14**	**28**	**401**	**27**	**27**	**31**	**321**	**444**	**6**	**25**	**31**	**416**	**1**	**26**	**96**	**115**	**2**	**2759**

nfs = not further specified

Table 8.8. LA 104106, Structure 1, main chamber, faunal data by feature number.

			Study Unit/Architectural Unit Vertical Type																								
			Full Cut to Floor Fill	Upper Fill above Roof	Lower Fill below Roof	Roofing Material	Extra-mural Fill	Floor Fill	Surface or Floor																Sealed Floor Feature		
			Intramural Area						Pit, nfs						Storage Facility	Hearth	Heat-ing Pit	Posthole				Wing Wall	Com-plex Sipapu	De-flector Socket	Storage Facility	Shallow Basin (nfs)	
Degree of Burning	**Common Name**		**F 0**	**F 0**	**F 0**	**F 0**	**F 0**	**F 0**	**F 14**	**F 20**	**F 45**	**F 59**	**F 102**	**F 173**	**F 50**	**F 64**	**F 48**	**F 40**	**F 74**	**F 103**	**F 107**	**F 115**	**F 19.01**	**F 132**	**F 123**	**F 127**	**Table Total**
None	Unknown small	Count	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	**1**
		Row %	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	100.00	**100.00**
		Col. %	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	100.00	**0.42**
	Small mammal	Count	1	–	–	1	–	7	1	1	–	1	–	–	–	24	–	–	–	3	–	–	–	1	1	–	**41**
		Row %	2.44	–	–	2.44	–	17.07	2.44	2.44	–	2.44	–	–	–	58.54	–	–	–	7.32	–	–	–	2.44	2.44	–	**100.00**
		Col. %	3.85	–	–	8.33	–	6.36	100.00	100.00	–	50.00	–	–	–	44.44	–	–	–	100.00	–	–	–	12.50	100.00	–	**17.08**
	Medium–large mammal	Count	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**2**
		Row %	100.00	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**100.00**
		Col. %	7.69	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**0.83**
	Large mammal	Count	1	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**2**
		Row %	50.00	–	–	–	–	50.00	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**100.00**
		Col. %	3.85	–	–	–	–	0.91	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**0.83**
	Gunnison's prairie dog	Count	2	1	–	2	–	20	–	–	1	–	1	2	1	7	–	–	–	–	–	–	–	2	–	–	**39**
		Row %	5.13	2.56	–	5.13	–	51.28	–	–	2.56	–	2.56	5.13	2.56	17.95	–	–	–	–	–	–	–	5.13	–	–	**100.00**
		Col. %	7.69	25.00	–	16.67	–	18.18	–	–	100.00	–	100.00	100.00	100.00	12.96	–	–	–	–	–	–	–	25.00	–	–	**16.25**
	Botta's pocket gopher	Count	–	–	–	–	1	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	**2**
		Row %	–	–	–	–	50.00	–	–	–	–	–	–	–	–	50.00	–	–	–	–	–	–	–	–	–	–	**100.00**
		Col. %	–	–	–	–	25.00	–	–	–	–	–	–	–	–	1.85	–	–	–	–	–	–	–	–	–	–	**0.83**
	Banner-tailed kangaroo rat	Count	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**1**
		Row %	–	–	–	–	–	–	–	–	–	100.00	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**100.00**
		Col. %	–	–	–	–	–	–	–	–	–	50.00	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**0.42**
	Small rodent	Count	–	–	–	–	–	3	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	**4**
		Row %	–	–	–	–	–	75.00	–	–	–	–	–	–	–	–	–	–	–	–	–	25.00	–	–	–	–	**100.00**
		Col. %	–	–	–	–	–	2.73	–	–	–	–	–	–	–	–	–	–	–	–	–	50.00	–	–	–	–	**1.67**
	Medium–large rodent	Count	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	**1**
		Row %	–	–	–	–	–	–	–	–	–	–	–	–	–	100.00	–	–	–	–	–	–	–	–	–	–	**100.00**
		Col. %	–	–	–	–	–	–	–	–	–	–	–	–	–	1.85	–	–	–	–	–	–	–	–	–	–	**0.42**
	Desert cottontail	Count	4	–	–	2	–	20	–	–	–	–	–	–	–	4	–	1	1	–	1	1	–	5	–	–	**39**
		Row %	10.26	–	–	5.13	–	51.28	–	–	–	–	–	–	–	10.26	–	2.56	2.56	–	2.56	2.56	–	12.82	–	–	**100.00**
		Col. %	15.38	–	–	16.67	–	18.18	–	–	–	–	–	–	–	7.41	–	100.00	100.00	–	100.00	50.00	–	62.50	–	–	**16.25**
	Black-tailed jack rabbit	Count	4	3	–	4	–	17	–	–	–	–	–	–	–	1	1	–	–	–	–	–	–	–	–	–	**30**
		Row %	13.33	10.00	–	13.33	–	56.67	–	–	–	–	–	–	–	3.33	3.33	–	–	–	–	–	–	–	–	–	**100.00**
		Col. %	15.38	75.00	–	33.33	–	15.45	–	–	–	–	–	–	–	1.85	100.00	–	–	–	–	–	–	–	–	–	**12.50**
	Dog	Count	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**3**
		Row %	100.00	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**100.00**
		Col. %	11.54	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**1.25**
	Bobcat	Count	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**1**
		Row %	–	–	–	–	–	100.00	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**100.00**
		Col. %	–	–	–	–	–	0.91	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**0.42**
	Medium artiodactyl	Count	3	–	2	1	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**7**
		Row %	42.86	–	28.57	14.29	–	14.29	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**100.00**
		Col. %	11.54	–	100.00	8.33	–	0.91	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**2.92**

(Table 8.8, continued)

			Study Unit/Architectural Unit Vertical Type																								
			Full Cut to Floor Fill	Upper Fill above Roof	Lower Fill below Roof	Roofing Material	Extra-mural Fill	Floor Fill	Surface or Floor																Sealed Floor Feature		
			Intramural Area						Pit, nfs						Storage Facility	Hearth	Heat-ing Pit	Posthole				Wing Wall	Com-plex Sipapu	De-flector Socket	Storage Facility	Shallow Basin (nfs)	
Degree of Burning	**Common Name**		**F 0**	**F 0**	**F 0**	**F 0**	**F 0**	**F 0**	**F 14**	**F 20**	**F 45**	**F 59**	**F 102**	**F 173**	**F 50**	**F 64**	**F 48**	**F 40**	**F 74**	**F 103**	**F 107**	**F 115**	**F 19.01**	**F 132**	**F 123**	**F 127**	**Table Total**
	Medium–large artiodactyl	Count	3	–	–	–	–	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**5**
		Row %	60.00	–	–	–	–	40.00	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**100.00**
		Col. %	11.54	–	–	–	–	1.82	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**2.08**
	Elk	Count	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**1**
		Row %	–	–	–	–	–	100.00	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**100.00**
		Col. %	–	–	–	–	–	0.91	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**0.42**
	Pronghorn	Count	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**1**
		Row %	–	–	–	100.00	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**100.00**
		Col. %	–	–	–	8.33	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**0.42**
	Hawks and harriers	Count	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**1**
		Row %	–	–	–	–	–	100.00	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**100.00**
		Col. %	–	–	–	–	–	0.91	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**0.42**
Dry burn	Gunnison's prairie dog	Count	–	–	–	–	–	5	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**5**
		Row %	–	–	–	–	–	100.00	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**100.00**
		Col. %	–	–	–	–	–	4.55	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**2.08**
	Desert cottontail	Count	–	–	–	–	–	14	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**14**
		Row %	–	–	–	–	–	100.00	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**100.00**
		Col. %	–	–	–	–	–	12.73	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**5.83**
	Black-tailed jack rabbit	Count	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**1**
		Row %	–	–	–	–	–	100.00	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**100.00**
		Col. %	–	–	–	–	–	0.91	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**0.42**
	Medium–large artiodactyl	Count	–	–	–	–	–	6	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**6**
		Row %	–	–	–	–	–	100.00	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**100.00**
		Col. %	–	–	–	–	–	5.45	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**2.50**
Light	Small mammal	Count	–	–	–	–	–	–	–	–	–	–	–	–	–	3	–	–	–	–	–	–	–	–	–	–	**3**
		Row %	–	–	–	–	–	–	–	–	–	–	–	–	–	100.00	–	–	–	–	–	–	–	–	–	–	**100.00**
		Col. %	–	–	–	–	–	–	–	–	–	–	–	–	–	5.56	–	–	–	–	–	–	–	–	–	–	**1.25**
	Gunnison's prairie dog	Count	1	–	–	–	–	1	–	–	–	–	–	–	–	2	–	–	–	–	–	–	–	–	–	–	**4**
		Row %	25.00	–	–	–	–	25.00	–	–	–	–	–	–	–	50.00	–	–	–	–	–	–	–	–	–	–	**100.00**
		Col. %	3.85	–	–	–	–	0.91	–	–	–	–	–	–	–	3.70	–	–	–	–	–	–	–	–	–	–	**1.67**
	Botta's pocket gopher	Count	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	**1**
		Row %	–	–	–	–	–	–	–	–	–	–	–	–	–	100.00	–	–	–	–	–	–	–	–	–	–	**100.00**
		Col. %	–	–	–	–	–	–	–	–	–	–	–	–	–	1.85	–	–	–	–	–	–	–	–	–	–	**0.42**
	Desert cottontail	Count	1	–	–	–	–	5	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**6**
		Row %	16.67	–	–	–	–	83.33	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**100.00**
		Col. %	3.85	–	–	–	–	4.55	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**2.50**
	Black-tailed jack rabbit	Count	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**1**
		Row %	–	–	–	–	–	100.00	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**100.00**
		Col. %	–	–	–	–	–	0.91	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**0.42**
	Medium artiodactyl	Count	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**1**
		Row %	–	–	–	100.00	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**100.00**
		Col. %	–	–	–	8.33	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**0.42**
	Elk	Count	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**1**
		Row %	100.00	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**100.00**
		Col. %	3.85	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**0.42**
Heavy	Small mammal	Count	–	–	–	–	1	–	–	–	–	–	–	–	–	2	–	–	–	–	–	–	–	–	–	–	**3**
		Row %	–	–	–	–	33.33	–	–	–	–	–	–	–	–	66.67	–	–	–	–	–	–	–	–	–	–	**100.00**
		Col. %	–	–	–	–	25.00	–	–	–	–	–	–	–	–	3.70	–	–	–	–	–	–	–	–	–	–	**1.25**

(Table 8.8, continued)

			Study Unit/Architectural Unit Vertical Type																								
			Full Cut to Floor Fill	Upper Fill above Roof	Lower Fill below Roof	Roofing Material	Extra-mural Fill	Floor Fill	Surface or Floor																Sealed Floor Feature		
			Intramural Area						Pit, nfs						Storage Facility	Hearth	Heat-ing Pit	Posthole				Wing Wall	Com-plex Sipapu	De-flector Socket	Storage Facility	Shallow Basin (nfs)	
Degree of Burning	**Common Name**		**F 0**	**F 0**	**F 0**	**F 0**	**F 0**	**F 0**	**F 14**	**F 20**	**F 45**	**F 59**	**F 102**	**F 173**	**F 50**	**F 64**	**F 48**	**F 40**	**F 74**	**F 103**	**F 107**	**F 115**	**F 19.01**	**F 132**	**F 123**	**F 127**	**Table Total**
	Gunnison's prairie dog	Count	–	–	–	–	–	–	–	–	–	–	–	–	–	2	–	–	–	–	–	–	–	–	–	–	**2**
		Row %	–	–	–	–	–	–	–	–	–	–	–	–	–	100.00	–	–	–	–	–	–	–	–	–	–	**100.00**
		Col. %	–	–	–	–	–	–	–	–	–	–	–	–	–	3.70	–	–	–	–	–	–	–	–	–	–	**0.83**
	Medium–large rodent	Count	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	**1**
		Row %	–	–	–	–	–	–	–	–	–	–	–	–	–	100.00	–	–	–	–	–	–	–	–	–	–	**100.00**
		Col. %	–	–	–	–	–	–	–	–	–	–	–	–	–	1.85	–	–	–	–	–	–	–	–	–	–	**0.42**
	Desert cottontail	Count	–	–	–	–	–	–	–	–	–	–	–	–	–	2	–	–	–	–	–	–	–	–	–	–	**2**
		Row %	–	–	–	–	–	–	–	–	–	–	–	–	–	100.00	–	–	–	–	–	–	–	–	–	–	**100.00**
		Col. %	–	–	–	–	–	–	–	–	–	–	–	–	–	3.70	–	–	–	–	–	–	–	–	–	–	**0.83**
	Black-tailed jack rabbit	Count	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**1**
		Row %	–	–	–	–	100.00	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**100.00**
		Col. %	–	–	–	–	25.00	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**0.42**
	Dog, coyote, wolf	Count	–	–	–	–	–	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**2**
		Row %	–	–	–	–	–	100.00	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**100.00**
		Col. %	–	–	–	–	–	1.82	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**0.83**
	Medium artiodactyl	Count	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**1**
		Row %	–	–	–	–	100.00	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**100.00**
		Col. %	–	–	–	–	25.00	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**0.42**
Calcined	Small mammal	Count	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	**1**
		Row %	–	–	–	–	–	–	–	–	–	–	–	–	–	100.00	–	–	–	–	–	–	–	–	–	–	**100.00**
		Col. %	–	–	–	–	–	–	–	–	–	–	–	–	–	1.85	–	–	–	–	–	–	–	–	–	–	**0.42**
	Medium–large mammal	Count	–	–	–	–	–	–	–	–	–	–	–	–	–	2	–	–	–	–	–	–	–	–	–	–	**2**
		Row %	–	–	–	–	–	–	–	–	–	–	–	–	–	100.00	–	–	–	–	–	–	–	–	–	–	**100.00**
		Col. %	–	–	–	–	–	–	–	–	–	–	–	–	–	3.70	–	–	–	–	–	–	–	–	–	–	**0.83**
	Gunnison's prairie dog	Count	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**1**
		Row %	–	–	–	–	–	100.00	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**100.00**
		Col. %	–	–	–	–	–	0.91	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**0.42**
Table Total		**Count**	**26**	**4**	**2**	**12**	**4**	**110**	**1**	**1**	**1**	**2**	**1**	**2**	**1**	**54**	**1**	**1**	**1**	**3**	**1**	**2**	**1**	**8**	**1**	**1**	**241**
		Row %	**10.79**	**1.66**	**0.83**	**4.98**	**1.66**	**45.64**	**0.41**	**0.41**	**0.41**	**0.83**	**0.41**	**0.83**	**0.41**	**22.41**	**0.41**	**0.41**	**0.41**	**1.24**	**0.41**	**0.83**	**0.41**	**3.32**	**0.41**	**0.41**	**100.00**
		Col. %	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

nfs = not further specified

Figure 8.8. Wing wall complex, Structure 1, LA 104106.

burned annuals identified (Table 8.7). Feature 115 contained two unburned bone fragments and a macrobotanical assemblage dominated by burned perennials with trace amounts of burned annuals, cultigens, and unburned annuals (Tables 8.7, 8.8). Inferred construction of the wing wall complex consisted of large, upright stone slabs set in narrow linear trenches and anchored to the floor using adobe. Additional support for the west wing wall was inferred from an adjacent posthole (Feature 101). Morphologically this cylindrical feature was angled down toward the southeast, suggesting that the inferred post projected up toward the center of the wing wall. Maintenance and remodeling of the eastern wing wall joined a small post (Feature 103) and the southeast main support post using adobe. Although the slabs may have been removed as part of the abandonment process, a similar construction method was used to form bin features in the southwest and southeast corners of the main chamber.

Bin features. Two bin features (Feature 71 and 75) were incorporated into the construction of the main post support and wingwall complex. The north wall of Feature 71 was constructed with an upright slab set in the floor and the south wall was constructed using an adobe coping. These two vertical elements articulated with the wall of the main chamber and the southwest posthole (Feature 73) forming an enclosure. A pollen sample removed from the floor yielded evidence of native trees and shrubs, economic species and herbs. Native tree and shrub species were dominated by piñon/juniper, but also included oak and sagebrush. Economic taxon, dominated by *Chenopodium/amaranth*, also include beeweed, corn, and squash, while herbs identified include the sunflower family (see Appendix 2).

The north wall of Feature 75 was constructed using an upright, shaped sandstone slab and small vertical posts faced with adobe (Fig. 8.9). The southwest wall was constructed using adobe and a linear trench, presumably to support a vertical slab. These two vertical elements articulated with the wall of the main chamber and the southeast posthole (Feature 74) forming an enclosure. Evidence of remodeling is suggested by the presence of a capped, crescent-shaped trench (Feature 130) located approximately

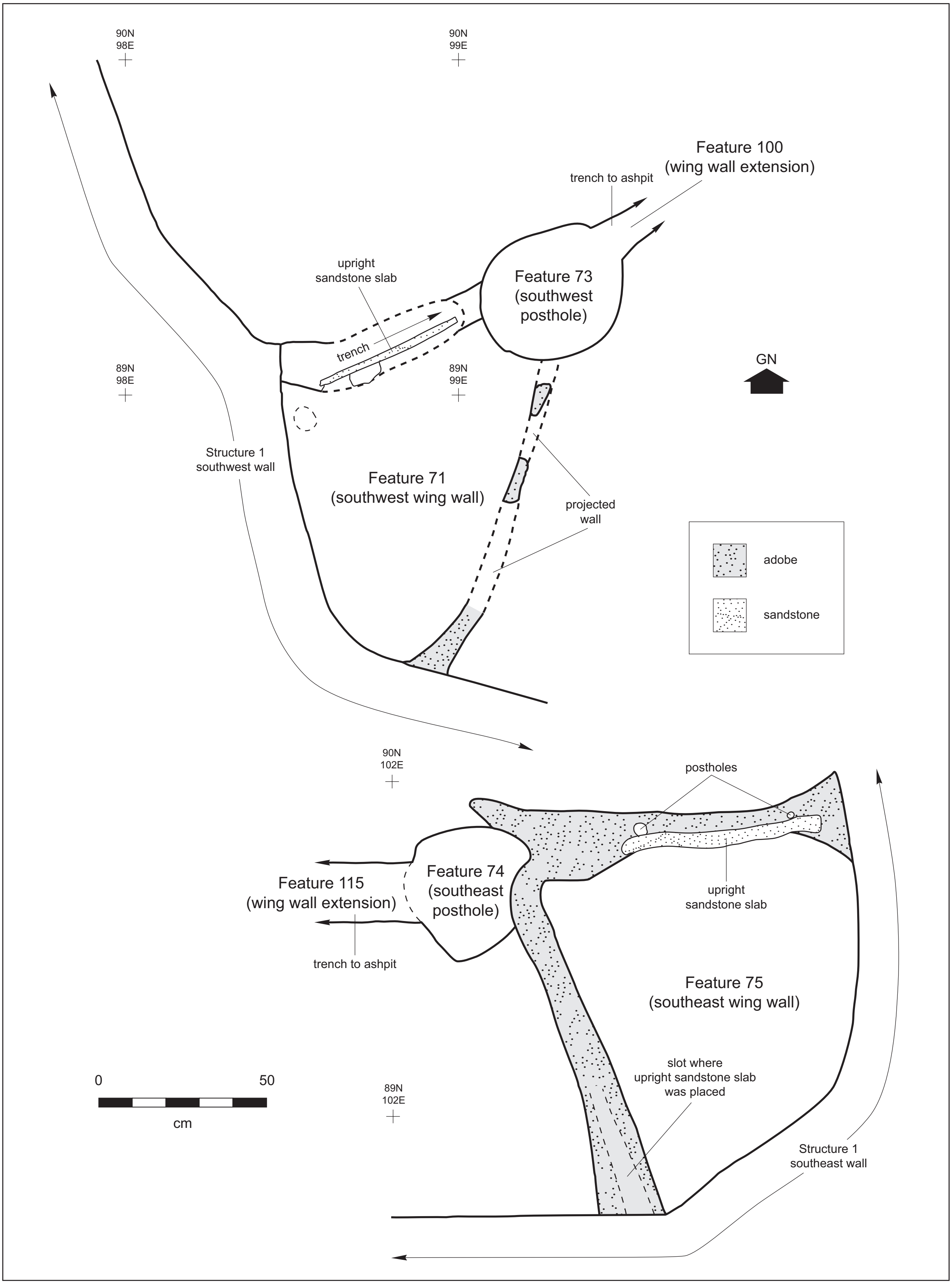


Figure 8.8.1. Plan of wing wall complex, Structure 1, LA 104106.

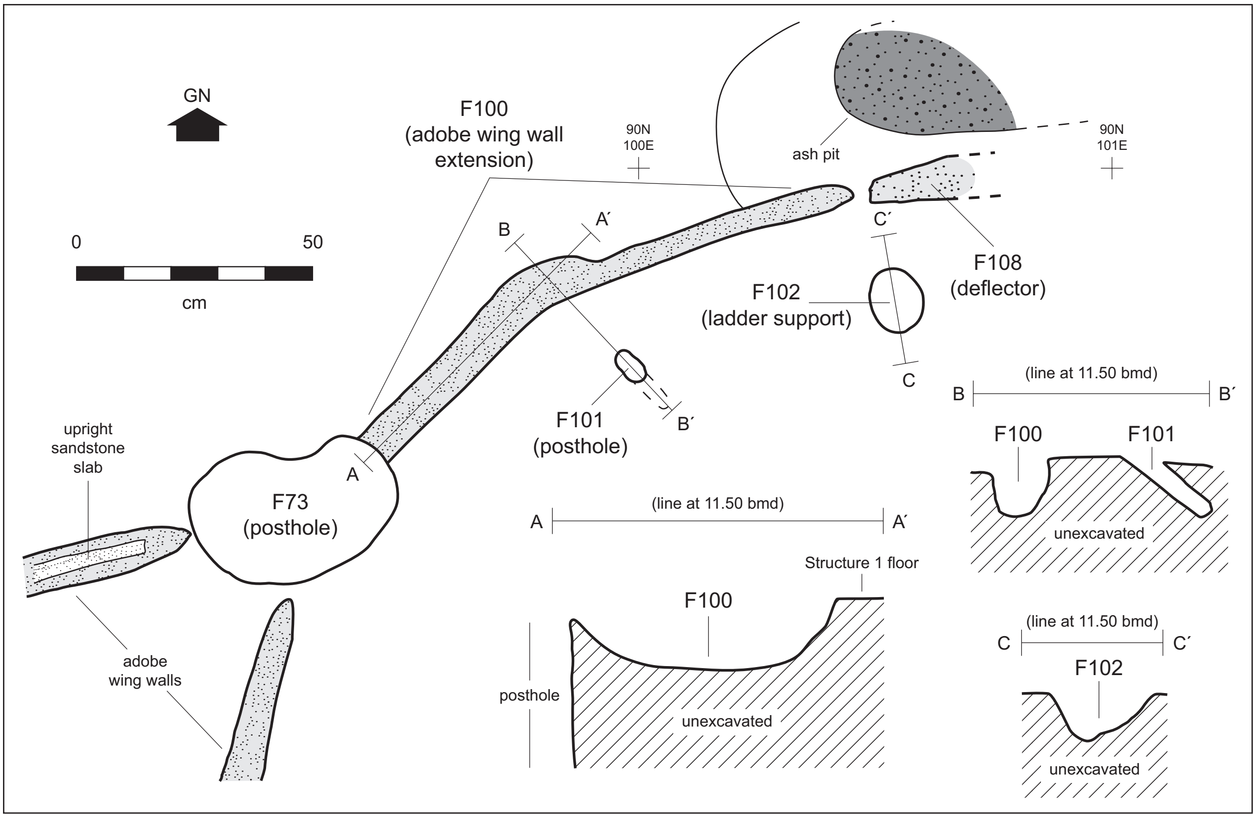


Figure 8.8.2. Plan of wing wall extension, Structure 1, LA 104106.

35 cm west of Feature 75. This trench contained charred perennial species and may represent the location of an earlier bin partition or contiguous bin feature, which was subsequently removed. Both bin features were partially dismantled and obliterated perhaps during the abandonment process. Although these features appear to have been cleared out, the floor fill layer of Feature 75 contained a partial gray ware jar and a single utilized piece of debitage (Tables 8.9, 8.10). Together the bins, post supports, wing walls, and deflector form a partition, separating the southern third of the structure from the northern floor surface. This partition had a 20 cm wide opening, presumably to facilitate air flow, between the deflector and east wing wall.

Deflector, ash pit, and central hearth. The deflector (Feature 108) was constructed by incorporating a shallow, narrow, linear trench into the southwest margin of a molded adobe basin interpreted as an ash pit (Feature 67). Similar to portions of the wing wall complex and bin features, the trench, identified as Feature 108, was inferred to have supported a vertical stone slab subsequently removed, perhaps during the abandonment process. Of all the tabular sandstone recovered from the structure, only one piece displayed evidence of thermal alteration in the form of oxidization. This item was positioned vertically along the south wall of the structure to the west of the vent opening. Based on the location, condition, and size, it is likely that this element may have functioned as the deflector slab (Fig. 8.10). This feature contained adobe fragments, charcoal, and ash, presumably redeposited from the adjacent ash pit.

The boundary of the ash pit (Feature 67) was defined by the sloping limits of the basin. However, the adobe copping of this feature yielded to the floor on all sides but the south, rendering the exterior feature margins indistinguishable from the remaining floor surface. This shallow, oval basin contained a single layer of loose gray ash that yielded macrobotanical remains dominated by burned perennials followed by trace amounts of cultivars and unburned annuals (Table 8.7). A pollen sample col-

Table 8.9. LA 104106, Structure 1, main chamber, ceramic data by feature number.

		Study Unit/Architectural Unit Vertical Type																				
		Full Cut to Floor Fill	General Structure Fill	Upper Fill above Roof		Lower Fill below Roof	Roofing Material	Extramural Fill	Floor Fill		Surface or Floor											
		Intramural Area		Thermally Altered Pit	Intramural Area	Intramural Area			Bin, nfs	Intramural Area	Pit, nfs			Storage Facility		Hearth	Heating Pit	Posthole	Wingwall	Deflector Socket	Intramural Area	Table Total
Pottery Type		F 0	F 0	F 177	F 0	F 0	F 0	F 0	F 75	F 0	F 15	F 59	F 113	F 31	F 44	F 64	F 48	F 107	F 100	F 132	F 0	
Cibola Gray Ware																						
Plain rim	Count	17	–	–	6	–	1	9	1	6	–	1	–	–	–	–	–	–	–	–	3	**44**
	Row %	38.64	–	–	13.64	–	2.27	20.45	2.27	13.64	–	2.27	–	–	–	–	–	–	–	–	6.82	**100.00**
	Col.%	6.27	–	–	2.97	–	1.33	2.54	20.00	6.82	–	20.00	–	–	–	–	–	–	–	–	1.83	**3.69**
Plain body	Count	221	3	1	169	6	65	279	4	64	1	4	3	–	–	3	1	1	1	5	161	**992**
	Row %	22.28	0.30	0.10	17.04	0.60	6.55	28.13	0.40	6.45	0.10	0.40	0.30	–	–	0.30	0.10	0.10	0.10	0.50	16.23	**100.00**
	Col.%	81.55	100.00	100.00	83.66	100.00	86.67	78.81	80.00	72.73	100.00	80.00	100.00	–	–	100.00	100.00	100.00	100.00	83.33	98.17	**83.22**
Indented corrugated	Count	–	–	–	–	–	–	6	–	–	–	–	–	–	–	–	–	–	–	–	–	**6**
	Row %	–	–	–	–	–	–	100.00	–	–	–	–	–	–	–	–	–	–	–	–	–	**100.00**
	Col.%	–	–	–	–	–	–	1.69	–	–	–	–	–	–	–	–	–	–	–	–	–	**0.50**
Plain corrugated	Count	–	–	–	–	–	–	14	–	–	–	–	–	–	–	–	–	–	–	–	–	**14**
	Row %	–	–	–	–	–	–	100.00	–	–	–	–	–	–	–	–	–	–	–	–	–	**100.00**
	Col.%	–	–	–	–	–	–	3.95	–	–	–	–	–	–	–	–	–	–	–	–	–	**1.17**
Unfired plain gray ware	Count	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	**1**
	Row %	–	–	–	–	–	–	–	–	–	–	–	–	–	100.00	–	–	–	–	–	–	**100.00**
	Col.%	–	–	–	–	–	–	–	–	–	–	–	–	–	100.00	–	–	–	–	–	–	**0.08**
Mudware	Count	1	–	–	–	–	–	–	–	2	–	–	–	–	–	–	–	–	–	–	–	**3**
	Row %	33.33	–	–	–	–	–	–	–	66.67	–	–	–	–	–	–	–	–	–	–	–	**100.00**
	Col.%	0.37	–	–	–	–	–	–	–	2.27	–	–	–	–	–	–	–	–	–	–	–	**0.25**
Lino Smudged	Count	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	**1**
	Row %	–	–	–	–	–	–	–	–	100.00	–	–	–	–	–	–	–	–	–	–	–	**100.00**
	Col.%	–	–	–	–	–	–	–	–	1.14	–	–	–	–	–	–	–	–	–	–	–	**0.08**
Cibola White Ware																						
Unpainted, polished white ware	Count	1	–	–	12	–	4	24	–	3	–	–	–	–	–	–	–	–	–	–	–	**44**
	Row %	2.27	–	–	27.27	–	9.09	54.55	–	6.82	–	–	–	–	–	–	–	–	–	–	–	**100.00**
	Col.%	0.37	–	–	5.94	–	5.33	6.78	–	3.41	–	–	–	–	–	–	–	–	–	–	–	**3.69**
Mineral paint, undifferentiated	Count	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**1**
	Row %	–	–	–	100.00	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**100.00**
	Col.%	–	–	–	0.50	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**0.08**
Basketmaker III–Pueblo I (indeterminate mineral)	Count	5	–	–	3	–	1	8	–	5	–	–	–	–	–	–	–	–	–	–	–	**22**
	Row %	22.73	–	–	13.64	–	4.55	36.36	–	22.73	–	–	–	–	–	–	–	–	–	–	–	**100.00**
	Col.%	1.85	–	–	1.49	–	1.33	2.26	–	5.68	–	–	–	–	–	–	–	–	–	–	–	**1.85**
White Mound Black-on-white	Count	2	–	–	1	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	**4**
	Row %	50.00	–	–	25.00	–	–	25.00	–	–	–	–	–	–	–	–	–	–	–	–	–	**100.00**
	Col.%	0.74	–	–	0.50	–	–	0.28	–	–	–	–	–	–	–	–	–	–	–	–	–	**0.34**

(Table 8.9, continued)

		Study Unit/Architectural Unit Vertical Type																				
		Full Cut to Floor Fill	General Struct-ure Fill	Upper Fill above Roof		Lower Fill below Roof	Roof-ing Mater-ial	Extra-mural Fill	Floor Fill		Surface or Floor											
		Intra-mural Area		Therm-ally Altered Pit	Intra-mural Area	Intramural Area			Bin, nfs	Intra-mural Area	Pit, nfs			Storage Facility		Hearth	Heat-ing Pit	Post-hole	Wing-wall	De-flector Socket	Intra-mural Area	Table Total
Pottery Type		F 0	F 0	F 177	F 0	F 0	F 0	F 0	F 75	F 0	F 15	F 59	F 113	F 31	F 44	F 64	F 48	F 107	F 100	F 132	F 0	
La Plata Black-on-white	Count	20	–	–	4	–	4	4	–	6	–	–	–	1	–	–	–	–	–	–	–	**39**
	Row %	51.28	–	–	10.26	–	10.26	10.26	–	15.38	–	–	–	2.56	–	–	–	–	–	–	–	**100.00**
	Col.%	7.38	–	–	1.98	–	5.33	1.13	–	6.82	–	–	–	100.00	–	–	–	–	–	–	–	**3.27**
Cibola Red Ware																						
Tallahogan Red (red slip over white paste)	Count	2	–	–	2	–	–	5	–	1	–	–	–	–	–	–	–	–	–	1	–	**11**
	Row %	18.18	–	–	18.18	–	–	45.45	–	9.09	–	–	–	–	–	–	–	–	–	9.09	–	**100.00**
	Col.%	0.74	–	–	0.99	–	–	1.41	–	1.14	–	–	–	–	–	–	–	–	–	16.67	–	**0.92**
Tohatchi Red (red slip over red paste)	Count	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**1**
	Row %	–	–	–	100.00	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**100.00**
	Col.%	–	–	–	0.50	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**0.08**
Tohatchi Red-on-brown	Count	–	–	–	–	–	–	2	–	–	–	–	–	–	–	–	–	–	–	–	–	**2**
	Row %	–	–	–	–	–	–	100.00	–	–	–	–	–	–	–	–	–	–	–	–	–	**100.00**
	Col.%	–	–	–	–	–	–	0.56	–	–	–	–	–	–	–	–	–	–	–	–	–	**0.17**
Upper San Juan White Ware																						
Mineral paint, undifferentiated	Count	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**1**
	Row %	100.00	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**100.00**
	Col.%	0.37	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**0.08**
Chapin Black-on-white	Count	1	–	–	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**4**
	Row %	25.00	–	–	75.00	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**100.00**
	Col.%	0.37	–	–	1.49	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**0.34**
Basketmaker III–Pueblo I (indeterminate)	Count	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	**1**
	Row %	–	–	–	–	–	–	100.00	–	–	–	–	–	–	–	–	–	–	–	–	–	**100.00**
	Col.%	–	–	–	–	–	–	0.28	–	–	–	–	–	–	–	–	–	–	–	–	–	**0.08**
Mogollon Highlands Brown Ware																						
Alma Plain Body	Count	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	**1**
	Row %	–	–	–	–	–	–	100.00	–	–	–	–	–	–	–	–	–	–	–	–	–	**100.00**
	Col.%	–	–	–	–	–	–	0.28	–	–	–	–	–	–	–	–	–	–	–	–	–	**0.08**
Table Total	**Count**	**271**	**3**	**1**	**202**	**6**	**75**	**354**	**5**	**88**	**1**	**5**	**3**	**1**	**1**	**3**	**1**	**1**	**1**	**6**	**164**	**1192**
	Row %	**22.73**	**0.25**	**0.08**	**16.95**	**0.50**	**6.29**	**29.70**	**0.42**	**7.38**	**0.08**	**0.42**	**0.25**	**0.08**	**0.08**	**0.25**	**0.08**	**0.08**	**0.08**	**0.50**	**13.76**	**100.00**
	Col.%	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

nfs = not further specified

Table 8.10. LA 104106, Structure 1 main chamber, lithic data by feature number.

		Study Unit/Architectural Unit Vertical Type																			
		Full Cut to Floor Fill	Upper Fill above Roof	Lower Fill below Roof	Roofing Material	Extra-mural Fill	Floor Fill		Surface or Floor											Sealed Floor Feature	
		Intramural Area					Bin, nfs	Intra-mural Area	Pit, nfs				Storage Facility		Hearth	Heat-ing Pit	Wing-wall	Sipapu	Intra-mural Area	Storage Facility	
Lithic Type		F 0	F 0	F 0	F 0	F 0	F 75	F 0	F 14	F 42	F 54	F 59	F 44	F 50	F 64	F 48	F 100	F 19.01	F 0	F 123	Table Total
										Chert, Local											
Core flake	Count	1	5	–	1	5	–	2	–	–	–	–	–	–	–	–	–	–	–	–	**14**
	Row %	7.14	35.71	–	7.14	35.71	–	14.29	–	–	–	–	–	–	–	–	–	–	–	–	**100.00**
	Col. %	2.27	11.90	–	4.55	7.14	–	3.13	–	–	–	–	–	–	–	–	–	–	–	–	**4.90**
Angular debris	Count	–	2	–	–	1	–	–	–	–	–	–	–	–	-	1	–	–	–	–	**4**
	Row %	–	50.00	–	–	25.00	–	–	–	–	–	–	–	–	-	25.00	–	–	–	–	**100.00**
	Col %	–	4.76	–	–	1.43	–	–	–	–	–	–	–	–	-	14.29	–	–	–	–	**1.40**
Flake fragment	Count	–	1	–	–	2	–	1	–	1	–	–	–	–	–	–	–	–	1	–	**6**
	Row %	–	16.67	–	–	33.33	–	16.67	–	16.67	–	–	–	–	–	–	–	–	16.67	–	**100.00**
	Col %	–	2.38	–	–	2.86	–	1.56	–	50.00	–	–	–	–	–	–	–	–	16.67	–	**2.10**
Biface flake	Count	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	**1**
	Row %	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	100.00	–	**100.00**
	Col %	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	16.67	–	**0.35**
Uniface	Count	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**1**
	Row %	–	100.00	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**100.00**
	Col %	–	2.38	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**0.35**
										Silicified Wood, Local											
Core flake	Count	14	6	1	7	25	–	9	–	–	2	–	–	–	2	–	–	–	2	–	**68**
	Row %	20.59	8.82	1.47	10.29	36.76	–	13.24	–	–	2.94	–	–	–	2.94	–	–	–	2.94	–	**100.00**
	Col %	31.82	14.29	50.00	31.82	35.71	–	14.06	–	–	28.57	–	–	–	25.00	–	–	–	33.33	–	**23.78**
Angular debris	Count	12	7	1	4	14	–	3	–	–	1	–	–	–	1	–	–	–	–	2	**45**
	Row %	26.67	15.56	2.22	8.89	31.11	–	6.67	–	–	2.22	–	–	–	2.22	–	–	–	–	4.44	**100.00**
	Col %	27.27	16.67	50.00	18.18	20.00	–	4.69	–	–	14.29	–	–	–	12.50	–	–	–	–	100.00	**15.73**
Flake fragment	Count	2	2	–	–	3	–	6	–	1	1	–	–	–	1	1	–	–	–	–	**17**
	Row %	11.76	11.76	–	–	17.65	–	35.29	–	5.88	5.88	–	–	–	5.88	5.88	–	–	–	–	**100.00**
	Col %	4.55	4.76	–	–	4.29	–	9.38	–	50.00	14.29	–	–	–	12.50	14.29	–	–	–	–	**5.94**
Biface flake	Count	–	2	–	–	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**4**
	Row %	–	50.00	–	–	50.00	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**100.00**
	Col %	–	4.76	–	–	2.86	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**1.40**
Bipolar flake	Count	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**1**
	Row %	100.00	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**100.00**
	Col %	2.27	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**0.35**

(Table 8.10, continued)

		Study Unit/Architectural Unit Vertical Type																		
		Full Cut to Floor Fill	Upper Fill above Roof	Lower Fill below Roof	Roofing Material	Extra-mural Fill	Floor Fill		Surface or Floor										Sealed Floor Feature	
		Intramural Area					Bin, nfs	Intra-mural Area	Pit, nfs				Storage Facility		Hearth	Heat-ing Pit	Wing-wall	Sipapu	Intra-mural Area	Storage Facility	
Lithic Type		**F 0**	**F 0**	**F 0**	**F 0**	**F 0**	**F 75**	**F 0**	**F 14**	**F 42**	**F 54**	**F 59**	**F 44**	**F 50**	**F 64**	**F 48**	**F 100**	**F 19.01**	**F 0**	**F 123**	**Table Total**
Tool	Count	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**1**
	Row %	100.00	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**100.00**
	Col %	2.27	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**0.35**
Biface	Count	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**1**
	Row %	–	100.00	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**100.00**
	Col %	–	2.38	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**0.35**
Core	Count	1	1	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	**3**
	Row %	33.33	33.33	–	–	–	–	33.33	–	–	–	–	–	–	–	–	–	–	–	–	**100.00**
	Col %	2.27	2.38	–	–	–	–	1.56	–	–	–	–	–	–	–	–	–	–	–	–	**1.05**
Hammer-stone	Count	3	–	–	–	1	–	2	–	–	–	–	–	–	–	–	–	–	–	–	**6**
	Row %	50.00	–	–	–	16.67	–	33.33	–	–	–	–	–	–	–	–	–	–	–	–	**100.00**
	Col %	6.82	–	–	–	1.43	–	3.13	–	–	–	–	–	–	–	–	–	–	–	–	**2.10**
Sedimentary, Local																					
Core flake	Count	1	3	–	1	3	–	–	–	–	–	–	–	–	–	–	–	–	1	–	**9**
	Row %	11.11	33.33	–	11.11	33.33	–	–	–	–	–	–	–	–	–	–	–	–	11.11	–	**100.00**
	Col %	2.27	7.14	–	4.55	4.29	–	–	–	–	–	–	–	–	–	–	–	–	16.67	–	**3.15**
Angular debris	Count	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**1**
	Row %	–	–	–	–	100.00	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**100.00**
	Col %	–	–	–	–	1.43	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**0.35**
Core	Count	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**1**
	Row %	100.00	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**100.00**
	Col %	2.27	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**0.35**
Quartzite, Local																					
Hammer-stone	Count	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	**1**
	Row %	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	100.00	–	**100.00**
	Col %	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	16.67	–	**0.35**
Chert, Non-local																					
Core flake	Count	3	7	–	2	8	1	21	–	–	3	1	–	–	1	–	–	–	–	–	**47**
	Row %	6.38	14.89	–	4.26	17.02	2.13	44.68	–	–	6.38	2.13	–	–	2.13	–	–	–	–	–	**100.00**
	Col %	6.82	16.67	–	9.09	11.43	100.00	32.81	–	–	42.86	33.33	–	–	12.50	–	–	–	–	–	**16.43**
Angular debris	Count	1	–	–	–	1	–	2	–	–	–	–	–	–	–	–	–	–	–	–	**4**
	Row %	25.00	–	–	–	25.00	–	50.00	–	–	–	–	–	–	–	–	–	–	–	–	**100.00**
	Col %	2.27	–	–	–	1.43	–	3.13	–	–	–	–	–	–	–	–	–	–	–	–	**1.40**
Flake fragment	Count	1	–	–	–	–	–	4	–	–	–	–	–	–	–	–	–	–	–	–	**5**
	Row %	20.00	–	–	–	–	–	80.00	–	–	–	–	–	–	–	–	–	–	–	–	**100.00**
	Col %	2.27	–	–	–	–	–	6.25	–	–	–	–	–	–	–	–	–	–	–	–	**1.75**

Table 8.10 (continued)

		Study Unit/Architectural Unit Vertical Type																			
		Full Cut to Floor Fill	Upper Fill above Roof	Lower Fill below Roof	Roofing Material	Extra-mural Fill	Floor Fill		Surface or Floor											Sealed Floor Feature	
		Intramural Area					Bin, nfs	Intra-mural Area	Pit, nfs				Storage Facility		Hearth	Heat-ing Pit	Wing-wall	Sipapu	Intra-mural Area	Storage Facility	
Lithic Type		**F 0**	**F 0**	**F 0**	**F 0**	**F 0**	**F 75**	**F 0**	**F 14**	**F 42**	**F 54**	**F 59**	**F 44**	**F 50**	**F 64**	**F 48**	**F 100**	**F 19.01**	**F 0**	**F 123**	**Table Total**
Biface flake	Count	–	–	–	–	–	–	1	–	–	–	–	–	1	–	–	–	–	–	–	**3**
	Row %	–	–	–	–	–	–	33.33	–	–	–	–	–	33.33	–	–	–	–	–	–	**100.00**
	Col %	–	–	–	–	–	–	1.56	–	–	–	–	–	100.00	–	–	–	–	–	–	**1.05**
Tool	Count	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	**1**
	Row %	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	100.00	–	–	–	**100.00**
	Col %	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	100.00	–	–	–	**0.35**
Biface	Count	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	**1**
	Row %	–	–	–	–	–	–	100.00	–	–	–	–	–	–	–	–	–	–	–	–	**100.00**
	Col %	–	–	–	–	–	–	1.56	–	–	–	–	–	–	–	–	–	–	–	–	**0.35**
Obsidian, Non-local																					
Core flake	Count	–	1	–	3	2	–	7	–	–	–	2	–	–	2	2	–	1	–	–	**20**
	Row %	–	5.00	–	15.00	10.00	–	35.00	–	–	–	10.00	–	–	10.00	10.00	–	5.00	–	–	**100.00**
	Col %	–	2.38	–	13.64	2.86	–	10.94	–	–	–	66.67	–	–	25.00	28.57	–	50.00	–	–	**6.99**
Angular debris	Count	–	2	–	3	–	–	2	–	–	–	–	–	–	–	2	–	–	–	–	**9**
	Row %	–	22.22	–	33.33	–	–	22.22	–	–	–	–	–	–	–	22.22	–	–	–	–	**100.00**
	Col %	–	4.76	–	13.64	–	–	3.13	–	–	–	–	–	–	–	28.57	–	–	–	–	**3.15**
Flake fragment	Count	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	**1**
	Row %	–	–	–	–	–	–	100.00	–	–	–	–	–	–	–	–	–	–	–	–	**100.00**
	Col %	–	–	–	–	–	–	1.56	–	–	–	–	–	–	–	–	–	–	–	–	**0.35**
Biface flake	Count	2	–	–	–	1	–	1	1	–	–	–	–	–	–	1	–	1	–	–	**7**
	Row %	28.57	–	–	–	14.29	–	14.29	14.29	–	–	–	–	–	–	14.29	–	14.29	–	–	**100.00**
	Col %	4.55	–	–	–	1.43	–	1.56	100.00	–	–	–	–	–	–	14.29	–	50.00	–	–	**2.45**
Bipolar flake	Count	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**1**
	Row %	–	100.00	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**100.00**
	Col %	–	2.38	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**0.35**
Biface	Count	–	–	–	1	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**2**
	Row %	–	–	–	50.00	50.00	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**100.00**
	Col %	–	–	–	4.55	1.43	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**0.70**
Biface	Count	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	**1**
	Row %	–	–	–	–	–	–	–	–	–	–	–	–	–	100.00	–	–	–	–	–	**100.00**
	Col %	–	–	–	–	–	–	–	–	–	–	–	–	–	12.50	–	–	–	–	–	**0.35**
Table Total	**Count**	**44**	**42**	**2**	**23**	**71**	**1**	**64**	**1**	**2**	**7**	**3**	**1**	**1**	**8**	**7**	**1**	**2**	**6**	**2**	**288**
	Row %	**15.28**	**14.58**	**0.69**	**7.99**	**24.65**	**0.35**	**22.22**	**0.35**	**0.69**	**2.43**	**1.04**	**0.35**	**0.35**	**2.78**	**2.43**	**0.35**	**0.69**	**2.08**	**0.69**	**100.00**
	Col %	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

nfs = not further specified

Figure 8.9. Feature 75, Structure 1, LA 104106.


Figure 8.10. Floor fill layer, Structure 1, LA 104106.

lected from the floor northwest of this feature produced evidence of native trees and shrubs, economic taxon, and herbs. Tree and shrub taxon were dominated by piñon/juniper with trace amounts of sage brush present. Economic species were dominated by *Chenopodium*/amaranth followed by beeweed and trace amounts of cholla and prickly pear, while herbs were dominated by the sunflower family (see Appendix 2). An area of deeply oxidized adobe was identified along the north-central section of the feature where it articulated with the central hearth (Feature 64), the final feature in the deflector/ash pit/hearth complex (Fig. 8.11).

The central hearth (Feature 64) was constructed by excavating a deep cone-shaped or conical basin 25 cm below the elevation of the floor surface and then lining the interior with adobe. Approximately 10 cm above the base, this feature expanded horizontally 25 to 60 cm before meeting the floor level. The feature was defined at the floor surface by a segmented adobe collar. This collar may be part of a remodeling or maintenance episode that related to the expanded size of the feature orifice. The segmented adobe collar was constructed by positioning 15 crescent-shaped "loafs" 10 to 25 cm in length by 8 to 11 cm wide by 5 to 8 cm thick around the perimeter and upper interior limits of the feature (Fig. 8.12). Interestingly, the segments lining the southern portion of this feature were shorter in length than those along the northern half of the feature. The gaps defining these segments may have some directional significance (see King and Bice 1992).

The central hearth contained four layers of a loose, fine sandy loam with inclusions of charcoal, ash, adobe, and artifacts. Layers were differentiated based on color rather than inclusions or texture (Fig. 8.13). Artifacts recovered from the central hearth included ceramic, lithic, bone, macrobotanical, and chronologic samples. Ceramic artifacts consisted of a single unburned gray body sherd (Table 8.9). Lithic artifacts included seven pieces of unutilized debitage, with only one piece displaying evidence of thermal alteration, and one small corner-notched projectile point (see Wenker below) (Table 8.10). Bone consisted primarily of unburned, fragmentary, small mammal, rodent, and rabbit remains (Table

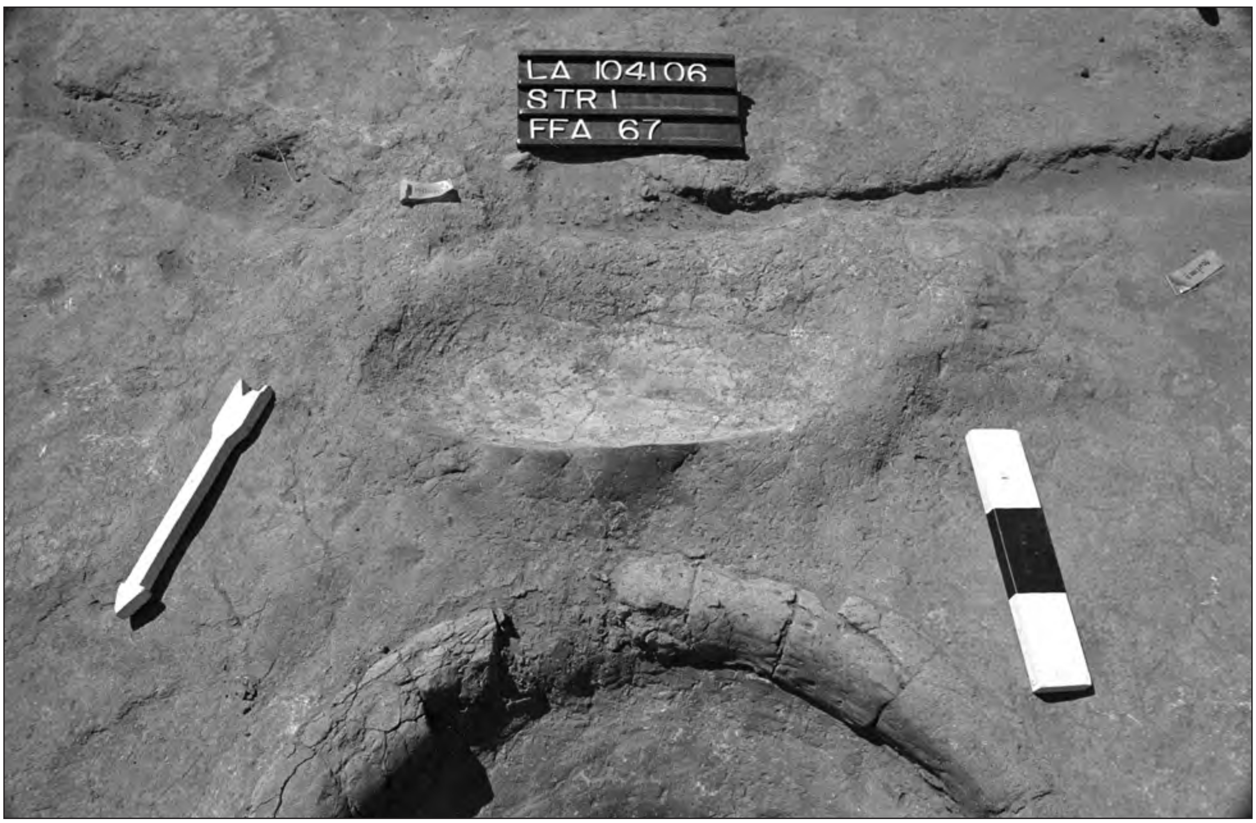


Figure 8.11. Feature 67, Structure 1, LA 104106.

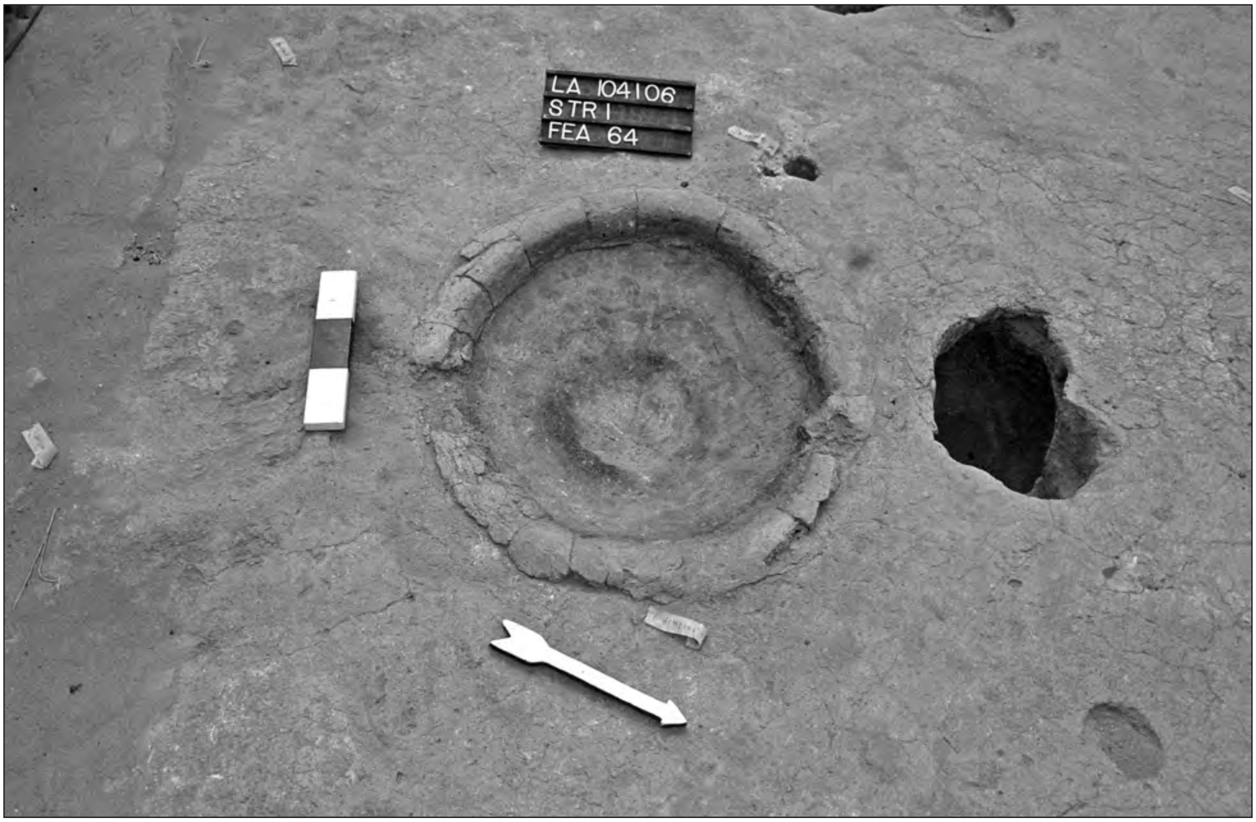


Figure 8.12. Feature 64, Structure 1, LA 104106.

8.8). In contrast to the artifact assemblage, over 80 percent the macrobotanical remains recovered from this feature were burned. Cultivars dominated the assemblage followed by perennial, annuals and grasses (Table 8.7). The paucity of thermally altered artifacts indicate that the majority were deposited in this feature after the final thermal episode, possibly during the abandonment process.

Recovered chronometric materials included a dendrochronological sample, three archaeomagnetic samples, and a radiometric sample. All but the dendrochrolonogical sample yielded data related to the temporal occupation of this structure. Archaeomagnetic samples were removed from the segmented collar, under the collar, and from the interior of the feature. Date ranges from these samples included AD 635–710, AD 585–670, and AD 625–675, respectively. The radiometric sample yielded a standard extended count calibrated intercept date of 770 cal AD (Beta-164341; *Zea mays* cob and cupule fragments; δ^{13} = -11.1 o/oo). When calibrated using OxCal v3.8 (Bronk Ramsey 2002; Stuiver et a1. 1998), a 2-sigma date range of 670–970 cal AD (p = .95) was generated.

Floor vaults/warming pits. Lateral floor vaults or warming pits were present on the east and west side of the central hearth while a possible central vault was located north of the hearth. Positioned 2.2 m and 1.8 m east and west of the central hearth were lateral floor vaults, Feature 48 and Feature 57, respectively. Of these, Feature 48 was in use or open at the floor surface while Feature 57 was sealed. These features were constructed by excavating a deep, steep-sided oval basin with a horizontal base located 17 to 36 cm below the floor surface. The feature interiors ranged in size between 58 and 75 cm long by 45 and 52 cm wide with the long axis paralleling the nearby wall.

Feature 48 contained three soil layers and displayed oxidized soil along the upper margins of the east and west feature limits. The lower fill layer was a fine sand containing numerous large charcoal fragments. Above this layer was a deposit of sand that was lighter in color containing fewer and smaller

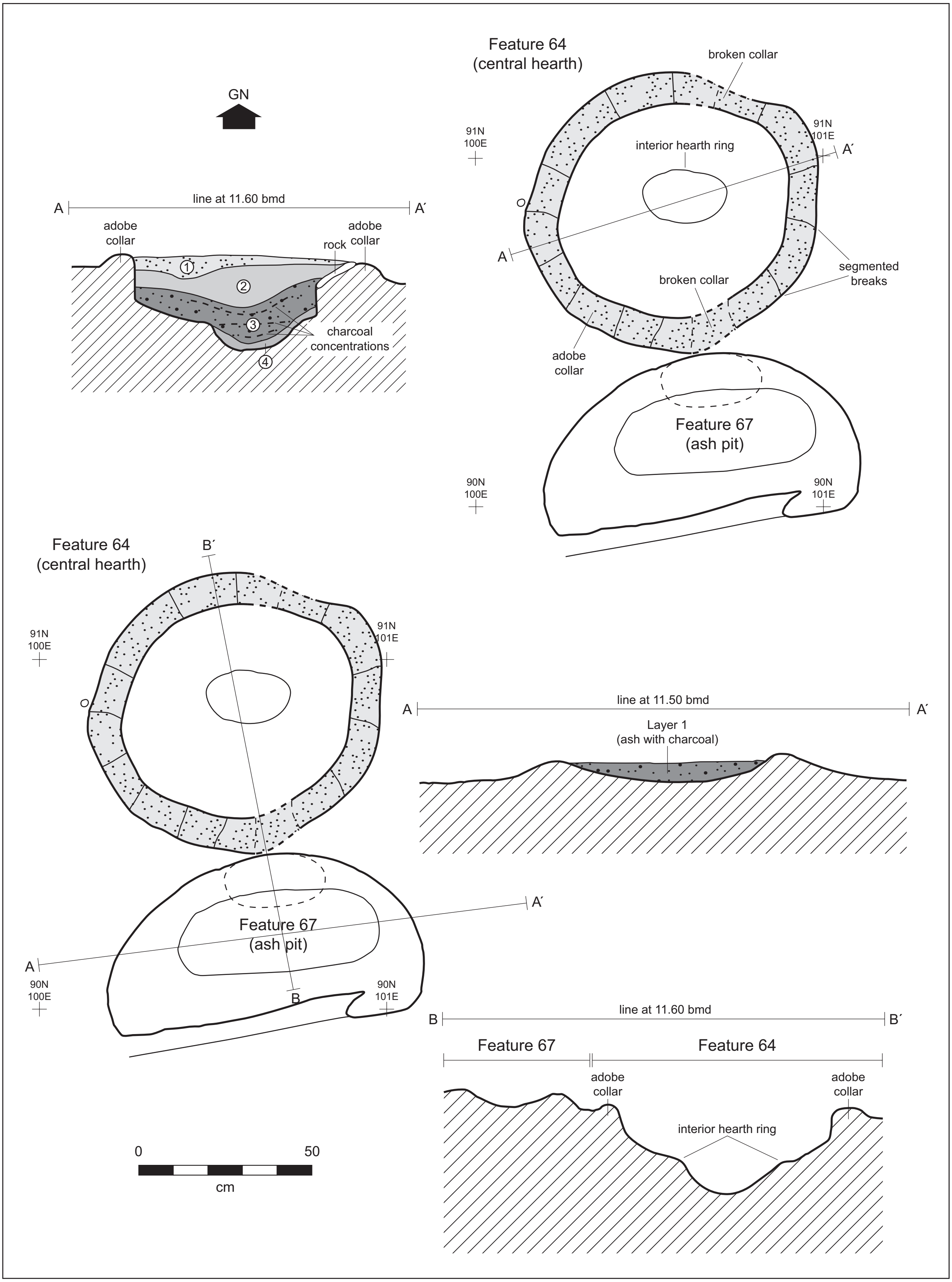


Figure 8.13. Plan and profile, Feature 64, Structure 1, LA 104106.

fragments of charcoal. Finally, the upper layer represents a mixed deposit of feature fill and structural collapse. Artifacts recovered from the eastern floor vault included ceramic, lithic, bone, macrobotanical, and chronometric samples.

Ceramic artifacts consisted of a single unburned gray body sherd. Lithic artifacts included seven pieces of unutilized debitage; none displayed evidence of thermal alteration (Tables 8.9, 8.10). Faunal remains consisted of a single unburned fragment of rabbit bone. In contrast to the previously discussed material culture, nearly 95 percent the macrobotanical remains recovered from Feature 48 were burned. Burned perennials dominated the assemblage followed by a low frequency of burned cultivars. In addition, low frequencies of unburned annuals and grasses were present (Table 8.7). A dendrochronologic sample from this feature did not date, and an archaeomagnetic sample (Appendix 7) was imprecise, only reinforcing the seventh-century age estimate. Similar to the central hearth, few thermally altered artifacts were deposited in the eastern floor vault after the final thermal episode, possibly as part of the abandonment process.

Unlike the eastern floor vault, the western floor vault (Feature 57) was sealed at the floor surface and unburned. This feature contained a layer of consolidated sand mixed with adobe fragments capped at floor level using a layer of adobe 4 to 5 cm thick. No artifacts or chronometric samples were recovered from this feature; however, a pollen sample yielded evidence for native trees and shrubs, economic species, and herbs. Tree and shrub taxon were dominated by Mormon tea with trace amounts of sagebrush and piñon/juniper. Economic species were dominated by beeweed followed by *Chenopodium/amaranthus*, while herbs identified include the sunflower family (see Appendix 2).

Located to the north and roughly equidistant from the floor vaults and the central hearth was a prominent and discrete layer of adobe (Feature 133). Feature 133 was constructed by applying an oval layer of adobe 1.5 m long by 1.2 m wide and 5–7 cm thick over a worn and pitted floor surface. No artifacts were recovered from this layer or from the underlying surface. Several deep cylindrical and shallow basin type features were excavated through and into the surface created by this adobe layer (Figs. 8.14a, 8.14b). Similar features, interpreted as central floor vaults, have been described from the Dolores area of southwestern Colorado and from the southern Chuska Valley of New Mexico (cf. Brisbin et al. 1988:185, 198; Kuckelman 1988:956; Morris and Kotyk 1999:146; Loebig 2000:233; see also Wilshusen 1988b:654). This feature may have been a variation of a central vault feature identified in contemporaneous and later structures. Alternatively, the feature may represent the repaired landing area worn from entering and exiting the structure.

Storage features. East and west of the central adobe floor "patch" (Feature 133) were three additional pits, which, based on their size and morphology, were interpreted as storage features. Feature 31 was located north of the eastern floor vault along the eastern wall of the structure. This feature was constructed by excavating a oval basin with a slightly bell-shaped north side, 15 cm below the level of the floor, and lining the interior with a thin layer of adobe. Feature 31 contained a single homogeneous layer of loose sandy loam with inclusions of charcoal flecks and artifacts. Artifacts included a single La Plata Black-on-white bowl body sherd (Table 8.9), a single unutilized biface flake (Table 8.10), macrobotanical remains dominated by carbonized perennial followed by low frequencies of cultigens and unburned annuals (Table 8.7). A pollen sample collected from the floor northwest of this feature produced evidence of native trees and shrubs, economic taxon, and herbs. Tree and shrub taxon were dominated by piñon with trace amounts of sage brush, Mormon tea, and oak. Economic species were dominated by *Chenopodium/amaranthus* followed by beeweed and trace amounts of cholla and corn while herbs were dominated by the sunflower family followed by mustard (see Appendix 2). Located northeast of the western floor vault, Feature 50 approximated the size and morphology of Feature 31.

Feature 50 was constructed by excavating a pit 26 cm below the surface of the floor. The east and west sides of the feature were bell-shaped while the north and south limits were vertical or perpendicular to the floor surface. The vertical walls retained aboriginal excavation marks, and the base of the feature, lined with adobe, retained the applicator's finger impressions (Fig. 8.15). This, like most floor features in the main chamber of Structure 1, was filled with a single homogeneous layer of loose sandy loam with inclusions of charcoal flecks and artifacts. Artifacts included half of an unburned

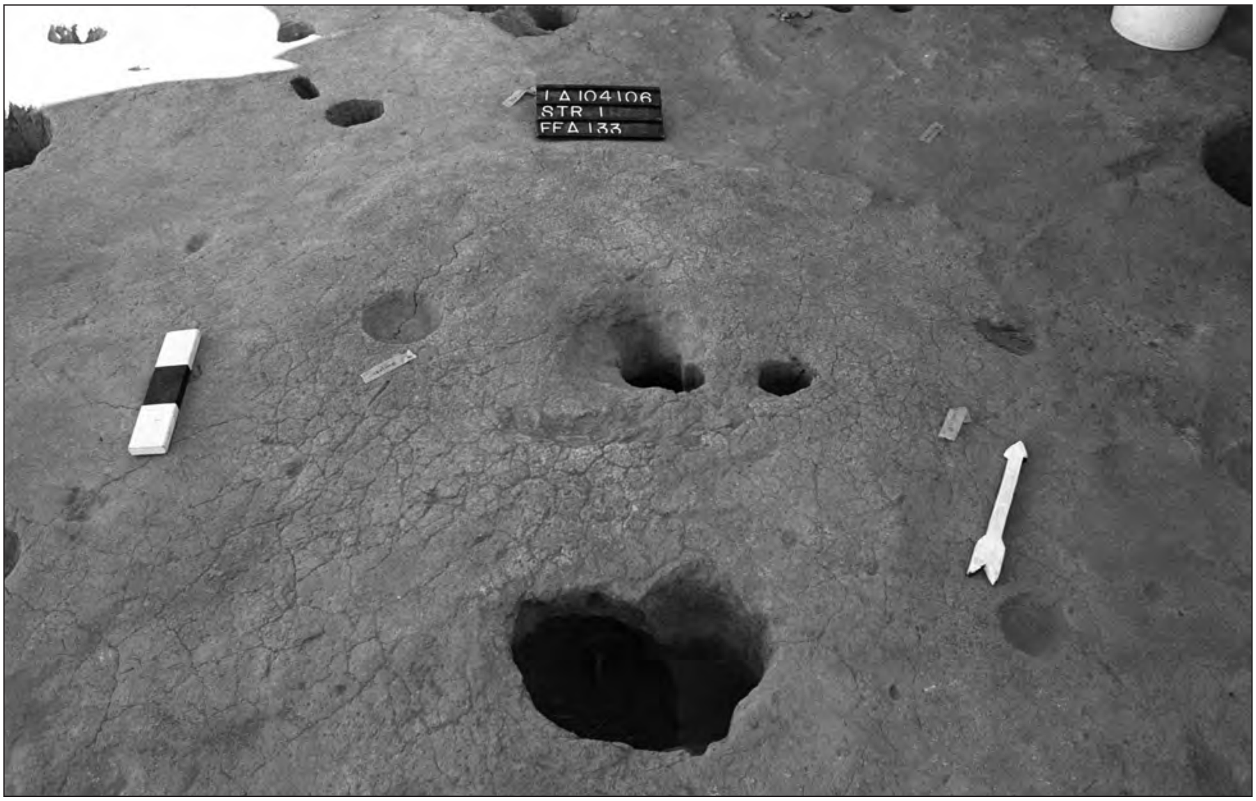


Figure 8.14a. Feature 133, Structure 1, LA 104106, before excavation.

Figure 8.14b. Feature 133, Structure 1, LA 104106, after excavation.

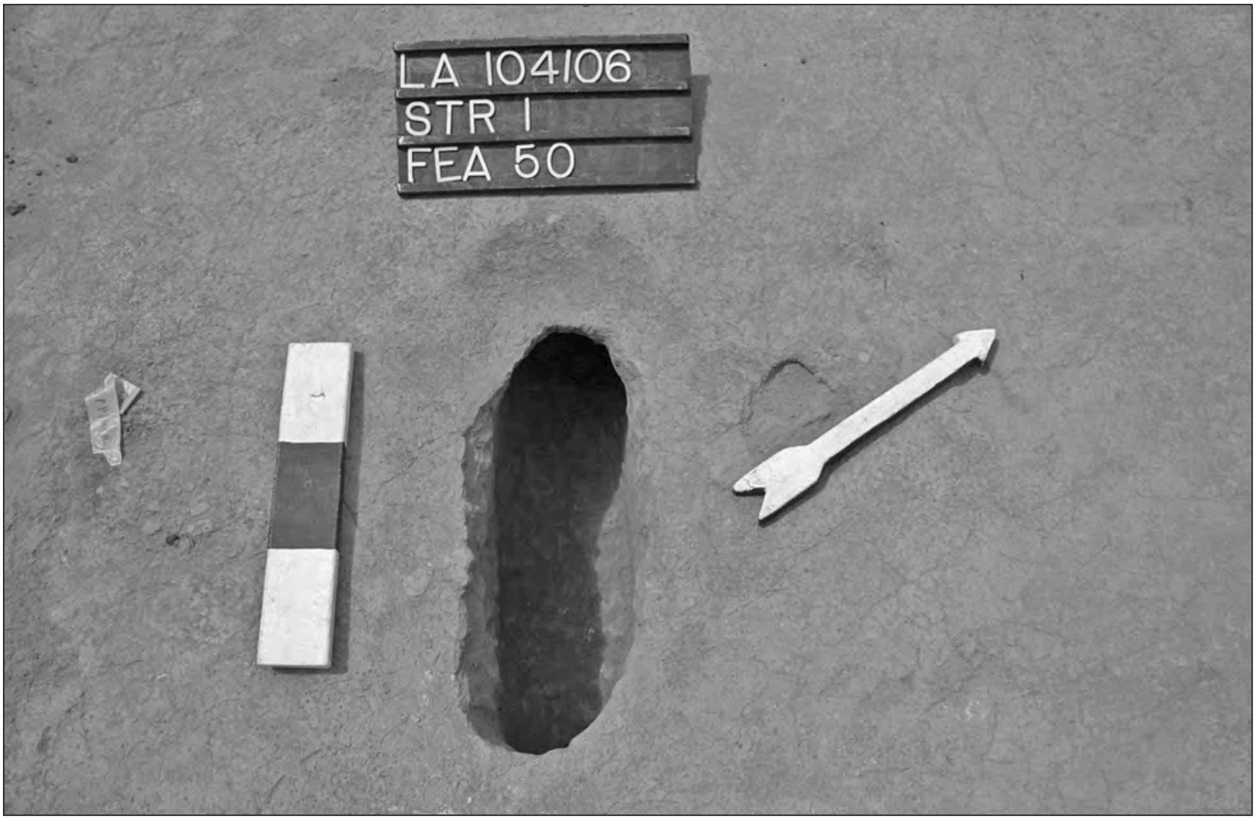


Figure 8.15. Feature 50, Structure 1, LA 104106.

prairie dog mandible and a single unutilized biface flake (Tables 8.8, 8.10). The pollen assemblage consisted of native trees and shrubs, economic taxon, and herbs. Native tree and shrub pieces included piñon/juniper, sagebrush, and Mormon tea. Economic species were dominated by a goosefoot or amaranth but also included beeweed and corn, while herbs consisted of the sunflower family (see Appendix 2). Given feature morphology and recovered pollen remains , this feature may have been used for storing inflexible linear objects, possibly boughs of vegetation, wands, or *pahos.* The final storage feature (Feature 44), was located approximately 80 cm northwest of Feature 50.

Feature 44 was constructed by excavating a bell-shaped pit 34 cm below the surface of the floor. This feature was filled with a single homogeneous layer of loose sandy loam with inclusions of charcoal flecks and artifacts. Artifacts included a small amount of unfired ceramic paste, a single unutilized biface flake, and a discoidal bead fragment. This feature was not sampled for botanical remains. It is possible that the lithic and ornament fragment were deposited through natural processes, however. The fragile and perishable nature of the unfired ceramic paste suggests these deposits are primary in nature. This feature may have functioned as a facility to store processed ceramic paste for later use.

Unlike the other storage features, Feature 123 was sealed at the floor surface. This feature contained a layer of consolidated sand mixed with adobe fragments capped at the floor level using a layer of adobe 4–5 cm thick. Suspended in the fill of this feature were two fragments of tabular sandstone that refit into one large piece. In addition to the sandstone, Feature 123 contained several carbonized and uncarbonized annual, perennial, and cultivar species (Table 8.7), unburned small mammal bone (Table 8.8), and two pieces of angular debris (Table 8.10). A pollen sample complements the macrobotanical assemblage yielding evidence for native trees and shrubs, economic species, and herbs. Tree and shrub taxon were dominated by Mormon tea with trace amounts of sage brush and piñon/juniper. Economic species were dominated by beeweed followed by *Chenopodium/amaranthus*, while herbs identified include the sunflower family (see Appendix 2).

Ventilator opening. The ventilator opening (Feature 52) was remodeled using posts, adobe, and tabular sandstone to constrict the aperture of the ventilator tunnel. Two posts (Feature 107 and Feature 110) were set vertically on each side of the opening and sealed into the wall with adobe. Adobe formed around these posts created two lobes that protruded into the main chamber. Feature 107 yielded a single unburned fragment of a small mammal and a single gray ware jar body sherd. Tabular sandstone positioned horizontally above and at the base of the vent opening was also secured using adobe (Fig. 8.16). This feature functioned as a conduit, bringing fresh air into the main chamber from the original ground surface. Interestingly, the form of the opening mimics that of Feature 132, located on the floor directly in front of this the opening.

Sand-filled pits. Of all the feature types identified in the main chamber, sand-filled pits were the most common (n = 52). Including the sealed storage and vault features described above, sand-filled pits comprise 63 percent of all features associated with the floor surface (Fig. 8.17). Sand-filled pits were grouped into four categories based on morphology and content. The most common feature category, cylindrical pit not further specified (nfs), was defined as features that display greater or equal depth compared to the horizontal dimension. When the horizontal dimension was greater than the depth, features were identified as shallow basin. The sipapu, similar in morphology to pit was differentiated by the presence of several unique items including lithics, green mineral, shell ornament fragments, and abraded or faceted minerals (see Ornaments, below). Features deeper than 3 cm and less than 5 cm in diameter were identified as a stick impression. Fill in all categories typically consists of a single homogeneous layer of loose, fine sandy loam with inclusions of charcoal flecks. In some instances these features contained artifacts consisting of ceramic, lithic, and macrobotanical remains. Artifacts were more commonly recovered from pit features with trace amounts of macrobotanical remains recovered from shallow basin features.

Figure 8.16. Feature 52, Structure 1, LA 104106.

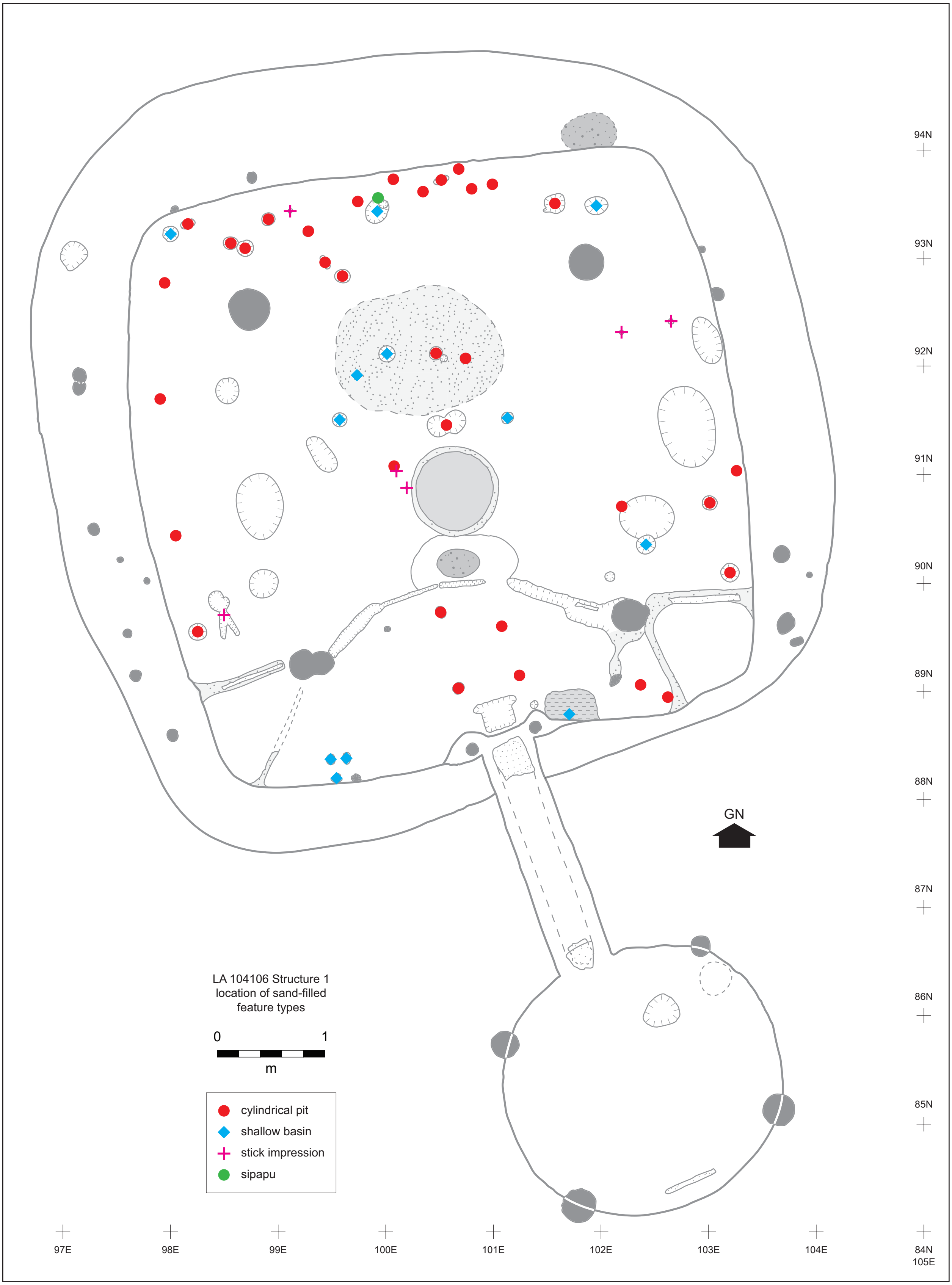


Figure 8.17. Distribution of sand-filled pit features, Structure 1, LA 104106.

Pits were constructed by excavating narrow cylindrical or conical-shaped opening 10–12 cm in diameter, 18 cm deep, on average, through the floor of the structure. Pit features were clustered in six general areas in the main chamber of Structure 1. These include along the north wall, west wall, in the southeast and southwest quadrants, in front of the vent opening, and north of the central hearth, including the largest of these features, Feature 59 (see Fig. 8.16).

Feature 59 contained most of the cultural material present in the cylindrical pit features. Ceramics included a gray ware seed jar rim and four plain gray jar body sherds, lithics included one unutilized chert flake and two obsidian flakes also unutilized, two unburned fragments of small mammal bone, and an array of carbonized botanical remains including perennials and a trace of cultigens. Feature 59 was also unique in its size compared to other sand-filled pits. From a matrix of sand-filled pit dimensions, Feature 59 was larger and deeper than all other cylindrical pit features (Fig. 8.18). Given its location, contents, and morphology, Feature 59 may have served a function unlike the smaller pit features identified on the floor surface. Feature 59 possibly functioned as a support for a notched pole ladder used to access the main chamber or may represent a variation of a central floor vault (Fig. 8.13).

Slightly north of Feature 59 were Feature 42 and Feature 45. Feature 42 contained two unutilized pieces of debitage and a pollen sample that yielded evidence of native trees and shrubs, economic species, herbs and weeds (see Appendix 2). Tree and shrub species include oak, rose, and Mormon tea. Economic species include cholla, beeweed, and lily while the herb and weed group includes sunflower family and buckwheat. Feature 45 only contained a single unburned fragment of small mammal bone.

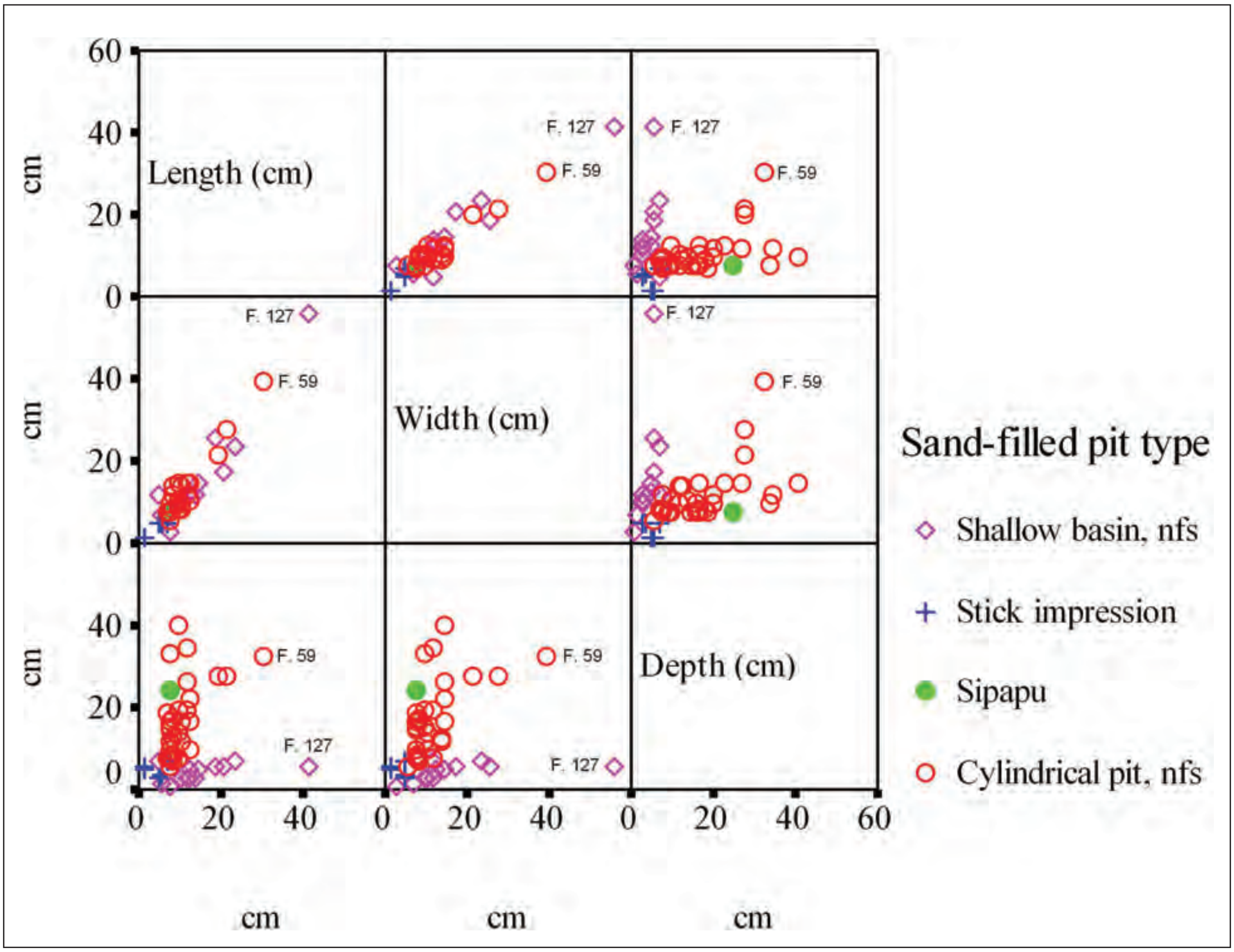


Figure 8.18. Scatter plot of sand-filled pit dimensions, Structure 1, LA 104106.

The remaining cylindrical pit features were concentrated along the north wall, positioned around the perimeter of the structure or in front of the vent opening. These features were also less than 30 cm in depth and fell closer to the mean horizontal measurements. Feature 14, located near the northwest corner of the structure contained an unutilized piece of debitage, an unburned small mammal bone fragment, and a trace of botanical remains including cultigens and unburned annuals. Feature 15 positioned adjacent to Feature 14, contained one gray body sherd. Feature 173, located near the northeast corner of the structure that contained two unburned small mammal bone fragments and Feature 21 contained a fragment of an unburned perennial. Feature 54 located along the east wall of the structure contained seven unutilized pieces of debitage. Debitage consisted of three chert and four silicified wood flakes. Interestingly, the four silicified wood fragments refit into one large core flake. Pit features located in front of the ventilator opening include Feature 102, Feature 103, and Feature 111. Each possessed a different artifact assemblage. Feature 102 contained an unburned fragment of small mammal bone and botanical remains, including a trace of cultigens and unburned annuals. Feature 103 contained three gray body sherds and Feature 111 contained cultivars and an array of carbonized perennials.

Stick impressions. Stick impressions were constructed by excavating a 3–5 cm diameter opening 5 cm deep (minimum) into the floor surface. These features were positioned in the center of the structure and near the east and north wall. No artifacts were collected from these features. These features may have functioned to hold prayer sticks or other small, inflexible, linear objects.

Shallow basins. Shallow basin features were constructed by excavating a slight depression 15–16 cm in diameter and 13 cm deep into the floor surface. Shallow basins were positioned near the ventilator opening, near the southeast corner of the structure, near the center of the structure, and along the north wall. A cluster of three shallow basins (Feature 178, Feature 179, and Feature 180) were located adjacent to the south wall, between the southwest bin and ventilator opening. No artifacts or samples were recovered from these features and given their proximity to the southwest bin (Feature 71) and the south wall, these are interpreted as pot rests. Similarly, Feature 106, located on the east side of the ventilator opening, may also have functioned to support containers related to activities surrounding the ancillary hearth (Feature 105). Two isolated shallow basins, Feature 68 and Feature 127, were located in the southeast portion of the main chamber structure. Feature 68 contained a burned shaped fragment of tabular sandstone. Unlike Feature 68, Feature 127 was sealed at the floor surface and yielded an unburned small mammal bone and two carbonized corn cupules. Feature 127 was also unique in its size compared to other sand-filled shallow basins. This feature was larger than all other shallow basin features (see Fig. 8.17) and given its location, Feature 127 may have represented an unfinished or abandoned lateral vault.

Four shallow basin features (Feature 41, Feature 47, Feature 49, and Feature 51) were located in the center of the structure; however, no artifacts or samples were recovered from these features. Feature 41, Feature 49, and Feature 51 were similar in size and were positioned between 80 and 100 cm from Feature 59, the inferred ladder support. These features may have functioned as container rests or *paho* seats (Fig. 8.13). The remaining four shallow basin features were located along the north wall of the structure. Similar to the shallow basins in the center of the structure, artifacts were scarce, limited to a single unburned juniper cone recovered from Feature 18 (Table 8.7). In addition, three of these features (Feature 16, Feature 18, and Feature 19b) were evenly spaced, 90 to 100 cm apart, in a linear arrangement along the north wall of the structure and may have served a similar function as those positioned in the center of the structure. This inference is supported by the presence of Feature 19b, a shallow basin feature that articulates with Feature 19a, the sipapu.

Sipapu. Feature 19 was positioned near the north wall, opposite the vent opening, amid the cluster of pit features (see Fig. 8.16). Feature 19 was subdivided during the excavation process into three separate sub-features to facilitate collection of material remains and description of various compositional elements. Feature 19a and Feature 19c were similar in morphology and construction to other pit features while Feature 19b, that articulates with Feature 19a, was similar to other shallow basin features. Feature 19c is considered a pit; however, Feature 19a is differentiated from other pit features based on the presence of an exotic artifact assemblage associated with an array of botanical species. In addition, Feature 19a was bifurcated with an eastern lobe, identified below the floor surface, and filled with adobe.

Several unique artifacts including a broken shell pendant, a blue-green mineral, abraded pebbles, and obsidian flakes were recovered approximately 8 to 10 cm above the base of Feature 19a (Fig. 8.19). In addition to material culture, Feature 19a also yielded evidence for an array of biotic remains. Macrobotanical data consisted of one carbonized corn cupule, an unburned juniper cone, and hundreds of unburned goosefoot seeds (Table 8.7). Not unlike the macrobotanical data, pollen data depict an array of native shrubs and economic and herbal species (see Appendix 2). Native tree and shrub species included piñon, rose family, sage, and Mormon tea. Economic species include beeweed, corn, and *Chenopodium/amaranthus,* while herbs identified include the sunflower family (yellow flower) buckwheat, mustard, and evening primrose. Finally, some of these species have therapeutic value used to treat colds, wounds, and digestive maladies.

Interestingly, recovered artifacts depict four colors: white, blue-green, yellow, and black (Fig. 8.20). Additionally, yellow or white blooms are common to the species identified by the pollen data. Although color choice may be limited to availability in the surrounding environment, the fact that the color scheme are represented in different artifact categories suggests there was some ritual or perhaps directional significance to these choices (DeBoer 2005). Given its location, contents, and color scheme, Feature 19a appears to have served a ritual function. Also, because this structure appears to have been systematically dismantled with some building material removed, these items may have been left as offerings prior to or during the abandonment process.

Remodeling and floor feature arrangement. As previously stated, Structure 1 displayed several episodes of remodeling or maintenance activity that are represented by five sealed features and several adobe remodels. Sealed features include two pit features (Feature 37 and Feature 53), one storage facility (Feature 123), one shallow basin (Feature 127), and the eastern lobe of the sipapu (Feature 19a). Adobe remodels were represented by an adobe floor patch positioned in the center of the structure (Feature 133), remodeling of the southeast bin (Feature 130) into a single feature, and remodeling of the ventilator opening (Feature 52), and perhaps a segmented adobe collar placed on the central hearth (Feature 64).

Sealed floor features were more common on the west side of the structure offering an additional 2.5 sq m of floor space to the west of the central hearth, mirroring the floor space offered on the east side of the hearth. Interestingly, the sealed pit features and open pit features located along the west wall of Structure 1 were positioned 2.2 m apart. This regimented spacing and repeated positioning may indicate these features were parts of paired sets. Several other features were evenly spaced approximately 60 cm apart. These features consisted primarily of pit features clustered along the north wall and in front of the ventilator opening. The repeated nature both in spacing and location suggests the use of an object(s) that had regular form such as a wooden rack or framework (Fig. 8.21). Regularly spaced sand-filled pits in Pueblo I structures have been interpreted to represent altar supports (Wilshusen 1989:95).

Additional features. Four additional features identified in the main chamber of Structure 1 could not be classified among the types previously described. One feature (Feature 177) was positioned just above the floor in the roof fall stratum, two (Feature 105 and Feature 132) were positioned adjacent to the ventilator opening, and one, Feature 66, was located north of the southwest bin (Feature 71). Feature 177 consisted of a jumble of oxidized adobe mixed with ash, charcoal, roof fall (Stratum 4), and post-abandonment fill (Stratum 6). Given its jumbled nature, construction and morphological details for this feature are inferred. Feature 177 was constructed by forming an adobe basin subsequently used for thermal applications (see Fig. 8.1). A flotation sample of ash and charcoal collected from this feature yielded carbonized annuals, perennials, grasses, and cultivars (Table 8.7). Artifacts found in spatial association included a single gray jar body sherd. This feature may represent a post-abandonment activity or more likely represents an extramural activity area positioned on or near the roof that was subsequently deposited during the abandonment process.

Feature 66 was positioned near the southwest corner of the structure, north of Feature 71, the southwest bin. This feature had an irregular morphology in both plan and profile. The northwest

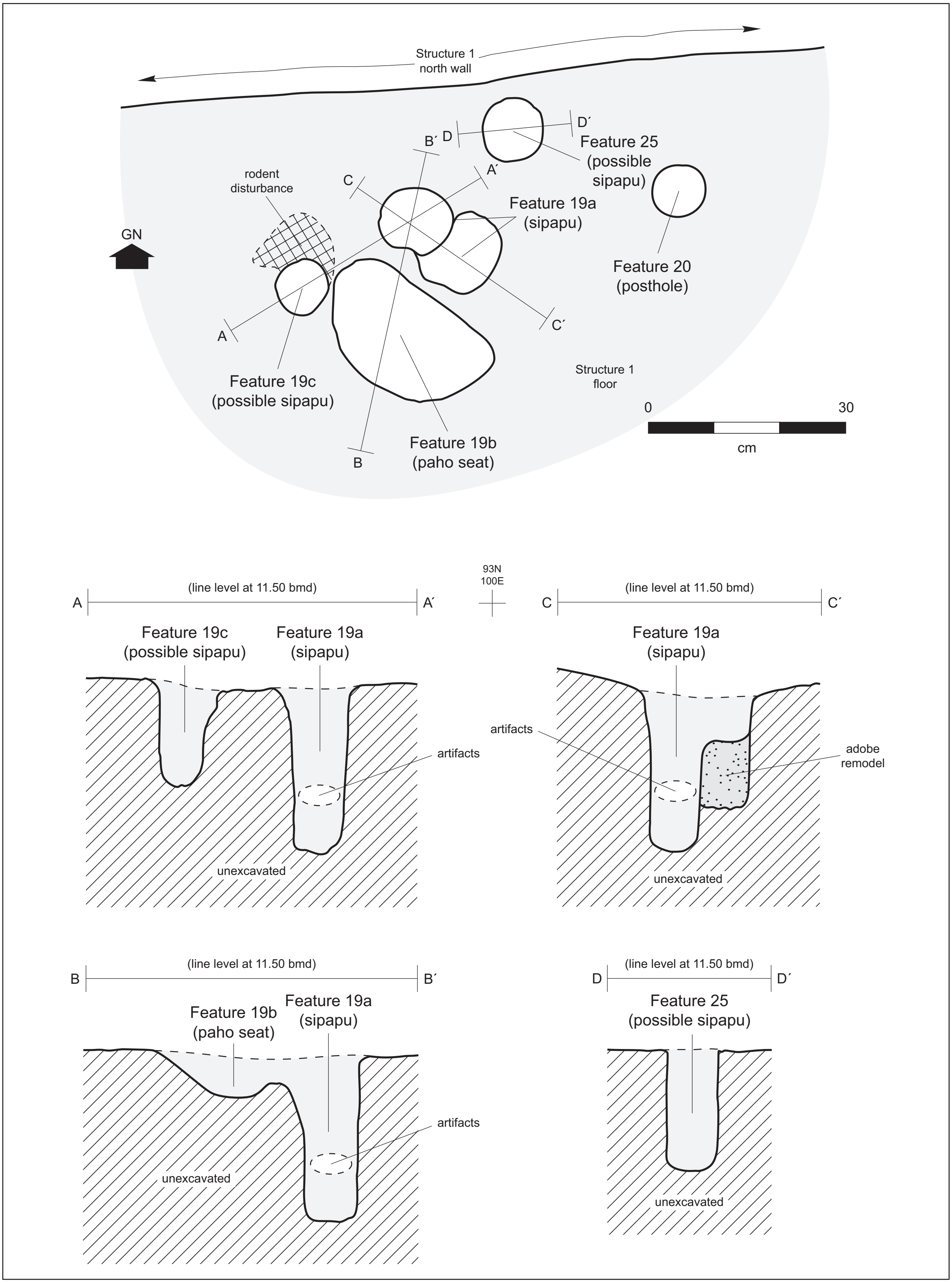


Figure 8.19. Plan and profile, Feature 19, Structure 1, LA 104106.

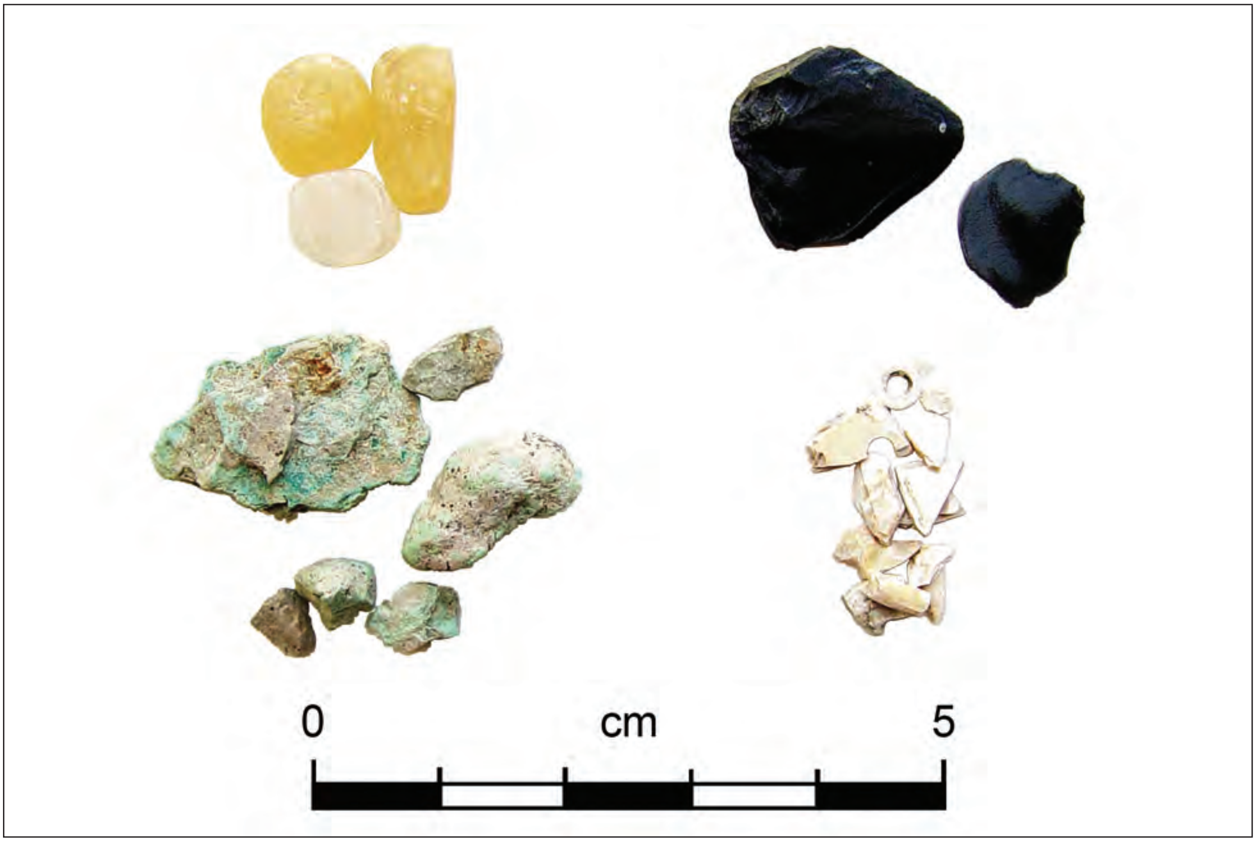


Figure 8.20. Material recovered from Feature 19a, Structure 1, LA 104106.

portion of Feature 66 was constructed by excavating two shallow, contiguous basins. These basins become deeper to the southeast forking into two narrow, linear swales or arms. A third linear swale, contiguous to the northern basins, extends west. At the base of the feature near the branch of the two southern arms were two narrow, cylindrical impressions approximately 2–4 cm in diameter and 10–12 cm deep (Fig. 8.22). Feature 66 was filled with a similar matrix as most other floor features but did not yield any material culture and was not sampled for botanical remains. This feature may have been multipurpose, used to support a variety of items such as pots. The narrow cylindrical impressions are similar to other features associated with the floor surface and those described by Wilshusen (1988b:653) as prayer stick or paho holes.

Feature 105 was an ancillary hearth located along the southern wall adjacent to the east side of the ventilator opening. This feature was constructed by adhering a triangular-shaped ground stone fragment to the vertical wall surface. Sooting and oxidation of the wall, floor, and sandstone slab indicated intense thermal activity was contained within a 45 by 30 cm area (Fig. 8.23). Associated with this feature was a small shallow basin also showing evidence of thermal alteration. In addition to the ground stone fragment, an archaeomagnetic sample was recovered yielding a date range of AD 625–680 (see Blinman and Cox, Appendix 7, this report). Based on extent of burning this feature may have functioned as an ancillary hearth supplementing the central hearth for heat and food preparation.

Feature 132 was located directly to the north of the ventilator opening and was constructed by excavating an irregularly shaped basin approximately 25 cm below the surface of the floor. The vertical walls and base of the feature were lined with adobe (Fig. 8.24). Upper fill consisted of a homogeneous layer of loose sandy loam with inclusions of charcoal flecks and artifacts. Lower fill consisted of a consolidated sand mixed with adobe fragments. Artifacts included a five plain gray jar sherds and one Tallahogan Red jar sherd ceramic

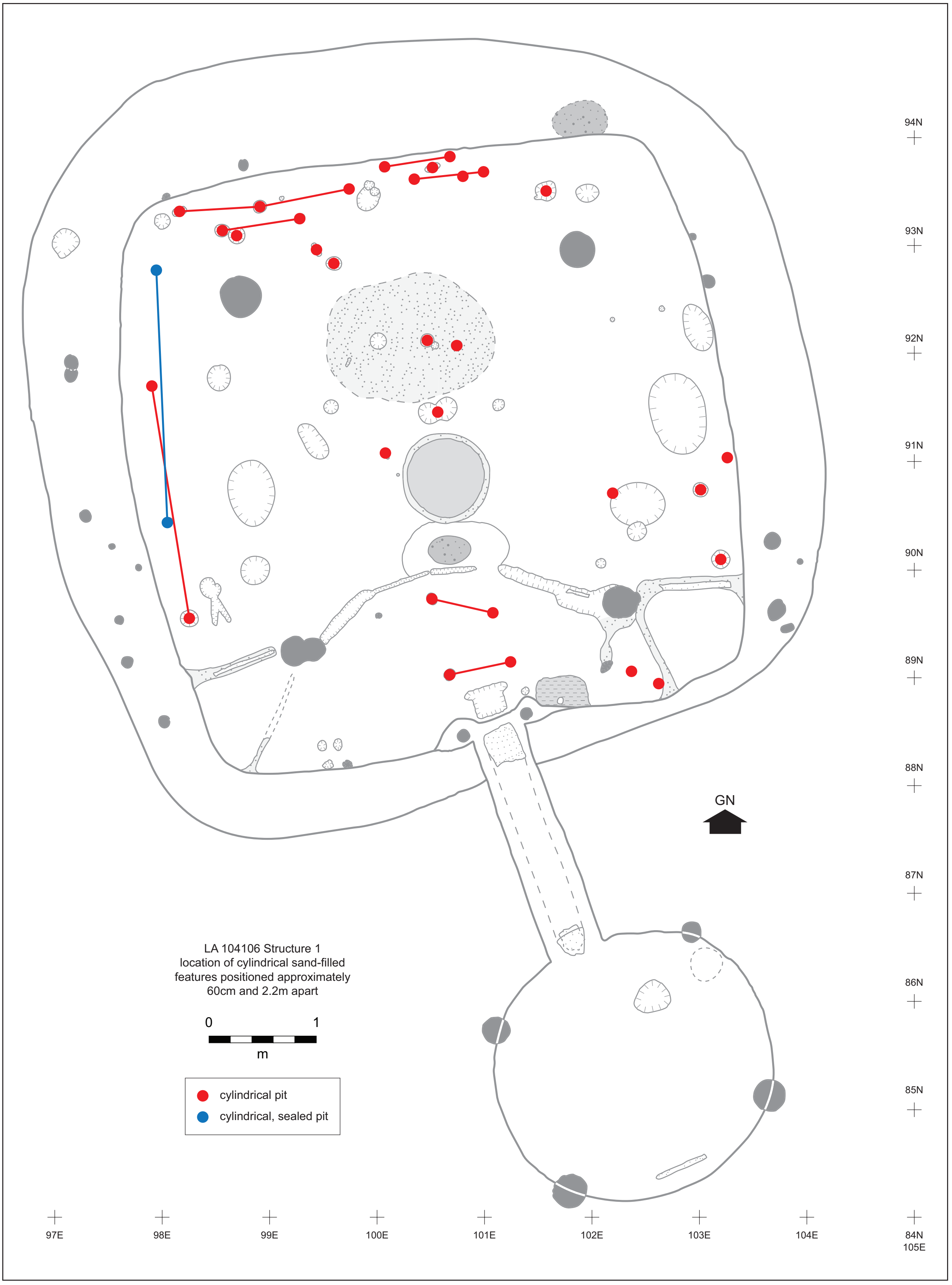


Figure 8.21. Distribution of sand-filled pits, Structure 1, LA 104106.

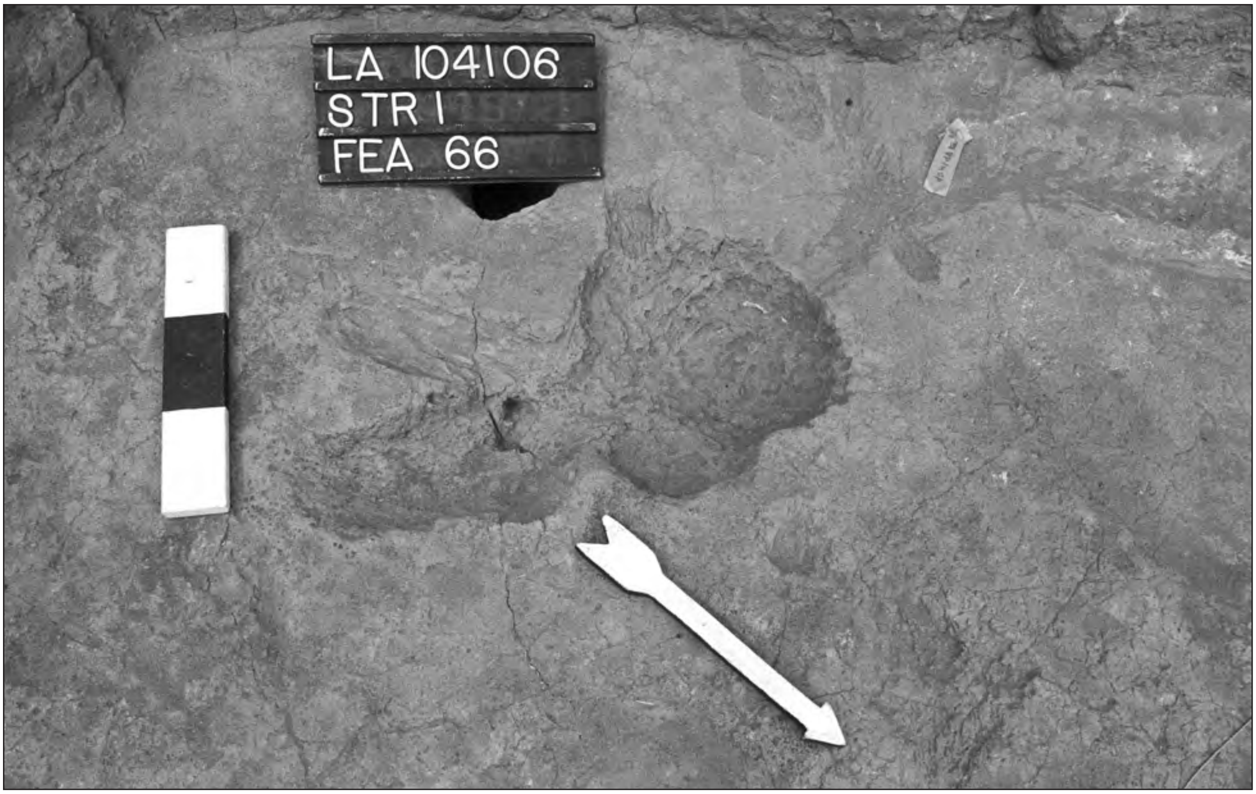


Figure 8.22. Feature 66, Structure 1, LA 104106.

Figure 8.23. Feature 105 and southeast corner of Structure 1, LA 104106.

Figure 8.24. Feature 132 and ventilator opening (Feature 52), Structure 1, LA 104106.

(Table 8.9). Bone artifacts consisted of unburned fragmentary small mammal or rodent remains (Table 8.8). Similarly the macrobotanical assemblage was dominated by unburned annuals with low frequencies of cultivar and unburned perennial (Table 8.7). Given the morphology and location this feature may have supported for a tabular stone function as a damper controlling airflow into the structure. The remodeling of the southern half of this feature may be related to the other remodeling or maintenance episodes identified in the structure. This repair or remodeling event may have also contributed to the appearance of the ventilator opening (Feature 52).

Structure 4, antechamber (AUN 1.03). Structure 4 was located 2 m southeast of the main chamber of Structure 1 and was constructed in a similar manner. The floor of the antechamber was located approximately 1.30 m below the original ground surface and positioned approximately 40 cm higher than floor of the main chamber (Figs. 8.25a, 8.25b). A total of seven features were associated with the floor surface and post-abandonment processes of the antechamber, including four postholes, one pit, an upright stone, the ventilator tunnel, and a ceramic container (see Fig. 8.5).

Postholes. Four postholes (Features 118, 119, 120, and 120), set in the wall and positioned roughly equidistant from each other, represent the locations of the primary supports for the superstructure of the antechamber. Each of these large, deep, vertical pits were similar in size, content, and fill sequence. Post supports ranged in size between 22 and 40 cm in diameter, 30 and 53 cm deep, and contained a single layer of post-abandonment fill similar to Stratum 2. The roofed antechamber functioned as a ventilator shaft, supplying fresh air to the main chamber via the ventilator tunnel (Fig. 8.26). In addition, these primary post supports contained ceramic, lithic, and bone artifacts.

Ceramic artifacts were recovered from Feature 120 and included six plain gray jar sherds (Table 8.11). Lithic artifacts included a single piece of unutilized silicified wood debitage recovered from

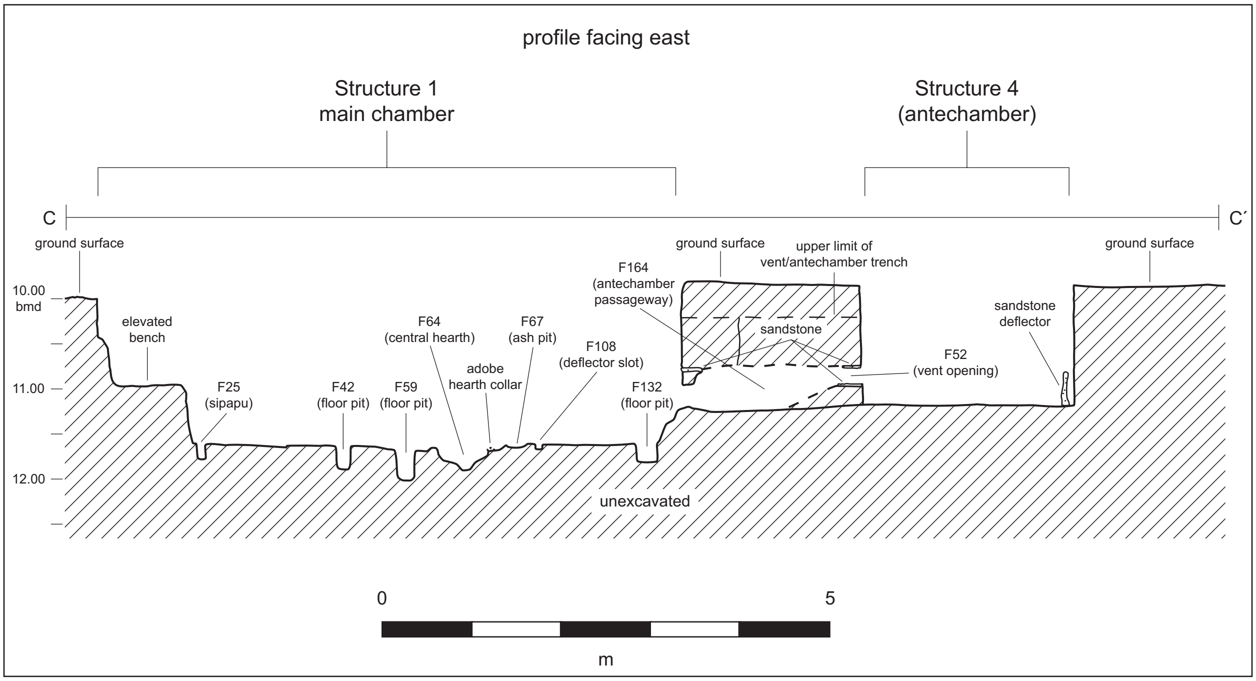


Figure 8.25a. Architectural profile, Structure 1, LA 104106.

Feature 119 and Feature 120 (Table 8.12). Finally, eggshell fragments were recovered from Feature 118.

Vent tunnel. The ventilator tunnel opening (Feature 166) was constructed by setting numerous slabs of tabular sandstone horizontally in an adobe matrix forming a rectangular opening (Fig. 8.27). This construction episode appears to have modified an earlier passageway or tunnel into an airway by restricting the orifice. It is likely that this remodeling event is related to the alterations of the ventilator opening (Feature 52) in the main chamber, those made to the central hearth (Feature 64), floor surface (Feature 133), and possibly the sealing of floor features.

Pit feature. A single pit was identified near the center of floor (Feature 122). This feature did not display any evidence of thermal alteration and was affected by rodent disturbance. Excavation identified a single homogeneous layer of fill, similar to Stratum 2, and yielded a hammerstone of silicified wood. Due to the nature of the disturbance, no samples were recovered from this feature. Southeast of this feature was a slab of shaped sandstone resembling a metate. This item was placed in an upright position along the axis of the antechamber opposite the ventilator tunnel opening (Fig. 8.28).

Artifact cache. Unlike many of the pragmatic, functional, or technological features previously described, Feature 112 was truly unique. Feature 112 was recovered near the floor of the antechamber and consisted of a ceramic seed jar filled with numerous lithic artifacts, bone tools, and ornaments. This cache was positioned near the northeast wall next to three hammerstones (Fig. 8.29). Combined, the context and contents of Feature 112 present a significant and extravagant assemblage possibly representing a *curandero(a),* shaman, or folk healer's kit. The contents of Feature 112 included caching a minimum of 152 lithic artifacts, four stone ornaments, four bone tools, and a single piece of marine shell inside a ceramic seed jar. Although not found in situ during the excavation, two fossilized bone t ools were spatially associated with these items (Figs. 8.30a, 8.30b). The horizontal and vertical location of this feature suggest these objects may have been originally placed in a niche, hung from a roofing element, or arranged soon after much of the activities in the structure and surrounding area had subsided.

The ceramic container consisted of a La Plata Black-on-white seed jar decorated on the interior surface with opposing thunderbird motifs and a fugitive red pigment applied to the exterior (Fig. 8.31). Lithic artifacts found in direct association with Fea-

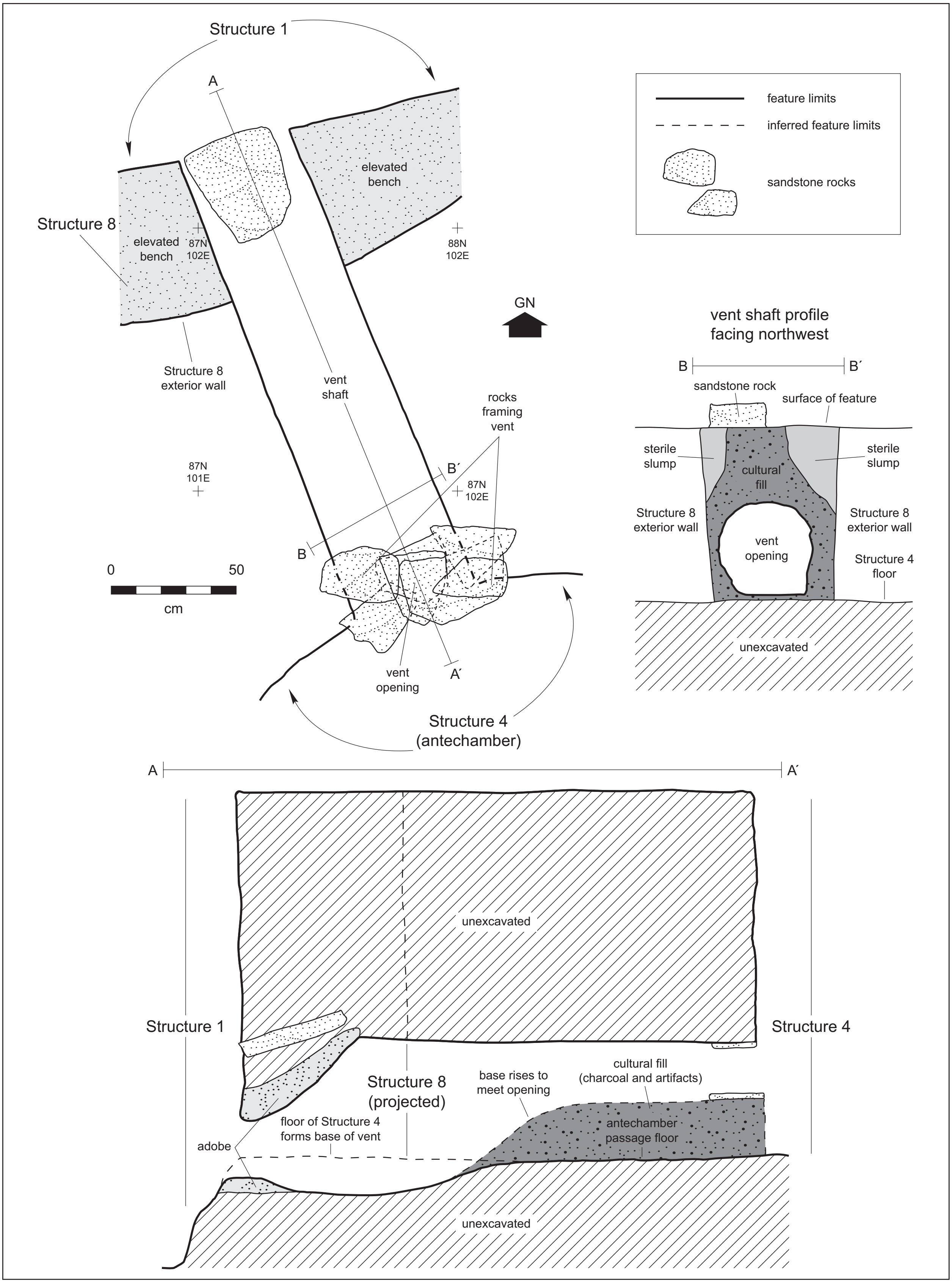


Figure 8.25b. Plan and profiles of ventilator shaft, Structure 1, LA 104106.

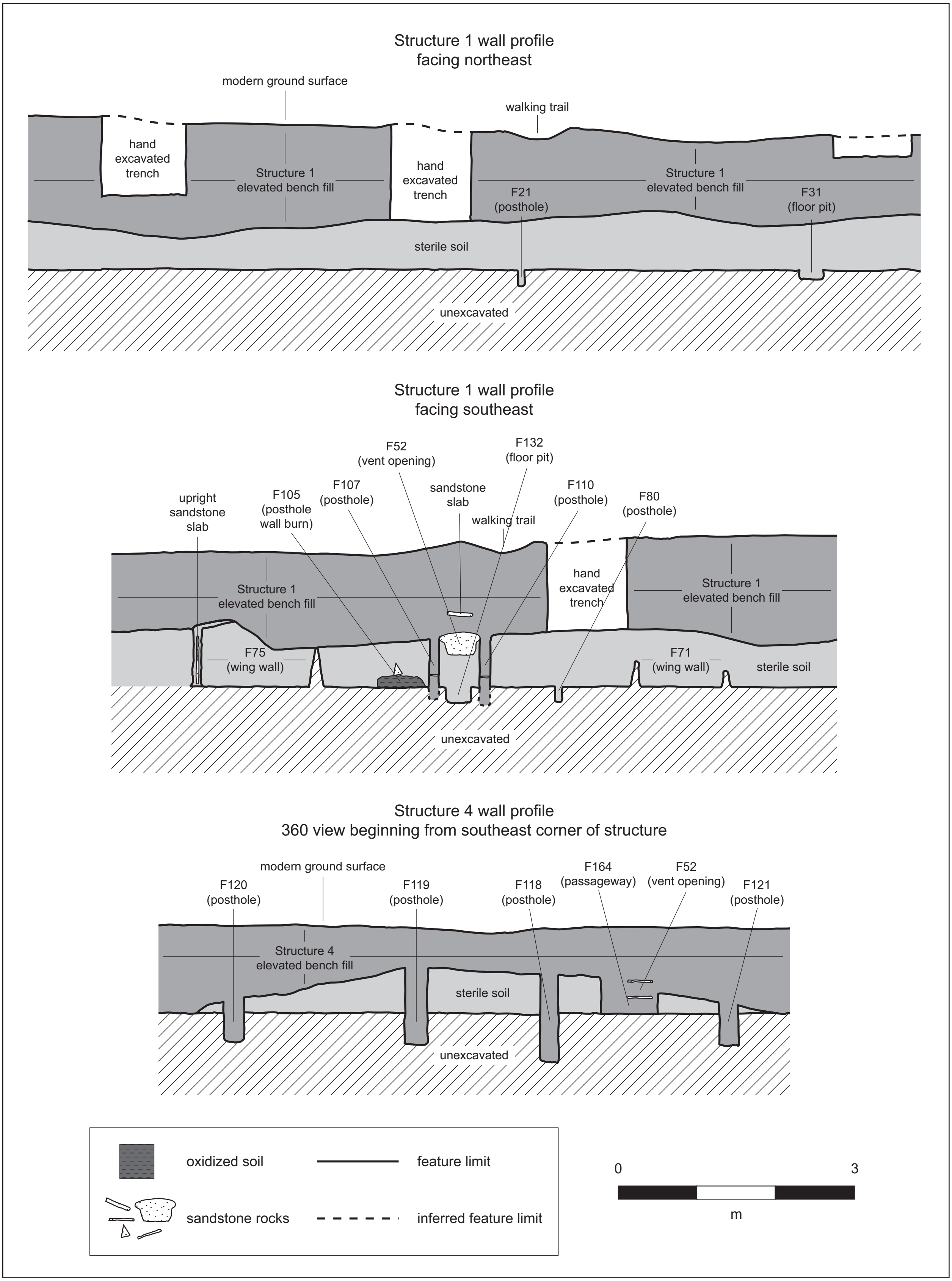


Figure 8.26. Antechamber soil profile, Structure 1, LA 104106.

Table 8.11. LA 104106, Structure 1, antechamber, ceramic data by feature number.

			Upper Fill above Roof	Lower Fill below Roof	Roofing Material	Extra-mural Fill	Floor Fill		Surface or Floor		
			Intramural Area				Ceramic Container	Intra-mural Area	Post-hole	Vent Tunnel	Table Total
Ware	**Pottery Type**						**F 112**		**F 120**	**F 164**	
Cibola Gray	Plain rim	Count	-	3	1	10	1	13	-	-	**28**
		Row %	-	10.71	3.57	35.71	3.57	46.43	-	-	**100.00**
		Col. %	-	1.38	7.69	6.49	2.50	3.17	-	-	**3.09**
	Unknown rim	Count	-	1	-	-	-	2	-	-	**3**
		Row %	-	33.33	-	-	-	66.67	-	-	**100.00**
		Col. %	-	0.46	-	-	-	0.49	-	-	**0.33**
	Plain body	Count	37	195	12	118	24	372	6	23	**787**
		Row %	4.70	24.78	1.52	14.99	3.05	47.27	0.76	2.92	**100.00**
		Col. %	84.09	89.86	92.31	76.62	60.00	90.73	100.00	100.00	**86.77**
	Indented corrugated	Count	-	-	-	13	-	-	-	-	**13**
		Row %	-	-	-	100.00	-	-	-	-	**100.00**
		Col. %	-	-	-	8.44	-	-	-	-	**1.43**
	Unfired plain gray	Count	-	2	-	-	-	3	-	-	**5**
		Row %	-	40.00	-	-	-	60.00	-	-	**100.00**
		Col. %	-	0.92	-	-	-	0.73	-	-	**0.55**
	Mudware	Count	-	1	-	-	-	-	-	-	**1**
		Row %	-	100.00	-	-	-	-	-	-	**100.00**
		Col. %	-	0.46	-	-	-	-	-	-	**0.11**
Cibola White	Unpainted, polished	Count	1	3	-	6	-	13	-	-	**23**
		Row %	4.35	13.04	-	26.09	-	56.52	-	-	**100.00**
		Col. %	2.27	1.38	-	3.90	-	3.17	-	-	**2.54**
	Mineral paint, undiffer-entiated	Count	-	-	-	-	7	-	-	-	**7**
		Row %	-	-	-	-	100.00	-	-	-	**100.00**
		Col. %	-	-	-	-	17.50	-	-	-	**0.77**
	Pueblo II (indeterminate mineral)	Count	-	-	-	1	-	-	-	-	**1**
		Row %	-	-	-	100.00	-	-	-	-	**100.00**
		Col. %	-	-	-	0.65	-	-	-	-	**0.11**
	Basketmaker III–Pueblo I (indeterminate mineral)	Count	4	9	-	3	-	2	-	-	**18**
		Row %	22.22	50.00	-	16.67	-	11.11	-	-	**100.00**
		Col. %	9.09	4.15	-	1.95	-	0.49	-	-	**1.98**
	La Plata Black-on-white	Count	1	2	-	2	8	5	-	-	**18**
		Row %	5.56	11.11	-	11.11	44.44	27.78	-	-	**100.00**
		Col. %	2.27	0.92	-	1.30	20.00	1.22	-	-	**1.98**
Tusayan White	Lino Black-on-white	Count	-	1	-	-	-	-	-	-	**1**
		Row %	-	100.00	-	-	-	-	-	-	**100.00**
		Col. %	-	0.46	-	-	-	-	-	-	**0.11**
Mogollon Brown	Alma Plain Body	Count	1	-	-	1	-	-	-	-	**2**
		Row %	50.00	-	-	50.00	-	-	-	-	**100.00**
		Col. %	2.27	-	-	0.65	-	-	-	-	**0.22**
Table Total		**Count**	**44**	**217**	**13**	**154**	**40**	**410**	**6**	**23**	**907**
		Row %	**4.85**	**23.93**	**1.43**	**16.98**	**4.41**	**45.20**	**0.66**	**2.54**	**100.00**
		Col. %	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

Table 8.12. LA 104106, Structure 1, antechamber, lithic data by feature number.

		Upper Fill above Roof	Lower Fill below Roof	Roofing Material	Extra-mural Fill	Floor Fill		Surface or Floor			
		Intramural Area				Ceramic Container	Intra-mural Area	Pit, nfs	Posthole		Table Total
Artifact Morphology						**F 112**		**F 122**	**F 119**	**F 120**	
					Local Chert						
Core flake	Count	–	3	–	1	2	1	–	–	–	**7**
	Row %	–	42.86	–	14.29	28.57	14.29	–	–	–	**100.00**
	Col. %	–	8.33	–	3.03	1.29	3.85	–	–	–	**2.60**
Angular debris	Count	–	–	–	1	1	–	–	–	–	**2**
	Row %	–	–	–	50.00	50.00	–	–	–	–	**100.00**
	Col. %	–	–	–	3.03	0.65	–	–	–	–	**0.74**
Flake fragment	Count	2	2	–	–	4	–	–	–	–	**8**
	Row %	25.00	25.00	–	–	50.00	–	–	–	–	**100.00**
	Col. %	14.29	5.56	–	–	2.58	–	–	–	–	**2.97**
Early stage biface	Count	–	–	–	–	1	–	–	–	–	**1**
	Row %	–	–	–	–	100.00	–	–	–	–	**100.00**
	Col. %	–	–	–	–	0.65	–	–	–	–	**0.37**
Late stage biface	Count	–	1	–	–	–	–	–	–	–	**1**
	Row %	–	100.00	–	–	–	–	–	–	–	**100.00**
	Col. %	–	2.78	–	–	–	–	–	–	–	**0.37**
Core	Count	–	–	–	–	1	–	–	–	–	**1**
	Row %	–	–	–	–	100.00	–	–	–	–	**100.00**
	Col. %	–	–	–	–	0.65	–	–	–	–	**0.37**
					Local Silicified Wood						
Core flake	Count	4	13	–	15	71	6	–	1	–	**110**
	Row %	3.64	11.82	–	13.64	64.55	5.45	–	0.91	–	**100.00**
	Col. %	28.57	36.11	–	45.45	45.81	23.08	–	100.00	–	**40.89**
Angular debris	Count	2	1	1	8	12	2	–	–	–	**26**
	Row %	7.69	3.85	3.85	30.77	46.15	7.69	–	–	–	**100.00**
	Col. %	14.29	2.78	50.00	24.24	7.74	7.69	–	–	–	**9.67**
Flake fragment	Count	3	4	–	5	17	2	–	–	1	**32**
	Row %	9.38	12.50	–	15.63	53.13	6.25	–	–	3.13	**100.00**
	Col. %	21.43	11.11	–	15.15	10.97	7.69	–	–	100.00	**11.90**
Biface flake	Count	–	1	–	–	3	–	–	–	–	**4**
	Row %	–	25.00	–	–	75.00	–	–	–	–	**100.00**
	Col. %	–	2.78	–	–	1.94	–	–	–	–	**1.49**
Bipolar flake	Count	–	–	–	–	1	–	–	–	–	**1**
	Row %	–	–	–	–	100.00	–	–	–	–	**100.00**
	Col. %	–	–	–	–	0.65	–	–	–	–	**0.37**
Formal flaked tool	Count	–	–	–	–	1	–	–	–	–	**1**
	Row %	–	–	–	–	100.00	–	–	–	–	**100.00**
	Col. %	–	–	–	–	0.65	–	–	–	–	**0.37**
Early stage biface	Count	–	–	–	–	1	–	–	–	–	**1**
	Row %	–	–	–	–	100.00	–	–	–	–	**100.00**
	Col. %	–	–	–	–	0.65	–	–	–	–	**0.37**

(Table 8.12, continued)

		Upper Fill above Roof	Lower Fill below Roof	Roofing Material	Extra-mural Fill	Floor Fill		Surface or Floor			
		Intramural Area				Ceramic Container	Intra-mural Area	Pit, nfs	Posthole		Table Total
Artifact Morphology						**F 112**		**F 122**	**F 119**	**F 120**	
Late stage biface	Count	–	–	–	–	3	–	–	–	–	**3**
	Row %	–	–	–	–	100.00	–	–	–	–	**100.00**
	Col. %	–	–	–	–	1.94	–	–	–	–	**1.12**
Core	Count	–	–	–	–	2	1	–	–	–	**3**
	Row %	–	–	–	–	66.67	33.33	–	–	–	**100.00**
	Col. %	–	–	–	–	1.29	3.85	–	–	–	**1.12**
Hammer-stone	Count	–	–	–	–	1	2	1	–	–	**4**
	Row %	–	–	–	–	25.00	50.00	25.00	–	–	**100.00**
	Col. %	–	–	–	–	0.65	7.69	100.00	–	–	**1.49**
Local Quartzite											
Core flake	Count	–	2	–	–	1	1	–	–	–	**4**
	Row %	–	50.00	–	–	25.00	25.00	–	–	–	**100.00**
	Col. %	–	5.56	–	–	0.65	3.85	–	–	–	**1.49**
Non-local Chert											
Core flake	Count	2	4	1	1	3	1	–	–	–	**12**
	Row %	16.67	33.33	8.33	8.33	25.00	8.33	–	–	–	**100.00**
	Col. %	14.29	11.11	50.00	3.03	1.94	3.85	–	–	–	**4.46**
Angular debris	Count	–	–	–	1	1	1	–	–	–	**3**
	Row %	–	–	–	33.33	33.33	33.33	–	–	–	**100.00**
	Col. %	–	–	–	3.03	0.65	3.85	–	–	–	**1.12**
Flake fragment	Count	–	2	–	–	4	–	–	–	–	**6**
	Row %	–	33.33	–	–	66.67	–	–	–	–	**100.00**
	Col. %	–	5.56	–	–	2.58	–	–	–	–	**2.23**
Biface flake	Count	–	1	–	–	–	–	–	–	–	**1**
	Row %	–	100.00	–	–	–	–	–	–	–	**100.00**
	Col. %	–	2.78	–	–	–	–	–	–	–	**0.37**
Formal flaked tool	Count	–	–	–	–	1	–	–	–	–	**1**
	Row %	–	–	–	–	100.00	–	–	–	–	**100.00**
	Col. %	–	–	–	–	0.65	–	–	–	–	**0.37**
Early stage biface	Count	–	–	–	–	1	–	–	–	–	**1**
	Row %	–	–	–	–	100.00	–	–	–	–	**100.00**
	Col. %	–	–	–	–	0.65	–	–	–	–	**0.37**
Non-local Obsidian											
Core flake	Count	1	2	–	–	3	8	–	–	–	**14**
	Row %	7.14	14.29	–	–	21.43	57.14	–	–	–	**100.00**
	Col. %	7.14	5.56	–	–	1.94	30.77	–	–	–	**5.20**
Angular debris	Count	–	–	–	–	2	1	–	–	–	**3**
	Row %	–	–	–	–	66.67	33.33	–	–	–	**100.00**
	Col. %	–	–	–	–	1.29	3.85	–	–	–	**1.12**
Flake fragment	Count	–	–	–	1	4	–	–	–	–	**5**
	Row %	–	–	–	20.00	80.00	–	–	–	–	**100.00**
	Col. %	–	–	–	3.03	2.58	–	–	–	–	**1.86**
Biface flake	Count	–	–	–	–	11	–	–	–	–	**11**
	Row %	–	–	–	–	100.00	–	–	–	–	**100.00**
	Col. %	–	–	–	–	7.10	–	–	–	–	**4.09**

(Table 8.12, continued)

		Upper Fill above Roof	Lower Fill below Roof	Roofing Material	Extra-mural Fill	Floor Fill		Surface or Floor			
		Intramural Area				Ceramic Container	Intra-mural Area	Pit, nfs	Posthole		Table Total
Artifact Morphology						**F 112**		**F 122**	**F 119**	**F 120**	
Formal flaked tool	Count	–	–	–	–	1	–	–	–	–	**1**
	Row %	–	–	–	–	100.00	–	–	–	–	**100.00**
	Col. %	–	–	–	–	0.65	–	–	–	–	**0.37**
Middle stage biface	Count	–	–	–	–	1	–	–	–	–	**1**
	Row %	–	–	–	–	100.00	–	–	–	–	**100.00**
	Col. %	–	–	–	–	0.65	–	–	–	–	**0.37**
Late stage biface	Count	–	–	–	–	1	–	–	–	–	**1**
	Row %	–	–	–	–	100.00	–	–	–	–	**100.00**
	Col. %	–	–	–	–	0.65	–	–	–	–	**0.37**
Table Total	**Col. %**	**14**	**36**	**2**	**33**	**155**	**26**	**1**	**1**	**1**	**269**
	Row %	**5.20**	**13.38**	**0.74**	**12.27**	**57.62**	**9.67**	**0.37**	**0.37**	**0.37**	**100.00**
	Col. %	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

nfs = not further specified

Figure 8.27. Ventilator opening into the antechamber (Structure 4), LA 104106.

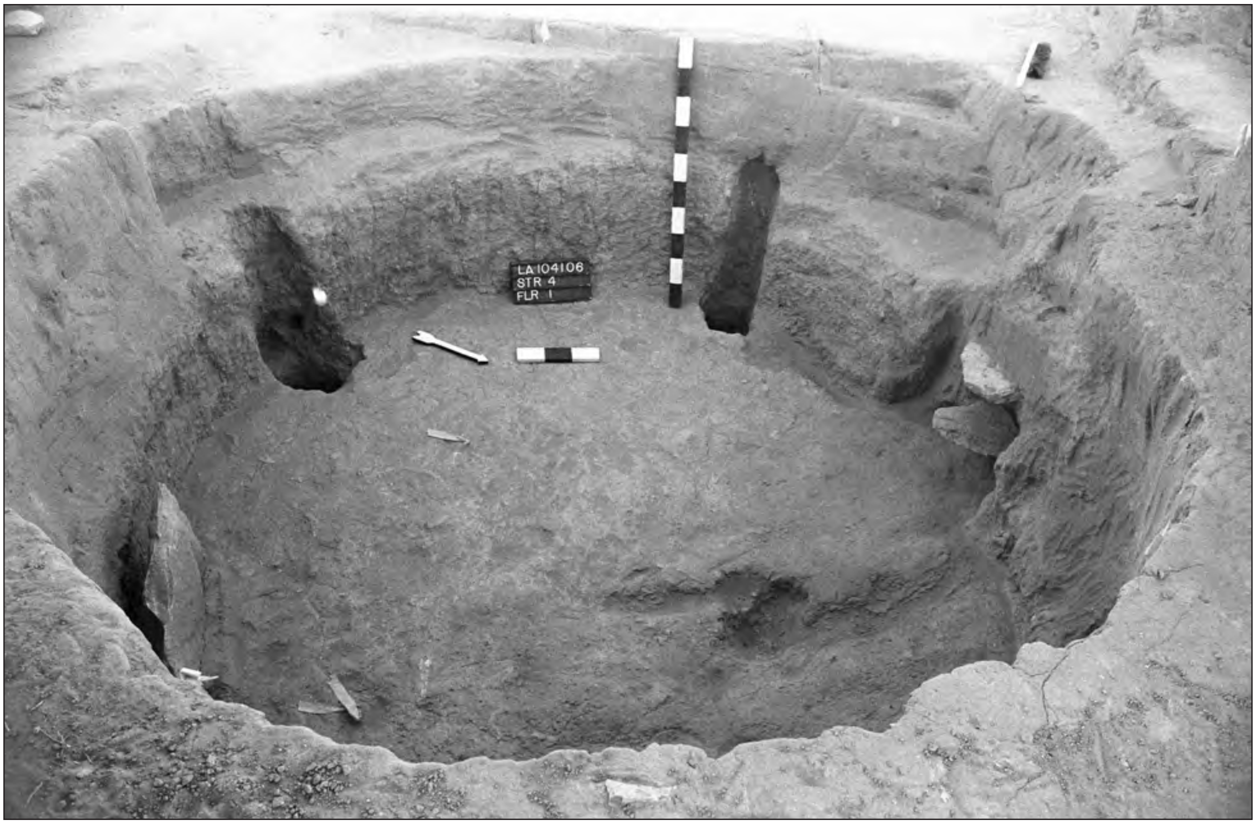


Figure 8.28. Antechamber (Structure 4), LA 104106.

Figure 8.29. Artifact cache, Feature 112, Structure 4, LA 104106.

Figure 8.30a (above), 8.30b (below). Two fossil bone implements (FS 908) recovered near Feature 112, LA 104106.

ture 112 were dominated by unutilized debitage (n = 120) resulting from reduction of local and nonlocal materials. Three pieces of obsidian, two from the cache and one spatially associated flake, submitted for EDXRF analysis indicated Mount Taylor and the Valle Grande were the source locations for the obsidian material type (see Appendix 3). In addition to unutilized debitage, Feature 112 contained 20 pieces of utilized debitage, nine bifaces including one projectile point fragment, and three small cores. Bone artifacts included four bone awls; however, poor preservation of these objects omits any observations on manufacture or wear patterns. Ornaments included four cut, polished, and drilled white stone pendants or earnings and a single piece of modified marine shell (see Ornaments, below). Similar to the contents of the sipapu (Feature 19.01), the materials from Feature 112 also represent four colors: white, black, red, and yellow. Complementing the unique diversity and quantity of material culture and placement of the decorative motifs on the interior of the container, a pollen sample recovered from the interior of the vessel yielded a unique array of native shrubs, economic plants, and herbs (see Appendix 2) (Fig. 8.32).

Native tree and shrub pollen included piñon, juniper, oak, rose family, and sage. Economic species identified include cholla, prickly pear, beeweed, corn, *Chenopodium/amaranthus*, parsley family, lily family, and sunflower family. Finally, herbs identified include buckwheat and mustard. Smith (Appendix 2) notes that the unique and diverse array of pollen was inconsistent with economic activities and suggests there may be a ceremonial significance to the artifact assemblage and pollen data. Ethnographic data show that many of these species have medicinal, ceremonial, or paint applications.

Floor assemblage. In all, 1,544 artifacts and samples were recovered from the floor and floor fill context of Structure 1 main chamber, bench and antechamber. Artifacts found in situ on the floor surface or in floor fill included ceramic, lithic, ornament, ground stone, and mineral material types (Fig. 8.33). The bench fill and surface materials are summarized since this structural subdivision was excavated primarily by quadrant defined by the 1

Figure 8.31. La Plata Black-on-white seed jar containing artifact cache, Feature 112, LA 104106.

Figure 8.32. Artifact assemblage, Feature 112, LA 104106.

by 1 m grid units used during the initial trenching of the main chamber. Floor fill in the main chamber, defined as the 5 cm (maximum) above the surface, was screened using 1/8-inch mesh hardware cloth. In addition, flotation and pollen samples were recovered from alternating grid units across the floor of the main chamber to systematically sample the surface for differences in activity and use (Fig. 8.34). Since many of the structural elements were removed during the abandonment process of Structure 1, floor and floor fill artifact assemblages are, in some cases, more likely the result of these activities rather than the result of activities conducted within this structure at the time of occupation.

Ceramic were the most common artifact type recovered, consisting primarily of fugitive red and plain gray jar sherds. Also, a limited amount of decorated white wares including bowl sherds of La Plata Black-on-white were recovered (Table 8.13). Although no decorated ceramics were recovered directly from the floor surface, the combined or aggregated weight of decorated ceramics from the floor fill layer of each 1 by 1 m grid unit indicates this ceramic ware group was common in the central and southwest portion of the main chamber and in the antechamber. Gray ware ceramic types recovered from floor and floor fill contexts, also using aggregated weight per 1 by 1 m unit, were distributed in the northwest and southeast portion of the main chamber and antechamber (Fig. 8.35). Driving this distribution are partial vessels of fugitive red and plain jars (Vessel 2). Since there is a high correspondence between ware and form (i.e., plain jars and decorated bowls) mean ceramic weights were calculated for jar and bowl forms to normalize the effect high frequencies of gray ware pottery seemingly had on the overall distribution.

When mean sherd weight of jars (mean = 21.1 g per sherd) and bowls (mean = 6.7 g per sherd) is used, there was little overlap in the distribution of these different vessel forms. The distribution of jars reveals a pattern unlike that generated by ware

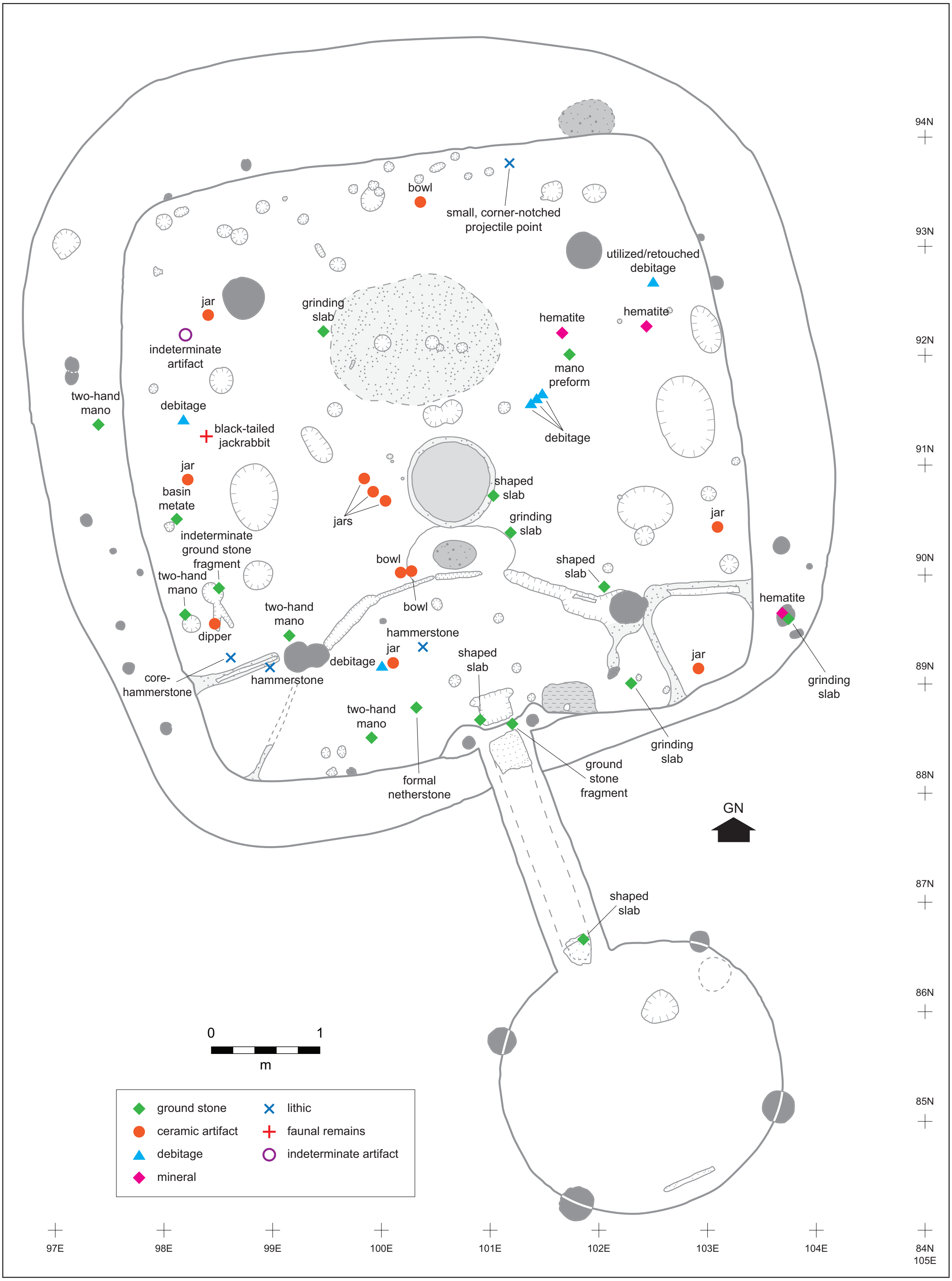


Figure 8.33. In situ floor and floor fill artifacts, Structure 1, LA 104106.

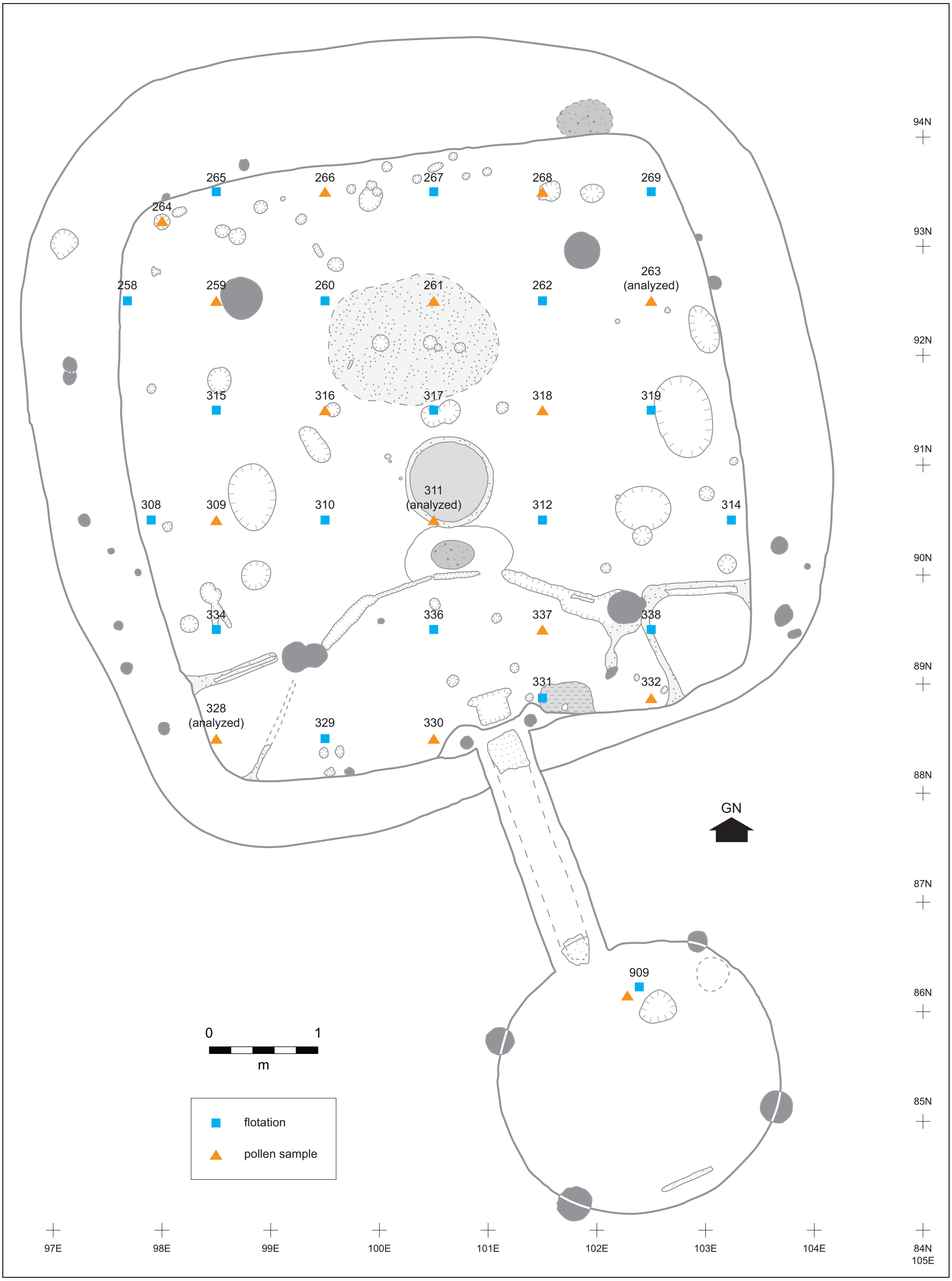


Figure 8.34. Flotation and pollen samples recovered from floor contact, Structure 1, LA 104106.

Table 8.13. LA 104106, Structure 1, floor and floor fill, ceramics.

		Architectural Unit Number			
		Main Chamber		Antechamber	
Pottery Type		**Floor Fill**	**Surface or Floor**	**Floor Fill**	**Table Total**
Cibola Gray					
Plain rim	Count	6	3	13	**22**
	Row %	27.27	13.64	59.09	**100.00**
	Col. %	6.82	1.83	3.17	**3.32**
Unknown rim	Count	–	–	2	**2**
	Row %	–	–	100.00	**100.00**
	Col. %	–	–	0.49	**0.30**
Plain body	Count	64	161	372	**597**
	Row %	10.72	26.97	62.31	**100.00**
	Col. %	72.73	98.17	90.73	**90.18**
Unfired plain gray	Count	–	–	3	**3**
	Row %	–	–	100.00	**100.00**
	Col. %	–	–	0.73	**0.45**
Mudware	Count	2	–	–	**2**
	Row %	100.00	–	–	**100.00**
	Col. %	2.27	–	–	**0.30**
Lino Smudged	Count	1	–	–	**1**
	Row %	100.00	–	–	**100.00**
	Col. %	1.14	–	–	0.15
Cibola White					
Unpainted, polished	Count	3	–	13	**16**
	Row %	18.75	–	81.25	**100.00**
	Col. %	3.41	–	3.17	**2.42**
Basketmaker III–Pueblo 1 (indeterminate mineral)	Count	5	–	2	**7**
	Row %	71.43	–	28.57	**100.00**
	Col. %	5.68	–	0.49	**1.06**
La Plata Black-on-white	Count	6	–	5	**11**
	Row %	54.55	–	45.45	**100.00**
	Col. %	6.82	–	1.22	**1.66**
Cibola Red					
Tallahogan Red (red slip over white paste)	Count	1	–	–	**1**
	Row %	100.00	–	–	**100.00**
	Col. %	1.14	–	–	**0.15**
Table Total	**Count**	**88**	**164**	**410**	**662**
	Row %	**13.29**	**24.77**	**61.93**	**100.00**
	Col. %	**100.00**	**100.00**	**100.00**	**100.00**

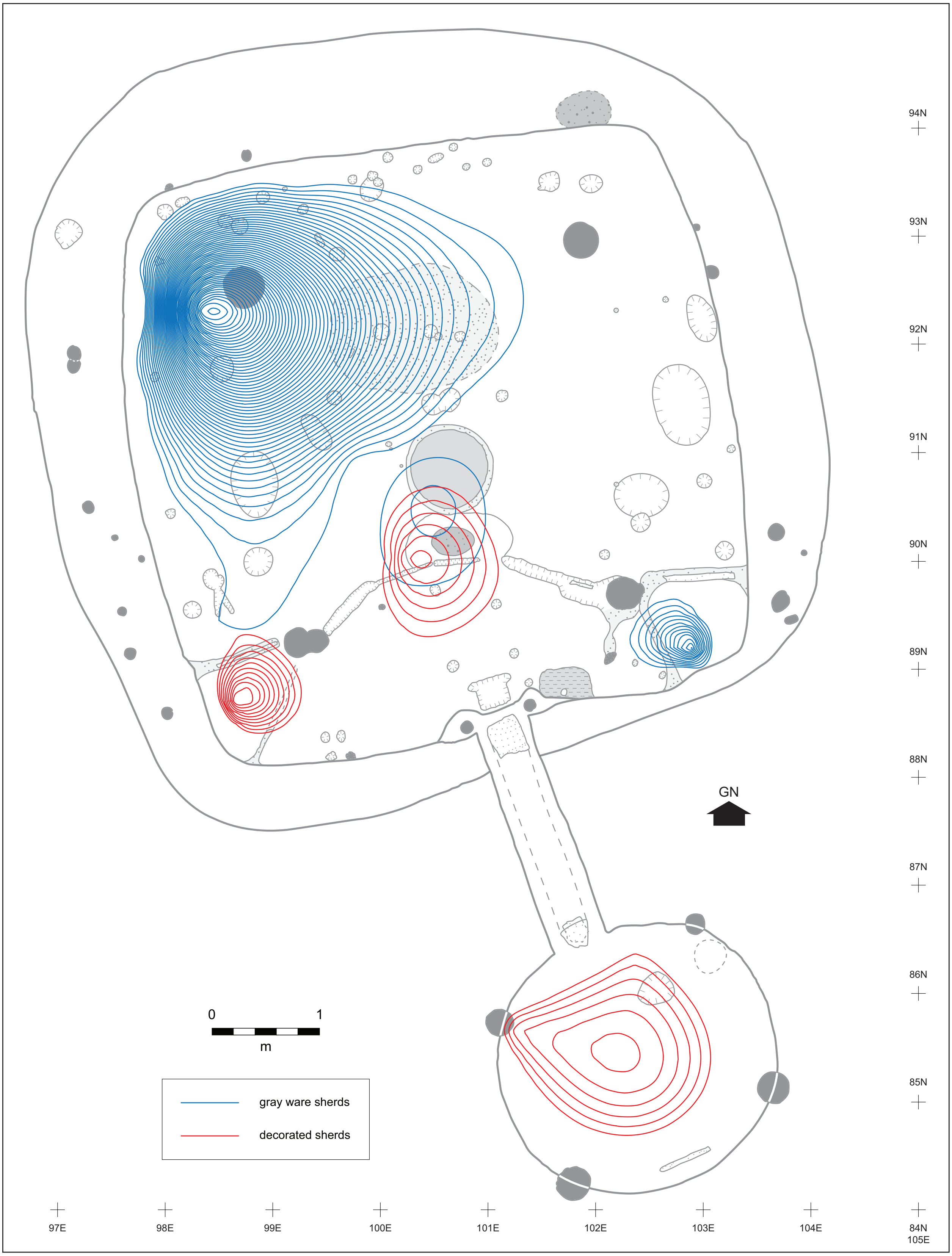


Figure 8.35. Decorated and gray ware ceramics recovered from floor fill context by aggregated weight, Structure 1, LA 104106.

weight alone. The northwest concentration shifts south, suggesting these ceramic artifacts are much larger in size when compared to the sherds associated with Vessel 2 (Fig. 8.36). Dissimilarity in frequency and size may be related to differences in associated discard or depositional environments. For example, given the close proximity of Vessel 2 to the northwest main roof support post, smaller sherd size in this area may be related to the trampling of this container during the removal of that particular architectural element. In contrast, the relatively larger size of jar sherds recovered from the southeast bin (Feature 75) suggests this partial vessel may have been stored in this location.

The distribution of bowls from floor fill context shows they were more common in the south-central and southeastern portion of the main chamber and in the antechamber. Although it is difficult to arrive at a definitive statement, the distribution of larger bowl sherds in these areas may be related to the storage of these partial vessels, similar to the jar sherds in Feature 75.

Flake stone artifacts consisted primarily of unutilized core flakes and flake fragments derived from local material types. In addition, nonlocal material types and several formal tools including cores, projectile points, and hammerstones were recovered (Table 8.14). The distribution of debitage recovered from the floor fill layer, by mean aggregated weight per square meter (mean = 3.4 g per artifact), show lithic material in four distinct concentrations (Fig. 8.37). Although some of the lithic artifacts associated with the concentrations in the main chamber likely represent secondary refuse, the higher proportion of larger flakes and occurrence of utilized debitage identified in the northeastern portion of the main chamber may represent an activity area. While the concentration of debitage in the antechamber likely includes secondary deposits, some may also be de facto refuse originally associated with Feature 112, an artifact cache. The distribution of chipped stone tools shows formal and utilized items present in the northeast portion while cores and hammerstones were common in the south-central and southwestern portion of the main chamber. This distribution, if related to site occupation activities, may reflect use and production locations, respectively.

In all, 15 in situ and three additional ground stone artifacts, recovered from features, were present in the main chamber and antechamber of Structure 1 (Table 8.15). Ground stone artifacts consisting of grinding slabs, two-hand manos, and shaped slabs, in addition to a basin metate and netherstones, used for processing pigment, were commonly distributed in the south portion of the main chamber (Fig. 8.38). Many of these items display residue of a red pigment possibly related to the production of fugitive red pottery. Some, including the shaped slabs, may have functioned as architectural elements used in the construction of wing walls and bins or as part of an apron surrounding the roof entry way. The number and type of ground stone artifacts, combined with the distribution of formal lithic tools common within the partitioned wing wall area of the main chamber structure, are additional evidence that the inhabitants segregated activities performed in this portion of the structure with those performed in the remainder of the main chamber.

Bone and eggshell artifacts (n = 139) recovered from floor fill contexts in Structure 1 were dominated by burned and unburned, fragmentary small mammal, rodent, and cottontail and jack rabbit remains (Table 8.16). Burned bone is distributed in a "band" extending from the northeast side of the central hearth (Feature 64) to the south side of the central hearth. The southern lobe of the burned bone distribution is dominated by cottontail and jack rabbit while the northeastern lobe is dominated by burned artiodactyl with a single burned canine fragment recovered near the central hearth (Fig. 8.39).

Unburned bone was distributed among four concentrations throughout the main chamber (AUN 1.01) while eggshell was only distributed in the antechamber (AUN 1.03). Unburned bone was dominated by small mammal, rodent, and cottontail and jack rabbit remains. The remainder of unburned bone consists artiodactyl fragments including elk, pronghorn, and exotic species such as hawk or harrier and bobcat. The distribution of unburned small mammal bone may be related to economy and subsistence; however, given the numerous burrowing species identified, the isolated distributions are more likely the result of natural, post-abandonment formation processes. Unidentifiable artiodactyl species were distributed near the central hearth while the more exotic species were distributed along the axes of the structure. Unburned and burned artiodactyl bone are clearly the result of subsistence practices related to the pro-

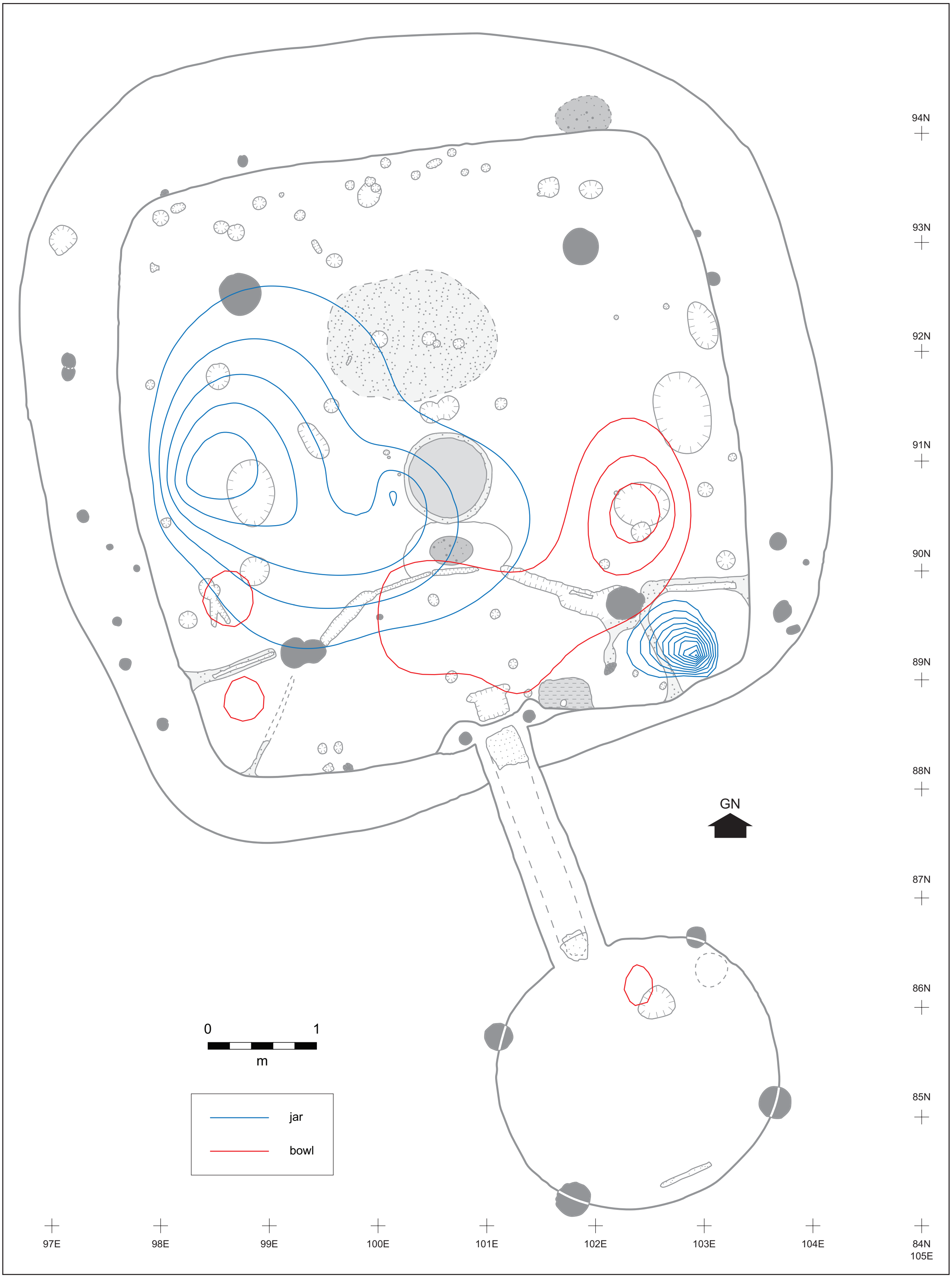


Figure 8.36 Bowl and jar sherds recovered from floor fill context by mean weight, Structure 1, LA 104106.

Table 8.14. LA 104106, Structure 1, floor and floor fill, lithic material.

			Architectural Unit			
			Main Chamber		Ante-chamber	
Material Class	**Artifact Morphology**		**Floor Fill**	**Surface or Floor**	**Floor Fill**	**Table Total**
Chert, local	Core flake	Count	2	–	1	**3**
		Row %	66.67	–	33.33	**100.00**
		Col. %	3.13	–	3.85	**3.13**
	Flake fragment	Count	1	1	–	**2**
		Row %	50.00	50.00	–	**100.00**
		Col. %	1.56	16.67	–	**2.08**
	Biface flake	Count	–	1	–	**1**
		Row %	–	100.00	–	**100.00**
		Col. %	–	16.67	–	**1.04**
Silicified wood, local	Core flake	Count	9	2	6	**17**
		Row %	52.94	11.76	35.29	**100.00**
		Col. %	14.06	33.33	23.08	**17.71**
	Angular debris	Count	3	–	2	**5**
		Row %	60.00	–	40.00	**100.00**
		Col. %	4.69	–	7.69	**5.21**
	Flake fragment	Count	6	–	2	**8**
		Row %	75.00	–	25.00	**100.00**
		Col. %	9.38	–	7.69	**8.33**
	Core	Count	1	–	1	**2**
		Row %	50.00	–	50.00	**100.00**
		Col. %	1.56	–	3.85	**2.08**
	Hammerstone	Count	2	–	2	**4**
		Row %	50.00	–	50.00	**100.00**
		Col. %	3.13	–	7.69	**4.17**
Sedimentary, local	Core flake	Count	–	1	–	**1**
		Row %	–	100.00	–	**100.00**
		Col. %	–	16.67	–	**1.04**
Quartzite, local	Core flake	Count	–	–	1	**1**
		Row %	–	–	100.00	**100.00**
		Col. %	–	–	3.85	**1.04**
	Hammerstone	Count	–	1	–	**1**
		Row %	–	100.00	–	**100.00**
		Col. %	–	16.67	–	**1.04**
Chert, non-local	Core flake	Count	21	–	1	**22**
		Row %	95.45	–	4.55	**100.00**
		Col. %	32.81	–	3.85	**22.92**
	Angular debris	Count	2	–	1	**3**
		Row %	66.67	–	33.33	**100.00**
		Col. %	3.13	–	3.85	**3.13**
	Flake fragment	Count	4	–	–	**4**
		Row %	100.00	–	–	**100.00**
		Col. %	6.25	–	–	**4.17**
	Biface flake	Count	1	–	–	**1**
		Row %	100.00	–	–	**100.00**
		Col. %	1.56	–	–	**1.04**
	Late stage biface	Count	1	–	–	**1**
		Row %	100.00	–	–	**100.00**
		Col. %	1.56	–	–	**1.04**

Table 8.14 (continued)

			Architectural Unit			
			Main Chamber		Ante-chamber	
Material Class	**Artifact Morphology**		**Floor Fill**	**Surface or Floor**	**Floor Fill**	**Table Total**
Obsidian, non-local	Core flake	Count	7	–	8	**15**
		Row %	46.67	–	53.33	**100.00**
		Col. %	10.94	–	30.77	**15.63**
	Angular debris	Count	2	–	1	**3**
		Row %	66.67	–	33.33	**100.00**
		Col. %	3.13	–	3.85	**3.13**
	Flake fragment	Count	1	–	–	**1**
		Row %	100.00	–	–	**100.00**
		Col. %	1.56	–	–	**1.04**
	Biface flake	Count	1	–	–	**1**
		Row %	100.00	–	–	**100.00**
		Col. %	1.56	–	–	**1.04**
Table Total		**Count**	**64**	**6**	**26**	**96**
		Row %	**66.67**	**6.25**	**27.08**	**100.00**
		Col. %	**100.00**	**100.00**	**100.00**	**100.00**

cessing of game animals around the central hearth while the identification of more exotic species spatially dispersed across the floor may be the result of abandonment processes.

Macrobotanical remains (n = 608) were identified from both floor and floor fill contexts within Structure 1, the majority of which were recovered from alternated flotation samples systematically recovered from the floor of main chamber (Table 8.17). The assemblage was dominated by burned cliff rose, piñon, juniper, and salt bush followed by carbonized corn remains. In addition, burned annuals identified included amaranth and goosefoot seeds. Unburned remains were dominated by goosefoot, spurge, purslane, and juniper. Carbonized perennial species were ubiquitous among the samples; however, at a minimum of 25 artifacts per square meter, four discrete concentrations are apparent. Similarly, burned corn remains were ubiquitous among all the samples but when a minimum of three artifacts per square meter was set, concentrations are apparent in the north-central portion and in the southwest portion of the structure with small pockets in the west and southeast. Unlike burned perennial and cultivar remains, burned annuals, at the same density of three items per square meter, were concentrated in the south-central portion of the main chamber (Fig. 8.40).

Unburned remains show a different distribution compared to burned remains. When limits were set at two items per square meter and 20 artifacts per square meter, respectively, unburned perennials were concentrated in the north-central area and a high concentration of unburned annuals were evident in the southwest portion of the main chamber (Fig. 8.41). When the burned and unburned macrobotanical data are compared with the burned and unburned faunal data an interesting pattern emerges. The concentration of unburned annuals present in the southwest portion of the structure is spatially associated with unburned bone suggesting that both are likely the result of post-abandonment processes perhaps related to burrowing animal species. The lack of unburned bone and perennial species, dominated by male juniper cones, suggest that green juniper boughs were used in the structure perhaps as roofing material. If so, this would imply that the structure was constructed or maintained in the spring or early summer. The close spatial association between burned macrobotanical and faunal remains indicates that processing, and presumably, the consumption of these important bi-

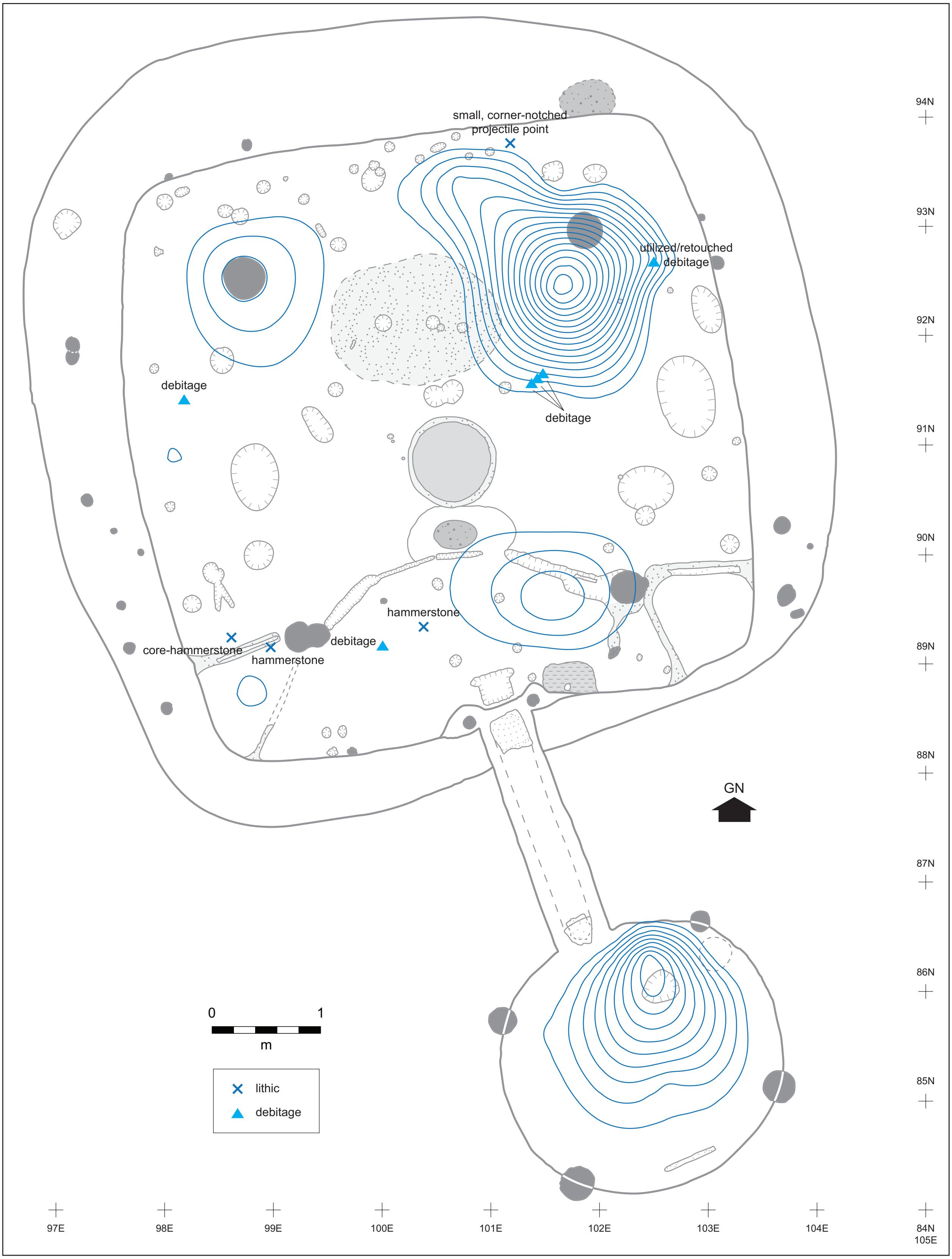


Figure 8.37. In situ lithic floor artifacts and lithic debitage aggregated by weight per square meter recovered from floor fill context, Structure 1, LA 104106.

Table 8.15. LA 104106, Structure 1, floor and floor fill, ground stone.

			Main Chamber		Bench	Ante-chamber	
Artifact Function	**Adhesions**		**Floor Fill**	**Surface or Floor**	**Surface or Floor**	**Floor Fill**	**Table Total**
Sedimentary, Local							
Indeterminate ground stone fragment	none	Count	1	–	–	–	**1**
		Row %	100.00	–	–	–	**100.00**
		Col. %	12.50	–	–	–	**6.67**
Grinding slab	pigment residue	Count	2	1	1	–	**4**
		Row %	50.00	25.00	25.00	–	**100.00**
		Col. %	25.00	25.00	50.00	–	**26.67**
Formal netherstone, (pigment processing)	pigment residue	Count	–	1	–	–	**1**
		Row %	–	100.00	–	–	**100.00**
		Col. %	–	25.00	–	–	**6.67**
Two-hand mano	none	Count	1	–	1	1	**3**
		Row %	33.33	–	33.33	33.33	**100.00**
		Col. %	12.50	–	50.00	100.00	**20.00**
	pigment residue	Count	1	–	–	–	**1**
		Row %	100.00	–	–	–	**100.00**
		Col. %	12.50	–	–	–	**6.67**
Basin metate	pigment residue	Count	–	1	–	–	**1**
		Row %	–	100.00	–	–	**100.00**
		Col. %	–	25.00	–	–	**6.67**
Shaped slab	none	Count	2	1	–	–	**3**
		Row %	66.67	33.33	–	–	**100.00**
		Col. %	25.00	25.00	–	–	**20.00**
Mano preform	none	Count	1	–	–	–	**1**
		Row %	100.00	–	–	–	**100.00**
		Col. %	12.50	–	–	–	**6.67**
Table Total		**Count**	**8**	**4**	**2**	**1**	**15**
		Row %	**53.33**	**26.67**	**13.33**	**6.67**	**100.00**
		Col. %	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

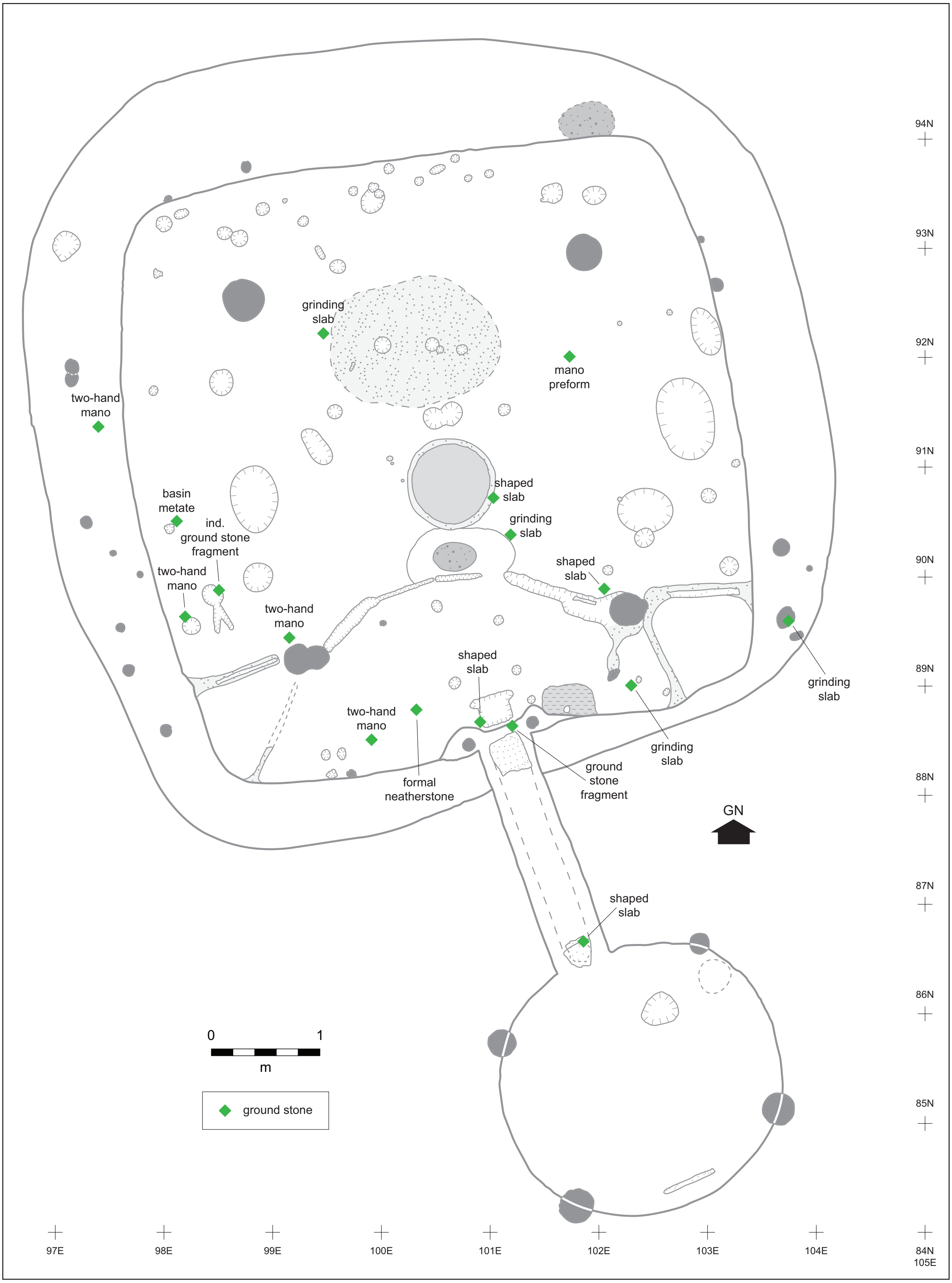


Figure 8.38. In situ ground stone artifacts from floor and floor fill contexts, Structure 1, LA 104106.

Table 8.16. LA 104106, Structure 1, floor and floor fill, faunal material.

		Main Chamber		Antechamber			
		Point Proven-ience	1 x 1 Grid Unit	Northeast Quad	Southeast Quad	1 x 1 Grid Unit	Table Total
No Burning							
Small mammal	Count	–	7	1	3	1	**12**
	Row %	–	58.33	8.33	25.00	8.33	**100.00**
	Col. %	–	6.67	16.67	27.27	8.33	**8.63**
Large mammal	Count	–	1	–	–	–	**1**
	Row %	–	100.00	–	–	–	**100.00**
	Col. %	–	0.95	–	–	–	**0.72**
Gunnison's prairie dog	Count	–	20	2	1	2	**25**
	Row %	–	80.00	8.00	4.00	8.00	**100.00**
	Col. %	–	19.05	33.33	9.09	16.67	**17.99**
Botta's pocket gopher	Count	–	–	–	1	–	**1**
	Row %	–	–	–	100.00	–	**100.00**
	Col. %	–	–	–	9.09	–	**0.72**
Peromyscus sp.	Count	–	–	–	–	1	**1**
	Row %	–	–	–	–	100.00	**100.00**
	Col. %	–	–	–	–	8.33	**0.72**
Small rodent	Count	–	3	–	–	–	**3**
	Row %	–	100.00	–	–	–	**100.00**
	Col. %	–	2.86	–	–	–	**2.16**
Desert cottontail	Count	–	20	2	1	4	**27**
	Row %	–	74.07	7.41	3.70	14.81	**100.00**
	Col. %	–	19.05	33.33	9.09	33.33	**19.42**
Black-tailed jack rabbit	Count	4	13	–	2	–	**19**
	Row %	21.05	68.42	–	10.53	–	**100.00**
	Col. %	80.00	12.38	–	18.18	–	**13.67**
Dog, coyote, wolf	Count	–	–	–	1	–	**1**
	Row %	–	–	–	100.00	–	**100.00**
	Col. %	–	–	–	9.09	–	**0.72**
Bobcat	Count	–	1	–	–	–	**1**
	Row %	–	100.00	–	–	–	**100.00**
	Col. %	–	0.95	–	–	–	**0.72**
Medium artiodactyl	Count	–	1	–	–	–	**1**
	Row %	–	100.00	–	–	–	**100.00**
	Col. %	–	0.95	–	–	–	**0.72**
Medium-to-large artiodactyl	Count	–	2	–	–	–	**2**
	Row %	–	100.00	–	–	–	**100.00**
	Col. %	–	1.90	–	–	–	**1.44**
Elk	Count	–	1	–	–	–	**1**
	Row %	–	100.00	–	–	–	**100.00**
	Col. %	–	0.95	–	–	–	**0.72**
Pronghorn	Count	–	–	–	1	–	**1**
	Row %	–	–	–	100.00	–	**100.00**
	Col. %	–	–	–	9.09	–	**0.72**
Eggshell	Count	–	–	–	–	4	**4**
	Row %	–	–	–	–	100.00	**100.00**
	Col. %	–	–	–	–	33.33	**2.88**
Hawks and harriers	Count	–	1	–	–	–	**1**
	Row %	–	100.00	–	–	–	**100.00**
	Col. %	–	0.95	–	–	–	**0.72**

Table 8.16 (continued)

		Main Chamber		Antechamber			
		Point Proven-ience	**1 x 1 Grid Unit**	**Northeast Quad**	**Southeast Quad**	**1 x 1 Grid Unit**	**Table Total**
Dry Burn							
Gunnison's prairie dog	Count	–	5	–	–	–	**5**
	Row %	–	100.00	–	–	–	**100.00**
	Col. %	–	4.76	–	–	–	**3.60**
Desert cottontail	Count	–	14	–	–	–	**14**
	Row %	–	100.00	–	–	–	**100.00**
	Col. %	–	13.33	–	–	–	**10.07**
Black-tailed jack rabbit	Count	–	1	–	–	–	**1**
	Row %	–	100.00	–	–	–	**100.00**
	Col. %	–	0.95	–	–	–	**0.72**
Medium-to-large artiodactyl	Count	–	6	–	–	–	**6**
	Row %	–	100.00	–	–	–	**100.00**
	Col. %	–	5.71	–	–	–	**4.32**
Light Burn							
Gunnison's prairie dog	Count	–	1	–	–	–	**1**
	Row %	–	100.00	–	–	–	**100.00**
	Col. %	–	0.95	–	–	–	**0.72**
Desert cottontail	Count	–	5	1	–	–	**6**
	Row %	–	83.33	16.67	–	–	**100.00**
	Col. %	–	4.76	16.67	–	–	**4.32**
Black-tailed jack rabbit	Count	1	–	–	1	–	**2**
	Row %	50.00	–	–	50.00	–	**100.00**
	Col. %	20.00	–	–	9.09	–	**1.44**
Heavy Burn							
Dog, coyote, wolf	Count	–	2	–	–	–	**2**
	Row %	–	100.00	–	–	–	**100.00**
	Col. %	–	1.90	–	–	–	**1.44**
Calcined							
Gunnison's prairie dog	Count	–	1	–	–	–	**1**
	Row %	–	100.00	–	–	–	**100.00**
	Col. %	–	0.95	–	–	–	**0.72**
Table Total	**Count**	**5**	**105**	**6**	**11**	**12**	**139**
	Row %	**3.60**	**75.54**	**4.32**	**7.91**	**8.63**	**100.00**
	Col. %	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

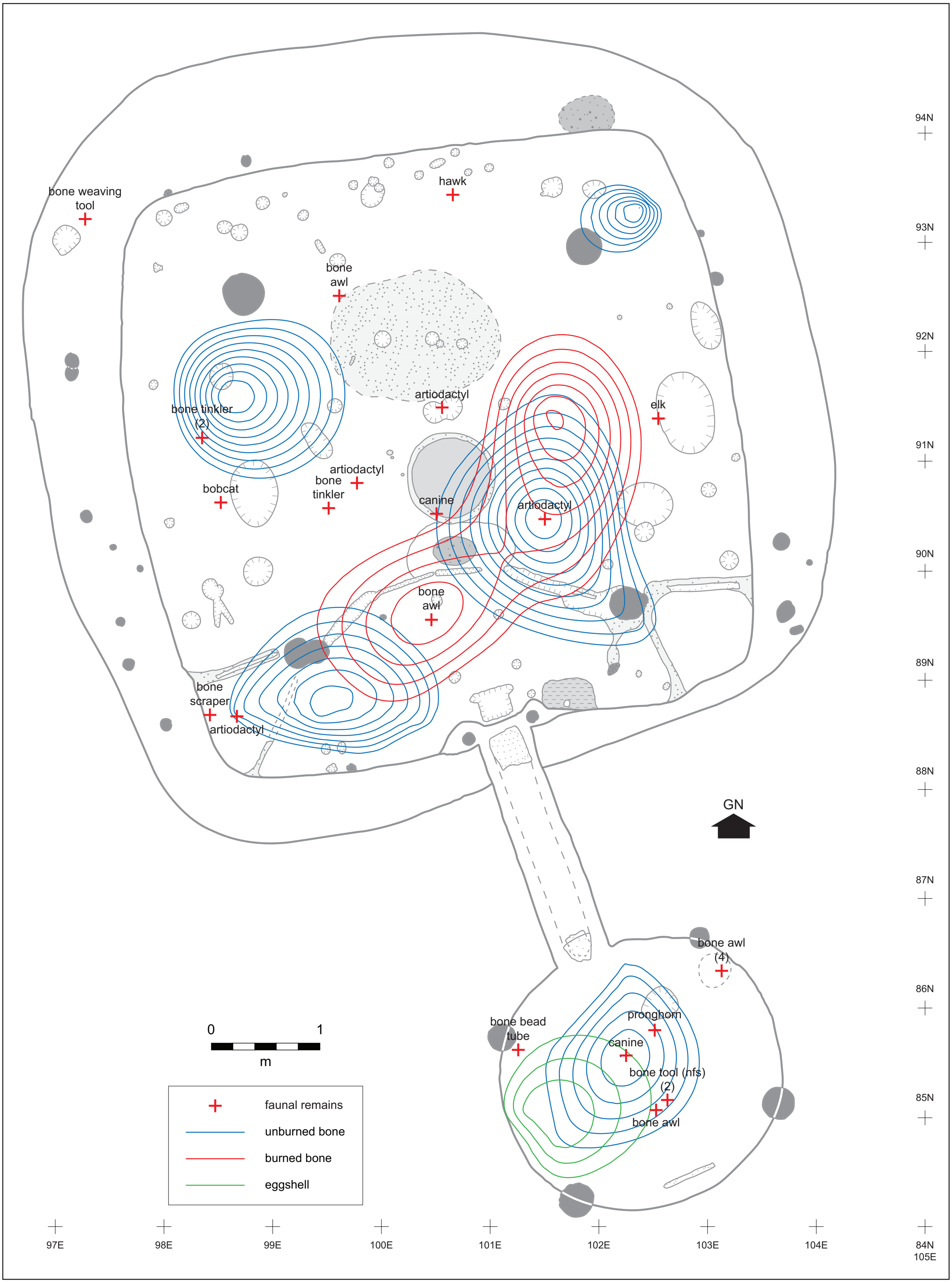


Figure 8.39. Bone artifacts from floor and floor fill contexts, Structure 1, LA 104106.

Table 8.17. LA 104106, Structure 1, floor and floor fill, macrobotanical material.

				Main Chamber	Antechamber		
				1 x 1 Grid Unit	North-east Quad	1 x 1 Grid Unit	
Charring State	**Botanical Group**	**Common Name**		**Floor Fill**	**Floor Fill**	**Floor Fill**	**Table Total**
Carbonized	Annuals	Amaranth	Count	7	-	-	**7**
			Row %	100.00	-	-	**100.00**
			Col. %	1.25	-	-	**1.15**
		Goosefoot	Count	5	1	1	**7**
			Row %	71.43	14.29	14.29	**100.00**
			Col. %	0.90	4.00	4.00	**1.15**
		Cheno-Am	Count	3	-	-	**3**
			Row %	100.00	-	-	**100.00**
			Col. %	0.54	-	-	**0.49**
		Sunflower	Count	1	-	-	**1**
			Row %	100.00	-	-	**100.00**
			Col. %	0.18	-	-	**0.16**
		White-stemmed stickleaf	Count	1	-	-	**1**
			Row %	100.00	-	-	**100.00**
			Col. %	0.18	-	-	**0.16**
		Purslane	Count	3	-	-	**3**
			Row %	100.00	-	-	**100.00**
			Col. %	0.54	-	-	**0.49**
	Perennials	Serviceberry	Count	3	-	4	**7**
			Row %	42.86	-	57.14	**100.00**
			Col. %	0.54	-	16.00	**1.15**
		Mountain mahogany	Count	-	-	1	**1**
			Row %	-	-	100.00	**100.00**
			Col. %	-	-	4.00	**0.16**
		Cliff rose	Count	14	5	-	**19**
			Row %	73.68	26.32	-	**100.00**
			Col. %	2.51	20.00	-	**3.13**
		Juniper	Count	132	7	7	**146**
			Row %	90.41	4.79	4.79	**100.00**
			Col. %	23.66	28.00	28.00	**24.01**
		Wolfberry	Count	1	-	-	**1**
			Row %	100.00	-	-	**100.00**
			Col. %	0.18	-	-	**0.16**
		Piñon	Count	61	8	6	**75**
			Row %	81.33	10.67	8.00	**100.00**
			Col. %	10.93	32.00	24.00	**12.34**
		Rose family	Count	2	-	-	**2**
			Row %	100.00	-	-	**100.00**
			Col. %	0.36	-	-	**0.33**
		Greasewood/ saltbush	Count	25	-	2	**27**
			Row %	92.59	-	7.41	**100.00**
			Col. %	4.48	-	8.00	**4.44**
		Coniferous wood	Count	9	-	-	**9**
			Row %	100.00	-	-	**100.00**
			Col. %	1.61	-	-	**1.48**

(Table 8.17, continued)

				Main Chamber	Antechamber		
				1 x 1 Grid Unit	North-east Quad	1 x 1 Grid Unit	
Charring State	**Botanical Group**	**Common Name**		**Floor Fill**	**Floor Fill**	**Floor Fill**	**Table Total**
		Non-coniferous wood	Count	1	-	-	**1**
			Row %	100.00	-	-	**100.00**
			Col. %	0.18	-	-	**0.16**
		Unknown taxon	Count	2	-	-	**2**
			Row %	100.00	-	-	**100.00**
			Col. %	0.36	-	-	**0.33**
	Cultivars	Corn	Count	39	2	1	**42**
			Row %	92.86	4.76	2.38	**100.00**
			Col. %	6.99	8.00	4.00	**6.91**
	Unidentified	Unknown	Count	1	-	-	**1**
			Row %	100.00	-	-	**100.00**
			Col. %	0.18	-	-	**0.16**
		Unidentifiable seed	Count	1	-	-	**1**
			Row %	100.00	-	-	**100.00**
			Col. %	0.18	-	-	**0.16**
Unburned	Annuals	Amaranth	Count	2	-	-	**2**
			Row %	100.00	-	-	**100.00**
			Col. %	0.36	-	-	**0.33**
		Goosefoot	Count	201	-	-	**201**
			Row %	100.00	-	-	**100.00**
			Col. %	36.02	-	-	**33.06**
		Cheno-Am	Count	3	-	-	**3**
			Row %	100.00	-	-	**100.00**
			Col. %	0.54	-	-	**0.49**
		Bugseed	Count	1	-	-	**1**
			Row %	100.00	-	-	**100.00**
			Col. %	0.18	-	-	**0.16**
		Spurge	Count	11	-	-	**11**
			Row %	100.00	-	-	**100.00**
			Col. %	1.97	-	-	**1.81**
		White-stemmed stickleaf	Count	1	2	-	**3**
			Row %	33.33	66.67	-	**100.00**
			Col. %	0.18	8.00	-	**0.49**
		Purslane	Count	11	-	-	**11**
			Row %	100.00	-	-	**100.00**
			Col. %	1.97	-	-	**1.81**
		Seepweed	Count	2	-	-	**2**
			Row %	100.00	-	-	**100.00**
			Col. %	0.36	-	-	**0.33**
	Perennials	Hedgehog cactus	Count	-	-	1	**1**
			Row %	-	-	100.00	**100.00**
			Col. %	-	-	4.00	**0.16**
		Juniper	Count	15	-	1	**16**
			Row %	93.75	-	6.25	**100.00**
			Col. %	2.69	-	4.00	**2.63**
	Grasses	Ricegrass	Count	-	-	1	**1**
			Row %	-	-	100.00	**100.00**
			Col. %	-	-	4.00	**0.16**
Table Total			**Count**	**558**	**25**	**25**	**608**
			Row %	**91.78**	**4.11**	**4.11**	**100.00**
			Col. %	**100.00**	**100.00**	**100.00**	**100.00**

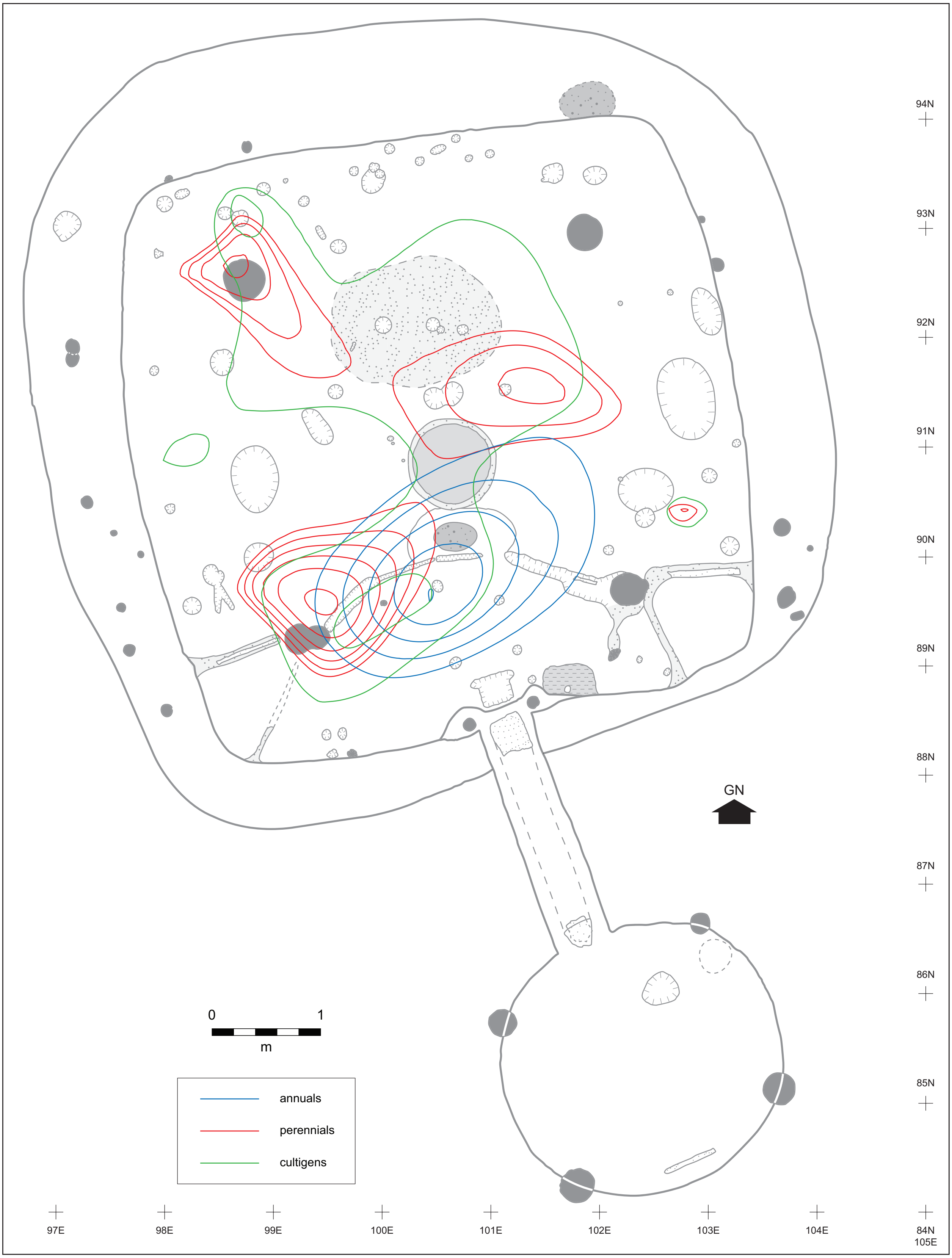


Figure 8.40. Carbonized macrobotanical remains recovered from floor and floor fill context aggregated by count, Structure 1, LA 104106.

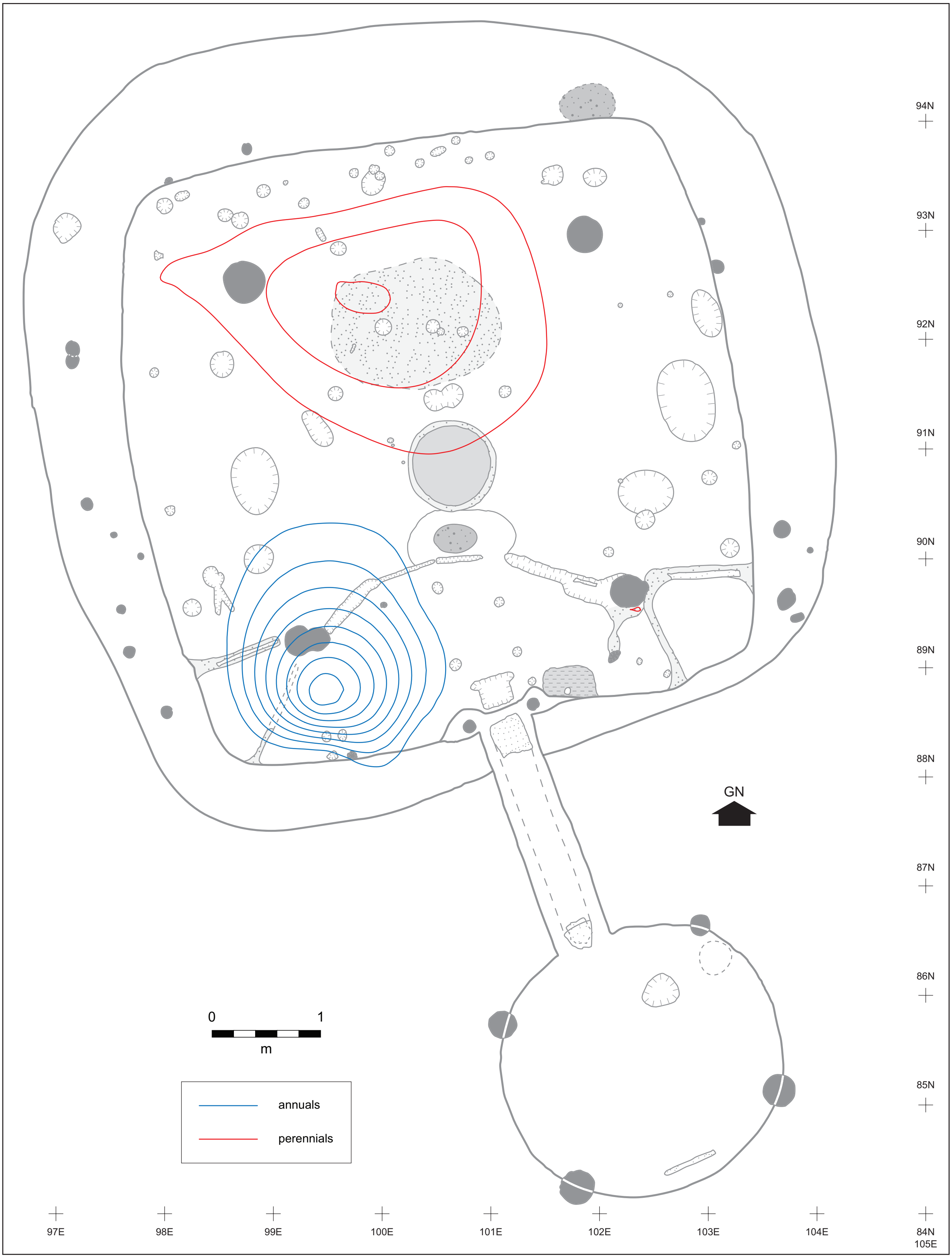


Figure 8.41. Uncarbonized macrobotanical remains recovered from floor and floor fill context aggregated by count, Structure 1, LA 104106.

otic resources, were common activities in the main chamber of Structure 1.

Based on aggregated artifact counts from floor, floor fill, and features set at a minimum of 5 artifacts per square meter, the high frequency of material present in the antechamber is the result of artifact counts associated with Feature 112, bone, and eggshell. These counts also show that the area defined by the wing wall and the area immediately adjacent to the hearth were likely activity or processing areas while the perimeter of the structure seems to have been maintained and is free of extraneous debris. This is especially true for the northeast and west-central portion of the main chamber (Fig. 8.42).

Structure 2 (AUN 2.01). Structure 2 was a shallow pit structure initially identified through a series of auger tests. Excavations began by stripping the surface deposits in the immediate area of the auger tests to define the horizontal limits, followed by excavating a trench of contiguous 1 by 1 m grid units in 10 cm levels along the 97N grid line to define the vertical limits. A second 1 by 1 m trench, perpendicular to the first was also excavated in 10 cm levels, down to floor fill. The two trenches partitioned the structure into four quadrants (Fig. 8.43). These four quadrants were excavated in one level to approximately 10 cm above the floor. Floor fill was excavated by grid unit and screened through 1/8-inch mesh. Floor contact artifacts were mapped as they were uncovered. After the floor was cleared, all features were defined, excavated, profiled, mapped, photographed, and described in detail.

The 1 by 1 m trenches clearly defined the horizontal and vertical limits of the structure and offered an exposure to evaluate the stratigraphic filling sequence. Structure 2 contained three soil layers including Stratum 1, which was identified as post-abandonment fill and two indigenous layers (Stratum 97 and Stratum 98). Stratum 1 was the uppermost layer identified in this structure under which Stratum 97 overlaid Stratum 98 (Fig. 8.44). The soil profile indicated that the upper portion of the structure filled by natural post-abandonment geomorphological processes while the lower portion of the structure filled through cultural and noncultural events.

Stratum 1 and Stratum 8 have been previously described in the stratigraphic descriptions for Structure 1. Stratum 97 was a very dark grayish brown (10YR 3/2 dry) cultural deposit that extended across the structure and had a maximum thickness of 30 cm. Stratum 97 was distinctive in the frequency and size of charcoal, and the presence of small tabular sandstone fragments contained in it. In addition to sandstone fragments, this layer contained a limited amount of artifacts. This unconsolidated deposit becomes diffuse toward both the outer limits and the floor of the structure and had a sharp boundary with underlying Stratum 98. Based on the high frequency of charcoal, Stratum 97 is interpreted as a burned superstructure or brush covering. Stratum 98 was a brown (10YR 53 dry) noncultural mixed deposit. This layer illustrates the prevalence of bioturbation that occurred following the abandonment of the site. This deposit formed through the mixing and churning of Stratum 97 with the native sterile substrate (Stratum 8). Stratum 98 was identified around the perimeter of the structure and truncated Stratum 97.

Nine features, associated with a single use surface, were present within Structure 2. Table 8.18 provides feature summary data; plan and profile views of features are presented in Appendix 5. In all, 1,003 artifacts and archaeological samples were recovered from Structure 2 (Table 8.1). Systematic excavation of the cross trenches indicated that artifacts were more common in the upper fill levels and may have been related to post-occupational deposition or cultural activity.

Construction. Structure 2 was constructed by excavating a circular basin 3.40 m long by 3.50 m wide and 80 cm deep down through Stratum 8. The sides and base of the aboriginal excavation formed the walls and floor of the structure. The floor and walls were unlined and defined by a compacted surface that appeared as one continuous surface between the floor and the walls. Perhaps the most distinguishing characteristic of Structure 2 was the presence of several large pits positioned near the center of the structure (Fig. 8.45).

Pit features. Structure 2 contained five pit features that ranged in size between 32 and 134 cm long, 30 and 121 cm wide, and 5 and 39 cm deep. The largest of the pit features (Feature 81) was located near the center of the structure. Feature 81 was constructed by excavating a steep-sided basin 39 cm below the surface of the floor. This feature was filled with a single homogeneous layer of loose charcoal-infused sandy loam with inclusions of charcoal and artifacts (Table 8.19). Ceramic artifacts in Feature

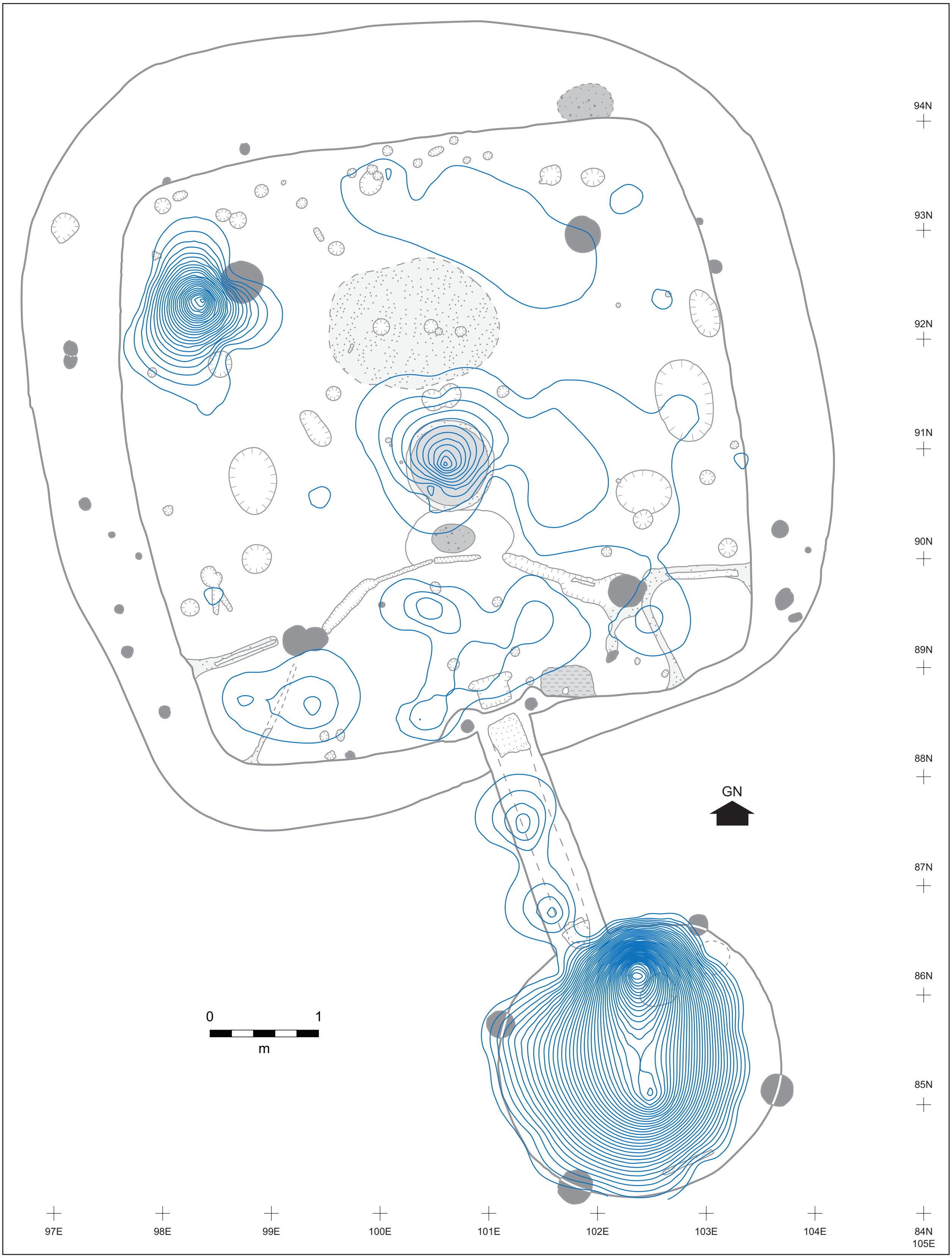


Figure 8.42. All cultural material recovered from floor and floor fill contexts aggregated by count, Structure 1, LA 104106.

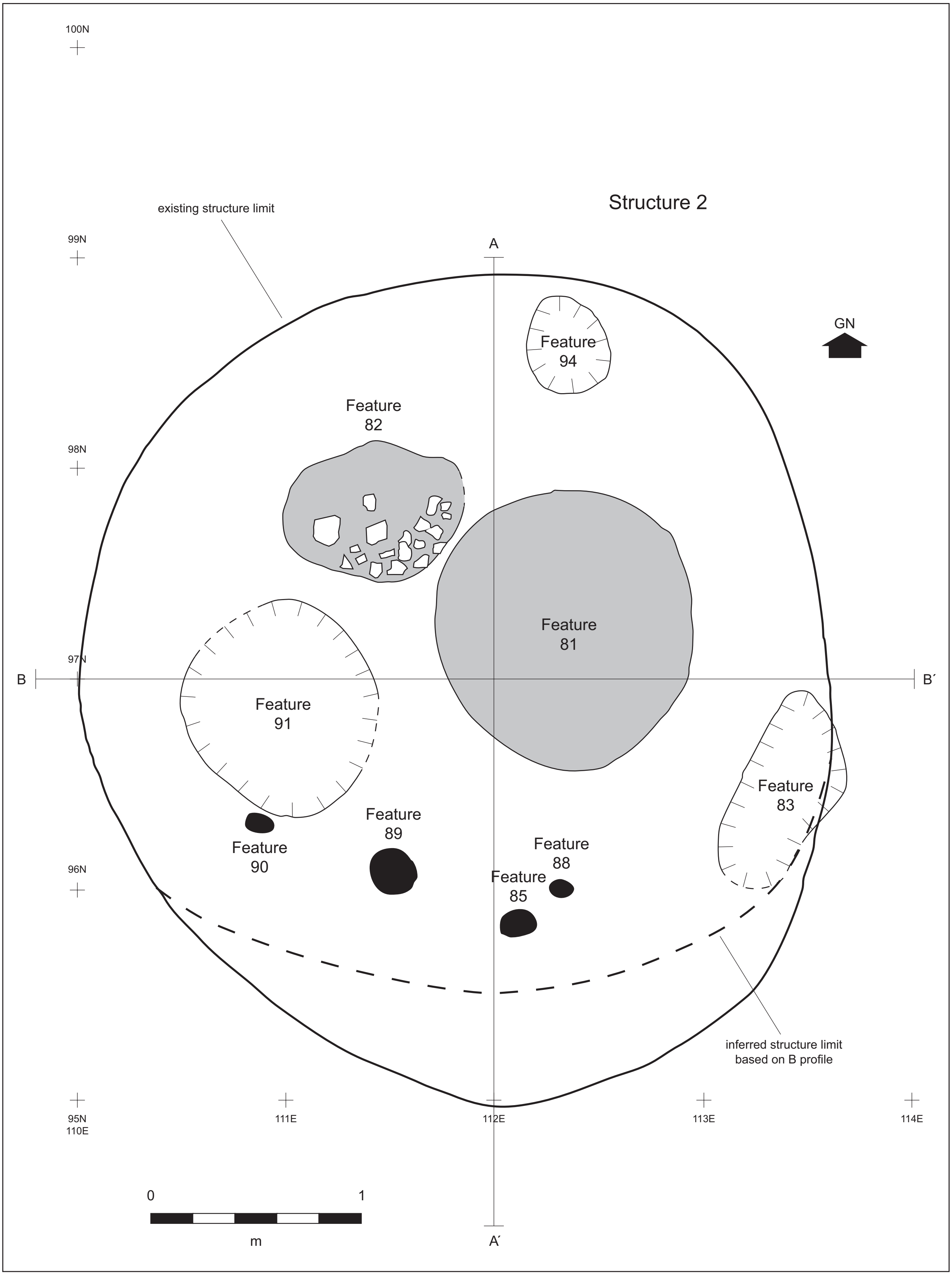


Figure 8.43. Plan of Structure 2, LA 104106.

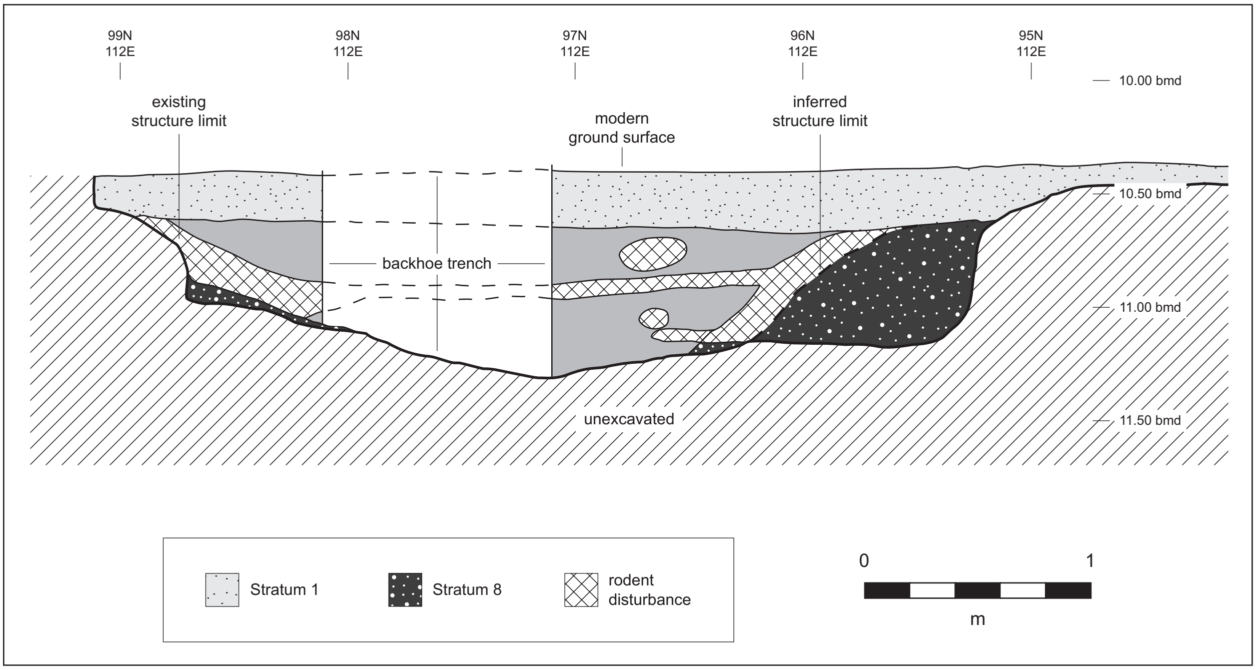


Figure 8.44. Soil profile, Structure 2, LA 104106.

81 were dominated by gray body and rim sherds, limited amount of nondiagnostic white wares, and few La Plata Black-on-white sherds (Table 8.20). Lithic artifacts were all unburned, derived from locally available materials, and included three pieces of unutilized debitage, a core, and a hammerstone (Table 8.21). Bone fragments were dominated by unburned, small mammal and rodent remains with a single fragmentary mule deer element, and fragmentary elements of the dog family (Table 8.22). Numerous macrobotanical remains were recovered from Feature 81, dominated by carbonized perennial shrubs and trees, cultivars, and uncarbonized annuals seeds (Table 8.23). A standard radiometric sample submitted for analysis yielded a conventional radiocarbon age of 1420 ± 60 (Beta-164343; *Pinus edulis* wood; δ^{13} = -25.0* o/oo).When calibrated a 2-sigma date range of 575–655 cal AD (p = .93) was produced (see Table 8.39). Based on the contents, fill, and morphology, this feature may have functioned as a parching or roasting facility where the processing of biotic materials required low-level heat.

Feature 82 was located adjacent to the northwest limit of Feature 81. Feature 82 was constructed by excavating a shallow basin with gently sloping sides 8 cm below the floor surface and lining the southern portion with small pieces of tabular sandstone (see Table 8.18). Feature 82 contained a single layer of loose charcoal-stained sandy loam. Suspended in the fill of this feature were numerous small fragments of sandstone. In addition, to the sandstone Feature 82 contained several plain gray body sherds (Table 8.20), unutilized debitage, a core, and a biface (Table 8.21). Numerous macrobotanical remains were also recovered from Feature 82, dominated by carbonized perennial shrubs and trees, cultivars, and uncarbonized annuals seeds (Table 8.23). Similar to Feature 81, the contents, fill, and morphology indicate this feature may have functioned as a processing facility for biotic materials requiring a low level of heat.

Feature 83 was located in the southeast quadrant near the limits of Structure 2. Feature 83 was constructed by excavating an oblong shallow basin with steep sloping sides 18 cm below the floor surface (see Table 8.18). Feature 83 contained a single layer of loose charcoal-stained sandy loam that contained a single egg shell fragment (Table 8.22). In addition to egg shell, a limited amount of macrobotanical remains, which were dominated by uncarbonized annuals seeds and perennial shrubs and trees followed by carbonized cultivars, were identified (Table 8.23). Given the location, Feature 83 may

Table 8.18. LA 104106, Study Unit 1, satellite structure and extramural feature summary data.

Feature	Type	Architectural Unit	Location[1]	Size (cm) Length x Width x Depth	Shape (Plan and Profile)	Fill	Contents	Comments
35	Animal interment, nfs	Extramural area	87.20N/ 92.60E	80 x 70 x 10 (inferred)	irregular, irregular	Layer 1 (10YR 7/3 dry very pale brown) loose, silty loam. Inclusions of small gravel, artifacts, and charcoal flecks in very low frequencies.	Macrobotanical	Disarticulated modern feature. Spoil from pipe line installation present.
81	Pit, nfs	2.01 (Structure 2)	96.32N/ 112.36E	134 x 121 x 39	circular, basin	Layer 1 (Munsell 10YR 6/4 light yellowish brown) fine charcoal-stained sand with laminated structure, and numerous charcoal fragments.	Ceramic, lithic, bone, and macrobotanical	Deep, steep-sided basin. ^{14}C sample (cal AD 640), piñon wood charcoal.
82	Pit, nfs	2.01 (Structure 2)	95.84N/ 111.48E	64 x 80 x 8	oval, basin	Layer 1 (Munsell 5YR 4/6 yellowish red) charcoal flecks mixed with loose sand.	Ceramic, lithic and macrobotanical	Shallow, gentle-sided basin with tabular sandstone lining the south half.
83	Pit, nfs	2.01 (Structure 2)	95.52N/ 113.16E	100 x 35 x 18	oval, basin	Layer 1 (Munsell 10YR 6/4 light yellowish brown) fine sand, with charcoal common in rodent burrows.	Eggshell and macrobotanical	Shallow, gentle-sided basin.
85	Pit, nfs	2.01 (Structure 2)	94.43N/ 112.11E	13 x 30 x 11	irregular, irregular	Layer 1 (Munsell 10YR 6/4 light yellowish brown) fine sand with some charcoal.	Macrobotanical	Shallow, gentle-sided basin.
88	Post support	2.01 (Structure 2)	94.94N/ 112.52E	14 x 14 x 10	circular, conical	Layer 1 (Munsell 10YR 6/4 light yellowish brown) fine sand with some charcoal.	Macrobotanical	Shallow, steep-sided feature.
89	Post support	2.01 (Structure 2)	95.15N/ 111.40E	22 x 22 x 28	circular, conical	Layer 1 (Munsell 10YR 6/4 light yellowish brown) fine sand.	Bone, macrobotanical, and pollen including Brassicaceae and Eriogonum	Moderately deep, steep-sided posthole.
90	Post support	2.01 (Structure 2)	95.28N/ 110.70E	13 x 18 x 5	oval, basin	Layer 1 (Munsell 10YR 6/4 light yellowish brown) fine sand.	N/A	Shallow, gentle-sided basin.

(Table 8.18, continued)

Feature	Type	Architectural Unit	Location[1]	Size (cm) Length x Width x Depth	Shape (Plan and Profile)	Fill	Contents	Comments
91	Storage facility	2.01 (Structure 2)	95.84N/ 110.92E	108 x 110 x 44	circular, basin	Layer 1 (Munsell 10YR 6/4 light yellowish brown) laminated sand and silty clay with charcoal.	Ceramic, lithic, ground stone, and concretion	Deep, steep-sided basin.
94	Pit, nfs	2.01 (Structure 2)	97.60N/ 112.32E	32 x 43 x 8	circular, basin	Layer 1 (Munsell 10YR 6/4 light yellowish brown) clean fine sand.	Macrobotanical	Shallow, gentle-sided basin.
114	Pit, nfs	3.01 (Structure 3)	80.70N/ 110.25E	24 x 56 x 9	oval, basin	Layer 1 (Munsell 10YR 6/3 pale brown) loose, fine sand with charcoal flecks.	Macrobotanical and pollen including Asteraceae Cleome, and Cucurbita	Shallow, gentle-sided basin. Articulates with Feature 117.
116	Pit, nfs	3.01 (Structure 3)	80.61N/ 110.33E	17 x 20 x 16	circular, conical	Layer 1 (Munsell 10YR 6/3 pale brown) loose, fine sand with charcoal flecks uncommon.	Macrobotanical	Shallow, adobe-lined basin.
117	Posthole	3.01 (Structure 3)	80.80N/ 110.66E	23 x 28 x 63	circular, cylindrical	Layer 1 (Munsell 10YR 6/4 light yellowish brown) compact clay. Layer 2 (Munsell 10YR 6/3 pale brown) sandy loam mixed with wood.	macrobotanical	Deep, cylindrical, adobe-lined feature. Terraced interior. Articulates into Feature 114. ^{14}C sample (AD 560),[2] piñon wood charcoal.
124	Posthole	5.01 (Structure 5)	73.80N/ 97.60E	20 x 20 x 17	circular, conical	Layer 1 (Stratum 2, Munsell 10YR 6/4 light yellowish brown) loose, fine sandy loam with charcoal flecks.	Macrobotanical	Deep, cylindrical posthole.
125	Posthole	5.01 (Structure 5)	74.52N/ 97.26E	20 x 21 x 37	circular, conical	Layer 1 (Stratum 2, Munsell 10YR 6/4 light yellowish brown) loose, fine sandy loam with charcoal flecks.	Macrobotanical and pollen including Eriogonum and Rosaceae	Deep, cylindrical posthole.
126	Pit, nfs	5.01 (Structure 5)	74.00N/ 97.13E	10 x 9 x 5	circular, basin	Layer 1 (Stratum 2, Munsell 10YR 6/4 light yellowish brown) loose, fine sandy loam with charcoal flecks. Loose, silty sand with small amounts of charcoal flecks.	N/A	Shallow, gentle-sided basin.

(Table 8.18, continued)

Feature	Type	Architectural Unit	Location[1]	Size (cm) Length x Width x Depth	Shape (Plan and Profile)	Fill	Contents	Comments
128	Posthole	5.01 (Structure 5)	72.91N/ 96.13E	7 x 6 x 8	circular, conical	Layer 1 (Stratum 2, Munsell 10YR 6/4 light yellowish brown) loose, fine sandy loam with charcoal flecks.	N/A	Deep, cylindrical posthole.
129	Posthole	5.01 (Structure 5)	73.63N/ 95.85E	8 x 5 x 10	circular, conical	Layer 1 (Stratum 2, Munsell 10YR 6/4 light yellowish brown) loose, fine sandy loam with charcoal flecks.	N/A	Deep, cylindrical posthole.
131	Pit, nfs	5.01 (Structure 5)	73.75N/ 96.70E	8 x 8 x 8	circular, cylindrical	Layer 1 (Stratum 2, Munsell 10YR 6/4 light yellowish brown) loose, fine sandy loam with charcoal flecks.	N/A	Shallow, cylindrical posthole.
134	Ceramic con-tainer	Extramural area	83.90N/ 103.12E	21 x 29 x 8	irregular, irregular	Stratum 2 (Munsell 10 YR 5/3 brown) sandy loam with charcoal. south of Structure 1.	Ceramic and lithic	Partial gray ware vessel.
135	Thermal feature, nfs	Extramural area	96.32N/ 109.28E	110 x 30 x 9	circular, (inferred) basin	Layer 1 (Munsell 10YR 6/3 light brown) silty sand with charcoal and fire-cracked rock.	Ceramic, lithic, and bone	Shallow, gentle-sided basin.
136	Pit, nfs	Extramural area	95.16N/ 110.12E	100 x 50 x 25	oval, basin	Layer 1 (Munsell 5YR 3/1 very dark gray, Munsell 5YR 3/2 dark reddish brown, Munsell 7.5YR 5/6 strong brown) charcoal stained fine sand.	Ceramic and lithic	Moderately deep, gentle-sided basin.
137	Cist, nfs	Extramural area	118.12N/10 7.36E	96 x 160 x 156	circular, bell-shaped	Layer 1 (Munsell 10YR 5/6 yellowish brown) loose, silty sand. Layer 2 (Munsell 5YR 4/4 reddish brown to 5YR 4/6 yellowish red) heavily oxidized, compacted silty sand. Layer 3 (Munsell 10YR 6/6 brownish yellow) sterile silty sand.	Lithic, ground stone, bone, macrobotanical	Deep, bell-shaped pit. Truncated by backhoe trench. Archaeomagnetic sample (AD 430–555).
138	Animal burial	7.01 (Structure 7)	94.30N/ 115.00E	5 x 15 x 5	irregular, irregular	Stratum 2 Silty charcoal-stained soil with inclusions of caliche, charcoal and ash.	N/A	Modern dog cranium found suspended in fill of structure.

(Table 8.18, continued)

Feature	Type	Architectural Unit	Location[1]	Size (cm) Length x Width x Depth	Shape (Plan and Profile)	Fill	Contents	Comments
139	Thermally altered pit, nfs	Extramural area	95.62N/ 94.36E	56 x 70 x 45	oval, basin	Layer 1 (Munsell 10YR 5/4 yellowish brown) Charcoal-stained soil. Layer 2 (Munsell 10YR 6/4 light yellowish brown) loose, fine sandy loam with charcoal flecks.	Lithic, ground stone and macrobotanical	Gentle-sided, shallow basin.
140	Post support	7.01 (Structure 7)	93.32N/ 115.24E	23 x 36 x 34	oval, basin	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sandy loam with charcoal flecks.	Macrobotanical	Shallow, steep sided basin.
141	Thermally altered pit, nfs	7.01 (Structure 7)	94.88N/ 113.56E	36 x 36 x13	circular, basin	Layer 1 (Munsell 10YR 5/4 yellowish brown). Charcoal-stained soil with sandstone fragments.	Ceramics, lithics, ground stone, bone, macrobotanical, and pollen including Eriogonum and Asteraceae	Shallow gentle-sided, basin with oxidized edges.
142	Posthole	7.01 (Structure 7)	94.20N/ 113.44E	45 x 24 x 31	circular, cylindrical	Layer 1 (Munsell 7.5YR 5/6) silty loam with charcoal flecks and caliche.	Macrobotanical	Deep, cylindrical feature.
143	Pit, nfs	7.01 (Structure 7)	93.70N/ 114.00E	29 x 28 x 15	circular, basin	Layer 1 (Munsell 10YR 6/3 pale brown) very fine sand.	Macrobotanical	Shallow, gentle-sided basin.
144	Pit, nfs	7.01 (Structure 7)	93.72N/ 114.64E	20 x 20 x 16	circular, basin	Layer 1 (Munsell 10YR 6/3 pale brown) fine sand with charcoal flecks.	Macrobotanical	Shallow, gentle-sided basin.
145	Thermally altered pit, nfs	Extramural area	69.34N/ 99.26E	66 x 28 x 14	oval, basin	Layer 1 (Munsell 10YR 8/2 dark gray brown) compacted sandy loam with charcoal. Layer 2 (Munsell 10YR 6/4 light yellowish brown). Sandy loam with charcoal flecks.	Lithic and macrobotanical	Shallow, gentle-sided basin with oxidized margins.
146	Pit, nfs	Extramural area	70.78N/ 100.08E	82 x 60 x 16	circular, basin	Layer 1 (Munsell 10YR 8/2 dark gray brown) sandy loam with high amount of charcoal, occasional clay, and carbonate flecks.	Lithic and macrobotanical	Shallow, gentle-sided basin with occasional oxidation at margins.

(Table 8.18, continued)

Feature	Type	Architectural Unit	Location[1]	Size (cm) Length x Width x Depth	Shape (Plan and Profile)	Fill	Contents	Comments
150	Pit, nfs	Extramural area	87.70N/ 103.40E	130 x 105 x 26	circular basin	Layer 1 (Munsell 2.5YR 5/4 light white brown) loose silty sand with charcoal flecks uncommon.	Macrobotanical	Moderately deep, steep-sided basin with oxidized tabular sandstone fragments.
151	Pit, nfs	7.01 (Structure 7)	93.60N/ 116.00E	18 x 18 x 18	circular, basin	Layer 1 (Munsell 10YR 6/4 light yellowish brown). Compacted sand with charcoal.	Lithic and bone and macrobotanical	Shallow, steep sided basin.
152	Posthole	7.01 (Structure 7)	93.92N/ 115.92E	30 x 26 x 68	circular, cylindrical	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, fine sand with charcoal flecks uncommon.	Lithics bone, macrobotanical, and unburned wood	Deep, cylindrical (AD 530),[2] piñon wood.
153	Pit, nfs	Extramural area	70.24N/ 99.60E	64 x 58 x 8	circular, basin	Layer 1 (Munsell 10YR 8/2 dark gray brown) sandy loam with charcoal.	N/A	Shallow, gentle-sided basin.
154	Pit, nfs	Extramural area	105.12N/10 7.36E	220 x 180 x 16	circular, basin	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, silty sand. Layer 2 (Munsell 2.5YR 3/0 very dark gray) fairly compacted, charcoal-stained silty sand.	Ceramic, lithic, ground stone, and macrobotanical	Shallow, gentle-sided basin.
174	Post	Extramural area	78.55N/ 113.06E	9 x 8 x 12	circular, cylindrical	Burned post fragment.	Dendrochronological sample (n/a)	Remnants of burned, in situ post.
175	Cist, nfs	Extramural area	104.20N/10 5.90E	115 x 101 x 97	circular, bell-shaped	Layer 1 (Munsell 10YR 6/4 light yellowish brown) loose, sandy loam with eolian and alluvial sorting.	N/A	Deep, bell-shaped pit.

[1] = Feature center point
[2] = intercept radiocarbon age
nfs = not further specified

Figure 8.45. Structure 2, LA 104106.

represent an abandoned storage feature. However, the absence of material culture coupled with the amount of disturbance precludes a definitive function.

Feature 91 was located southwest of the large central pit (Feature 81). Feature 91 was constructed by excavating a steep-sided basin pit 44 cm below the surface of the floor. Similar to Feature 82 this feature was filled with a single homogeneous layer of loose charcoal-infused sandy loam with inclusions of charcoal and artifacts (Table 8.19). Ceramic artifacts were dominated by gray body and rim sherds (Table 8.20). Lithic artifacts were all unburned and include four pieces of unutilized debitage derived from locally available materials (Table 8.21). Feature 91 was the only feature that contained ground stone consisting of a whole shaped slab and a mano fragment (Table 8.24) (see Murrell, below). No faunal remains were associated with this feature and only a limited amount of macrobotanical remains including carbonized cultivars and uncarbonized perennials were recovered (Table 8.23). Given the large amount of disturbance identified in the structure, it is possible the artifact assemblage may have been deposited through mixing processes. Based on the contents, fill, and morphology, this feature may have functioned as a storage facility.

Feature 94 was constructed by excavating a steep-sided basin pit 8 cm below the surface of the floor. This feature was filled with a single homogeneous layer of loose charcoal-infused sandy loam similar to Feature 85 (see Table 8.18). No artifacts were recovered from this feature and based on the contents, fill, and morphology, coupled with the amount of disturbance, a function for this feature is elusive.

Postholes. Four features interpreted as postholes (Feature 85, Feature 88, Feature 89, and Feature 90) were evenly spaced, display similar morphology, and were positioned along the south-central portion of the structure. Feature 85, located near the southern perimeter, was the smallest pit identified in Structure 2. Feature 85 was constructed by excavating a steep-sided basin pit 11 cm below the surface of the

Table 8.19. LA 104106, Study Unit 1, satellite structure and feature number by artifact type.

		Artifact Type									
Structure	**Feature**	**Ceramic**	**Lithic**	**Ground Stone**	**Bone**	**Pollen**	**Macrobotanical**	**Chronological Sample**	**Ornament, nfs**	**Bulk Sample**	**Table Total**
2	FLR/ FLR fill	54	4	1	4	–	–	–	–	–	**63**
	81	70	5	–	58	1	187	1	–	–	**322**
	82	20	5	–	–	2	30	–	–	1	**58**
	83	–	–	–	1	1	14	–	–	–	**16**
	85	–	–	–	–	1	29	–	–	–	**30**
	88	–	–	–	–	1	4	–	–	–	**5**
	89	–	–	–	18	1	6	–	–	–	**25**
	91	15	4	2	–	1	2	–	2	–	**26**
	94	–	–	–	1	1	23	–	–	–	**25**
3	FLR/ FLR fill	34	–	2	8	–	–	3	–	–	**47**
	114	–	–	–	–	1	4	–	–	–	**5**
	116	–	–	–	–	1	–	–	–	–	**1**
	117	–	–	–	–	1	65	2	–	–	**68**
5	FLR/ FLR fill	25	3	1	–	–	–	–	–	–	**29**
	124	–	–	–	–	1	–	–	–	–	**1**
	125	–	–	–	–	1	4	–	–	–	**5**
	126	–	–	–	–	1	–	–	–	–	**1**
	128	–	–	–	–	1	–	–	–	–	**1**
	129	–	–	–	–	1	–	–	–	–	**1**
	131	–	–	–	–	1	–	–	–	–	**1**
6	FLR/ FLR fill	5	4	–	5	–	–	–	–	–	**14**
7	FLR/ FLR fill	17	6	–	2	–	–	–	–	–	**25**
	140	–	–	–	–	1	73	–	–	–	**74**
	141	2	4	–	1	1	20	–	–	–	**28**
	142	–	–	–	1	1	51	–	–	–	**53**
	143	–	–	–	–	1	22	–	–	–	**23**
	151	–	1	–	1	1	7	–	–	–	**10**
	152	–	6	–	9	1	21	1	–	–	**38**
Table Total		**242**	**42**	**6**	**109**	**24**	**562**	**7**	**2**	**1**	**995**

nfs = not further specified

Table 8.20. LA 104106, Study Unit 1, satellite structure and feature number by ceramic type.

			Structure 2				Structure 3	Structure 5	Structure 6	Structure 7		
Ware	**Pottery Type**	**Vessel Form and Portion**	**F 0**	**F 81**	**F 82**	**F 91**	**F 0**	**F 0**	**F 0**	**F 0**	**F 141**	**Table Total**
Gray	Plain Rim	Bowl rim	1	2	–	1	–	–	–	–	–	4
		Jar rim	1	–	–	–	–	–	–	–	–	1
		Seed jar rim	1	2	1	–	–	–	–	1	–	5
	Unknown Rim	Indeterminate rim	–	–	–	–	–	–	–	–	1	2
	Plain Body	Indeterminate	–	–	–	–	1	–	–	–	–	1
		Jar neck	1	–	–	–	–	–	–	1	–	2
		Jar body	44	62	14	14	31	20	4	15	1	205
		Jar body with handle	–	1	–	–	–	–	–	–	–	1
		Jar body with lug handle	–	–	–	–	–	3	–	–	–	3
White	Basketmaker III–Pueblo I	Bowl rim	1	2	–	–	–	–	–	–	–	3
		Bowl body	2	–	–	–	–	–	–	–	–	2
	La Plata Black-on-white	Bowl rim	–	1	–	–	–	1	–	–	–	2
		Bowl body	3	–	–	–	–	1	–	–	–	4
Red	Tallahogan Red	Bowl rim	–	–	2	–	–	–	–	–	–	2
		Bowl body	–	–	2	–	–	–	1	–	–	3
		Jar body	–	–	1	–	–	–	–	–	–	1
Brown	Alma Plain	Body sherd, polished interior/exterior	–	–	–	–	1	–	–	–	–	1
Total			54	70	20	15	34	25	5	17	2	242

Table 8.21. LA 104106, Study Unit 1, satellite structure and feature number by lithic data.

Raw Material Type	Artifact Morphology	Artifact Function	Portion	Architectural Unit Number										Table Total
				Structure 2				Structure 5	Structure 6	Structure 7				
				Feature										
				0	81	82	91	0	0	0	141	151	152	
Local														
Chert	Biface flake	unutilized	whole	–	–	–	–	–	–	–	1	–	–	**1**
			proximal	–	–	–	–	–	–	–	–	–	1	**1**
Chalcedony	Flake fragment	unutilized	distal	–	–	–	–	–	–	–	–	–	1	**1**
Fossiliferous chert	Flake fragment	unutilized	Medial	–	–	–	–	–	1	–	–	–	–	**1**
Silicified wood	Angular debris	unutilized	indet.	–	2	–	–	–	1	–	–	–	–	**3**
	Core flake	unutilized	whole	1	1	1	–	1	1	1	–	–	–	**6**
			proximal	2	–	–	1	–	1	–	–	–	–	**4**
			lateral	1	–	–	–	1	–	1	–	–	–	**3**
	Biface flake	unutilized	whole	–	–	–	–	–	–	–	–	–	1	**1**
			proximal	–	–	–	1	–	–	–	–	–	–	**1**
	Flake fragment	unutilized	lateral	–	–	–	–	–	–	–	–	–	1	**1**
	Multidirectional core	unutilized	whole	–	–	1	–	1	–	–	–	–	–	**2**
	Bipolar core	unutilized	whole	–	1	–	–	–	–	–	–	–	–	**1**
	Hammerstone	hammer-stone	whole	–	1	–	–	–	–	–	–	–	–	**1**
Sandstone	Core flake	unutilized	whole	–	–	1	–	–	–	–	–	–	–	**1**
	Flake fragment	unutilized	distal	–	–	–	1	–	–	–	–	–	–	**1**
Non-local														
Chinle chert	Core flake	unutilized	whole	–	–	–	1	–	–	–	1	–	–	**2**
			lateral	–	–	–	–	–	–	1	1	–	–	**2**
Obsidian	Core flake	unutilized	whole	–	–	–	–	–	–	–	–	1	1	**2**
	Biface flake	unutilized	whole	–	–	–	–	–	–	–	–	–	1	**1**
	Flake fragment	unutilized	distal	–	–	1	–	–	–	–	–	–	–	**1**
	Middle-stage biface	biface	indet.	–	–	–	–	–	–	1	–	–	–	**1**
Grants Ridge obsidian	Angular debris	unutilized	indet.	–	–	–	–	–	–	1	–	–	–	**1**
	Core flake	unutilized	lateral	–	–	–	–	–	–	1	–	–	–	**1**
	Early-stage biface	biface	whole	–	–	–	–	–	–	–	1	–	–	**1**
	Middle-stage biface	biface	whole	–	–	–	–	–	–	–	–	–	–	**1**
Table Total				**4**	**5**	**5**	**4**	**3**	**4**	**6**	**4**	**1**	**6**	**42**

indet. = indeterminate

Table 8.22. LA 104106, Study Unit 1, satellite structure and feature number by faunal data.

Species	Element	Completeness	Architectural Unit Number												Table Total
			Structure 2					Structure 3	Structure 6	Structure 7					
			Feature												
			0	81	83	89	94	0	0	0	141	142	151	152	
Small mammal/ medium–large bird	Cranium	<25%	–	–	–	–	–	–	–	–	–	1	–	–	**1**
Small mammal	Long bone fragment	<25%	–	2	–	–	–	1	1	–	–	–	–	–	**4**
	Flat bone fragment	<25%	–	2	–	–	–	–	–	–	–	–	–	2	**4**
	Rib	<25%	–	1	–	–	–	–	–	–	–	–	–	–	**1**
Medium–large mammal	Indeterminate fragment	<25%	–	–	–	–	–	–	–	–	1	–	–	–	**1**
	Flat bone fragment	<25%	–	1	–	–	–	1	–	1	–	–	–	–	**3**
Gunnison's prairie dog	Cranium	<25%	–	8	–	–	–	–	–	–	–	–	1	–	**9**
	Mandible	Complete	–	1	–	–	–	–	–	–	–	–	–	–	**1**
		>75%	–	1	–	–	–	–	–	–	–	–	–	–	**1**
		<25%	–	3	–	–	1	1	–	–	–	–	–	–	**5**
	Rib	50–75%	–	4	–	–	–	–	–	–	–	–	–	–	**4**
		25–50%	–	4	–	–	–	–	–	–	–	–	–	–	**4**
	Clavicle	>75%	–	1	–	–	–	–	–	–	–	–	–	–	**1**
	Innominate	50–75%	–	1	–	–	–	–	–	–	–	–	–	–	**1**
	Humerus	>75%	–	1	–	–	–	–	–	–	–	–	–	–	**1**
		50–75%	–	1	–	–	–	–	–	–	–	–	–	–	**1**
	Radius	>75%	–	1	–	–	–	–	–	–	–	–	–	–	**1**
		50–75%	–	2	–	–	–	–	–	–	–	–	–	–	**2**
	Ulna	50–75%	–	1	–	–	–	–	–	–	–	–	–	–	**1**
		25–50%	–	3	–	–	–	–	–	–	–	–	–	–	**3**
	MC 3	Complete	–	–	–	–	–	–	–	–	–	–	–	1	**1**
	Tibia	25–50%	–	2	–	–	–	–	–	–	–	–	–	–	**2**
	Fibula	50–75%	–	1	–	–	–	–	–	–	–	–	–	–	**1**
Botta's pocket gopher	Mandible	>75%	–	1	–	–	–	–	–	–	–	–	–	–	**1**
Banner–tailed kangaroo rat	Innominate	50–75%	1	–	–	–	–	–	–	–	–	–	–	–	**1**
Peromyscus sp.	Mandible	Complete	–	1	–	–	–	–	–	–	–	–	–	–	**1**
Medium–large rodent	Long bone fragment	<25%	–	1	–	–	–	–	–	–	–	–	–	1	**2**
	Flat bone fragment	<25%	–	1	–	–	–	–	–	–	–	–	–	3	**4**
	Cranium	<25%	–	–	–	–	–	–	–	–	–	–	–	1	**1**
	Innominate	<25%	–	–	–	–	–	–	–	–	–	–	–	1	**1**
Desert cottontail	Cranium	<25%	–	1	–	–	–	–	–	–	–	–	–	–	**1**
	Mandible	<25%	–	2	–	–	–	1	–	–	–	–	–	–	**3**
	Rib	50–75%	–	1	–	–	–	–	–	–	–	–	–	–	**1**
	Scapula	25–50%	–	1	–	–	–	–	–	–	–	–	–	–	**1**
	Innominate	25–50%	–	–	–	1	–	–	–	–	–	–	–	–	**1**
	Femur	<25%	–	2	–	–	–	2	1	–	–	–	–	–	**5**
	Tibia	<25%	1	1	–	1	–	–	–	–	–	–	–	–	**3**
	Tarsal	Complete	–	–	–	3	–	–	–	–	–	–	–	–	**3**
	Astragalus	Complete	–	–	–	1	–	–	–	–	–	–	–	–	**1**

(Table 8.22, continued)

Species	Element	Complete-ness	Architectural Unit Number												Table Total
			Structure 2					Struct-ure 3	Struct-ure 6	Structure 7					
			Feature												
			0	81	83	89	94	0	0	0	141	142	151	152	
Small mammal/ medium–large bird	Cranium	<25%	–	–	–	–	–	–	–	–	–	1	–	–	**1**
	Calcaneous	Complete	–	–	–	1	–	–	–	–	–	–	–	–	**1**
		50–75%	–	–	–	–	–	1	–	–	–	–	–	–	**1**
	MT 2	Complete	–	–	–	1	–	–	–	–	–	–	–	–	**1**
	MT 3	Complete	–	–	–	1	–	–	–	–	–	–	–	–	**1**
	MT 4	Complete	–	–	–	1	–	–	–	–	–	–	–	–	**1**
	MT 5	Complete	–	–	–	1	–	–	–	–	–	–	–	–	**1**
	First phalanx (pes)	Complete	–	–	–	4	–	–	–	–	–	–	–	–	**4**
	Second phalanx (pes)	Complete	–	–	–	3	–	–	–	–	–	–	–	–	**3**
Black–tailed jack rabbit	Femur	<25%	1	–	–	–	–	–	–	–	–	–	–	–	**1**
	Tibia	<25%	–	1	–	–	–	–	–	–	–	–	–	–	**1**
Dog	Cranium	<25%	–	1	–	–	–	–	–	–	–	–	–	–	**1**
	MT 5	Complete	–	1	–	–	–	–	–	–	–	–	–	–	**1**
Medium artiodactyl	Rib	<25%	–	1	–	–	–	1	–	–	–	–	–	–	**2**
Medium–large artiodactyl	Rib	<25%	–	–	–	–	–	–	1	1	–	–	–	–	**2**
Elk	Rib	<25%	1	–	–	–	–	–	–	–	–	–	–	–	**1**
Mule deer	Metacarpal	<25%	–	1	–	–	–	–	–	–	–	–	–	–	**1**
Very large bird	Long bone fragment	<25%	–	–	–	–		–	2	–	–	–	–	–	**2**
Eggshell	Eggshell	<25%	–	–	1	–		–	–	–	–	–	–	–	**1**
Table Total			**4**	**58**	**1**	**18**	**1**	**8**	**5**	**2**	**1**	**1**	**1**	**9**	**109**

Table 8.23. LA 104106, Study Unit 1, satellite structure and feature number by macrobotanical data.

			Architectural Unit																	
			Structure 2								Structure 3		Structure 5	Structure 7						
			Feature																	
			81	82	83	85	88	89	91	94	114	117	125	140	141	142	143	151	152	Table Total
Carbonized																				
Annuals	Amaranth	Seed	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**2**
	Goosefoot	Seed	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3	–	–	**3**
	Cheno-Am	Seed	–	–	–	–	1	1	–	–	–	–	–	–	–	–	–	–	–	**2**
Perennials	Sagebrush	Wood	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**1**
	Mountain mahogany	Wood	–	–	–	–	–	–	–	15	–	–	–	–	–	–	–	–	–	**15**
	Cliff rose	Wood	3	–	–	3	–	–	–	–	–	–	–	–	–	–	–	–	–	**6**
	Cholla	Seed	–	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**2**
	Hedgehog cactus	Seed	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**1**
	Juniper	Wood	13	16	–	9	–	–	–	4	–	3	–	13	5	9	–	–	7	**79**
	Pine	Needle	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	**1**
	Piñon	Nutshell	2	–	–	2	–	–	–	–	–	–	–	–	–	–	–	–	–	**4**
		Wood	20	–	–	8	–	–	–	2	–	–	–	7	11	7	–	–	3	**58**
	Prickly pear	Seed	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	**1**
	Rose family	Wood	3	1	–	–	–	–	–	–	–	–	–	–	4	1	–	–	–	**9**
	Greasewood/ saltbush	Wood	–	2	–	–	–	–	–	–	–	–	–	–	–	1	–	–	1	**4**
	Nonconifer-ous wood	Wood	–	1	–	–	–	–	–	–	–	–	–	–	–	2	–	–	–	**3**
Grasses	Ricegrass	Caryopsis	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**1**
Cultivars	Corn	Cupule	5	4	2	2	2	1	1	1	–	1	–	2	-	2	1	2	2	**28**
		Glume	1	–	–	2	–	–	–	–	–	–	–	–	–	–	–	–	–	**3**
		Kernel	3	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**5**
		Embryo	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**1**
Unidentified	Unidentifi-able seed	Seed	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**1**
Unburned																				
Annuals	Goosefoot	Seed	129	2	9	–	1	4	–	–	3	26	4	44	–	26	8	1	–	**257**
	Spurge	Seed	–	–	–	–	–	–	–	–	1	14	–	–	–	–	1	–	–	**16**
	Purslane	Seed	–	–	–	–	–	–	–	–	–	–	–	3	–	–	–	–	–	**3**
Perennials	Juniper	Twig	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	**1**
		Cone (male)	–	–	2	–	–	–	–	1	–	–	–	–	–	–	–	–	–	**3**
	Piñon	Wood	–	–	–	–	–	–	–	–	–	14	–	–	–	–	–	–	8	**22**
Grasses	Ricegrass	Caryopsis	2	–	–	1	–	–	1	–	–	7	–	3	-	2	9	4	–	**29**
Unidentified	Knotweed family	Seed	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	**1**
Table Total			**187**	**30**	**14**	**29**	**4**	**6**	**2**	**23**	**4**	**65**	**4**	**73**	**20**	**51**	**22**	**7**	**21**	**562**

Table 8.24. LA 104106, Study Unit 1, satellite structure and feature number by ground stone data.

			Architectural Unit				
			Structure 2		Structure 3	Structure 5	
				F 91			Table Total
Local							
Sandstone	indeterminate ground stone fragment	internal fragment	-	-	1	1	**2**
	mano fragment	edge fragment	-	1	-	-	**1**
	basin metate	whole	-	-	1	-	**1**
	shaped slab	whole	-	1	-	-	**1**
Orthoquartzite	one-hand mano	whole	1	-	-	-	**1**
Table Total			**1**	**2**	**2**	**1**	**6**

floor (see Table 8.18). This feature was filled with a single homogeneous layer of loose charcoal-infused sandy loam with inclusions of charcoal. No artifacts were recovered from this feature yet macrobotanical remains were present, dominated by carbonized perennial shrubs and trees and cultivars with trace amounts of uncarbonized taxon present (Table 8.23). This feature may represent a shallow posthole however given the amount of disturbance identified, feature function is tenuous.

Feature 88 was constructed by excavating a steep-sided basin pit 10 cm below the surface of the floor. This feature was filled with a single homogeneous layer of loose charcoal-infused sandy loam with inclusions of charcoal (Table 8.19). No artifacts were recovered from this feature yet trace amounts of macrobotanical remains including carbonized cultivars, annuals, and uncarbonized annuals, perennials, and grasses were identified (Table 8.23).

Feature 89 was constructed by excavating a steep-sided basin 28 cm below the surface of the floor. This feature was filled with a single homogeneous layer of loose charcoal-infused sandy loam with inclusions of charcoal (Table 8.18). Suspended in the fill of this feature were numerous unburned fragments and complete skeletal elements from the lower limb of a desert cottontail. In addition, trace amounts of macrobotanical remains including uncarbonized annuals, carbonized cultivars, and annuals were identified (Table 8.23). A pollen sample submitted for analysis yielded evidence for native trees and shrubs, economic species, and herbs. Tree and shrub taxon were dominated by piñon/juniper while economic species were limited to *Chenopodium/amaranthus*. Herbs identified include the sunflower family, buckwheat, and mustard (see Appendix 2).

Feature 90 was constructed by excavating a steep-sided basin pit 5 cm below the surface of the floor. This feature was filled with a single homogeneous layer of loose charcoal-infused sandy loam with inclusions of charcoal (see Table 8.18). No artifacts or macrobotanical remains were recovered from this feature.

Floor artifact assemblage. In all, 63 artifacts were recovered from the floor and floor fill deposits of Structure 2 (Table 8.19). Ceramics consist primarily of plain gray jar sherds with a limited amount of Basketmaker III–Pueblo I white ware bowl sherds including La Plata Black-on-white (Table 8.23). Although the sample size limits pattern recognition, ceramic artifacts were more common in the center of the structure and may be related to post-abandonment processes. Lithic artifacts consisted of four unutilized core flakes derived from locally available silicified wood. In addition, a single, whole, one-hand mano derived of orthoquartzite was recovered (Table 8.22). In situ ground stone artifacts consisted of a whole basin metate and a internal fragment of an indeterminate tool (Table 8.24). Ground stone artifacts were located in the southeast portion of the structure and may have functioned secondarily as architectural elements. Bone artifacts were limited to three unburned fragments of small mammal or rodent. A single unburned fragment of elk rib was identified (Table 8.22).

Structure 3 (AUN 3.01). Structure 3 was a shallow pit structure initially identified through a series of auger tests. Excavations began by excavating two perpendicular 1 by 1 m trenches in 10 cm levels along the 79N grid line and 111E line. The two trenches clearly defined the maximum horizontal and vertical limits of the structure, partitioned the structure into two unexcavated areas, and offered an exposure used to evaluate the stratigraphic filling sequence (Fig. 8.46). The two unexcavated areas were then each excavated down in two full-cut levels to approximately 10 cm above the floor. Floor fill was excavated by grid unit and screened through 1/8-inch mesh. Floor contact artifacts were mapped as they were uncovered. After the floor was cleared, all features were defined, excavated, profiled, mapped, photographed, and described in detail. Structure 3 contained two soil layers, Stratum 1 and Stratum 2, identified as post-abandonment fill deposited by natural geomorphological processes (see descriptions above) (Fig. 8.47). A total of 536 artifacts and archaeological samples were recovered from Structure 3 (see Table 8.1). The frequency of and types of ceramic artifacts recovered through the systematic excavation of the 1 by 1 m trenches was similar to that identified in Structure 1, indicating these structures are contemporaneous and were abandoned at the same time.

Construction. Structure 3 was constructed by excavating a circular basin 2.75 m long by 2.55 m wide and 1.30 m deep down through Stratum 8. The sides and base of the aboriginal excavation formed a portion of the walls and floor of the structure. Appearing as a continuous surface, the floor rises to meet the walls and both are defined by a compacted surface. A section of wall located in the southeast portion of the structure appears to have been constructed using tabular sandstone slabs set vertically to support loose extramural fill. Although these slabs were horizontal at the time of discovery, their size and frequency lends to this interpretation (Fig. 8.48). Structure 3 contained three features including two pits (Feature 114 and Feature 116) and a posthole (Feature 117), all located along the northern perimeter of the structure (see Fig. 8.44).

Feature 114 was constructed by excavating a basin 9 cm below the surface of the floor with gently sloping sides that articulated with the north wall of the structure. This feature was filled with a single homogeneous layer of loose sandy loam with inclusions of charcoal flecks. No artifacts were recovered; however, macrobotanical remains include uncarbonized annuals (Table 8.23). A pollen sample submitted for analysis yielded evidence for native trees and shrubs, economic species, and herbs. Tree and shrub taxon were dominated by piñon/juniper followed by sage and rose family species. Economic species include cholla, beeweed, squash, *Chenopodium/amaranthus*, and sunflower family (see Appendix 2). Feature 116 was located to the west of Feature 114 and was constructed by excavating a steep-sided basin 18 cm below the surface. This feature was filled with a single homogeneous layer of loose sandy loam with inclusions of charcoal flecks. No artifacts were recovered from this feature.

Feature 117 was located adjacent to the north wall of Structure 3 within Feature 114. Feature 117, interpreted as a large posthole, was constructed by excavating a deep cylindrical pit 63 cm below the floor surface, truncating a portion of Feature 114. Evidence of remodeling or maintenance was present in the southern portion of the feature indicating the installation of a shallow, secondary or supplemental post support adjacent to the deeper support. Feature 117 was filled with a single homogeneous layer of loose sandy loam with inclusions of charcoal flecks and unburned wood. No artifacts were recovered; however, macrobotanical remains include uncarbonized annuals, perennials, and grasses with trace amounts of carbonized perennials and cultivars (Table 8.23).

A sample of unburned wood submitted for dendrochronological examination yielded a noncutting data of AD 514–621 vv (see Appendix 6). A radiometric sample, also recovered from Feature 117, yielded a conventional AMS radiocarbon age of 1510 ± 40 (Beta-164344; *Juniperus* wood; δ^{13} = -22.9 l). When calibrated using OxCal v3.8, a 2-sigma date

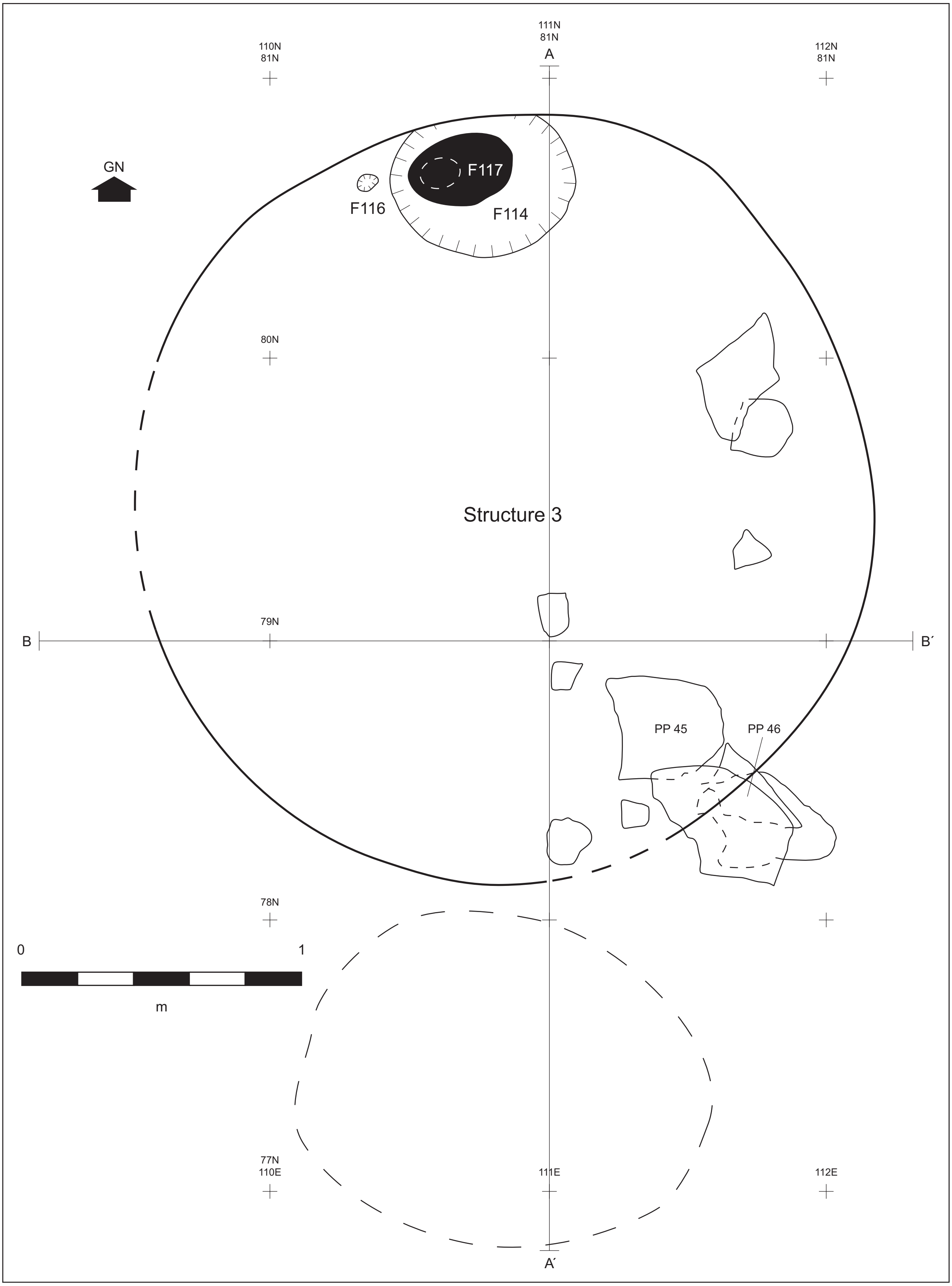


Figure 8.46. Plan of Structure 3, LA 104106

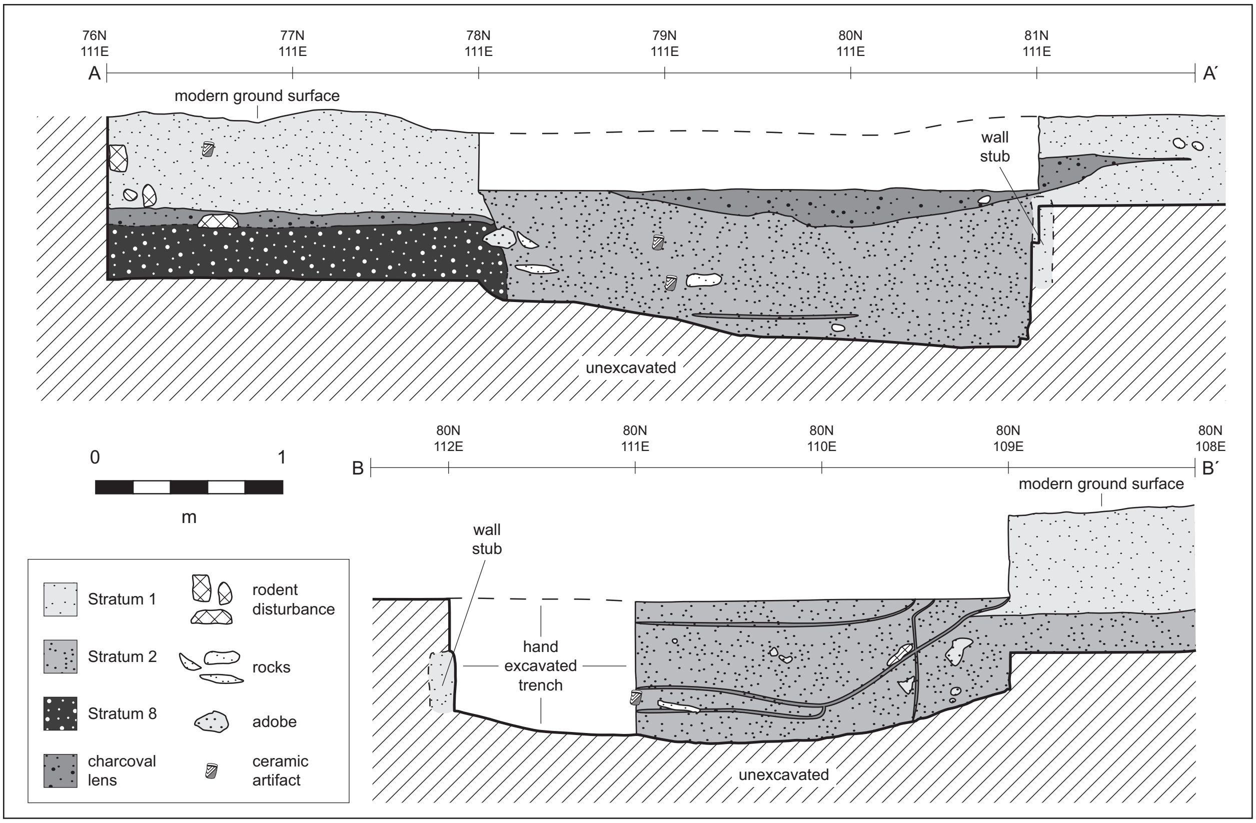


Figure 8.47. Soil profile of Structure 3, LA 104106.

Figure 8.48. Structure 3, LA 104106.

range of 430–600 cal AD (p = .95) was generated (see Table 8.39).

Floor artifact assemblage. In all, 47 artifacts and archaeological samples were recovered from the floor and floor fill deposits of Structure 3 (Table 8.19). Except for two ground stone artifacts, all artifact were recovered from floor fill levels. Ceramics consisted of plain gray sherds and a single plain brown ware sherd (Table 8.20). Although the sample size limits pattern recognition, ceramic artifacts were more common in the northeastern portion of this structure and may be related to feature function or use. Bone artifacts were limited to seven unburned fragments of small mammal or rodent and a single unburned fragment of medium artiodactyl (Table 8.22). Bone fragments were uncommon in floor fill levels suggesting post-abandonment deposition. In situ ground stone artifacts consist of a whole basin metate and a internal fragment of an indeterminate tool (Table 8.24). Ground stone artifacts were located in the southeast portion of the structure and may have functioned secondarily as architectural elements.

Structure 5 (AUN 5.01). Structure 5 was a shallow pit structure initially identified through a hand excavations using 1 m grid units. These excavations identified a dense charcoal-stained area, further investigated using a 1 by 1 m trench in 10 cm levels along the 96E line (Fig. 8.49). The trench effectively removed the majority of fill from the structure. The remaining fill was also removed by grid unit in a single level down to the floor and screened through 1/4-inch mesh. A total of 133 artifacts and archaeological samples were recovered from Structure 5 and spatially associated grid units (see Table 8.1). Floor contact artifacts were point located as they were uncovered. After the floor was cleared, all features were defined, excavated, profiled, mapped, photographed, and described in detail.

The 1 by 1 m trench clearly defined the horizontal

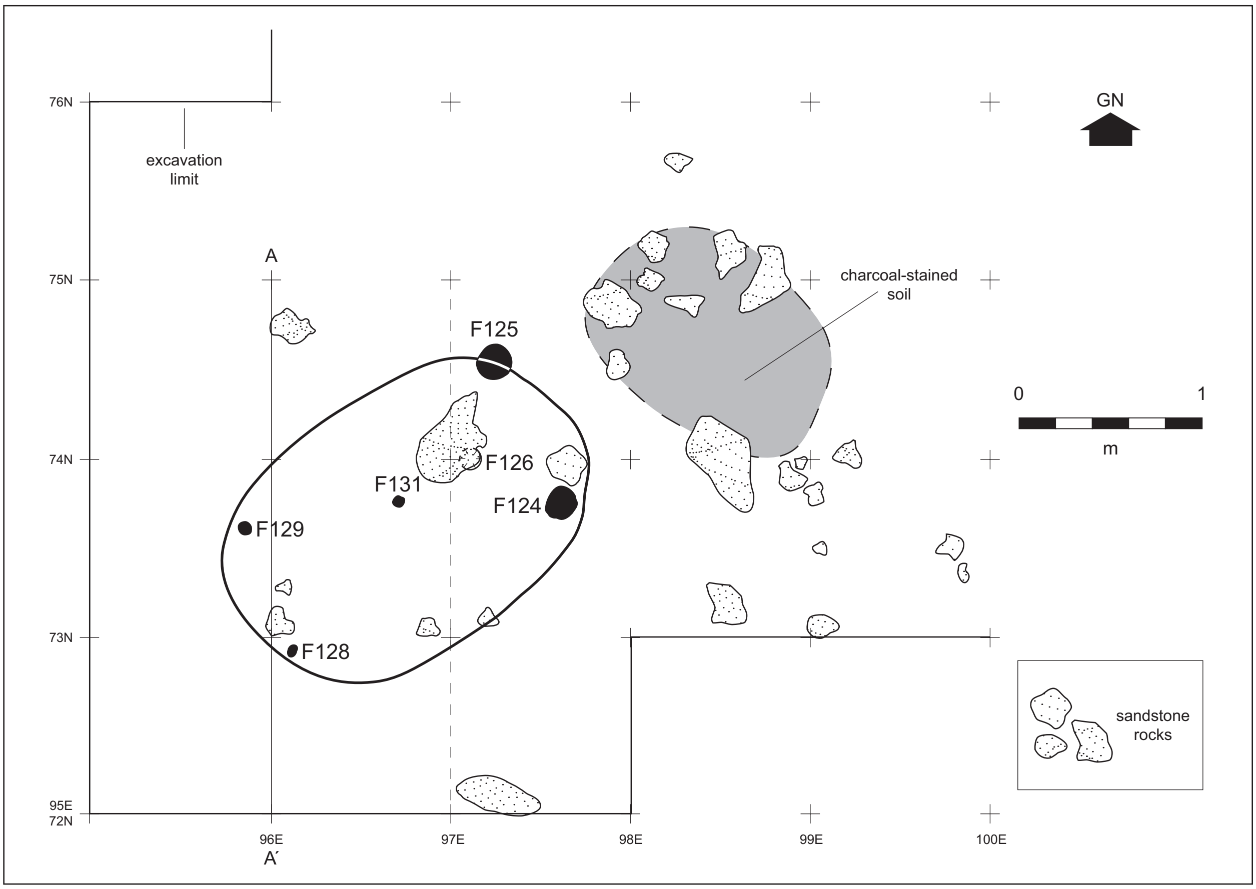


Figure 8.49. Plan of Structure 5, LA 104106.

and vertical limits of the structure and offered an exposure to evaluate the stratigraphic filling sequence. Structure 5 contained four soil layers, Stratum 1, Stratum 95, and Stratum 96 (Fig. 8.50). The soil profile indicated that the upper portion of the structure filled through post-abandonment noncultural geomorphological processes while the lower portion of the structure filled as part of the abandonment event. Re-occupation is represented in the upper fill levels and consists of ceramic types diagnostic of the Pueblo II to Pueblo III periods. All stratigraphic layers display a prevalence of bioturbation.

Stratum 95 was below Stratum 1 (see above) and consisted of a very dark grayish brown (10YR 6/3 dry) noncultural deposit that extended across the structure and onto the original ground surface surrounding Structure 5. With a maximum thickness of 50 cm, Stratum 95 was distinguished by the presence of small, burned and unburned tabular sandstone fragments. In addition to sandstone fragments, this layer contained artifacts and a limited amount of charcoal. This unconsolidated deposit became diffuse across the original ground surface and had a sharp boundary with underlying Stratum 8. Based on the high frequency of artifacts and sandstone fragments, Stratum 95 is interpreted as a mix of post-abandonment fill and superstructure. Stratum 96 was a brown (10YR 5/3 dry) noncultural deposit. This layer was similar to Stratum 95 in texture yet was distinguished by a lower frequency of artifacts, tabular sandstone, and an increased frequency of charcoal.

Construction. Structure 5 was constructed by excavating an oval basin 2.20 m long by 1.45 m wide and 0.45 m deep through Stratum 8, the native sterile substrate (80 cm below modern ground surface). The sides and base of the aboriginal excavation formed the walls and floor of the structure, which appeared as a continuous surface. Structure 5 contained six features including two pits (Feature 126 and Feature 131) and a four postholes (Feature 124, Feature 125, Feature 128, and Feature 129) (Fig. 8.51).

Postholes. Feature 124 was constructed by excavating a steep-sided conical basin 17 cm below the surface of the floor adjacent to the southeast wall of the structure. This feature was filled with a single homogeneous layer of loose sandy loam with inclusions of charcoal flecks. No artifacts were recovered. Feature 125 was constructed by excavating a

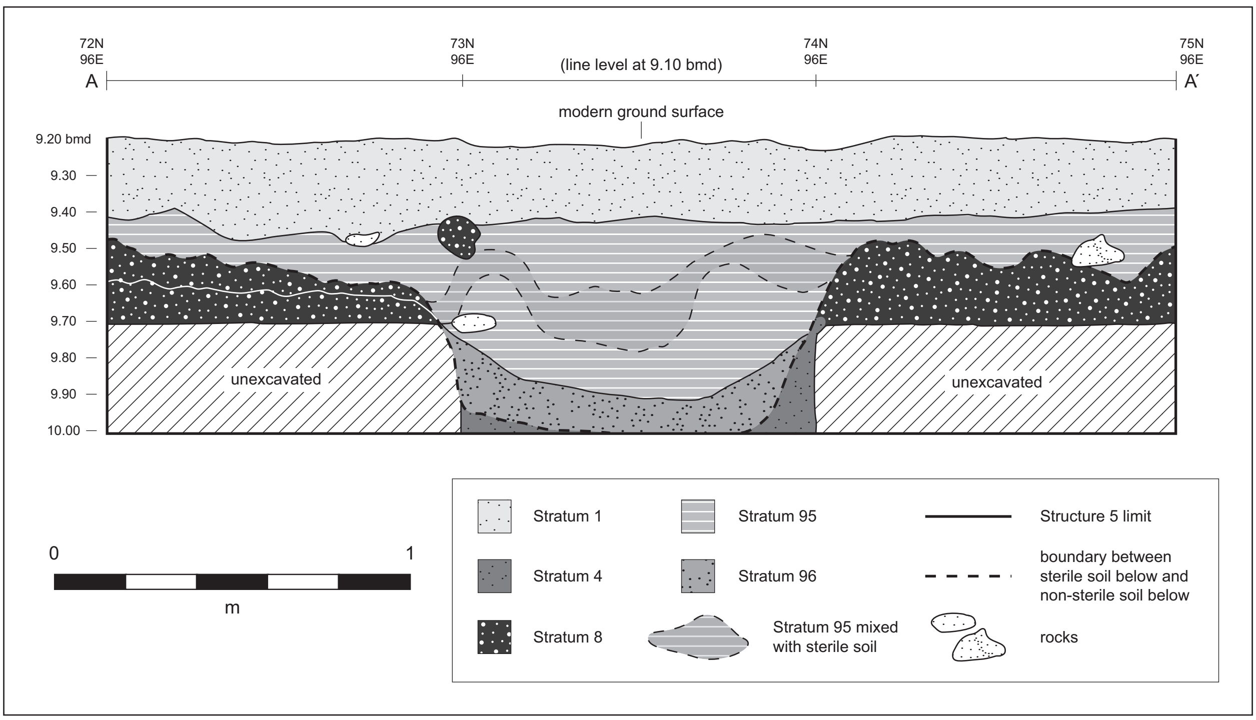


Figure 8.50. Soil profile of Structure 5, LA 104106.

Figure 8.51. Structure 5, LA 104106.

steep-sided conical basin 37 cm below the surface of the floor, which truncated the northeast wall of the structure. Similar to Feature 124, this feature was filled with a single homogeneous layer of loose sandy loam with inclusions of charcoal flecks. No artifacts were recovered; however, macrobotanical remains include four unburned goosefoot seeds (Table 8.23). A pollen sample submitted for analysis yielded evidence for native trees and shrubs, economic species, and herbs. Tree and shrub taxon were dominated by piñon/juniper followed by sage and rose family species. Economic species identified include *Chenopodium/amaranthus* remains, sunflower family, buckwheat, and mustard (see Appendix 2).

Feature 128 was located in the southwest portion of the structure and was constructed by excavating a steep-sided conical-shaped basin 8 cm below the surface. This feature was filled with a single homogeneous layer of loose sandy loam with inclusions of charcoal flecks. No artifacts were recovered from this feature. Feature 129 was located in the southwest portion of the structure and was constructed by excavating a conical-shaped basin 10 cm below the surface. This feature was filled with a single homogeneous layer of loose sandy loam with inclusions of charcoal flecks. No artifacts were recovered from this feature.

Pits. Feature 126 and Feature 131 were located in the east-central and central portion of the structure, respectively. Each feature was constructed by excavating a cylindrical pit 5–8 cm below the floor surface. No artifacts were recovered from these features. These features may represent shallow postholes used to support a small rack.

Floor artifact assemblage. Twenty-nine artifacts were recovered from the floor and fill deposits of Structure 5 (Table 8.19). Except for a single ceramic artifact (PP 52) and one ground stone artifact (PP 63) all other artifacts were recovered from floor fill levels. PP 52 consists of three floor contact ceramics that refit into a larger plain gray jar body sherd with lug handles. The floor contact ground stone artifact was an internal fragment from an indeterminate parent tool.

Floor fill ceramics were dominated by plain gray body sherds and La Plata Black-on-white bowl sherds were also identified (Table 8.20). Lithic artifacts recovered from the floor fill consisted of two unutilized pieces of debitage and a multidirectional core (Table 8.21). Although sample size is small, artifacts were evenly distributed across the floor and floor fill layers. The lack of internal thermal features, combined with the inferred post support features and limited floor space, suggests Structure 5 was used for storage.

Structure 6 (AUN 6.01). Structure 6 was shallow pit structure initially identified through auger tests. These tests identified a dense charcoal-stained area subsequently investigated using two perpendicular 1 by 1 m trenches excavated in 10 cm levels between the 116–117N line and the 109–110E line (Fig. 8.52). These trenches clearly established the horizontal and vertical limits of the structure and effectively removed the majority of fill from the structure. The remaining fill was removed by quadrant in a single level down to the floor fill. Floor fill was excavated by grid unit and screened through 1/4-inch mesh. In all, 97 artifacts and archeological samples were recovered from Structure 6 and spatially associated grid units outside the limits of the structure (see Table 8.1). Floor contact artifacts were point located as they were uncovered. After the floor was cleared, all features were defined, excavated, profiled, mapped, photographed, and described in detail.

Each 1 by 1 m trench offered an exposure to evaluate the stratigraphic filling sequence. Structure 6 contained two soil layers, Stratum 1 and Stratum 2 (Fig. 8.52). The filling sequence indicated the structure filled through noncultural geomorphological processes. Both stratigraphic layers display bioturbation as contributing to the stratigraphic formation. The frequency of artifacts recovered through the systematic excavation of the 1 by 1 m grid unit from Stratum 1 and Stratum 2 trenches in Structure 1 was similar to that identified in Structure 6, indicating these structures were abandoned at the same time.

Construction. Structure 6 was constructed by excavating a circular basin approximately 3.0 m in diameter and 60 cm deep through Stratum 8, the native sterile substrate (65 cm below modern ground

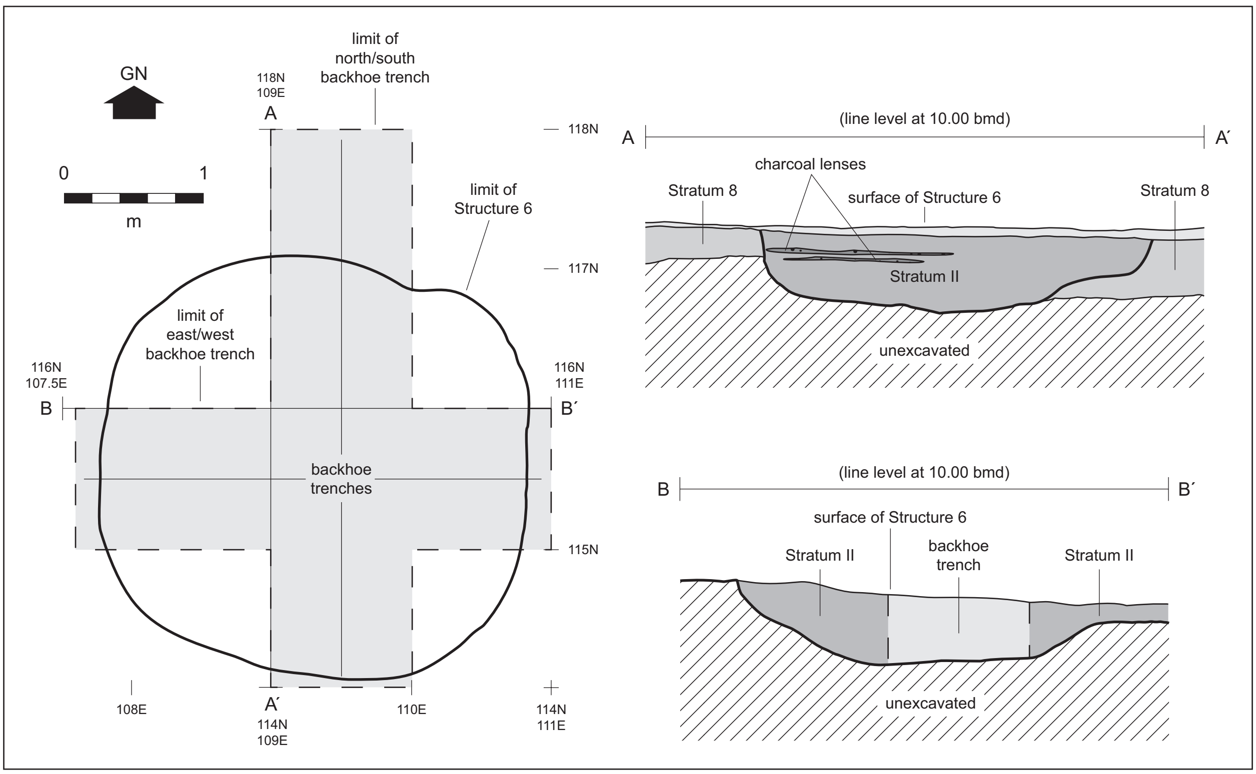


Figure 8.52. Plan and profile of Structure 6, LA 104106.

surface). The sides and base of the aboriginal excavation formed the walls and floor of the structure, which appeared as a continuous surface. Structure 6 did not contained any features.

Floor artifact assemblage. Fourteen artifacts were recovered from floor fill deposits of Structure 6 (see Table 8.19). Floor fill ceramics included plain gray body sherds and a Tallahogan Red bowl sherd (Table 8.20). Lithic artifacts recovered from the floor fill consisted of four unutilized pieces of debitage (Table 8.21). Bone artifacts consisted of five unburned fragmentary elements from small mammals and rodents. Artifacts were evenly distributed in the floor fill layers. The lack of internal thermal features and thermal alteration combined with limited floor space suggests that Structure 6 was used for storage.

Structure 7 (AUN 7.01). Structure 7 was a shallow pit structure initially identified through surface stripping the upper fill levels. Subsequent 1 by 1 m grid units along the 115E grid line and in grid unit 94N/114E were excavated in 10 cm levels down to floor fill. These excavations clearly defined the horizontal and vertical limits and effectively removed the majority of fill from the structure. The remaining fill was removed by quadrant in a single level grid unit down to the floor fill (Fig. 8.54). Floor fill was excavated by grid unit and screened through 1/4-inch mesh. Floor contact artifacts were point located as they were uncovered. After the floor was cleared, all features were defined, excavated, profiled, mapped, photographed, and described in detail.

The 1 by 1 m trench offered an exposure to evaluate the stratigraphic filling sequence. Structure 7 contained four soil layers including Stratum 1 and Stratum 2 and two indigenous layers, Stratum 93 and Stratum 94. Stratum 1 and Stratum 2, which contained a canine cranium (Feature 139), were the uppermost fill layers identified in this structure. Stratum 93 and Stratum 94 were below this stratum (Fig. 8.55). The filling sequence indicates the Structure 7 was filled by post-abandonment geomorphological processes.

Stratum 1 and Stratum 2 (described above) were above Stratum 93, a pale brown (10YR 6/3 dry) cultural deposit of sandy loam that extended across the structure. With a maximum thickness of 60 cm, Stratum 93 was distinctive in its decreased frequency and size of charcoal and the lack of small tabular sandstone fragments common to this stratum. This unconsolidated deposit had a sharp boundary with underlying Stratum 94 and may represent the remains of an earthen roof covering or superstructure. Stratum 94 was a pale brown (10YR 6/3 dry) eolian deposit that displayed numerous sorted sand lenses. This deposit formed through the settling of wind-borne sediments lying directly above the floor of the structure. Based on the low frequency of charcoal and decreased number of artifacts, this layer appears to be the result of wind-borne sediments accumulating in an unmaintained structure.

In all, 548 artifacts and archaeological samples were recovered from Structure 7 and spatially associated grid units (see Table 8.1). Similar to other satellite structures, the frequency of and types of artifacts recovered from Stratum 1 and Stratum 2 are similar to those identified in the upper fill layers of Structure 1, indicating these structures were occupied and abandoned during the same period of time.

Construction. Structure 7 was constructed by excavating a circular basin 2.35 m long by 2.10 m wide and 1.20 cm deep down through Stratum 8. The sides and base of the aboriginal excavation formed the walls and floor of the structure. The floor and walls were unlined and were defined by a compacted surface that appeared as one continuous surface. A total of seven features, associated with a single use surface, were present within Structure 7. Perhaps the most distinguishing characteristic of Structure 7 was the preservation of features located at the margin of the road cut (Fig. 8.56). Table 8.18 provides feature summary data. Plan and profile views of the features are presented in Appendix 5.

Pit features. Structure 7 contained three pit features that range in size between 18 and 29 cm long, 18 and 28 cm wide, and 15 and 18 cm deep. The largest of the pit features (Feature 143) was located near and into the east wall of the structure. Feature 143 was constructed by excavating a steep-sided basin pit 15 cm below the surface of the floor. This feature was filled with a single homogeneous layer of loose sandy loam with inclusions of charcoal flecks (Table 8.19). Only macrobotanical remains were recovered from Feature 143, dominated by uncarbonized annuals and grasses (Table 8.23). Given the copious amount of disturbance identified in the structure, it is possible the macrobotanical assemblage is the result of mixing with modern deposits. Based on the contents, fill, and morphology, this feature may have functioned as a storage feature.

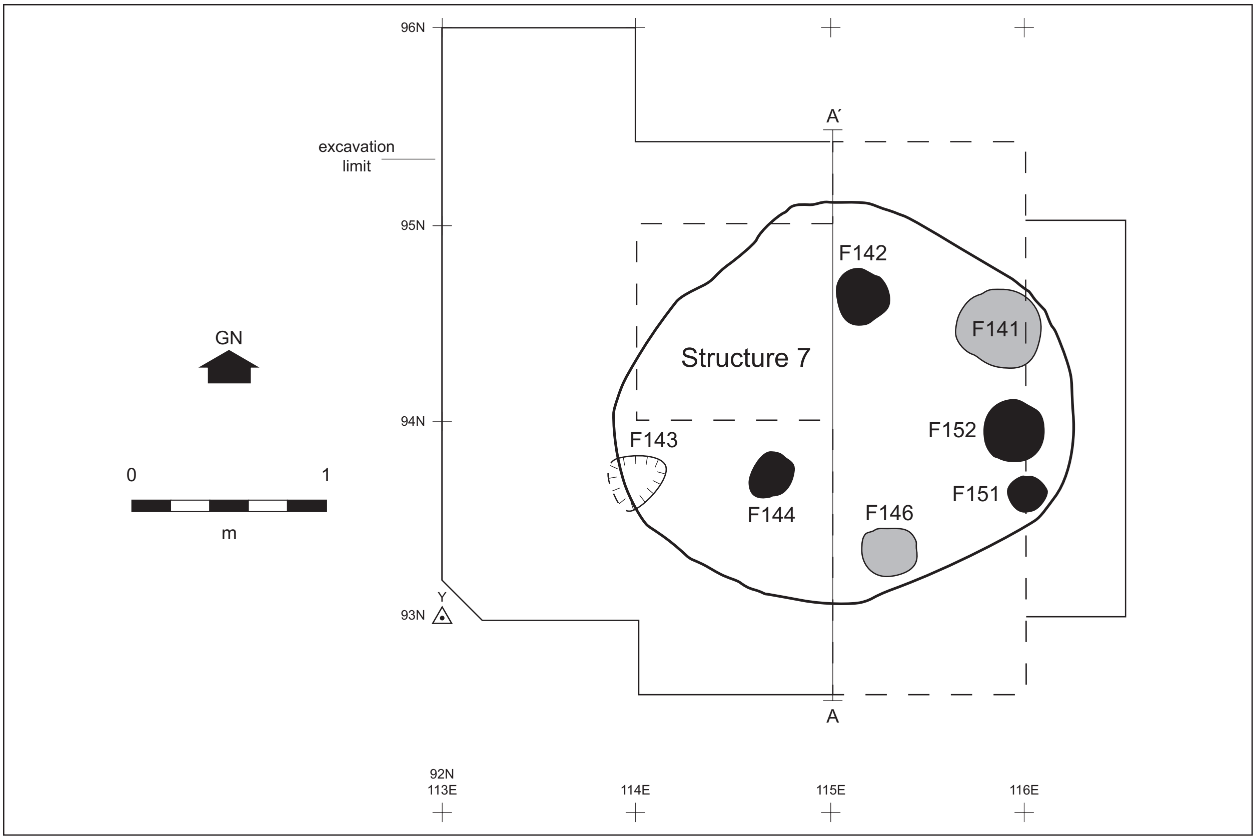


Figure 8.54. Plan of Structure 7, LA 104106.

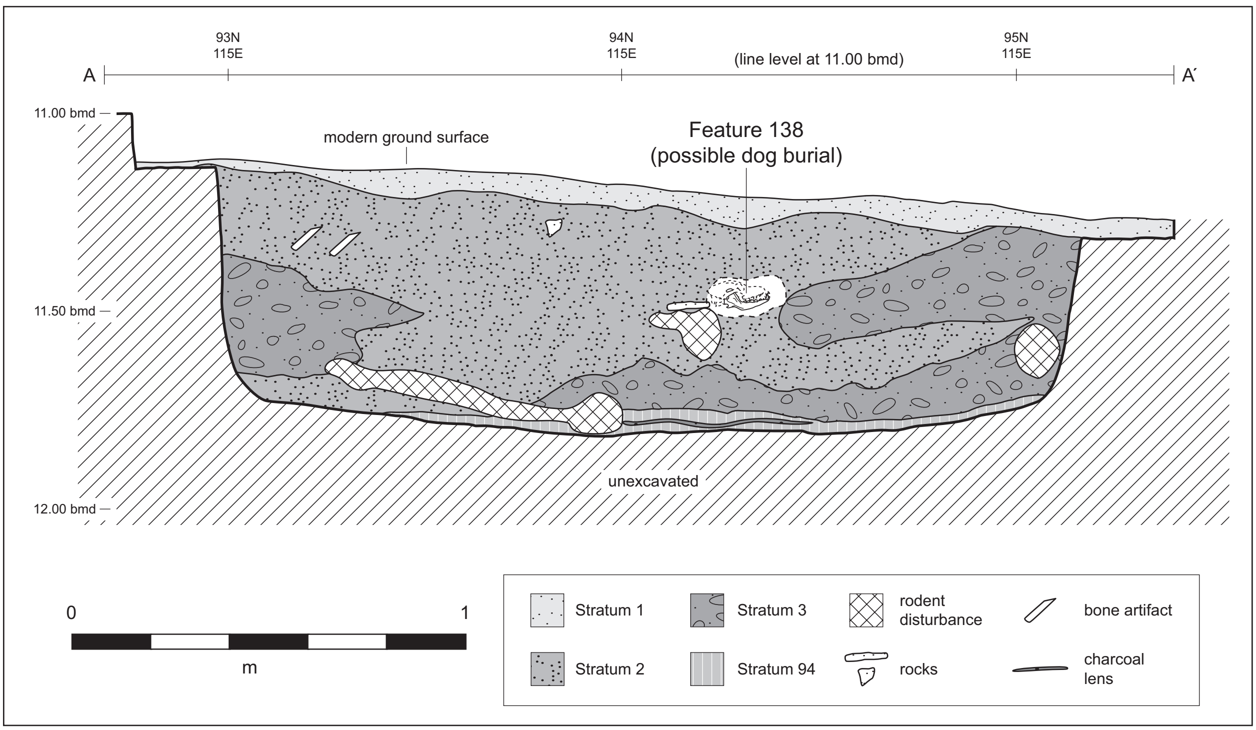


Figure 8.55. Soil profile of Structure 7, LA 104106.

Figure 8.56. Structure 7, LA 104106.

Feature 144 was located in the southwest portion of the structure and was constructed by excavating a shallow basin with gently sloping sides 16 cm below the floor surface (see Table 8.18). Feature 144 contained fill similar to Feature 143, a single layer of loose sandy loam with inclusions of charcoal flecks. No artifacts or macrobotanical remains were recovered from this feature suggesting it may have functioned as a storage feature.

Feature 151 was located in the southeast quadrant near the limits of Structure 7. Feature 151 was constructed by a circular shallow basin with steep sloping sides 18 cm below the floor surface (see Table 8.18). This feature contained a single layer of loose charcoal-stained sandy loam that yielded a single unutilized obsidian core flake and macrobotanical remains (Table 8.21). Macrobotanical remains recovered from Feature 151 were dominated by uncarbonized annuals and grasses with a trace of carbonized cultivars identified (Table 8.23). Given the amount of rodent disturbance identified in the structure, it is possible that the uncarbonized portion of the macrobotanical assemblage is the result of mixing with modern deposits. The lack of thermal alteration and minimal artifacts suggest this feature may have functioned as a storage facility.

Postholes. Three features were interpreted as postholes (Feature 140, Feature 142, and Feature 152) based on morphology, location, and content. Feature 140 was constructed by excavating a steep-sided basin 34 cm below the surface of the floor. This feature was filled with a single homogeneous layer of loose sandy loam with inclusions of charcoal flecks (Table 8.19). Macrobotanical remains were dominated by unburned annuals followed by carbonized perennials and a trace of carbonized cultivars (Table 8.23).

Feature 142 was constructed by excavating a steep-sided basin 31 cm below the surface of the floor. This feature was filled with a single homogeneous layer of loose sandy loam with inclusions of charcoal and artifacts including bone (Table 8.19). Bone artifacts consisted of the burned and fragmentary element of a small mammal. In addition, macrobotanical remains including uncarbonized annuals, carbonized perennials, and trace amounts of cultivars were recovered (Table 8.23).

Feature 152 was constructed by excavating a steep-sided pit 68 cm below the surface of the floor. This feature was filled with a single homogeneous layer of loose sandy loam with inclusions of charcoal and artifacts (Table 8.19). Lithic artifacts included six unutilized pieces of debitage derived from local and nonlocal raw material (Table 8.21). Faunal remains consisted of the unburned fragments of small rodents (Table 8.22). In addition, macrobotanical remains, including carbonized perennials, trace amounts of cultivars, and uncarbonized perennials were recovered (Table 8.18). A radiometric sample submitted for analysis yielded a conventional AMS radiocarbon age of 1550 ± 40 (Beta-164345; *Pinus edulis* wood; δ^{13} = -23.5 o/oo), and a 2-sigma date range of 420–580 cal AD (p = .95) was produced (see Table 8.39).

Thermal features. A single thermal feature was identified in Structure 7 (Feature 141). Feature 141 was constructed by excavating a steep-sided pit 13 cm below the surface of the floor. Subsequently the base and sides of the feature were oxidized through thermal activity. This feature was filled with a single homogeneous layer of charcoal-infused loose sandy loam with inclusions of charcoal, sandstone fragments, and artifacts (Table 8.19). Lithic artifacts included three pieces of unutilized debitage derived from local and nonlocal raw materials and an early stage biface derived from obsidian (Table 8.21). Bone artifacts consisted of an unburned fragment of a medium to large mammal (Table 8.22). Macrobotanical remains were limited to carbonized perennials. A pollen sample submitted for analysis yielded evidence for native trees and shrubs, economic species, and herbs. Tree and shrub taxon were dominated by piñon/juniper with trace amounts of sage and willow species identified. Economic species were limited to *Chenopodium/amaranthus*, while herbs identified include buckwheat and mustard (see Appendix 2).

Floor artifact assemblage. Twenty-five artifacts were recovered from the floor fill deposits of Structure 7 (see Table 8.19). All ceramic artifacts consist of gray jar sherds (Table 8.20). Lithic artifacts consist of five unutilized flakes derived from local and nonlocal raw material types and a middle stage biface manufactured from obsidian (Table 8.21). Bone artifacts were limited to unburned fragments of medium to large mammals (Table 8.22). Based on the small size, artifact content, and feature array, Structure 7 may have functioned as a habitation room.

Study Unit 1, extramural features. Thirteen extramural features including five thermally altered pits, three pits, two cists, a single ceramic container, one post, and a modern animal interment were identified at LA 104106, SU 1 (Table 8.25). In general, the vertical context and horizontal relationship of these features to Structure 1 and the other satellite structures indicates they are contemporaneous with the overall occupation of SU 1 and their upper limits represent the original ground surface. Table 8.18 provides feature summary data. Plan and profile views for features are presented in Appendix 5.

Thermally altered pits. Four thermally altered pit features were identified in SU 1 that range in size between 56 and 110 cm long, 28 and 70 cm wide, and 9 and 45 cm deep. Feature 135 was located just beyond the west margin of Structure 2 and was constructed by excavating a gently sloping basin 9 cm into the native sterile substrate. This feature was filled with a homogeneous layer of loose, charcoal-infused sandy loam with inclusions of charcoal, fire-cracked rock, and artifacts. Artifacts included seven gray body sherds and one nondiagnostic white ware sherd (Table 8.26), one unutilized piece of debitage derived from a nonlocal source (Table 8.27), and five unburned and fragmentary pieces of bone derived from small mammals and rodents (Table 8.28). No macrobotanical remains were recovered. Based on the contents, fill, and morphology, this feature may have functioned as a processing facility for biotic materials requiring a low level of heat such as parching.

The deepest thermal feature, Feature 139, was located northwest of Structure 1 and was constructed by excavating a gently sloping basin 45 cm into the native sterile substrate. The upper 8–10 cm of this feature was filled with a homogeneous layer of charcoal-infused sandy loam. The lower fill was similar in texture to the upper layer; however, the lower layer was distinguished by a lighter color and fewer charcoal flecks (see Table 8.18). No artifacts and few macrobotanical remains were recovered from Feature 139 including uncarbonized annuals and carbonized cultivars (Table 8.29).

Feature 145 was the southernmost feature identified in SU 1. This feature was constructed by exca-

Table 8.25. LA 104106, Study Unit 1, extramural feature number and type by artifact type.

Feature Type	Feature	Ceramic	Lithic	Ground Stone	Bone	Pollen	Macro–botanical	Chrono-logic Sample	Ornament	Mineral	Table Total
Extramural area	0	4324	1242	9	93	–	–	–	3	14	**5685**
Pit, nfs	136	7	5	–	–	1	23	–	–	–	**36**
	150	–	–	–	–	–	5	–	–	–	**5**
	154	5	2	–	–	–	59	–	–	–	**66**
Cist, nfs	137	–	12	1	2	1	68	–	–	–	**84**
	175	–	2	–	1	1	45	–	–	–	**49**
Post	174	–	–	–	–	–	–	1	–	–	**1**
Ceramic container	134	13	1	–	–	2	–	–	–	–	**16**
Animal burial (nfs)	35	–	–	–	1	–	–	–	–	–	**1**
Thermally altered pit	135	8	1	–	5	1	–	–	–	–	**15**
	139	–	–	–	–	1	4	–	–	–	**5**
	145	–	1	–	–	1	27	–	–	–	**29**
	146	–	3	–	–	1	2	–	–	–	**6**
Total		**4357**	**1269**	**10**	**102**	**9**	**233**	**1**	**3**	**14**	**5998**

Table 8.26. LA 104106, Study Unit 1, extramural feature number by ceramic type.

			Extramural Area Feature				
			134	135	136	154	Table Total
Gray	plain body	jar body	13	7	7	5	**32**
White	unpainted, polished	bowl rim	–	1	–	–	**1**
Table Total			**13**	**8**	**7**	**5**	**33**

Table 8.27. LA 104106, Study Unit 1, extramural feature number by lithic data.

				Feature								
				134	135	136	137	145	146	154	175	Table Total
Local												
Chert	middle-stage biface	biface	proximal	–	–	–	–	–	–	–	1	**1**
Silicified wood	angular debris	unutilized angular debris	indet. fragment	–	–	1	3	–	–	–	–	**4**
	core flake	unutilized flake	whole	–	–	1	1	–	–	–	–	**2**
			proximal	–	–	–	–	–	–	1	–	**1**
			lateral	–	–	–	4	1	–	1	1	**7**
	flake fragment	unutilized flake	medial	–	–	1	–	–	1	–	–	**2**
			distal	–	–	–	1	–	1	–	–	**2**
			lateral	–	–	–	1	–	1	–	–	**2**
	late-stage biface	large projectile point	medial	–	–	–	1	–	-	–	–	**1**
Red Dog shale	angular debris	unutilized angular debris	indet. fragment	1	–	–	–	–	–	–	–	**1**
Non-local												
Chinle chert	core flake	unutilized flake	whole	–	–	1	–	–	–	–	–	**1**
			proximal	–	–	1	–	–	–	–	–	**1**
Obsidian	flake fragment	unutilized flake	lateral	–	–	–	1	–	–	–	–	**1**
Grants Ridge obsidian	angular debris	unutilized angular debris	indet. fragment	–	1	–	–	–	–	–	–	**1**
Table Total				**1**	**1**	**5**	**12**	**1**	**3**	**2**	**2**	**27**

indet. = indeterminate

Table 8.28. LA 104106, Study Unit 1, extramural feature number by faunal data.

			Feature				
Species	**Element**	**Completeness**	**35**	**135**	**137**	**175**	**Total**
Small mammal	long bone fragment	<25%	–	–	1	–	**1**
Small rodent	flat bone fragment	<25%	–	–	–	1	**1**
Desert cottontail	cranium	<25%	–	1	–	–	**1**
	ulna	<25%	–	1	–	–	**1**
	tibia	<25%	–	–	1	–	**1**
	MT 4	<25%	–	1	–	–	**1**
Black-tailed jack rabbit	lumbar vertebra	<25%	–	1	–	–	**1**
	femur	<25%	–	1	–	–	**1**
Dog	partial skeleton	25–50%	1	–	–	–	**1**
Table Total			**1**	**5**	**2**	**1**	**9**

Table 8.29. LA 104106, Study Unit 1, extramural feature number by macrobotanical data.

			Feature								
			136	137	139	145	146	150	154	175	Total
Carbonized											
Annuals	Amaranth	seed	–	–	–	–	–	–	1	–	**1**
	Cheno-Am	seed	–	–	–	–	–	–	1	–	**1**
Perennials	Sagebrush	wood	–	1	–	–	–	–	–	–	**1**
	Mountain mahogany	wood	–	5	–	–	–	–	–	–	**5**
	Cliff rose	wood	–	9	–	–	–	–	–	–	**9**
	Juniper	wood	16	9	–	–	–	–	–	–	**25**
	Piñon	nutshell	–	1	–	–	–	–	1	–	**2**
		wood	2	3	–	20	–	–	–	–	**25**
	Greasewood/ saltbush	wood	–	12	–	–	–	–	–	–	**12**
	Coniferous wood	wood	–	1	–	–	–	–	–	–	**1**
	Nonconiferous wood	wood	2	–	–	–	–	–	–	–	**2**
Grasses	Grass family	caryopsis	–	–	–	–	–	–	2	–	**2**
	Ricegrass	caryopsis	–	2	–	–	–	1	–	–	**3**
Cultivars	Corn	cupule	1	8	1	–	–	–	4	2	**16**
		glume	–	2	–	–	–	–	–	–	**2**
		kernel	–	12	–	–	–	–	1	–	**13**
Unidentified	Mint family	seed	–	1	–	–	–	–	–	–	**1**
Unburned											
Annuals	Amaranth	seed	–	–	1	–	–	–	1	–	**2**
	Goosefoot	seed	1	–	2	7	2	4	46	32	**94**
	Spurge	seed	1	–	–	–	–	–	–	1	**2**
	Purslane	seed	–	–	–	–	–	–	–	9	**9**
Perennials	Juniper	twig	–	1	–	–	–	–	–	–	**1**
		cone (male)	–	1	–	–	–	–	–	1	**2**
Grasses	Ricegrass	caryopsis	–	–	–	–	–	–	1	–	**1**
Unidentified	Globemallow	seed	–	–	–	–	–	–	1	–	**1**
Table Total			**23**	**68**	**4**	**27**	**2**	**5**	**59**	**45**	**233**

vating a shallow basin with gently sloping sides 14 cm into the native sterile substrate (Stratum 8). The east margins of the feature were oxidized while the west half was truncated by mechanical excavation (see Table 8.18). Similar to Feature 139, the upper portion of Feature 145 was filled with a homogeneous charcoal-infused layer of sandy loam with inclusions of charcoal and artifacts while the lower fill, similar in texture, was distinguished by a lighter color and fewer charcoal flecks. Artifacts recovered were limited to a single piece of unutilized debitage derived from locally available material. Macrobotanical remains were dominated by carbonized perennial shrubs and trees with trace amounts of uncarbonized annuals (Table 8.28). Based on the contents, fill, and morphology, this feature may have also functioned as a processing facility for biotic materials requiring a low level of heat.

Feature 146 was located in the south-central portion of SU 1 and was constructed by excavating a basin with gently sloping sides 9 cm into the native sterile substrate. This feature was filled with a homogeneous layer of loose, charcoal-stained sandy loam with inclusions of charcoal, fire-cracked rock, and artifacts (Table 8.25). Artifacts included seven gray body sherds and one nondiagnostic white ware sherd (Table 8.26), one unutilized piece of debitage derived from a nonlocal source (Table 8.27), and five unburned and fragmentary pieces of bone derived from small mammals and rodents (Table 8.28). No macrobotanical remains were recovered. Based on the contents, fill, and morphology, this feature may have functioned as a parching or drying facility for processing biotic materials requiring a low level of heat.

Feature 150 was located just beyond the southeast limit of Structure 1 and was constructed by excavating a shallow basin with gently sloping sides 26 cm into the native sterile substrate with the base and interior limits of the feature displaying patchy oxidation (see Table 8.18). Feature 150 contained a single homogeneous layer of loose charcoal-stained sandy loam. Suspended in the fill of this feature were numerous fragments of charcoal and oxidized fragments of tabular sandstone; however, no artifacts were recovered. Furthermore, macrobotanical remains were limited to uncarbonized annual seeds and a single carbonized grass seed (Table 8.29). Similar to the other thermally altered pits, Feature 150 may have functioned as a processing facility for biotic materials requiring a low level of heat.

Pit features. Three pit features were identified from the extramural area of SU 1. They range in size between 64 and 220 cm long, 50 and 180 cm wide, and 8 and 26 cm deep. The largest of the pit features, Feature 154, was located north of the main excavation area and had been truncated by the installation of an underground utility. Feature 154 was constructed by excavating a gently sloping basin 16 cm into Stratum 8. The upper 8 cm of this feature was filled with a homogeneous layer of loose eolian sediments similar to Stratum 1. The lower fill consisted of a homogeneous charcoal-stained layer of sandy loam with inclusions of charcoal and artifacts (Table 8.25). Artifacts were limited to five plain gray body sherds (Table 8.28) and two unutilized core flakes derived from locally available materials (Table 8.27). Numerous macrobotanical remains were recovered from Feature 154, dominated by uncarbonized annuals with trace amounts of carbonized perennial shrubs and trees, cultivars, and annuals (Table 8.29). Given the degree and nature of disturbance in this feature, it is possible that the artifact assemblage may have been deposited through mixing processes. Based on the contents, fill, and morphology, this feature may have functioned as a processing or storage facility.

Feature 136 was located adjacent to the southwest limit of Structure 2 and was constructed by excavating a shallow basin with gently sloping sides 25 cm into the native sterile substrate (Stratum 8) (see Table 8.18). Feature 136 contained a single mottled layer of loose charcoal-stained sandy loam. Suspended in the fill of this feature were numerous charcoal fragments. In addition to the charcoal, Feature 136 contained several plain gray body sherds (Table 8.26) and unutilized debitage derived from local and nonlocal sources (Table 8.27). Numerous macrobotanical remains were also recovered from Feature 136 dominated by carbonized perennial shrubs and trees with trace amounts of cultivars and uncarbonized annuals identified (Table 8.29). Similar to Feature 154, the contents, fill, and morphology indicate this feature may have functioned as a processing or storage facility.

Feature 153 was located in the south-central portion of SU 1 and was constructed by excavating a shallow basin with gently sloping sides 8 cm into the native sterile substrate (Stratum 8) (see Table 8.18). Feature 153 contained a single layer of loose charcoal-stained sandy loam. No artifacts or samples were recovered. This feature may represent an abandoned storage feature.

Cist features. Two cist features were identified from the extramural area of SU 1 at LA 104106. The northernmost cist, Feature 137, was located adjacent to the northwest margin of Structure 6 (see Fig. 8.50). Feature 137 was constructed by excavating a bell-shaped pit 1.50 m into the native sterile substrate (Stratum 8). The base of the feature was partially lined with small fragments of tabular sandstone positioned contiguously along the southeast side. In the center, a zone of oxidation was identified that appears to represent the location of intense burning. The mouth of the feature may have been skirted with tabular sandstone slabs evidenced by the numerous fragments identified in the fill. Feature 137 was filled with a single homogeneous layer of loose sandy loam, similar if not identical to Stratum 2, with inclusions of charcoal, numerous fragments of tabular sandstone, and artifacts (Table 8.25). A portion of the fill was removed by mechanical excavation. In addition, this feature was previously impacted by the installation of an underground utility cable.

Lithic artifacts recovered from Feature 137 were dominated by unutilized debitage derived from locally available materials and a large projectile point (Table 8.27). Bone artifacts include the unburned fragmentary remains of small mammals (Table 8.28). Macrobotanical remains were dominated by carbonized perennial trees and shrubs followed by cultigens and finally grasses with trace amounts of uncarbonized perennial trees and shrubs (Table 8.29). Ground stone artifacts include a complete basin metate. Based on its contents and condition, Feature 137 appears to have functioned primarily as a roasting or baking facility, and subsequently as a storage facility.

Feature 175 was the smaller of the two cist features, located north of the main excavation area. Feature 175 was constructed by excavating a bell-shaped pit 97 cm into the native sterile substrate (Stratum 8) and was filled with a single homogeneous layer of loose sandy loam, similar if not identical to Stratum 2, with inclusions of charcoal, numerous fragments of tabular sandstone, and artifacts (Table 8.18). A portion of this feature was previously impacted by the installation of an underground utility line.

Lithic artifacts consisted of a single piece of unutilized debitage derived from locally available materials, and a biface (Table 8.27). Bone artifacts included the unburned fragmentary remains of a small mammal (Table 8.28). Macrobotanical remains were dominated by uncarbonized annual seeds followed by trace amounts of carbonized cultigens (Table 8.29). Based on the contents and morphology, Feature 175 appears to have also functioned as a storage facility.

Ceramic container. Feature 134 consists of the base of a plain gray jar (Fig. 8.57) located adjacent to the southeast limit of the Structure 1 antechamber. This feature contained a single piece of unutilized debitage derived from a nonlocal source (Table 8.27) and bone, including the unburned fragmentary remains of a small mammal (Table 8.29).

Post feature. Feature 174 consisted of the burned remains of an isolated post located to the southeast of Structure 3. This feature was constructed by excavating a cylindrical pit 22 cm into the native sterile substrate and filled with a vertical wooden element that presumably burned after installation. This feature may have functioned as a support post for a ramada associated with Structure 3. A dendrochronology sample removed from Feature 174 was sub-

Figure 8.57. Feature 134, LA 104106.

mitted for analysis, but due to erratic growth and false rings, the results did not yield any chronometric data (Appendix 6).

Modern animal interment. Feature 35 consisted of a partial canine skeleton located along the western excavation limit of SU 1 and was positioned, stratigraphically, above all other extramural features. Based on the stratigraphic placement, it is likely these are the remains of a dog that was hit by a passing car and died at this location prior to the subsequent accumulation of sediment.

Study Unit 1, extramural area material culture. Extramural artifacts recovered from LA 104106, SU 1 are described in the following section. The material culture aspect of this provenience is dominated by the remains of a late Basketmaker III occupation with evidence for a limited Pueblo-period occupation. Artifact categories recovered from the extramural area of SU 1 include ceramic, lithic, ground stone, and bone. Macrobotanical materials and pollen samples were only recovered from extramural features (see Table 8.1). The aggregated distribution of artifacts recovered from surface and excavated extramural contexts portray a high density of material east-southeast of Structure 1 followed by a secondary concentration to the south (Fig. 8.58). These concentrations, especially the southeastern one, may represent a weakly formed midden.

Ceramics. In all, 4,363 ceramic artifacts were recovered from the modern ground surface and excavated extramural contexts in SU 1. The ceramic assemblage was comprised mainly of Basketmaker III gray ware sherds superimposed by ceramics associated with the Pueblo period. The vast majority of ceramic types were identified as Cibola Gray and White wares manufactured during the late Basketmaker III and early Pueblo I period (Table 8.30). Driving the pattern observed in the artifact distribution derived from combined counts per square meter (see Fig. 5.11) are ceramic types associated with a late Basketmaker III–early Pueblo I occupation. The distribution of Basketmaker III–early Pueblo I pottery types, set at a minimum of 50 g/sq m (mean = 5.0 g per sherd [SD = 5.3 g]), highlights the southeastern concentration and a concentration east of Structure 1, suggesting larger sherd size in these areas, possibly related to the formation of the midden. The distribution of Pueblo-period ceramics, set at a minimum of 17 g/sq m (mean = 8.5 g per sherd [SD = 8.7 g]), is dissimilar to the distribution of the Basketmaker III–early Pueblo I ceramics. The limited frequency of Pueblo-period ceramic types from discrete clusters suggest these items are the result of repeated short-term occupations during this period (Fig. 8.59).

Lithic artifacts. In all, 1,242 lithic artifacts were recovered from the extramural area of SU 1 (Table 8.31). The distributions of lithic debitage by count and weight present two distinct patterns, each dissimilar to the ceramic distribution. By count, lithic debitage (minimum 5/sq m) was distributed in discrete clusters that encircle Structure 1. The southwest concentration was associated with whole and fragmentary biface and core artifact types, possibly reflecting a reduction location. The concentration to the south was associated with fragmentary artifacts and may reflect a secondary deposit or disposal area. When distributed by weight (mean = 2.8 g per flake [SD = 8.2 g]), set at 14 g/sq m, the arc of debitage around the north side of Structure 1 is reduced to two concentrations with the highest densities located southwest and west of Structure 1 and near Structure 5 (Fig. 8.60).

Taken together, the overlapping distributions of lithic artifacts to the northwest, southwest, and south of Structure 1 reflect a 1:1 ratio between count and weight. The distribution by weight per unit area on the west side of the Structure 1 reflects larger debitage size and the concentration to the north of Structure 1 shows a higher quantity of smaller flakes with two dense concentrations of larger flakes. These differences in patterning suggest differences in formation process or in site activities. The higher frequency of smaller flakes may reflect lithic reduction activity areas geared toward tool production while concentrations by greater mean weight per area may reflect areas of core reduction, as reflected to the northeast of Structure 5. Here, spatially associated with a hammerstone and two cores, flake count is low, and weight is extremely high. This supports the interpretation of core reduction locations. The fact that formal tools and cores were not commonly found in association with debitage or extramural features points to different functional or depositional environments in those contexts.

Although the overall distribution of lithic debitage did not mimic that of the ceramic data, there were instances where these two artifact types co-

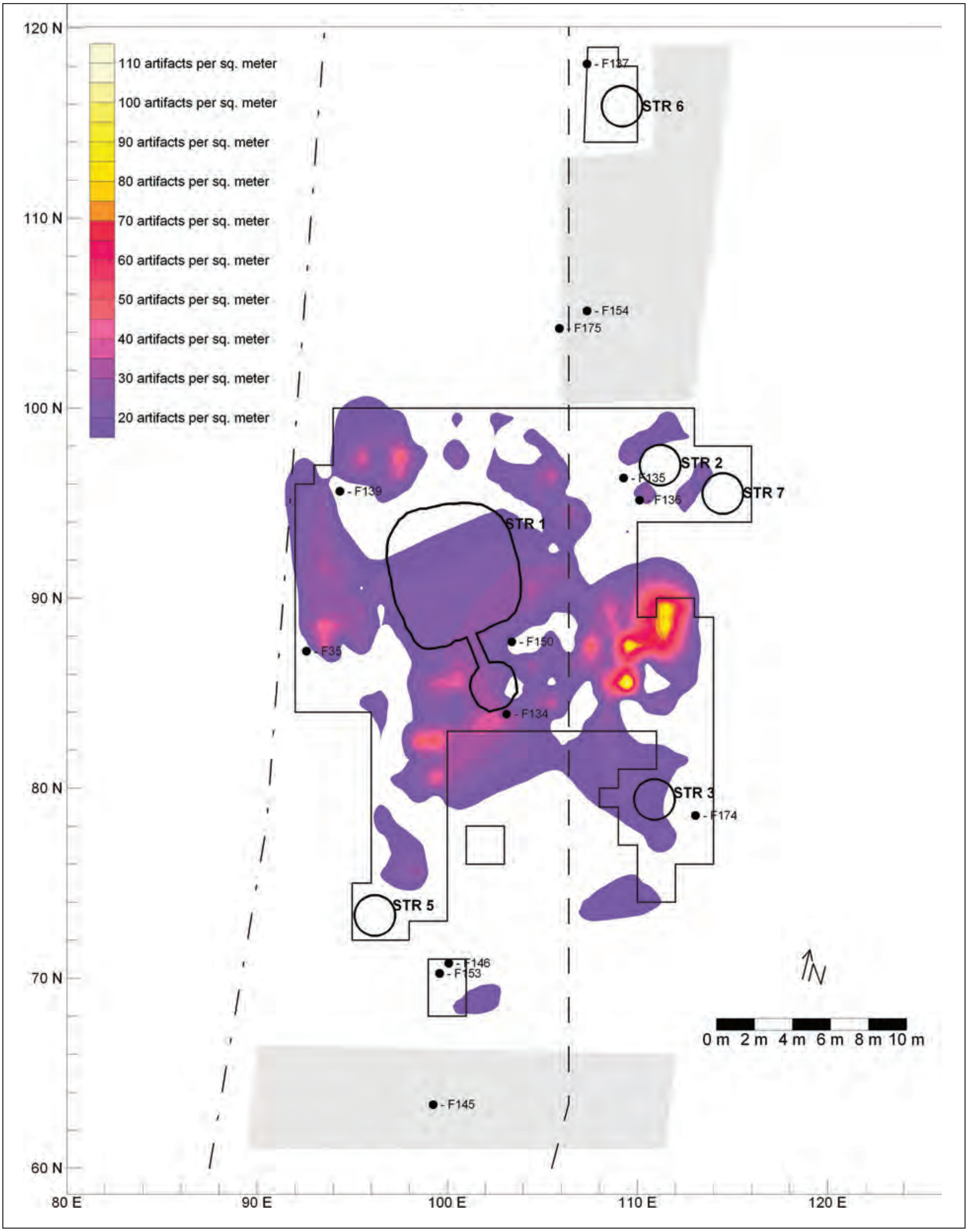


Figure 8.58. All extramural artifacts aggregated by count, Study Unit 1, LA 104106.

Table 8.30. LA 104106, Study Unit 1, extramural ceramic tradition, ware group, and pottery type by vessel form and portion.

Ware	Pottery Type	Indeter-minate	Bowl	Jar	Miniature Vessel	Body Sherd Polished	Body Sherd Unpolished	Other	Table Total
Cibola									
Gray	Plain rim	–	64	78	–	–	–	3	**145**
	Unknown rim	17	–	–	–	–	–	–	**17**
	Plain body	4	–	3740	–	–	–	–	**3744**
	Indented corrugated	–	–	11	–	–	–	–	**11**
	Plain corrugated	1	1	91	–	–	–	–	**93**
	Alternating corrugated	–	–	2	–	–	–	–	**2**
	Mudware	3	–	–	3	–	–	–	**6**
White	Unpainted, polished, white ware	1	68	36	–	–	–	–	**105**
	Mineral Paint (undifferentiated)	–	5	3	–	–	–	–	**8**
	Pueblo II (indeterminate mineral)	–	5	1	–	–	–	–	**6**
	Escavada Black-on-white (solid designs)	–	3	2	–	–	–	–	**5**
	Pueblo II (thick parallel lines)	–	2	–	–	–	–	–	**2**
	Gallup Black-on-white	–	5	6	–	–	–	–	**11**
	Basketmaker III–Pueblo I (indeterminate mineral)	1	69	13	–	–	–	–	**83**
	White Mound Black-on-white	–	4	–	–	–	–	–	**4**
	La Plata Black-on-white	1	47	3	–	–	–	1	**52**
Red	White Mountain Red (painted, undifferentiated)	–	1	–	–	–	–	–	**1**
	Tallahogan Red (red slip over white paste)	1	3	1	–	–	–	–	**5**
	Tohatchi Red-on-brown	–	1	–	–	–	–	–	**1**
Upper San Juan									
White	Unpainted white ware (undifferentiated)	–	2	–	–	–	–	–	**2**
	Mineral paint (undifferentiated)	–	1	–	–	–	–	–	**1**
	Plain gray	–	–	1	–	–	–	–	**1**
	Piedra Black-on-white	–	1	–	–	–	–	–	**1**
	Chapin Black-on-white	–	1	–	–	–	–	–	**1**
	Mancos Black-on-white (hachured)	–	1	–	–	–	–	–	**1**
	Basketmaker III–Pueblo I (indeterminate)	–	1	–	–	–	–	–	**1**
Mogollon Highlands									
Red	San Francisco Red	–	4	–	–	–	–	–	**4**
Brown plain	Alma Plain rim	–	4	1	–	–	–	–	**5**
	Alma Plain body	2	–	–	–	18	25	–	**45**
Table Total		**31**	**293**	**3989**	**3**	**18**	**25**	**4**	**4363**

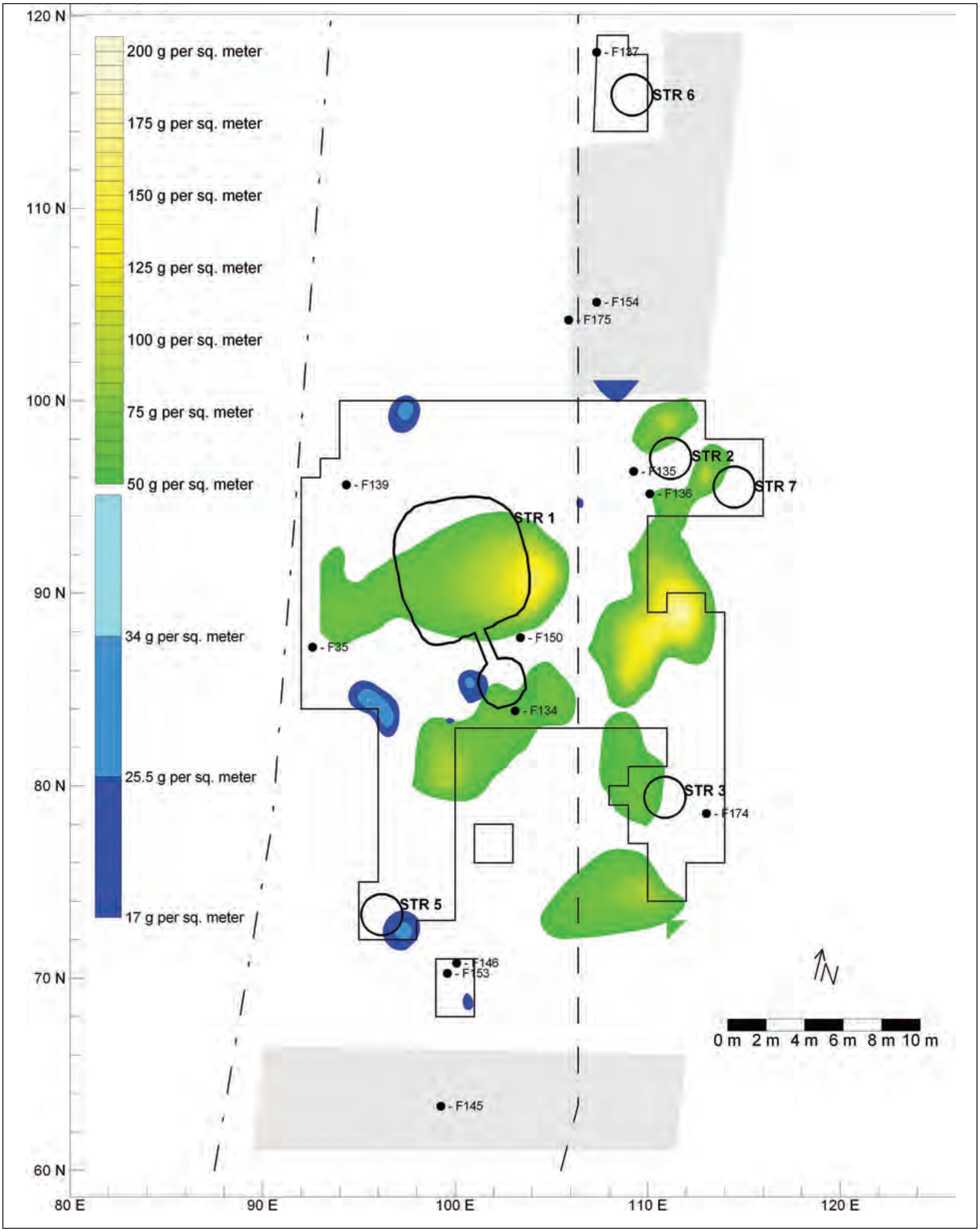


Figure 8.59. Basketmaker III and Pueblo II–III extramural ceramic artifacts aggregated by weight, Study Unit 1, LA 104106.

Table 8.31. LA 104106 Study Unit 1, extramural lithic artifact data.

	Artifact Morphology	Portion	Unutilized Debitage	Utilized/ Retouched Debitage	Utilized/ Retouched Scraper	Utilized/ Retouched Biface	Utilized/ Retouched Projectile Point	Core	Hammer-stone	Table Total
Local										
Chert	Angular debris	indeterminate fragment	24	1	–	–	–	–	–	**25**
	Core flake	whole	43	3	–	–	–	–	–	**46**
		proximal	20	–	–	–	–	–	–	**20**
		distal	1	–	–	–	–	–	–	**1**
		lateral	9	–	–	–	–	–	–	**9**
	Biface flake	whole	2	1	–	–	–	–	–	**3**
		proximal	2	–	–	–	–	–	–	**2**
	Bipolar flake	whole	1	–	–	–	–	–	–	**1**
	Flake fragment	medial	6	–	–	–	–	–	–	**6**
		distal	14	–	–	–	–	–	–	**14**
		lateral	11	1	–	–	–	–	–	**12**
	Multidirectional core	whole	–	–	–	–	–	1	–	**1**
	Bipolar core	indeterminate fragment	–	–	–	–	–	2	–	**2**
		whole	–	–	–	–	–	1	–	**1**
	Late stage uniface	lateral	–	–	1	–	–	–	–	**1**
	Late stage biface	proximal	–	–	–	–	1	–	–	**1**
		medial	–	–	–	–	1	–	–	**1**
	Biface fragment, edge-bite flake	whole	–	1	–	–	–	–	–	**1**
	Biface fragment, overshoot flake	lateral	1	–	–	–	–	–	–	**1**
	Reworked late-stage biface	whole	–	–	–	–	1	–	–	**1**
Silicified wood	Angular debris	indeterminate fragment	209	5	–	–	–	–	–	**214**
	Core flake	whole	156	5	–	–	–	–	–	**161**
		proximal	144	4	–	–	–	–	–	**148**
		lateral	115	1	–	–	–	–	–	**116**
	Biface flake	whole	14	1	–	–	–	–	–	**15**
		proximal	6	–	–	–	–	–	–	**6**
		lateral	1	–	–	–	–	–	–	**1**
	Bipolar flake	whole	5	–	–	–	–	–	–	**5**
		lateral	4	–	–	–	–	–	–	**4**
	Pot lid	whole	1	–	–	–	–	–	–	**1**
	Flake fragment	medial	49	–	–	–	–	–	–	**49**
		distal	73	1	–	–	–	–	–	**74**
		lateral	127	1	–	–	–	–	–	**128**
	Tested cobble	indeterminate fragment	–	–	–	–	–	1	–	**1**
		whole	–	–	–	–	–	1	–	**1**
	Multidirectional core	whole	–	–	–	–	–	4	–	**4**
	Bipolar core	whole	–	–	–	–	–	2	–	**2**
	Hammerstone	indeterminate fragment	–	–	–	–	–	–	–	**1**
	Early stage biface	indeterminate fragment	–	–	–	1	–	–	–	**1**

(Table 8.31, continued)

	Artifact Morphology	Portion	Unutilized Debitage	Utilized/ Retouched Debitage	Utilized/ Retouched Scraper	Utilized/ Retouched Biface	Utilized/ Retouched Projectile Point	Core	Hammer-stone	Table Total
	Late stage biface	indeter-minate fragment	–	–	–	1	–	–	–	**1**
		distal	–	–	–	–	1	–	–	**1**
Sedi-mentary	Angular debris	indeter-minate fragment	4	–	–	–	–	–	–	**4**
	Core flake	whole	3	–	–	–	–	–	–	**3**
		proximal	1	–	–	–	–	–	–	**1**
		lateral	1	–	–	–	–	–	–	**1**
	Flake fragment	lateral	1	–	–	–	–	–	–	**1**
	Hammerstone	whole	–	–	–	–	–	–	–	**1**
	Early stage biface	whole	–	–	–	1	–	–	–	**1**
Quartz-ite	Angular debris	indeter-minate fragment	1	–	–	–	–	–	–	**1**
	Core flake	whole	2	–	–	–	–	–	–	**2**
		proximal	1	–	–	–	–	–	–	**1**
		lateral	4	–	–	–	–	–	–	**4**
	Biface flake	whole	1	–	–	–	–	–	–	**1**
		proximal	1	–	–	–	–	–	–	**1**
	Flake fragment	medial	2	–	–	–	–	–	–	**2**
		distal	1	–	–	–	–	–	–	**1**
		lateral	2	–	–	–	–	–	–	**2**
	Hammerstone	whole	–	–	–	–	–	–	–	**1**
Flaked mineral	Flake fragment	distal	1	–	–	–	–	–	–	**1**
						Non-local				
Chert	Angular debris	indeter-minate fragment	13	1	–	–	–	–	–	**14**
	Core flake	whole	25	–	–	–	–	–	–	**25**
		proximal	7	1	–	–	–	–	–	**8**
		lateral	9	–	–	–	–	–	–	**9**
	Biface flake	whole	3	–	–	–	–	–	–	**3**
	Bipolar flake	whole	1	–	–	–	–	–	–	**1**
		lateral	1	–	–	–	–	–	–	**1**
	Flake fragment	medial	2	–	–	–	–	–	–	**2**
		distal	1	–	–	–	–	–	–	**1**
		lateral	5	–	–	–	–	–	–	**5**
	Bipolar core	indeter-minate fragment	–	–	–	–	–	1	–	**1**
		whole	–	–	–	–	–	1	–	**1**
	Late stage biface	proximal	–	–	–	–	1	–	–	**1**
Obsidian	Angular debris	indeter-minate fragment	15	–	–	–	–	–	–	**15**
	Core flake	whole	8	–	–	–	–	–	–	**8**
		proximal	5	–	–	–	–	–	–	**5**
		lateral	4	–	–	–	–	–	–	**4**
	Biface flake	whole	7	–	–	–	–	–	–	**7**
		proximal	2	–	–	–	–	–	–	**2**
		lateral	1	–	–	–	–	–	–	**1**
	Flake fragment	distal	6	–	–	–	–	–	–	**6**
		lateral	4	–	–	–	–	–	–	**4**
	Bipolar core	whole	–	–	–	–	–	2	–	**2**
	Early stage biface	indeter-minate fragment	–	–	–	1	–	–	–	**1**
Table Total			**1183**	**27**	**1**	**4**	**5**	**16**	**3**	**1242**

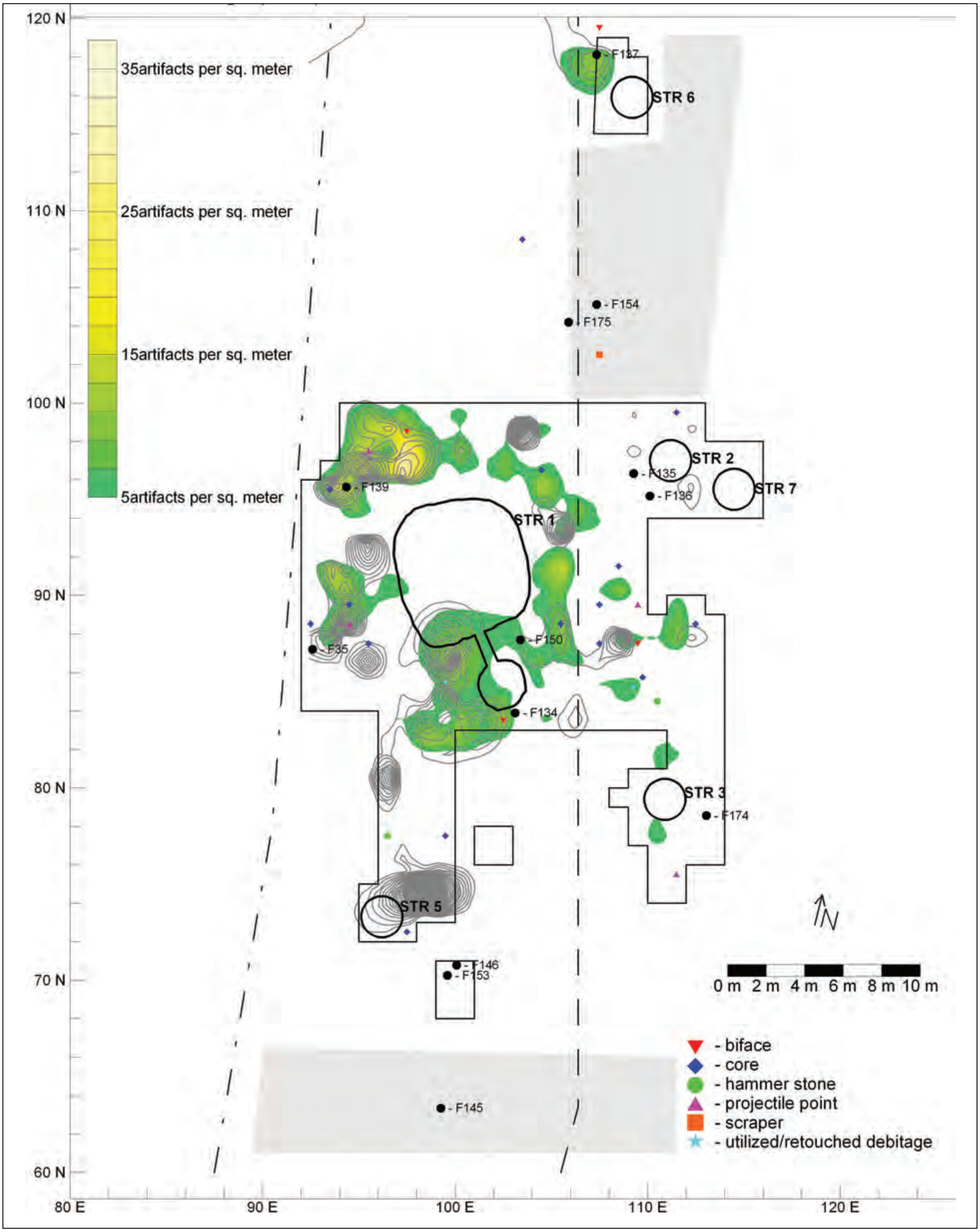


Figure 8.60. Lithic tools and debitage aggregated by count and weight, Study Unit 1, LA 104106.

occurred. For example, the majority of flaked stone tools and cores were located east of Structure 1, spatially associated with the high concentration of ceramic artifacts. In this context, larger sherd size and flake stone tools may represent the systematic disposal of household refuse. In areas with fewer ceramic artifacts and overlapping count/unit and weight/unit distributions of debitage, such as to the northwest and south of Structure 1, these patterns suggest lithic reduction or activity areas.

Ground stone. The ground stone assemblage was predominantly fragmentary in nature with whole or diagnostic tools used for processing a variety of biotic and natural resources including plants, minerals, and possibly animals. Nine pieces of ground stone were recovered from the surface and from the excavation of the extramural area in SU 1. The majority of these items were indeterminate fragments in addition to a complete one-hand mano and a complete basin metate. Most of these artifacts were distributed across the excavation area between 80N and 90N grid lines and co-occurred with the distribution of lithics on the west and east side of Structure 1. This pattern supports the observation that these may be activity areas.

Fauna. The faunal assemblage was diverse and represents the exploitation of small to medium-sized mammals. Ninety pieces of animal bone were recovered from the extramural surface of SU 1. The majority of these items were the unburned, fragmentary remains of small to medium-sized mammals including jack rabbit, cottontail, prairie dog, and gopher. In addition, the identification of horse, dog, chicken, and sheep recovered from upper fill levels reflects modern roadside activity. Distribution data by count shows the highest concentration of fauna to the southeast of Structure 1, co-occurring with ceramic and lithic artifacts. The co-occurrence of these different artifact classes supports the interpretation that this area represents a weakly formed midden or disposal area.

Study Unit 2

Sixty-four 1 by 1 m grid units and 14 systematic auger tests were used to define the extent, nature, and depth of the subsurface deposits. Fill was removed in 10 cm levels to a maximum depth of 60 cm below modern ground surface and screened through 1/4-inch mesh. Following preliminary investigations, mechanical equipment was used to remove the upper noncultural fill layer and to expose both the original ground surface and intact cultural deposits. Hand excavations within SU 2 identified ephemeral structures and 25 other cultural features (see Fig. 8.1). In all, 3,114 artifacts were recovered from SU 2 (Table 8.32). Feature types include one, possibly two ephemeral structures, unlined pits, thermally altered pits, and rock concentrations (Table 8.33). In addition to these features, three charcoal-stained areas were identified that may represent feature discard areas.

Diagnostic artifacts suggest six temporal periods: Basketmaker II, Basketmaker III to early Pueblo, late Pueblo II to early Pueblo III, historic Navajo. However, these temporal components are likely the result of only three occupational periods including Basketmaker II, Basketmaker III to early Pueblo, and historic Navajo. Based on diagnostic artifact spatial patterning and chronometric data, SU 2 is the result of a series of complex occupations discussed below.

Early Historic Component

Structure 9. Located in the northern portion of SU 2, Structure 9 consisted of a shallow, unburned, oval depression best characterized as a occupation surface (Fig. 8.62). During the excavation of Structure 9, fill was removed in 1 by 1 m grid units and screened through 1/4-inch mesh. Structure limits were defined by the well preserved, compact, and lightly stained surface. Definition of the limits became increasingly more difficult toward the perimeter of the surface. The long axis of Structure 9 was oriented north–south and measured approximately 4.3 m by 2.7 m with a maximum depth of 15 cm.

A total of six floor features were identified within the structure as defined by the occupation surface. Features in direct association with this surface include Feature 23, and a complex of five features: Feature 69, Feature 76, Feature 77, Feature 78, and Feature 79 (Fig. 8.63). However, only five are the result of the early historic occupation. Absent from the feature assemblage was evidence of a superstructure. The roofing arrangement may not have required set posts or other archaeological visible features. Such roofing arrangements might have included various forked-stick or lean-to configurations (Mindellef 1898; Spencer and Jett 1981; Witherspoon 1983) (Fig. 8.64).

Table 8.32. LA 104106, Study Unit 2, feature number and type by artifact type.

	Feature		Ceramic	Lithic	Ground Stone	Bone	Pollen	Macro-botan-ical	Chrono-logic Sample	Mineral, nfs	Table Total
Extramural Area											
Extramural area	0	Count	980	736	6	184	–	–	8	9	**1923**
		Row %	50.96	38.27	0.31	9.57	–	–	0.42	0.47	**100.00**
		Col. %	95.33	88.67	50.00	90.20	–	–	38.10	100.00	**61.60**
Pit, nfs	39	Count	1	–	–	17	–	30	–	–	**48**
		Row %	2.08	–	–	35.42	–	62.50	–	–	**100.00**
		Col. %	0.10	–	–	8.33	–	2.97	–	–	**1.54**
	60	Count	–	1	–	–	–	–	–	–	**1**
		Row %	–	100.00	–	–	–	–	–	–	**100.00**
		Col. %	–	0.12	–	–	–	–	–	–	**0.03**
	61	Count	–	–	–	–	–	1	–	–	**1**
		Row %	–	–	–	–	–	100.00	–	–	**100.00**
		Col. %	–	–	–	–	–	0.10	–	–	**0.03**
	172	Count	–	–	–	–	1	9	–	–	**10**
		Row %	–	–	–	–	10.00	90.00	–	–	**100.00**
		Col. %	–	–	–	–	12.50	0.89	–	–	**0.32**
Cist, nfs	11	Count	1	4	–	–	1	374	2	–	**382**
		Row %	0.26	1.05	–	–	0.26	97.91	0.52	–	**100.00**
		Col. %	0.10	0.48	–	–	12.50	37.03	9.52	–	**12.24**
	12	Count	–	–	–	–	1	231	2	–	**234**
		Row %	–	–	–	–	0.43	98.72	0.85	–	**100.00**
		Col. %	–	–	–	–	12.50	22.87	9.52	–	**7.50**
	24	Count	11	48	5	1	–	173	3	–	**241**
		Row %	4.56	19.92	2.07	0.41	–	71.78	1.24	–	**100.00**
		Col. %	1.07	5.78	41.67	0.49	–	17.13	14.29	–	**7.72**
	98	Count	–	6	–	–	1	19	–	–	**26**
		Row %	–	23.08	–	–	3.85	73.08	–	–	**100.00**
		Col. %	–	0.72	–	–	12.50	1.88	–	–	**0.83**
Hearth	7	Count	–	–	–	–	–	2	1	–	**3**
		Row %	–	–	–	–	–	66.67	33.33	–	**100.00**
		Col. %	–	–	–	–	–	0.20	4.76	–	**0.10**
Fire pit	1	Count	–	5	–	–	1	2	1	–	**9**
		Row %	–	55.56	–	–	11.11	22.22	11.11	–	**100.00**
		Col. %	–	0.60	–	–	12.50	0.20	4.76	–	**0.29**
	2	Count	–	5	–	1	1	1	1	–	**9**
		Row %	–	55.56	–	11.11	11.11	11.11	11.11	–	**100.00**
		Col. %	–	0.60	–	0.49	12.50	0.10	4.76	–	**0.29**
	3	Count	–	16	–	–	1	10	1	–	**28**
		Row %	–	57.14	–	–	3.57	35.71	3.57	–	**100.00**
		Col. %	–	1.93	–	–	12.50	0.99	4.76	–	**0.90**
	6	Count	–	–	–	–	–	1	–	–	**1**
		Row %	–	–	–	–	–	100.00	–	–	**100.00**
		Col. %	–	–	–	–	–	0.10	–	–	**0.03**
	10	Count	–	–	–	–	–	2	–	–	**2**
		Row %	–	–	–	–	–	100.00	–	–	**100.00**
		Col. %	–	–	–	–	–	0.20	–	–	**0.06**

(Table 8.32, continued)

	Feature		Ceramic	Lithic	Ground Stone	Bone	Pollen	Macro-botan-ical	Chrono-logic Sample	Mineral, nfs	Table Total
Posthole	4	Count	–	–	–	–	–	–	1	–	**1**
		Row %	–	–	–	–	–	–	100.00	–	**100.00**
		Col. %	–	–	–	–	–	–	4.76	–	**0.03**
	58	Count	–	1	–	–	–	–	–	–	**1**
		Row %	–	100.00	–	–	–	–	–	–	**100.00**
		Col. %	–	0.12	–	–	–	–	–	–	**0.03**
Thermally altered pit	22	Count	–	–	–	–	1	22	–	–	**23**
		Row %	–	–	–	–	4.35	95.65	–	–	**100.00**
		Col. %	–	–	–	–	12.50	2.18	–	–	**0.74**
	46	Count	–	–	–	1	–	–	–	–	**1**
		Row %	–	–	–	100.00	–	–	–	–	**100.00**
		Col. %	–	–	–	0.49	–	–	–	–	**0.03**
Structure 9											
Pit, nfs	76	Count	2	–	–	–	–	33	–	–	**35**
		Row %	5.71	–	–	–	–	94.29	–	–	**100.00**
		Col. %	0.19	–	–	–	–	3.27	–	–	**1.12**
	77	Count	–	4	–	–	–	31	–	–	**35**
		Row %	–	11.43	–	–	–	88.57	–	–	**100.00**
		Col. %	–	0.48	–	–	–	3.07	–	–	**1.12**
	78	Count	–	–	–	–	–	21	–	–	**21**
		Row %	–	–	–	–	–	100.00	–	–	**100.00**
		Col. %	–	–	–	–	–	2.08	–	–	**0.67**
	79	Count	–	–	–	–	–	24	–	–	**24**
		Row %	–	–	–	–	–	100.00	–	–	**100.00**
		Col. %	–	–	–	–	–	2.38	–	–	**0.77**
Hearth	23	Count	–	–	–	–	–	4	1	–	**5**
		Row %	–	–	–	–	–	80.00	20.00	–	**100.00**
		Col. %	–	–	–	–	–	0.40	4.76	–	**0.16**
Thermally altered pit	69	Count	–	1	1	–	–	20	–	–	**22**
		Row %	–	4.55	4.55	–	–	90.91	–	–	**100.00**
		Col. %	–	0.12	8.33	–	–	1.98	–	–	**0.70**
Intramural area	0	Count	33	3	–	–	–	–	–	–	**36**
		Row %	91.67	8.33	–	–	–	–	–	–	**100.00**
		Col. %	3.21	0.36	–	–	–	–	–	–	**1.15**
Table Total		**Count**	**1028**	**830**	**12**	**204**	**8**	**1010**	**21**	**9**	**3122**
		Row %	**32.93**	**26.59**	**0.38**	**6.53**	**0.26**	**32.35**	**0.67**	**0.29**	**100.00**
		Col. %	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

nfs = not further specified

Table 8.33. LA 104106, Study Unit 2, feature summary data.

Feature	Type	Architectural Unit	Location[1]	Size (cm) length x width x depth	Shape (plan and profile)	Fill	Contents	Comments
1	Thermally altered pit, nfs	Extramural area	12.80N/103.16E	104 x 70 x 56	Irregular Basin	Layer 1 (Munsell 2.5YR 4/0 dark gray) loose charcoal-stained sandy loam.	Lithic and macrobotanical	Shallow, gentle-sided basin. Patchy oxidation at feature margins. Spatially associated with Feature 2 and Feature 3. Considerable rodent disturbance.
2	Thermally altered pit, nfs	Extramural area	12.74N/102.60E	60 x 57 x 20	Oval Basin	Layer 1 (Munsell 2.5YR 4/0 dark gray) loose charcoal-stained sandy loam.	Lithic, bone, and macrobotanical	Shallow, steep-sided basin. Spatially associated with Feature 1 and Feature 3. Considerable rodent disturbance.
3	Thermally altered pit, nfs	Extramural area	12.70N/101.40E	127 x 90 x 31	Irregular Basin	Layer 1 (Munsell 2.5YR 4/0 dark gray) loose charcoal-stained sandy loam.	Lithic and macrobotanical	Shallow, steep-sided basin. Spatially associated with Feature 1 and Feature 2. Considerable rodent disturbance. ^{14}C (380 BC).[2]
4	Posthole	Extramural area	22.26N/96.71E	25 x 25 x 33	Circular Cylindrical	Layer 1 (Munsell 10YR 5/6 yellowish brown) loose, sandy loam charcoal uncommon.	Macrobotanical	Deep, cylindrical feature.
6	Thermally altered pit, nfs	Extramural area	14.82N/90.16E	90 x 65 x 18	Oval Basin	Layer 1 (Munsell 2.5YR 4/0 dark gray to 2.5YR 3/0 very dark gray) charcoal-stained silty sand.	Macrobotanical	Shallow, steep-sided basin.
7	Thermally altered pit, nfs	Extramural area	10.54N/86.46E	46 x 50 x 8	Circular Basin	Layer 1 (Munsell 2.5YR 4/0 dark gray) loose charcoal-stained sandy loam. Layer 2 (Munsell 5YR 4/6 yellowish red) loose, oxidized silty sand.	Macrobotanical	Shallow, gentle-sided basin. Archaeomagnetic sample (n/a).[3]
9	Thermally altered pit, nfs	Extramural area	11.10N/88.30E	70 x 62 x 10	Circular Basin	Layer 1 (Munsell 2.5YR 3/0 very dark gray) compact, charcoal-stained silty sand mottled with (Munsell 2.5YR 6/4 yellowish brown-light) silty sand.	Macrobotanical	Shallow, gentle-sided basin.
10	Thermally altered pit, nfs	Extramural area	11.44N/87.56E	70 x 60 x 7	Bifurcated Basin	Layer 1 (Munsell 2.5YR 4/0 dark gray) compacted, charcoal-stained, silty sand.	Macrobotanical	Shallow, gentle-sided basin.
11	Roasting facility	Extramural area	28.00N/94.06E	52 x 52 x 32	Circular Bell-shaped	Layer 1 (Munsell 10YR 5/6 yellowish brown) loose, silty sand with charcoal flecks.	Ceramic, lithic, and macrobotanical	Deep, bell-shaped feature. Oxidized rind. Spatially associated with Feature 12. ^{14}C (AD 1520, 1590, 1620)[2] archaeomagnetic sample.[3]

(Table 8.33, continued)

Feature	Type	Architectural Unit	Location[1]	Size (cm) length x width x depth	Shape (plan and profile)	Fill	Contents	Comments
12	Roasting facility	Extramural area	26.52N/101.82E	40 x 42 x 40	Circular Bell-shaped	Layer 1 (Munsell 2.5y 6/0 dark gray) charcoal stained, silty sand. Layer 2 (Munsell 10YR 5/6 yellowish brown). loose, slightly charcoal stained, silty sand. Layer 3 (Munsell 10YR 6/4 light yellowish brown) charcoal stained, silty sand.	Macrobotanical	Deep, bell-shaped feature. Oxidized rind. Spatially associated with Feature 11. ^{14}C (AD 1660)[2] archaeomagnetic sample.[3]
22	Thermally altered pit, nfs	Extramural area	22.66N/90.34E	60 x 52 x 12	Circular Basin	Layer 1 (Munsell 2.5YR 3/0 very dark gray) charcoal-stained sandy loam. Layer 2 (Munsell 10YR 5/6 yellowish brown) silty, loamy sand with charcoal mottles.	Macrobotanical	Shallow, gentle-sided basin. Sides lined with tabular sandstone. ^{14}C (AD 30)[2] archaeomagnetic sample.[3]
23	Hearth	9.01 (Structure 9)	24.68N/89.68E	32 x 28 x 3	Circular Basin	Layer 1 (Munsell 2.5YR 4/0 dark gray) compact, charcoal-stained silty sand.	Ceramic and macrobotanical	Shallow, gentle-sided basin. ^{14}C (AD 1680, 1730, 1810, 1930, 1950)[2] archaeomagnetic sample.[3]
24	Cist, nfs	Extramural area	22.84N/88.78E	140 x 240 x 2	Irregular Bell-shaped	Layer 1 (Munsell 10YR 4/4 dark yellowish brown). loose, sandy loam with charcoal flecks and sandstone fragments uncommon. Layer 2 (Munsell 10YR 5/6 yellowish brown) loose, sandy loam.	Ceramic, lithic, ground stone, bone, and macrobotanical	Deep, steeped-sided, undercut cist with terrace interior. Patchy oxidation at base of feature. Upper portion of feature defined with small fragments of tabular sandstone. Spatially associated with Structure 9 ^{14}C (lower strata 340, 320, 210 BC; upper strata AD 1510, 1600, 1620)[2] archaeomagnetic sample.[3]
39	Pit, nfs	Extramural area	27.74N/100.46E	53 x 57 x 15	Circular Basin	Layer 1 (Munsell 10YR 5/3 brown) charcoal-rich sand.	Ceramic, bone, and macrobotanical	Shallow, steep-sided basin.
46	Pit, nfs	Extramural area	24.70N/95.05E	35 x 35 x ?	Irregular Basin	Layer 1 (Munsell 10YR 4/4 dark yellowish brown). loose, sandy loam with charcoal flecks and sandstone fragments uncommon. Layer 2 (Munsell 10YR 5/6 yellowish brown) loose, sandy loam.	Bone	Shallow, gentle-sided basin. Considerable rodent disturbance.
58	Posthole	Extramural area	24.98N/94.46E	18 x 18 x 40	Circular Cylindrical	Layer 1 (Munsell 10YR 4/4 dark yellowish brown). loose, sandy loam with charcoal flecks.	Lithic	Shallow, steep-sided feature. Considerable rodent disturbance.
60	Pit, nfs	Extramural area	19.75N/89.50E	25 x 25 x 17	Circular Basin	Layer 1 (Munsell 10YR 6/3 pale brown) homogeneous charcoal-stained sandy loam.	Lithic and macrobotanical	Deep, steep-sided basin. Considerable rodent disturbance.

(Table 8.33, continued)

Feature	Type	Architectural Unit	Location[1]	Size (cm) length x width x depth	Shape (plan and profile)	Fill	Contents	Comments
61	Pit, nfs	Extramural area	19.15N/89.44E	26 x 24 x 10	Circular Basin	Layer 1 (Munsell 10YR 6/3 pale brown) homogeneous charcoal-stained sandy loam. Layer 2 (Munsell 10YR 6/4 light yellowish brown) heterogeneous charcoal-stained sandy loam with sterile mottles.	Macrobotanical	Shallow, steep-sided basin.
69	Pit, nfs	9.01 (Structure 9)	23.55N/89.60E	60 x 70 x 15	Circular Basin	Layer 1 (Munsell 2.5YR 3/0 very dark gray) loose, charcoal-stained sandy loam.	Lithics, ground stone	Shallow, steep-sided basin. Articulates with Feature 78 and Feature 79. Considerable insect and rodent disturbance. ^{14}C (380 BC).[2]
76	Pit, nfs	9.01 (Structure 9)	23.56N/88.70E	44 x 44 x 21	Bifurcated Basin	Layer 1 (Munsell 2.5YR 3/0 very dark gray) loose, charcoal-stained sandy loam.	Ceramic and macrobotanical	Deep, steep-sided basin. Articulates with Feature 77.
77	Pit, nfs	9.01 (Structure 9)	23.94N/88.80E	50 x 50 x 15	Bifurcated Basin	Layer 1 (Munsell 2.5YR 3/0 very dark gray) loose, charcoal-stained sandy loam.	Lithic and macrobotanical	Deep, steep-sided basin. Articulates with Feature 76.
78	Pit, nfs	9.01 (Structure 9)	23.76N/89.20E	40 x 32 x 11	Bifurcated Basin	Layer 1 (Munsell 2.5YR 3/0 very dark gray) loose, charcoal-stained sandy loam.	Macrobotanical	Shallow, gentle-sided basin. Articulates with Feature 69 and Feature 79.
79	Pit, nfs	9.01 (Structure 9)	23.40N/89.20E	40 x 28 x 10	Bifurcated Basin	Layer 1 (Munsell 2.5YR 3/0 very dark gray) loose, charcoal-stained sandy loam.	Macrobotanical	Shallow, gentle-sided basin. Articulates with Feature 69 and Feature 78.
98	Cist, nfs	Extramural area	24.00N/92.00E	112 x 128 x 73	Bifurcated Bell-shaped	Layer 1 (Munsell 10YR 6/2). Medium to fine sand with inclusions of charcoal, oxidized sandstone, and adobe.	Lithic and macrobotanical	Steep-sided, bell-shaped feature. Articulates with Feature 172.
172	Pit, nfs	Extramural area	23.74N/91.32E	62 x 62 x 38	Bifurcated Basin	Layer 1 (Munsell 10YR 5/1 gray Medium to fine sand with inclusions of charcoal and adobe. Layer 2 (Munsell 10YR 6/2 light brownish gray) medium to fine sand with inclusions of charcoal, oxidized sandstone.	Macrobotanical	Deep, steep-sided basin. Articulates with Feature 98. Base partially lined with fragments of tabular sandstone.

[1] Feature center point
[2] intercept radiocarbon age and dated material
[3] = oval center point
nfs = not further specified

Figure 8.62. Structure 9, LA 104106.

Feature 23 is centrally located within Structure 9 and was constructed by excavating a basin with gently sloping sides 5 cm below the surface of the floor or use surface. Subsequently, the base and sides were highly oxidized through thermal activity contained within the feature. This feature was filled with a single homogeneous layer of loose sandy loam with inclusions of charcoal flecks. No artifacts were recovered; however, macrobotanical remains include a trace of carbonized corn and rice grass and uncarbonized annual and perennial species (Table 8.34). The highly oxidized condition of Feature 23 and surrounding surface suggest it was used for tasks which required high, concentrated heat. Its centralized location combined with oxidized condition suggest Feature 23 was the central hearth.

A complex of four features, Feature 76, Feature 77, Feature 78, and Feature 79, were located in the south-central portion of Structure 9. Feature 76 and Feature 77 were conjoined and similar in construction, configuration, and orientation. Feature 76 and Feature 77 were 21 and 15 cm deep, respectively, and contained a single homogeneous layer of charcoal-stained sandy loam with inclusions of charcoal and artifacts. Artifacts recovered from Feature 76 included two plain gray jar body sherds (Table 8.35) and artifacts recovered from Feature 77 included four unutilized pieces of debitage (Table 8.36). Macrobotanical remains recovered from each feature were dominated by unburned annuals followed by carbonized annuals and trace amounts of carbonized perennial, grasses, and cultivars (Table 8.34).

Feature 78 and Feature 79, located 10 cm east of Feature 76 and Feature 77, were also two small conjoined features similar in construction and content. These features were constructed by excavating a shallow basin with gently sloping sides 11 and 10 cm below the floor of Structure 9, respectively. Each was filled with a single homogeneous layer of charcoal-stained sandy loam containing flecks of charcoal. Macrobotanical remains were dominated by unburned annuals with trace amounts of carbonized annuals, perennials, and cultivars (Table 8.34). A single ground stone fragment was recovered from

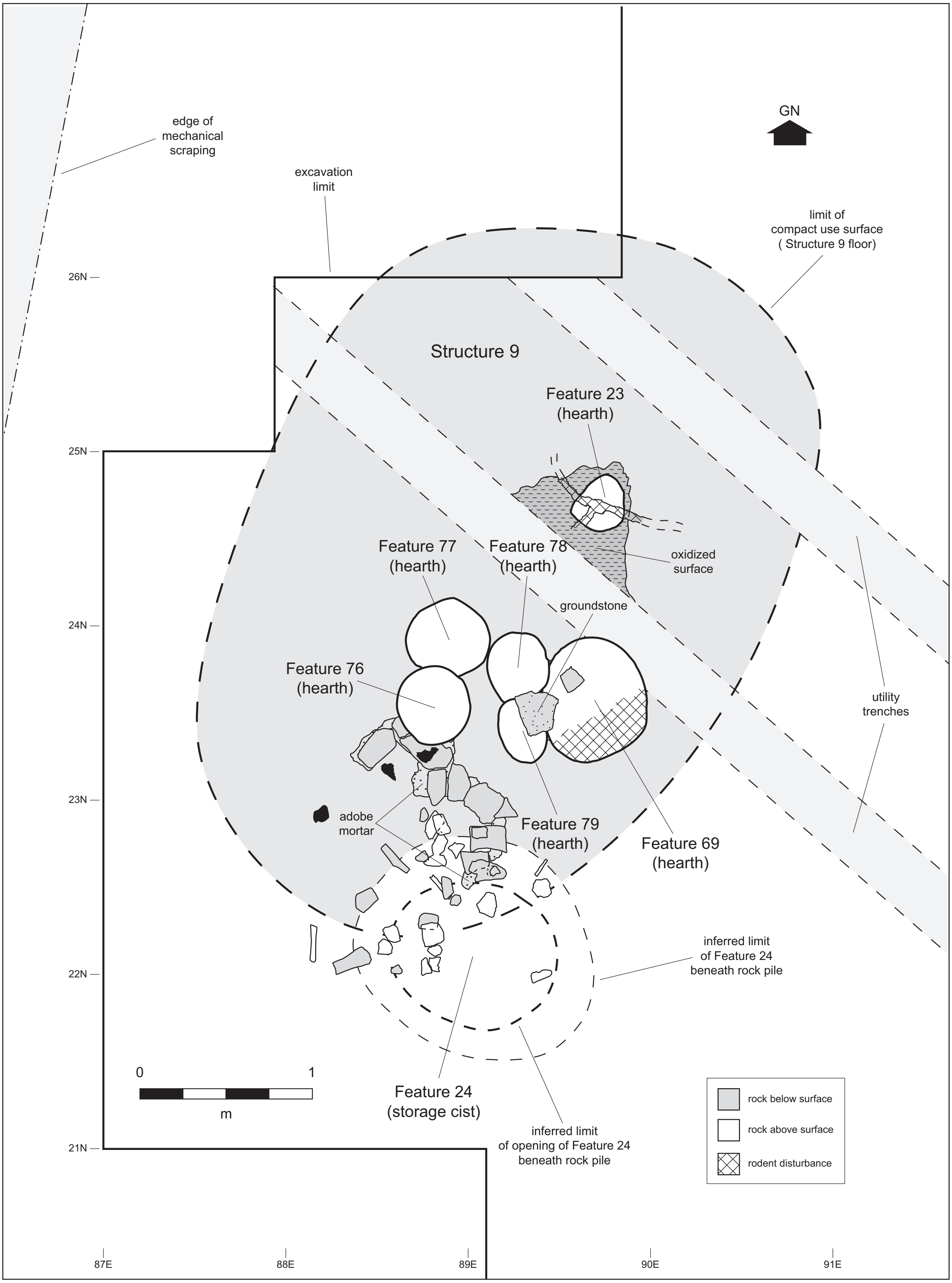


Figure 8.63. Plan of Structure 9, LA 104106.

Figure 8.64. Navajo summer shelter, c. 1935. (Photo by Leona E. Kessler, courtesy Palace of the Governors Photo Archives (NMHM/DCA), neg. no. 118682.)

the adjoining area east of these two features. Similarities in construction, condition, and proximity suggest that these four features were used in related tasks that required staged, low-level heat. Similarities in macrobotanical data support this observation.

Adjacent to the southern perimeter of the floor surface was a large subterranean chamber, Feature 24. Feature 24 was constructed by excavating the loose fill and loosely consolidated sandstone from fractures in the native sandstone bedrock. The opening was partially encircled with unutilized sandstone and ground stone fragments. Feature 24 had a maximum depth of 2 m with an area of oxidized bedrock identified at the base of the feature. Numerous artifacts and chronometric data were recovered from this feature that suggest it was constructed and used in the Basketmaker II period and reused during the early historic Navajo occupation. Ceramic artifacts recovered from this feature included plain gray body sherds and a Dinetah gray body (Table 8.35). Lithic artifacts included unutilized debitage (Table 8.36) and ground stone artifacts, mostly fragmentary remains, with a single whole artifact recovered from the original ground surface (Table 8.37). Faunal artifacts were limited to a single, unburned prairie dog long-bone (Table 8.38). Macrobotanical remains were plentiful, dominated by unburned annuals followed by carbonized grasses, trace amounts of carbonized perennials, and cultivars (Table 8.34).

Two radiometric samples from Feature 24, one recovered from the upper strata (FS 2290) and one from the lower strata (FS 2320), were submitted for analysis. FS 2290 yielded a conventional AMS radiocarbon age of 350 ± 50 BP (Beta-164339; *Juniperus* wood charcoal; δ^{13} = -25.0* o/oo) and FS 2320 yielded a conventional AMS radiocarbon age of 2190 ± 40 (Beta-164340; *Sarco/Atriplex* wood charcoal; δ^{13} = -11.9 o/oo). When calibrated, FS 2290 generated a 2-sigma range of 1440–1650 cal AD (p = .95). FS 2320 generated a 2-sigma range of 360–150 cal BC (p = .93) (Table 8.39). Together these dates suggest the initial construction of this feature occurred during the BM II period and was subsequently reused during the early historic occupation. One archaeomagnetic sample was collected from the bottom of Feature 24.

Table 8.34. LA 104106, Study Unit 2, macrobotanical data by feature number.

		Extramural Area														Structure 9						
		Feature														Feature						
		1	**2**	**3**	**6**	**7**	**10**	**11**	**12**	**22**	**24**	**39**	**61**	**98**	**172**	**23**	**69**	**76**	**77**	**78**	**79**	**Table Total**
Carbonized																						
Annuals	Amaranth	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	**1**
	Goosefoot	–	–	5	–	–	1	–	3	5	3	2	1	15	3	–	3	6	–	–	2	**49**
	Cheno-Am	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	1	–	–	–	**2**
	Bugseed	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1	–	–	**2**
	Winged pigweed	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	**1**
	Tansy mustard	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**1**
	Sunflower	–	–	–	–	–	–	–	–	–	1	2	–	–	–	–	–	–	–	–	–	**3**
	Purslane	–	–	–	–	1	–	31	103	–	1	4	–	–	–	–	–	–	–	–	–	**140**
Perennials	Juniper	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	**1**
	Wolfberry	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	**1**
	Pine	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	**1**
	Piñon	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2	1	1	–	**4**
	Unknown taxon	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	**1**
Grasses	Grass family	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	**1**
	Ricegrass	1	–	–	–	–	–	–	–	1	7	–	–	2	1	1	3	1	2	–	–	**19**
Cultivars	Corn	–	–	1	–	–	–	2	–	2	3	5	–	2	2	1	2	2	2	1	1	**26**
Unidentified	Mallow family	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	**1**
	Seed	–	–	3	–	–	–	1	–	–	2	–	–	–	1	–	–	1	–	–	–	**8**
Unburned																						
Annuals	Amaranth	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	1	–	–	–	–	**2**
	Goosefoot	–	–	–	–	–	1	16	22	12	150	14	–	–	1	1	10	18	24	18	21	**308**
	Cheno-Am	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**1**
	Winged pigweed	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	**1**
	Spurge	–	–	1	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	**2**
	Sunflower	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	**1**
	Purslane	–	–	–	–	–	–	321	100	–	1	3	–	–	–	–	–	1	–	–	–	**426**
Perennials	Juniper	–	–	–	–	–	–	1	–	1	1	–	–	–	–	1	–	–	–	–	–	**4**
Grasses	Ricegrass	–	1	–	–	1	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	**3**
Table Total		**2**	**1**	**10**	**1**	**2**	**2**	**374**	**231**	**22**	**173**	**30**	**1**	**19**	**9**	**4**	**20**	**33**	**31**	**21**	**24**	**1010**

Table 8.35. LA 104106, Study Unit 2, ceramic type by feature number.

		Extramural Area				Structure 9		
		Feature				Feature		
Ceramic Type	**Vessel Form**	**F0**	**F1**	**F24**	**F39**	**F0**	**F76**	**Table Total**
		Gray						
Plain rim	bowl rim	10	–	–	–	–	–	**10**
	jar rim	4	–	–	–	–	–	**4**
	seed jar rim	6	–	–	–	–	–	**6**
	indeterminate rim	3	–	–	–	–	–	**3**
Plain body	indeterminate	2	–	–	–	–	–	**2**
	bowl body	2	–	1	–	–	–	**3**
	jar neck	24	–	–	–	1	–	**25**
	jar body	553	1	9	1	20	2	**586**
	jar body with handle	1	–	–	–	–	–	**1**
	fired coil	1	–	–	–	–	–	**1**
Indented corrugated	jar neck	4	–	–	–	–	–	**4**
	jar rim	1	–	–	–	–	–	**1**
	jar body	23	–	–	–	–	–	**23**
Dinetah Gray	jar neck	16	–	–	–	–	–	**16**
	jar rim	6	–	–	–	–	–	**6**
	jar body	185	–	1	–	10	–	**196**
		White						
Polished white ware	indeterminate	4	–	–	–	–	–	**4**
	bowl rim	4	–	–	–	1	–	**5**
	bowl body	28	–	–	–	–	–	**28**
	jar body	5	–	–	–	–	–	**5**
	jar body with handle	1	–	–	–	–	–	**1**
Mineral paint, nfs	bowl body	2	–	–	–	–	–	**2**
	jar body	3	–	–	–	–	–	**3**
Escavada Black-on-white	bowl rim	4	–	–	–	–	–	**4**
	bowl body	6	–	–	–	–	–	**6**
	jar neck	1	–	–	–	–	–	**1**
	canteen rim	1	–	–	–	–	–	**1**
Gallup Black-on-white	jar body	2	–	–	–	–	–	**2**
Basketmaker III–Pueblo I, mineral	bowl rim	4	–	–	–	–	–	**4**
	bowl body	4	–	–	–	1	–	**5**
	jar body	4	–	–	–	–	–	**4**
Chaco McElmo Black-on-white	bowl rim	1	–	–	–	–	–	**1**
La Plata Black-on-white	bowl rim	1	–	–	–	–	–	**1**
	bowl body	4	–	–	–	–	–	**4**
Pueblo III (indeterminate organic)	bowl body	5	–	–	–	–	–	**5**
Unpainted white ware	bowl body	2	–	–	–	–	–	**2**
Chapin Black-on-white	bowl body	1	–	–	–	–	–	**1**
Chuska Corrugated	jar neck	1	–	–	–	–	–	**1**
		Red						
Tallahogan Red	bowl body	2	–	–	–	–	–	**2**
		Historic Decorated						
Zuni/Acoma polished red	jar neck	2	–	–	–	–	–	**2**
	jar rim	5	–	–	–	–	–	**5**
	jar body	18	–	–	–	–	–	**18**
	jar body with strap or coil handle	2	–	–	–	–	–	**2**
Acoma/Zuni Polychrome, nfs	bowl body	13	–	–	–	–	–	**13**
	jar rim	1	–	–	–	–	–	**1**
	jar body	8	–	–	–	–	–	**8**
Table Total		**980**	**1**	**11**	**1**	**33**	**2**	**1028**

Table 8.36. LA 104106, Study Unit 2, lithic artifact type by feature number.

				Extramural Area									Structure 9			
				Feature												
Material Type	**Morphology**	**Function**	**Portion**	**0**	**1**	**2**	**3**	**11**	**24**	**58**	**60**	**98**	**0**	**69**	**77**	**Table Total**
				Local												
Chert	Angular debris	Unutilized angular debris	Indeterminate fragment	17	–	–	1	–	–	–	–	–	–	–	–	**18**
	Core flake	Utilized/ retouched debitage	Whole	2	–	–	–	–	–	–	–	–	–	–	–	**2**
			Proximal	1	–	–	–	–	–	–	–	–	–	–	–	**1**
		Unutilized flake	Whole	20	–	–	–	–	4	–	–	–	–	–	–	**24**
			Proximal	7	–	–	–	–	2	–	–	–	–	–	–	**9**
			Lateral	12	–	–	–	–	–	–	–	–	–	–	–	**12**
	Biface flake	Unutilized flake	Proximal	1	–	–	–	–	–	–	–	–	–	–	–	**1**
	Flake fragment	Utilized/ retouched debitage	Medial	1	–	–	–	–	–	–	–	–	–	–	–	**1**
		Unutilized flake	Medial	1	–	–	–	–	–	–	–	–	–	–	–	**1**
			Distal	11	–	–	1	–	–	–	–	–	–	–	–	**12**
			Lateral	7	–	–	–	–	–	–	–	–	1	–	–	**8**
	Multidirectional core	Unutilized core	Indeterminate fragment	1	–	–	–	–	–	–	–	–	–	–	–	**1**
			Whole	1	–	–	–	–	–	–	–	–	–	–	–	**1**
	Early stage biface	Biface	Indeterminate fragment	1	–	–	–	–	–	–	–	–	–	–	–	**1**
	Late stage biface	Small projectile point	Indeterminate fragment	3	–	–	–	–	–	–	–	–	–	–	–	**3**
	Reworked late stage biface	Drill	Proximal	1	–	–	–	–	–	–	–	–	–	–	–	**1**
		Small side-notched projectile point	Proximal	1	–	–	–	–	–	–	–	–	–	–	–	**1**
Chalcedony	Angular debris	Unutilized angular debris	Indeterminate fragment	3	–	–	–	–	–	–	–	–	–	–	–	**3**
	Core flake	Unutilized flake	Whole	2	–	–	–	–	–	–	–	–	–	–	–	**2**
			Lateral	2	–	–	–	–	–	–	–	–	–	–	–	**2**
	Middle stage biface	Projectile point preform	Whole	1	–	–		–	–	–	–	–	–	–	–	**1**
	Late stage biface	Small projectile point	Indeterminate fragment	1	–	–	–	–	–	–	–	–	–	–	–	**1**
		Large stemmed projectile point	Whole	1	–	–	–	–	–	–	–	–	–	–	–	**1**

(Table 8.36, continued)

				Extramural Area									Structure 9			
				Feature												
Material Type	**Morphology**	**Function**	**Portion**	**0**	**1**	**2**	**3**	**11**	**24**	**58**	**60**	**98**	**0**	**69**	**77**	**Table Total**
Fossiliferous chert	Angular debris	Unutilized angular debris	Indeterminate fragment	8	–	–	–	–	–	–	–	–	–	–	–	**8**
	Core flake	Unutilized flake	Whole	14	–	1	1	–	1	–	–	–	–	–	–	**17**
			Proximal	8	–	–	–	–	1	–	–	–	–	–	–	**9**
			Lateral	3	–	–	–	–	–	–	–	–	–	–	–	**3**
	Biface flake	Unutilized flake	Whole	2	–	–	–	–	–	–	–	–	–	–	–	**2**
			Proximal	1	–	–	–	–	–	–	–	–	–	–	–	**1**
	Bipolar flake	Unutilized flake	Whole	1	–	–	–	–	–	–	–	–	–	–	–	**1**
	Flake fragment	Unutilized flake	Medial	2	–	–	–	–	–	–	–	–	–	–	–	**2**
			Distal	4	–	–	–	–	–	–	–	–	–	–	–	**4**
			Lateral	1	–	–	–	–	–	–	–	–	–	–	–	**1**
	Late stage biface	Biface	Medial	1	–	–	–	–	–	–	–	–	–	–	–	**1**
	Flake fragment	Unutilized flake	Distal	1	–	–	–	–	–	–	–	–	–	–	–	**1**
Silicified wood	Angular debris	Unutilized angular debris	Indeterminate fragment	151	1	–	3	–	8	–	–	–	–	–	1	**164**
	Core flake	Utilized/ retouched debitage	Whole	1	–	–	–	–	–	–	–	–	–	–	–	**1**
		Unutilized flake	Whole	90	–	–	1	–	4	–	–	2	–	1	1	**99**
			Proximal	75	1	–	5	1	4	–	–	–	1	–	–	**87**
			Lateral	92	2	2	1	1	2	–	1	1	1	–	1	**104**
	Biface flake	Unutilized flake	Whole	1	–	–	–	–	–	–	–	–	–	–	–	**1**
			Proximal	4	–	–	–	–	–	–	–	–	–	–	–	**4**
			Lateral	1	–	–	–	–	–	–	–	–	–	–	–	**1**
	Bipolar flake	Unutilized flake	Whole	3	–	–	–	–	–	–	–	–	–	–	–	**3**
			Lateral	4	–	–	–	–	–	–	–	–	–	–	–	**4**
	Flake fragment	Utilized/ retouched debitage	Medial	1	–	–	–	–	–	–	–	–	–	–	–	**1**
			Lateral	1	–	–	–	–	–	–	–	–	–	–	–	**1**
		Unutilized flake	Medial	20	1	–	2	–	2	–	–	–	–	–	–	**25**
			Distal	32	–	1	1	–	1	–	–	–	–	–	–	**35**
			Lateral	49	–	1	–	–	3	–	–	1	–	–	–	**54**
	Tested cobble	Unutilized core	Whole	1	–	–	–	–	–	–	–	–	–	–	–	**1**
	Unidirectional core	Unutilized core	Indeterminate fragment	1	–	–	–	–	–	–	–	–	–	–	–	**1**
			Whole	2	–	–	–	–	–	–	–	–	–	–	–	**2**
	Bidirectional core	Unutilized core	Whole	1	–	–	–	–	–	–	–	–	–	–	–	**1**
	Multidirectional core	Unutilized core	Indeterminate fragment	1	–	–	–	–	–	–	–	–	–	–	–	**1**
			Whole	3	–	–	–	–		–	–	–	–	–	–	**3**
	Bipolar core	Unutilized core	Whole	2	–	–	–	–	–	–	–	–	–	–	–	**2**
	Hammerstone	Hammer-stone	Whole	1	–	–	–	–	–	–	–	–	–	–	–	**1**
	Late stage uniface	Drill	Whole	1	–	–	–	–	–	–	–	–	–	–	–	**1**

(Table 8.36, continued)

				Extramural Area									Structure 9			
				Feature												
Material Type	**Morphology**	**Function**	**Portion**	**0**	**1**	**2**	**3**	**11**	**24**	**58**	**60**	**98**	**0**	**69**	**77**	**Table Total**
	Early stage biface	Biface	Whole	1	–	–	–	–	–	–	–	–	–	–	–	**1**
	Middle stage biface	Biface	Indeterminate fragment	2	–	–	–	–	–	–	–	–	–	–	–	**2**
	Late stage biface	Large projectile point	Proximal	1	–	–	–	–	–	–	–	–	–	–	–	**1**
		Large corner-notched projectile point	Distal	1	–	–	–	–	–	–	–	–	–	–	–	**1**
		Large side-notched projectile point	Lateral	1	–	–	–	–	–	–	–	–	–	–	–	**1**
		Small side-notched projectile point	Whole	1	–	–	–	–	–	–	–	–	–	–	–	**1**
Limestone	Angular debris	Unutilized angular debris	Indeterminate fragment	–	–	–	–	–	3	–	–	–	–	–	–	**3**
	Core flake	Unutilized flake	Whole	–	–	–	–	–	1	–	–	–	–	–	1	**2**
			Proximal	–	–	–	–	–	1	–	–	–	–	–	–	**1**
	Flake fragment	Unutilized flake	Medial	–	–	–	–	–	1	–	–	–	–	–	–	**1**
			Distal	–	–	–	–	–	1	–	–	–	–	–	–	**1**
	Multidirectional core	Unutilized core	Whole		–	–	–	–	1	–	–	–	–	–	–	**1**
Sandstone	Core flake	Unutilized flake	Lateral	1	–	–	–	–	–	–	–	–	–	–	–	**1**
Siltstone	Angular debris	Unutilized angular debris	Indeterminate fragment	1	–	–	–	–	–	–	–	–	–	–	–	**1**
	Core flake	Unutilized flake	Whole	2	–	–	–	–	–	–	–	–	–	–	–	**2**
			Lateral	1	–	–	–	–	–	–	–	–	–	–	–	**1**
Brown/red quartzite	Angular debris	Unutilized angular debris	Indeterminate fragment	5	–	–	–	–	2	–	–	–	–	–	–	**7**
	Core flake	Unutilized flake	Whole	1	–	–	–	–	2	–	–	1	–	–	–	**4**
			Proximal	2	–	–	–	–	3	–	–	–	–	–	–	**5**
			Lateral	–	–	–	–	–	–	–	–	1	–	–	–	**1**
Metaquartzite	Angular debris	Unutilized angular debris	Indeterminate fragment	2	–	–	–	–	–	–	–	–	–	–	–	**2**
	Core flake	Unutilized flake	Whole	1	–	–	–	–	–	–	–	–	–	–	–	**1**
			Proximal	3	–	–	–	–	–	–	–	–	–	–	–	**3**
			Lateral	2	–	–	–	–	–	–	–	–	–	–	–	**2**
	Flake fragment	Unutilized flake	Distal	–	–	–	–	–	1	–	–	–	–	–	–	**1**
Hematite	Angular debris	Unutilized angular debris	Indeterminate fragment	2	–	–	–	–	–	–	–	–	–	–	–	**2**

(Table 8.36, continued)

				Extramural Area									Structure 9			
				Feature												
Material Type	**Morphology**	**Function**	**Portion**	**0**	**1**	**2**	**3**	**11**	**24**	**58**	**60**	**98**	**0**	**69**	**77**	**Table Total**
				Non-local												
Washington Pass chert	Angular debris	Unutilized angular debris	Indeterminate fragment	4	–	–	–	–	–	–	–	–	–	–	–	**4**
	Late stage biface	Biface	Indeterminate fragment	1	–	–	–	–	–	–	–	–	–	–	–	**1**
Chinle chert	Angular debris	Unutilized angular debris	Indeterminate fragment	6	–	–	–	–	–	–	–	–	–	–	–	**6**
	Core flake	Unutilized flake	Whole	4	–	–	–	1	–	1	–	–	–	–	–	**6**
			Proximal	2	–	–	–	–	–	–	–	–	–	–	–	**2**
			Lateral	1	–	–	–	–	–	–	–	–	–	–	–	**1**
	Flake fragment	Unutilized flake	Distal	2	–	–	–	–	–	–	–	–	–	–	–	**2**
			Lateral	1	–	–	–	–	–	–	–	–	–	–	–	**1**
Obsidian	Core flake	Unutilized flake	Whole	–	–	–	–	1	–	–	–	–	–	–	–	**1**
	Flake fragment	Unutilized flake	Medial	1	–	–	–	–	–	–	–	–	–	–	–	**1**
	Reworked late stage biface	Small side-notched projectile point	Proximal	1	–	–	–	–	–	–	–	–	–	–	–	**1**
Grants Ridge obsidian	Angular debris	Unutilized angular debris	Indeterminate fragment	1	–	–	–	–	–	–	–	–	–	–	–	**1**
Table Total				**736**	**5**	**5**	**16**	**4**	**48**	**1**	**1**	**6**	**3**	**1**	**4**	**830**

The radiometric date produced from the lower stratum of Feature 24 indicates the initial use of this feature was roughly contemporaneous with Feature 3 and Feature 22 located to the east and Feature 69 located to the north within the limits of Structure 9. Based on size and content, it appears Feature 42 functioned, initially, as a large storage facility during the Basketmaker II period. Subsequently this feature filled and was reused or incorporated into the construction of Structure 9 during the early historic Navajo occupation, perhaps as a processing facility.

Extramural area, Study Unit 2. East of Structure 9, excavation identified an activity area associated with the Navajo occupation. This extramural area measures approximately 15 m north–south by 15 m east–west and contained three areas of charcoal-stained soil, 11 features, and numerous artifacts. Feature types identified include postholes, bell-shaped pits, one cist, fire pits, and three pits of indeterminate function (Table 8.35). Three areas of charcoal-stained soil were identified; two were located southeast of Structure 9, and one was located southeast of Feature 39. These areas may represent discard from feature use (see Fig. 5.14). Areas of charcoal-stained soil or "ash dumps" are reported from other early Navajo sites and display tremendous variation in location, size, and depth (Hester 1962:47; Ward et al. 1977). These deposits are reported to range from 3 to 30 ft (0.9 to 9.1 m) away from the structure and ranged in size between 18 inches (45.7 cm) to over 20 ft (6.1 m) in diameter and 4 to 6 inches (10.2 to 15.2 cm) in depth. The charcoal-stained areas in the northern portion of SU 2 fall within the reported spatial limits but did not have much vertical depth (less than 5 cm).

Postholes. Feature 4 and Feature 58 were located in the north-central portion of SU 2 and are

Table 8.37. LA 104106, Study Unit 2, ground stone type by feature number.

			Extramural Area		Structure 9	
Material	**Description**	**Portion**	**Feature 0**	**Feature 24**		**Table Total**
Sandstone	Indeterminate ground stone fragment	indeterminate fragment	–	1	–	**1**
		edge fragment	–	1	1	**2**
		Internal fragment	–	1	–	**1**
	Grinding slab	whole	–	1	–	**1**
	Mano fragment	end fragment	1	–	–	**1**
		edge fragment	2	–	–	**2**
	Metate fragment	edge fragment	–	1	–	**1**
	Shaped slab	edge fragment	1	–	–	**1**
Orthoquartzite	Indeterminate ground stone fragment	end fragment	1	–	–	**1**
	One-hand mano	whole	1	–	–	**1**
Table Total			**6**	**5**	**1**	**12**

interpreted as postholes based on size, construction, and contents. Each feature contained a single layer of loose, sandy loam with inclusions of charcoal flecks and artifacts (Table 8.35). Artifacts recovered include unburned, fragmentary wood and a single unutilized piece of debitage from Feature 4 and Feature 58, respectively (Table 8.36). Only Feature 4 contained wood fragments, and no chronometric data were obtained. Feature 4 and Feature 58 were 2.5 m apart and may represent the remains of a expedient shelter such as a wind break. This interpretation is supported by the distribution of ceramic and lithic artifacts. The majority of these artifacts were distributed to the east and southeast between these features.

Bell-shaped pits. Feature 11 and Feature 12 were bell-shaped pits located in the northwest portion of SU 2. These features, spaced 50 cm apart, were similar in size, shape, construction, and contents. Each feature was constructed by excavating a 30–40 cm deep, bell-shaped pit into the native substrate. Subsequently, the interiors were well oxidized; however, the fill was relatively free of charcoal or ash, suggesting these features were cleaned out prior to abandonment. Recovered from the fill of Feature 11 were four pieces of unutilized debitage (Table 8.36) and a single plain gray jar body sherd (Table 8.35). No artifacts were recovered from Feature 12. Macrobotanical data recovered from each feature was similar dominated by unburned annuals followed by carbonized annuals and trace amounts of carbonized perennials and cultivars (Table 8.34).

Archaeomagnetic samples recovered from Feature 11 and Feature 12 yielded a chronometric range of AD 1710–1815 and AD 1615–1750, respectively. A radiometric sample recovered from Feature 11 yielded a conventional AMS radiocarbon age of 340 ± 70 (Beta-164335; *Juniperus* wood charcoal; δ^{13} = -25.0* o/oo) and a sample recovered from Feature 12 yielded a conventional AMS radiocarbon age of 240 ± 50 (Beta-164336; *Juniperus* wood charcoal; δ^{13} = -25.0* o/oo). When calibrated using OxCal v3.8, the Feature 11 sample generated 2-sigma date ranges of 1430–1670 cal AD (p = .94) and 1780–1800 cal AD (p = .01). The Feature 12 sample generated 2-sigma ranges are 1480–1700 cal AD (p = .56), 1720–1820 cal AD (p = .31), and 1910–1960 cal AD (p = .25).

Similarities in construction, condition, content, and proximity to each other suggest these features were used in similar tasks. Similarities in macrobotanical data support this observation and also suggest that the unburned botanical remains identified within these features may also be cultural, perhaps representing an insulating layer protecting primary food stuffs. Morphological and spatial similarities also suggest these features were roughly contemporaneous.

The remaining three features spatially associ-

Table 8.38. LA 104106, Study Unit 2, faunal data by feature number.

			Extramural Area					
		Completeness	0	2	24	39	46	Table Total
Small mammal	Shaft fragment	<25%	1	–	–	5	–	**6**
Small-medium mammal	Shaft fragment	<25%	5	–	–	3	–	**8**
	Case fragment		1	–	–	–	–	**1**
Medium–large mammal	fragment	50–75%	1	–	–	–	–	**1**
	Shaft fragment	25–50%	1	–	–	–	–	**1**
	fragment	<25%	14	–	–	–	–	**14**
	Shaft fragment		22	–	–	1	–	**23**
	End fragment		1	–	–	–	–	**1**
	Case fragment		1	–	–	–	–	**1**
	Vert body fragment		3	–	–	–	–	**3**
	Vert arch fragment		2	–	–	–	–	**2**
	Vert articular facet		1	–	–	–	–	**1**
Large mammal	fragment	<25%	2	–	–	–	–	**2**
	Shaft fragment		5	–	–	–	–	**5**
Gunnison's prairie dog	Analytically complete		1	–	–	–	–	**1**
	Analytically complete	>75%	1	–	–	–	–	**1**
	Long bone distal and shaft		–	–	1	–	–	**1**
	Ilium fragment	50–75%	1	–	–	–	–	**1**
	Long bone proximal and 1/3 shaft		1	–	–	1	–	**2**
	Long bone proximal shaft fragment		1	–	–	–	–	**1**
	Long bone distal and 2/3 shaft		2	–	–	–	–	**2**
	Long bone distal shaft fragment		1	–	–	–	–	**1**
	Parietal	25–50%	1	–	–	–	–	**1**
	Ascending ramus		1	–	–	–	–	**1**
	Long bone distal shaft fragment		1	–	–	–	–	**1**
	Orbital region	<25%	1	–	–	–	–	**1**
	Max incisor		–	1	–	–	–	**1**
	Ascending ramus fragment		1	–	–	–	–	**1**
Medium–large rodent	Shaft fragment	<25%	–	–	–	2	–	**2**
Medium carnivore	Shaft fragment	<25%	1	–	–	–	–	**1**
Large carnivore	Long bone distal and 1/3 shaft	<25%	1	–	–	–	–	**1**
Dog, coyote, wolf	Auditory bulla	<25%	1	–	–	–	–	**1**
Dog	Analytically complete	>75%	1	–	–	–	–	**1**
	Ilium and acetabulum	50–75%	1	–	–	–	–	**1**
Badger	Analytically complete		1	–	–	–	–	**1**
	Case fragment	<25%	1	–	–	–	–	**1**
	Mandibular condyle		1	–	–	–	–	**1**
Mountain lion	Analytically complete		1	–	–	–	–	**1**
	Long bone proximal and 2/3 shaft	50–75%	1	–	–	–	–	**1**
	Long bone proximal and 1/3 shaft	25–50%	1	–	–	–	–	**1**
	Parietal	<25%	1	–	–	–	–	**1**
Small–medium artiodactyl	Fragment	<25%	2	–	–	–	–	**2**
	Shaft fragment		65	–	–	2	–	**67**
	End fragment		1	–	–	–	–	**1**
	Enamel		1	–	–	1	–	**2**
	Auditory bulla fragment		2	–	–	–	–	**2**
	Anterior max or brouse pad		1	–	–	–	–	**1**
	Vert spinous process		1	–	–	–	–	**1**
	Long bone proximal fragment		1	–	–	–	–	**1**
	Long bone distal shaft fragment		1	–	–	–	–	**1**
	Long bone distal fragment		1	–	–	–	–	**1**

(Table 8.38, continued)

			Extramural Area					
		Completeness	0	2	24	39	46	Table Total
Medium–large artiodactyl	Shaft fragment	<25%	2	–	–	–	–	**2**
	Enamel		4	–	–	–	–	**4**
	Root		1	–	–	–	–	**1**
Mule deer	Ilium fragment	25–50%	1	–	–	–	–	**1**
	Shaft fragment	<25%	1	–	–	–	–	**1**
	Enamel		–	–	–	1	–	**1**
	Mand premolar		–	–	–	1	–	**1**
	Long bone proximal shaft fragment		2	–	–	–	–	**2**
	Long bone proximal - lat or ant fragment		1	–	–	–	–	**1**
	Distal		–	–	–	–	1	**1**
	Long bone shaft split - distal and med		1	–	–	–	–	**1**
Pronghorn	Shaft fragment	<25%	1	–	–	–	–	**1**
	Mand symphysis fragment		1	–	–	–	–	**1**
Domestic sheep or goat	Analytically complete		1	–	–	–	–	**1**
	Lateral	50–75%	1	–	–	–	–	**1**
	Posterior		1	–	–	–	–	**1**
	Medial	25–50%	2	–	–	–	–	**2**
	Pubis fragment	<25%	1	–	–	–	–	**1**
	Long bone proximal shaft fragment		2	–	–	–	–	**2**
Table Total			**184**	**1**	**1**	**17**	**1**	**204**

ated with Structure 9 include Feature 39 (located in the northeast portion of the excavation area) and Feature 60 and Feature 61 (located in the west-central portion of the excavation area). Feature 39 was constructed by excavating a shallow steep-sided basin 15 cm into the native sterile substrate (see Table 8.33). This feature contained a single layer of loose, charcoal-rich sandy loam with inclusions of charcoal flecks and artifacts. Ceramic artifacts consisted of a single plain gray body sherd (Table 8.35) and faunal remains consisted of 17 pieces of burned and unburned animal bones (Table 8.38). Macrobotanical remains were dominated by unburned annuals with only trace amounts of carbonized annuals, perennials, and cultivars (Table 8.34). Numerous burned and unburned faunal remains were also recovered from spatially associated contexts adjacent to this feature.

Feature 60 and Feature 61, although not conjoined, were also similar in proximity to one another, content, and construction. Each feature was constructed by excavating a shallow, steep-sided basin 10 cm to 17 cm into the native substrate and contained a layer of homogeneous, charcoal-stained sandy loam. Bioturbation disturbed this layer in each feature; however, in Feature 61 the margins or boundary with the sterile substrate were less obscured. Only a single piece of unutilized debitage (Table 8.36) and a single carbonized annual plant remain (Table 8.34) were recovered from Feature 60 and Feature 61, respectively. Based on the lack of oxidation and associated material culture, feature function may be related to short-term on-site storage.

Feature 172 was a circular, steep-sided basin lined with several pieces of burned and unburned sandstone located approximately 70 cm east of Structure 9. Construction of Feature 172 truncated the southern portion of Feature 98. This feature contained an upper layer of loose, fine sandy loam with inclusions of charcoal and adobe and a lower layer of loose, fine sandy loam with inclusions of charcoal and oxidized sandstone (see Table 8.33). No artifacts and only trace amounts of carbonized annuals, cultivars, and grasses were recovered (Table 8.34).

In general, the extramural features display a

Table 8.39. LA 104106, radiometric data.

Provenience	Calibrated 1-Sigma Range	Calibrated 2-Sigma Range	MCMC* Calibrated 1-Sigma Range	MCMC Calibrated 2-Sigma Range
LA104106, F69	400 BC (40.8%) 350 BC	410 BC (45.6%) 340 BC	280 BC (59.7%) 225 BC	380 BC (2.8%) 350 BC
	290 BC (27.4%) 230 BC	320 BC (49.8%) 200 BC	220 BC (8.5%) 210 BC	320 BC (92.6%) 200 BC
LA104106, F3	400 BC (33.5%) 350 BC	400 BC (39.6%) 340 BC	280 BC (58.6%) 225 BC	370 BC (2.0%) 350 BC
	290 BC (34.7%) 230 BC	330 BC (55.8%) 200 BC	220 BC (9.6%) 210 BC	320 BC (93.4%) 190 BC
LA104106, F24, FS2320	360 BC (42.0%) 280 BC	390 BC (95.4%) 160 BC	300 BC (4.6%) 280 BC	360 BC (93.2%) 150 BC
	260 BC (26.2%) 190 BC		270 BC (63.6%) 170 BC	140 BC (2.2%) 110 BC
LA104106, F22	40 BC (5.4%) 25 BC	90 BC (1.0%) 70 BC	AD (68.2%) AD 65	40 BC (95.4%) AD 80
	20 BC (7.4%) 10 BC	60 BC (94.4%) AD 130		
	5 BC (55.4%) AD 65			
LA104106, F152	AD 430 (68.2%) AD 560	AD 420 (95.4%) AD 600	AD 430 (42.3%) AD 490	AD 420 (95.4%) AD 580
			AD 510 (25.9%) AD 560	
LA104106, F117	AD 460 (7.0%) AD 490	AD 430 (95.4%) AD 640	AD 430 (37.3%) AD 490	AD 430 (95.4%) AD 600
	AD 530 (61.2%) AD 610		AD 530 (30.9%) AD 570	
LA104106, F81	AD 580 (68.2%) AD 660	AD 460 (1.2%) AD 490	AD 600 (68.2%) AD 640	AD 575 (95.4%) AD 655
		AD 530 (92.6%) AD 710		
		AD 740 (1.6%) AD 770		
LA104106, F64	AD 670 (68.2%) AD 870	AD 640 (95.4%) AD 970	AD 730 (68.2%) AD 890	AD 670 (95.4%) AD 970
LA104106, F24, FS2290	AD 1470 (28.3%) AD 1530	AD 1450 (95.4%) AD 1650	AD 1510 (3.7%) AD 1530	AD 1450 (95.4%) AD 1650
	AD 1550 (39.9%) AD 1640		AD 1540 (64.5%) AD 1650	
LA104106, F11	AD 1470 (68.2%) AD 1640	AD 1430 (94.2%) AD 1670	AD 1530 (68.2%) AD 1650	AD 1440 (95.4%) AD 1670
		AD 1780 (1.2%) AD 1800		
LA104106, F5	AD 1490 (68.2%) AD 1650	AD 1440 (94.3%) AD 1670	AD 1520 (68.2%) AD 1650	AD 1450 (95.4%) AD 1670
		AD 1780 (1.1%) AD 1800		
LA104106, F12	AD 1520 (9.8%) AD 1560	AD 1480 (55.3%) AD 1700	AD 1520 (11.5%) AD 1560	AD 1500 (75.9%) AD 1700
	AD 1630 (29.4%) AD 1690	AD 1720 (30.1%) AD 1820	AD 1620 (49.1%) AD 1690	AD 1720 (19.5%) AD 1810
	AD 1730 (1.5%) AD 1750	AD 1910 (10.1%) AD 1960	AD 1770 (7.6%) AD 1800	
	AD 1760 (20.6%) AD 1810			
	AD 1930 (7.0%) AD 1960			
LA104106, F23	AD 1670 (9.7%) AD 1700	AD 1660 (95.4%) AD 1950	AD 1660 (68.2%) AD 1755	AD 1650 (95.4%) AD 1880
	AD 1720 (21.4%) AD 1780			
	AD 1790 (7.6%) AD 1820			
	AD 1830 (18.6%) AD 1880			
	AD 1910 (10.9%) AD 1950			

*MCMC = Markov Chain Monte-Carlo sampling method

wide range of functions associated with the early historic occupation, including expedient shelter, storage, and processing of SU 2. Typically, features were identified in pairs that displayed similarities in construction, contents, proximity to each other, and presumably function. Feature 4 and Feature 58 were postholes located in the central portion of the area. Feature 11 and Feature 12 were oxidized bell-shaped pits. Feature 22 and Feature 172 were partially rock-lined fire pits, and Feature 60 and Feature 61 were shallow basins of an unknown function. Features that were not paired included Feature 39 and Feature 98. Feature 39 was located the farthest from Structure 9 in the northeast corner of the study unit. Its detached location and close spatial association of faunal remains indicates this area was a discard and processing location.

Basketmaker II component

A third group of features (Feature 1, Feature 2, and Feature 3) was located in the southeast portion of SU 2 and each were similar in content and construction to one another (see Fig. 8.59). Feature 1 was constructed by excavating a shallow, gently sloping basin 56 cm into native sterile substrate. Patchy oxidation was identified along the base of the feature. This feature was filled with a single homogeneous layer of charcoal-stained sandy loam containing flecks of charcoal and artifacts. Artifacts included five pieces of unutilized debitage in addition to trace amounts of a carbonized grasses and unburned weedy annuals (Table 8.34).

Feature 2 was located 50 cm northwest of Feature 1 and was constructed by excavating a shallow, steep-sided basin 20 cm into native sterile substrate. This feature was filled with a single homogeneous layer of charcoal-stained sandy loam containing flecks of charcoal and artifacts. Similar to Feature 1, artifacts included five pieces of unutilized debitage (Table 8.36) and trace amounts of a uncarbonized grasses (Table 8.34). Feature 3 was the largest feature in this suite and was located approximately 1 m west of Feature 1. This feature was constructed by excavating a shallow, steep-sided basin 31 cm into native sterile substrate.

Feature 3 contained a single homogeneous layer of charcoal-stained sandy loam containing flecks of charcoal and artifacts including 16 pieces of unutilized debitage (Table 8.36) and trace amounts of a carbonized annuals, cultivars, and uncarbonized annuals (Table 8.34). A single radiometric sample recovered from Feature 3 (Beta-164333; *Juniperus* wood charcoal; δ^{13} = -15.1 o/oo) was submitted for analysis and yielded a conventional AMS radiocarbon age of 2270 ± 40. When calibrated the sample generated a 2-sigma date range of 320–190 cal BC (p = .93) (Table 8.39). Spatially associated with this suite of features was an area of charcoal stained soil with prevalent rodent disturbance throughout. Based on the content, construction, and spatial patterning, these features appear to be contemporaneous and may represent an activity area associated with a Basketmaker II occupation. Alternatively, this area may represent the remains of a shallow Basketmaker II surface structure.

Feature 22 was a shallow, circular basin with gently sloping sides intermittently lined with tabular sandstone fragments. This feature contained an upper layer of loose, charcoal-stained sandy loam with inclusions of charcoal flecks and a lower layer of loose, fine sandy mottled with charcoal-rich fill (see Table 8.33). No artifacts were recovered, however along with unburned annuals, trace amounts of carbonized annuals, cultivars, and grasses were identified (Table 8.39). A single radiometric sample recovered from Feature 22 (Beta-164337; *Sarco/Atriplex* wood charcoal; δ^{13} = -11.2 o/oo) was submitted for analysis and yielded a conventional AMS radiocarbon age of 1980 ± 40 BP. When calibrated using OxCal v3.8 (Bronk Ramsey 2002; Stuiver et a1. 1998), the sample generated a 2-sigma range of 40 cal BC to 80 cal AD (p = .95) (Table 8.39). The sooted condition of some rocks and the lack of oxidation suggests this feature was used for activities associated with low level heat.

Feature 69 was located within the limits of Structure 9 an early historic Navajo feature, constructed by excavating a steep-sided basin 15 cm below sterile substrate. This feature was filled with a single homogeneous layer of loose charcoal-stained sandy loam with inclusions of artifacts and charcoal flecks. Lithic artifacts included a single unutilized piece of debitage (Table 8.36). Macrobotanical remains included a trace of carbonized annuals, grasses, and cultivars in addition to a higher frequency of uncarbonized annuals (Table 8.34). A radiometric sample submitted for analysis yielded a conventional AMS radiocarbon age of 2280 ± 40 (Beta-164342; *Juniperus* wood charcoal; δ^{13} = -20.8 o/oo).When calibrated, a 2-sigma date range of 320–200 cal BC (p = .93) was produced (Table 8.39), suggesting this feature was not constructed during the early historic occupation.

Feature 98 contained a single layer of sandy loam with inclusions of burned and unburned tabular sandstone, artifacts, and adobe. The majority of the sandstone fragments were identified in the upper fill levels and were intermixed with adobe suggesting they may have been used to line the mouth or upper walls of the feature. Adobe fragments were identified throughout the fill and at the base of the feature supporting the interpretation that the upper portion of the feature was lined. Artifacts included five unutilized pieces of debitage (Table 8.36) and trace amounts of carbonized annuals, cultivars, and grasses (Table 8.34). Although located within the core of the early historic Navajo occupation, the construction, morphology, and contents of Feature 98 were more similar to Feature 24, a Basketmaker II cist, and may be associated with that temporal component.

Unknown temporal components

Feature 6, Feature 7, Feature 9, and Feature 10 were located in the southwest portion of the excavation area and all display evidence of thermal alternation. Feature 6 was constructed by excavating a shallow, steep-sided oval basin 18 cm into native sterile substrate. This feature was filled with a single homogeneous layer of charcoal-stained sandy loam containing flecks of charcoal that contained a single carbonized weedy annual (Table 8.34). Spatially associated with Feature 6 were numerous pieces of tabular and non-tabular sandstone. Although these stones seem to represent a weakly formed oval, none were oxidized or modified. This concentration of material may be a natural deposit or may be related to the early historic Navajo occupation used to secure brush, tarps, or hides as a temporary shelter.

Feature 7 was constructed by excavating a shallow, gently sloping basin 8 cm into native sterile substrate. This feature was filled with a single homogeneous layer of charcoal-stained sandy loam containing flecks of charcoal that contained a single carbonized weedy annual. The sides and base of the feature were highly oxidized indicating this feature contained prolonged heat and may have functioned as a processing facility.

Feature 9 was constructed by excavating a shallow, gently sloping oval basin 10 cm into native sterile substrate. This feature was filled with a single compact, homogeneous layer of charcoal-stained sandy loam containing flecks of charcoal. No artifacts or macrobotanical remains were recovered from this feature. The shallow depth and lack of thermal modification suggests this feature may have functioned as a short-term storage facility.

Feature 10 was constructed by excavating two conjoined shallow basins with gently sloping sides 7 cm into native sterile substrate. This feature was filled with a single compact, homogeneous layer of charcoal-stained sandy loam containing flecks of charcoal and trace amounts of carbonized and unburned weedy annuals (Table 8.34). This feature appears to represent a processing facility. The smaller lobe to the east may have been used to hold coals swept from the larger basin where signs of more intense heat are represented by oxidized sediment and small sandstone spalls.

Features 7, 9, and 10 are spatially associated with one another and positioned within an area of charcoal-stained sediment approximately 4 m in diameter. It is tempting to suggest these features are contemporaneous and that the area represents a small surface structure. Although plausible, no chronometric data are available and excavation could not clearly define a use surface. Therefore, these features could be the result of any or all of the temporal components identified in SU 2 and their proximity to the charcoal-stained sediment fortuitous.

Study Unit 2, material culture. Artifacts recovered from LA 104106, SU 2 are summarized in the following section. Cultural material recovered from this area is quite robust and complex (see Table 8.1). Artifact categories include ceramic, lithic, ground stone, bone, macrobotanical, and pollen. The ceramic assemblage was comprised mainly of Basketmaker III gray wares superimposed by ceramics associated with an early historic Navajo occupation. Lithic artifacts are dominated by unutilized debitage derived from locally available raw materials in addition to several flaked stone tools. Ground stone was present in low frequencies and fragmentary in nature. The faunal assemblage was diverse and represents the exploitation of medium to large mammals and domesticated species. Botanical remains were recovered from all sampled contexts. The botanical assemblage was dominated by carbonized saltbush, corn, and nonconiferous wood. Many other species were represented in lower frequencies. Pollen data complement the botanical assemblage and give insight into the paleoenvironmental setting.

Ceramics. In all, 1,028 ceramic artifacts were recovered from SU 2 and are representative of four temporal periods (Table 8.35). Ceramics were dispersed throughout the excavation area; higher frequencies were identified in the northern portion of the study unit. There, Basketmaker III and Pueblo-period pottery co-occur with partial vessels of Dinetah gray, Acoma/Zuni polychrome (Vessel 5), and a historic slipped polished red type (Vessel 4). The tight spatial patterning of these historic ceramic types encouraged further examination of the ceramic artifact assemblage. Closer examination of the prehistoric Pueblo-period ceramics indicated that these types were also derived from partial vessels of corrugated jars (Vessel 7 and Vessel 8) and a Puerco/Escavada Black-on-white bowl (Vessel 6) (see Wilson, Chapter 10, this report). In addition to refitting, Pueblo-period ceramics have a greater mean weight and standard deviation as compared to Basketmaker III–Pueblo I pottery (Table 8.40). Given the overall differences in size, the Basketmaker III–Pueblo I and Pueblo-period pottery seem to be the result of two different depositional environments during the site formation process.

Table 8.40. LA 104106, Study Unit 2, ceramic component and ware by mean weight.

Component	Ware	Mean	N	Standard Deviation
Basketmaker III–Pueblo I	Gray	5.326086957	23	4.105009954
	White	5.394736842	19	5.59816177
	Red	2.2	2	0.141421356
	Total	**5.213636364**	**44**	**4.710038311**
Pueblo II–Pueblo III	Gray	18.475	28	8.933027565
	White	12.43809524	21	14.69443691
	Total	15.8877551	49	11.99863938
Basketmaker III–Pueblo III	Gray	13.19271845	618	14.16037783
	Total	**13.19271845**	**618**	**14.16037783**
Basketmaker III–Pueblo III	White	6.12	50	6.478598992
	Total	**6.12**	**50**	**6.478598992**
Historic	Gray	6.246330275	218	5.571571217
	Historic decorated	5.526530612	49	7.370514894
	Total	**6.11423221**	**267**	**5.93337252**
Total	**Gray**	**11.44825254**	**887**	**12.70450653**
	White	**7.441111111**	**90**	**9.259357786**
	Red	**2.2**	**2**	**0.141421356**
	Historic decorated	**5.526530612**	**49**	**7.370514894**
	Total	**10.79717899**	**1028**	**12.33029541**

A ceramic distribution figure was generated by mean sherd weight for Basketmaker III pottery by ware group gray ware (mean = 5.3 g [SD = 4.1 g] contour interval mean weight minimum 15.9 g) and white ware (mean = 5.4 g [SD = 5.6 g]) types. Similarly, the distribution for each partial vessel was generated using mean sherd weight as the contour interval (Vessel 4, mean = 8.8 g [SD = 8.6 g] 17.6 g,; Vessel 5, mean = 1.5 g [SD = 1.2 g]; Vessel 6, mean = 7.8 g [SD = 9.2 g]; Vessel 7, mean = 20.5 g [SD = 22.0 g]; Vessel 8, mean = 18.9 g [SD = 9.2 g]; Dinetah gray, mean = 6.3 g [SD = 5.6 g]) (Fig. 8.65).

Interestingly, historic- and Pueblo-period partial vessels are in close proximity to one another suggesting that the Pueblo-period ceramics may have been acquired by and used during the early historic Navajo occupation. Also present among the concentrations of historic and Pueblo-period pottery were plain gray and decorated Basketmaker III–Pueblo I ceramics. In addition to being smaller compared to the Pueblo-period pottery, these types did not refit into partial vessels, supporting the observation that they are the result of a different depositional environment and not the result of the early historic occupation. The quantity of Basketmaker III ceramic types identified in this area, however, does suggest the presence of intact Basketmaker III–Pueblo I deposits outside the project limits.

Lithics. In all, 828 lithic artifacts were recovered from SU 2. Lithic raw material groups within SU 2 included silicified wood, chert, sedimentary, quartzite, chalcedony, and obsidian. The assemblage was dominated by silicified wood followed by chert, and small amounts of sedimentary, quartzite, chalcedony, and obsidian. The spatial distribution of debitage and tools provides some evidence for functional segregation of activities and perhaps the collection and use of ready made tools during the early historic occupation in SU 2. At 10 artifacts per square meter, debitage frequencies are higher south of the 20N grid line with lower concentrations found in the northeast, central, and southeast portions of the excavation area. When plotted using mean weight (mean = 2.8 g per artifact [SD = 8.2 g]) (grams/sq m) more spatially discrete areas are displayed (Fig. 8.66). In areas where count and weight frequencies overlap, as represented in the northeast, northwest, and southeast concentrations of the excavation area, a 1:1 ratio is assumed. In areas where no overlap occurred, such as the south-central con-

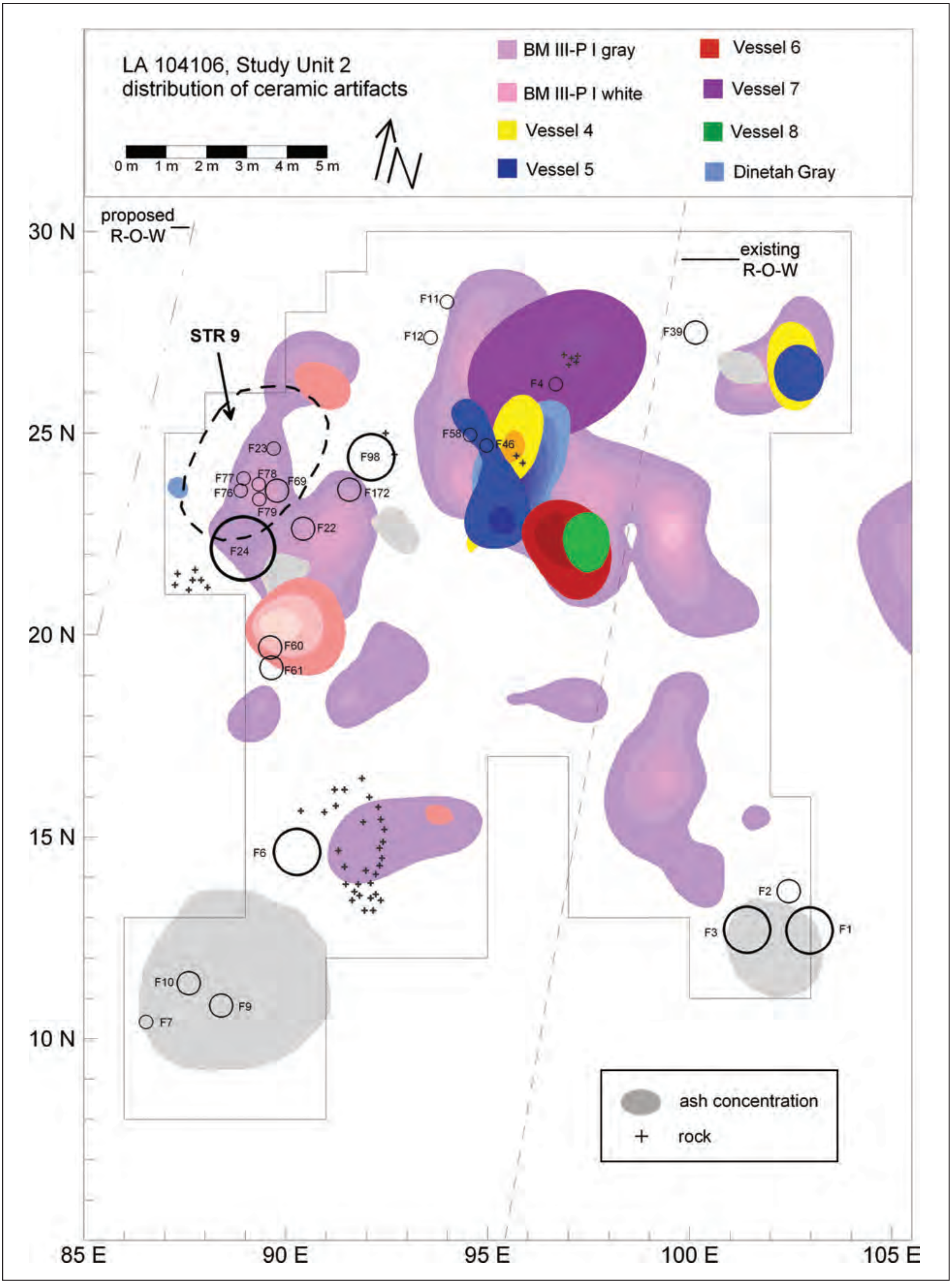


Figure 8.65. Basketmaker III pottery and partial ceramic vessels, Study Unit 2, LA 104106.

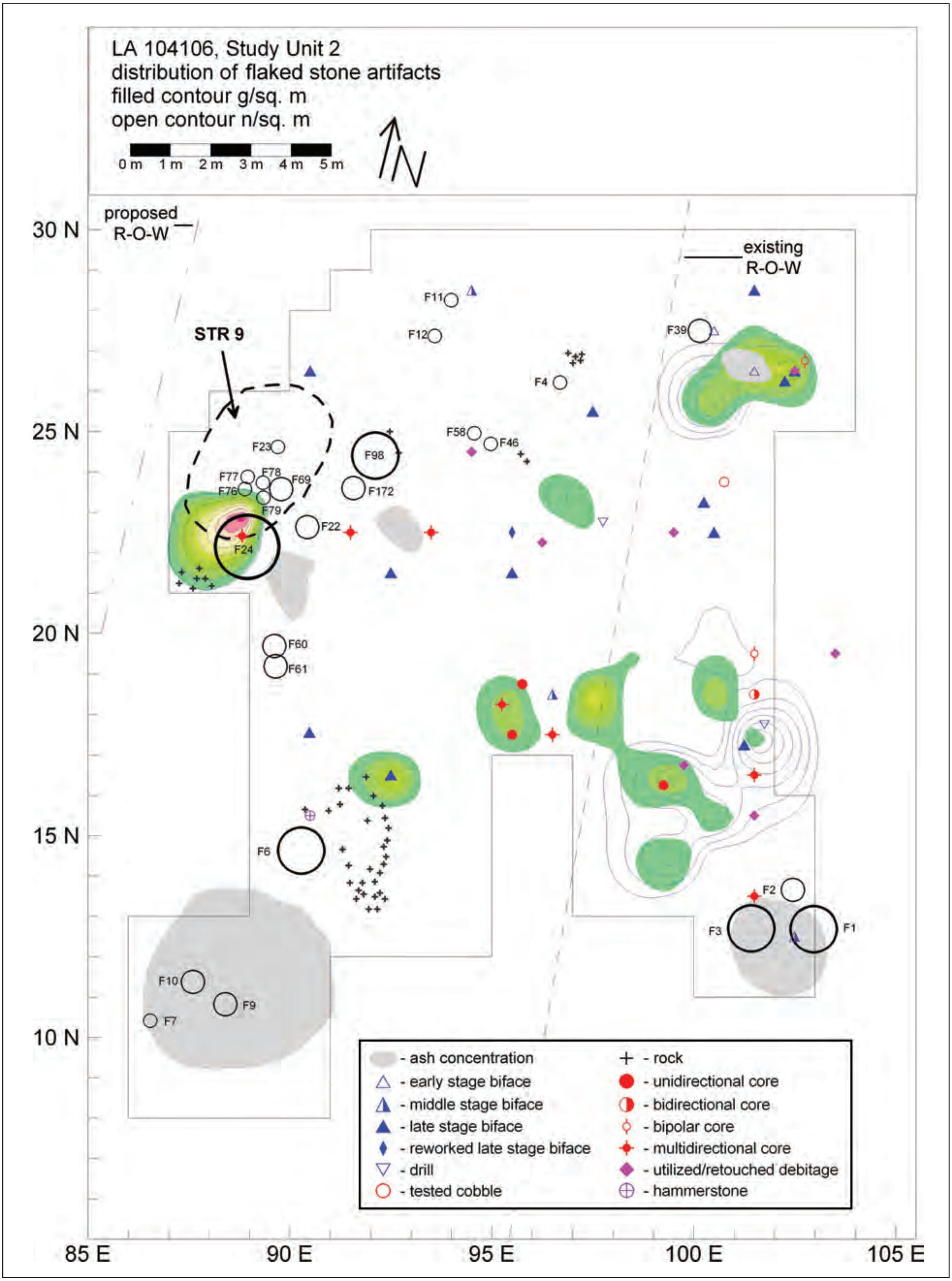


Figure 8.66. Lithic tools and debitage aggregated by count and weight, Study Unit 2, LA 104106.

centrations, the lower count to weight ratio reflects larger flake size. In these areas, larger flake size may be related to expedient core reduction activities while areas with overlapping frequency data may reflect deposition of secondary refuse or different reduction technologies. The distribution of flaked stone tools supports this observation.

Flaked stone tools include bifaces and projectile points and cores. Biface and projectile points fall into three broad categories: projectile points, drills, and scrapers. The most common projectile point were types similar to Cottonwood Triangular and Desert Side-Notched. A late Archaic dart point and a Basketmaker II point were also identified. Tools interpreted as drills include a side-notched flake leading to a narrow blade and a complete uniface. Most, however, were fragmentary. Finally, a single bifacial flaked scraper was recovered. A detailed discussion of tools is presented by Wenker, below (see also Wenker, Chapter 11).

A dichotomy in tool distribution was displayed near the 20N grid line. North of this line, 12 of the 18 (67 percent) bifaces or projectile points and four of the seven pieces of utilized debitage (57 percent) were recovered (Fig. 8.66). To the south of this line, 11 of 14 cores (79 percent) and a hammerstone were recovered. Co-occurring with the cores and hammerstone are higher debitage weights and counts, supporting the observation that this area may have been used for core reduction. In the northern portion of the excavation area, formal tools are spatially associated with most of the Dinetah gray pottery, historic pottery, and partial Anasazi vessels, attributed to the Navajo occupation. Similar to the ceramic assemblage, the different temporal components represented in the flaked stone tools recovered in this area of SU 2 were likely collected and reused by the early Navajo occupants. Functionally, this portion of the excavation area may have served as a processing and consumption location.

Macrobotanical remains. The macrobotanical record was weak yet diversified (Table 8.34). Data indicate that plants recovered from Structure 9 include those available in summer to early fall. Limited evidence of corn associated with Structure 9 was recovered. Weakly represented in the botanical assemblage were weedy annuals such as goosefoot and purslane, commonly recovered from archaeological sites in the Southwest. Trace amounts of corn indicate that limited agricultural consumption or processing was conducted within this study unit. Low frequencies of economically useful wild plants, combined with trace amounts of corn, indicates a site function geared toward activities other than wild plant or agriculture, possibly herding (Bailey and Bailey 1986:16–17).

Fauna. Just over 22 percent (n = 204) of all the faunal remains recovered from LA 104106 were recovered from SU 2. The assemblage was dominated by medium to large mammals and small to medium artiodactyls, including pronghorn and mule deer. Of interest were "exotic" species including mountain lion and badger. Conspicuously underrepresented, however, were small mammals and rodents, prevalent in SU 1. In contrast to the faunal remains recovered from SU 1, nearly 62 percent of the faunal remains from SU 2 displayed evidence of thermal alteration ranging from dry burn (associated with roasting) to calcined (associated with incineration) (Table 8.38). Spatially, faunal materials in SU 2 were concentrated in the northeast portion of the excavation area surrounding Feature 39 with two concentrations located approximately 2 m east of Structure 9 and a third smaller concentration located in the southeastern portion of the excavation area.

Mammal and artiodactyl count per square meter display a similar spatial pattern; however, there is differentiation in the concentration of bone east of Structure 9. This area, which displays two overlapping distributions of burned and unburned bone, contained few artiodactyl remains (Fig. 8.66.1). The concentration of bone to the northeast of Structure 9 contained burned and unburned remains of each animal class. Differentiation related to diagnostic species can also be observed between the east area and the northeast concentration. All of the badger and the majority of sheep and mountain lion were associated with the concentration east of Structure 9, while the majority of deer, carnivore, and pronghorn bone was associated with the northeastern concentration. Although identification of individual faunal species is related to the condition of the bone, the distribution of different identifiable specie in spatially discrete areas suggests these remains are the result of processing, consumption, and disposal of animals. The frequency of all bone and burned bone represented in the northeastern cluster suggests this area was discard from processing related to feature use. Co-occurring with the bone concentration east of

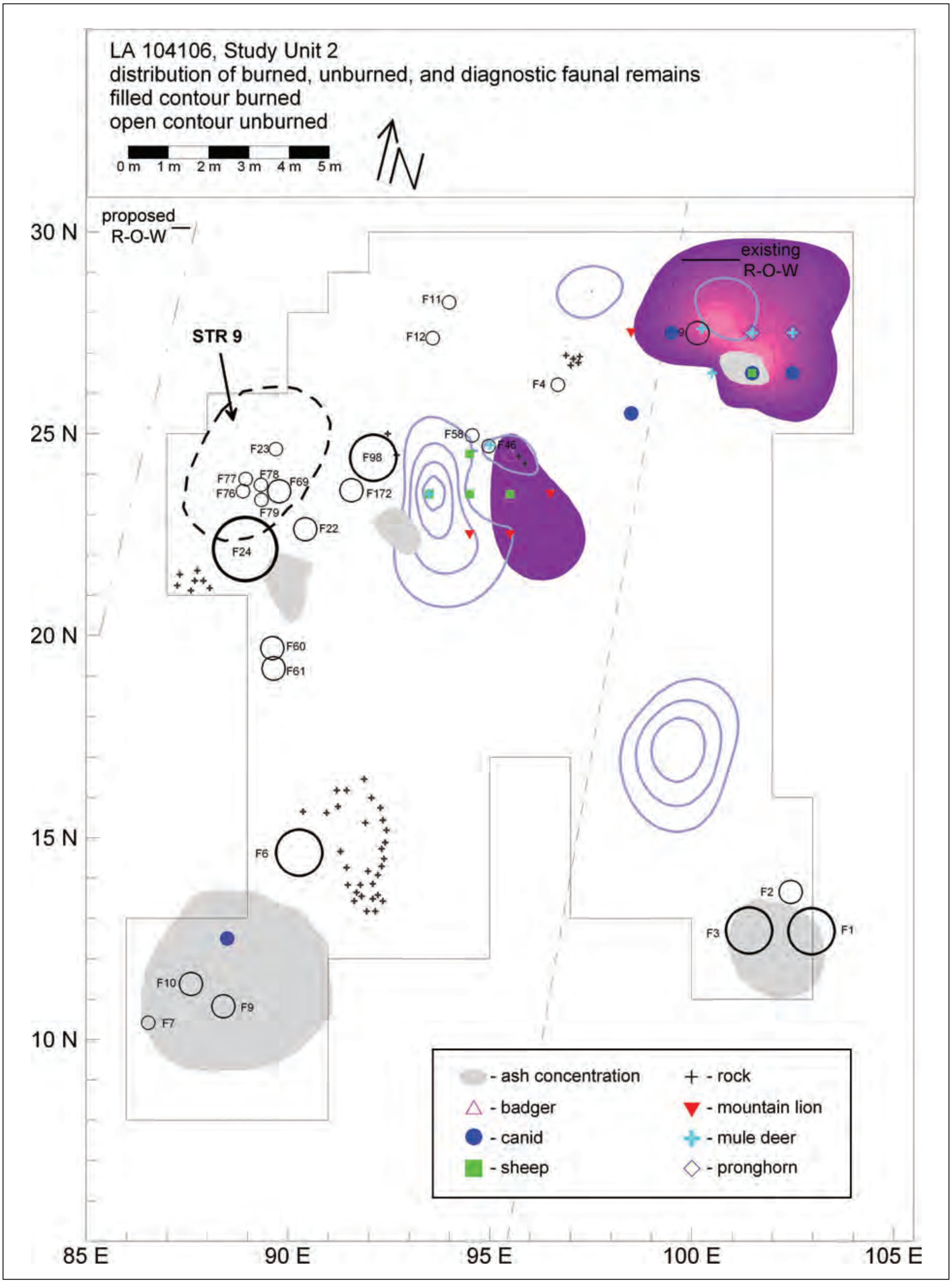


Figure 8.66.1. Burned and unburned bone aggregated by count, Study Unit 2, LA 104106.

Structure 9 were numerous partial ceramic vessels, suggesting these artifacts may have been used contemporaneously.

Ground stone. Few ground stone artifacts were recovered from SU 2 (Table 8.37). The majority of these remains were spatially associated with Feature 24, southwest of Structure 9. Most ground stone artifacts were fragmentary in nature with only two whole artifacts were identified. Most were indeterminate fragments likely recycled into the construction of Feature 24 during the early historic Navajo period. The remaining ground stone artifacts were widely distributed across the excavation area. Unlike ceramic, bone, and lithic data, only four ground stone artifacts were spatially associated with the early historic Navajo occupation. These include two indeterminate fragments, a mano fragment, and a portion of a shaped slab. One indeterminate fragment was recovered from Structure 9. The remaining three ground stone artifacts were spatially associated with the central activity area, defined by the ceramic and bone distribution. Given the inferred acquisition and use of ready-made ceramic and flake stone tools by the early historic Navajo occupants, the paucity of ground stone tools associated with this component indicates these items were not required for the associated tasks or were transported to another location.

Study Units 3 and 4

SU 3 was located approximately 16 m south of SU 1 (see Fig. 8.1). This area contained two thermal features (Feature 5 and Feature 8) and a limited number of artifacts interpreted to be the results of an early historic Navajo occupation. Feature 5 was constructed by excavating a shallow basin a minimum of 10 cm into the native substrate and was subsequently well oxidized (Table 8.41). Feature 5 contained a single homogeneous layer of charcoal-stained sandy loam, void of artifacts. A flotation sample yielded trace amounts of carbonized annuals, cultivars, and uncarbonized annuals (Table 8.42). Similar to the northern portion of SU 1, Dinetah gray pottery and a partial ceramic vessel of St. Johns polychrome were spatially associated with this feature (Table 8.43). A radiometric sample recovered from Feature 5 yielded a standard conventional radiocarbon age of 320 ± 60 (Beta-164334; *Juniperus* wood charcoal; δ^{13} = -25.0* o/oo). When calibrated using OxCal v3.8, the sample generated a 2-sigma range of 1470–1690 cal AD (p = .95).

Feature 8 was located approximately 2 m south of Feature 5 and consists of a shallow basin with a single homogeneous layer of charcoal-stained soil (Table 8.41). Although no artifacts were recovered from Feature 8, macrobotanical remains include trace amounts of carbonized perennials and unburned annuals (Table 8.42). No interpretable chronometric data were recovered from this features, however the close spatial association suggests that this feature is contemporaneous with Feature 5. Based on feature content, presence of a partial ceramic vessel, and chronometric data, SU 3 appears to be contemporaneous with the early historic occupation identified in SU 2.

SU 4 was an intermediary area located between SU 1 and SU 2. Excavation in this area was initially conducted with mechanical equipment with subsequently by hand at locations identified as containing cultural material. In general, this area contained an amorphous area of charcoal-stained soil distributed between Backhoe Trench (BHT) 4 and BHT 6 (see Fig. 8.1).

Three features were identified, all of which consist of ash and charcoal lenses. Feature 147 was identified in BHT 4 approximately 60 cm below modern ground surface. This feature consists of a concentration of ash and charcoal. No artifacts were recovered from this feature or from the immediate area; however, a flotation sample yielded trace amounts of carbonized perennials (Table 8.42). Spatially associated with Feature 147 was Feature 148, which was similar in content and morphology. Feature 149 was identified in BHT 6 approximately 1.0 m below modern ground surface. No artifacts were found in direct association; however, Feature 149 contained trace amounts of carbonized perennials (Table 8.42). Although no chronometric data were submitted for analysis from these of charcoal lenses, their stratigraphic position relative to one another and their morphology are similar to other Archaic deposits identified near Mexican Springs and in the Tohatchi Flats areas.

Table 8.41. LA 104106, Study Unit 3 and Study Unit 4, feature summary data.

Feature	Type	Architect-ural Unit	Location[1]	Size (cm) (length x width x depth)	Shape (plan and profile)	Fill	Contents	Comments
5	Hearth	extramural area	16.02N/ 91.61E	61 x 57 x 9	circular basin	Layer 1 (Munsell 10YR 8/2 dark gray brown) loose charcoal-stained soil with inclusions of charcoal.	macro-botanical	Shallow, gentle-sided basin. Deeply oxidized feature limits (rind). Spatially associated with Feature 8. ^{14}C (AD 1530, 1560, 1630).[2]
8	Hearth	extramural area	17.96N/ 91.36E	60 x 50 x 5	circular basin	Layer 1 (Munsell 10YR 8/2 dark gray brown) silty charcoal-stained soil with inclusions of charcoal and ash.	macro-botanical	Shallow-sided, basin-shaped feature. Deeply oxidized feature limits (rind). Spatially associated with Feature 5. Archaeomagnetic sample (n/a).[3]
147	Charcoal/ ash lens	extramural area	47.50N/ 96.50E	60 x 55 (incomplete) x 10	circular basin	Layer 1 (Munsell 10YR 5/2 grayish brown) silty charcoal-stained soil with inclusions of charcoal and oxidized sandstone fragments.	macro-botanical	Concentration of charcoal identified in Backhoe Trench 4.
148	Charcoal/ ash lens	extramural area	48.50N/ 96.50E	65 x 75 (incomplete) x 8	irregular	Layer 1 (Munsell 10YR 5/2 grayish brown) silty charcoal-stained soil with inclusions of coarse sand and small gravel.	macro-botanical	Amorphous concentration of charcoal identified in Backhoe Trench 4.
149	Charcoal/ ash lens	extramural area	48.50N/ 103.50E	45 x 50 (incomplete) x 10	unknown basin	Layer 1 (Munsell 10YR 5/2 grayish brown) silty charcoal-stained soil with inclusions of charcoal, coarse sand, and small gravel.	lithic, bone, and macro-botanical	Concentration of charcoal identified in Backhoe Trench 6.

[1] feature center point
[2] intercept radiocarbon age
[3] oval center point

Table 8.42. LA 104106, Study Unit 3 and Study Unit 4, macrobotanical data by feature number.

		Study Unit 3		Study Unit 4		
	Common Name	**F 5**	**F 8**	**F 147**	**F 149**	**Total**
Carbonized						
Annuals	Goosefoot	1	–	–	–	**1**
	Purslane	1	–	–	–	**1**
Perennials	Juniper	–	–	7	20	**27**
	Piñon	–	–	13	–	**13**
Cultivars	Corn	1	1	–	–	**2**
Unidentified	Unidentifiable seed	–	–	–	1	**1**
Unburned						
Annuals	Goosefoot	5	2	–	–	**7**
	Purslane	1	–	1	–	**2**
Table Total		**9**	**3**	**21**	**21**	**54**

Table 8.43. LA 104106, Study Unit 3 and Study Unit 4, ceramic data.

		Study Unit 3	Study Unit 4	
Ware	**Pottery Type**	**Extramural Area**		**Total**
Cibola				
Gray	Plain rim	–	1	**1**
	Plain body	–	11	**11**
White	Unpainted, polished	–	3	**3**
Red	St. Johns Polychrome	1	–	**1**
Athabaskan				
Gray	Dinetah Gray	6	–	**6**
Table Total		**7**	**15**	**22**

Architecture

The late Basketmaker III period is marked by the appearance of deep subterranean structures associated with numerous extramural slab-lined storage features and a shallow midden located to the south and southeast of the structure. In some instances, an arc of four or five contiguous surface rooms are present on the west or northwest side of the pit structure (Damp and Kotyk 2000; Plog 1997:60; E. Reed 1956:11; Schroeder 1979:8). Finally, oversized pit structures, often interpreted as integrative structures, are reported from this period (e.g., Tohatchi Village, Shabik'eschee Village, and Mexican Springs Wash) (Cordell 1979:134; 1997:240; Damp and Kotyk 2000; Roberts 1935; Stuart and Gauthier 1981:91).

Excavation data indicate a wide range of variation in Basketmaker III pit structure morphology, interior feature array, and orientation. In general, late Basketmaker III structures were commonly circular or subrectangular, with or without a raised interior platform or bench positioned around the perimeter of the pit excavation. An entry room or antechamber, located to the south or southeast, is connected to the main chamber by a narrow passage or tunnel. In other examples, the antechamber is contiguous to the main chamber (Cordell 1984:219; Cordell 1997:239; McGregor 1965:209; Kearns et al. 2000). Depth also varied with the floor located between 50 and 200 cm below original ground surface. Walls were commonly constructed using the unlined or plastered perimeter of the excavated pit followed by walls constructed using slab footers. Common floor features include a central hearth, ash pit, a deflector, spatial partitions such as wing walls or clay radials, four primary roof support posts, and numerous subfloor pits of various sizes and depths (Cordell 1984, 1997:234; Roberts 1929; McKenna and Truell 1986). Less common floor features include ladder sockets, a sipapu, warming pits, and pot rests.

Although considerable variation exists among Basketmaker III pit structures, a site plan generally consists of one or more contemporaneous residential units represented by three to five pit structures and numerous extramural features oriented along a single axis, typically northwest to southeast. Sites can occur as single residential units or in clusters of units referred to as a community or village often illustrated by Shabik'eschee Village (i.e. Cordell 1984:147; Damp and Kotyk 2000; McGregor 1965:242; Plog 1997:60; E. Reed 1956:12; Roberts 1929; Rohn 1989:154). In some instances, habitation locations are encircled by what are interpreted as stockades (Chenault and Motsinger 2000:50; Rohn 1975).

Shelley (1990, 1991) subdivided Basketmaker III pit structures into four stylistic categories, Western, Northern, Pocket, Mixed, and Other, based on combinations of various morphological attributes including size, presence/absence of an antechamber, and floor divisions. The spatial and temporal patterning of these various morphological attributes have been related to distinct regional settlement characteristics. The Northern style is generally distinguished from the Western style pit structure by the presence of a detached antechamber, wing walls, and a three-quarter or crescent encircling bench. Pocket structures are generally small basin-shaped structures with few, if any, floor features. The Mixed style displays characteristics of both the Northern and Western style pit structures. In addition to these styles, Shelley used "great or oversized pit structure" to categorized Basketmaker III pit structure architecture. Unlike Northern, Western, and Mixed, Pocket and Oversized pit structures are not regionally specific, occurring together with the former regional variants.

Kotyk (1999:263–325) subdivided late Basketmaker III pit structures into Type A and Type B structures for the Mexican Springs area based on the presence of an antechamber or ventilator, respectively. In general, Type A structures were subrectangular in shape, had a crescent shaped or three-quarter encircling bench, and a main chamber subdivided using a wing wall complex creating bins flanking the ventilator opening. Incorporated within the wing wall complex were two of the four main roof support posts and bins, positioned along the wall in each corner of the structure. The roof of the antechamber was also supported by four main posts. Other common internal features include a deflector, ash pit, floor vaults, and an array of subfloor pits of various shapes and sizes. Most structures are reported to be less than 35 sq m in size with two greater than 40 sq m and one just over 100 sq m. Morphological characteristics of Type B structure are similar to Type A structures with the exception of having an ventilator system and no bins. Type A structures resemble the Northern style described by Shelley (1990, 1991).

Hensler (1999:913–943) also subdivided Basketmaker pit structure architecture into styles or traditions based on overall geometric shape and internal feature configuration. Using these morphological characteristics, he identified three traditions: Tradition A, Tradition B, and Tradition C. In addition, Hensler presents a speculative temporal development for each tradition identifying temporal variations using Arabic numerals. Tradition A structures, identified in the northern Chuska Valley, the Puerco Valley, and on Black Mesa, were circular structures with the presence of a ramp or a ventilator system oriented to the southeast. Tradition B structures included many of the same features as Tradition A structures, but were rectangular or subrectangular in shape. In addition, Tradition B structures had bins, wing walls, and southern oriented detached antechambers. This tradition has been identified across most of the Southwest and is similar to the Northern style and Type A styles described above. Finally, the Tradition C Basketmaker III structures are circular or subrectangular, had attached antechambers, and were more uniform in size as compared with Tradition A and Tradition B structures.

This tradition is similar to the Western style described by Shelley (1990, 1991).

Excavation conducted at LA 104106 identified at least seven features interpreted as structures. A complex of six late Basketmaker III structures was identified within SU 1. One compact use surface was found to have been associated with an early historic occupation and another potential structural area associated with a Basketmaker II occupation were present at SU 2. Among the Basketmaker III structures identified at LA 104106, Pocket structures and a great pit structure, resembling Northern style, Type A, or Tradition B structures described above, were identified.

Structure 1, constructed during the mid AD 600s and abandoned by the late AD 600s, and was the largest structure identified at LA 104106. Structure 1 was subrectangular in shape with a complete or full bench and a detached circular antechamber, located approximately 2 m southeast of the main chamber. The antechamber articulates with the main chamber via a narrow tunnel or passage. The main chamber contained a central hearth/ash pit/deflector and wing wall complex. In addition, lateral floor vaults or warming pits, a central floor vault, a sipapu, and numerous sand-filled pits were identified. Four primary posts supplemented with leaner posts, originating from the bench surface, formed the framework or superstructure that likely supported additional organic material and an earth covering.

Minimal remodeling, more accurately characterized as maintenance, was identified. Examples include repair of the central hearth, removal of a small wall partition, adobe floor patches, and sealed floor features. One true remodeling event may be related to the transformation of the antechamber into a ventilator. Although there was circumstantial evidence represented in stratigraphy, the presence of cached tools suggests the antechamber remained covered until abandonment. Based on stratigraphic relationships and material remains, Structure 1 was systematically dismantled and building materials, including large tabular pieces of sandstone, metates, and much of the wooden superstructure, were salvage. Removal of these large durable materials suggests the inhabitants relocated nearby or made repeated trips to salvage architectural elements.

Larger structure size and the presence of notable ritual features including sipapus, prayer stick or altar impressions, and central or lateral floor vaults are often used to distinguish integrative from domestic structures in the Southwest (Adler 1993; Adler and Wilshusen 1990; Cordell 1984; Lipe 1989; Wilshusen 1988b, 1989). Presence of such features in association with a larger structure size is also cited as evidence for community integration and the foundation for community development. It appears that Kotyk calculated the area of some structures by multiplying length by width; however, because not all structure limits were rectangular in plan, areas of oval structures were inflated. When area calculations for an oval (*l x w x 0.8*) were used for these examples, the larger structure area for LA 61955 was diminished to just under 70 sq m (753.5 sq ft). This structure, however, is still one of the largest Basketmaker III structures in the area, followed by Structure 1 at LA 104106 (Fig. 8.67). Based on its size, presence of numerous paired sand-filled pits, a sipapu with cached offerings, and a cached pot filled with tools, ornaments, and nonlocal lithic material, Structure 1 is interpreted as a community structure or low-level integrative facility.

Structure 1 was surrounded by five smaller satellite or pocket structures. These smaller structures appear to have served a variety of functions including cooking, processing, and storage. Each displayed limited evidence for a superstructure, and, with the exception of Structure 2, few intramural features.

Structure 2 contained numerous charcoal-filled features, yet absent was evidence of oxidation, suggesting the repeated use of these features and structure as a cooking or food processing location. Based on its location and contents, Structure 7 may represent a replacement for Structure 2 after the interior space had been exhausted. Structure 3 with few intramural features or material culture had the most evidence for being a sleeping or storage structure (Schmader 1994). Structure 5 was positioned south of Structure 1 and contained the best evidence for a superstructure. Given its morphology and size, this structures was likely a storage room. Structure 6 was located to the north, farthest from Structure 1. Its size and lack of internal features also suggests it was used as storage. The morphological and temporal placement of the satellite structures at LA 104106 fit well with the patterns identified in the surrounding area. Similar structures have been identified near Mexican Springs (Kotyk 1999) and

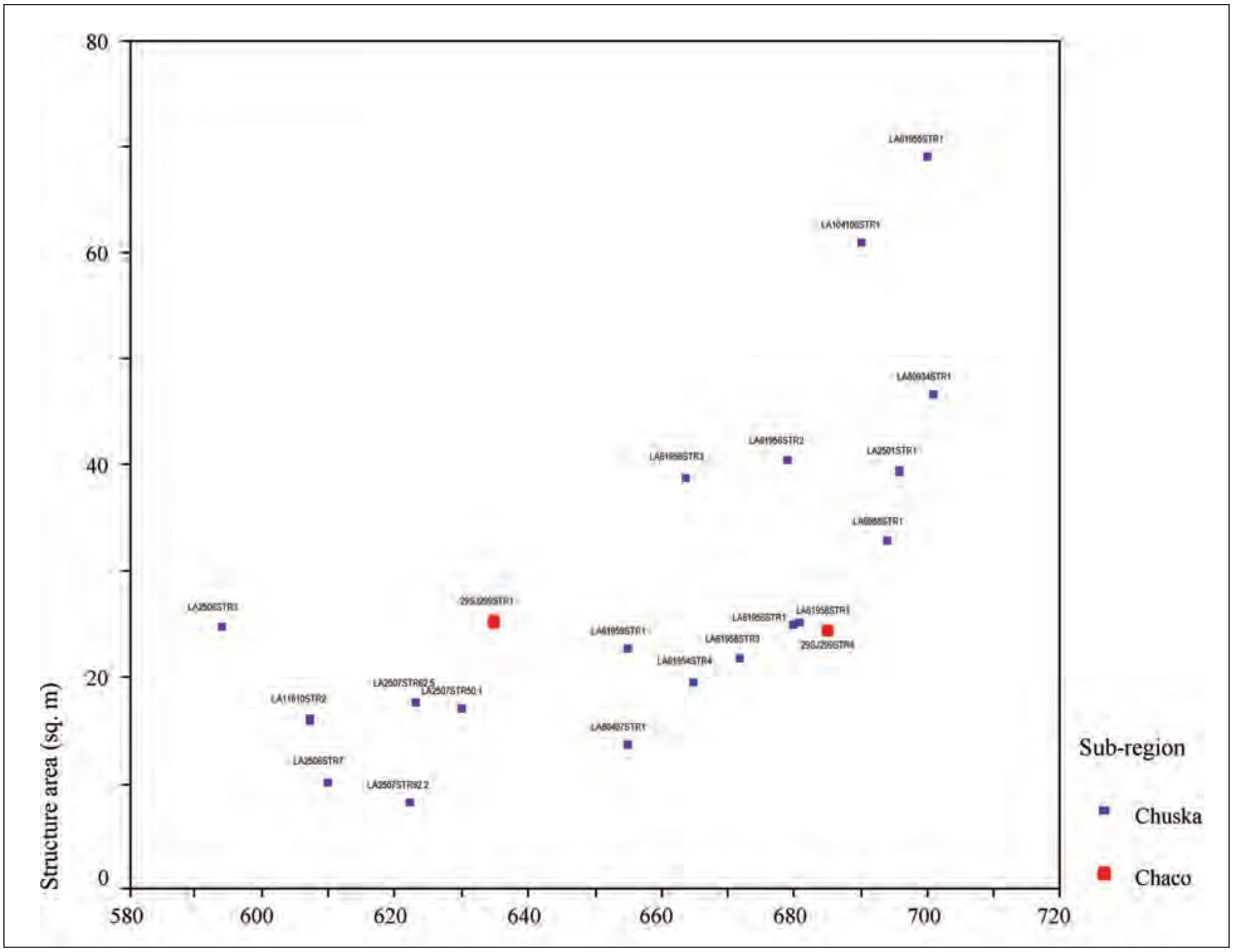


Figure 8.67. Scatter plot of Basketmaker III structure size by chronometric age (AD).

in the Tohatchi Flats area (Benham 1966; Kearns et al. 2000).

Excavation conducted within SU 2 identified one, possibly two ephemeral structures and associated activity area containing 19 features. Six temporal periods were represented in the artifact assemblage; however, chronometric data only yielded evidence for Basketmaker II and early historic occupation. Structure 9, a shallow oval depression best characterized as a occupation surface, was located in the northwest portion of the excavation area.

Material Culture

Artifacts and samples recovered from LA 104106 are grouped into 10 broad categories. Artifact categories include ceramic, lithic, bone, ground stone, mineral, and ornament with sample categories inclusive of macrobotanical, pollen, chronological, and adobe. All artifact types were subjected to full analysis that monitored a core set of variables for comparative purposes. A select number of the pollen samples recovered from secure contexts, including floor surfaces and features, were submitted for analysis and complement the macrobotanical data. As with pollen samples, chronological materials, including radiometric, dendrochronological, and archaeomagnetic samples, were collected from

Table 8.44. LA 104106, ceramic tradition, ware group, and type by vessel form and portion.

Ware	Pottery Type	Indet.	Bowl	Jar	Miniature Vessel	Body Sherd Polished	Body Sherd Unpolished	Other	Total
Cibola									
Gray	Plain rim	3	123	176	–	–	–	6	**308**
	Unknown rim	26	–	–	–	–	–	–	**26**
	Plain body	26	20	7382	–	–	–	2	**7430**
	Indented corrugated	–	–	58	–	–	–	–	**58**
	Plain corrugated	1	1	115	–	–	–	–	**117**
	Alternating corrugated	–	–	2	–	–	–	–	**2**
	Unfired plain	1	–	10	–	–	–	–	**11**
	Mudware	3	–	–	7	–	–	–	**10**
	Lino Smudged	–	2	–	–	–	–	–	**2**
White	Unpainted, polished	7	140	80	–	–	–	1	**228**
	Mineral Paint (undifferentiated)	–	8	13	–	–	–	–	**21**
	Pueblo II (indet. mineral)	–	6	1	–	–	–	–	**7**
	Escavada Black-on-white (solid designs)	–	16	3	–	–	–	2	**21**
	Pueblo II (thick parallel lines)	–	2	–	–	–	–	–	**2**
	Gallup Black-on-white	–	5	8	–	–	–	–	**13**
	Basketmaker III–Pueblo I (mineral)	4	141	24	–	–	–	–	**169**
	Chaco McElmo Black-on-white	–	1	–	–	–	–	–	**1**
	White Mound Black-on-white	–	13	1	–	–	–	–	**14**
	La Plata Black-on-white	2	149	6	–	–	–	1	**158**
	Pueblo III (indet. organic)	–	5	–	–	–	–	–	**5**
Red	White Mountain Red (painted, undifferentiated)	–	1	–	–	–	–	–	**1**
	St. Johns Polychrome	–	1	–	–	–	–	–	**1**
	Tallahogan Red (red slip over white paste)	1	32	6	–	–	–	–	**39**
	Tohatchi Red (red slip over red paste)	–	–	1	–	–	–	–	**1**
	Tohatchi Red-on-brown	–	3	–	–	–	–	–	**3**
Cibola (Matte Paint)									
Historic decorated	Zuni/Acoma polished red	–	–	27	–	–	–	–	**27**
	Acoma/Zuni Polychrome (indet.)	–	13	9	–	–	–	–	**22**
Upper San Juan									
White	Unpainted, undifferentiated	–	4	–	–	–	–	–	**4**
	Mineral paint (undifferentiated)	–	2	–	–	–	–	–	**2**
	Plain gray	–	–	1	–	–	–	–	**1**
	Piedra Black-on-white	–	1	–	–	–	–	–	**1**

Table 8.44 (continued)

Ware	Pottery Type	Indet.	Bowl	Jar	Miniature Vessel	Body Sherd Polished	Body Sherd Unpolished	Other	Total
	Chapin Black-on-white	–	6	–	–	–	–	–	**6**
	Mancos Black-on-white (hachured)	–	1	–	–	–	–	–	**1**
	Basketmaker III–Pueblo I (indet.)	–	3	–	–	–	–	–	**3**
Tusayan									
White	Lino Black-on-white	–	1	–	–	–	–	–	**1**
Chuskan									
White	Chuska Corrugated	–	–	1	–	–	–	–	**1**
Mogollon Highlands									
Red	San Francisco Red	–	4	–	–	–	–	–	**4**
Brown plain	Alma Plain rim	–	4	1	–	–	–	–	**5**
	Alma Plain body	2	–	–	–	20	35	–	**57**
Athabaskan									
Gray	Dinetah Gray	–	–	224	–	–	–	–	**224**
Table Total		**76**	**708**	**8149**	**7**	**20**	**35**	**12**	**9007**

secure contexts and some were submitted for chronologic determination. The bulk sample artifact category includes adobe and clay samples removed from structural elements and features.

Ceramics

Ceramics were the most common artifact identified, comprising nearly half of all materials recovered from at LA 104106. In all, 9,007 ceramic sherds were recovered during data recovery investigations at LA 104106 (see Table 8.1). These items are associated with six regional manufacturing traditions that spanned three broad temporal periods. Although several spatial and temporal manufacturing periods are represented, the vast majority of diagnostic types date to the late Basketmaker III–early Pueblo I period (AD 600–750) followed by types diagnostic of the early Historic period (AD 1700–1850), and finally types known to have been produced during the mid Anasazi Pueblo period (AD 1000–1200) (Table 8.44). Given that ceramic artifacts were associated with spatially discrete temporal components (as described above), the following discussion will broadly categorize the ceramic assemblage. Details on ceramic identification, dating, and temporal trends for various occupations identified during the present study are addressed by Wilson in Chapter 10.

Basketmaker III pottery types identified included a limited quantity of types associated with the early part of this period or Muddy Wash phase (AD 500 to 600) however, the most robust ceramic data are indicative the later part of the period or the Tohatchi phase (AD 600–725). Muddy Wash phase ceramic types identified included Alma Plain and trace amounts Tohatchi Red-on-brown. In addition, the low frequencies of San Juan types including Piedra Black-on-white and Chapin Black-on-white may be associated with this phase or initial occupation of the site. Ceramics diagnostic of the Tohatchi phase include La Plata Black-on-white, Lino Black-on-white, and White Mound Black-on-white. It should be noted that neckbanded pottery was absent in collections recovered during data recovery, supporting the observation that the Basketmaker III occupation dates prior to AD 725 (Loebig 2000).

The prehistoric ceramic assemblage from LA 104106 was comprised of 8,734 sherds divided into gray wares (7,964, 91 percent), white wares (659, 8 percent), brown wares (62, < 1 percent), and red wares (49, < 1 percent). The majority of these artifacts were recovered from SU 1. Most of the ceramics display characteristics diagnostic of manufacture in the Cibola Tradition and were associated with the late Basketmaker III occupation in SU 1 (92 percent). Prehistoric gray ware types are dominated by plain gray body sherds and plain gray rim sherds followed by types that display surface manipulation including corrugated varieties indicative of the Anasazi Pueblo II and Pueblo III periods. Again, no neckbanded types were identified.

The most common white ware category consisted of nondiagnostic unpainted, polished ceramic artifacts displaying paste and temper characteristics common to Cibola types, followed by mineral painted ceramic artifacts diagnostic of the late Basketmaker III–early Pueblo I period including La Plata Black-on-white and White Mound Black-on-white. Together these ceramic categories comprise just over 84 percent of the total prehistoric white ware assemblage. The remaining 16 percent of the white wares consisted of Cibola types including Puerco/Escavada Black-on-white, Gallup Black-on-white, and mineral painted ceramic artifacts diagnostic of the Pueblo II period. Low frequencies of San Juan types manufactured during the Basketmaker III period, Pueblo I period, Pueblo II Chuskan types manufactured during the Pueblo II period, and Tusayan types manufactured during the Basketmaker III period were also present. Red and brown ware ceramic types combined represent just over 1 percent of the prehistoric ceramic assemblage. The most common red ware types include Tallahogan red and Tohatchi red produced in the Cibola area during the early Basketmaker III period followed by contemporaneous red and brown wares produced in the Mogollon Highlands including San Francisco red and Alma plain. Finally, very low frequencies of red wares produced in the Cibola region during the Pueblo II–Pueblo III period were reported.

Ceramic vessel forms identified at LA 104106 were divided into seven broad categories including Indeterminate, Bowl, Jar, Miniature vessel, Body sherd polished, and Body sherd unpolished. These vessel form categories were further subdivided into vessel portion. For the purposes of this discussion, ware and vessel form will be used to categorize the assemblage. Detailed discussion of form and portion are presented by Wilson in Chapter 10.

Similar to contemporaneous sites in the area, vessel form categories are dominated by gray ware jars followed by white ware bowls. This general assemblage pattern holds for the Basketmaker III vessel forms that also include gray ware bowls, white ware jars, and red ware bowls in decreasing frequency. In addition, polished brown bowls, jars, and body sherds not further specified (nfs), and limited numbers of Other vessel forms, including canteen rim, gourd dipper, and double bowl, were also identified. The ware groups and vessel forms for the limited numbers of Pueblo-period ceramics follow the general temporal patterns for the area such as gray ware jars and white ware bowls and jars.

For the late Basketmaker III ceramic component, jar rims are reported in lower frequencies than seed jar rims, which according to Loebig (2000:5–90), suggests that seed jar forms were used primarily for storage since they are a closed form with a narrow orifice. This, however, contradicts the findings of Goff and Hensler (1999:80–81) who observed that seed jars displayed evidence for thermal alteration suggesting they were used as cooking pots. Vessel forms of locally produced Cibola ceramics follow a common pattern of predominately gray ware jars identified for Basketmaker III components; however, nonlocal ceramic vessel forms such as those manufactured in the upper San Juan and Mogollon areas are dominated by white or red ware bowls. Yet none of the nonlocal ceramic types, except Mogollon types, displayed evidence of post-firing modification resulting from use wear. Altogether, it appears that the role of imported decorated bowls differed from pottery produced locally or acquired from the Mogollon region.

Exterior surface treatment was monitored to identify patterns in technological and decorative attributes. Of the 8,519 discernible exterior surfaces, most were plain and unpolished (n = 7,548, 88.6 percent) followed by the application of unfired hematite, commonly referred to as fugitive red (n = 573, 6.7 percent), to gray ware jar and white ware bowls exteriors. When fugitive red frequencies were calculated for Basketmaker III pottery recovered from SU 1, the percentage increased to 7.6 percent, likely reflecting differences in site formation or recovery processes. The remaining 5 percent of surface treatments included plain polished, corrugated, slipped and polished, plain striated slipped unpolished, smudged, and basket impressed in decreasing frequency.

Although slightly higher, the frequency of fugitive red ceramics at LA 104106 is similar those of the NSEP Project (about 6 percent) (Hays-Gilpin et al. 1999:52) and N33 Cove-Redrock Valley Project (about 5 percent) (L. Reed and Hensler 1998) for the late Basketmaker III–early Pueblo I period. In each case, these findings contrast with fugitive red frequencies reported from the Dolores Archaeological Project (DAP) (Erickson 1988:483) and the N30–N31 Project (Damp 1999b, Appendix B.3a–c) where fugitive mineral was only identified on 2.4 percent and less than 1 percent, respectively, for contemporaneous assemblages. Variation in the quantity of fugitive red pottery between the sites along the Chuska Slope and the northern Colorado Plateau may be related to artifact processing procedures, temporal placement, or regional preference.

Alternatively, this post-firing application may have been related to the esthetic qualities offered by Mogollon ceramics. Northern Mogollon ceramic production included the use of clays that fired to a red or reddish yellow color and a lower frequency of pink or buff colors when affected by an oxidizing firing regimen (Wilson and Blinman 1988:370). Therefore, the application of a fugitive red may be a way to compensate for the oxidized pink or buff colors produced by locally available clays, simulating the appearance of Mogollon ceramics (Schroeder 1982; Wilson and Blinman 1988). Decorated San Juan ceramic types, however, require a refined firing regime to achieve the desired affect. This may make these types more valuable or their acquisition and possession may represent increased ideological or sociopolitical ties with the Mesa Verde region (Blinman and Wilson 1988:404). Manufacture of early Anasazi red ware types is also argued to have been a surrogate for Mogollon pottery, where vessels displaying a fugitive red coating may have served a similar function as decorated San Juan Red wares (Erickson 1988). DAP investigations identified that San Juan Red wares were tied to ritual context including integrative structures (Wilshusen 1988c) and by extension, fugitive red vessels were likely tied to ritual activities (Goff and Hensler 1999:79) thus indicating increased ideological or sociopolitical ties with the Mesa Verde region during the late Basketmaker III period (Blinman and Wilson 1988:404).

Similar to the prehistoric components, Historic-period ceramics were dominated by gray ware jars and decorated jars were more common than decorated bowls. Of the gray wares present, the majority were Dinetah gray. Historic ceramic types comprise approximately 3 percent (n = 273) of the overall ceramic assemblage recovered from LA 10406. All of these artifacts were recovered from SU 2 with trace amounts recovered from SU 3. The historic ceramic assemblage consists of 244 (82 percent) Dinetah gray ware ceramics and 49 (8 percent) decorated ceramics. Decorated ceramics consist of a matte painted Acoma/Zuni polychrome similar to Ashiwi or Acomita Polychrome produced in the Cibola area during the late eighteenth century and a portion of a contemporaneous vessel displaying a polished red slip.

The overall distribution of ceramic types show three general patterns across the site. First, the majority of the late Basketmaker III–early Pueblo I ceramics were recovered from SU 1. Second, all of the historic ceramics were recovered from SU 2 and SU 3 with the vast majority located in SU 2.

Pueblo-period ceramics recovered SU 1 displayed a 5:1 gray to white ware ratio, similar to other contemporaneous assemblages in the northern San Juan, suggesting these types may be the result of a short-term residential occupation located outside the project area (Wilson and Blinman 1995:74–76). Unlike SU 1, Pueblo-period ceramics recovered from SU 2 had a nearly 1:1 gray to white ware ratio. In addition, the mean ceramic weight of Pueblo-period ceramics recovered from SU 1 is lower that those recovered from SU 2. Finally, in SU 1, Pueblo-period ceramics are primarily represented by individual sherds and Basketmaker III ceramics represented by sherds and partial vessels, while in SU 2, Pueblo-period ceramics were represented by partial vessels and Basketmaker III ceramics were represented by individual sherds. This dichotomy in Pueblo-period pottery composition between SU 1 and SU 2 suggests that they are the result of two different depositional or functional environments.

Based on the characteristics of ceramics recovered from SU 1, the pottery was the result of a late Basketmaker III habitation and a short-term Pueblo-period occupation. In SU 2, the quantity of Basketmaker III pottery indicates the presence of a residential area outside the project limits, but the ratio between ware groups, mean sherd size, and

Table 8.45. LA 104106, lithic material source, artifact class, and artifact type by study unit number.

			Study Unit			Total
Artifact Type	Artifact Function		1	2	4	
Local						
Debitage	Unutilized debitage	Count	1638	762	1	**2401**
		Row %	68.22	31.74	0.04	**100.00**
		Col. %	76.79	91.92	100.00	**81.03**
	Utilized/ retouched debitage	Count	59	7	–	**66**
		Row %	89.39	10.61	–	**100.00**
		Col. %	2.77	0.84	–	**2.23**
Flaked and Battered Tools	Informal flaked tools	Count	–	1	–	**1**
		Row %	–	100.00	–	**100.00**
		Col. %	–	0.12	–	**0.03**
	Scraper	Count	3	–	–	**3**
		Row %	100.00	–	–	**100.00**
		Col. %	0.14	–	–	**0.10**
	Biface	Count	12	6	–	**18**
		Row %	66.67	33.33	–	**100.00**
		Col. %	0.56	0.72	–	**0.61**
	Projectile point	Count	5	11	–	**16**
		Row %	31.25	68.75	–	**100.00**
		Col. %	0.23	1.33	–	**0.54**
	Core	Count	26	14	–	**40**
		Row %	65.00	35.00	–	**100.00**
		Col. %	1.22	1.69	–	**1.35**
	Hammerstone	Count	24	1	–	**25**
		Row %	96.00	4.00	–	**100.00**
		Col. %	1.13	0.12	–	**0.84**
Non-local						
Debitage	Unutilized debitage	Count	326	25	–	**351**
		Row %	92.88	7.12	–	**100.00**
		Col. %	15.28	3.02	–	**11.85**
	Utilized/ retouched debitage	Count	19	–	–	**19**
		Row %	100.00	–	–	**100.00**
		Col. %	0.89	–	–	**0.64**
Flaked and Battered Tools	Biface	Count	9	1	–	**10**
		Row %	90.00	10.00	–	**100.00**
		Col. %	0.42	0.12	–	**0.34**
	Projectile point	Count	4	1	–	**5**
		Row %	80.00	20.00	–	**100.00**
		Col. %	0.19	0.12	–	**0.17**
	Core	Count	8	–	–	**8**
		Row %	100.00	–	–	**100.00**
		Col. %	0.38	–	–	**0.27**
Table Total		**Count**	**2146**	**830**	**1**	**2977**
		Row %	**72.09**	**27.88**	**0.03**	**100.00**
		Col. %	**100.00**	**100.00**	**100.00**	**100.00**

the identification of partial vessels in the Pueblo-period pottery combined with chronometric data (see above), suggests these items are actually the result of the early historic Navajo occupation identified in this area.

Lithics

The lithic assemblage was dominated by debitage resulting from the reduction of locally available raw material types and some nonlocal material types. In all, 2,963 lithic artifacts were recovered during data recovery investigations at LA 104106. Lithic artifacts represent just over 16 percent of the total artifact assemblage recovered from LA 104106; 72 percent and 28 percent were recovered from SU 1 and SU 2, respectively (see Table 8.1). Lithic debitage was present in both SU 1 and SU 2 and was determined to be the result of different temporal components. The following discussion will categorize the entire assemblage followed by each individual study unit.

The LA 104106 lithic assemblage was comprised of 2,837 (95.7 percent) pieces of debitage and 126 (4.3 percent) flaked or battered tools (Table 8.45). These items were associated with three broad temporal components: Basketmaker II , Basketmaker III, and early historic Navajo. The majority of the items were associated with the Basketmaker III occupation in SU 1 (72 percent), and the remaining (28 percent) were associated with mixed Basketmaker II, Basketmaker III, and early historic Navajo components identified in SU 2. Therefore, categorizations more likely reflect the Basketmaker III occupation(s); however, a component-based discussion is offered in the debitage summary section below.

Debitage. The lithic debitage category for LA 104106 included 2,467 (87 percent) lithic artifacts derived from locally available material types and 370 (13 percent) derived from nonlocal material types. The assemblage consists of 2,752 (97 percent) unutilized and 85 (3 percent) utilized/retouched pieces of debitage. Debitage morphology was dominated by core flakes, angular debris, and flake fragments derived from local and nonlocal material types alike. Flake morphology displays a relatively high percentage of core flakes (93.7 percent) in relation to biface flakes (6.3 percent), indicating that most of the assemblage was the result of middle to late stage core reduction followed by early stage biface manufacture and limited evidence for late stage reduction geared toward biface thinning. Although few in number, biface flakes were more common in nonlocal material types than local material types. To a lesser extent, evidence of expedient tool use was represented by a small percentage (3 percent) of utilized/retouched debitage (Table 8.46).

Slightly over 79 percent of the debitage recovered from LA 104106 lacked dorsal cortex indicating a minimal amount of early stage core reduction and the transportation of partially reduced local and nonlocal materials to the site. When present, dorsal cortex was more commonly retained on locally available raw material types pointing to some on-site reduction of this class of raw material. Interestingly, of the nonlocal material types identified, nearly 92 percent of the chert lacked dorsal cortex compared to only 52 percent of the obsidian debitage, suggesting that cortical obsidian cores were being transported to the site or acquired through trade as suggested by Kearns (1999a) (Table 8.46). Mean measurements from whole flakes (n = 710) show that the majority of the debitage are medium to large in size (Table 8.47).

As mentioned earlier, the majority of the debitage was the result of reduction of locally available raw material types including silicified wood, local chert, sedimentary, quartzite, and finally flaked mineral materials. Flake morphology for local materials was dominated by core flakes followed by nearly equal amounts of angular debris and flake fragments. In addition, low frequencies of biface and bipolar flakes were identified. Debitage derived from local materials were commonly fine to medium grained in quality and lack dorsal cortex. Mean measurements show that whole flakes derived from local material are similar in size to nonlocal material types recovered from LA 104106.

Local material types. Silicified wood comprised 70.7 percent (n = 2,005) and was the dominant material type category identified in the lithic assemblage from LA 104106. This material type displayed a range of textures and colors. Material texture ranged from fine to coarse and flawed and colors ranged from light to dark with red and chalcedonic variants identified. As to be expected, fine-grained and fine-grained and flawed materials were most common and combined for 1,470 pieces or 73.4 percent of the textures identified for this material type (Table 8.48). As to be expected, material quality was an important factor guiding expedient tool manu-

Table 8.46. LA 104106, lithic debitage material source and morphology by percent of dorsal cortex and artifact function.

				Study Unit			
Lithic Source	**Artifact Type**	**Artifact Function**		**1**	**2**	**4**	**Table Total**
Local	Debitage	Unutilized debitage	Count	1638	762	1	**2401**
			Row %	68.22%	31.74%	0.04%	**100.00%**
			Col. %	76.33%	91.81%	100.00%	**80.65%**
		Utilized/ retouched debitage	Count	59	7	–	**66**
			Row %	89.39%	10.61%	–	**100.00%**
			Col. %	2.75%	0.84%	–	**2.22%**
	Flaked and battered tools	Informal flaked tools	Count	–	1	–	**1**
			Row %	–	100.00%	–	**100.00%**
			Col. %	–	0.12%	–	**0.03%**
		Scraper	Count	3	–	–	**3**
			Row %	100.00%	–	–	**100.00%**
			Col. %	0.14%	–	–	**0.10%**
		Biface	Count	12	6	–	**18**
			Row %	66.67%	33.33%	–	**100.00%**
			Col. %	0.56%	0.72%	–	**0.60%**
		Projectile point	Count	5	11	–	**16**
			Row %	31.25%	68.75%	–	**100.00%**
			Col. %	0.23%	1.33%	–	**0.54%**
		Core	Count	26	14	–	**40**
			Row %	65.00%	35.00%	–	**100.00%**
			Col. %	1.21%	1.69%	–	**1.34%**
		Hammerstone	Count	24	1	–	**25**
			Row %	96.00%	4.00%	–	**100.00%**
			Col. %	1.12%	0.12%	–	**0.84%**
Non-local	Debitage	Unutilized debitage	Count	326	25	–	**351**
			Row %	92.88%	7.12%	–	**100.00%**
			Col. %	15.19%	3.01%	–	**11.79%**
		Utilized/ retouched debitage	Count	19	1	–	**19**
			Row %	100.00%	5.3%	–	**100.00%**
			Col. %	0.89%	0.12%	–	**0.64%**
	Flaked and battered tools	Biface	Count	9	1	–	**10**
			Row %	90.00%	10.00%	–	**100.00%**
			Col. %	0.42%	0.12%	–	**0.34%**
		Projectile point	Count	4	1	–	**5**
			Row %	80.00%	20.00%	–	**100.00%**
			Col. %	0.19%	0.12%	–	**0.17%**
		Core	Count	8	–	–	**8**
			Row %	100.00%	–	–	**100.00%**
			Col. %	0.37%	–	–	**0.27%**
Table Total			**Count**	**2146**	**830**	**1**	2977
			Row %	**72.09%**	**27.88%**	**0.03%**	100.00%
			Col. %	**100.00%**	**100.00%**	**100.00%**	100.00%

Table 8.47. LA 104106, lithic material source, material type, and artifact morphology by mean whole flake measurements.

Material Type	Morphology		Length (mm)	Width (mm)	Thickness (mm)	Weight (g)
		Local				
Silicified wood	Core flake	Mean	20.01	18.72	5.36	3.21
		N	383	383	383	383
		Standard Deviation	10.30	8.74	3.44	10.63
	Biface flake	Mean	16.50	14.18	3.23	0.82
		N	22	22	22	22
		Standard Deviation	6.98	5.84	1.69	0.98
	Bipolar flake	Mean	21.25	20.92	9.08	8.60
		N	12	12	12	12
		Standard Deviation	9.77	11.31	8.62	19.27
	Total	**Mean**	**19.86**	**18.54**	**5.35**	**3.24**
		N	**417**	**417**	**417**	**417**
		Standard Deviation	**10.15**	**8.75**	**3.69**	**10.72**
Chert	Core flake	Mean	19.16	18.03	4.78	1.82
		N	110	110	110	110
		Standard Deviation	7.91	6.39	2.14	2.07
	Biface flake	Mean	17.29	16.57	3.43	1.00
		N	7	7	7	7
		Standard Deviation	6.82	6.19	1.27	0.55
	Bipolar flake	Mean	18.00	12.00	4.00	1.00
		N	2	2	2	2
		Standard Deviation	4.24	1.41	1.41	0.42
	Total	**Mean**	**19.03**	**17.84**	**4.69**	**1.76**
		N	**119**	**119**	**119**	**119**
		Standard Deviation	**7.78**	**6.36**	**2.11**	**2.01**
Sedimentary	Core flake	Mean	31.15	27.10	8.00	10.77
		N	20	20	20	20
		Standard Deviation	15.97	15.09	4.63	15.88
	Total	**Mean**	**31.15**	**27.10**	**8.00**	**10.77**
		N	**20**	**20**	**20**	**20**
		Standard Deviation	**15.97**	**15.09**	**4.63**	**15.88**
Quartzite	Core flake	Mean	17.56	19.56	5.33	2.07
		N	9	9	9	9
		Standard Deviation	7.30	5.41	3.12	2.06
	Biface flake	Mean	16.00	12.00	3.00	0.60
		N	1	1	1	1
		Standard Deviation	–	–	–	–
	Total	**Mean**	**17.40**	**18.80**	**5.10**	**1.92**
		N	**10**	**10**	**10**	**10**
		Standard Deviation	**6.90**	**5.63**	**3.03**	**1.99**
Chalcedony	Core flake	Mean	26.67	27.67	6.67	7.60
		N	3	3	3	3
		Standard Deviation	10.50	16.86	4.62	10.67
	Biface flake	Mean	13.00	12.00	2.00	0.20
		N	1	1	1	1
		Standard Deviation	–	–	–	–
	Total	**Mean**	**23.25**	**23.75**	**5.50**	**5.75**
		N	**4**	**4**	**4**	**4**
		Standard Deviation	**10.97**	**15.84**	**4.43**	**9.47**
Total	**Core flake**	**Mean**	**20.26**	**18.96**	**5.34**	**3.21**
		N	**525**	**525**	**525**	**525**
		Standard Deviation	**10.29**	**8.79**	**3.31**	**9.78**
	Biface flake	**Mean**	**16.55**	**14.58**	**3.23**	**0.84**
		N	**31**	**31**	**31**	**31**

(Table 8.47, continued)

Material Type	Morphology		Length (mm)	Width (mm)	Thickness (mm)	Weight (g)
	Bipolar flake	**Standard Deviation**	**6.63**	**5.75**	**1.54**	**0.87**
		Mean	**20.79**	**19.64**	**8.36**	**7.51**
		N	**14**	**14**	**14**	**14**
		Standard Deviation	**9.14**	**10.90**	**8.15**	**17.94**
	Total	**Mean**	**20.07**	**18.74**	**5.30**	**3.19**
		N	**570**	**570**	**570**	**570**
		Standard Deviation	**10.13**	**8.75**	**3.49**	**9.81**
		Non-local				
Chert	Core flake	Mean	21.47	19.88	5.46	3.31
		N	83	83	83	83
		Standard Deviation	10.99	11.12	2.80	8.01
	Biface flake	Mean	16.43	15.71	3.00	0.97
		N	7	7	7	7
		Standard Deviation	9.68	12.54	1.63	1.32
	Bipolar flake	Mean	33.00	20.00	13.00	6.70
		N	1	1	1	1
		Standard Deviation	–	–	–	–
	Total	**Mean**	**21.21**	**19.56**	**5.35**	**3.17**
		N	**91**	**91**	**91**	**91**
		Standard Deviation	**10.94**	**11.15**	**2.90**	**7.69**
Obsidian	Core flake	Mean	14.07	14.03	3.97	0.65
		N	29	29	29	29
		Standard Deviation	5.51	3.83	1.38	0.55
	Biface flake	Mean	13.32	11.63	2.21	0.37
		N	19	19	19	19
		Standard Deviation	3.64	4.11	1.08	0.28
	Bipolar flake	Mean	12.00	7.00	5.00	0.40
		N	1	1	1	1
		Standard Deviation	–	–	–	–
	Total	**Mean**	**13.73**	**12.96**	**3.31**	**0.53**
		N	**49**	**49**	**49**	**49**
		Standard Deviation	**4.78**	**4.13**	**1.53**	**0.48**
Total	Core flake	Mean	19.55	18.37	5.07	2.62
		N	112	112	112	112
		Standard Deviation	10.37	10.08	2.58	6.99
	Biface flake	Mean	14.15	12.73	2.42	0.53
		N	26	26	26	26
		Standard Deviation	5.83	7.30	1.27	0.74
	Bipolar flake	Mean	22.50	13.50	9.00	3.55
		N	2	2	2	2
		Standard Deviation	14.85	9.19	5.66	4.45
	Total	**Mean**	**18.59**	**17.25**	**4.64**	**2.25**
		N	**140**	**140**	**140**	**140**
		Standard Deviation	**9.91**	**9.82**	**2.68**	**6.32**
Silicified wood	Core flake	Mean	20.01	18.72	5.36	3.21
		N	383	383	383	383
		Standard Deviation	10.30	8.74	3.44	10.63
	Biface flake	Mean	16.50	14.18	3.23	0.82
		N	22	22	22	22
		Standard Deviation	6.98	5.84	1.69	0.98
	Bipolar flake	Mean	21.25	20.92	9.08	8.60
		N	12	12	12	12
		Standard Deviation	9.77	11.31	8.62	19.27
	Total	**Mean**	**19.86**	**18.54**	**5.35**	**3.24**
		N	**417**	**417**	**417**	**417**
		Standard Deviation	**10.15**	**8.75**	**3.69**	**10.72**
Chert	Core flake	Mean	20.16	18.82	5.07	2.46
		N	193	193	193	193
		Standard Deviation	9.40	8.76	2.46	5.51

(Table 8.47, continued)

Material Type	Morphology		Length (mm)	Width (mm)	Thickness (mm)	Weight (g)
	Biface flake	Mean	16.86	16.14	3.21	0.99
		N	14	14	14	14
		Standard Deviation	8.06	9.51	1.42	0.97
	Bipolar flake	Mean	23.00	14.67	7.00	2.90
		N	3	3	3	3
		Standard Deviation	9.17	4.73	5.29	3.30
	Total	**Mean**	**19.98**	**18.59**	**4.98**	**2.37**
		N	**210**	**210**	**210**	**210**
		Standard Deviation	**9.32**	**8.78**	**2.49**	**5.31**
Obsidian	Core flake	Mean	14.07	14.03	3.97	0.65
		N	29	29	29	29
		Standard Deviation	5.51	3.83	1.38	0.55
	Biface flake	Mean	13.32	11.63	2.21	0.37
		N	19	19	19	19
		Standard Deviation	3.64	4.11	1.08	0.28
	Bipolar flake	Mean	12.00	7.00	5.00	0.40
		N	1	1	1	1
		Standard Deviation	–	–	–	–
	Total	**Mean**	**13.73**	**12.96**	**3.31**	**0.53**
		N	**49**	**49**	**49**	**49**
		Standard Deviation	**4.78**	**4.13**	**1.53**	**0.48**
Sedimentary	Core flake	Mean	31.15	27.10	8.00	10.77
		N	20	20	20	20
		Standard Deviation	15.97	15.09	4.63	15.88
	Total	**Mean**	**31.15**	**27.10**	**8.00**	**10.77**
		N	**20**	**20**	**20**	**20**
		Standard Deviation	**15.97**	**15.09**	**4.63**	**15.88**
Quartzite	Core flake	Mean	17.56	19.56	5.33	2.07
		N	9	9	9	9
		Standard Deviation	7.30	5.41	3.12	2.06
	Biface flake	Mean	16.00	12.00	3.00	0.60
		N	1	1	1	1
		Standard Deviation	–	–	–	–
	Total	**Mean**	**17.40**	**18.80**	**5.10**	**1.92**
		N	**10**	**10**	**10**	**10**
		Standard Deviation	**6.90**	**5.63**	**3.03**	**1.99**
Chalcedony	Core flake	Mean	26.67	27.67	6.67	7.60
		N	3	3	3	3
		Standard Deviation	10.50	16.86	4.62	10.67
	Biface flake	Mean	13.00	12.00	2.00	0.20
		N	1	1	1	1
		Standard Deviation	–	–	–	–
	Total	**Mean**	**23.25**	**23.75**	**5.50**	**5.75**
		N	**4**	**4**	**4**	**4**
		Standard Deviation	**10.97**	**15.84**	**4.43**	**9.47**
Total	**Core flake**	**Mean**	**20.13**	**18.85**	**5.30**	**3.11**
		N	**637**	**637**	**637**	**637**
		Standard Deviation	**10.30**	**9.02**	**3.19**	**9.35**
	Biface flake	**Mean**	**15.46**	**13.74**	**2.86**	**0.70**
		N	**57**	**57**	**57**	**57**
		Standard Deviation	**6.34**	**6.51**	**1.47**	**0.82**
	Bipolar flake	**Mean**	**21.00**	**18.88**	**8.44**	**7.02**
		N	**16**	**16**	**16**	**16**
		Standard Deviation	**9.35**	**10.63**	**7.73**	**16.79**
	Total	**Mean**	**19.78**	**18.44**	**5.17**	**3.00**
		N	**710**	**710**	**710**	**710**
		Standard Deviation	**10.09**	**8.98**	**3.36**	**9.23**

Table 8.48. LA 104106, lithic material source, class, and type by material quality.

			Material Quality								
	Material Type		**Glassy**	**Glassy, Flawed**	**Fine-grained**	**Fine-grained, Flawed**	**Medium-grained**	**Medium-grained, Flawed**	**Coarse-grained**	**Coarse-grained, Flawed**	**Table Total**
Local											
Silicified wood	Silicified wood	Count	–	–	655	816	178	306	34	16	**2005**
		Row %	–	–	32.67	40.70	8.88	15.26	1.70	0.80	**100.00**
		Col. %	–	–	61.16	85.18	70.92	95.33	62.96	94.12	**70.67**
Chert	Chert	Count	–	–	141	64	28	6	4	–	**243**
		Row %	–	–	58.02	26.34	11.52	2.47	1.65	–	**100.00**
		Col. %	–	–	13.17	6.68	11.16	1.87	7.41	–	**8.57**
	Chalcedony	Count	–	–	16	4	1	–	–	–	**21**
		Row %	–	–	76.19	19.05	4.76	–	–	–	**100.00**
		Col. %	–	–	1.49	0.42	0.40	–	–	–	**0.74**
	Fossiliferous chert	Count	–	–	83	15	1	–	–	–	**99**
		Row %	–	–	83.84	15.15	1.01	–	–	–	**100.00**
		Col. %	–	–	7.75	1.57	0.40	–	–	–	**3.49**
Sedimentary	Limestone	Count	–	–	6	4	3	1	–	–	**14**
		Row %	–	–	42.86	28.57	21.43	7.14	–	–	**100.00**
		Col. %	–	–	0.56	0.42	1.20	0.31	–	–	**0.49**
	Sandstone	Count	–	–	3	–	7	1	14	–	**25**
		Row %	–	–	12.00	–	28.00	4.00	56.00	–	**100.00**
		Col. %	–	–	0.28	–	2.79	0.31	25.93	–	**0.88**
	Siltstone	Count	–	–	1	–	2	2	–	–	**5**
		Row %	–	–	20.00	–	40.00	40.00	–	–	**100.00**
		Col. %	–	–	0.09	–	0.80	0.62	–	–	**0.18**
	Hematite	Count	–	–	2	1	–	–	–	–	**3**
		Row %	–	–	66.67	33.33	–	–	–	–	**100.00**
		Col. %	–	–	0.19	0.10	–	–	–	–	**0.11**
	Red Dog shale	Count	–	–	1	–	–	–	–	–	**1**
		Row %	–	–	100.00	–	–	–	–	–	**100.00**
		Col. %	–	–	0.09	–	–	–	–	–	**0.04**
Quartzite	Brown/red quartzite	Count	–	–	3	–	16	–	–	–	**19**
		Row %	–	–	15.79	–	84.21	–	–	–	**100.00**
		Col. %	–	–	0.28	–	6.37	–	–	–	**0.67**
	Meta-quartzite	Count	–	–	16	–	12	1	2	–	**31**
		Row %	–	–	51.61	–	38.71	3.23	6.45	–	**100.00**
		Col. %	–	–	1.49	–	4.78	0.31	3.70	–	**1.09**
	Ortho-quartzite	Count	–	–	1	–	–	–	–	–	**1**
		Row %	–	–	100.00	–	–	–	–	–	**100.00**
		Col. %	–	–	0.09	–	–	–	–	–	**0.04**
Non-local											
Chert	Washington Pass chert	Count	–	–	12	2	–	–	–	–	**14**
		Row %	–	–	85.71	14.29	–	–	–	–	**100.00**
		Col. %	–	–	1.12	0.21	–	–	–	–	**0.49**
	Chinle chert	Count	–	–	129	52	3	4	–	1	**189**
		Row %	–	–	68.25	27.51	1.59	2.12	–	0.53	**100.00**
		Col. %	–	–	12.04	5.43	1.20	1.25	–	5.88	**6.66**
	San Andres chert	Count	–	–	2	–	–	–	–	–	**2**
		Row %	–	–	100.00	–	–	–	–	–	**100.00**
		Col. %	–	–	0.19	–	–	–	–	–	**0.07**

(Table 8.48, continued)

	Material Type		Material Quality: Glassy	Glassy, Flawed	Fine-grained	Fine-grained, Flawed	Medium-grained	Medium-grained, Flawed	Coarse-grained	Coarse-grained, Flawed	Table Total
Obsidian	Obsidian	Count	52	4	–	–	–	–	–	–	**56**
		Row %	92.86	7.14	–	–	–	–	–	–	**100.00**
		Col. %	37.68	14.81	–	–	–	–	–	–	**1.97**
	Grants Ridge obsidian	Count	86	23	–	–	–	–	–	–	**109**
		Row %	78.90	21.10	–	–	–	–	–	–	**100.00**
		Col. %	62.32	85.19	–	–	–	–	–	–	**3.84**
Table Total		**Count**	**138**	**27**	**1071**	**958**	**251**	**321**	**54**	**17**	**2837**
		Row %	**4.86**	**0.95**	**37.75**	**33.77**	**8.85**	**11.31**	**1.90**	**0.60**	**100.00**
		Col. %	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

facture. For example, of the 47 pieces of utilized/retouched fine-grained silicified wood materials were commonly selected (n = 39, 83 percent). Core flakes were more common (n = 987, 49.3 percent) than biface flakes (n = 40, 2.0 percent) (Table 8.49) and most all lacked dorsal cortex (Table 8.46). Mean measurements from whole silicified wood flakes (n = 278) show that the majority of the debitage are medium to large in size when compared to other material types, averaging 19.8 mm in length, 18.4 mm in width, 5.2 mm in thickness, and 3 grams.

The local chert material category included chert (n = 243 or 66.9 percent), fossiliferous chert (n = 99 or 27.3 percent), and chalcedony (n = 21 or 5.8 percent). This material category mimics the trends identified in the silicified wood material type in material quality. Local chert, chalcedonic chert, and fossiliferous chert ranged from fine to flawed, medium-grained in texture. Fine-grained, fine-grained and flawed, medium-grained, and medium-grained and flawed are most common and combined for a total of 359 pieces or 98.9 percent of the textures for this material category (Table 8.48). Core flakes comprise 54.0 percent (n = 196) and biface flakes 4.1 percent (n = 15) of the local chert recovered from LA 104106 (Table 8.49) with nearly 73 percent (n = 264) of all local chert debitage lacking dorsal cortex (Table 8.46). Whole flake measurements for this material category are similar to other local material types (Table 8.47). Local chert flake morphology also correlates to material quality. Again, finer grained materials were being selected for informal tool manufacture. Of the 18 pieces of utilized/retouched local chert debitage identified, 17 (94.4 percent) are of a fine or fine and flawed quality.

Locally available sedimentary and quartzite materials included sandstone, limestone, and orthoquartzite. Similar to the other locally available material categories (n = 79, 83.2 percent) are fine-grained and flawed or medium-grained and flawed. The remaining 16.8 percent (n = 16) are coarse-grained and flawed in texture (Table 8.48). Of the sedimentary and quartzite debitage core flakes (n = 57, 60 percent) and biface flakes (n = 2, 2.1 percent), 26.3 percent (n = 45) lack dorsal cortex. The remaining flake morphology types identified include angular debris (n = 22) and flake fragments (n = 14). On average, whole flake measurements for sedimentary materials are larger and display a greater standard deviation than the rest of the debitage assemblage, suggesting a different reduction pattern or tool size (Table 8.47).

Whole quartzite flakes fall within size ranges for other material types and are consistent with the assemblage on the whole in flake morphology classes and frequency of dorsal cortex (Table 8.47). This suggests that quartzite debitage was the result of reduction strategies similar to those applied to other material types, such as silicified wood and chert, identified at LA 104106. These reduction strategies were middle to late stage core reduction and early stage biface manufacture.

The flaked mineral category includes two fragments of hematite and one of red dog shale. While these materials were derived from parent material and display morphological characteristics similar to other lithic debitage, they are more likely the result

Table 8.49. LA 104106, lithic source, material class, material type by artifact morphology.

			Material Quality								
Material Class	**Material Type**		**Glassy**	**Glassy, Flawed**	**Fine-grained**	**Fine-grained, Flawed**	**Medium-grained**	**Medium-grained, Flawed**	**Coarse-grained**	**Coarse-grained, Flawed**	**Table Total**
Local Lithic Source											
Silicified wood	Silicified wood	Count	–	–	655	816	178	306	34	16	**2005**
		Row %	–	–	32.67%	40.70%	8.88%	15.26%	1.70%	0.80%	**100.00%**
		Col. %	–	–	61.16%	85.18%	70.92%	95.33%	62.96%	94.12%	**70.67%**
Chert	Chert	Count	–	–	141	64	28	6	4	–	**243**
		Row %	–	–	58.02%	26.34%	11.52%	2.47%	1.65%	–	**100.00%**
		Col. %	–	–	13.17%	6.68%	11.16%	1.87%	7.41%	–	**8.57%**
	Chal-cedony	Count	–	–	16	4	1	–	–	–	**21**
		Row %	–	–	76.19%	19.05%	4.76%	–	–	–	**100.00%**
		Col. %	–	–	1.49%	0.42%	0.40%	–	–	–	**0.74%**
	Fossil-iferous chert	Count	–	–	83	15	1	–	–	–	**99**
		Row %	–	–	83.84%	15.15%	1.01%	–	–	–	**100.00%**
		Col. %	–	–	7.75%	1.57%	0.40%	–	–	–	**3.49%**
Sedimentary	Limestone	Count	–	–	6	4	3	1	–	–	**14**
		Row %	–	–	42.86%	28.57%	21.43%	7.14%	–	–	**100.00%**
		Col. %	–	–	0.56%	0.42%	1.20%	0.31%	–	–	**0.49%**
	Sandstone	Count	–	–	3	–	7	1	14	–	**25**
		Row %	–	–	12.00%	–	28.00%	4.00%	56.00%	–	**100.00%**
		Col. %	–	–	0.28%	–	2.79%	0.31%	25.93%	–	**0.88%**
	Siltstone	Count	–	–	1	–	2	2	–	–	**5**
		Row %	–	–	20.00%	–	40.00%	40.00%	–	–	**100.00%**
		Col. %	–	–	0.09%	–	0.80%	0.62%	–	–	**0.18%**
	Hematite	Count	–	–	2	1	–	–	–	–	**3**
		Row %	–	–	66.67%	33.33%	–	–	–	–	**100.00%**
		Col. %	–	–	0.19%	0.10%	–	–	–	–	**0.11%**
	Red Dog shale	Count	–	–	1	–	–	–	–	–	**1**
		Row %	–	–	100.00%	–	–	–	–	–	**100.00%**
		Col. %	–	–	0.09%	–	–	–	–	–	**0.04%**
Quartzite	Brown/red quartzite	Count	–	–	3	–	16	–	–	–	**19**
		Row %	–	–	15.79%	–	84.21%	–	–	–	**100.00%**
		Col. %	–	–	0.28%	–	6.37%	–	–	–	**0.67%**
	Meta-quartzite	Count	–	–	16	–	12	1	2	–	**31**
		Row %	–	–	51.61%	–	38.71%	3.23%	6.45%	–	**100.00%**
		Col. %	–	–	1.49%	–	4.78%	0.31%	3.70%	–	**1.09%**
	Ortho-quartzite	Count	–	–	1	–	–	–	–	–	**1**
		Row %	–	–	100.00%	–	–	–	–	–	**100.00%**
		Col. %	–	–	0.09%	–	–	–	–	–	**0.04%**
Non-local Lithic Source											
Chert	Washing-ton Pass chert	Count	–	–	12	2	–	–	–	–	**14**
		Row %	–	–	85.71%	14.29%	–	–	–	–	**100.00%**
		Col. %	–	–	1.12%	–	–	–	–	–	**0.49%**
	Chinle chert	Count	–	–	129	52	3	4	–	1	**189**
		Row %	–	–	68.25%	27.51%	1.59%	2.12%	–	0.53%	**100.00%**
		Col. %	–	–	12.04%	5.43%	1.20%	1.25%	–	5.88%	**6.66%**
	San Andres chert	Count	–	–	2	–	–	–	–	–	**2**
		Row %	–	–	100.00%	–	–	–	–	–	**100.00%**
		Col. %	–	–	0.19%	–	–	–	–	–	**0.07%**
Obsidian	Obsidian	Count	52	4	–	–	–	–	–	–	**56**
		Row %	92.86%	7.14%	–	–	–	–	–	–	**100.00%**
		Col. %	–	–	–	–	–	–	–	–	**1.97%**
	Grants Ridge obsidian	Count	86	23	–	–	–	–	–	–	**109**
		Row %	78.90%	21.10%	–	–	–	–	–	–	**100.00%**
		Col. %	–	–	–	–	–	–	–	–	**3.84%**
Table Total		**Count**	**138**	**27**	**1071**	**958**	**251**	**321**	**54**	**17**	**2837**
		Count	**138**	**27**	**1071**	**958**	**251**	**321**	**54**	**17**	**2837**
		Row %	**4.86%**	**0.95%**	**37.75%**	**33.77%**	**8.85%**	**11.31%**	**1.90%**	**0.60%**	**100.00%**

of pigment or ornament processing rather than core reduction or flake stone tool manufacture. Hematite was a common mineral recovered from LA 104106 and may be related, in part, to pottery or regalia pigmentation decoration (see Lakatos, below).

Nonlocal debitage. Nonlocal raw material types included chert and obsidian, representing a small proportion of the debitage recovered from LA 104106. Flake morphology for nonlocal materials includes core flakes followed by angular debris and flake fragments. In addition, biface flakes and a low frequency of bipolar flakes are present in the assemblage (Table 8.49). Debitage derived from nonlocal chert materials are commonly fine grained in quality and lack dorsal cortex. Obsidian was commonly glassy and flawed; some had dorsal cortex present. Mean dimensions show that whole flakes derived from nonlocal materials are smaller, in general, than the whole flakes recovered from the LA 104106 assemblage. However, whole nonlocal chert flakes are larger then the average local chert flake size. Based on morphology and size, nonlocal debitage appears to be the result of late stage core reduction and early to late stage biface manufacture.

The nonlocal chert category was mostly comprised of Zuni Mountain chert followed by low frequencies of Narbona Pass chert, and finally San Andres chert (Table 8.49). The debitage characteristics of nonlocal chert are similar to those identified in the local chert material category, except in size and amount of dorsal cortex. Flake morphology was dominated by core flakes, angular debris, and flake fragments with a low frequency of biface flakes (Table 8.49). Nearly 92 percent of all nonlocal chert debitage lacked dorsal cortex (Table 8.46). Again, finer grained materials were being selected for informal tool manufacture. All utilized/retouched nonlocal chert debitage identified are of a fine/fine and flawed quality. Whole flake mean measurements combined with a high frequency of core flakes and minimal dorsal cortex reflect middle to late stage core reduction and early stage biface manufacture.

Obsidian debitage quality ranges from glassy to glassy and flawed (Table 8.48). Flake morphology shows an equal frequency of core flakes and biface flakes, which is higher than the frequency of angular debris, flake fragments, or bipolar flakes combined (Table 8.49). Only 51.2 percent of the obsidian recovered lacked dorsal cortex (Table 8.46). Although limited by small sample size, mean for 49 whole obsidian flakes show that the majority of the debitage are smaller than the average dimensions for all other material types (Table 8.47). Whole flake dimensions for this material category are not consistent with other nonlocal material types, reflecting a focus on late stage core reduction associated with biface maintenance and manufacturing.

Five obsidian samples were submitted to Steven Shackley of the Berkeley Archaeological EDXRF Lab for source determination. All but one, produced from the Valles Rhyolite obsidian source, were produced from deposits consistent with the Mount Taylor source near Grants, New Mexico (Appendix 3).

Debitage discussion. In all, 2,837 pieces of lithic debitage were recovered from four study units during data recovery investigations at LA 104106. Lithic debitage was present in most study units at LA 104106 however, the majority of the items (72 percent) were present in SU 1, a Basketmaker III occupation, with the remaining items (28 percent) present in SU 2, a mixed deposit of Basketmaker II, Basketmaker III, and early historic Navajo components. The lithic debitage category was dominated by locally available material types including silicified wood and chert. Nonlocal materials also included chert in addition to obsidian. Local chert materials included chalcedonic and fossiliferous varieties. Nonlocal chert varieties included spotted Zuni Mountain chert, Washington (Nabona) Pass chert, and San Andres chert. Obsidian varieties included material derived from Grants Ridge and Valle Grande sources, with the majority of these items derived from the Grants Ridge source. These results may indicate the lithic procurement strategies of the site occupants, in part, may have been be aligned with the southern portion of the San Juan Basin. Local and nonlocal materials consisted primarily of core flakes with local materials displaying higher frequencies of angular debris and flake fragments and lower frequency of biface flakes compared to nonlocal material types.

The inverse relationship between flake utilization or retouching and raw material class (local v. nonlocal) seems to indicate a functional difference. Utilized/retouched debitage was identified more commonly among nonlocal materials (5.1 percent [n = 19]) than local material types (2.7 percent [n = 66]); however, this maybe the result of sample size. Furthermore, the frequency of debitage compared to formal flake tools (including bifaces and projectile points), also illustrates a functional difference between these two material classes. The debitage to tool ratio for local materials was 130:1, while the ratio for nonlocal materials was 29:1, indicating on-site reduction of local materials. These ratios, combined with the morphological characteristics associated with each material category, supports the observation that debitage derived from local materials were the result of middle to late stage core reduction while debitage derived from nonlocal materials were the result of late stage core reduction with evidence of biface manufacture or maintenance. The limited quantity of biface flakes derived from nonlocal materials suggests off-site reduction of these materials and that manufactured tools were being transported to the site, especially in SU 2.

Intra-study unit lithic comparison. At least three temporal periods, including historic Navajo, were represented in the lithic assemblage. An analysis aimed at isolating the lithic assemblage associated with the Navajo component was conducted. Lithics within SU 2 were divided into two subsets, assuming that the two subsets would reflect different reduction patterns representative of a particular temporal component. Based on the spatially discrete patterns observed in the ceramic assemblage, lithics recovered from the northern portion of SU 2 were assumed to be the result of the early historic Navajo occupation (SU 2.1), while lithics recovered from the southern portion of the study unit were assumed to be the result of Basketmaker II and Basketmaker III occupations (SU 2.2). Knowing that lithic material from one or more of these components may be mixed among the subsets, these assemblages were compared to the extramural Basketmaker III lithic assemblage (SU 1).

Artifact categories used in this analysis included informal tools such as utilized/retouched debitage, formal tools including bifaces, projectile points, cores and battered tools, and biface and bipolar debitage collected from extramural contexts. These variables were selected since they reflect expedient versus formal tool use and different reduction strategies. Each variable was compared between the three subsets to identify if patterns or differences existed in reduction and tool use. Biface flakes and utilized/retouched debitage were the dominant categories identified in the late Basketmaker III assemblage. Biface or projectile point was the dominant category in the SU 2.1 while the frequency of cores was slightly higher than other variables in SU 2.2.

The high frequency of biface flakes and utilized/retouched debitage identified in the Basketmaker III assemblage reflects formal tool production and informal tool use. The low frequency of biface flakes and high frequency of formal tools identified within SU 2.1 indicates a limited emphasis on tool production and an elevated emphasis on formal tool use. The higher frequency of cores within SU 2.2 suggests core reduction activities. Based on the relative frequencies of the selected variables within each analytic unit, three different reduction strategies appear to be represented.

To test for significant differences in the reduction strategies and tool use between these three analytic units, Chi-square and ANOVA tests were conducted. The null hypothesis was that no significant difference in reduction strategies and tool use, at the .05 level, was present between these three subsets. Like most, this analysis produced mixed results. A comparison of flaked/battered tools and utilized/retouched flake frequencies produced a significant difference ($\chi^2 = 9.695$, df = 1, p = .002; Fisher's Exact [2-sided] p = .003) between the SU 1 and SU 2 assemblages, rejecting the null hypothesis. No significant differences, however, were observed in flaked/battered tools and utilized/retouched flake frequencies between SU 2.1 and SU 2.2 ($\chi^2 = .000$, df = 1, p = .1000, 2 cells [50 percent]) with expected counts < 5; Fisher's Exact [2-sided] p = 1.000) suggesting the subsets are of similar composition. Unlike the results produced for tool frequencies, there were no significant differences in biface and bipolar flake frequencies between SU 1 and SU 2 ($\chi^2 = .012$, df = 1, p = .914; Fisher's Exact [2-sided] p = 1.000).

Similar to the tool frequencies observed in the SU 2.1 and SU 2.2 subsets, there was no significant difference in the frequencies of biface and bipolar flakes between these two samples ($\chi^2 = .000$, df = 1, p = .100; 3 cells [75 percent] with expected counts < 5; Fisher's Exact [2-sided] p = 1.000). Additionally, an ANOVA test produced no significant differences in mean whole flake size between SU 1 and SU 2 debitage (Table 8.50).

These data suggest that the SU 1 tool assemblage is the result of a different formation process compared to the SU 2 assemblage. This is likely the result of on-site activities during the Basketmaker III–Pueblo I and early historic Navajo occupations, respectively. The statistically high number of utilized/retouched and biface flakes and statistically

Table 8.50. ANOVA results from Study Unit 1 and Study Unit 2, whole flake size comparison.

		Sum of Squares	df (degrees of freedom)	Mean Square	F	Sigma
Length (mm)	Between groups	42.34	1	42.34	0.49	0.49
	Within groups	39138.73	449	87.17		
	Total	**39181.07**	**450**			
Width (mm)	Between groups	113.50	1	113.50	1.75	0.19
	Within groups	29200.51	449	65.03		
	Total	**29314.00**	**450**			
Thickness (mm)	Between groups	33.32	1	33.32	2.95	0.09
	Within groups	5076.88	449	11.31		
	Total	**5110.20**	**450**			
Weight (g)	Between groups	0.20	1	0.20	0.00	0.96
	Within groups	41699.78	449	92.87		
	Total	**41699.98**	**450**			

Table 8.51. LA 104106, inter- and intra-study unit debitage comparison.

			Reduction Stage				
			Utilized Debitage	**Flaked Tool**	**Core/ Hammer-stone**	**Biface Flake**	**Total**
Subset*	Basketmaker III	Count	26	10	15	39	**90**
		Expected count	21.1	19.1	18.5	31.3	**90**
	Ethnohistoric	Count	4	15	5	4	**28**
		Expected count	6.6	6.0	5.8	9.7	**28**
	Basketmaker II–III	Count	3	5	9	6	**23**
		Expected count	5.4	4.9	4.7	8.0	**23**
	Total	**Count**	**33**	**30**	**29**	**49**	**141**
		Expected count	**33**	**30**	**29**	**49**	**141**

*lithic type crosstabulation

low number of formal tools observed in the SU 1 indicates the assemblage was the result of limited biface manufacture and expedient tool use. Conversely, the statistically low number of utilized/retouched and biface flakes and statistically high number of flaked and battered tools indicate the assemblage was the result of formal tool use rather then production. This analysis, in turn, supports the interpretation that flaked stone tools from different temporal periods in SU 2 were collected and used by the early historic occupants. The use of ready-made lithic tools is echoed in the ceramic assemblage and common at Historic-period Navajo sites (Kent 1984:161) (Table 8.51). Although significant differences in tool frequencies exist between SU 1 and SU 2, no significant differences in debitage reduction strategies or flake size were identified, indicating similarities in reduction techniques, the mixing of temporal components, or lack of on-site tool production in the SU 2 assemblage.

Flaked Stone Tools
Chris T. Wenker

Surface collections and excavations at LA 104106 recovered 211 whole and fragmentary flaked stone tools. The assemblage includes many formal shaped tools such as projectile points and bifaces and a variety of informal or unshaped items such as used/retouched flakes, cores, and hammerstones. Three additional biface flakes, representing broken biface-edge fragments from manufacturing errors, are also treated as biface fragments in this section (one is also a used/retouched flake tool). These biface flakes were also included in the discussion of debitage.

Table 8.52. LA 104106, summary of flaked stone tools.

	Study Unit		
Tool Type	1	2	Total
Used/retouched debitage	78	7	**85**
Hammerstone	18	1	**19**
Core-hammerstone	6	0	**6**
Core	34	14	**48**
Drill	0	2	**2**
End scraper	2†	0	**2†**
Biface	24*	6	**30***
Projectile point	9	12	**21**
Total	**171**	**42**	**213**

†two fragments of one tool
*does not include one biface fragment in the used/retouched debitage category

One hundred seventy-one of the 213 tools were derived from SU 1, which represents a single-component late Basketmaker III habitation locus (Table 8.52). The 42 remaining tools were derived from SU 2, which contained evidence of multiple occupations ranging from Basketmaker II through early historic in age. The tools from these two study units are described and evaluated separately in the following discussion. No flaked stone tools were recovered from SU 3 or SU 4.

In the following discussion, parametric tests in SPSS[7] (such as t-tests and ANOVA) were used to compare sample means whenever normally distributed data were available. Most samples were skewed away from normal distributions (usually heavily toward the left, with many extreme outliers to the right), as confirmed by one-sample Kolmogorov-Smirnov tests. Non-parametric tests such as Mann-Whitney U and Kruskall-Wallis H were used in these instances. Sample means are still reported for continuity and ease of interpretation, however, even though such non-parametric tests use the ranks of the cases rather than the sample means.

Basketmaker III flaked stone tools in Study Unit 1. Informal used/retouched flakes (n = 78), cores (n = 34), and hammerstones (n = 18) constitute the most numerous Basketmaker III tool classes in SU 1 at LA 104106 (Table 8.53). Formally shaped bifaces or biface fragments (n = 34) and core/hammerstones (n = 6) were also relatively common, but other tools such as scrapers were rare (n = 1). Locally available stone types predominated all tool classes, but imported chert and obsidian constituted almost one-quarter of all tools and were present in a variety of tool classes including cores, used/retouched flakes, and bifaces (including projectile points).

Basketmaker III tool types and functions. Most bifaces and projectile points lack signs of definite use wear (Table 8.54). Conversely, most flakes in the used/retouched flake category did show signs of use, often in addition to retouch. These characteristics can help illuminate artifact functions.

Used/retouched flakes. Flakes that showed use wear such as rounding, striations, or microflaking,

Table 8.53. LA 104106, flaked stone tools and stone types from Basketmaker III contexts.

	Chert, local	Silicified wood	Sedi-mentary	Quartzite	Chert, non-local	Obsidian	Total
Used/ retouched debitage	14	44	1	0	14	5	**78**
Hammerstone	0	15	1	2	0	0	**18**
Core-hammerstone	0	5	0	1	0	0	**6**
Core	6	19	1	0	5	3	**34**
End scraper	2†	0	0	0	0	0	**2†**
Biface	4*	9	1	0	2	8	**24***
Projectile point	3	2	1	0	1	2	**9**
Total	**29**	**94**	**5**	**3**	**22**	**18**	**171**

†two fragments of one tool
*does not include one biface fragment in the used/retouched debitage category

singly or in combination, were classified into either unidirectional, bidirectional, rotary/drill, or indeterminate use categories (Table 8.54). These signs of use occur alone or in combination with retouched flake scars. Unidirectional use occurred perpendicular to the tool edge (n = 36), and is inferred to represent scraping, shaving, or planing activities. Bidirectional use occurred parallel with the tool edge (n = 22), and is inferred to represent cutting or sawing activities. Indeterminate use wear (usually marked by edge-rounding and polish with no striations) is uncommon (n = 2). Rotary use wear, inferred to represent drilling action, is rare (n = 1), as are informal, retouched drill-bit edges (n = 1).

The mean used edge angles of flakes in the two main use categories differ significantly in a t-test (unidirectional use, mean = 48.6 degrees; bidirectional use, mean = 40.9 degrees; t = 2.037, p = .046). Schutt (1980) proposes that edge angles less than 40 degrees are better suited for cutting implements and those over 40 degrees are better for chopping. Both use wear categories at LA 104106 displayed mean edge angles greater than 40 degrees, however, indicating that Schutt's (1980) arbitrary cut-off point may not adequately explain the observed use categories. Hayden (1999:195) and J. Moore (2001) reported similarly equivocal edge-angle results in used flake assemblages from other Archaic and post-Archaic sites in New Mexico.

Most used/retouched flakes in SU 1 were made of locally available silicified wood, chert, chalcedony, and sandstone (n = 59), but obsidian (n = 5), Narbona Pass chert (n = 3), and Zuni Mountain chert (n = 11) made up a substantial part of the assemblage. No strong correlations existed between raw material types and use categories.

Few of the used/retouched flakes showed sufficient wear or shaping to allow conclusive functional determinations of individual items. A single, large, medium-grained piece of silicified-wood angular debris (FS 816) displayed a unidirectionally retouched projection (6 mm long by 4 mm wide) that lacked obvious use wear. Its morphology, however, indicates its intended function was as a drill or perforator.

Bifaces. Nine projectile points are present (Table 8.53), and of the remaining 25 bifaces, 10 are complete and 15 represent small proximal, distal, or indeterminate edge fragments. Some of these fragments could represent projectile point stem, tip, or tang fragments, but others resembled items that were broken during production (see below). Although most bifaces showed no identifiable use wear beyond retouch flaking (Table 8.54), several late-stage bifaces showed evidence of use or were reworked.

Only five of the bifaces are percussion-flaked items. The two largest percussion-flaked bifaces (one of sandstone and one of silicified wood) are thick, relatively narrow, and resemble bidirectional

Table 8.54. LA 104106, tool wear or edge modification types from Basketmaker III contexts.

		Use Wear or Edge Modification Type						
Tool Type	**Stone Type**	**Unidirectional Use**	**Bidirectional Use**	**Rotary Use/ Drill**	**Indeterminate**	**Retouch Only**	**Battering**	**Total**
Angular debris	Silicified wood	5	3	1	1	4	0	14
	Chert, local	0	0	0	0	1	0	1
	Chert, non-local	3	0	0	0	1	0	4
Core flake	Silicified wood	10	8	0	0	6	0	24
	Chert, local	6	0	1	0	1	0	8
	Chert, non-local	4	4	0	0	0	0	8
	Obsidian	1	2	0	0	0	0	3
Biface flake	Silicified wood	1	0	0	0	0	0	1
	Chert, local	1	1	0	0	0	0	2
	Obsidian	1	1	0	0	0	0	**2**
Flake fragment	Silicified wood	3	1	0	0	1	0	**5**
	Chert, local	1	1	0	0	1	0	**3**
	Sedimentary	0	0	0	1	0	0	**1**
	Chert, non-local	0	1	0	0	1	0	**2**
Core/ hammerstone	Silicified wood	0	0	0	0	0	5	**5**
	Quartzite	0	0	0	0	0	1	**1**
Hammerstone	Silicified wood	0	0	0	0	0	15	**15**
	Sedimentary	0	0	0	0	0	1	**1**
	Quartzite	0	0	0	0	0	2	**2**
Late-stage uniface	Chert, local	0	0	0	0	2†	0	**2†**
Early-stage pressure-flaked biface	Silicified wood	0	0	0	0	1	0	**1**
	Chert, local	0	0	0	0	1	0	**1**
	Chert, non-local	0	0	0	0	1	0	**1**
	Obsidian	0	0	0	0	4	0	**4**
Early-stage percussion-flaked biface	Silicified wood	0	0	0	0	2	0	**2**
	Sedimentary	0	0	0	0	1	0	**1**
Middle-stage pressure-flaked biface*	Chert, local	0	0	0	0	2	0	**2**
	Obsidian	0	0	0	0	3	0	**3**
Late-stage pressure-flaked biface (including projectile points)	Silicified wood	2	0	0	1	4	0	**7**
	Chert, local	0	0	0	0	3	0	**3**
	Chert, non-local	0	0	0	0	1	0	**1**
	Sedimentary	0	0	0	0	1	0	**1**
	Obsidian	0	0	0	0	3	0	**3**
Late-stage percussion-flaked biface	Silicified wood	0	0	0	0	1	0	**1**
Reworked late stage biface	Chert, local	0	0	0	0	1	0	**1**
Reworked biface, indeterminate	Chert, non-local	0	0	0	0	1	0	**1**
Total		**38**	**22**	**2**	**3**	**48**	**24**	**137**

Unused cores excluded.
†two fragments of one tool
*Does not include one middle-stage percussion-flaked local chert biface fragment in the used/retouched debitage category.

flake cores rather than tools or preforms. Two of the three remaining percussion-flaked bifaces are edge fragments while the third was a complete but broken middle-stage biface that is probably a tool preform.

Many of the remaining 29 pressure-flaked bifaces probably represent usable tools or fragments thereof. The morphology of some of the small late-stage fragments suggests that they represent projectile points, but few tools show definite signs of use such as impact burination scars. Three late-stage bifaces (two complete and one distal fragment) did show extensive edge-rounding, abrasive smoothing, and some striations, indicating heavy use. The two whole specimens probably functioned as side scrapers, and the distal fragment possibly served as a knife. Reused tools included a bifacially reworked Narbona Pass chert biface fragment, of uncertain function, and a broken projectile point that was renotched.

A significant difference in mean edge angles exists between the pressure (mean = 37.1 degrees) and percussion-flaked (mean = 56.5 degrees) bifaces (t = -2.937, p = .006; biface flakes excluded), which is probably related to production characteristics rather than to use. An ANOVA test indicates that early, middle, and late-stage bifaces also show significant differences between their edge angles (mean = 49.3 degrees, 34.0 degrees, and 35.1 degrees, respectively; F = 4.317, p = .024). A post-hoc examination of the sample means indicates that the early-stage biface group differs from the middle and late-stage groups. Removing the two early-stage bifaces that are probably bidirectional cores brings the mean of early-stage biface edges to 43.5 degrees. After this transformation, the three classes show no significant mean edge-angle difference in an ANOVA test (F = 1.992, p = .158). Hence, biface edge angles reveal probable manufacturing differences between percussion and pressure-flaked bifaces, and between probable cores and early-stage bifaces, but few other functional differences are indicated by this measure.

*Projectile points in Study Unit 1***.** Nine projectile points were present in the assemblage, but only three were complete (Fig. 8.68). Six were classified as untyped large (probably dart) points, but only two of these had intact hafting elements (Fig. 8.68:f, g). One whole chert dart point (Fig. 8.68:g) is side-notched, but it was reworked from a larger corner-notched point. The other mostly complete point (Fig. 8.68:f), made of baked siltstone, or porcellanite, is a large, narrow-stemmed, corner-notched point. This tool closely resembles Kearns and Silcock's (1999:6–11) Type 1401 points, which they report from Archaic/Basketmaker II to Pueblo II sites (Kearns and Silcock 1999:6–16). Following R. Moore and Brown's (2002) key this item can be typed as a Hidden Valley ("Durango"-style) Basketmaker II point. Three other large distal fragments or mid-sections (Fig. 8.68:d, e, i) all probably represent corner-notched items. The final dart-base fragment (Fig. 8.68:h) is an indeterminate notched type.

Three small corner-notched (probably arrow) points are also present in the Basketmaker III component (Fig. 8.68:a–c). Two are whole, and one is a proximal fragment. Two are of obsidian, and one is made of Narbona Pass chert. The two complete points are extensively shaped and are nearly identical in size and outline, suggesting that they may have been manufactured by the same individual (Whittaker 1987). The broken point is made of a thin flake, and due to a minimal amount of retouch, the original dorsal and ventral flake scars are visible across most of both faces. These corner-notched points correspond well with Kearns and Silcock's (1999:6–11) Type 2401–2403 points, which occur almost exclusively at Basketmaker III sites (Kearns and Silcock 1999:6–16). The small, stemmed arrow points that are also common at regional Basketmaker III sites (Kearns and Silcock 1999) are absent from the Twin Lakes assemblage.

Scrapers. Two fragments of a late-stage unifacially flaked tool made of local chert, found in separate contexts, represent a single end scraper. Neither fragment shows definite signs of use wear, but extensive shaping of the distal end indicates the tool's function.

*Percussors***.** Many hammerstones (n = 18) and core/hammerstones (n = 6) are present in the Basketmaker III assemblage (Table 8.53). All are made of locally available material. Silicified wood predominates (n = 20, including 5 cores), and quartzite (n = 3, with 1 core) and sandstone (n = 1) round out the assemblage. Although the mean weight of silicified wood core/hammerstones (mean = 201 g) is less than that of the unflaked silicified wood hammer stones (mean = 275 g), a t-test shows this difference is not significant (t = 1.179, p = .254). The

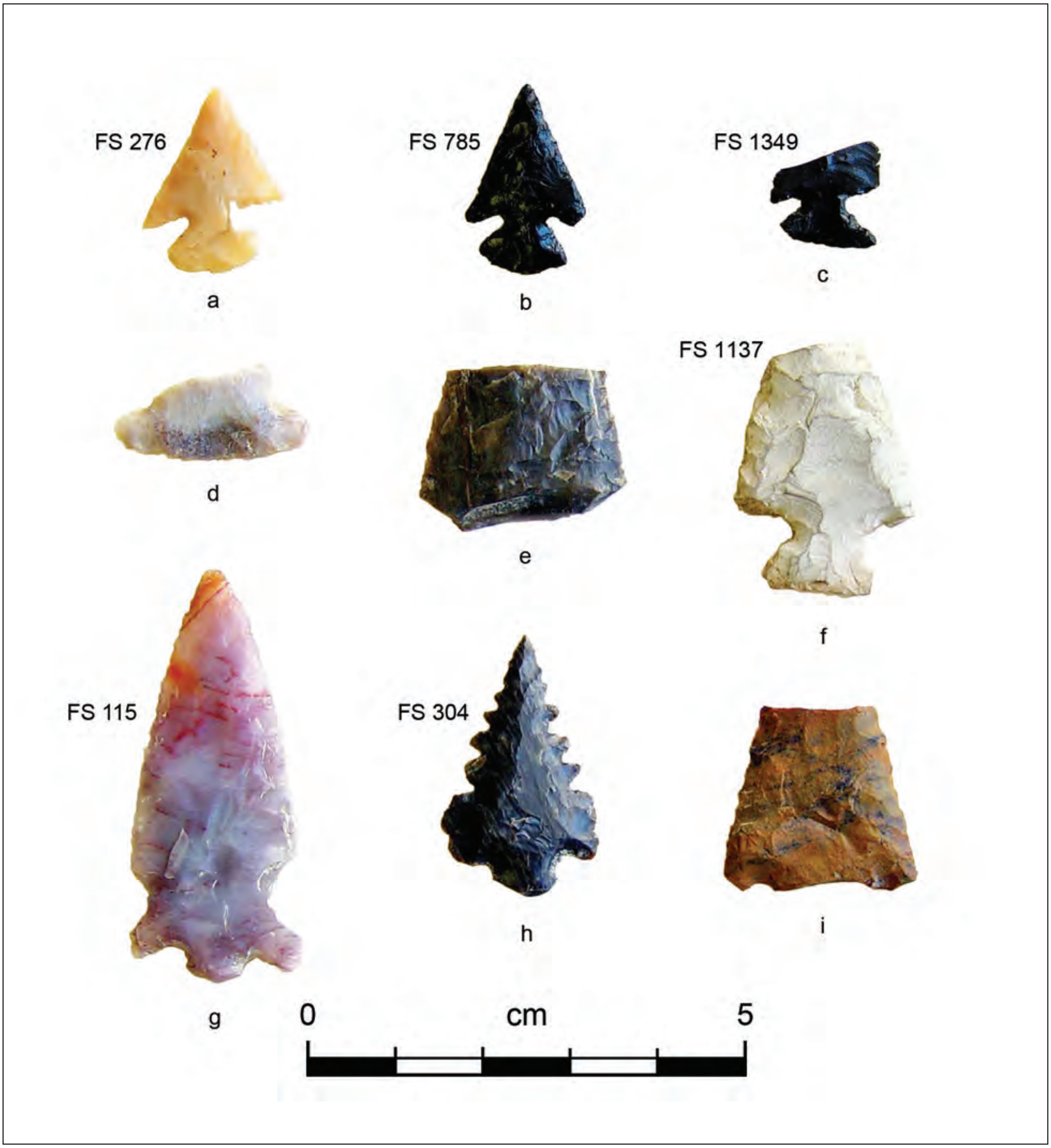


Figure 8.68. Projectile points (a–i), Study Unit 1, LA 104106.

Table 8.55. LA 104106, biface fracture types observed in the Basketmaker III assemblage.

		Biface Fracture Type					
Tool Type	**Stone Type**	**None**	**Bending**	**Outrepasse Flake**	**Edge-bite Flake**	**Indeter-minate**	**Total**
Early-stage pressure-flaked biface	Silicified wood	1	0	0	0	0	**1**
	Chert, local	1	0	0	0	0	**1**
	Chert, non-local	1	0	0	0	0	**1**
	Obsidian	4	0	0	0	0	**4**
Early-stage percussion-flaked biface	Silicified wood	0	0	0	0	1	**1**
Middle-stage pressure-flaked biface	Chert, local	0	0	1	0	1	**2**
	Obsidian	2	1	0	0	0	**3**
Middle-stage percussion-flaked biface	Chert, local	0	0	0	1	0	**1**
Late-stage pressure-flaked biface (including projectile points)	Silicified wood	2	4	0	0	1	**7**
	Chert, local	0	0	0	0	3	**3**
	Chert, non-local	1	0	0	0	0	**1**
	Sedimentary	0	1	0	0	0	**1**
	Obsidian	1	0	1	0	1	**3**
Late-stage percussion-flaked biface	Silicified wood	0	1	0	0	0	**1**
Total		**13**	**7**	**2**	**1**	**7**	**30**

three quartzite hammerstones are fairly small (the reused core being the smallest overall percussor), ranging from 45 g to 198 g in weight. All of the quartzite and silicified wood hammerstones probably served as light-duty flintknapping percussors. The single sandstone cobble percussor is anomalous in its large size (1,032 g), suggesting it may have been used to manufacture ground stone tools or to shape construction stones.

Basketmaker III tool production. Some aspects of site function at SU 1, LA 104106 can be outlined by examining the technological aspects of flaked stone tool production. Whole and fragmentary tools, as well as flaking debris, provide the data sources to examine tool production strategies.

Biface manufacture. Of the 34 bifaces constituting the Basketmaker III assemblage, two are recycled items that are excluded from this discussion of production. Similarly, two of the tools classified as early-stage percussion bifaces are also excluded because they probably represent bidirectional cores. The 30 remaining bifaces were used to assess aspects of on-site biface manufacture (Table 8.55).

Locally available silicified wood (n = 10) and chert (n = 7) accounted for 57 percent of this biface sample. Obsidian accounted for many of the remaining bifaces (n = 10, including 2 projectile points). One biface was made of Zuni Mountain chert, one projectile point was made of Narbona Pass chert, and another projectile point was made of porcellanite.

Overall, almost as many early and middle-stage bifaces (n = 14) as late-stage bifaces (n = 16) were present in the Basketmaker III assemblage (Table 8.55). All but three of these tools were manufactured primarily through pressure-flaking techniques. The three percussion-flaked items are represented by one early, one middle, and one late-stage biface. All percussion-flaked bifaces were made of locally available silicified wood or chert.

Fracture types observed among the fragmentary bifaces provided little evidence for on-site biface production (Table 8.55), partly because a large proportion of tools are complete. Flaking errors such as outrepassé flake terminations and "edge-bite" flakes provide fairly certain evidence of on-site production activities (e.g., Johnson 1979; J. Moore 2001). Only three tools exhibit such fracture types. Two are middle or late-stage pressure-flaked items and one is a middle-stage percussion-flaked biface. The late-stage pressure-flaked production failure are made of Mount Taylor obsidian, but the other two manufacture failures are made of local chert. All the remaining broken bifaces display fractures of indeterminate origin that provide no certain insight into production or use.

The flaking debris assemblage recovered from the extramural area of SU 1 contain 97 flakes classified as biface flakes (slightly over 3 percent of the entire debitage sample [see Table 8.49]). The presence of biface flakes is taken as a strong indicator of biface reduction (see Wenker in LA 32964 tool description). Silicified wood accounts for 38 percent (n = 34) of the biface flakes, and other local siliceous materials including chert and chalcedony account for an additional 12 percent (n = 11). Some local quartzite is also present (n = 2). Obsidian, of both Mount Taylor material and other unidentified varieties, actually constitutes the single most common raw material (40 percent) used in the manufacture of biface flakes (n = 36). Other exogenous siliceous materials include Narbona Pass chert (n = 1) and Zuni Mountain chert (n = 6). The proportions of biface flake raw materials fairly mirror the raw material proportions of the bifaces (Table 8.53), although no quartzite bifaces were recovered and no porcellanite flaking debris is present.

The mean weight (mean = 0.69 g) and length (mean = 15 mm) of all unbroken biface flakes (n = 54) do not signal a focus on either pressure or percussion techniques. The weight of unbroken obsidian biface flakes (n = 19, mean = 0.37 g) does not differ significantly from the weight of all other whole non-obsidian biface flakes (mean = 0.86 g) in a Mann-Whitney U test (Z = -1.652, p = .099). The means appear dissimilar because several non-obsidian flakes are heavy outliers that inflate the mean of that category. Similarly, a t-test shows no significant difference between the length of unbroken obsidian (mean = 13.3 mm) and non-obsidian (mean = 16.2 mm) biface flakes (t = 1.95, p = .057). These observations suggest that similar reduction techniques were used for obsidian and non-obsidian bifaces.

The obsidian and non-obsidian biface flakes apparently differed in their cortex coverage, however. Of the 10 biface flakes with dorsal cortex, nine are made of obsidian (25 percent of the obsidian biface flakes) and the remainder is of silicified wood. Among the bifaces themselves, two pressure-flaked silicified wood bifaces (one early and one late stage) display remnants of cortex, as does a single early-stage obsidian pressure-flaked biface.

In sum, bifaces in all stages of manufacture are present in the Basketmaker III component at LA 104106, but the paucity of biface flakes in the debitage assemblage indicates a generally low level of on-site production. The predominance of obsidian and silicified wood bifaces matches well with the prevalence of obsidian and silicified wood among the meager biface flake assemblage. These characteristics indicate on-site bifacial tool production using those stone types, although cortical obsidian biface flakes indicate a somewhat different production trajectory that may relate to the conservation of that imported material.

Used/retouched flake production. Forty-three of the 78 used/retouched flake tools are made from core flakes; 19 are pieces of angular debris, 11 are of flake fragments, and only 5 are made of biface flakes. The weights of used/retouched core flakes (mean = 4.3 g), angular debris (mean = 4.7 g), flake fragments (mean = 4.9 g), and biface flakes (mean = 1.4 g) do not significantly differ (Kruskall-Wallis χ^2 = 3.236, df = 3, p = .357). The small size of the five used/retouched biface flakes (three of local material and two of obsidian) corresponds fairly well with the size of the overall unused biface flake assemblage (see above). These five flakes probably could have been taken opportunistically from the overall collection of biface flakes, indicating that large bifaces were not being used specifically for flake tool-blank production (cf. Kelly 1988:719–720).

The bulk of the used/retouched core flakes, flake fragments, and angular debris are presumably made from the abundant cores in SU 1 (Table 8.56). The assemblage contains nearly as many bipolar cores (n = 16) as all other combined types (n = 24). Locally available stone types (n = 32) predominate the overall core assemblage, but obsidian and Zuni Mountain chert are relatively common, especially in the bipolar core category.

Core types show a significant difference among their weights (Table 8.56; Kruskall-Wallis χ^2 = 21.855, df = 4, p < .001). Mean ranks indicate that the bipolar cores constitute a group that differs from all of the non-bipolar core categories. The consistently small

Table 8.56. LA 104106, core types and raw material types from Basketmaker III contexts.

	Silicified Wood	Chert, Local	Quartzite	Sand-stone	Zuni Chert	Obsidian	Total	Mean Weight (g)
Tested cobble	3	0	0	0	0	0	**3**	111
Unidirectional core	1	0	1	0	0	0	**2**	124
Bidirectional core	1	1	0	0	1	0	**3**	73
Multidirectional core	13	1	0	1	1	0	**16**	323 (182*)
Bipolar core	6	4	0	0	3	3	**16**	10
Total	**24**	**6**	**1**	**1**	**5**	**3**	**40**	**153**
Mean weight (g)	143	12	45	2450	24	1		

*Excluding sandstone

size of the bipolar cores could indicate that they were functionally distinct from the other core classes.

Twenty-five bipolar flakes were recovered from LA 104106 with 17 present in the SU 1 debitage, and nearly all (n = 14) are of local material. None are used or retouched, however, suggesting that the bipolar cores may not have been used to manufacture used/retouched flakes. A Mann-Whitney U test shows that the mean weight of the 17 unused bipolar flakes (mean = 3.2 g) does not significantly differ from that of the overall used/retouched flake assemblage (mean = 4.3 g; Z = -.491, p = .624). Apparently size alone did not preclude bipolar flakes from being used or retouched. The functional roles of the bipolar cores and flakes remain unclear.

Core sizes were also constrained by the available nodule sizes of raw materials (Table 8.56). The single sandstone core represents an anomalously large item, and silicified wood cores constitute the next largest set of cores. By comparison, the local quartzite core is fairly small. Zuni Mountain chert cores are twice as large as those of local chert. Obsidian cores (all of which are bipolar) represent the smallest core material class.

Two-thirds of silicified wood cores exhibit cortex (n = 16), as does one-half of the local chert cores (n = 3). Both quartzite and sandstone cores are partially cortical. One of the five Zuni Mountain chert cores displays cortex, and two of the three obsidian cores are partially cortical as well suggesting the relative availability of these material types.

This Basketmaker III flaked stone assemblage contains abundant used/retouched flakes made of local and exogenous material, but flake production does not appear to have been strongly organized toward core efficiency. The common presence of multidirectional cores, the general absence of large biface flake blanks and bifacial core reduction, the wide range of core sizes (among raw materials and among core types), and the common use of angular debris for used/retouched flake tools at LA 104106 emphasizes the general expediency of flake-blank production in this component.

Basketmaker and Navajo flaked stone tools in Study Unit 2. Forty-two tools were recovered from SU 2 (Tables 8.52, 8.57), which contained evidence of Basketmaker II, Basketmaker III, and early historic Navajo occupations. None of the dated features contained flaked stone tools. Due to the spatial overlap of the Navajo and Basketmaker occupations (as indicated by feature and ceramic distributions), the general tool assemblage probably also represents a composite sample of all occupation periods.

The mixed tool sample constitutes 20 percent of the site's overall flaked stone tools. Little insight can be gained by outlining the specific functional and technological aspects of this undatable assemblage. Nor can the assemblage be fruitfully contrasted against the Basketmaker III component in SU 1, because the mixed assemblage both predates and postdates the SU 1 assemblage and no diachronic trends would be revealed (see debitage comparison above). The remainder of this discussion summarizes the mixed tool assemblage, and then focuses on the study unit's projectile point styles and functions.

Study Unit 2 flaked stone tool types. The mixed

Table 8.57. LA 104106, Study Unit 2, flaked stone tools and stone types from mixed deposits.

	Silicified Wood	Chert, Local	Sedimentary	Narbona Pass Chert	Obsidian	Total
Used/ retouched debitage	3	4	0	0	0	**7**
Hammerstone	1	0	0	0	0	**1**
Core	11	2	1	0	0	**14**
Unifacial drill	1	0	0	0	0	**1**
Drill/retouched point	0	1	0	0	0	**1**
Biface	3	2	0	1	0	**6**
Large projectile point	3	1	0	0	0	**4**
Small projectile point preform	0	1	0	0	0	**1**
Small projectile point	1	5	0	0	1	**7**
Total	**23**	**16**	**1**	**1**	**1**	**42**

sample is dominated by three broad tool classes: bifaces/projectile points (n = 18), cores (n = 14), and used/retouched flakes (n = 7; Tables 8.52, 8.57). A hammerstone and two drills (one unifacial, and one a retouched projectile point) round out the assemblage.

Aside from retouch, signs of use wear are present on only two of the local chert used/retouched flakes, which evince unidirectional wear. The single hammerstone is battered, and only one other worn tool, a recycled projectile point (discussed below), shows cutting or scraping use wear.

The projectile point and biface sample is dominated by pressure-flaked items (n = 17). Two bifaces (one early stage and one middle stage) were produced through percussion. Exogenous raw materials were exceptionally uncommon in the tool assemblage, although some exotic stone types were present in the debitage. Only two late-stage bifaces were made of nonlocal material (Narbona Pass chert and obsidian).

Only four bifaces or projectile points are unbroken. Biface fracture types provide little clear evidence of use or production, however. Most fractures (n = 13) are bending breaks or are of unknown types. One early-stage local chert biface shows a crenated fracture and heat crazing, indicating that it was burned. Finally, a silicified wood dart point fragment shows a probable burination fracture originating from its distal end, indicating that it may have been broken during use. One percent (n = 10) of the flaking debris assemblage consists of biface flakes (see Table 8.36), and all are made of local materials, further indicating that little biface manufacture or maintenance took place in SU 2.

All cores are made of locally available material. Multidirectional cores are most common (n = 7), and low counts of unidirectional (n = 3), bipolar (n = 2), and bidirectional (n =1) cores and a single tested pebble are also present. The diversity of core types and the wide range in sizes (2.1 to 182.2 g, mean = 45.4 g) indicates little standardization of flake production. The lone silicified wood hammerstone is markedly larger than any of the cores (356 g), suggesting that its use may not have been related to the reduction of the cores in the study unit assemblage.

In sum, the flaked stone tool assemblage in SU 2 differed from other Twin Lakes samples in its high proportion of bifaces and projectile points but near-absence of biface flakes. The tool assemblage also contained a relatively high frequency of cores, but nearly lacks precursors. As discussed below, the types of small projectile points, and the presence of some recycled projectiles, may indicate that much of the assemblage derives from the early historic occupation.

Thirteen projectile points (including one that was reworked into a drill) derive from SU 2 (Tables 8.52, 8.57; Fig. 8.69), but the temporal affiliations of these tools cannot be delineated through their contextual associations, because none were

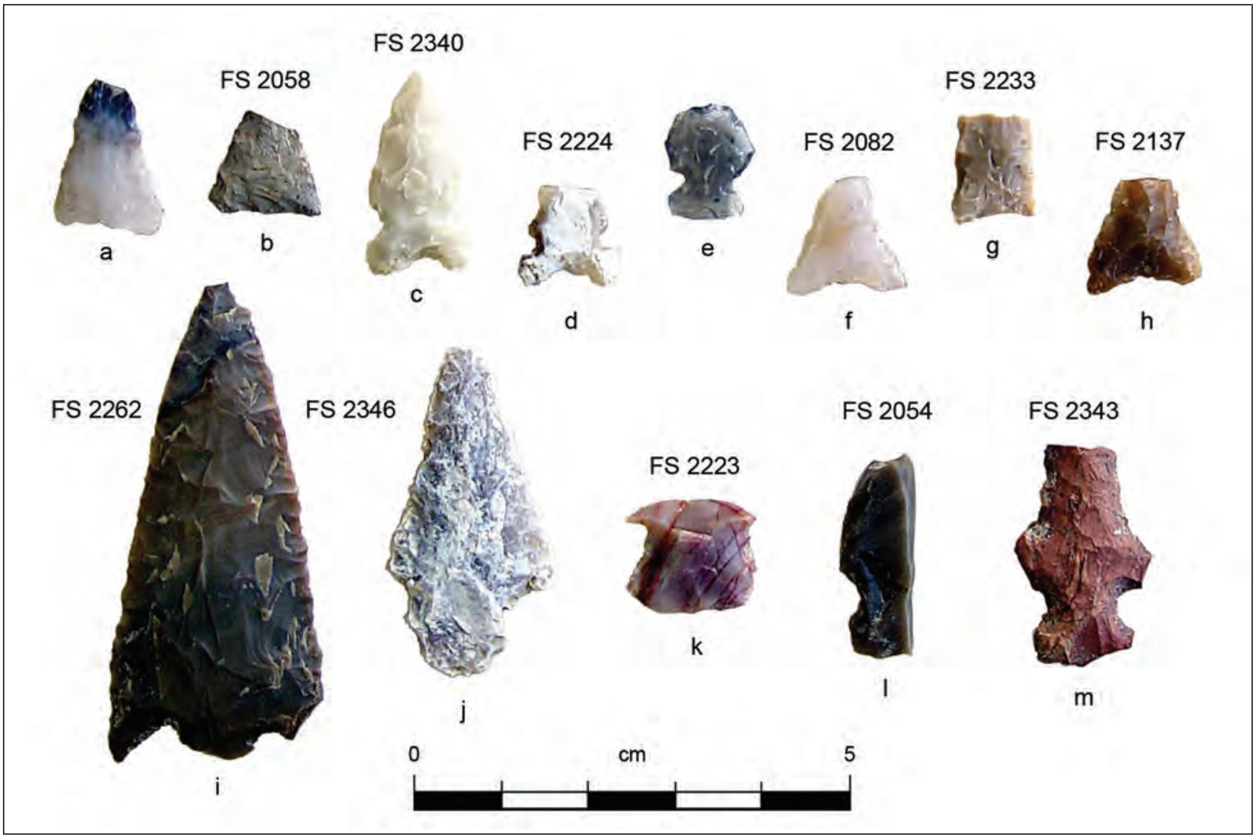


Figure 8.69. Projectile points (a–m), Study Unit 2, LA 104106.

recovered from features or deposits of known age. Morphology and signs of reuse may provide some indication of their period of use.

Three large point fragments, all lacking use wear, may be dart points related to the Basketmaker II-period occupation (Fig. 8.69:i–l). One of the fragments consists of a basal section of an untyped corner-notched point (Fig. 8.69:k), and one is a lateral section of an untyped side-notched point (Fig. 8.69:l). The largest fragment (Fig. 8.69:i) is a blade from a large corner-notched point. Any or all of these points could have been brought to the site by later residents as well.

Seven small arrow-sized points (including a preform) are probably related to the early historic Navajo occupation (Fig. 8.69:a–f, l). These tools include one unnotched, straight-base triangular point (Fig. 8.69:b); three unnotched, concave-base points; and two side-notched, concave-base points (Fig. 8.69:c, d). The preform (Fig. 8.69:h) also resembles an unnotched, concave-base point (see Fig. 8.66). As a group, these points strongly resemble those reported by Brugge (1986:125) and Lekson (1987:679) from an early historical Navajo site in Chaco Canyon. The side-notched, concave-base points also resemble those that Kearns and Silcock (1999:6–18) recovered from early historic Navajo sites near the San Juan River. Skinner (1999a:59, 127) reports another similar side-notched, concave-base point from a historical Navajo site near Mexican Springs. Simmons (1982a:210) illustrates a similar point from an Anasazi site, however.

The three remaining points (including two darts [Figs. 8.69:j, m] and one arrow [Fig. 8.69:c]) are extensively reworked or reused, a characteristic that may indicate their relationship to the Navajo component. It is well documented that the Navajo often scavenged stone tools from prehistoric sites (Brugge 1986:126; Chapman 1977:451; Kent 1984:161; Lekson 1987:679), although this observation does not preclude the same behavior by other, previous site residents. One of the scavenged dart points (Fig. 8.69:m) is a side-notched projectile point with a reworked blade. Although it lacks use wear, the blade morphology indicates it was serving as a drill when it broke. The second dart point (Fig. 8.69:j) is a complete, heavily patinated, stemmed point that displays extensive edge rounding on both tangs and on part of the lateral stem edge. The rounded areas do not resemble purposeful basal grinding or hafting wear. The point was apparently grasped by the blade (which itself shows no wear) and used "backwards" as an informal cutting or scraping implement.

The third reused point, an obsidian side-notched arrow point (Fig. 8.69:e), is a proximal fragment that shows extensive bifacial retouch along the broken distal edge. The tool may represent an arrow that broke during use and was reshaped into a blunt point while it was still in its haft, or it may have been salvaged and reshaped at a later time. In its stem and notch morphology, this point more closely resembles the Basketmaker III arrow points in SU 1 than the other (possibly Navajo-made) arrow points from SU 2. Simmons (1982a) also describes similar side-notched points as Anasazi points.

The spatial distribution of points in SU 2 (all from extramural locations) also provides some circumstantial evidence that may indicate their occupational affiliation. All of the arrow points, and all but two of the dart points, lay north of the 20N grid line. This portion of the study unit also contained the overwhelming majority of Dinetah gray pottery and all of the partial Anasazi vessels, which are attributed to the Navajo occupation (see discussion above). The two southern dart points (Fig. 8.69:i, j) occupied the southwestern area around an undated feature cluster (Basketmaker II?). No points were found in the southeastern portion of the study unit, in the area of the Basketmaker II features. These associations suggest that the SU 2 projectile point assemblage may mostly relate to the early Historic period of occupation.

Ground Stone

Jesse B. Murrell

Ninety-two ground stone artifacts were recovered from LA 104106. These artifacts were recovered from a variety of archaeological contexts including structure fill, structure floors, and intramural and extramural features. All but six, made of quartzite, were manufactured from sandstone. The most common artifact types are indeterminate ground stone fragments followed by grinding slabs and shaped slabs, mano fragments, and two-hand manos in descending order. The artifact type distribution suggests that a range of tasks requiring ground stone tools were carried out by the site's occupants. These include the manufacture and maintenance of ground stone tools, the manufacture of architectural elements, the processing of agricultural and nondomesticated vegetal resources, and the processing of pigments. The following discussion summarizes the assemblage. A detailed and interpretive discussion of ground stone artifacts is presented in Chapter 12.

Indeterminate tools. Indeterminate ground stone fragments (n = 26) were the most common ground stone artifact identified. With the exception of one made from orthoquartzite, all of the fragments are of sandstone. Ground stone fragments were recovered from a variety of archaeological contexts, most of which appear to be secondary refuse. For example FS 204, recovered from Structure 1 roof fall layers (Stratum 4), was secondarily used as a roofing element. Both FS 614 and FS 869 also recovered from of Structure 1, were secondarily used to shim or otherwise support a primary roof support post from settling. Several formal tools relegated to the indeterminate ground stone fragment category show evidence of initial shaping or production. All except FS 250-1 have flat, single-use surfaces and none of the fragments displays maintained use surfaces. FS 2352 exhibits a polished use surface, while all others show only grinding/faceting wear. Six fragments show evidence of thermal alteration including color change or reddening, crenated fracturing, and sooting. One has an adhering red pigment residue. Table 8.58 summarizes the metric attributes of the indeterminate ground stone fragments.

Manos. Six sandstone mano fragments were recovered from a variety of contexts and display single convex use surfaces. With the exception of a single fragment recovered from an intramural primary refuse pit in Structure 2, all other fragments recovered from extramural areas and structure fill appear to be secondary refuse. All show only grinding/faceting wear with the exception of FS 148, which exhibits unidirectional linear striations (Table 8.59).

Four whole orthoquartzite one-hand manos were recovered, all of which appear to have been secondary refuse. All are oval-shaped in outline with the exception of FS 2347, which is irregu-

Table 8.58. LA 104106, indeterminate ground stone fragments, select attribute summary.

FS	Provenience	Portion	Shaping	Use Surface Cross-section	Length (mm)	Width (mm)	Thick-ness (mm)	Weight (g)
32	Surface, 88N/115E	edge fragment	none	flat	81.0	53.0	19.0	146.0
85	Surface, 56N/90E	edge fragment	flaking	flat	124.0	68.0	28.0	372.0
119	85N/111E, Level 3	internal fragment	none	flat	141.0	101.0	16.0	218.0
147	Structure 1, bench fill	internal fragment	none	flat	71.0	40.0	11.0	55.0
189	Structure 1, fill	internal fragment	none	flat	89.0	54.0	24.0	154.0
204	Structure 1, roof fall	internal fragment	none	flat	118.0	75.0	16.0	213.0
249-2	Structure 1, fill	internal fragment	none	flat	227.0	147.0	24.0	1300.0
250-1	Structure 1, fill	corner	none	flat	116.0	85.0	23.0	265.0
250-2	Structure 1, fill	internal fragment	none	flat	96.0	71.0	19.0	176.0
250-3	Structure 1, fill	internal fragment	none	flat	90.0	50.0	13.0	122.0
349	Structure 1, floor fill	corner	none	irregular	233.0	164.0	33.0	1950.0
565	97N/113E, Level 1	edge fragment	flaking	flat	80.0	67.0	11.0	126.0
570	Structure 5, fill	edge fragment	none	flat	37.0	35.0	13.0	21.0
614	Structure 1, Feature 40	end fragment	flaking	flat	120.0	120.0	27.0	750.0
699	79.60N/111.39E	internal fragment	none	flat	300.0	219.0	18.0	1870.0
748	80.20N/110.95E	edge fragment	flaking	flat	297.0	171.0	54.0	3800.0
869	Structure 1, Feature 105	edge fragment	flaking	flat	259.0	170.0	20.0	1200.0
907	Structure 1, antechamber fill	edge fragment	flaking	flat	109.0	82.0	27.0	478.0
908	Structure 1, antechamber fill	internal fragment	none	flat	86.0	60.0	21.0	209.0
930	Structure 5, fill	internal fragment	none	flat	142.0	106.0	42.0	650.0
997	Structure 6, fill	internal fragment	none	flat	280.0	273.0	52.0	5300.0
1337	Structure 7, fill	internal fragment	none	flat	70.0	67.0	29.0	243.0
2163	21N/98E, Level 1	end fragment	none	irregular	99.0	74.0	40.0	526.0
2305	Structure 9, fill	edge fragment	none	flat	97.0	114.0	43.0	850.0
2307	Structure 9, fill	internal fragment	none	concave	161.0	107.0	13.0	306.0
2310	Structure 9, fill	indeterminate	none	convex	95.0	80.0	40.0	572.0
2352	Structure 9, fill	edge fragment	none	flat	237.0	215.0	44.0	2850.0

larly shaped. All exhibit convex use surfaces with grinding/faceting wear. FS 2347 has an irregularly shaped plan view outline, FS 712 exhibits two opposing use surfaces (Fig. 8.70), while the other manos exhibit a single use surface. Table 8.60 presents an attribute summary and Table 8.61 presents central tendency and dispersion statistics for the metric attributes of whole one-hand manos.

Six whole, sandstone two-hand manos were recovered during the excavation of Structures 1 and Structure 2. Those located in structure fill likely represent secondary refuse while FS 941 located at the base of a posthole had a secondary use as a post footing. FS 1182 recovered from the bench of Structure 1 was likely cached, or represents primary refuse. With the exception of FS 941, which is subrectangular in outline, all have oval-shaped outlines and exhibit a single convex use surface. FS 347 and FS 1182 exhibit unidirectional linear striations that parallel the transverse axis, while the others exhibit grinding/faceting wear (Fig. 8.71). Four two-hand manos (FS 347, FS 778-2, FS 909, and FS 1182) exhibit a use surface that is upturned at the ends suggesting they were used in trough metates. A single mano dis-

Table 8.59. LA 104106, mano fragments, selected attributes summary.

FS	Provenience	Portion	Shaping	Sharpening	Length (mm)	Width (mm)	Thickness (mm)	Weight (g)
80	106N/96E, surface collection	internal fragment	none	yes	61.0	49.0	27.0	148.0
148	Structure 1, bench fill	medial fragment	pecking	yes	103.0	81.0	27.0	311.0
955	Structure 2, Feature 91	edge fragment	flaking	no	73.0	69.0	19.0	185.0
1014	87N/112E, Level 2	end fragment	flaking	yes	94.0	72.0	20.0	197.0
2188	17N/97E, Level 2	end fragment	flaking	no	93.0	61.0	32.0	281.0
2201	25N/96E, Level 1	edge fragment	none	yes	80.0	50.0	18.0	87.0

Figure 8.70. One-hand mano (FS 712), LA 104106.

Table 8.60. LA 104106, one-hand manos, selected attributes summary.

FS	Provenience	Shaping	Sharpening	Length (mm)	Width (mm)	Thickness (mm)	Use Surface Length (mm)	Use Surface Width (mm)	Use Surface Area (mm^2)	Weight (g)
712	Structure 2, fill	pecking	yes	126.0	101.0	32.0	107.0	91.0	7790.0	750.0
712	–	–	–	–	–	–	108	94	8122	–
778-1	Structure 2, fill	grinding	no	99.0	86.0	41.0	78.0	71.0	4430.0	507.0
855	87N/94E, Level 3	pecking	no	110.0	75.0	48.0	88.0	58.0	4083.0	564.0
2347	16.92N/ 91.50E, elevation 8.40	–	none	–	81.0	74.0	42.0	61.0	54.0	2635.0

Table 8.61. LA 104106, whole one-hand manos, metric attributes, descriptive statistics.

	N	Minimum	Maximum	Mean	Standard Deviation
Length (mm)	4	81.0	126.0	104.0	18.9
Width (mm)	4	74.0	101.0	84.0	12.6
Thickness (mm)	4	32.0	48.0	40.8	6.6
Use surface length (mm)	5	61.0	108.0	88.4	19.9
Use surface width (mm)	5	54.0	94.0	73.6	18.4
Use surface area (mm^2)	5	2635.0	8122.0	5412.0	2420.5
Weight (g)	4	406.0	750.0	556.8	144.5

Figure 8.71. Two-hand manos, LA 104106: (a) FS 347; (b) FS 1182.

plays an adhering red pigment residue on the surface opposing the use surface. Production input, maintenance, and metric attributes for two-hand manos are presented in Table 8.62 and the descriptive statistics for these attributes are presented in Table 8.63.

Metates and grinding slabs. Four whole, sandstone basin metates with concave use surfaces were recovered from LA 104106. Two metates (FS 357 and FS 698) can be described as shallow basin metates, while FS 1087, composed of two conjoining fragments, and FS 1326 can be described as deep basin metates. FS 357 was recovered from the floor of Structure 1, had an adhering red pigment residue on the use surface face, and is considered secondary refuse. FS 698 was located in the fill of Structure 3 and likely represents secondary refuse. One recovered from Feature 137, which is a bell-shaped pit, may have been cached for an anticipated future use. FS 1326 was recovered from Backhoe Trench 4 rendering refuse designation problematic. Table 8.64 presents a select attribute summary and Table 8.65 presents a metric attribute summary. A single sandstone basin metate fragment was recovered from the fill of Structure 9. This context suggests that the artifact is secondary refuse or was recycled by later site occupants. It lacks evidence of initial shaping, but it does exhibit a single sharpened concave surface with grinding/faceting wear. The artifact was heat fractured and sooted.

Eight whole and two fragmentary grinding slabs were recovered from LA 104106 (Table 8.66). All are of sandstone, lack evidence of production input or maintenance, and display a single use surface with grinding/faceting wear. Except FS 1214, all display residual red pigment adhering to the use surface. All but one of the fragments were recovered from Structure 1. Only FS 355, recovered from the floor of Structure 1, and FS 1341, recovered from the bench, represent secondary refuse. All other items appear to represent secondary refuse. Metric attributes are presented in Table 8.65.

Two whole formal netherstones (FS 356 and FS 615) were recovered during the excavation of Structure 1. One recovered from the floor of Structure 1 likely represents de facto refuse while one recovered from Structure 1, Feature 40 was secondarily used as a post footing. Both artifacts were manufactured by flaking the margins of sandstone slabs and display maintained use surfaces. FS 356, oval in plan, displays a single concave use surface with longitudinally oriented, unidirectional, linear striations. The use surface also exhibits an adhering red pigment residue. FS 615, subrectangular in plan, also has a single concave use surface with grinding/faceting wear (Fig. 8.72).

Shaped slabs and percussors. LA 104106 yielded a total of eight shaped slabs manufactured by flaking the margins of tabular sandstone (Table 8.67). The majority of these items likely represent architectural elements used in the construction of Structure 1. Two shaped slabs spatially associated with Feature 115 most likely fitted upright into the wing wall complex located in the eastern half of the structure. Their floor fill proveniences suggest they collapsed after the structure was abandoned. FS 348 propped against the wall immediately west of the vent tunnel opening (Feature 52) in Structure 1 displayed a heat-altered appearance. This element may have been originally positioned upright in Feature 108, a deflector slot. Measurements of this feature indicate that a slab of this size could be accommodated. Another architectural element was positioned upright, immediately within the interior of the Structure 1 antechamber wall opposite the passageway opening (Feature 164). This item portrayed a striking similarity to a deflector; however, no ventilator opening was identified (see Fig. 8.24). A small shaped slab was recovered from the fill of Feature 91. It is unclear whether the artifact was stored here for future use or simply discarded. The size and plan view outline form suggest FS 954 may have functioned as a lid for a ceramic container.

A single axe head manufactured from an indurated sandstone was recovered from the fill of Structure 7 and likely represents secondary refuse. The hafting element, which consists of two opposing lateral notches, was manufactured by pecking and grinding. The artifact is hour glass-shaped in plan view with a relatively straight poll and a sinuous bit. The bit edge is considered to be resharpened, but exhibits no subsequent wear. Resharpening was accomplished by the unifacial removal of a series of flakes. Two small flake scars originate from the poll end and run along one lateral edge. This scarring may be the product of using the poll end as a hammer or bit end as a wedge whereby the poll end is struck to split materials.

A single fragmentary sandstone artifact interpreted as an anvil was recovered from the upper fill of Structure 1 suggesting the artifact represents sec-

Table 8.62. LA 104106, two-hand manos, selected attributes summary.

FS	Provenience	Shaping	Sharpening	Length (mm)	Width (mm)	Thickness (mm)	Use Surface Length (mm)	Use Surface Width (mm)	Use Surface Area (mm^2)	Weight (g)
345	Structure 1, floor fill	flaking and pecking	yes	192.0	111.0	37.0	190.0	110.0	16720.0	1350.0
347	Structure 1, floor fill	none	yes	194.0	92.0	26.0	194.0	92.0	14278.0	650.0
778-2	Structure 2, fill	flaking	yes	160.0	114.0	31.0	160.0	114.0	14592.0	900.0
909	Structure 1, antechamber, fill	flaking	yes	189.0	105.0	37.0	189.0	101.0	15271.0	1250.0
941	Structure 1, Feature 73	flaking and pecking	yes	229.0	163.0	75.0	213.0	136.0	26071.0	5800.0
1182	Structure 1, bench contact	flaking and pecking	yes	195.0	120.0	26.0	195.0	118.0	18408.0	1100.0

Table 8.63. LA 104106, whole two-hand manos, metric attributes and descriptive statistics.

	N	Minimum	Maximum	Mean	Standard Deviation
Length (mm)	6	160.0	229.0	193.2	21.9
Width (mm)	6	92.0	163.0	117.5	24.2
Thickness (mm)	6	26.0	75.0	38.7	18.5
Use surface length (mm)	6	160.0	213.0	190.2	17.2
Use surface width (mm)	6	92.0	136.0	111.8	15.1
Use surface area (mm^2)	6	14278.0	26071.0	17556.8	4442.6
Weight (g)	6	650.0	5800.0	1841.7	1955.4

Table 8.64. LA 104106, basin metates, selected attributes summary.

FS	Provenience	Shaping	Sharpening	Plan View Outline	Wear Pattern
357	Structure 1, floor contact	flaking	yes	oval	unidirectional linear striations paralleling transverse axis
698	Structure 3, fill	none	yes	irregular	grinding/faceting
1087	Feature 137	pecking	yes	irregular	grinding/faceting
1326	Backhoe trench 4	flaking	yes	irregular	grinding/faceting

Table 8.65. LA 104106, whole basin metates, metric attributes summary.

FS	Length (mm)	Width (mm)	Thickness (mm)	Use Surface Length (mm)	Use Surface Width (mm)	Use Surface Area (mm^2)	Depth (mm)	Weight (g)
357	551	465	68	235.0	215.0	40420.0	7.0	28900.0
698	390	373	103	230.0	185.0	34040.0	4.0	22000.0
1087	538	394	68	444.0	213.0	75658.0	54.0	21300.0
1326	569	428	92	440.0	209.0	73568.0	49.0	22200.0

Table 8.66. LA 104106, grinding slabs, selected attributes summary.

FS	Provenience	Plan View Outline Form	Use Surface Cross-section	Length (mm)	Width (mm)	Thickness (mm)	Use Surface Length (mm)	Use Surface Width (mm)	Use Surface Area (mm^2)	Weight (g)
249	Structure 1, fill	irregular	convex	110.0	50.0	21.0	106.0	48.0	4070.0	203.0
254	Structure 1, fill	indeter-minate	concave	170.0	170.0	24.0	–	–	–	800.0
326	Structure 1, floor fill	irregular	irregular	328.0	297.0	34.0	32.0	19.0	486.0	4700.0
350	Structure 1, floor fill	oval	irregular	359.0	161.0	50.0	41.0	24.0	787.0	4000.0
355	Structure 1, floor contact	subrec-tangular	irregular	205.0	159.0	36.0	176.0	132.0	18586.0	2450.0
1214	Structure 1, fill	irregular	irregular	232.0	131.0	92.0	196.0	90.0	14112.0	7200.0
1341	Structure 1, bench contact	oval	convex	118.0	91.0	14.0	34.0	18.0	490.0	170.0
2303	Structure 9, fill	irregular	irregular	252.0	104.0	55.0	184.0	100.0	14720.0	2650.0

Figure 8.72. Ground stone tool (FS 615), Feature 40, Structure 1, LA 104106.

Table 8.67. LA 104106, shaped slabs, selected attributes summary.

FS	Provenience	Portion	Plan View Outline	Thermal Alteration	Length (mm)	Width (mm)	Thickness (mm)	Weight (g)
273	Structure 1, floor contact	conjoined fragments, incomplete artifact	indeter-minate	reddened	278.0	228.0	19.0	1450.0
327	Structure 1, floor fill	whole	irregular	–	635.0	486.0	49.0	20500.0
348	Structure 1, floor contact	edge fragment	indeter-minate	reddened and fractured	167.0	162.0	21.0	800.0
352	Structure 1, floor fill	corner	indeter-minate	fractured and sooted	195.0	187.0	20.0	950.0
938	Structure 1, Feature 52	edge fragment	indeter-minate	–	240.0	164.0	27.0	1750.0
954	Structure 2, Feature 91	whole	circular	–	98.0	91.0	9.0	126.0
1354	Structure 1, antechamber floor contact	whole	irregular	–	497.0	377.0	59.0	14100.0
2184	24N/97E, Level 1	edge fragment	indeter-minate	–	129.0	100.0	11.0	188.0

ondary refuse. The use surface exhibits pecking and is similar to several other ground stone artifacts. It displays residual red pigment adhering to the surface as if the artifact was used with a hammerstone to crush pigment. A series of small flake scars originating from the opposing surface are located along a lateral margin. It is unclear whether these were intentionally removed or incidentally removed during the use of the artifact as an anvil. A single expedient handstone was recovered from extramural area of SU 1. This context again suggests the artifact was deposited as secondary refuse. The artifact is whole, of orthoquartzite, and lacks evidence of production input and maintenance. The handstone is oval-shaped in plan view and exhibits a single convex use surface with grinding/faceting wear.

Fauna

In all, 923 faunal remains were recovered from LA 104106 (Table 8.1). A detailed and interpretive discussion is presented by Akins in Chapter 13. The majority of the remains are unburned, fragmentary long bones. Burning was more common on faunal material recovered from the extramural context of SU 1 and Structure 1, main chamber, than satellite structures. A wide variety of species were identified in the assemblage however, nearly one-third is represented by desert cottontail, and Gunnison's prairie dog. Small to large mammal and small to medium artiodactyl combine to represent an additional 30 percent of the assemblage. Together these groups compose over 60 percent of the faunal materials recovered from LA 104106 and infer the acquisition and processing of small game animals. Although this general pattern was expressed for each excavated context there are some differences based on proveniences that are possibly related to function, formation process, or use.

Most of the small to medium artiodactyl remains were recovered from SU 2. Underrepresented, however, were desert cottontail remains, common from SU 1. In addition, deer remains were more common in SU 1 while elk and pronghorn remains were more common in SU 2. Furthermore, all but one of the exotic animal species were recovered from the extramural context of SU 2. Finally, of the 25 eggshell fragments, 21 were recovered from the Structure 1, antechamber. In contrast, all bird and turkey bone were recovered from the bench of Structure 1 and from three satellite structures potentially representing coop, processing, and consumption locations during the late Basketmaker III period. The common occurrence of artiodactyl species recovered from SU 2 suggests longer or at least more logistically sophisticated hunting strategies as compared to SU 1. Acquisition of small game animals in SU 1 is likely related to expedient hunting strategies such as field hunting. Differences in subsistence strategies are likely related to the more sedentary nature of late Basketmaker III agricultural society while SU 2 reflects the seasonally transient nature of the early historic Navajo occupation.

Macrobotanical Remains

The macrobotanical sample includes charred and uncharred plant remains recovered during the excavation of structures and features. The majority of these remains were recovered from flotation samples. The macrobotanical data are dominated by carbonized perennials and cultivars, followed by annuals and grasses in descending order. Uncarbonized macrobotanical data are dominated by annuals; low frequencies of perennials and grasses are identified. A detailed and interpretive discussion is presented by McBride and Toll in Chapter 14.

A total of 4,789 carbonized and uncarbonized botanical remains were recovered from LA 104106 (Table 8.1). These remains fall into four broad botanical groups including annuals, perennials, grasses, and cultivars. Although carbonized remains are likely the result of human activity, the context and quantity of some uncarbonized remains are considered cultural (see SU 1, Structure 1, Floor 1 and SU 1, Feature 11 and Feature 12). Of carbonized or partially carbonized remains, perennial species (65.1 percent) are followed by cultivars (16.9 percent), annuals (13.6 percent), grasses (2.6 percent) and unidentified species (1.9 percent). Common perennial species identified represent the exploitation of trees and woody shrubs. Corn was the only carbonized cultivar identified; however, squash was identified in the pollen assemblage (Appendix 2). Carbonized annuals reflect the exploitation of weedy species including *Portulaca, Chenopodium, Amaranthus,* and *Helianthus*. Exploitation of grasses is reflected by limited quantity of rice grass. Contextually, macrobotanical remains were removed from intramural areas of structures and features.

Ornaments, Minerals, Concretions, and Polished Stones

This section describes and quantifies the ornaments, minerals, and other artifacts collected in low frequencies during the data recovery efforts at LA 104106. While collection of recognizable artifacts including ornaments and brightly colored minerals such as turquoise is typical of most research projects, investigations at LA 104106 encouraged the systematic recovery of all minerals, concretions, and other "natural" objects. Although commonly classified as miscellaneous or exotic, the context of these objects is important for understanding if they are naturally occurring (ubiquitous) or the result of cultural processes. Indeed this distinction cannot be made with confidence in all cases, but frequency and spatial relationship do provide a means for interpreting the distribution and potential cultural utilization of these resources.

Identification of exotic materials can be used to estimate the geographic source of certain material; however, their presence may not completely reflect the exchange system used to acquire these items (Baugh and Nelson 1987; Toll 1991). For example, there are historical accounts of people from Zia and Zuni making pilgrimages to the west coast to acquire shells (Frisbie 1975). Alternatively, objects and raw material can be acquired through trade, either directly with primary acquisition individuals or through a third party. Whether acquired directly or through long-distance trade networks, the frequency and diversity of exotic items reflects access to these materials, perhaps informing on varying levels of social status or interaction (Mathien 1984). Presence or absence of manufacturing debris can be used to identify if ornaments were being manufactured from raw material or if complete ornaments were acquired (Mathien 1997).

The distribution and frequency of modified and unmodified naturally or locally occurring raw material is also important for determining site use and function. A high frequency of unmodified minerals or concretions from most excavated contexts, for example, suggests these items are naturally occurring and likely a reflection of the local geology. On the contrary, if variability in frequency of unmodified minerals is identified between contexts then these items may be the result of cultural processes. Additionally, if unmodified minerals are recovered from similar contexts as modified minerals then they are likely raw material acquired presumably for similar uses as modified or utilized materials. Combined frequency, diversity, use, curation, and disposal of ornaments, exotic materials, and locally available minerals may inform on site role or function

Methodology. Analysis of ornaments, minerals, concretions and other low frequency artifact types monitored a core set of variables that recorded material characteristics, ornament or artifact type, condition, portion, count, weight, and dimensions. Additional variables such as manufacturing stage, shape, surface treatment or embellishment, wear, and drill hole type were recorded for ornaments and most other modified items. Finally in addition to the aforementioned variables, mineral color was monitored using Munsell soil color charts. Culturally modified minerals were coded as a pigment stone if a well defined color streak was produced on paper and a paint stone if little or no residue was produced. These types of minerals are commonly referred to as ocher and hematite or limonite, respectively

Material characteristics were recorded hierarchically, starting with the basic material class (i.e., stone, bone, mineral). Subsequent documentation included recording clearly identifiable material types. Condition refers to the overall completion of the artifact recorded as whole (a single intact artifact), fragmentary (an incomplete artifact), and complete (a single whole artifact refit from fragments). Distinctions between various shell, stone, and mineral types were determined based on previous research results (see Hensler et al. 1999:871; Mathien 1997:1120), basic chemical tests (diluted HCl), and published descriptions (e.g., Dietrich 2005; 2006; Kozuch 2002; Pough 1988; Venn 1984). Material identification was aided through microscopic examination using 7x and 45x magnification.

Based on material type identifications, items were classified as local or imported. Local items are inferred to be available within approximately an 18 km (11.2 mile) radius (cf. Arnold 1989; Kelly 1995). This is not to say that these items could not also be acquired through trade or barter, only that trade is not a requirement. Imported items are derived from extra-regional sources or what Toll (1991:80) refers to as "exotic." The inferred geographic source of these items was recorded based on the material type.

Analysis resulted in the identification of 136 artifacts derived from six material classes (Table 8.68). Minerals are by far the most common material class recovered from LA 104106 with many of these items associated with the large late Basketmaker III structure (Structure 1) identified in SU 1. Other material classes associated with this site include ceramic, shell, bone, stone, lithic, and fossil.

Ornaments. Ornaments were recovered exclusively from the Basketmaker III component at LA 104106. Although limited quantities were recovered, these items show a diverse range in material class and ornament style. Most of the material classes identified are locally available; however, imported shell, stone, and mineral items are also present. Most of the ornaments are whole (n = 19) and were recovered from floor and floor fill context of Structure 1. The majority of whole and fragmentary ornaments are worn and exhibit rounded edges, polish, or a sheen suggesting long-term use or curation. Ornaments are commonly thought of as personal adornment items such as jewelry; however, these objects can also be fastened to clothing, baskets, or ceremonial regalia (Morris 1980:94).

Six bone ornaments were identified from intramural contexts of Structure 1 and Structure 7 (Fig. 8.73). Four of the six bone ornaments are interpreted as tinklers made from black-tailed jackrabbit and desert cottontail tibias (see Akins, Chapter 13). Two of these items (FS 257 and 310) were recovered from floor fill in the western portion of Structure 1 and the remaining one (FS 1058) was recovered from upper fill levels of Structure 7. Also recovered from the upper fill levels of Structure 7 was a pendant (FS 1355) made from a mule deer incisor by drilling a hole through the root. Finally, a single bone tube bead was recovered from the antechamber. All of these items are whole and each exhibits a slight polish or sheen (Figs. 8.74a, 8.74b).

One pendant is made from a bowl rim sherd of a Lino Smudged vessel (FS 313; Fig. 8.75). This item was recovered from the floor fill layer in the southeast portion of Structure 1. The pendant is

Table 8.68. LA 104106, ornament material class by provenience.

		Bone			Shell					Fossil	Mineral							Lithic	Stone				
Architectural Unit	**Architectural Unit Vertical Type**	**Bone Bead**	**Bone Tinkler**	**Pend-ant**	**Orna-ment, nfs**	**Pend-ant**	**Rec-tangular Bead**	**Cylind-rical Bead**	**Dis-coidal Bead**	**Manu-port**	**Con–cretion**	**Raw Mater-ial**	**Manu–port**	**Paint Stone**	**Pig-ment Stone**	**Bead Blank**	**Shaped Stone**	**Gizzard Stone**	**Con–cretion**	**Pend-ant**	**Cylind-rical Bead**	**Dis-coidal Bead**	**Total**
Extramural area	Level	–	–	–	–	–	–	1	–	–	–	9	1	5	–	1	–	3	7	–	1	–	**28**
	Bladed surface	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	1	–	–	–	–	**2**
Structure 1 (main chamber)	Full cut to floor fill	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**1**
	Upper fill above roof	–	–	–	–	–	–	–	–	–	1	1	–	1	–	–	–	–	–	–	–	–	**3**
	Lower fill below roof	–	–	–	–	–	–	–	–	–	–	2	–	–	1	–	–	–	–	–	–	–	**3**
	Roofing material	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	1	–	–	–	–	**2**
	Extramural fill	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	1	–	–	–	–	**2**
	Floor fill	–	3	–	–	–	–	–	–	–	1	11	1	2	–	–	–	–	–	–	–	–	**18**
	Surface or floor	–	–	–	–	1	1	–	1	–	–	4	6	–	–	–	3	–	–	–	–	1	**17**
Structure 1 (bench)	Upper fill above roof	–	–	–	–	–	–	–	–	–	–	1	–	1	–	–	–	1	–	–	–	–	**3**
	Floor fill	–	–	–	–	–	–	1	–	–	–	–	–	2	1	–	–	–	–	–	–	1	**5**
	Surface or floor	–	–	–	–	–	–	1	–	–	–	–	–	–	1	–	–	–	–	–	–	–	**2**
Structure 1 (ante-chamber)	Level	–	–	–	–	–	–	–	–	–	–	7	–	–	–	–	–	–	–	–	–	–	**7**
	General structure fill	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	1	–	–	–	–	**2**
	Upper fill above roof	–	–	–	–	–	–	–	–	–	–	–	–	2	–	–	–	–	–	–	–	–	**2**
	Lower fill below roof	1	–	–		–	–	–	–	2	–	13	–	–	–	–	–	–	–	–	–	–	**16**
	Floor fill	–	–	–	1	–	–	–	–	–	–	7	–	–	1	–	–	–	–	4	–	–	**13**
Structure 3	General structure fill	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	5	–	–	–	–	**5**
	Extramural fill	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	**1**
	Floor fill	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	**1**
Structure 7	Level	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	**1**
	Upper fill above roof	–	1	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**2**
Table Total		**1**	**4**	**1**	**1**	**2**	**1**	**3**	**1**	**2**	**2**	**57**	**9**	**13**	**6**	**1**	**3**	**15**	**7**	**4**	**1**	**2**	**136**

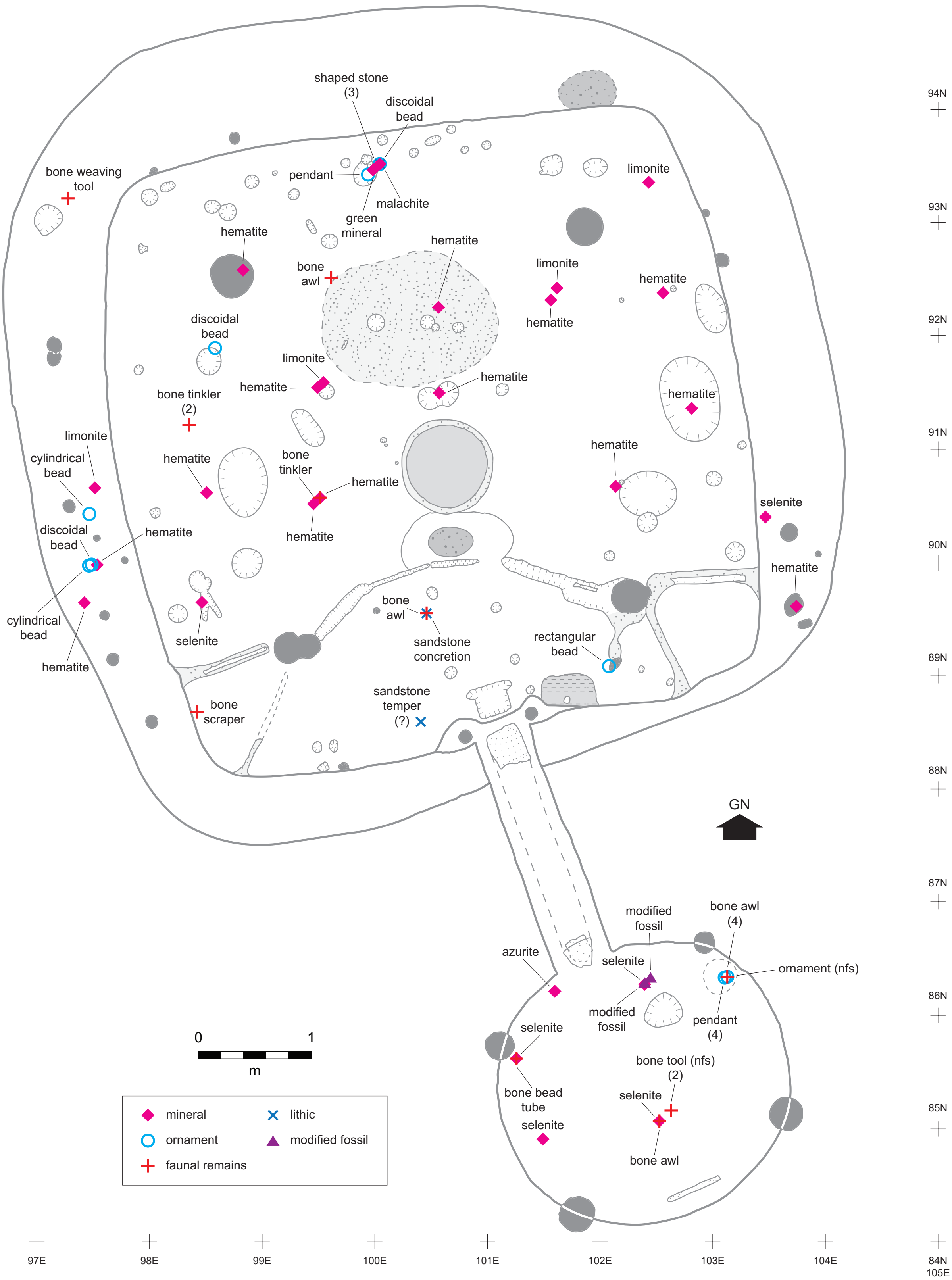
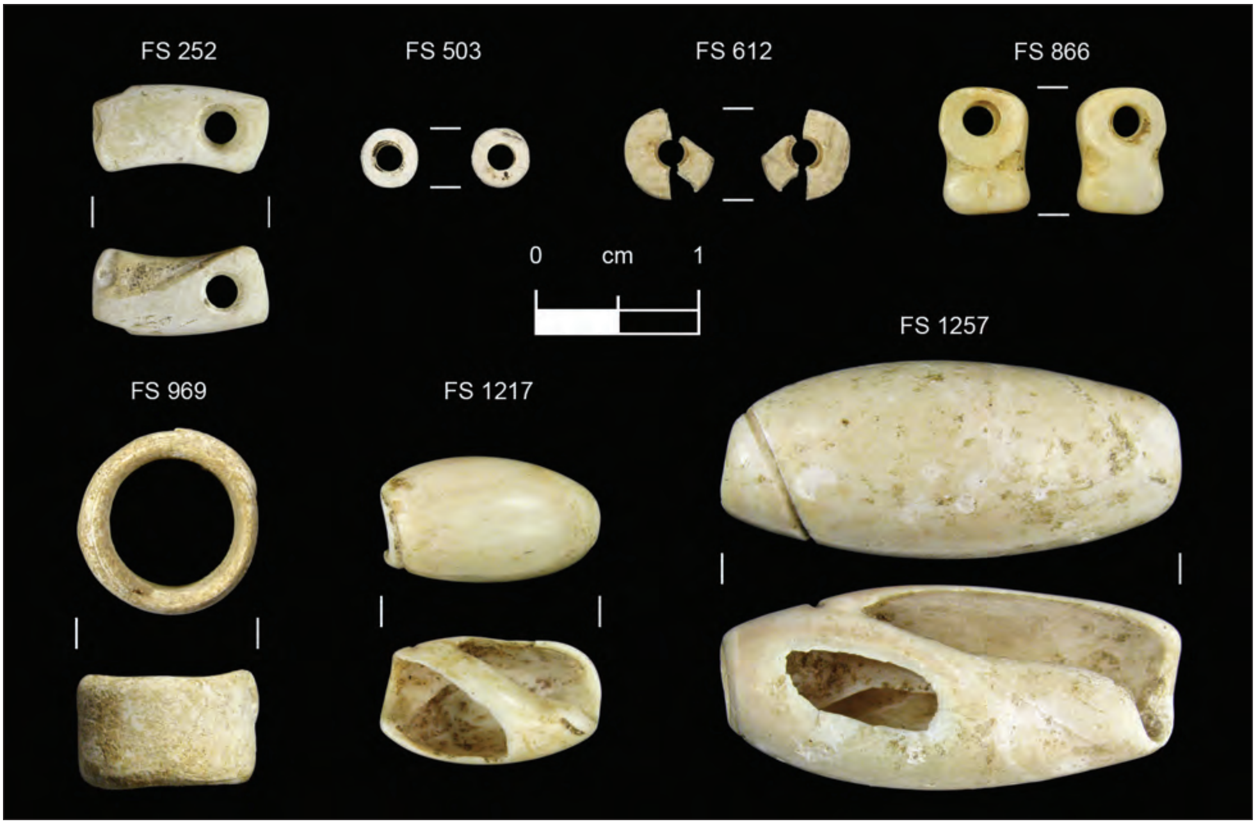


Figure 8.73. Ornaments and minerals, Structure 1, LA 104106.



Figures 8.74a (above), 8.74b (below). Beads, LA 104106.

trapezoidal in shape with a drill hole located at the narrow, rounded end. The edges appear to have been flaked then ground smooth. The polished black appearance gives this ornament a jet-like quality that contrasts the lighter-colored shell ornaments recovered from the same context (see also Wilson, Chapter 10).

Marine shell was fashioned into bead, pendant, and indeterminate ornament types. No fresh water or terrestrial shell was identified. Five shell beads were recovered from LA 104106, with all but one recovered from the main chamber and bench of Structure 1. Three of these (FS 969, 1217, 1257) are cylindrical and made from olivella shell and an indeterminate fragment of marine shell. Both the olivella shell beads (FS 1217, 1257) were recovered from the bench in the southwest portion of Structure 1. Each is pale cream in color and manufactured by grinding the spire down to the body whorl suture (Love-dePeyer 1980:104; Kozuch 2002:702). The ventral side of the body whorl is missing and the edges are rounded over indicating these items wore through or were used continually following damage. The final cylindrical shell was recovered from the extramural area east of Structure 1 antechamber. This bead is chalky white in color and manufactured from the body whorl of a gastropod. Both the spire and aperture are absent; however, worn ridges remain across the exterior surface. This object is also well worn but does not display a polish or luster as described for the previous two ornaments. A single discoidal bead (FS 503) and one rectangular bead (FS 866), identified in the main chamber of Structure 1, were recovered from Feature 19 (sipapu) and Feature 103 respectively. The small discoidal bead or heshi (Frisbie 1975:123) is complete, chalky white in color, and extremely friable. The rectangular bead recovered from Feature 103 is pale cream in color and wedge shaped in profile. A shallow grove or furrow is incised into each side at the central portion of the ornament giving it a “figure-8” appearance (Judd 1954:92). One end is drilled through. This object, like most recovered from the site, is well worn, exhibiting a polish or sheen.

Two shell pendants were also recovered from Structure 1. FS 252 was identified in structure fill re-

Figure 8.75. Lino Smudged pendant, LA 104106.

Figure 8.76. Marine shell pendant, LA 104106.

moved from the northeast quadrant of Structure 1. This object is white in color, fashioned from what appears to be a shell bracelet fragment. All edges are rounded and smooth with a polished luster present on the exterior surface. Similar artifacts have been reported from Pueblo Bonito and the Cove-Redrock Valley (Hensler et al. 1999:899; Judd 1954:90). The second pendant (FS 503) was recovered from the sipapu (Feature 19) and manufactured from shell with an abalone-like luster (Fig. 8.76). This object is one of the few fragmentary ornaments identified at this site. Although this artifact is fragmentary (up to 15 pieces), all appear to be from the same ornament. Attempts at refitting the fragments into its complete form were unsuccessful due to wear, exfoliation, and possible breakage prior to deposition.

Finally a single indeterminate shell ornament (FS 1359) fragment was recovered from Feature 112, a ceramic container located in the floor fill of the antechamber. This ornament fragment is cream color and may be a portion of a body whorl from an O*liva* shell. Unlike many of the whole and fragmentary ornaments recovered from this site, the edges on this fragment are not worn or rounded.

Ornaments fashioned from minerals include a partially drilled piece of hematite or red-dog shale (FS 857) and three shaped pieces of what appear to be selenite (FS 503) . A single piece of earthy colored red mineral was fashioned into a dome and partially drilled at the apex (FS 2131) . The edges and base are striated and the crown polished. This object was recovered from an extramural area west of Structure 1. Three shaped pieces of what appear to be selenite (FS 503) were recovered from the sipapu (Feature 19). Two of these pieces are made from a translucent pale yellow (2.5Y 7/4) mineral that displays a platy structure and sand inclusions at 10x magnification. The third piece is a translucent-to-transparent white platy mineral that is most likely selenite. One of the yellow minerals and the white mineral exhibit striations and facets and are roughly spherical in shape. The second piece of yellow mineral also exhibits striations and is roughly cylindrical in shape (see Fig. 8.20).

Stone ornament types, similar to those manufactured from shell, include beads and pendants. Two discoidal beads and one cylindrical bead were recovered from the main chamber of Structure 1 and an adjacent extramural area. A fragmentary discoidal bead manufactured from a friable white stone (travertine?) (FS 612) was recovered from Feature 44. The other discoidal bead (FS 1216) was recovered from bench surface fill layer in the southwest portion of Structure 1 and is manufactured from jet (see Fig. 8.74). The cylindrical bead (FS 1222), recovered from an extramural area east of Structure 1, is manufactured from a soft green stone, perhaps serpentine (see Fig. 8.74). This item is broken in half along the long axis offering a impression as to its complete form. This bead had been drilled from both sides and the two conical holes join near the center. The exterior and ends are well polished and lustrous. In addition, the broken interior edges are polished or rounded. Several parallel incisions are present in the center of the bead, perpendicular to the long axis. A cursory examination of the literature for Basketmaker III–Pueblo I sites and contemporaneous sites in the surrounding area did not identify similar forms.

Finally, four pendants (FS 1349) or ear drops fashioned from travertine and possibly argillite were recovered from Feature 112, a ceramic container located in the floor fill of the antechamber (Fig. 8.77; also see Fig. 8.29). Three of the four are trapezoidal in plan with a hole drilled through the narrow end. The fourth is ovoid also with a hole drilled through the narrow end. Two of the trapezoidal objects and the oval object are chalky white in color and appear to be manufactured from the same piece of raw material. The oval pendant is shaped and well polished but the trapezoidal pieces still exhibit manufacturing striations that have been polished over. A "lip" runs along two adjacent edges of the trapezoidal pieces where the material has been deeply scored, presumably to create a fracture line. While both surfaces are well polished and smooth to the touch, one side has been treated more extensively. The third trapezoidal pendant is manufactured from a different material than the other three pendants. This material is creamy white in color and has small cavities or grainy crystalline inclusions visible under magnification adhering to the host matrix. All sides are well polished and worn. Although this material could be travertine, it fits more closely with descriptions for argillite.

Minerals. Most of the mineral types identified are derived from locally available iron oxides (hematite and limonite), with copper-based minerals (malachite and azurite) and clear gypsum or selenite identified in low frequencies. Iron oxides varied

Figure 8.77. Pendants, LA 104106.

in color, hardness, and modification with softer forms (ocher) suitable as pigment and harder forms as paint stones, particularly for decorating ceramics.

Hematite and limonite were recovered from nearly all contexts within SU 1 with almost 40 percent (39.5 percent) of these material types recovered from floor and floor fill contexts in Structure 1 (Table 8.69). The balance of these materials were recovered from post-abandonment fill, extramural contexts, Structure 7, and extramural area contexts of SU 1. Similar to other studies conducted in the area, hematite is more common than limonite (Hensler et al. 1999; Skinner 1999). Modified hematite and limonite comprise 44.2 percent of the iron oxide minerals and typically display a grinding facet on one or more sides (Fig. 8.77.1) with one piece partially drilled. Unmodified iron oxides recorded as raw material include soft varieties, hard varieties, and concretions of various colors.

Hematite and limonite artifacts recovered from extramural contexts in SU 1 were more common along the eastern portion of the site. In general modified minerals were positioned southeast and unmodified minerals northeast of Structure 1. Finally, modified minerals recovered from extramural contexts and extramural fill levels in Structure 1 have a greater mean weight (mean = 9.2 g) than unmodified minerals (mean = 6.4 g), suggesting that unmodified minerals, particularly the harder varieties of hematite and limonite (< 1 g) may have been naturally occurring.

Unlike iron oxide minerals recovered from extramural contexts, softer varieties of hematite and limonite were more common within Structure 1, particularly from floor and floor fill contexts. Modified minerals recovered from these contexts comprise 35.3 percent of the minerals recovered from floor and floor fill and consist primarily of harder varieties of hematite. Unmodified minerals recovered from these some contexts were dominated by softer red ocher (41.2 percent). Modified hematite paint and pigment stones were more common in the west and west-central portion of the structures, and unmodified raw material was common in features in the eastern portion of the structure. Also, all oxide minerals recovered from these contexts were

Table 8.69. LA 104106, mineral type by provenience.

		Hematite			Limonite			Selenite	Green Mineral	Yellow Mineral	Azur-ite	Mala-chite	
	Vertical Sub-division	Raw Mater-ial	Paint Stone	Pig-ment Stone	Raw Mater-ial	Paint Stone	Pig-ment Stone	Raw Material	Manu-port	Manu-port	Manu-port	–	Table Total
Study Unit 1													
Extramural area	Level	6	4	–	1	1	–	–	–	–	1	–	**13**
Structure 1 (main chamber)	Upper fill above roof	–	1	–	–	–	–	1	–	–	–	–	**2**
	Lower fill below roof	2	–	1	–	–	–	–	–	–	–	–	**3**
	Roofing material	–	–	–	–	–	1	–	–	–	–	–	**1**
	Extramural fill	–	–	–	–	–	1	–	–	–	–	–	**1**
	Floor fill	5	2	–	2	–	–	2	–	1	–	–	**12**
	Surface or floor	3	–	–	–	–	–	–	5	–	–	1	**9**
Structure 1 (bench)	Upper fill above roof	1	1	–	–	–	–	–	–	–	–	–	**2**
	Floor fill	–	1	1	–	1	–	–	–	–	–	–	**3**
	Surface or floor	–	–	1	–	–	–	–	–	–	–	–	**1**
Structure 1 (ante-chamber)	Level	–	–	–	–	–	–	2	–	–	–	–	**2**
	General structure fill	–	–	–	–	–	–	–	–	–	1	–	**1**
	Upper fill above roof	–	2	–	–	–	–	–	–	–	–	–	**2**
	Lower fill below roof	–	–	–	–	–	–	4	–	–	–	–	**4**
	Floor fill	–	–	–	–	–	1	1	–	–	–	–	**2**
Structure 7	Level	1	–	–	–	–	–	–	–	–	–	–	**1**
Study Unit 2													
Extramural area	Level	2	–	–	–	–	–	–	–	–	–	–	**2**
	Bladed surface	1	–	–	–	–	–	–	–	–	–	–	**1**
Table Total		**21**	**11**	**3**	**3**	**2**	**3**	**10**	**5**	**1**	**2**	**1**	**62**

positioned north of the partitioning wing wall. The vertical context and spatial distribution of these materials suggests that both hard and soft raw materials recovered from lower fill levels in Structure 1 were culturally derived. These results are similar to those reported for LA 61955, Structure 1, an oversized late Basketmaker III structure near Mexican Springs, New Mexico (Skinner 1999:257).

Iron oxide mineral color varied between Munsell hue 10R values 3–5 to Munsell hue 2.5Y value 7 with most colors recorded between Munsell 10R 5/8 and 2.5YR 3/1. Interestingly, modified materials display two separate color ranges with reddish colored minerals falling between Munsell 10R 3/2 and 10R 4/8 and yellow minerals (although fewer in number) between 10YR 4/3 and 2.5Y 7/6. The results of a raw material study in the Cove-Redrock Valley area of New Mexico conducted by Hensler (1999:551) found that limonite was locally available but hematite was rare. Based on these findings she concludes that most of the hematite recovered from archaeological contexts was imported into the Cove-Redrock area. Although no systematic raw material study was conducted as part of this research project, these data suggest that red saturated hematite and ocher from LA 104106, Structure 1 is also the result of exchange or collection forays outside the project area while more neutral yellow colored minerals may be part of the local geology.

Copper-based minerals identified include mal-

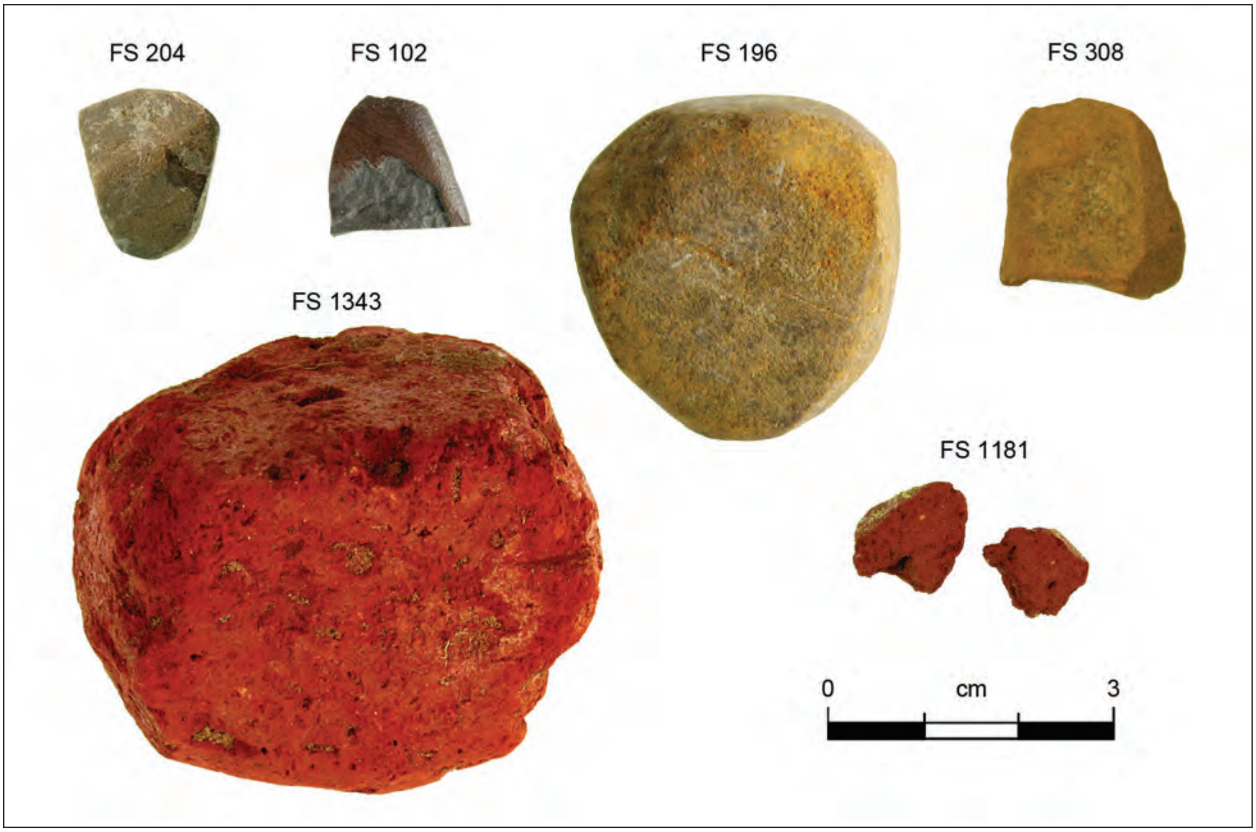


Figure 8.77.1. Modified and unmodified minerals, Study Unit 1, LA 104106.

achite, azurite, and a soft platy blue-green mineral that may be an earth-colored malachite. None displayed evidence of modification or wear. All but one fragment of azurite, recovered from an extramural area west of Structure 1, were recovered from floor or floor feature context within the main chamber and antechamber of Structure 1. A single piece of malachite and five pieces of blue-green mineral were recovered from the sipapu (Feature 19) in the main chamber and a piece of azurite was recovered from the floor of the antechamber near the vent tunnel opening.

Selenite is the final mineral type identified at LA 104016. Similar to the iron and copper-based minerals, most of the selenite was recovered from floor and floor fill contexts within Structure 1, particularly in the antechamber. Although none of these items displayed evidence of modification of wear their distribution suggests that they were the result of cultural processes. Selenite recovered from the antechamber was spatially associated with Feature 112 (a cache of lithic, tools, and ornaments).

Modified hematite and limonite iron oxide materials may be associated with making mineral-based paint used in black-on-white decorated ceramic production. Similarly, softer ocher could be ground or applied directly to ceramic containers as a post-firing pigment know as fugitive red, common on ceramics recovered from this site. Alternatively, these materials could have been used in a variety of decorative ways including coloring textiles, hunting paraphernalia, architectural elements, or for personal adornment.

Attributing cultural use of unmodified minerals is more challenging compared to modified minerals; however, context can provide the basis for making a determination. The association of the malachite and blue-green mineral (FS 503) and other exotic artifacts combined with their context (recovered from Feature 19, sipapu) suggests ritual if not ceremonial purpose for these items. Overall, modified and unmodified minerals recovered from floor and floor fill contexts in Structure 1 comprise four basic colors: red, yellow, blue-green, and white. Although no clear directional patterning of these colors was identified, the context of floor and floor fill artifacts hint at yellow-red to the north and blue-white to the south. Interestingly, these were the colors represented in the sipapu, only instead of red hematite (10R 4–5/8), black obsidian was found. The combined frequency of mineral types recovered from LA 104106 is similar to that reported for Basketmaker III to Pueblo I contexts in the Cove-Redrock Valley, Arizona (cf. Hensler et al. 1999:886).

Concretions, polished pebbles, and fossils. Concretions are hard, naturally occurring objects that form through the accumulation of mineral matter in a host rock, commonly sedimentary formations. They tend to be spherical or ovoid in shape but considerable variation has been noted. Polished pebbles can also occur naturally, such as gastropods, or weathered through wind and water. Naturally occurring polished stones recovered from secure cultural contexts and culturally modified pebbles or small stones are often interpreted as polishing stones used in ceramic production. Finally, fossils are part of the natural landscape representing the actual or trace remains of aquatic or terrestrial plants, animals, and bacteria. As with unmodified concretions and polished pebbles, the cultural use of unmodified fossils is largely based on contextual data. All material classes described above were most likely part of the local geology.

Nine concretions were recovered from LA 104106, six of which were from SU 2. Two different types of concretions were identified, spherical and bilobed; all but one were complete. One round (FS 631) and two bilobed concretions (FS 161 and 336) were recovered from SU 1 and two round (FS 2053 and 2161) and four bilobed concretions (FS 2161, 2180, 2192, and 2232) were recovered from SU 2. Cultural use for a concretions recovered from upper fill levels of Structure 1 and the surrounding extramural area are unclear; however, the concretion recovered from floor fill context within the main chamber of Structure 1 is more secure. This item (FS 336), recovered south of the wing wall near where it articulates with the deflector and ash pit, was a

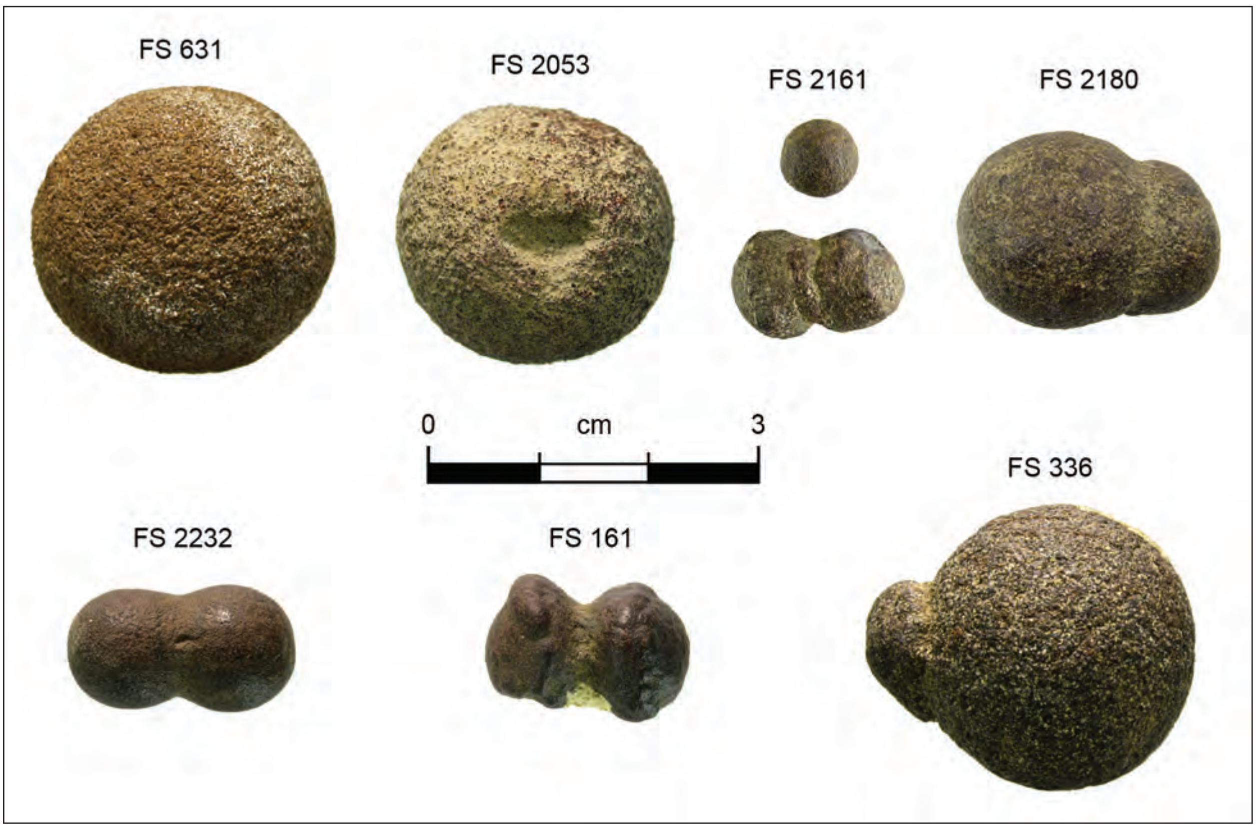


Figure 8.77.2. Concretions, LA 104106.

mass of hematite with coarse-grained sand inclusions. Unlike all other concretions recovered from the site, this artifact is half a bilobed concretion. With a flat side, a convex side, and one lobe noticeably larger than the other, this artifact has a fetish-like quality (Fig. 8.77.2).

Two of the six concretions recovered from SU 2 are spherical and spatially associated with the early historic Navajo occupation. The remaining four are bilobed concretions, two of which are also spatially associated with the Navajo occupation and two are spatially associated with a high density lithic concentration. Not all of these concretions can be considered culturally derived with confidence. Three appear to be part of the eclectic Navajo assemblage. One spherical concretion located southeast of Feature 39 was associated with burned bone, chipped stone tools, debitage, and an ash concentration interpreted as feature discard. The other two concretions, one spherical and one bilobed, were located just north of Structure 9 and each exhibit a slight polish or sheen. The remaining three concretions may also be culturally derived but limited contextual data are available to support this interpretation.

Several polished pebbles (n = 15) were recovered from LA 104106. All but one were recovered from SU 1. Unlike spherical or ovoid-shaped pebbles used as polishing stones, the polished pebbles recovered from this site are tabular and in some instances display residual morphological characteristics of chipped stone artifacts such as a bulb of percussion. These objects range in size from 6 mm by 5 mm by 1 mm to 22 mm by 14 mm by 7 mm. Nine were recovered from upper fill layers of Structure 1 and Structure 3 with one recovered from the roof fall layer and another recovered from the floor fill layer of these structures, respectively. The remaining four were recovered from extramural contexts. Based on size, appearance, and context, 11 of these objects are interpreted as gizzard stones. Identification of gizzard stones suggests butchering for large fowl animals, presumably turkey, an important dietary observation supported by the presence of eggshell and bone.

Only two fossils were recovered from LA 104106. These objects were recovered from the floor fill level of the Structure 1 antechamber and were spatially associated with Feature 112, a cache of chipped stone, tools, and ornaments. Both are long-bone fragments of nearly equal length derived from a large animal. The smaller of the two exhibits polish along one margin that extends around onto the adjacent side. Grinding and polishing was also noted at the opposite end, but less pronounced or discernible. The larger item exhibits shaping and use wear similar to specialized ground stone tools such as lap stones, abraders, or shaft straighteners. This tool was fashioned by flaking, grinding, and gently rounding both ends. One side of one end has been polished and incised. Based on the amount of polish and varied directional patterns of the incisions, it appears that this wear characteristic is the result of multiple use episodes. A similar wear pattern is displayed along an adjacent margin or edge. Here, the polish is interrupted by multiple parallel incisions, perpendicular to the long axis. Much of the artifact surface, edges, and high points exhibit a polished or rounded quality, as do many of the ornaments, suggesting long term use or curation (Fig. 8.78; see also Figure 8.27).

Summary. Several types of ornaments, minerals, and other low frequency artifacts such as pol-

Figure 8.78. Detail of use wear on fossil bone (FS 908), LA 104106.

ished pebbles and concretions were recovered from LA 104106. The majority of these items were associated with the Basketmaker III component, more specifically with Structure 1. Although the relative frequency of these items is low compared to other material culture categories, such as lithics and ceramics, the variety of imported material suggests that participation in intra- and inter-regional trade, exchange, or barter was common. The lack of evidence for workshop or ornament manufacture debris supports this observation

Shell from the Pacific Coast or Gulf of California was likely acquired as whole or complete objects through hand-to-hand exchange systems rather then from primary or secondary sources. Hand-to-hand exchange is supported by the presence of a shell bracelet fragment (Hohokam?) recycled into a pendant. The condition of shell beads, and manufactured artifacts recovered from LA 104106 is notable. Over 76 percent of these items are whole and 80 percent display evidence of wear. Shell beads are worn through on the ventral side, well polished, and had rounded edges suggesting they were repeatedly or continuously worn. Among some tribes in California there were two categories of shell beads, those that have monetary value and used by all for commerce and shell beads that were only used by people authorized to possess such items, usually through inherited positions of rank (King 1978). Based on the frequency of whole items and their worn condition, the shell beads recovered from LA 104106 were, perhaps, also passed down or inherited. Wear on fragmentary or incomplete ornaments displayed as rounded or smoothed edges on post-manufacture breaks indicates continued use or curation. Although presence of marine shell suggests interregional trade or exchange, most "exotic" objects may likely be obtained through intraregional exchange networks.

The majority of bone ornaments identified at this site are interpreted as tinklers often associated with regalia ornamentation. A small bone tube bead may also have been attached to a textile or basket. Similar objects were also used as nose or ear plugs.

Hematite is considered a common mineral locally available in and around the San Juan Basin (Mathien 1997). Excavation data for the current project, however, produced minimal naturally occurring amounts of this mineral on site, supporting the observations presented by Hensler et al. (1999) that these materials were likely introduced through exchange networks. The high frequency of pigment minerals such as hematite and red ocher could be indicative of ceramic manufacture; however, few tools such as scrapers, polishing stones, or ceramic paste were identified. Alternatively, these minerals may have been used as pigment for textiles, baskets, hunting paraphernalia, application of fugitive red, or body paint.

Argillite, travertine, and jet are also reportedly found in and around the San Juan Basin, usually occurring in lag gravels. Argillite and travertine, however, are more commonly deposited at hot springs and caves. Today the nearest active hot springs, over 100 degrees F (37.7 degrees C), are in the Jemez Mountains, 200 km (124.3 miles) to the east, also a source for some of the obsidian found at this site. To the southeast (100 km, 62.1 miles), deposits of travertine were left behind where hot springs once flowed near the El Malpais. Interestingly hot springs and caves figure prominently in Pueblo cosmology representing passages or pathways used for communicating with the ancestors (Parsons 1939). Therefore, objects made from these materials may also symbolize these significant places even if not obtained directly from these sources. Serpentine, malachite, and azurite are also reported to be regionally available, found near Buell Park, Arizona, 30 km (18.6 miles) to the northwest; and the Zuni Mountains, 50 km (31.1 miles) to the southeast, respectively. The latter area is also a source for some of the chert found at this site.

Contextually, many of the ornaments and exotic minerals identified at this site were recovered from features, the floor, and floor fill of Structure 1. Four stone pendants and a shell ornament fragment were part of a cache of artifacts stored in a ceramic container identified in the antechamber (Feature 112). A fragmentary shell pendant, shell bead, three pieces of shaped selenite, and six pieces of blue-green mineral, one of which is malachite, were recovered from the sipapu (Feature 19) along with two obsidian flakes. One olivella shell bead was recovered from a small pit (Feature 159) located on the bench of Structure 1 and a figure-8 shell was bead recovered from a small floor pit (Feature 103) located near the southeast post support. Together, nearly 16 percent of all items reported in this chapter were recovered from features.

Based on the diversity, condition, and context of the minerals and ornaments recovered from LA 104106, it is likely that many of these items were acquired through hand-to-hand inter- and intraregional exchange systems. This is not to say that isolated source material was not being exploited when encountered or materials were not acquired through long-distance forays to caves, springs, or the Pacific Coast. Rather, the types and quantities of these materials fit regional patterns of exchange for Basketmaker III occupations in the southern Chuska Valley. Based on context and condition long-term use, curation, and perhaps inheritance of these objects suggests this late Basketmaker III structure was not strictly used as a domicile. Caches of exotic material, modified fossil bone, and an inordinate amount of pigment indicate this may have been the residence of an individual or family with a particular or specialized social function, perhaps the residence of a ritual healer or shaman.

Research Questions

LA 104106 is a multicomponent site with evidence for Basketmaker II, late Basketmaker III, and early historic Navajo occupations. Although several temporal components are present, each appears to be the result of a temporally discrete occupation. Systematic collection of chronometric samples, artifact and feature analysis, and the subsequent spatial examination are used to address the questions presented in the research design, which focused on site function, community role, and settlement and subsistence patterns. Site function and subsistence are addressed separately for each component then compared to contemporaneous occupations to identify consistency or difference in economic endeavors, regional interaction with surrounding communities, and exploitation of the natural environment. From these inferences the role of each temporal component within the community and overall settlement patterns can be address at LA 104106. In order to address these aspects of the research design, however, it is important to establish chronometric control over the archaeological deposits.

Chronology

Excavations at LA 104106 identified eight formal structures, three potential informal surface structures, and 167 features. Several methods were employed to establish temporal control of structures and features including radiometric, dendrochronologic, archaeomagnetic, and mean ceramic manufacture data. Combined, these methods were used to identify three broad temporal components including Basketmaker II occupations, late Basketmaker III Anasazi occupations, and pre-Bosque Redondo Navajo occupations.

Radiocarbon dating. Radiocarbon samples were prioritized by context, taxon, and sample size of macrobotanical remains. Carbonized cultigens were chosen over woody perennial species, such as *Atriplex*. When sufficient quantities of either were unavailable, piñon or juniper wood were used. Thirteen samples were submitted to Beta Analytic Inc. for dating (Beta-164333 to Beta-164345). In some cases, small (less than 1 g) composite samples, derived through flotation, required the use of AMS dating method (Appendix 4a).

Conventional radiocarbon dates obtained from Beta Analytic were calibrated using OxCal Analyzer[8] v3.8 (Bronk Ramsey 2002; Stuiver et al. 1998). Chronometric data recovered from botanical remains recovered from features indicate LA 104106 was initially occupied during the Figueredo phase of the Basketmaker II period (400 [300] cal. B.C.–150 [200] cal. AD) followed by an apparent occupational hiatus lasting approximately 250 years (see Chapter 15, this report). Based on a single radiometric determination, the site was reoccupied between 60 cal BC and cal AD 130 (2 sigma), followed by a second occupational hiatus lasting approximately 500 years or until the late Basketmaker III period. The late Basketmaker III occupation (420–720 cal AD [2 sigma]) was intense, followed again by a long occupational hiatus lasting 850–1,000 years or until the ethnohistoric period (ca. 1700). The early historic occupation appears to date to between 1440 and 1860 cal AD (2 sigma), prior to the incarceration of Navajos and Apaches at Fort Sumner, New Mexico (Fig. 8.79). These data also indicate that occupations at LA 104106 were spatially discrete; SU 1 was the result of a single late Basketmaker III occupation, SU 2 represents Basketmaker II, late Basketmaker III occupations, and SU 3, an early historic occupation.

Archaeomagnetic dating. The OAS Archaeomagnetic Dating Laboratory collected and analyzed 15 samples from LA 104106; however, only 12 yielded chronometric data useful for the interpreta-

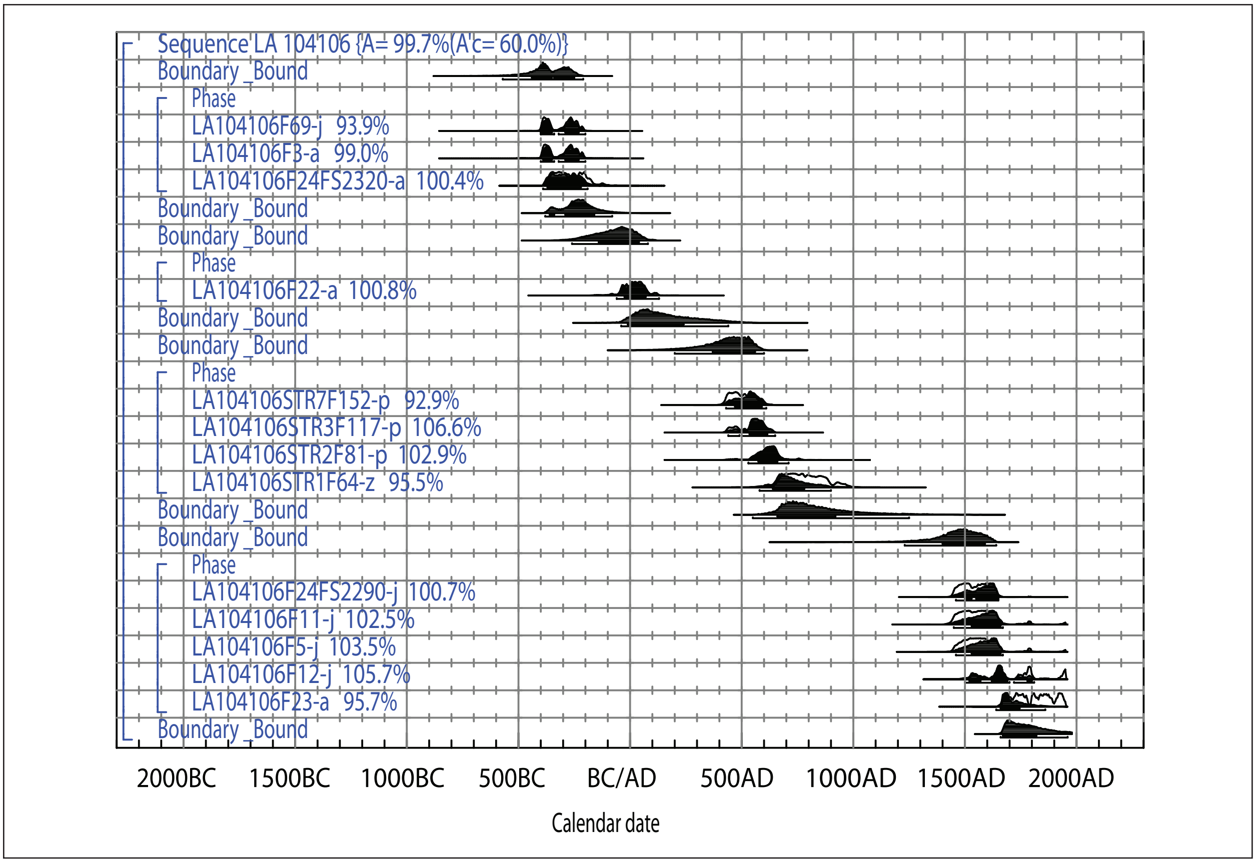


Figure 8.79. Calibrated radiocarbon dates, LA 104106.

tion of temporal occupations (Appendix 7). Of the 12 samples, six were collected from SU 1, of which five were recovered from Structure 1. Three samples from Structure 1 were recovered from the central hearth (Feature 64) and one sample was recovered from Feature 105, interpreted as an ancillary hearth. The suite of samples obtained from Feature 64 produced a date range of AD 585–710 while the sample recovered from Feature 105 yielded a date range of AD 625–680. A fifth sample from Feature 48, while imprecise, reaffirms the other Structure 1 date ranges. A single extramural feature (Feature 137), adjacent to Structure 6, yielded a date range of AD 435–550.

Five samples recovered from SU 2 and one sample recovered from SU 3 yielded chronometric data. In SU 2, Feature 11 (AD 1710–1815) and Feature 12 (AD 1615–1750) produced dates that suggest relative contemporaneity of use. Feature 7 and Feature 23 yielded limited information due to high α_{95} values. Archaeomagnetic data collected from burned sandstone at the bottom of a cist (Feature 24) yielded a date of 330–230 BC, which supports the 2-sigma radiometric determination from the lower radiocarbon sample. In SU 3, Feature 5 produced a date range of AD 1665–1765.

Dendrochronology. In all, 29 dendro-chronological samples, recovered from various contexts within SU 1 were submitted for analysis; however, only three samples yielded limited chronometric information (Appendix 6). A sample recovered from Feature 103, located in the main chamber of Structure 1, yielded an outer ring date of 616+vv and a sample recovered from Feature 165, located on the bench of Structure 1, yielded an outer ring date of 592vv. The last sample, recovered from the upper fill levels of Structure 3, yielded an outer ring date of 621vv.

Ceramics. Ceramic dating was accomplished following the method developed by Hays-Gilpin et al. (1999) for the Cove-Redrock Valley. Briefly, using published manufacture dates the authors present a minimum use date for single component occupations. Using the earliest end date and the latest start date, an ending date was generated for the occupation. Mean beginning and ending ceramic date ranges are calculated for types that have a life span of less than 250 years. Refining this range, Hays-Gilpin et al. (1999:56) halved the mean ranges to obtain the "best" ceramic range that represents 50 percent of the range closest to the mean. Mean ceramic dates for pre AD 1600 pottery at LA 104106 were calculated based on the published or the refined pottery dates presented by Hays-Gilpin et al. (1999:467) (Fig. 8.80).

Table 8.71 presents the best mean ceramic manufacture dates for all Basketmaker III–Pueblo I types recovered from excavated contexts in SU 1. Based on these data, all structures within SU 1 appear to be contemporaneous, occupied between AD 600 and AD 725. When the sample was reduced to ceramics recovered from floors of structures, a similar temporal range was produced supporting the observations presented for the entire late Basketmaker III–early Pueblo I ceramic assemblage. Although the assemblage in SU 2 was mixed, mean manufacture dates for post-AD 1600 pottery support the radiocarbon and archaeomagnetic results of an eighteenth-century occupation (Table 8.72).

Dating summary. Collectively, these dating techniques provided strong temporal patterns related to the occupation of LA 104106. The first evidence of occupation, identified in SU 2, was during the Basketmaker II period (400 BC–AD 80) followed by an occupational hiatus. The site was reoccupied by a robust, but brief, Tohatchi phase occupation

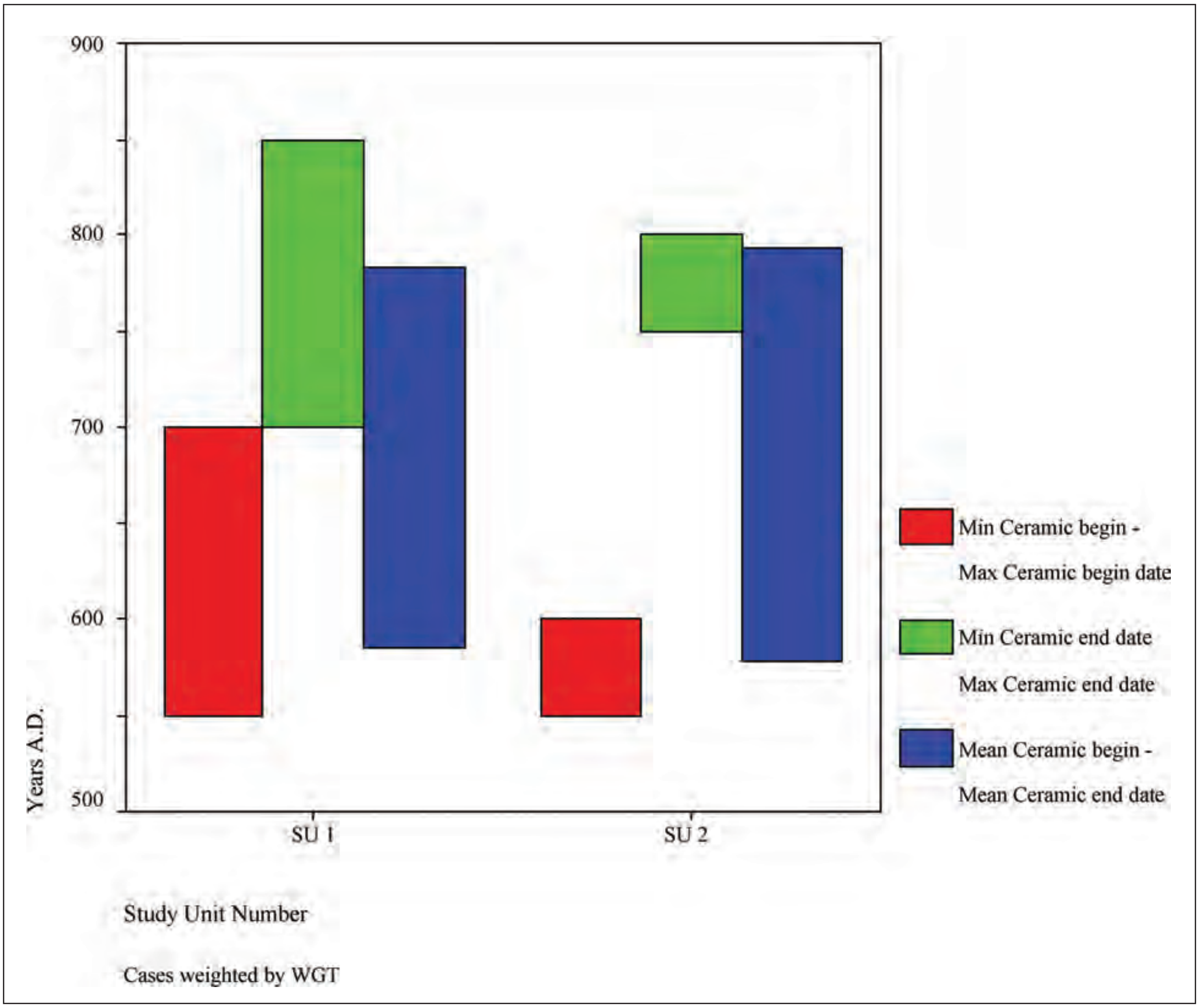


Figure 8.80. High-low graph of manufacture date ranges for temporally diagnostic prehistoric ceramic artifacts.

Table 8.71. LA 104106, Study Unit 1, mean ceramic manufacture dates.

Architectural Unit		Ceramic Begin Date (Years AD)	Mean Ceramic Date (Years AD)	Ceramic End Date (Years AD)
Structure 1 (main chamber)	Mean	581	683	786
	N	243	243	243
	SD	12	7	22
Structure 1 (ante-chamber)	Mean	595	678	761
	N	549	549	549
	SD	10	5	21
Structure 2	Mean	581	680	778
	N	151	151	151
	SD	17	8	23
Structure 3	Mean	575	688	800
	N	2	2	2
	SD	0	0	0
Structure 5	Mean	600	675	750
	N	15	15	15
	SD	0	0	0
Structure 6	Mean	550	665	780
	N	1	1	1
	SD	0	0	0
Structure 7	Mean	575	688	800
	N	37	37	37
	SD	0	0	0
Total	**Mean**	**588**	**680**	**771**
	N	**997**	**997**	**997**
	SD	**14**	**7**	**24**

SD = Standard Deviation

(AD 620–690) followed by another occupational hiatus. Although evidence for a Pueblo II–III period occupation is represented by ceramic artifacts, they were likely acquired and used by the subsequent early historic occupants. The early historic-period was represented by a late eighteenth-century Navajo occupation that appeared to have recycled material culture from numerous preceding temporal periods. Archaeomagnetic samples recovered from features associated with this component yielded a chronometric range of AD 1625–1815 supporting the modeled radiometric samples that yielded a date range of AD 1670–1780, and the decorated ceramic date ranges of AD 1700–1850. These temporal trends offer an opportunity to examine if the other areas of the Colorado Plateau experienced similar fluctuations in frequency of dated contexts useful for refining chronology and addressing broader questions related to community interaction during the Basketmaker II period (see Chapter 15, this report).

Site Activities and Function

Site activities and site function can be interpreted from spatial and temporal patterns identified in artifact and feature attributes. Artifact and feature attributes associated with the late Basketmaker III occupation were spatially segregated from the Basketmaker II and early historic occupation. Material culture associated with each of these occupations were also spatially patterned. Chronometric control presented above, combined with spatially patterning of material remains, were used to examine site activities and inferred site function.

Site activities. The Basketmaker II component identified at LA 104106 was limited to the southern

Table 8.72. LA 104106, best mean ceramic manufacture dates, historic.

Pottery Type		Ceramic Begin Date (AD)	Mean Ceramic Date (AD)	Ceramic End Date (AD)
Acoma/Zuni Polished Red	Mean	1700	1775	1850
	N	27	27	27
	SD	0	0	0
Acoma/Zuni Polychrome (indeterminate)	Mean	1700	1750	1800
	N	22	22	22
	SD	0	0	0
Dinetah Gray	Mean	1600	1700	1800
	N	218	218	218
	SD	0	0	0
Total	**Mean**	**1618.352**	**1711.70412**	**1805.05618**
	N	**267**	**267**	**267**
	SD	**38.78197**	**25.30265116**	**15.10292474**

SD = Standard Deviation

portion of the site (SU 2), represented by four dated features. In addition, six undated features are interpreted to be associated with this occupation based on morphology, contents, or diagnostic artifacts. These features were distributed in the east and northwest portion of the excavation area. Although these contexts have been compromised by subsequent occupations and development activities related to the highway construction and right-of-way maintenance, some general observations can be made.

Feature 3 was a shallow basin spatially associated with two similar features and an area of dense charcoal-stained soil and were located in the existing right-of-way. Similar configurations dating to the Basketmaker II period in the area are interpreted as shallow surface structures (see discussion in LA 32964). Although this seems likely, the level of disturbance and amorphous nature of the deposit make it difficult to definitively classify this area as a structure. The features contained charcoal-rich soil; however, the sides and base of these features were not oxidized indicating they were perhaps storage or processing features. The stained soil in and around these features may have been the result of a burned brush superstructure as reported by Freuden (1998b:195) at contemporaneous sites. The limits of this deposit, however, were diffuse and not clearly discernible.

This set of features, and adjacent area, contained low frequencies of unutilized debitage, chipped stone tools, and macrobotanical remains including limited amounts of rice grass and corn. Based on feature condition and spatially associated artifacts activities, this component centered on storage and perhaps processing of agricultural produce and wild plants. Directly to the northwest of this feature area was a high concentration of chipped stone debitage spatially associated with flake stone tools and cores suggesting that core reduction and tool maintenance or manufacture occurred there. However, it is unclear when these activities occurred (see chipped stone debitage and tool description, above).

A second set of features dating to the Basketmaker II period were located in the northwest portion of SU 1, near Structure 9. Feature 22, Feature 24, and Feature 69 were all positioned among the early historic Navajo occupation. Several other undated features (including Features 1, 2, 7, 9, 10, and 98), also located in this study unit, may be contemporaneous with this Basketmaker II occupation Although the contents of the shallow Features 22 and 69 were similar to the frequency and variety of remains recovered from the upper levels of a deep cist (Feature 24), radiometric determinations are roughly contemporaneous with the initial construction of Feature 24. Chronometric data recovered from Feature 24 identified that the initial construction occurred during the Basketmaker II period and subsequently reused during the late eighteenth century. This feature resembles a Style 2 cist (Kearns et al. 1998:336) and lower fill levels contained primarily lithic, ground stone, and macrobotanical remains including rice grass and weedy annuals. Kearns et al. (1998:336) interpreted these large subterranean features as storage locations used to cache agricultural surplus. The presence of storage features and potential processing and habitation areas suggest that this location was the setting for seasonal farming activities during the Basketmaker II period.

The most robust, or at least most archaeological visible, component was a late Basketmaker III occupation, interpreted to have occurred during the Tohatchi phase between AD 620 and AD 690. This Tohatchi phase component, located primarily in the northern portion of the site (SU 1), yielded evidence for a wide range of activities related to subsistence practices including lithic tool production, ceramic vessel production, fowl domestication, and agricultural processing. In addition, the presence of a large habitation structure with arguably ritual features suggests that ceremonial activities, perhaps related to healing or community integration, also occurred at this location. Identification of numerous small satellite structures indicate that more mundane activities such as cooking, storage, and sleeping are also associated with this component.

Lithic data from the extramural context indicated that tool production and core reduction occurred in different areas of the site. Based on higher frequencies of smaller flakes and lower frequencies of larger flakes, also spatially associated with a hammerstone and two cores, core reduction appears have been more common than tool production activities. Flake stone tool diversity was relatively low for this component suggesting that subsistence activities required informal or expedient tools, a common observation for sedentary or semisedentary agriculturalists (Kelley 1995).

Ceramic data recovered from the main chamber for Structure 1 produced a small quantity of unfired ceramic paste indicating that ceramic manufacture also occurred at this location. Other evidence for ceramic manufacture was the presence of culturally modified minerals and sherd scrapers. In addition to ceramic paste, large quantities of culturally modified and unmodified hematite were also identified from this structure. Ground stone tools, retaining the mineral residue, supports the observation that pigment, perhaps for paint or fugitive red "slips," were prepared in the main chamber of Structure 1. Activities performed within the partitioned wing wall area of the main chamber structure differed from those preformed in the remainder of the main chamber. Within the area partitioned by the wing wall, a higher frequency and diversity of ground stone, flaked stone tools, and more bowl sherds (by weight) suggest this area was the focus of processing activities while the rest of the main chamber functioned as a storage and consumption location.

Faunal data indicate that the capture and processing of small mammal species, including desert cottontail, in addition to low frequencies of elk and pronghorn remains was conducted by the site occupants. Acquisition of small game animals is likely related to expedient hunting activities that occurred in close proximity to the site such as agricultural fields. Although evidence of artiodactyl remains suggests longer range or logistical hunting activities, the limited amount of artiodactyl material was limited and may have been acquired through trade or barter with neighboring groups. Turkey bone and egg shell artifacts were also associated with the Basketmaker III occupation, indicating the rearing and use of domesticated species. Nearly all of the eggshell fragments were recovered from the antechamber of Structure 1, yet most of the turkey bone was recovered from satellite structures and Structure 1. The contextual patterning of these different turkey remains suggests that antechamber may potentially represent a coop while processing and consumption occurred within the structures.

The early historic component appears to be the result of at least two occupations occurring between AD 1700 and 1850. This component was represented by a surface structure, numerous extramural features, and a diverse artifact assemblage. In general, the intra- and extramural features displayed a wide range of functions including shelter, storage, and processing of biotic resources. Typically, features were paired, displaying similarities in construction, contents, proximity to one another, and arguably function.

Six floor features were identified within the limits of Structure 9, defined by a compacted use surface. These features include a central heath and a complex of four features located in the south-central portion of the structure. Similarities in construction, morphology, and content of the intramural features suggest they were used in related or similar tasks that required staged, low-level heat. East of this structure was an activity area that contained numerous artifacts and several extramural features.

Extramural features associated with this occupation included three postholes, two bell-shaped pits, one fire pit, and two pits of indeterminate function. The three postholes, located in the central portion of the activity area, may represent the remains of an expedient structure, such as a wind break. Two bell-shaped pits, similar in size, shape, and construction, were located northwest of the postholes. These well-oxidized features appear to have been used to roast biotic resources. Similar features identified by Dittert (1961) have been interpreted as "fireless" (Hester 1962:47) cooking features. Initially intense burning saturated the feature interior with heat and live coals were used for roasting small bundles of food stuffs. The intense heat in turn hardened the interior walls, created an effective barrier against insects and rodents. Ethnographically these features were used to store agricultural products (Hill 1938:42). The area surrounding the shallow unlined basin located northeast of the post holes may represent a discard area based on the co-occurrence of lithics, ceramics, and burned bone.

The majority of the artifacts associated with this component were distributed in the northern portion the excavation area, east of Structure 9. Basketmaker III pottery types were also dispersed throughout the excavation area. Co-occurring with the Basketmaker III assemblage were Pueblo period, historic Pueblo, and Navajo ceramic types. Although these assemblages overlapped, most Navajo pottery was restricted to the northern portion of the excavation area, east of Structure 9. Ceramic data indicate that the inhabitants acquired and used partial vessels from earlier temporal components as processing, storage, or serving tools. The accumulation of ideas, technologies, or materials by Navajo bands is not a new concept. The recycling of lithic tools and use of discarded sherds for pottery temper among the Navajo for example, is clearly documented (Kent 1984:161).

Formal flaked stone tools identified with the early historic Navajo component include bifaces, projectile points, drills, and scrapers. Projectile points are well represented and include Cottonwood Triangular, Desert Side-notched and a curated Late Archaic and a Basketmaker II point. Tools interpreted as drills are also side-notched and display a high shoulder leading to a long, narrow blade. One large scraper is present in the assemblage. Two broad activity categories are represented in the formal tool assemblage include hunting, supported by the identification of projectile points, and processing, supported by the presence of drills and a scraper.

Ethnobotanical data recovered from SU 2 indicate a diversified assemblage of plants available to the ethnohistoric Navajo occupants during the summer to early fall, including minimal evidence of corn. Trace amounts of corn indicate limited agricultural consumption or processing was conducted within this portion of the site. The faunal assemblage also indicates the acquisition, processing, and presumably consumption of medium to large artiodactyl and more exotic species, including badger and mountain lion. Most of the artiodactyl remains including mule deer were recovered from SU 2. This pattern contrasts by a lack of small mammal and rodent remains recovered from this area. Furthermore, all but one of the unusual animal species were recovered from the extramural context of SU 2. The frequency and condition of artiodactyl species common in SU 2 suggest long range, or at least more logistically sophisticated, hunting strategies were part of the on-site activities.

Site activity summary. The Basketmaker II occupation has been partly obscured by post-occupation events including reoccupation and highway construction and maintenance. The condition and distribution of features point to processing and storage of plant and possible animal resources. The identification of a potential shallow surface structure and on-site storage suggests activities related to seasonal agriculture and logistical hunting.

The Basketmaker III occupation, dating from the mid to late AD 600s, appears to have been intense yet brief. The identification of what may be an early integrative or community structure suggests that some level of organization at the supra-household level, if not community level, was emerging at this time. The ceramic assemblage associated with this occupation was comprised primarily of plain gray wares with few decorated types including La Plata Black-on-white. The high frequency of pigment minerals and pigment processing stones indicates a high demand for red color to adorn pottery and, perhaps, ceremonial regalia, or hunting paraphernalia. Lithic technology focused on the reduction of locally available material types for the production of expedient and formal tools. Nonlocal material types identified include Zuni Mountain chert and obsidian acquired from the Grants area. Faunal and macrobotanical data indicate a year-round occupation with the exploitation of small mammals and corn agriculture.

Excavation of SU 2 identified an Basketmaker II and an early historic Navajo occupation. Spatial analysis of temporally diagnostic ceramic types, including Pueblo-period white wares, Dinetah gray, and historic polychrome sherds, was used to isolate the Navajo component and some of the associated material remains. The discrete distribution of diagnostic ceramics and lithic tools from different temporal periods appears to be the result of a late eighteenth-century Navajo occupation. Spatial examination and refiring of the Dinetah and historic Pueblo pottery types indicated these types were derived from whole or partial vessels. Co-occurring with the Dinetah and historic Pueblo pottery were prehistoric Pueblo-period ceramics, also derived from partial vessels, along with discrete clusters of Basketmaker III pottery. The close spatial patterning of prehistoric partial vessels along with the Dinetah and historic Pueblo ceramics indicate that the prehistoric ceramics were acquired by Navajos and are contemporaneous with the Navajo occupation.

The presence of several partial vessels from different temporal periods indicates that the occupants of this Navajo occupation were using partial vessels as tools or containers. The emphasis on ready-made ceramic tools was echoed in the lithic assemblage. Analysis of the lithic assemblage identified a high frequency of formal tools with little evidence of tool manufacture suggesting some of these tools were also collected by the Navajo site occupants. Unlike the Basketmaker III component, exploitation of large mammal species and domesticated livestock was common in the early historic Navajo assemblage. Macrobotanical data indicate local wild species and limited amounts of domesticated agriculture produce (corn) were processed and consumed at this location. The close spatial patterning of paired features with redundant morphologies combined with similar faunal and macrobotanical contents indicate that this portion of the site was likely occupied twice, perhaps during two consecutive summer seasons.

Based on the chronometric data and the absence of Euroamerican or commercially manufactured artifacts, a post-AD 1850 occupation seems unlikely. The presence of an expedient structure, formal tools, partial ceramic vessels combined with limited evidence for agriculture, and an emphasis on hunting and domesticated livestock suggest that this occupation may have been a summer residence related to herding and farming activities. Differences in subsistence strategies are likely related to the more sedentary nature of the late Basketmaker III agriculturists compared to the mobile or transient nature of Basketmaker II and early historic Navajo lifestyles.

Site function. Feature and artifact condition, frequency, and distribution indicate that on-site activities were organized to accomplish predetermined tasks related to site function. Clearly on one level, the functional roles of each particular temporal component identified at LA 104104 were geared toward acquisition of biotic resources related to subsistence-level economy. At another level, pronounced functional differences are evident between these components based on inferred activities.

The Basketmaker II component of this site was occupied between 400 BC and AD 80. This occupation was represented by two large cist features, several smaller shallow basins, and what may be a shallow, poorly preserved surface structure. The contents and condition of these remains suggest this occupation occurred during the growing season or spring to fall. Feature data indicate that on-site processing of limited cultivars and wild plant species did not require prolonged intense heat and that long-term storage of these resources was anticipated. The bone and chipped stone assemblages directly associated with these features seem to indicate that the acquisition and processing of small game animals played a functional role but logistical hunting did not. Based on these data the Basketmaker II occupation at LA 104106 appears to have functioned as a seasonal hamlet potentially related to the exploitation of agricultural land, gathering of wild plants, and hunting of small game animals.

The Basketmaker III component, occupied between AD 620 and 690, was represented by a large pit structure, several smaller satellite structures, extramural features, and a large volume of material culture. Based on the suite of structures and the density and diversity of material remains, this component likely functioned as a year-round habitation area. The inflated size, floor feature array, and artifacts associated with Structure 1 also suggest that this site may have served a specialized function, perhaps related to community integration, ritual healing, or ceramic manufacture. Contents of smaller structures indicate that they served a variety of functions including storage, cooking, and perhaps sleeping. The apparent methodological abandonment of Structures 1 combined with a cached "ritual" container, deconsecration objects recovered from floor features (Feature 64 and Feature 19a), and a high frequency of pigment types support the inference that this structure had functional roles beyond that of a domicile. In contrast, the smaller structures and associated extramural area appear to have functioned more as locations where daily subsistence activities occurred, perhaps in support of the activities and function of Structure 1.

The early historic component dates to the eighteenth or early nineteenth century and is represented by structural, feature, and material culture remains. A small habitation structure, more accurately characterized as a compact use surface, contained several internal features including a central heating feature. The spatial distribution of extramural features and associated ceramic, lithic, macrobotanical, and faunal remains indicate that the inhabitants utilized the extramural space east of this structured for the processing and consumption of biotic resources. The presence of numerous flake stone tools combined with exotic faunal remains including artiodactyl, badger, and mountain lion, indicate that this location was a base camp from which logistical hunting forays were launched into the higher elevations. The presence of sheep bone indicates the consumption of domesticated animal species and use of this area as a herding camp. Deeply oxidized bell-shaped pits and shallow basins combined with evidence of wild and domestic plant species suggests this portion of LA 104106 also functioned as a processing area for vegetal produce. The condition, variety, and frequency of these remains strongly support the interpretation that this location functioned as a seasonal camp related to herding, farming, and logistical hunting.

Community Interaction

The geographic and social scale of intra- and intercommunity interaction for residential mobile and semisedentary groups, including Basketmaker II, Basketmaker III, and early historic Navajo occupations, in the southern Chuska Valley can be examined through the spatial distribution of contemporaneous sites and the frequency and type of nonlocal or exogenous material remains. For the Basketmaker II and early historic occupations, chronometric control is inadequate for distinguishing between dated contexts that can result from residentially mobile groups occupying multiple sites generationally. Therefore, intra- and intercommunity interaction are considered together. Given that the Basketmaker III component at LA 104106 represents only one habitation episode associated with a community structure, spatial data were used to identify similar types of structures and their associated communities in the surrounding area.

Basketmaker II. In the southern Chuska Valley and San Juan Basin, late Basketmaker II or Figueredo phase sites are more numerous than sites dating to the preceding Ear Rock phase. Interestingly, Figueredo phase (400[300] BC–AD 150[200]) sites were located in the same areas as earlier Basketmaker II sites, perhaps indicating continuity in land use or subsistence practices. In addition to LA 104106 and the sites described in the research section for LA 32964, sites with Figueredo phase components were also identified at LA 80419 (Freuden 1998b:149–222) located northeast of LA 6444 and Discovery 32, just southwest of the project area (Kearns 1998d:567–570), and LA 80434 located to the east of the project area in Tohatchi Flats (Freuden 1998a:477–582). Distances between dated sites are similar to that for the preceding phases (between approximately 2 km to 20 km [1.2 to 12.4 miles]), fitting well with reported ethnographic foraging ranges (cf. Adler 1994; Binford 1980, 1982; Kelly 1995:133) (Fig. 8.81).

Similar to the description presented for the Ear Rock components, Figueredo phase sites were represented by shallow pit structures with internal and extramural features. Burned fragmentary small mammal bone, limited chipped stone assemblages of locally available material, and evidence for reliance on woody perennial, wild annual, and cultigens species. At LA 80419 this component was represented by several structures with discernable spatial arrangements, extramural features (< 25 cm deep and cylindrical or basin shaped in profile), and a midden.

The Figueredo component at LA 80434 was represented by shallow pit structures, numerous large, burned bell-shaped cist, some with cached ground stone tools, and smaller unburned basins. The chipped stone assemblage contained a high frequency of broken or reworked projectile points with no clear spatial pattern in debitage except for higher frequencies defined as “workshop” areas (Freuden 1998a:549). The character of the assemblage indicates that much of the raw material arrived in a “refined” or reduced state with evidence for biface tool maintenance and manufacture. Much of the assemblage was derived from locally available material types with Brushy Basin, Narbona Pass chert, and obsidian identified in low frequencies. Small mammal bone dominated the faunal assemblage and most was burned and fragmentary. Macrobotanical analysis identified a high frequency

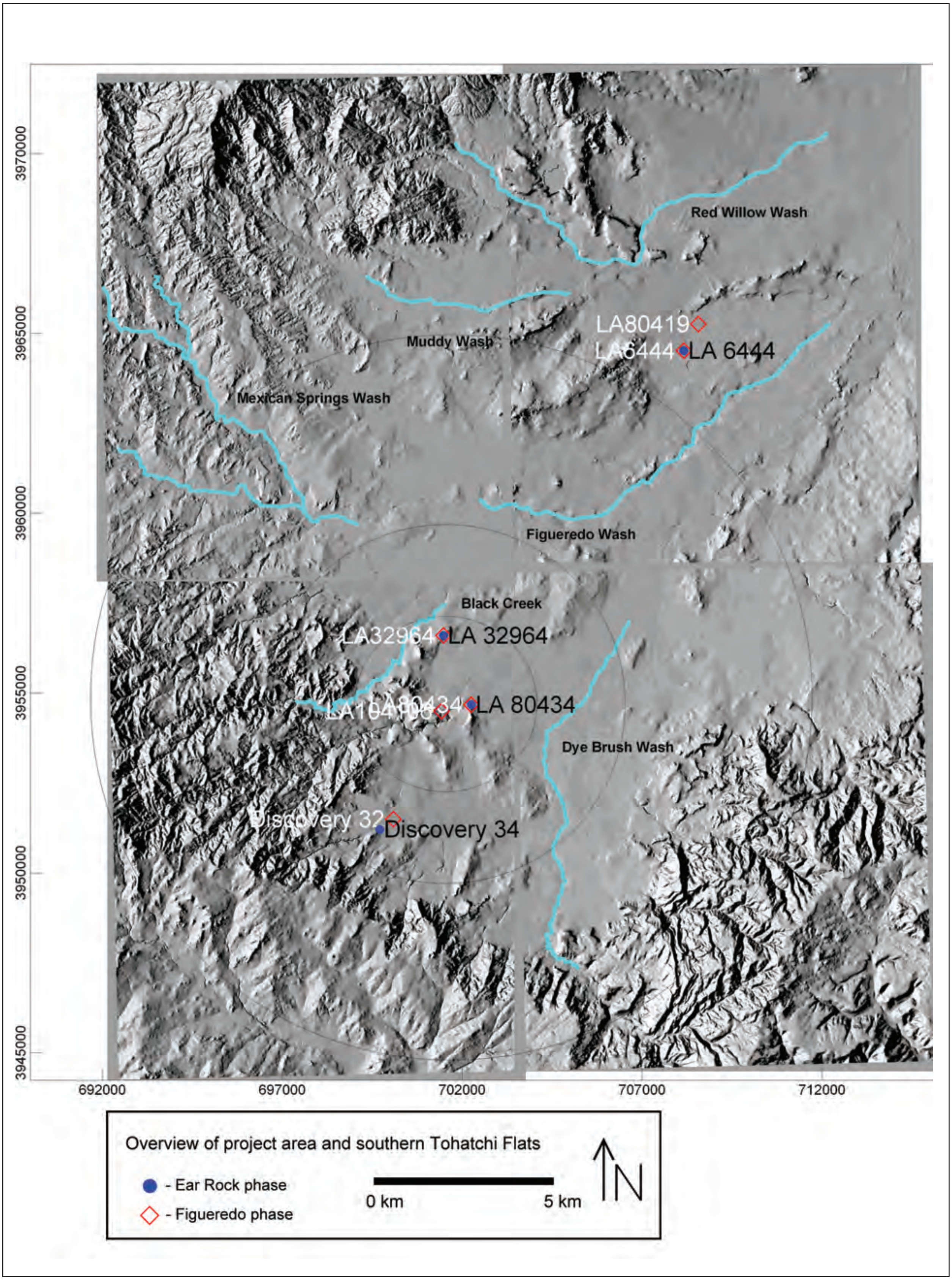


Figure 8.81. Distribution of Basketmaker II sites in southern Tohatchi Flats.

of woody trees and shrubs and lower frequencies of wild annual species and corn.

During this phase, large, fire-hardened bell-shaped pits, burials, and cached tools become more common. Increased evidence for on-site storage, more well-defined or at least recognizable use of space, and an increase in site frequency combined with repeated use of a particular geographic area suggests that small interhousehold communities may have inhabited this portion of the southern Chuska Valley during this time.

Basketmaker III. Community studies in the region have generally focused on the aggregated Pueblo I settlements of the Dolores area and the Pueblo II–Pueblo III settlements of the San Juan Basin and Mesa Verde regions (Adler 1994; Mahoney et al. 2000; Marshall et al. 1979). Defining communities during the late Basketmaker III period in the southern Chuska Valley has, until relatively recently, relied on survey data supplemented by a limited amount of excavation (see Damp and Kotyk 2000:105; Kearns et al. 2000:122). Recent excavation data have provided evidence for early Basketmaker III communities along the floor of the southern Chuska Valley and late Basketmaker III communities along the margins of the southern Chuska Valley. This evidence suggests that indicating relocation of some social units may have relocated to more favorable locations overtime.

Intercommunity interaction. The identification of an a specialized structure (Structure 1) at LA 104106, perhaps related to community integration, ritual healing, or ceramic manufacture, suggests the development of some level of supra-household, if not intra-community, organization was present during the late AD 600s along the southern extent of the Chuska Valley. If Structure 1 did provide an integrative function, what community did it serve? Excavation data indicate that early Basketmaker III (late AD 500s–early AD 600s) or Muddy Wash phase communities, like Muddy Wash and Twin Lakes, were located along the valley floor. By the mid AD 600s a portion of these Basketmaker III communities appear to have moved to higher elevations along the valley margins. By the late AD 600s the valley floor was largely abandoned in favor of valley margin locations (Kearns et al. 2000:124). Communities along the valley margins such as Gallup Station and Mexican Springs have similar pit structure architecture (i.e., Northern or Mixed style, Type A, or A Tradition) and ceramic assemblages as those identified on the valley floor. Likewise, the ceramic data and Structure 1 at LA 104106 also fit well within the range of variation reported for late Basketmaker III sites in the immediate area. The location and age of the Basketmaker III component at LA 104106 emphasizes that the valley margins were becoming favorable residential locations by the late AD 600s, supporting the observation that some portions of the valley floor were depopulated during this time.

Basketmaker III communities are conceptualized as loosely aggregated hamlets, each composed of one or more household and a communal structure (Kearns et al. 2000). Combined, excavation and survey data (ARMS 2006) indicate that in addition to the Muddy Wash, Twin Lakes, Gallup Station (not shown), and Mexican Springs communities, numerous Basketmaker III or Basketmaker III–Pueblo I sites are present in the immediate area of LA 104106, Tohatchi Village (LA 3098), and Dye Brush. Admittedly simplistic, these clusters of sites also likely represent communities of loosely aggregated hamlets (Damp and Kotyk 2000; Mahoney et al. 2000) (Fig. 8.82). The specialized, community, or low-level integrative structure at LA 104106 potentially served to integrate these disbursed hamlets in the area of Black Creek, the proposed name for this community.

Interregional interaction. The variety of exogenous material remains identified at Basketmaker III communities in the southern Chuska Valley, such as LA 104106, suggests that participation in interregional trade, exchange, or barter was common. Although relative frequencies of these items is low compared to other material culture categories such as lithics and ceramics, the sphere or catchment area of interregional exchange appears to be quite extensive (Fig. 8.83). Imported ceramic types such as Alma Plain and San Francisco red suggest an affiliation with the Mogollon Highlands region to the south. While still maintaining contact with populations to the south, the presence of San Juan ceramic types including Piedra Black-on-white, Chapin Black-on-white suggests increase contact with populations in the Northern San Juan region during the later part of the occupation, supporting the observation reported by Loebig (2000). Vessel forms derived from Mogollon and Cibola sources display similar use histories represented in the frequency

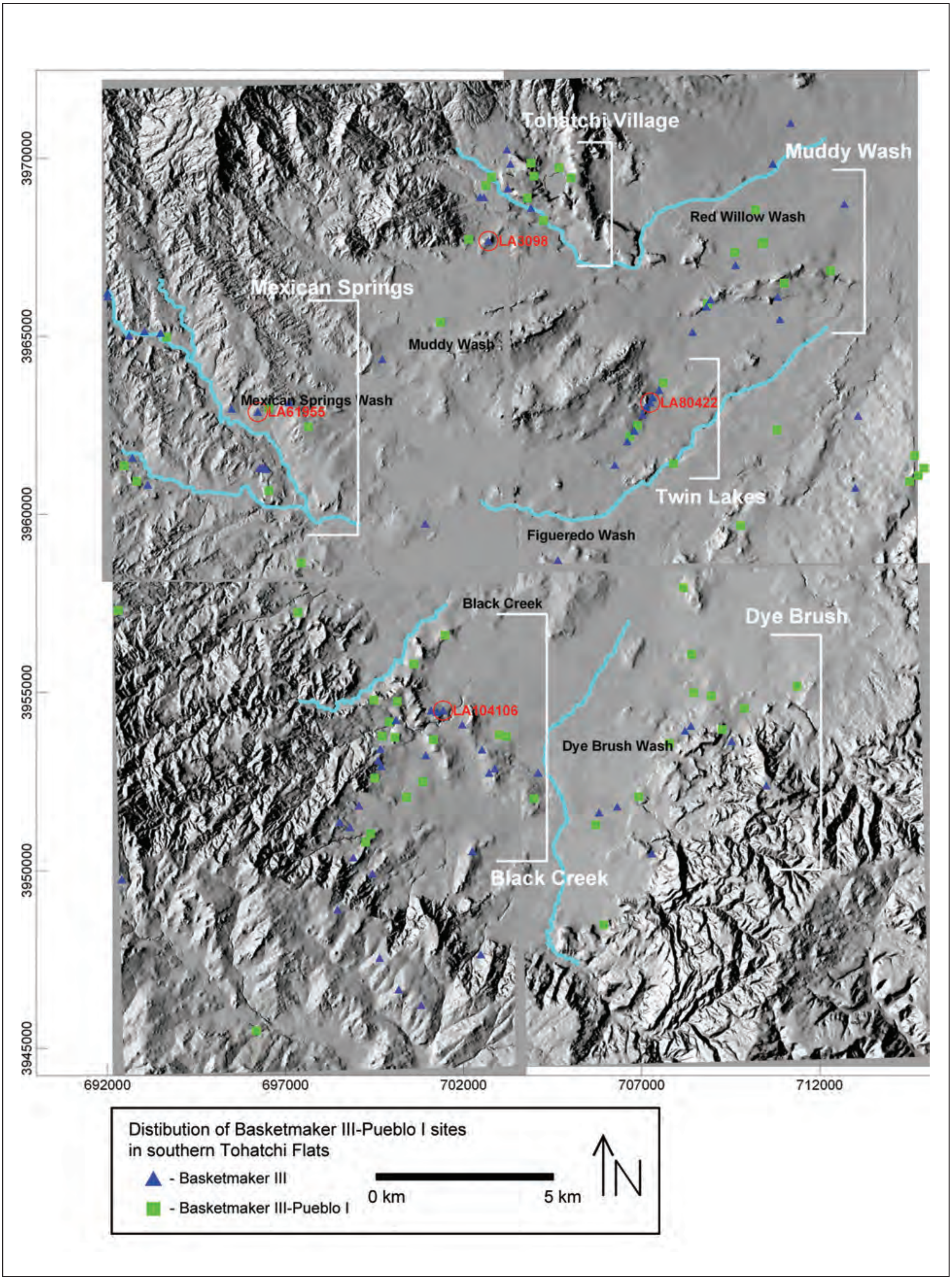


Figure 8.82. Distribution of Basketmaker III communities in southern Tohatchi Flats.

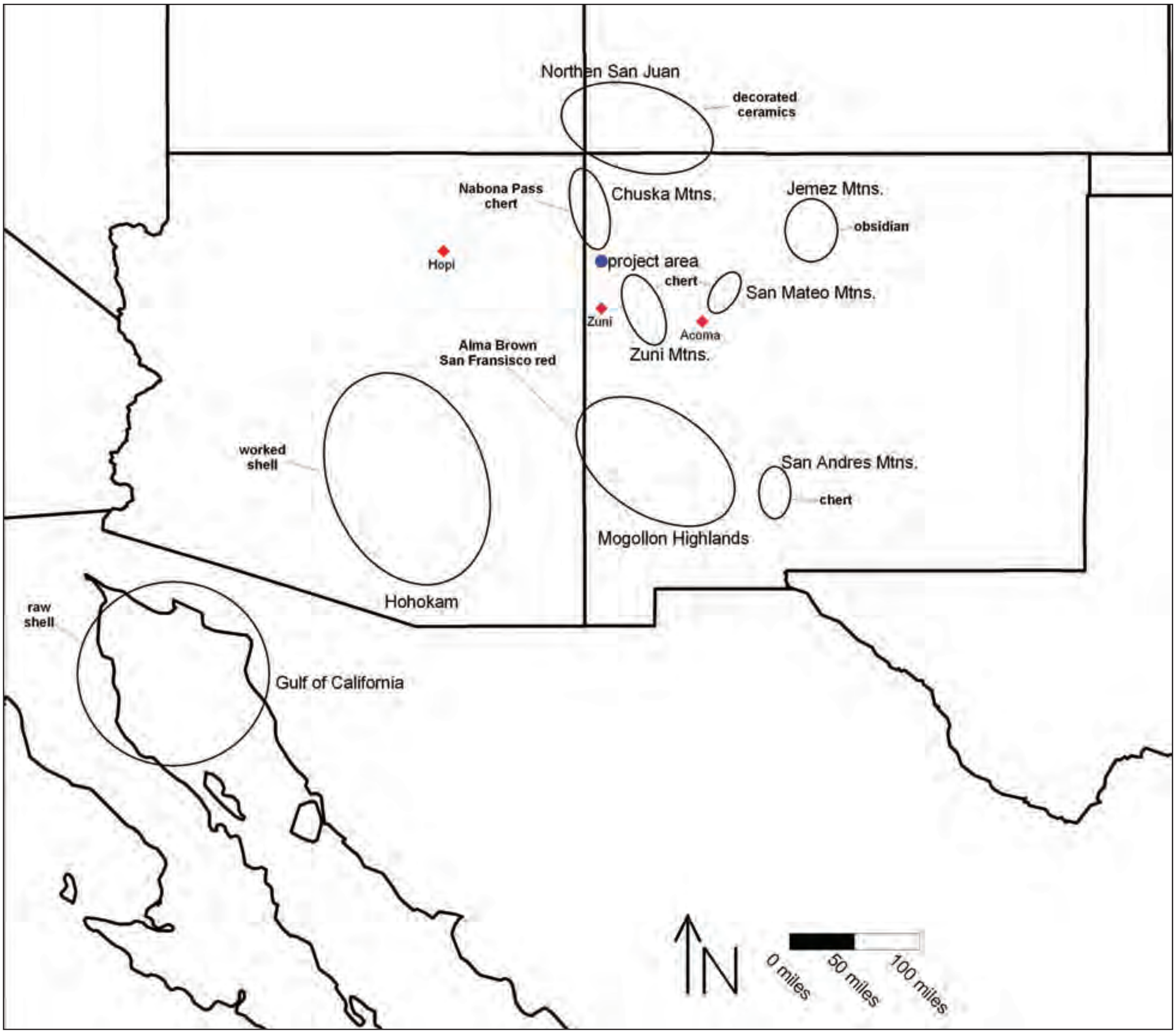


Figure 8.83. Potential source areas for nonlocal material culture.

and type of post-firing modifications or use-wear, which is likely related to subsistence level activities. However, San Juan ceramic types displayed few examples of post firing use-wear. Perhaps the acquisition and possession of decorated San Juan ceramic bowls may have represented increased ideological or sociopolitical ties with the northern San Juan region during the late Basketmaker III period (Blinman and Wilson 1988:404).

Lithic data, however, seem to support affiliations to the south because most sampled obsidian artifacts derived from deposits consistent with the nearby Mount Taylor source (Shackley 2003). Similarly, a high percentage of chert originated from the Zuni Mountains to the south. This strong pattern indicates the lithic procurement strategies of the site occupants may, in part, be aligned with the southern portion of the San Juan Basin.

Ornaments and minerals recovered from LA 104106 include marine shell, argillite, travertine, jet, serpentine, malachite, and azurite. Marine shell likely originated from the Pacific Coast or Gulf of California while some of the aforementioned minerals including argillite, travertine, and jet are reportedly present in and around the San Juan Basin. Argillite and travertine, however, are more commonly deposited at hot springs and caves, the nearest of which is between 200 km and 300 km (124.3 to 186.4 miles) from this location. Serpentine, malachite, and azurite also reported to be regionally available, are found between 30 km and 50 km (18.6 and 31.1 miles) to the northwest and south, respectively. Based on the diversity, condition, and lack of production debris, minerals and finished ornaments recovered from LA 104106 were likely acquired through hand-to-hand regional exchange systems. The types and quantities of materials recovered from this site fit regional patterns for Basketmaker III occupations.

Early Historic period. Although temporal resolution is imperfect, some generalizations can be made about early historic Navajo community interaction in the southern Chuska Valley. Pre-reservation phase sites are more commonly reported and characterized from outlying areas including Canyon de Chelley, Chaco Canyon, Lobo Mesa, and the northern Colorado Plateau (Bailey and Bailey 1982; Blinman 1997b; Brugge 1985; Reher 1977; Gerow and Hogan 2000; Gilpin 1996; Winter 1993). In the general area (5 km, 3.1 miles) of LA 104106, survey data have only reported three contemporaneous sites. Other sites in the Tohatchi Flats area interpreted to be the result of pre-reservation occupations, based the presence of Tewa polychrome and Jeddito Yellow ware ceramics, are LA 80412 and LA 152010–LA 152012 (Fig. 8.84).

Data reported from early historic Navajo sites in outlying areas are limited to LA 2547 (Hammack 1964) and LA 83491 (Burchett and Morris 1994). Ceramics collected from LA 2547 were reexamined by C. D. Wilson of the OAS for comparative purposes. While no Navajo ceramics were identified, reexamination of the LA 2547 ceramic assemblage found it was dominated by early brown wares, including Obelisk Utility and Adamana Utility (C. D. Wilson, pers. comm. 2001). Although not useful as a comparative data set for the early historic component at LA 104106, the assemblage is significant in its own right as one of the earliest ceramic sites in the area.

Excavation data from LA 83491 displayed general characteristics similar to LA 104106, SU 2. These characteristics include the presence of a shallow structure with a central hearth and a ceramic assemblage comprised of partial vessels including Acoma/Zuni polychrome, "Quemado" gray, White Mountain Redware, and Cibola wares. Ceramic types were spatially discrete and the historic Pueblo pottery is suggested to have been transported to the site by the Navajos (Zadeño, cited in Burchett and Morris 1994:486).

Burchett and Morris (1994) summarize LA 83491 as a multicomponent Anasazi and Navajo campsite with evidence of the Anasazi occupations limited to a few Cibola ceramics and White Mountain Redwares. Navajo occupations are reported to date to the "late 1700s and probably late 1800s" based on the Navajo ceramics and ethnographic data (Burchett and Morris 1994:490). The late 1700s occupation appears to have resulted in the construction of at least one of two shallow structures (Feature 2), while and the late 1800s occupation was a dispersed artifact scatter.

Navajo ceramic types are reported to have occurred in both surface and subsurface contexts. Although the majority of the ceramic assemblage was recovered from surface context, Gobernador gray (AD 1700–1800) and Piñon gray (AD 1800–present) were recovered from the fill of Feature 2, a shallow structure. In addition, Zadeño (cited in Burchett and Morris 1994:486) reports that all the Cibola pottery was recovered Feature 2, suggesting these items are associated with the occupation of the structure and do not represent a separate temporal component.

Ethnological research for LA 83491 reports a post-Bosque Redondo-era occupation related to one of Jesus Arviso's wives (Ritts-Benally 1994). This determination was based on two Zuni polychrome sherds, and a second-hand "story" that associated this site "with a Spanish man called *Sóós*" (Jesus Arviso) (Ritts-Benally 1994:307). Admittedly, Ritts-Benally (1994:307) states that the ethnographic evidence supporting a post-Bosque Redondo occupation associated with Jesus Arviso "is thin." Winter (1994b) summarizes LA 83491 as a multicomponent Navajo site that included pre- and post-Bosque Redondo occupations, which could not be spatially isolated. The earliest component dates between AD 1750 and 1800 based on the "time range of the Navajo sherds" (Winter 1994b:625). The second occupation was based solely on the reported ethnographic data reported by Ritts-Benally (1994). Functional interpretations of LA 83491 are made by Brugge (cited in Burchett and Morris 1994:490–92) who, from field observations made during data recovery, interpreted the site as a possible herding or lambing camp occupied between AD 1760 and 1830.

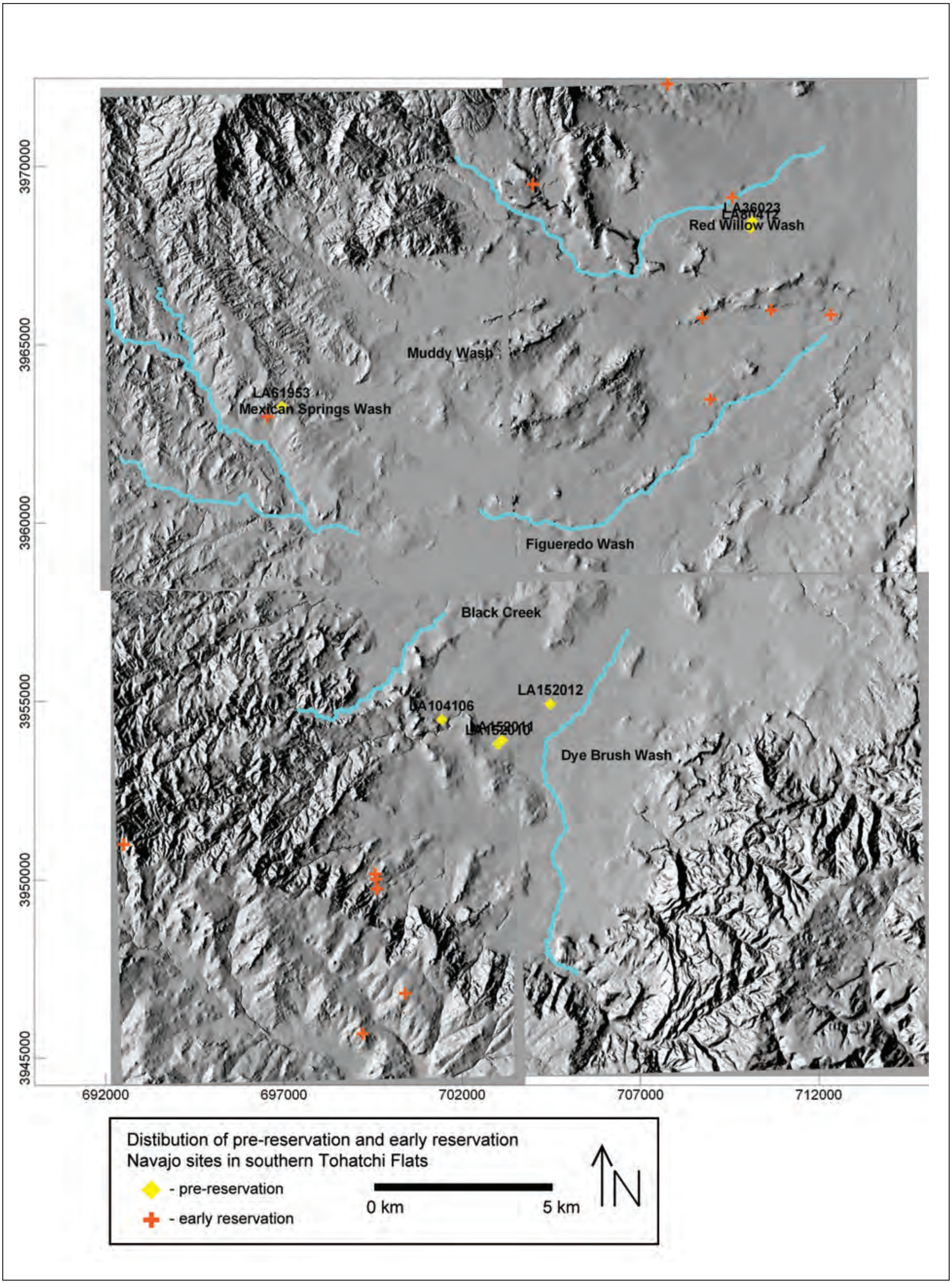


Figure 8.84. Distribution of pre-reservation and early reservation sites in southern Tohatchi Flats.

The ephemeral nature of the site combined with artifact assemblages geared toward ready-made tools indicates that these pre-reservation sites were likely summer camps related to hunting, herding, and plant gathering. The limited evidence of corn also indicates that some crop production may also have occurred at these locations. Ceramic data indicate that ethnohistoric Navajo populations may have acquired Hopi, Zuni, Rio Grande, and Acoma pottery directly from these villages, through a barter system, or on raiding forays. Based on the spatial relationship between these occupations, there may have been some reuse of these areas by family or extended family groups. Interestingly, these same areas were re-inhabited during the early reservation years, and could have represented extended family members returning to their pre-reservation range lands. Unlike early areas of occupation on the valley floor, early reservation sites are positioned in foothill locations or near prominent detached land forms that may have offered a more defensible or concealed setting (Fig. 8.84).

Community summary. Each temporal component identified at LA 104106 was part of a community that gained access to nonlocal materials through intra- and interregional interaction. During the Basketmaker II period, small bands of agriculturalists resided along the margins of, and on the valley floor of the southern Chuska Valley. These populations appear to have been bi-seasonally mobile returning the valley during the growing season and moving to higher elevations along the eastern or northern margins of the San Juan Basin, perhaps acquiring lithic raw material such as obsidian (Vierra 1994c). The subsequent Basketmaker III populations reoccupied some of these areas following an apparent 250-year hiatus (Damp and Kotyk 2000; Kearns 1996b). Similar to their counterpart, early Basketmaker III communities were initially established on the valley floor and gradually moved to higher elevations along the valley margins. Communities were comprised of small hamlets consisting of one or more individual households united or integrated through ritual activities and economic interdependency (cf. Hegmon 1989). These late Basketmaker III communities appear to be relatively discrete spatial enclaves focused on drainage systems. Although separate communities are expressed on the landscape, similarities in ceramic assemblages, architecture, and exogenous material indicate that individual communities were also integrated or shared similar community or social histories.

Subsequent Pueblo-period communities, although prevalent in the southern Chuska Valley, were not well represented at LA 104106. In fact, most of the Pueblo-period material was associated with a pre-reservation Navajo component. Early historic Navajo communities appear to have also taken advantage of the same favorable environmental settings along the margin and floor of the southern Chuska Valley. These occupations likely represent summer camps related to herding, hunting, and agricultural production occupied by family or extended family groups that returned seasonally to these locations during the warm weather months then retreating to winter camps, perhaps, along the western side of the Chuska Mountains (Gilpin 1996:171–196). Pre-reservation Navajo communities gleaned ready-made tools from the surrounding archaeological deposits and acquired pueblo pottery from the Hopi mesas, Zuni/Acoma province, and Rio Grande area through trade, barter, or raid. Community interaction may have focused on stock raising, hunting, and exchange.

9 | Data Recovery at LA 116035

LA 116035 is a multicomponent limited-activity site situated on a gentle southwest to northeast trending ridge overlooking Tohatchi Flats to the east (see Fig. 2.1). Most of the site surface has been affected by natural or mechanical disturbance. Natural disturbance includes eolian activity with active dunes and broad deflated areas. Sources of mechanical disturbance included a buried telephone cable, telephone pole, US 666, and two-track roads.

This site was originally identified by Mensel (1996) as a Pueblo II field camp with a less extensive Basketmaker III component. These components, covering approximately 4,800 sq m (51,666.8 sq ft), were represented by a light to moderate artifact scatter and seven rock concentrations interpreted as deflated thermal features. Data recovery investigations expanded the site boundary to include additional artifacts and reexamined the seven rock concentrations identified by Mensel (1996). Redefinition of the site boundary expanded the total area of LA 116035 to approximately 5,650 sq m (60,816.1 sq ft) and reduced the rock concentration count to four: one deflated thermal feature and three cairns (Fig. 9.1). During the course of data recovery investigations, only one individual visited the site.

Data recovery investigations began following an intensive surface examination. An instrument map was produced illustrating the expanded site limit, proposed construction zone, and other surface manifestations identified during the surface investigation. Surface artifacts located outside the proposed project area were sampled through in-field analysis (Table 9.1). A series of photographs were taken to document the setting prior to excavation (Fig. 9.2).

Due to the linear nature of the project area, a 1 by 1 m grid system was established parallel to the existing right-of-way, 14 degrees east of magnetic north. Horizontal control was maintained relative to a main datum, designated 0 mbd and 100N/100E, located within the proposed construction zone and vertical maintained relative to modern ground surface. All surface artifacts in the proposed construction zone were point located and collected.

In all, 36 grid units and 64 systematic auger tests were used to define the extent, nature, and depth of the deposits (Fig. 9.3). Excavations conducted within 1 by 1 m grid units ranged in depth from 10 cm to 40 cm below modern ground surface. Fill was removed in 10 cm levels and screened through 1/4-inch mesh. Vertical control was maintained relative to the modern ground surface and the main datum. Following hand excavations and auger tests, the project area was mechanically bladed to locate any cultural manifestations on the original ground surface.

Results

Data recovery investigations resulted in the identification of a dispersed artifact scatter associated with three rock cairns, one deflated thermal feature, one intact thermal feature (Feature 1), and a combined total of 145 ceramic, lithic, and ground stone artifacts. Of the 145 documented artifacts at the site, 90 were recovered from surface and subsurface contexts within the proposed project area (Table 9.1). Systematic auger tests verified the depth of the cultural deposit and extent of mechanical disturbance. Mechanical excavation was used to remove 30 cm to 40 cm of noncultural deposits (Stratum 1 and Stratum 2) exposing the original ground surface (Stratum 3) and Feature 1.

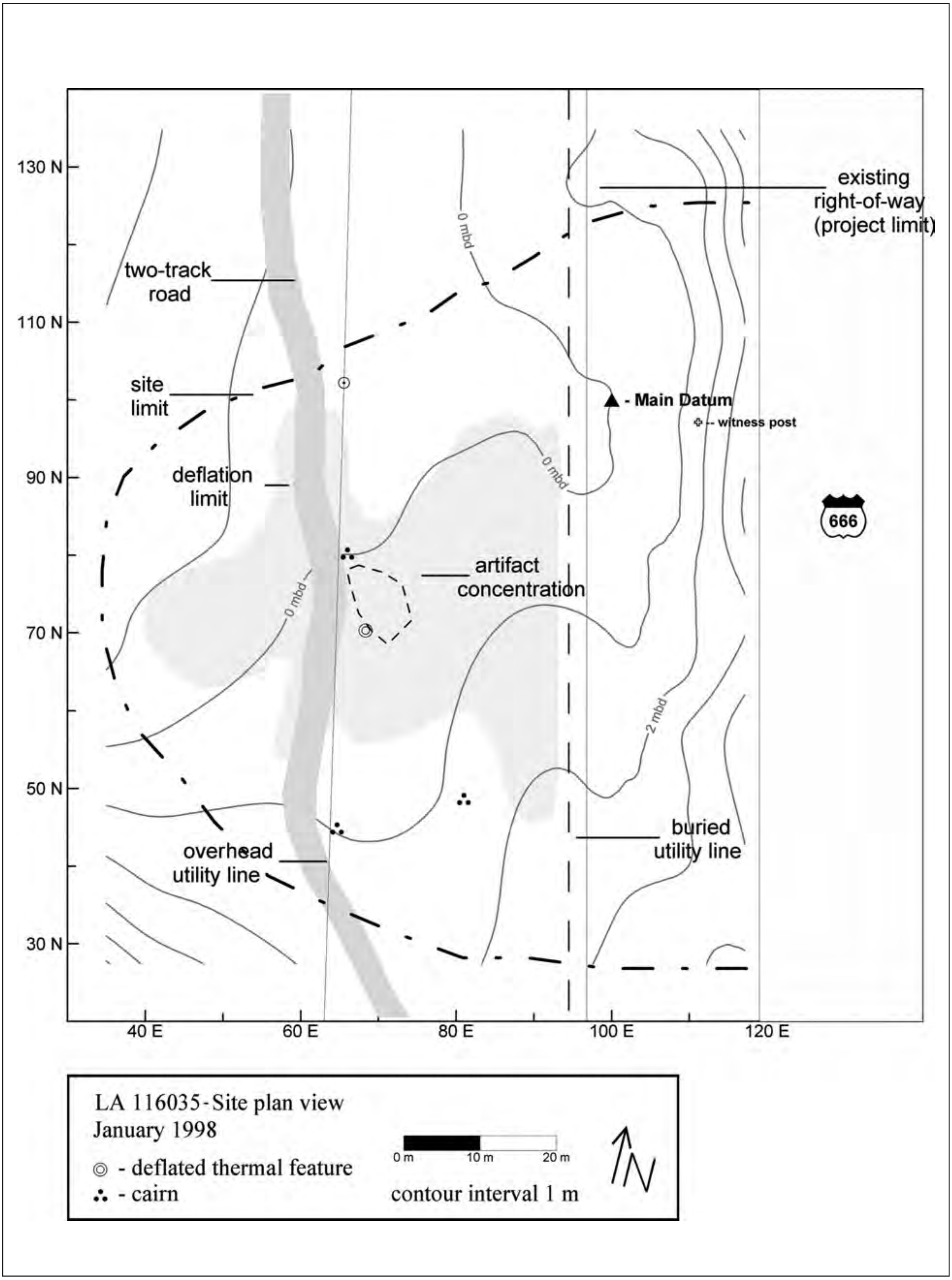


Figure 9.1. LA 116035, site plan.

Figure 9.2. LA 116035, overview.

Table 9.1. LA 116035, artifact type by collection method.

Artifact Type		Collection Method				
		In-field Analysis	Intensive Surface Collection	Screened (1/4")	Flotation	Table Total
Ceramic	Count	34	13	8	–	**55**
	Row %	61.82	23.64	14.55	–	**100.00**
	Col. %	64.15	61.90	11.59	–	**37.93**
Lithic	Count	19	7	61	–	**87**
	Row %	21.84	8.05	70.11	–	**100.00**
	Col. %	35.85	33.33	88.41	–	**60.00**
Ground stone	Count	–	1	–	–	**1**
	Row %	–	100.00	–	–	**100.00**
	Col. %	–	4.76	–	–	**0.69**
Macrobotanical	Count	–	–	–	2	**2**
	Row %	–	–	–	100.00	**100.00**
	Col. %	–	–	–	100.00	**1.38**
Table Total	**Count**	**53**	**21**	**69**	**2**	**145**
	Row %	**36.55**	**14.48**	**47.59**	**1.38**	**100.00**
	Col. %	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

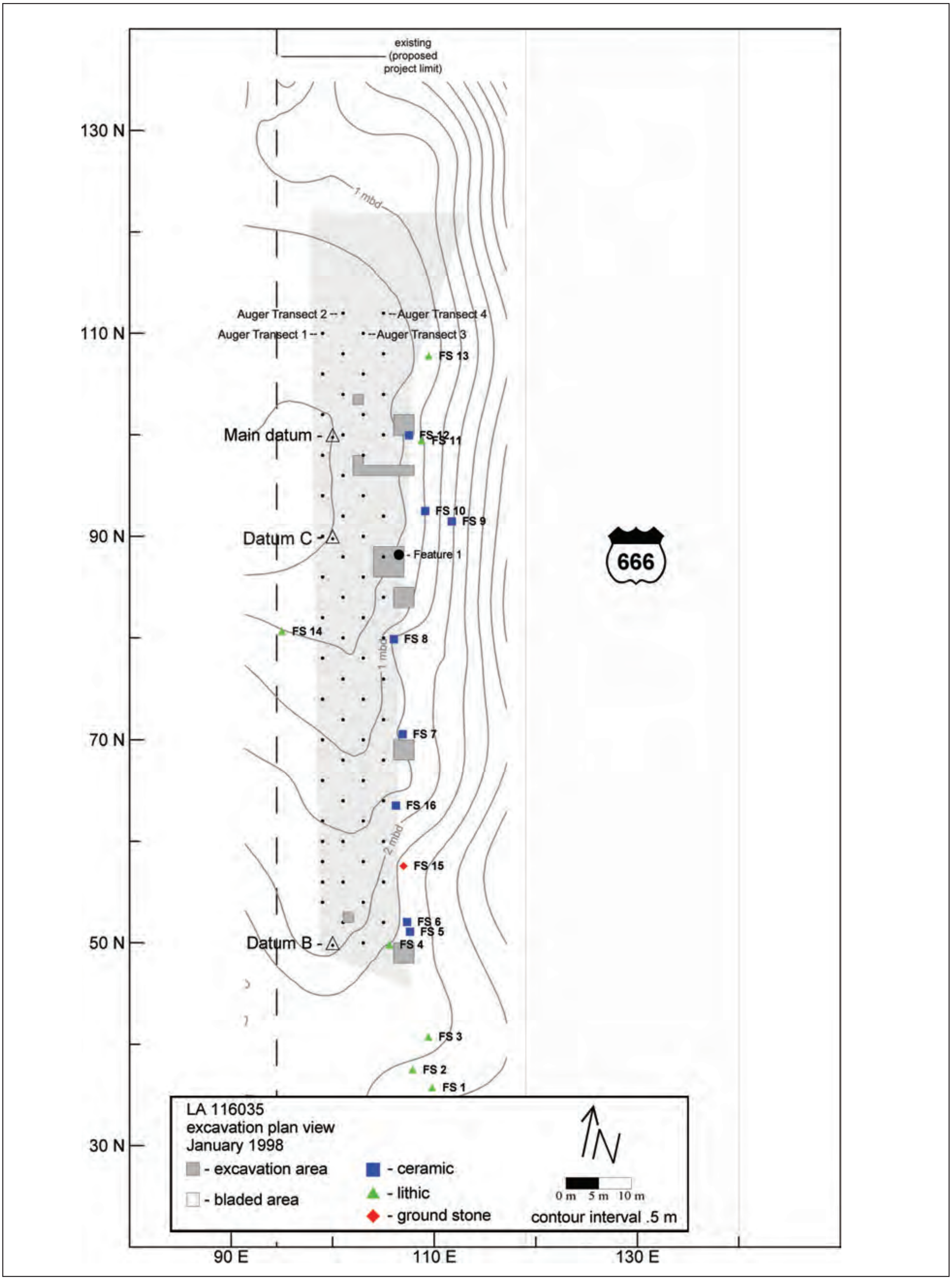


Figure 9.3. LA 116035, excavation, plan view.

Stratigraphy

Stratum 1 was a modern eolian deposit of fine, loose, yellowish brown (10YR 5/4 dry), silty sand. This layer contained a limited amount of cultural material, which appeared to be redeposited. Stratum 1 ranged in depth from 15 to 35 cm and was thickest at the east end of the excavation area.

Stratum 2 was a layer of coarse, semicompact, pale brown (10YR 6/3 dry), road construction debris, including base course gravel and asphalt. This layer, devoid of cultural material, had a maximum thickness of 15 cm. Stratum 2 was most evident at the western portion of the excavation area and became less distinct toward the east.

Stratum 3 was a deposit of fine, loose, consisted of a pale brown (10YR 6/3 dry), silty sand. Stratum 3 was positioned over friable sandstone bedrock and contained small sandstone spalls and cultural material including lithic artifacts and charcoal flecks. The sandstone spalls appear to have originated from the bedrock surface. This homogeneous layer had a maximum thickness of 30 cm deposit and is similar to the Upper Nakaibito Formation described by Sant and other (1999). This layer is also similar, if not identical, to Stratum 4 at LA 32964. The boundary between Stratum 2 and Stratum 3 was clear and abrupt. Diagnostic artifacts associated with this layer included ceramics representative of the Basketmaker III and Pueblo periods.

Finally, Stratum 4 was the sandstone bedrock substrate (Fig. 9.4).

Features

Feature 1 was constructed by excavating a shallow basin with gently sloping sides into the original ground surface (Stratum 3). The sides were unlined; however, native sandstone bedrock formed the base of this feature. Feature 1 measured 50 cm north–south by 70 cm east–west, had a maximum depth of 8 cm, and contained a primary deposit of charcoal rich soil. The boundary between this deposit and the native soil was weak due to diffusion of feature fill. Therefore, feature boundaries were inferred based on the extent of charcoal-rich soil. The charcoal-stained base of Feature 1 indicates that this feature was originally constructed down to the native bedrock (Fig. 9.5).

No portion of this feature was oxidized. Although lack of oxidation could be contributed to poor preservation, Feature 1 may have been used for tasks requiring low temperatures. Chronometric

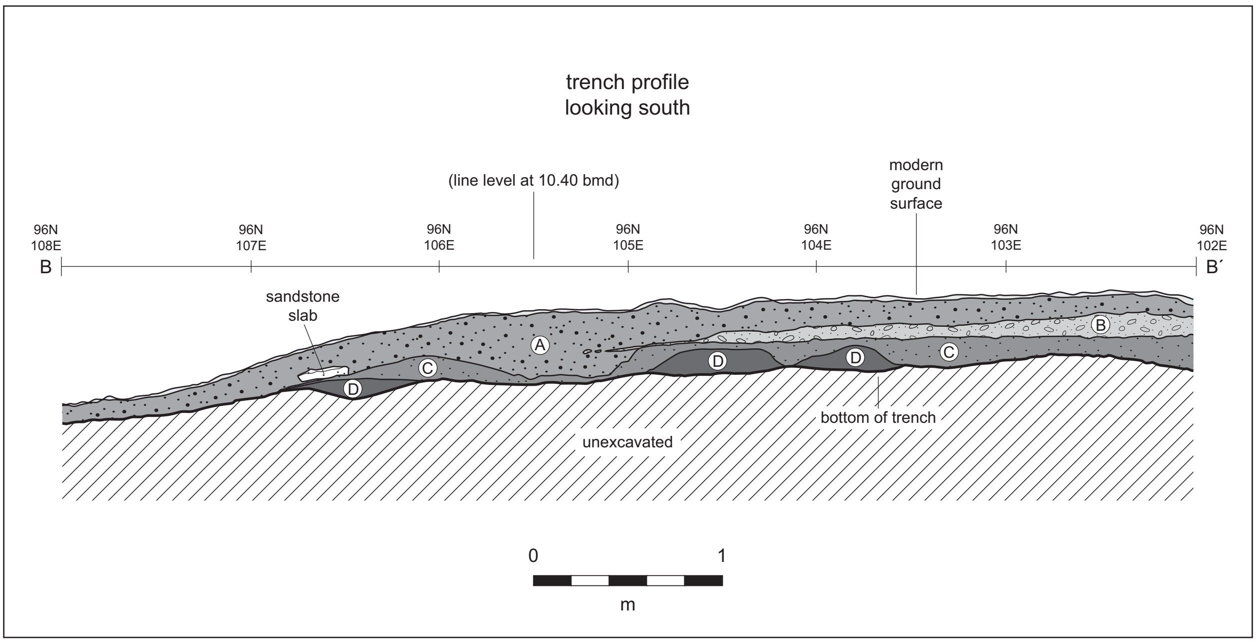


Figure 9.4. LA 116035, soil profile.

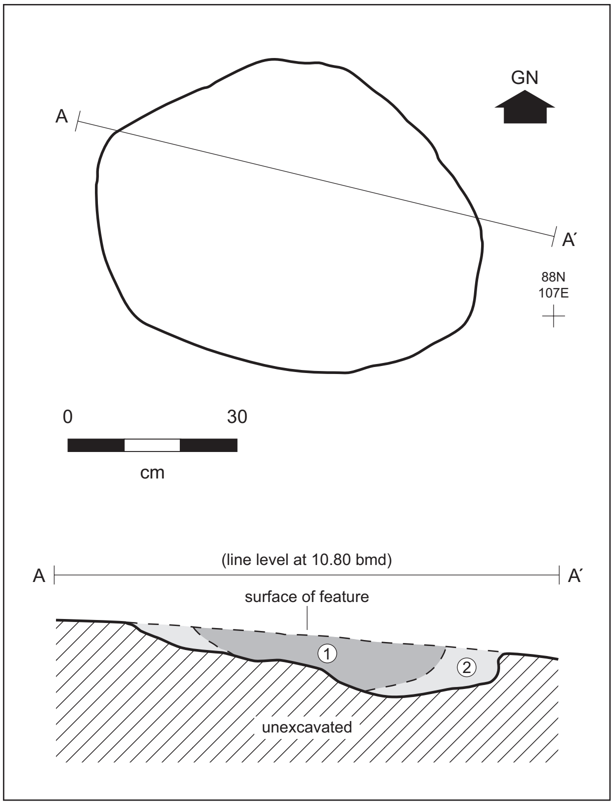


Figure 9.5. LA 116035, Feature 1, plan and profile.

samples could not be obtained from this feature due to insufficient thermal alteration for archaeomagnetic data and insufficient charcoal for radiocarbon data. Ethnobotanical data, derived from flotation samples, were limited to small amounts of uncharred *Chenopodium*.

Material Culture

Cultural material recovered from LA 116035 during data recovery investigations were limited to ceramic, lithic, and ground stone artifacts. The majority of these remains were recovered from the modern ground surface with few recovered from subsurface contexts. These remains are discussed in the following section.

Ceramics

In all, 55 ceramic artifacts were sampled from the modern ground surface and in upper fill levels at LA 116035. Twenty one sherds were recovered from surface and subsurface contexts within the proposed project area with an additional 34 recorded through in-field analysis. Temporal periods represented in the assemblage include Basketmaker III, Pueblo II, and Pueblo III (Table 9.2). The low frequency of ceramic artifacts may reflect the periodic or short-term use of this location during the Basketmaker III, Pueblo II, and Pueblo III periods, rather than a residential or habitation use. Periodic use of this location may be related to the procurement or processing of locally or seasonally available resources.

Lithics

In all, 87 lithic artifacts were identified at LA 104106. Sixty eight pieces of chipped stone were collected from surface and subsurface context with an additional 19 pieces recorded through in-field analysis (Table 9.1). Of the 87 lithic artifacts identified at LA 116035 nearly 60 percent were recovered from Stratum 3 (Table 9.3). In-field analysis monitored several of the same attributes presented in the formal analysis presented in *Office of Archaeological Studies Standardized Chipped Stone Analysis Manual* (OAS Staff 1994a) including material type, material quality, morphology, dorsal cortex, portion, platform type, length, width, and thickness.

The lithic assemblage from LA 116035 was dominated by locally available raw material types. Material types identified in the assemblage included silicified wood followed by chert and trace amounts of quartzite, siltstone, obsidian, and chalcedony. Silicified wood is abundant in the area, and ranges in quality from flawless, cryptocrystalline to flawed, medium-grained textures. The dominance of silicified wood is common at other sites excavated near the project area (Kearns et al. 1999; Skinner 1999a). Chert, chalcedony, limestone, and quartzite are also locally available in terrace and stream gravel deposits (Warren 1967:118). Obsidian was the only nonlocal material type identified.

The lithic assemblage is dominated by debitage resulting from core reduction with limited evidence of biface manufacture or maintenance. Together, core flakes, angular debris, and flake fragments combined comprised 93.1 percent (n = 81) of the total assemblage with evidence of biface produc-

Table 9.2. LA 116035, ceramic tradition, ware, and type by collection method.

Pottery Type		Collection Method			
		In-field Analysis	Intensive Surface Collection	Screened (1/4")	Table Total
Cibola Gray Ware					
Gray, plain body	Count	21	1	4	**26**
	Row %	80.77	3.85	15.38	**100.00**
	Col. %	61.76	7.69	50.00	**47.27**
Gray indented, corrugated	Count	9	–	–	**9**
	Row %	100.00	–	–	**100.00**
	Col. %	26.47	–	–	**16.36**
Gray, plain corrugated	Count	–	9	4	**13**
	Row %	–	69.23	30.77	**100.00**
	Col. %	–	69.23	50.00	**23.64**
Cibola White Ware					
White ware, unpainted, polished	Count	1	2	–	**3**
	Row %	33.33	66.67	–	**100.00**
	Col. %	2.94	15.38	–	**5.45**
White ware, mineral paint (undifferentiated)	Count	–	1	–	**1**
	Row %	–	100.00	–	**100.00**
	Col. %	–	7.69	–	**1.82**
Gallup Black-on-white	Count	1	–	–	**1**
	Row %	100.00	–	–	**100.00**
	Col. %	2.94	–	–	**1.82**
La Plata Black-on-white	Count	1	–	–	**1**
	Row %	100.00	–	–	**100.00**
	Col. %	2.94	–	–	**1.82**
Pueblo III (indeterminate organic)	Count	1	–	–	**1**
	Row %	100.00	–	–	**100.00**
	Col. %	2.94	–	–	**1.82**
Table Total	**Count**	**34**	**13**	**8**	**55**
	Row %	**61.82**	**23.64**	**14.55**	**100.00**
	Col. %	**100.00**	**100.00**	**100.00**	**100.00**

tion or maintenance limited to a single biface flake. Nearly 83 percent of the assemblage lacked cortex suggesting the raw materials were transported to the site in a partially reduced state (Table 9.4). Whole flake dimensional data presented in Table 9.5 show that whole flakes produced from local fine-grained cryptocrystalline material types are smaller than those produced from sedimentary and quartzite materials. This indicates that the parent nodules of higher quality materials types are smaller or further reduced than sedimentary and quartzite types. This size difference may also be related to the types of implements being produced. A relatively smaller flake size would result from chipped stone tools compared to the larger flake size associated with the maintenance and manufacture of ground stone or battered tools made from cryptocrystalline and sandstone/quartzite materials, respectively.

As previously stated, the majority of debitage identified at the site (n = 81 [61.7 percent]) was recovered from Stratum 3. Furthermore, 92 percent (n = 46) of the Stratum 3 lithics were recovered from a 3 by 3 m area excavated adjacent to Feature 1. While the majority of the debitage was identified from lower fill levels, all formal tools (bifaces) and cores were identified from surface context (Table 9.1). The inverse stratigraphic relationship between debitage and formal tools indicate two functional

Table 9.3. LA 116035, artifact type by stratum.

Stratum		Artifact Type				Table Total
		Ceramic	Lithic	Ground Stone	Macro-botanical	
0	Count	47	26	1	–	**74**
	Row %	63.51	35.14	1.35	–	**100.00**
	Col. %	85.45	29.89	100.00	–	**51.03**
1	Count	8	10	–	–	**18**
	Row %	44.44	55.56	–	–	**100.00**
	Col. %	14.55	11.49	–	–	**12.41**
2	Count	–	1	–	–	**1**
	Row %	–	100.00	–	–	**100.00**
	Col. %	–	1.15	–	–	**0.69**
3	Count	–	50	–	–	**50**
	Row %	–	100.00	–	–	**100.00**
	Col. %	–	57.47	–	–	**34.48**
10	Count	–	–	–	2	**2**
	Row %	–	–	–	100.00	**100.00**
	Col. %	–	–	–	100.00	**1.38**
Table Total	**Count**	**55**	**87**	**1**	**2**	**145**
	Row %	**37.93**	**60.00**	**0.69**	**1.38**	**100.00**
	Col. %	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

and possibly temporal divisions, however these relationships are more likely the result of mechanical disturbance and deflation.

Formal tools types identified include a core, a core/chopper, a hammerstone, and biface fragments. The single core made of silicified wood was substantially reduced, displayed multidirectional flake scars, lacked cortex, and measures 30 by 20 by 15 mm. A single core/chopper recorded through in-field analysis was made from a medium-grained sandstone that lacked cortex. This item displayed unidirectional flake scars and measured 130 by 80 by 50 mm. Two biface fragments were also identified at the site. FS 4, collected from the modern ground surface, was an indeterminate middle stage biface fragment made from silicified wood. This tool measured 31 by 14 by 6 mm. The bending fracture present indicates the tool may have been broken during manufacture. A second indeterminate biface fragment, also made from silicified wood, was recorded through in-field analysis and measured 17 mm wide and 3 mm thick. Limited evidence for biface manufacture identified at LA 116035 suggests these tools were transported to this location. In addition to flaked stone tools, a single indeterminate ground stone fragment was recovered from this site.

Ground Stone

Jesse B. Murrell

A single ground stone artifact (FS 15) was recovered from LA 116035. This artifact, recovered during the surface collection, is an indeterminate fragment derived from a fine-grained sandstone that lacked evidence of production input. The edge fragment displays a single flat use surface with grinding/faceting wear and evidence of maintenance or grinding surface rejuvenation displayed as pecking. The fragment measured 163 mm long by 132 mm wide by 43 mm thick and weighed 1,200 g.

Research Questions

LA 116035 was a multicomponent artifact scatter with a single thermal feature identified within the project area. Systematic data collection and artifact analysis were used to address some of the questions presented in the research design. Ceramic and lithic artifacts were recovered from different vertical contexts. As ceramic frequency decreased with depth, lithic artifacts increased suggesting portions

Table 9.4. LA 116035, lithic artifact data by material quality and dorsal cortex.

				Cortex Retention Class											
				Lacks Cortex					10–50%			60–100%			
				Material Quality					Material Quality			Material Quality			
Stratum	**Material Type**	**Artifact Function**	**Artifact Morphology**	**Glassy**	**Glassy and Flawed**	**Fine-grained**	**Fine-grained and Flawed**	**Medium-grained**	**Medium-grained and Flawed**	**Fine-grained**	**Fine-grained and Flawed**	**Medium-grained**	**Fine-grained**	**Medium-grained**	**Table Total**
0	Chert	Unutilized debitage	Angular debris	–	–	–	–	–	–	–	1	–	–	–	**1**
			Core flake	–	–	–	–	–	–	1	–	–	–	–	**1**
	Silicified wood	Unutilized debitage	Angular debris	–	–	3	2	–	–	1	1	–	–	–	**7**
			Core flake	–	–	4	–	–	–	4	–	–	1	–	**9**
		Biface	Early stage biface	–	–	1	–	–	–	–	–	–	–	–	**1**
			Middle stage biface	–	–	1	–	–	–	–	–	–	–	–	**1**
		Core	Multidirectional core	–	–	1	–	–	–	–	–	–	–	–	**1**
	Sandstone	Chopper	Unidirectional cobble tool	–	–	–	–	1	–	–	–	–	–	–	**1**
	Siltstone	Unutilized debitage	Core flake	–	–	–	–	–	–	1	–	–	–	–	**1**
	Meta-quartzite	Unutilized debitage	Angular debris	–	–	–	–	–	–	–	1	–	–	–	**1**
			Flake fragment	–	–	–	–	–	–	–	–	1	–	–	**1**
		Hammerstone	Hammerstone	–	–	–	–	–	–	–	–	–	–	1	**1**
1	Chert	Unutilized debitage	Core flake	–	–	–	1	–	–	–	–	–	–	–	**1**
	Silicified wood	Unutilized debitage	Angular debris	–	–	–	2	–	1	–	–	–	–	–	**3**
			Core flake	–	–	–	2	–	1	–	–	–	–	–	**3**
			Flake fragment	–	–	1	–	–	–	–	–	–	–	–	**1**
	Obsidian	Unutilized debitage	Core flake	–	1	–	–	–	–	–	–	–	–	–	**1**
			Flake fragment	1	–	–	–	–	–	–	–	–	–	–	**1**
2	Limestone	Unutilized debitage	Core flake	–	–	–	1	–	–	–	–	–	–	–	**1**
3	Chert	Unutilized debitage	Angular debris	–	–	2	–	–	–	–	–	–	–	–	**2**
			Core flake	–	–	1	1	–	–	–	–	–	–	–	**2**
			Flake fragment	–	–	1	–	–	–	–	–	–	–	–	**1**
3	Chalcedony	Unutilized debitage	Angular debris	–	–	–	1	–	–	–	–	–	–	–	**1**
	Silicified wood	Unutilized debitage	Angular debris	–	–	–	15	–	5	–	1	–	–	–	**21**
			Core flake	–	–	4	8	–	2	–	1	–	–	–	**15**
			Biface flake	–	–	1	–	–	–	–	–	–	–	–	**1**
			Flake fragment	–	–	–	4	–	1	–	–	–	–	–	**5**
	Obsidian	Unutilized debitage	Flake fragment	1	–	–	–	–	–	–	–	–	–	–	**1**
	Meta-quartzite	–	–	–	–	–	1	–	–	–	–	–	–	–	**1**
Table Total				**2**	**1**	**20**	**38**	**1**	**10**	**7**	**5**	**1**	**1**	**1**	**87**

Table 9.5. LA 116035, mean whole flake measurements.

Material Type		Length (mm)	Width (mm)	Thickness (mm)	Weight (g)
Silicified wood	Mean	19.31	15.69	5.75	0.83
	N	16	16	16	9
	SD	8.28	7.55	3.89	0.96
Chert	Mean	12.50	10.50	5.50	0.70
	N	2	2	2	1
	SD	3.54	3.54	0.71	–
Sedimentary	Mean	77.50	45.00	28.50	–
	N	2	2	2	–
	SD	74.25	49.50	30.41	–
Quartzite	Mean	51.00	38.50	17.50	21.70
	N	2	2	2	1
	SD	8.49	9.19	3.54	–
Total	**Mean**	**26.86**	**19.95**	**8.86**	**2.72**
	N	**22**	**22**	**22**	**11**
	SD	**26.04**	**16.64**	**10.38**	**6.35**

SD = Standard Deviation

of this site may be the result of an aceramic occupation (Table 9.1). Although an aceramic component is likely, making a clear distinction between occupation horizons is precluded due to small sample size and the extent of disturbance. While the limited data at LA 116035 have limited potential for the addressing some of the research questions presented in the data recovery plan, other questions such as chronology, duration of occupation, site function, and role within the settlement system can be addressed by the data.

Chronology

LA 116035 appears to be the result of periodic, short-term occupations during the Basketmaker III, Pueblo II–Pueblo III time. A third, aceramic, component was reflected by the inverse stratigraphic relationship between ceramic and lithic artifacts. Although this component is probable, it was impossible to isolate due to the lack of temporally diagnostic artifacts, chronometric data, and intact deposits.

Site Activities and Function

Site activities and site function are difficult to interpret from the spatial and temporal patterns identified in artifact and feature attributes due to the disturbed and deflated context of these remains. In general, LA 116035 appears to be the result of periodic, short-term occupations. Based on the frequency of ceramic types the most frequent or prolonged occupations occurred during the Pueblo II–Pueblo III periods with less frequent or brief occupations occurring during the Basketmaker III period. Lithic data indicate partially reduced raw materials and formal tools were transported to this location for further reduction and use. The presence of three temporal components reflected in low density ceramic assemblages combined with a lithic technology focused on the further reduction of partially reduced raw materials and formal tools suggest that site function remained stable over time. One temporally stable function may be related to the procurement and/or processing of locally available biotic resources.

Temporal and site function interpretations for LA 116035 were examined through an intersite comparison with post-Basketmaker II material recovered from LA 32964, located approximately 200 m (656.2 ft) to the north. LA 32964 is an extensive site characterized by a dispersed multicomponent artifact scatter with discrete Basketmaker II and Pueblo II–Pueblo III components. Ceramic and lithic data from these two sites were compared to identify temporal or functional similarities. Data from LA 32964 was selected based on similarities in the collection methods applied to LA 116035. This included assemblages derived from surface inventories and grid units excavated in arbitrary 10 cm levels using 1/4-inch wire mesh. Data collected from the Pueblo II–Pueblo III component located beyond the project limits at LA 32964 were excluded since sample size and recovery methods from these areas were incompatible with those from LA 116035.

Analysis of the ceramic data identified overlapping occupation sequences between LA 116035 and LA 32964. This means that more Pueblo II–Pueblo III pottery was observed at LA 116035 and more Basketmaker III–Pueblo I pottery was observed at LA 32964. Statistical analysis displayed an inverse relationship in Basketmaker III to Pueblo period ceramics between data sets (χ^2 = 16.564, df = 1, p = .000); Fisher's Exact [2-sided] p = .000) (Table 9.6). A comparison of ware group frequencies (χ^2 = 1.658, df = 1, p = .198, 1 cells [25 percent] with expected counts < 5; Fisher's Exact [2-sided] p = 1.000) and vessel form frequencies (χ^2 = .557, df = 1, p = .455, 1 cells [25 percent] with expected counts < 5; Fisher's Exact [2-sided] p = 1.000), however, did not produce significant differences between these assemblages. Statistical differences indicate LA 116035 was occupied longer or more frequently during the Pueblo period than the Basketmaker III period compared to the sampled portion of LA 32964. Similarities in ware type and vessel form indicate stable ceramic tool requirements for site activities between these two locations.

Unlike the ceramic data, lithic data did not display significant differences in the frequency of debitage morphology (χ^2 = 2.155, df = 1, p = .142, 1 cells [25 percent] with expected counts < 5; Fisher's Exact [2-sided] p = .199) or material source (χ^2 = 2.039, df = 1, p = .153; Fisher's Exact [2-sided] p = .225) between the two assemblages. Tool frequencies, however, are significantly different (χ^2 = 4.511, df = 1, p = .034, 2 cells [50 percent] with expected counts < 5; Fisher's Exact [2-sided] p = .053) suggesting similarities in reduction strategies and material selection but not tool use. An ANOVA test comparing mean whole flake measurements between LA 116035 and LA 32964 produced no significant difference in flake dimensions (Table 9.7). Similarities in morphology, material selection, and debitage size, yet differences in tool use suggest site activities also differed. One functional difference may be related to the procurement or processing of locally or seasonally available biotic resources. Although no evidence of cultigens was identified, they would have provided a predictable and seasonally available resource supporting the interpretation that LA 116035 was a Pueblo-period field camp (Mensel 1996).

Higher formal tool frequency combined with minimal evidence for biface manufacture suggests the site occupants transported cores and tools to LA 116035 for use and further reduction. This comparison suggests that activities at LA 116035 and the mixed post-Basketmaker II component at LA 32964 had similar ceramic but different lithic requirements which may reflect functional or temporal differences.

Table 9.6. LA 116035 and LA 32964, ceramic component comparison.

Component	**LA Crosstabulation**			
		LA 32964	**LA 116035**	**Total**
Basketmaker III	Count	133	27	**160**
	Expected count	121.06	38.94	**160**
Pueblo II–Pueblo III	Count	38	28	**66**
	Expected count	49.94	16.06	**66**
Total	**Count**	**171**	**55**	**226**
	Expected count	**171**	**55**	**226**

Table 9.7. ANOVA results from LA 116035 and LA 32964 whole flake size comparison.

		Sum of Squares	df (Degrees of Freedom)	Mean Square	F	Sigma
Length (mm)	Between groups	1083.445074	1	1083.445074	3.046795138	0.084096149
	Within groups	34137.7488	96	355.60155	–	–
	Total	**35221.19388**	**97**			
Width (mm)	Between groups	133.4401914	1	133.4401914	0.634514856	0.427669585
	Within groups	20189.05981	96	210.3027063	–	–
	Total	**20322.5**	**97**			
Thickness (mm)	Between groups	258.1658041	1	258.1658041	3.87095182	–
	Within groups	6402.538278	96	66.69310706	–	
	Total	**6660.704082**	**97**			
Weight (g)	Between groups	907.2787228	1	907.2787228	0.202048393	0.65425837
	Within groups	368213.0512	82	4490.403063	–	–
	Total	**369120.3299**	**83**			

Community Interaction

Investigations at LA 116035 yielded limited data to address concerns about community interaction. Chronometric control is inadequate for distinguishing various temporal components useful for identifying spatially contemporaneous sites. The few pieces of nonlocal lithic materials suggest that site occupants had limited access to nonlocal material resources. Although the site occupants may have acquired these materials through a trade network, they could have just as likely been scavenged from the nearby LA 32964.

10 | Ceramic Report

C. Dean Wilson

Investigations conducted during the Twin Lakes project resulted in the recording and recovery of 9,146 sherds from LA 32964, LA 103446, LA 104106, and LA 116035 (Table 10.1). The great majority of this pottery represents types manufactured during the Basketmaker III period, such as those identified at LA 104106 and LA 32964. In addition, distributions of pottery types indicate the limited use of various locations investigated during the Twin Lakes project area during the Pueblo II, Pueblo III, and early Navajo periods.

Previous studies of ceramic assemblages in the general area have resulted in a range of characterizations and interpretations of pottery trends for Basketmaker III and later occupations in the Chuska Valley and surrounding areas (Condon 1982; Hays-Gilpin et al. 1999; K. Hensler 1999; Morris 1980; Reed and Hensler 1999; P. Reed et al 2000; Fowler 1994; Wilson 1989; Waterworth 1999). In order to compare Twin Lakes pottery trends to those noted in other studies, attempts were made to utilize categories and approaches allowing for documentation of pottery distributions in a manner consistent with those utilized in earlier studies. Initial discussions in this report focus on the definition and description of analytical categories recorded during the Twin Lakes project. Interpretations of data, reflected by the distribution of the various categories recorded, will focus on attempts to utilize pottery distributions to determine the time of occupation reflected in assemblages from various contexts. Finally, pottery distributions from dated contexts were used to examine a variety of trends noted for various temporal components including those relating to pottery production, technology, exchange, and use. This data will also be combined with that accumulated during other studies in this area to examine regional trends and patterns.

Methodology

It is important to employ a pottery analysis system that can be used to monitor a wide range of variables to discern ceramic manufacture traits and influences. Analysis of pottery recovered during the Twin Lakes project involved examining sherds from each provenience at a site. Sherds displaying similar combinations of unique characteristics were separated into distinct groups or lots. Information about each sherd lot was recorded as a distinct data line. Consecutive lot number were assigned to each FS number. Sherds assigned to each lot were placed into a separate bag along with a small slip of acid-free paper recording the site, FS, and lot numbers. Information recorded during ceramic analysis included associated site, FS, and lot numbers, typological assignments, descriptive attribute codes, sherd count, and total lot weight. These procedures allow for merging ceramic data with proveniences data, and provided a system for locating items for data editing and more detailed analyses of pattern recognition.

Attribute Descriptions

Recording information about descriptive attributes reflected in pottery from various lots allows for analysis of the distribution of traits in a particular ceramic assemblage. Descriptive attribute classes recorded for all sherds analyzed during the Twin Lakes project include temper, interior pigment, ex-

Table 10.1. Distribution of pottery types at Twin Lakes project sites.

		LA 32964	LA 103446	LA 104106	LA 116035	Total
Cibola						
Plain rim	Count	2	–	308	–	**310**
	Col. %	1.70%	–	3.40%	–	**3.40%**
Unknown rim	Count	–	–	26	–	**26**
	Col. %	–	–	0.30%	–	**0.30%**
Plain body	Count	78	–	7421	5	**7504**
	Col. %	67.80%	–	82.50%	23.80%	**82.50%**
Indented corrugated	Count	–	–	58	–	**58**
	Col. %	–	–	0.60%	–	**0.60%**
Plain corrugated	Count	19	4	117	13	**153**
	Col. %	16.50%	33.30%	1.30%	61.90%	**1.70%**
Alternating corrugated	Count	–	–	2	–	**2**
	Col. %	–	–	0.00%	–	**0.00%**
Unfired plain gray ware	Count	–	–	11	–	**11**
	Col. %	–	–	0.10%	–	**0.10%**
Mudware	Count	–	–	10	–	**10**
	Col. %	–	–	0.10%	–	**0.10%**
Lino Smudged	Count	–	–	2	–	**2**
	Col. %	–	–	0.00%	–	**0.00%**
Unpainted polished white ware	Count	2	1	228	2	**233**
	Col. %	1.70%	8.30%	2.50%	9.50%	**2.50%**
Mineral paint (undifferentiated)	Count	3	5	21	1	**30**
	Col. %	2.60%	41.70%	0.20%	4.80%	**0.30%**
Pueblo II (indeterminate mineral)	Count	–	–	7	–	**7**
	Col. %	–	–	0.10%	–	**0.10%**
Escavada Black-on-white (solid designs)	Count	1	–	21	–	**22**
	Col. %	0.90%	–	0.20%	–	**0.20%**
Pueblo II (thick parallel lines)	Count	–	–	2	–	**2**
	Col. %	–	–	0.00%	–	**0%**
Gallup Black-on-white	Count	1	1	13	–	**15**
	Col. %	0.90%	8.30%	0.10%	–	**0.20%**
Basketmaker III–Pueblo I (indeterminate mineral)	Count	–	–	169	–	**169**
	Col. %	–	–	1.90%	–	**1.90%**
Chaco McElmo Black-on-white	Count	–	–	1	–	**1**
	Col. %	–	–	0.00%	–	**0%**
White Mound Black-on-white	Count	1	–	14	–	**15**
	Col. %	0.90%	–	0.20%	–	**0.20%**
La Plata Black-on-white	Count	–	–	158	–	**158**
	Col. %	–	–	1.80%	–	**1.70%**
Pueblo III (indeterminate organic)	Count	–	–	5	–	**5**
	Col. %	–	–	0.10%	–	**0.10%**
White Mountain Red (painted, undifferentiated)	Count	1	–	1	–	**2**
	Col. %	0.90%	–	0.00%	–	**0%**
St. Johns Polychrome	Count	–	–	1	–	**1**
	Col. %	–	–	0.00%	–	**0%**
White Mountain Red (unpainted, undifferentiated)	Count	1	–	–	–	**1**
	Col. %	0.90%	–	–	–	**0%**
Tallahogan Red (red slip over white paste)	Count	1	–	39	–	**40**
	Col. %	0.90%	–	0.40%	–	**0.40%**

(Table 10.1, continued)

		LA 32964	LA 103446	LA 104106	LA 116035	Total
Tohatchi Red (red slip over red paste)	Count	–	–	1	–	**1**
	Col. %	–	–	0.00%	–	**0%**
Tohatchi Red-on brown	Count	–	–	3	–	**3**
	Col. %	–	–	0.00%	–	**0%**
Western Pueblo						
Acoma/Zuni Polychrome (undifferentiated)	Count	–	–	22	–	**22**
	Col. %	–	–	0.20%	–	**0.20%**
Acoma/Zuni Polychrome unpainted polished red	Count	–	–	27	–	**27**
	Col. %	–	–	0.30%	–	**0.30%**
Mesa Verde						
Unpainted white ware (undifferentiated)	Count	–	–	4	–	**4**
	Col. %	–	–	0.00%	–	**0%**
Mineral paint (undifferentiated)	Count	–	–	2	–	**2**
	Col. %	–	–	0.00%	–	**0%**
Plain gray	Count	–	–	1	–	**1**
	Col. %	–	–	0.00%	–	**0%**
Piedra Black-on-white	Count	–	–	1	–	**1**
	Col. %	–	–	0.00%	–	**0%**
Chapin Black-on-white	Count	–	–	6	–	**6**
	Col. %	–	–	0.10%	–	**0.10%**
Mancos Black-on-white (hachured)	Count	–	–	1	–	**1**
	Col. %	–	–	0.00%	–	**0%**
Mancos Black-on-white (solid and hachured)	Count	1	–	–	–	**1**
	Col. %	0.90%	–	–	–	**0%**
Chuska						
Basketmaker III–Pueblo I (indeterminate)	Count	–	–	3	–	**3**
	Col. %	–	–	0.00%	–	**0%**
Chuska Corrugated	Count	–	1	1	–	**2**
	Col. %	–	8.30%	0.00%	–	**0%**
Mogollon						
San Francisco Red	Count	–	–	4	–	**4**
	Col. %	–	–	0.00%	–	**0.00%**
Alma Plain rim	Count	–	–	5	–	**5**
	Col. %	–	–	0.10%	–	**0.10%**
Alma Plain body	Count	–	–	57	–	**57**
	Col. %	–	–	0.60%	–	**0.60%**
Athabaskan						
Dinetah Gray	Count	4	–	224	–	**228**
	Col. %	3.50%	–	2.50%	–	**2.50%**
Total	**Count**	**115**	**12**	**8998**	**21**	**9146**
	Col. %	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**

terior pigment, interior manipulation, exterior manipulation, interior slip, exterior slip, vessel form, vessel appendage, modification, rim radius, and rim arc. A small sub-sample of sherds was also subjected to refiring analysis. Descriptions of the attribute categories recognized during the present study follow.

Temper. Temper refers to the characteristics of aplastic particles intentionally added to the clay or inclusions that occur naturally in the clay that would have served the same purpose. Temper analysis involved examining freshly broken sherd surfaces through a binocular microscope. Such characterizations are limited, but broad temper categories can be recognized based on combinations of color, shape, fracture, and sheen of tempering particles. Temper categories are useful for the identification of material sources that were used by prehistoric potters in various regions of the Southwest.

The dominant category recorded during the present study was recorded as *Dark matrix sandstone* (Fig. 10.1). This is represented by very fine rounded sand grains, which tend to be smaller than those recorded for the sand category, along with angular matrix fragments. These matrix fragments are dull, and appear to represent a material very high in hematite. A few sherds with a similar matrix consisted of sand particles of varying size and color and represent the use of poorly sorted sandstone. They were assigned to a *Multi-lithic sand* category.

The color of matrixes in sandstones assigned to this category was quite variable and includes examples recorded as black (0.8 percent), orange and black (1 percent), gray (2.3 percent), pale orange (0.9 percent), gray and red (1.2 percent), black, brown, white, and red (1.2 percent), brown and white (1.6 percent), brown (3.3 percent), black and red (1.3 percent), white (0.5 percent), red (1.0 percent), orange (0.6 percent), yellow (1.0 percent), and brown (2.7 percent). Similar ranges in colors were noted

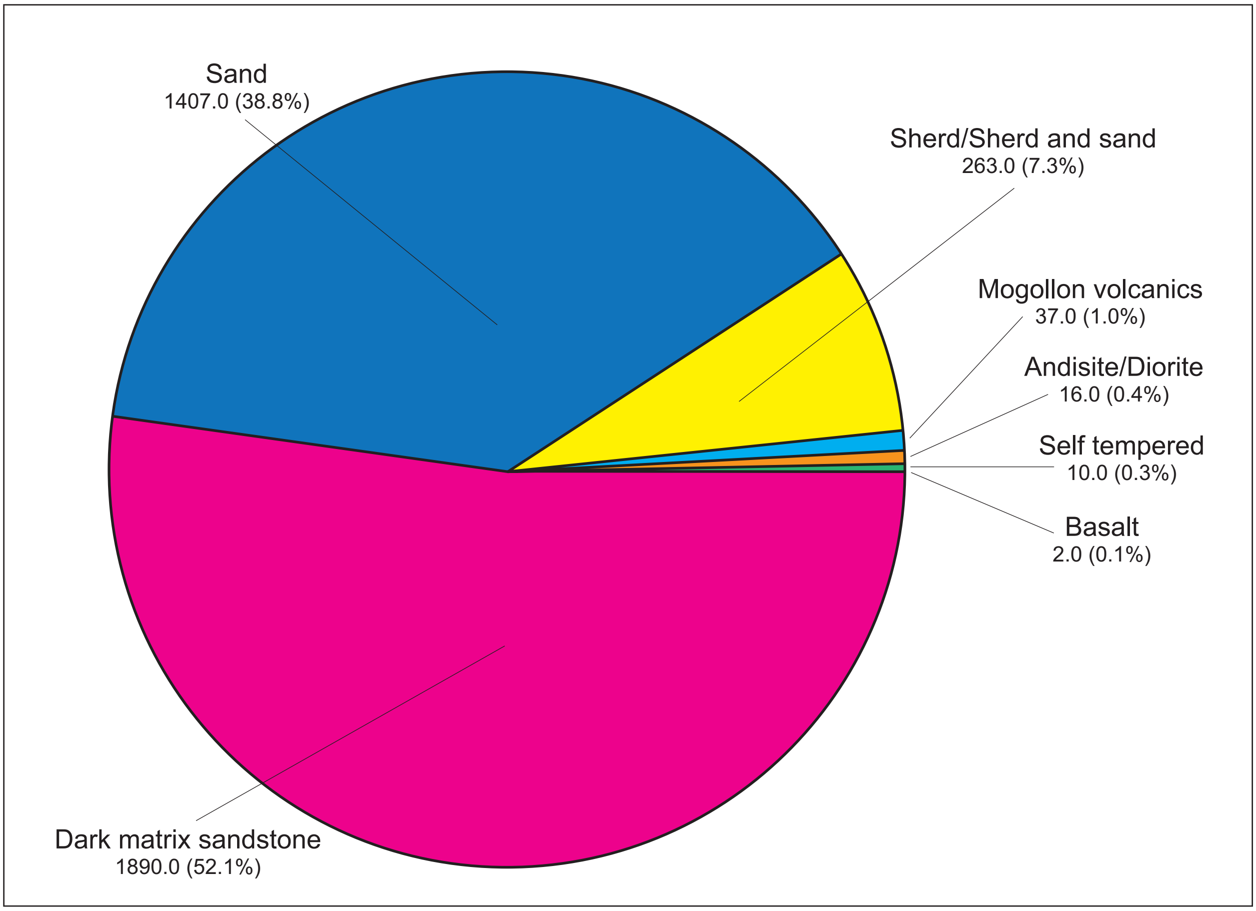


Figure 10.1. Pie chart of temper-type frequency.

for sandstone tempers recorded during the El Paso Natural Gas and N31–32 projects (Reed and Hensler 1998; Waterworth 1999).

Refiring analysis revealed that matrixes of different colors consistently fired to red colors in an oxidizing atmosphere. Thus, a common source of sandstone with hematite rich matrixes may be represented, and color variation documented reflects variation in natural weathering and exposed firing conditions.

Sand refers to rounded or sub-rounded, well-sorted sand grains. The great majority of the sherds recovered were tempered with either sand or sandstone (Fig. 10.1). These grains are translucent, or white to gray in color and may be frosted. This category is distinguished from sandstone temper by the presence of large, even-sized quartz grains, and the absence of a matrix. Some of the sand-tempered ceramics identified during the present study were most likely produced in the Cibola (or Chaco) regions. Temper consisting of sand along with rounded white to gray dull fragments, assumed to represent natural inclusions in the clay, was assigned to an *Oblate shale and sand* category.

Sherd refers to the use of crushed potsherds as temper. Crushed sherd fragments appear white, buff, gray, or orange in color. These fragments are often distinguished from crushed rock temper by their dull, nonreflective appearance. Small reflective rock particles may be included inside or outside the sherd fragments. In some cases, the presence of fairly large particles along with crushed sherd may indicate the addition of both crushed rock and sherd. In cases where both sherd and distinctive rock fragments occur together, the combination of the two materials was noted. An example of such a combination is reflected by the *Sherd and sand* category.

Mogollon volcanics refers to the presence of natural inclusions common in clay sources in the Mogollon Highlands located in Southwestern New Mexico. Previous studies of Mogollon pottery indicate the use of pedogenic sources ultimately derived from local volcanic outcrops and volcaniclastic sandstone in the Mogollon Highlands (Wilson 1999). These clay sources usually contain numerous igneous and sandstone inclusions precluding the addition of separate tempering material. Inclusions commonly occurring in brown ware types produced in the Mogollon Highlands tend to vary in size and are often more numerous and smaller than added crushed temper particles employed in other areas of the Southwest. Volcanic inclusions found in the local clay and other deposits consist of angular basalt, rhyolite, and sand particles. Similar fragments with sand were placed into a *Mogollon volcanics and sand* category.

Andesite/diorite refers to fragments from either crushed andesites or diorite along with sand grains. This category represents a temper used by Anasazi potters in most of the Northern San Juan or Mesa Verde region (Wilson and Blinman 1995b). This category is characterized primarily by angular to subangular lithic particles that are clear to milky white and sometimes reddish. Small, black, rod-shaped crystals are present, and may occur individually or within the larger particles. Examples reflecting the presence of similar igneous rock with sand were assigned to an *Andesite or diorite and sand category*. Examples with similar igneous rock with crushed sherd were included in *Andesite or diorite and sherd*.

Self-tempered refers to the presence of naturally occurring inclusions such as extremely fine sand or silt grains as the only aplastic fragments present.

Gray crystalline basalt refers to highly reflective, angular to subangular green, gray, or black particles. These fragments are very crystalline or sugary in appearance, and are very distinct and exhibit little variability. This temper reflects the use of distinctive igneous rock sources by potters in the Chuska region in northwestern New Mexico. Sherds with similar particles along with the addition of sand were assigned to a *Basalt and sand* category.

Pigment type. Pigment categories were based on the presence, type, and color of painted decorations noted on pottery surfaces. Sherds without evidence of painted decorations were simply coded as *None* category. Those for which the type of pigment could not be determined were placed into an *Indeterminate* category.

Mineral paint refers to the use of ground minerals such as iron oxides as pigments. These decorations are applied as powdered compounds, usually applied to the vessel surface using an organic binder. Mineral pigment is present as a distinct physical layer, and rests on the vessel surface. Such pigments typically display a matte finish and are usually thick enough to exhibit visible relief. Mineral pigments usually obscure surface polish and irregularities. The firing atmospheres to which mineral pigments were exposed affects color. Mineral pigment categories identified during the present study include *Mineral black*, *Mineral black both sides*, *Mineral red*, *Mineral brown* , and *Mineral black and red*.

Organic paint refers to the use of vegetal pigment only. Organic paint typically diffuses into rather than rests on the vessel surface. Thus, streaks and polish are often visible through the paint. The painted surface is generally lustrous, depending on the degree of surface polishing. Organic pigment may be gray, black, bluish, or occasionally orange in color. The edges of the painted designs are often fuzzy, and there may be a slight ghosting beyond the painted area. A single example of a polychrome produced using a combination of black organic paint and white clay was assigned to an *Organic white clay polychrome* category.

Surface manipulation. Attributes relating to surface manipulation reflect the type of polished, slipped, and surface texture treatments noted. Surface manipulation categories were recorded for both interior and exterior pottery surfaces. Sherds were assigned to categories based on the presence and type of surface texture.

Plain unpolished refers to surfaces where coil junctures have been completely smoothed, but surfaces were not polished. *Plain striated* denotes the presence of a series of long shallow parallel grooves resulting from brushing with a fibrous tool on an unpolished surface. *Basket impressed* refers to impressions resulting from a basket pressed against a vessel surface while it was still wet.

Other categories reflect variations of corrugated textures. *Indented corrugated* refers to the presence of fine exterior coils with regular indentations on the exterior surface. *Plain corrugated* refers to gray wares with similar coil treatments and relief described for *Indented corrugated* but without regularly spaced indentations. This category differs from similar neckbanded groups by thinner coils and coiled manipulations along the vessel body. Surfaces with alternating rows of treatments described for indented and plain corrugated were assigned to an *Alternating corrugated* category.

Polished surfaces are those that have been intentionally polished after smoothing. Polishing implies intentional smoothing with a polishing stone to produce a compact and lustrous surface. Surfaces exhibiting polished treatments were assigned to a *Plain polished* category.

Some sherds exhibited slipped surfaces. Slips represent intentional applications of clay, pigment or organic deposit over the vessel surface. Such applications are used to achieve black, white, or red surface colors not obtainable using paste clays or firing regimes commonly employed. Surfaces over which high iron slip clay was applied before firing were assigned to a *Polished red slip* or *Unpolished red slip* category. Those to which a red hematite coat was applied after firing were classified as *Fugitive red*. White wares to which a low iron slip was applied were classified as *Polished white slip*. Surfaces to which a black soot layer was applied during the later stages of firing were assigned to a *Polished smudged* category. Surfaces that have been too heavily worn to determine the original surface treatments were classified as *Surface missing*.

Vessel form. Observations about pottery shape and manipulations provide clues concerning the form and use of vessels from which these sherds were derived. The placement of sherds into form categories provides for functionally significant comparisons of different sherd assemblages. Rim sherds are usually assigned to more specific categories than body sherds.

Indeterminate refers to cases where vessel form is unknown. *Bowl rim* refers to sherds exhibiting inward curvature from the rim indicating they derived from bowls. *Bowl body* refers to body sherds with interior polishing or painted decoration.

Most of the sherds identified during the present study are unpolished body sherds for which the precise vessel form could not be determined. Most unpolished gray body sherds were assigned to a *Jar body* category, although some of these could have derived from bowls. Body sherds were assigned to this category only if they exhibited evidence of painting or polishing on the exterior surface only. *Jar neck* includes body jar sherds with curvature indicating they were derived from necked jars. *Jar rim* refers to rim sherds derived from jars with relatively wide rim diameters. Such rims are often associated with vessels used for cooking or storage. This form is distinguished from other jar rim forms by a wide orifice relative to vessel size.

Several other jar forms were also identified based on rim shape. *Seed jar rim* refers to spherical-shaped vessels with openings near the top. Rim sherds with an outward slope from the rim were classified as seed jars. The rims are characterized by constriction but exhibit no curvature indicative of a distinct neck. *Canteen rim* refers to small jars with lug handles near the top and very narrow necks.

Miniature pinch pot, *body* and *jar rim* refer to jar sherds from vessels too small to have been used for activities normally associated with this form. Miniature forms probably served in ritual contexts or as toys.

Sherds consisting of handles, that may or may not have been attached, were assigned to a series of categories describing the handle morphology. Coil categories identified include *Jar body with strap or coil handle*, *Jar body with lug handle*, *Indeterminate coil/strap handle*, and *Jar rim with strap handle*.

It is particularly difficult to determine vessel form for body sherds from some pottery groups, such as brown wares, based on location on polish. Thus, in a few cases sherds were assigned to categories describing location of polish without placing them into a particular category. Examples of such categories include *Body sherd polished both sides*, *Body sherd unpolished both sides*, *Body sherd polished exterior only*, and *Body sherds polished interior only*. Other vessel forms identified include *Gourd dipper*, *Fired coil*, *Double bowl*, and *Indeterminate rim*.

Modification. Modification refers to evidence of post-firing alteration including abrasion, drilling, chipping, or spalling. Data concerning such treatments provide information about use, repair, and recycling of sherds and vessels. Modification categories combine information concerning the size, shape, and associated wear patterns of a modified sherd.

Sherds that did not exhibit post-firing modifications were coded as *None*. *Drilled hole (complete)* refers to the presence of drilled holes used to mend vessels by tying vessel fragments together. Repair holes are usually located within 2 cm of an old break. *Drill hole incomplete* reflects cases where the drill hole does not go completely through both surfaces. *Beveled edge* refers to the presence of one or more abraded edges resulting from the intentional shaping of a sherd. Sherds with evidence of abrasion from use were assigned to a *Rim wear* category. *Ceramic scraper* refers to shaped sherds with wear indicative of this shaping during vessel manufacture. Sherds of unknown function beveled on all sides were assigned to a *Shaped item* category. *Interior worn from cooking* refers to a series of marks on a surface resulting from repeated heating cycles. Other forms reflecting surface wear include *Interior surface partially worn*, *Abraded surface (exterior)*, *Exterior partially exfoliated, Abraded surface (interior),* and *Interior/exterior erosions.*

Refiring Analysis

Refiring analysis was conducted on small samples of sherds. This technique allows for basic comparisons of mineral impurities in clay and ceramic pastes. The wide range of refired colors may indicate the use of several clay sources. Analysis conducted during the present study included refiring samples in an oxidizing atmosphere to a temperature of 950 centigrade. Such firings standardize the oxidation of iron compounds in clays and fire out organic materials. The exposure of sherds to these common conditions allows the comparison of pastes that may ultimately reflect the type and amounts of mineral impurities, particularly iron. Color of samples were recorded using Munsell color categories. While refiring analysis does not provide information about specific clay composition, a comparison of colors recorded for raw clays and ceramic pastes may allow for the identification of clay sources that could have been exploited. Interpretation of data from refiring studies relies on the assumption that clays from the same source area should contain similar mineral impurities, and should refire to the same color ranges.

A number of factors limit interpretations using this technique. One problem is that a number of sources exhibiting different characteristics may occur within the catchment area exploited by potters at a given location. Also, clays from discrete sources may fire to similar colors, or deposits firing to a particular color may occur over a wide area. Despite these problems, strong correlations between paste color, temper, or other attributes may reflect differences in clay availability and selection. Consistency in these attributes may reflect the products of local potters who consistently selected distinct clay and temper resources. Some problems may be controlled by accumulating data relating to the range of variation present in clay sources available to potters within a given area. Similarities between raw clay recovered from a particular source, and the dominant pottery paste clay also may also provide further clues relating to the identification of locally produced pottery.

Whole Vessel Analysis

While each sherd lot derived from complete vessels was analyzed and counted, a separate analysis was conducted on all complete or partial vessels identified. This involved recording detailed information relating to each vessel. Information recorded for each vessel included the basic information recorded during sherd analysis, as well as completeness, overall wear patterns, sooting patterns, rim diameter, and height. Each vessel was profiled and photographed.

Ceramic Type Descriptions

All sherds were assigned to previously defined typological categories based on combinations of characteristics. Items were then first assigned to a ceramic tradition followed by series of ware groups, and finally defined types. The analysis involved separation of pottery into broad groups of postulated areas of origin interpreted as a ceramic tradition or "cultural" association. Pottery was placed into various ceramic traditions, assumed to have originated from distinct geographic regions, based on temper, paste, and paint characteristics. Next, this pottery was divided into broad ware groups (e.g., gray, white, red, etc.) based on technological attributes and surface manipulation. Finally, it was assigned to ceramic types or groupings based on temporally sensitive painted decorations or textured treatments.

Cibola Tradition Pottery Types

The great majority of the Twin Lakes gray, white, and red ware pottery were assigned to types defined for the Cibola Tradition of the Anasazi. Pottery was assigned to Cibola Tradition types based on the presence of sand, sandstone and/or sherd temper, light pastes, and in some cases by stylistic traits. Gray and white ware types exhibiting characteristics defined for Cibola Tradition dominate a very wide geographic area. Cibola Tradition types are common in the area just north of the San Juan River, to the southern edge of the Colorado Plateau, west to the Chuska Mountains, and east to the Puerco River.

Cibola gray wares. Gray wares, as defined by the absence of polished surfaces or painted decorations, were assigned to Cibola Tradition types based on the presence of quartz sand, crushed sandstone, or sherd temper. Gray ware pottery, commonly assigned to this tradition, often has a light firing paste, reflecting the use of a low iron clay. Gray ware pottery was assigned to a particular type based on exterior surface treatments known to have changed through time. For example, gray ware assemblages dating to the Basketmaker III period are almost exclusively represented by sherds with smooth plain exteriors, while neckbanded forms are more common during the late Pueblo I and early Pueblo II periods. Corrugated forms dominated assemblages dating to most of the Pueblo II and all of the Pueblo III periods. Cibola Gray Ware type categories employed during the analysis of Twin Lakes ceramics include the following.

Mud Ware refers to the use of untempered silty clay to produce miniatures and figurines. Paste is very soft, crumbles easily, and is gray to brown in color. *Plain Gray Rim* is identical to pottery previously classified as Lino Gray (Colton 1955) and refers to unpolished gray ware rim sherds that have been completely smoothed on both surfaces (Figs. 10.2a, 10.2b). This category includes rim sherds assumed to have been derived from plain vessels. Plain body sherds were not included in this category, as similar body sherds could also have been derived from forms exhibiting coiled or corrugated treatments along the rim or neck. Exterior surfaces of early plain gray ware forms are commonly covered with a fugitive red pigment (Fig. 10.2a). A wide variety of vessel forms are reflected by rim sherds assigned to this type and include bowls, seed jars, and necked jars. Plain rim sherds that were too small to definitely determine whether they derived from plain gray vessels were are assigned to an *Unknown Gray Rim* category.

Plain Gray Body includes all unpolished gray body sherds. This category includes pottery from a wide area that has been previously classified as Lino Gray. This type commonly occurs at sites dating to all Anasazi periods, but is the dominant type at sites dating to the Basketmaker III and Pueblo I periods. While almost all the sherds assigned to this type were characterized as having derived from gray body sherds, they could have derived from the same range of forms as noted for Lino Plain gray rim sherds. A few unfired plain sherds were identified and assigned to a *Unfired Plain Gray Ware* category.

Figure 10.2a. LA 104106, examples of Plain Gray Rim pottery and plain gray ware with fugitive red pigment (Vessel 2).

Figure 10.2b. LA 104106, plain gray ware miniature seed jar fragment (Vessel 3).

The occurrence of such pottery provides evidence of local manufacture of gray ware pottery. Two sherds had pastes similar to that noted in other sand-tempered plain gray sherds but also displayed a polished and smudged surface (Fig. 10.3) similar to that noted in pottery previously described as *Lino Smudged* or Smudged Gray (Morris 1980; L. Reed et al. 1998).

A very small number of gray ware sherds associated with later (Pueblo II and Pueblo III) occupations were reflected by forms with corrugated exterior surfaces. As the assignment of temporally distinct corrugated forms is largely based on rim eversion, the lack of corrugated rim sherds prevented the identification of such types. Corrugated sherds were assigned to type categories based on slight differences in exterior textured treatments. Corrugated gray ware vessels have thin overlapping coils which often have regularly spaced indentations. These coils usually cover the entire exterior surface, although corrugated treatments are sometimes limited to the vessel neck.

Indented Corrugated includes sherds with narrow coils, regularly spaced indentations, and moderate to high contrast between coils (Fig. 10.4). *Plain Corrugated* refers to gray wares with similar coil treatment and relief as described for Indented Corrugated but without regularly spaced indentations (Fig. 10.5). Alternating Corrugated refers to a series of rows with treatments described for both plain and indented corrugated forms (Fig. 10.6).

Cibola white wares. White wares associated with the Cibola pottery tradition are represented by a wide range of types known to have been produced from AD 550 to 1300. Cibola White Wares tend to have white to gray pastes and are typically tempered with sand, sandstone, or sand and sherd. These gray wares were more commonly tempered with sherd during the late Pueblo II and Pueblo III periods and usually fire to buff colors when exposed to oxidizing atmospheres. Painted decorations in most Cibola White Ware types were executed in a mineral paint.

Figure 10.3. LA 104106, example of Lino Smudged, pottery pendant.

The great majority of types identified during the present study represent forms associated with Basketmaker III-period occupations. Characteristics of the earliest pottery includes the presence or sandstone temper usually without sherd and painted surfaces that are poorly polished to unpolished. White ware sherds associated with this occupations were assigned to both specific and descriptive types.

Unpainted White Ware refers to unpainted sherds with at least one polished surface but without painted decorations. While a few of these sherds may represent forms associated with late Pueblo II or Pueblo III occupations, both paste and surface characteristics indicate that the majority of these are associated with earlier Basketmaker III or Pueblo I occupations. While the presence of polishing on the unpainted portion of these sherds provided criteria for classification as a white ware, the painted portion of many of these early forms was unpolished. It is likely that unpainted sherds derived from such vessels would be simply described as gray body sherds so that the actual number of early sherds derived from white ware vessels may be under-represented.

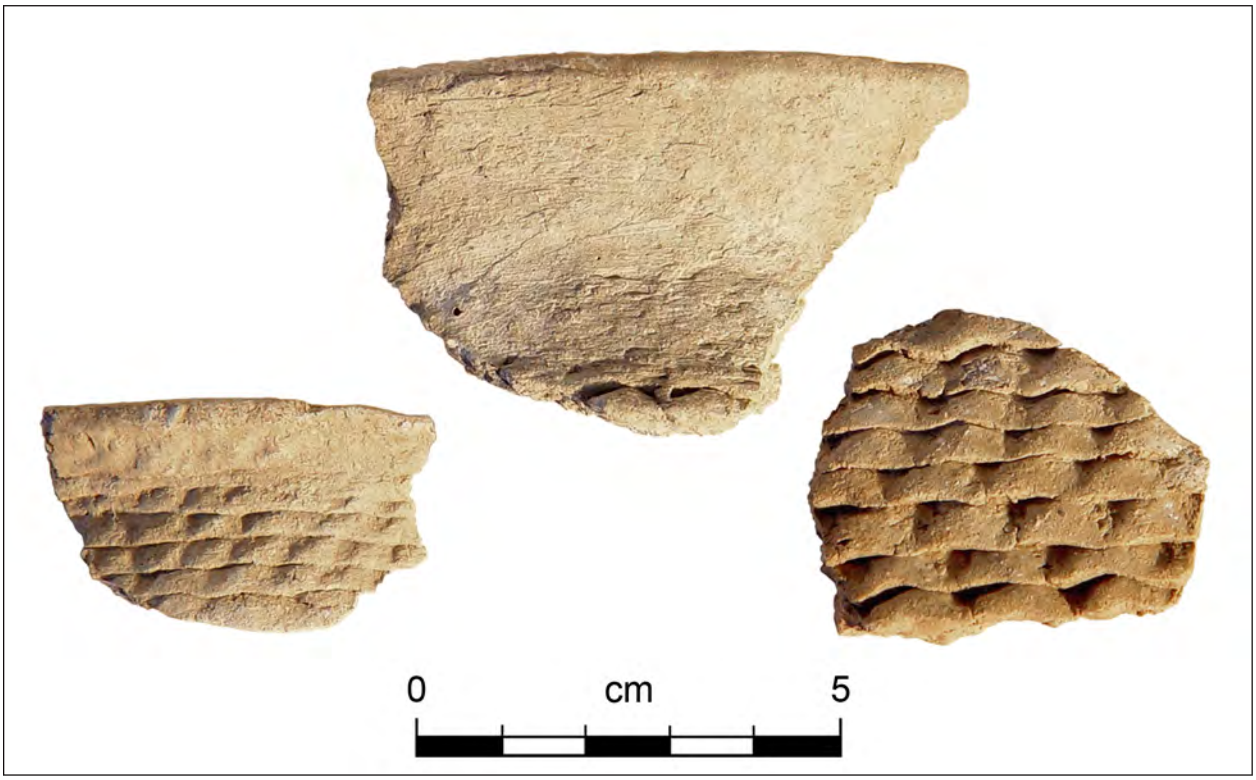


Figure 10.4. LA 104106, examples of Indented Corrugated pottery.

Figure 10.5. LA 104106, example of Plain Corrugated pottery.

Figure 10.6. LA 104106, example of Alternating Corrugated pottery.

The earliest Cibola decorated type noted for this area is *Tohatchi Red-on-brown*. This type appears to be a precursor to La Plata Black-on-white. Tohatchi Red-on-brown has a polished surface and silt or sandstone temper similar to that noted in early local brown ware types. It is distinguished from these brown wares by the presence of designs applied in a red clay and hematite. These designs generally consist of sloppily executed wide lines that are quite distinct from those noted in the earliest Anasazi white wares.

La Plata Black-on-white is the earliest Cibola White Ware type and is often the dominant decorated pottery at Basketmaker III sites (Fig. 10.7). La Plata Black-on-white is usually unpolished or slightly polished and decorated with mineral paint. La Plata Black-on-white commonly exhibits applications of fugitive red on the exterior surface. Pottery assigned to this type is almost always tempered with quartz sand. Similar pottery decorated with organic paint was assigned to Lino Black-on-white of the Tusayan Tradition. The overall design layout generally centers around a pedant from the rim, and a circle is often located near the center. Design of La Plata Black-on-white are usually organized in isolated groups of two or three pendants oriented from the rim. Designs motifs include thin lines, solid or open triangles, ticks, flags, and dot or basket stitched (Z and I) filled spaces. The lower part of the vessel is often undecorated with the exception of a circle located near the center. The great majority the pottery assigned to this type for the Twin Lakes project was derived from bowls, although extremely low frequencies of painted jars and painted seed jar interiors are represented.

Sherds exhibiting manipulations characteristic of pottery assigned to the Pueblo I period were classified as *White Mound Black-on-white* (Fig. 10.8). Surfaces are usually unslipped and slightly polished. Pastes tend to be very light and temper usually consists of sand. Designs are executed in red, brown, and black with mineral pigments. Design elements include thin to medium parallel lines or chevrons that may be embellished with ticked lines or trian-

Figure 10.7. LA 104106, examples of La Plata Black-on-white pottery.

gles. Designs are often arranged in a band around the rim.

Sherds exhibiting early surface treatments and decorations in mineral paint, but without enough design to be placed into either La Plata Black-on-white or White Mound Black-on-white were classified as *Basketmaker III–Pueblo I Indeterminate Mineral*. In some studies, the difficulty in defining early types has resulted in the placement of early forms in this more general type (McKenna and Toll 1992). An even more general group is reflected by the placement of some sherds into a *Mineral Paint Undifferentiated* category.

A very small amount of pottery displaying treatments and design styles indicative of production sometime during the either the Pueblo II or Pueblo III periods was identified in the Twin Lakes assemblage. These were assigned to a variety of different formal types and descriptive types such *Pueblo II Indeterminate Black-on-white* (Fig. 10.9).

Puerco/Escavada Black-on-white was assigned to sherds exhibiting a range of painted styles indicative of material previously classified as Puerco Black-on-white or Escavada Black-on-white (Figs. 10.10, 10.11). Definitions of and distinctions between Puerco Black-on-white and Escavada Black-on-white are somewhat confusing and vague. As used here, these categories include the use of solid design styles employed during the later part of the Pueblo II and early Pueblo III periods. Design styles may include triangles, parallel lines, and chevrons. Two separate styles of this type were noted during this analysis including one with *solid designs* and the other with *thick parallel lines*.

Gallup Black-on-white refers to sherds exhibiting Pueblo II surface manipulation and hachured designs (Fig. 10.12). Painted surfaces often display a thin chalky slip. Lines in earlier forms tend to be spaced wider than those associated with later examples of this type.

Chaco/McElmo Black-on-white refers to organic-painted sherds exhibiting early Pueblo III styles and treatments. Decorations are generally applied with an organic pigment. Painted decorations are

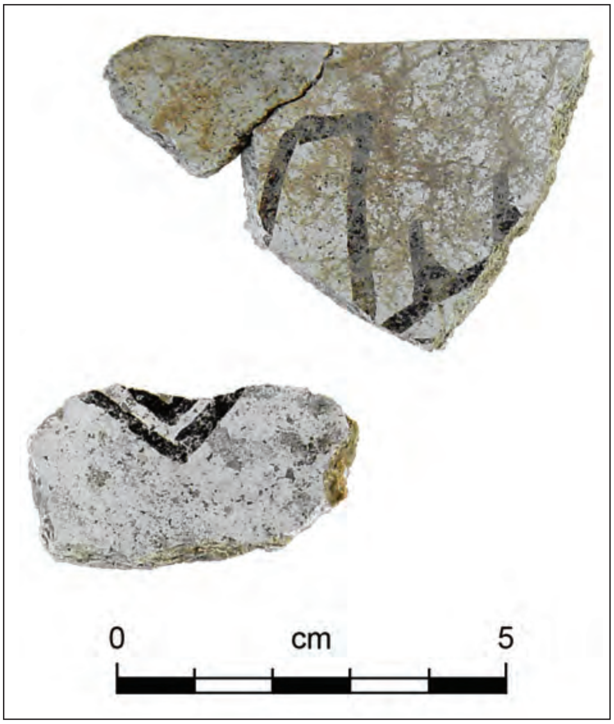


Figure 10.8. LA 104106, examples of White Mound Black-on-white pottery.

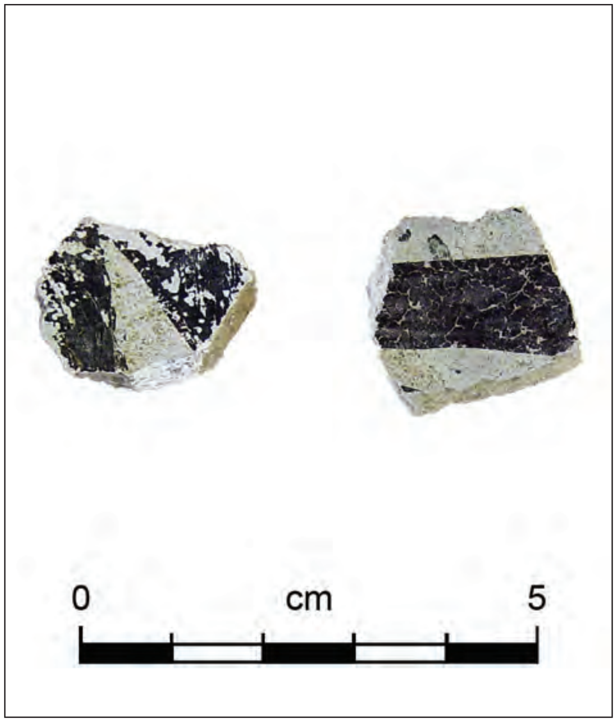


Figure 10.9. LA 104106, example of Pueblo II Indeterminate Black-on-white pottery.

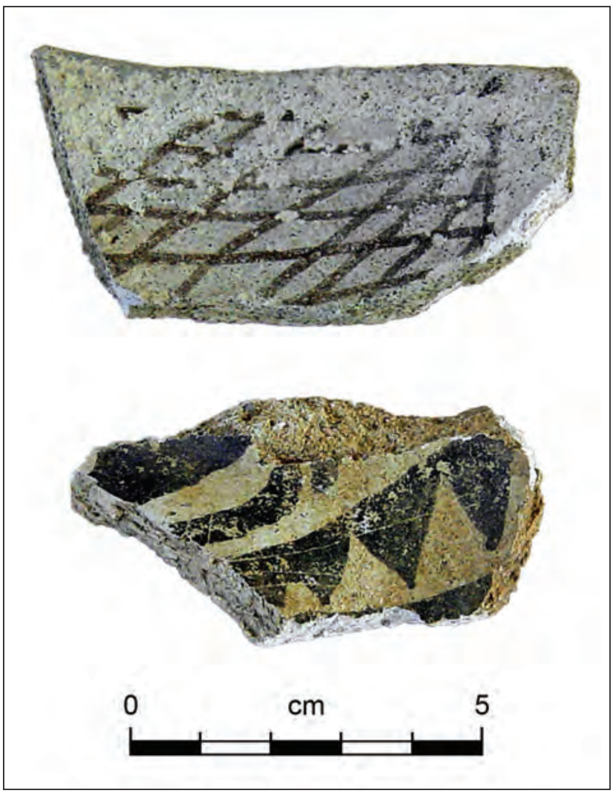


Figure 10.10. LA 104106, examples of Puerco/Escavada Black-on-white pottery.

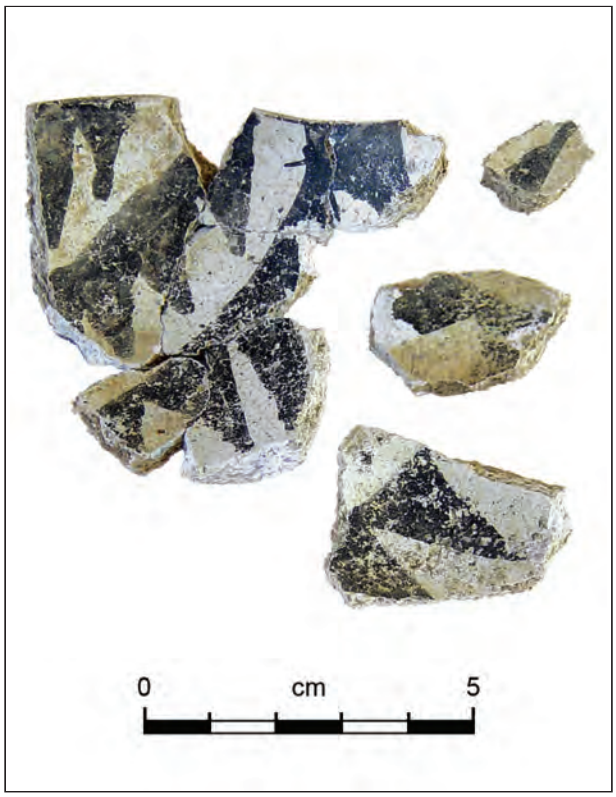


Figure 10.11. LA 104106, Study Unit 2, partial vessel of Puerco/Escavada Black-on-white (Vessel 6).

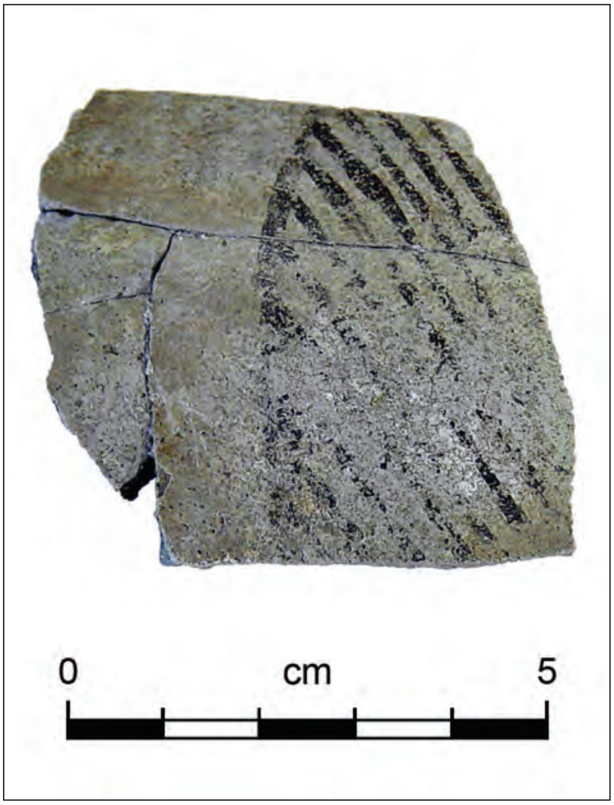


Figure 10.12. LA 104106, example of Gallup Black-on-white pottery.

almost always organized in a single band. A commonly occurring design within this type consists of a series of broad rectilinear lines in bands parallel to the rim. Other designs include ribbons filled with straight hachure, dots, triangles, stepped triangles, dots, diamonds, and ticked lines. Framing lines may be present but usually are relatively thin. Organic painted sherds without distinct designs were assigned to a *PIII Indeterminate Organic* category (Figs. 10.13, 10.14).

Early red ware. Early Cibola Red Ware, as used here, refers to early red slipped unpainted forms. Such forms appear during the Early Basketmaker III, and reflect the utilization low-iron paste and sand temper similar to those utilized in the production of local utility and decorated wares. Slip usually consists of a deep red with a moderately to heavily polished surface. Vessel forms are mainly represented by bowls and seed jars. Types were assigned to early slipped types based on paste characteristics.

Tohatchi Red or red slip over brown paste refers to a red slipped surface over a soft friable brown to reddish paste (L. Reed et al. 2000). Temper is usually a fine sand or sandstone. *Tallahogan Red* exhibits a similar slip applied over low-iron pastes similar to that noted in associated gray ware and white ware types (Daifuku 1961). Temper includes sand and sandstone (Fig. 10.15).

White Mountain Redwares

White Mountain Redware types represents one of the more common intrusive pottery types at Pueblo II and Pueblo III sites in Gallup area. White Mountain Redware types, produced within a fairly restricted area of west-central New Mexico and east-central Arizona, reflect a specialized technology. During later Anasazi occupations White Mountain Redware vessels were widely traded throughout much of the southwest (Carlson 1970). They are characterized by a white, gray to orange paste, sherd temper, and a dark red slip. Surfaces are well polished, and painted decorations usually executed in a black mineral or organic paint, although a polychrome effect was sometime achieved through the addition of a white clay paint. White Mountain Redware types identified during the present study include the fol-

Figure 10.13. LA 104106, example of Pueblo III Indeterminate Organic Black-on-white pottery.

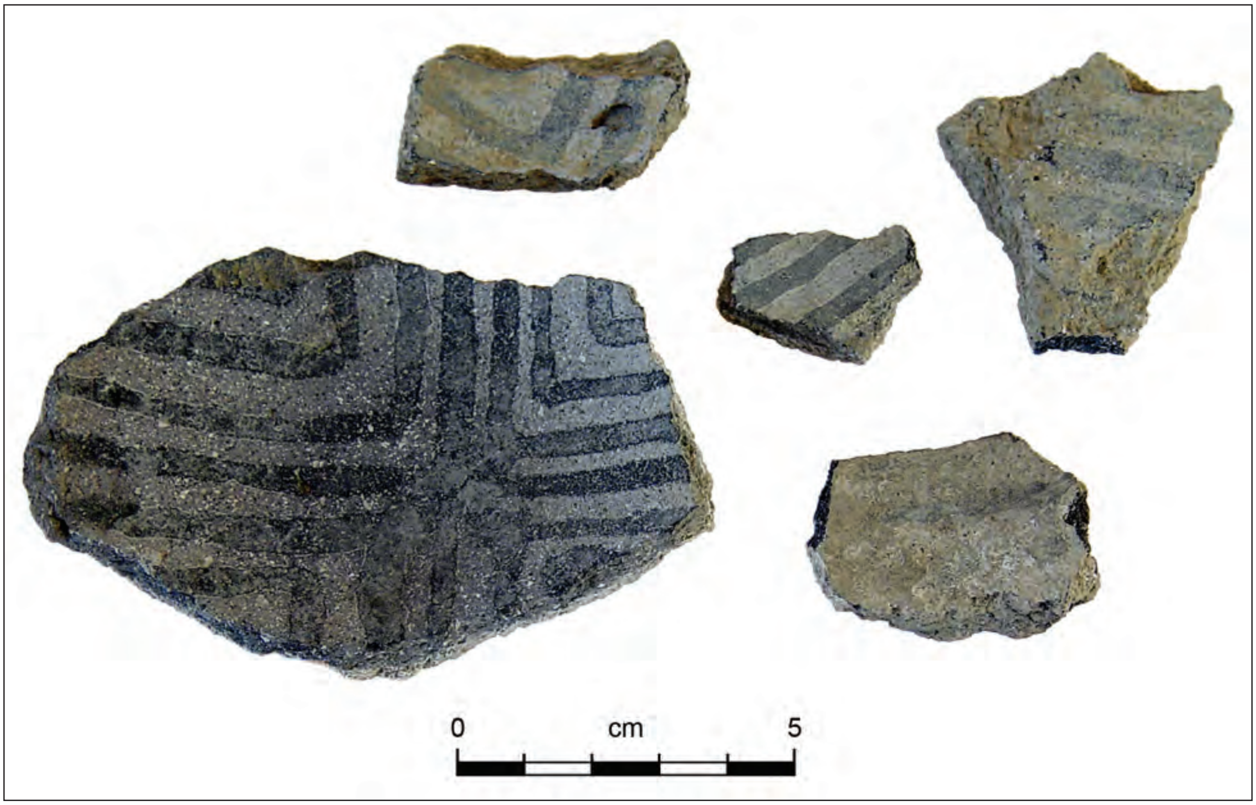


Figure 10.14. LA 104106, Study Unit 2, partial vessel of Pueblo III Indeterminate Organic Black-on-white (Vessel 7).

lowing. Unpainted sherds with pastes and surface treatments typical of pottery described for this tradition were assigned to a *White Mountain Redware (Undifferentiated)* category. Those exhibiting unspecified painted decoration were classified as *White Mountain Red (Painted Undifferentiated)*.

The only pottery assigned to a specific White Mountain Redware type is represented by a single sherd assigned to *St. Johns Polychrome*. Painted decorations are in black paint on the bowl exterior and often consist of an elaborate combination of solid and hachured motifs common in late Pueblo III Anasazi pottery (Fig. 10.16). Exterior bowl surfaces exhibited more simple solid designs in white clay paint.

San Juan Tradition Types

A few of the sherds identified during the present study were assigned to types of the San Juan or Mesa Verde Tradition based on the presence of andesite or diorite tempers. These appear to reflect material that was produced in areas along the San Juan River and associated drainages to the north. Published definitions and descriptions of types defined for the San Juan region were employed during the present study (Abel 1955; Breternitz et al. 1974; Oppelt 1991; Wilson and Blinman 1995b).

Gray ware types assigned to the San Juan Tradition were limited to plain gray body and rim sherds derived from *Chapin Gray* vessels. Other than the presence of andesite or diorite characteristics noted for pottery derived from this type, they are identical to that described for Lino Gray vessels.

Most pottery assigned to San Juan Tradition during the present study represent white ware types. Unpainted polished white wares associated with this tradition were classified as *Unpainted White Ware*. Sherds exhibiting forms and design styles similar to those described for La Plata Black-on-white were assigned to *Chapin Black-on-white* (Fig. 10.17).

Similar pottery exhibiting slightly later styles was assigned to *Piedra Black-on-white*. This type is

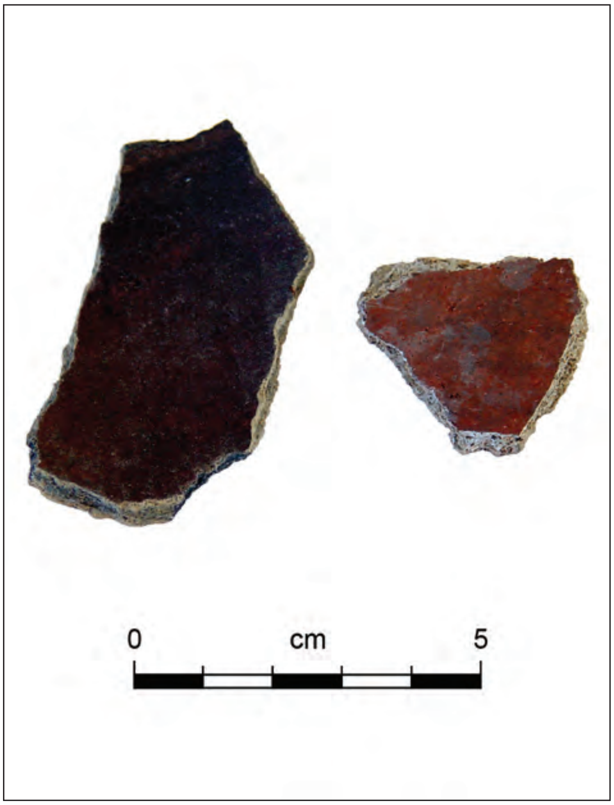


Figure 10.15. LA 104106, example of Tallahogan Red pottery.

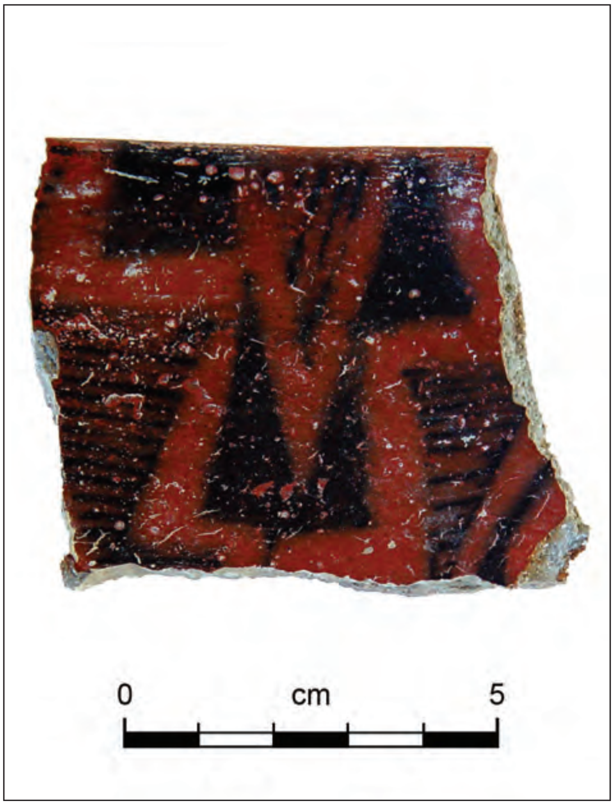


Figure 10.16. LA 104106, Study Unit 3, example of St. Johns Polychrome pottery.

similar, but not identical to White Mound Black-on-white of the Cibola Tradition. Piedra Black-on-white tends to be more polished, is sometimes slipped, and has a well-organized design layout. Designs were placed in relation to the rim or circumference of the vessel and Aarranged as a single unit composed of a series of several thin parallel intersecting lines covering a large portion of the vessel surface" (Wilson and Blinman 1995b). Lines were often embellished with ticked lines, triangles, and flagged triangles. Painted pottery with early characteristics that could not be placed into one of these two types were assigned to a *Basketmaker III–Pueblo I Black-on-white* category. Indistinct mineral paint that could not necessarily be assigned to a particular temporal span was classified as *Mineral Paint Undifferentiated*.

Pottery exhibiting andesite or diorite temper, along with surface treatments and designs in mineral paint characteristic of forms produced during the Pueblo II period, were assigned to *Mancos Black-on-white* (Fig. 10.18). Pottery assigned to this type was divided into stylistic varieties. Pottery exhibiting hachured treatments, similar to Gallup Black-on-white, were assigned to Mancos Black-on-white (hachured variety). Those exhibiting solid styles, similar to Escavada Black-on-white, were placed into a Mancos Black-on-white (solid variety).

Chuska Tradition

Two sherds exhibited crushed basalt temper characteristic of production in the nearby Chuska Valley. Both of these sherds were corrugated and assigned to a *Corrugated Body* category (Fig. 10.19).

Mogollon Tradition

A small number of sherds displayed pastes, temper, and surface characteristics indicative of types produced in the Mogollon Highlands. Mogollon Brown Ware temper consists of volcaniclastic rock sometimes with sand and reflects the use of self-tempered clays weathered from surrounding volcanic rocks. Pastes tend to be dark gray, brown, or yellow-red. Sherds displaying Mogollon pastes also displayed a range of surface manipulations previously noted in Mogollon pottery, and reflect trade wares from the Mogollon Highlands.

Pottery displaying Mogollon pastes were assigned to previously defined Mogollon Brown Ware or Mogollon decorated types (Haury 1936). Sherds with Mogollon pastes and smoothed and polished surfaces were assigned to either *Alma Plain Rim* or *Alma Plain Body* (Fig. 10.20). Alma Plain is the dominant pottery type at Mogollon sites and was associated with almost the entire occupational sequence (Wilson 1999). This represents the sole brown ware type associated with the earliest Mogollon occupations. Sherds exhibiting pastes and manipulation similar to that noted for Alma Plain, with the addition of red slip over one surface, were assigned to *San Francisco Red*.

Mogollon Brown Ware with smoothed plain, polished exterior surfaces and highly polished and sooted interior over a plain surface were classified as *Reserve Smudged*. This pottery type has a very long span but is most common from occupations that date after AD 1000. *Reserve Plain Corrugated Smudged* exhibits a similar smudged interior surface along with plain corrugated exterior treatments. These treatments often cover the entire vessel surface, and consist of a series of very thin, overlapping coils.

Historic Pottery Types

While the great majority of then Twin Lakes pottery recovered was manufactured before AD 1300, a small number of sherds reflect types known to have been produced in historic times by Navajo or Pueblo potters. Navajo pottery was reflected by sherds classified as *Dinetah Gray* (Fig. 10.21). Pottery assigned to this type dominate assemblages dating to the Dinetah and Gobernador phases of the Navajo (Brugge 1963; Wilson and Blinman 1993).

Exterior vessel surfaces are always unpolished, unpainted, and often very rough, bumpy, and pitted. Dinetah Gray is distinguished from much earlier plain Anasazi types by paste characteristics. Paste texture is often silty and surface color ranges from dark gray to black and may occasionally be brown or red. The paste cross section usually ranges from dark gray to black, but may occasionally be dark brown, red, or gray. Pastes may be vitrified or glassy in appearance and distinct cores are rare.

Tempering material varies between different areas of the Upper San Juan region. Sand temper was dominant in the Navajo Reservoir area, while a crushed detrital material containing sand and igneous porphyries was common along the La Plata Valley. The consistency of distinctive tempers in the early Navajo pottery has been used to define local varieties of Dinetah Gray. Forms are almost always cooking-storage jars.

Other historic pottery types identified in the Twin Lakes assemblage were produced in the Pueblos of Zuni, Acoma, or Laguna. The production of matte-painted polychrome vessels began in the Acoma, Laguna, and Zuni areas sometime after the Pueblo Revolt in 1680. Pottery produced at these Pueblos is characterized by the use of sherd temper, low iron pastes fired in an oxidizing atmosphere, and designs executed in black and red paint. While several sherds were assigned to this type, they all appear to be derived from a few vessels. Sherds exhibiting this paste along with decorations in red and matte paint were classified as *Acoma/Zuni Polychrome* (Figs. 10.22, 10.23) while similar slipped, unpainted sherds were classified as *Acoma/Zuni Polychrome (Unpainted)* (Fig. 10.24).

Examination of Ceramic Trends

Data relating to the distribution of pottery attribute and type categories were used to examine a variety of trends. Examinations will focused on the determination of time and duration of occupations reflected at various locations. Pottery distributions from these various components were then used to examine trends related to production, exchange, and use of pottery vessels.

Pottery Dating

Previous studies conducted in the southern Chuska Valley and surrounding areas provide a foundation for assigning Twin Lakes ceramics into fairly well-defined ceramic dating periods (Goetze and Mills 1993; Reed and Hensler 1998; Waterworth 1999; Wilson 1989; Windes 1977). Such assignments involve the use of the Pecos Classification system as well as shorter phases recently defined (L. Reed et al. 2000; Kearns and McVickar 1996; Kearns et al.

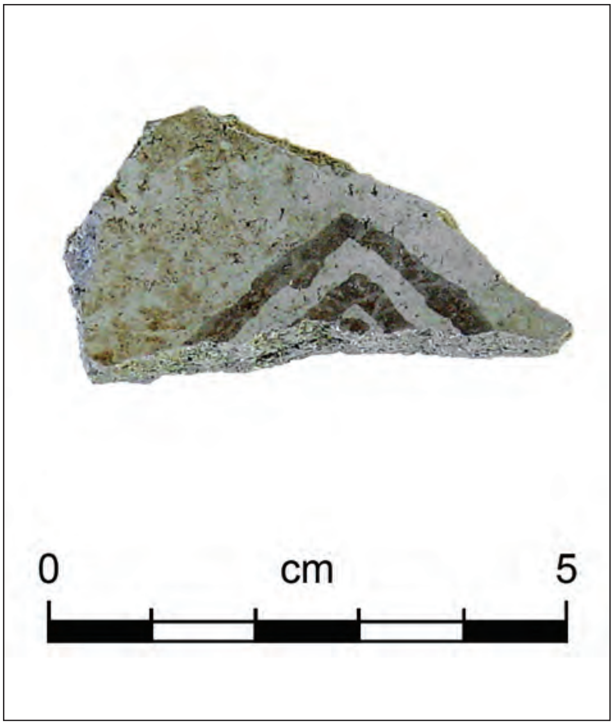


Figure 10.17. LA 104106, example of Chapin Black-on-white pottery.

Figure 10.18. LA 104106, example of Mancos Black-on-white pottery.

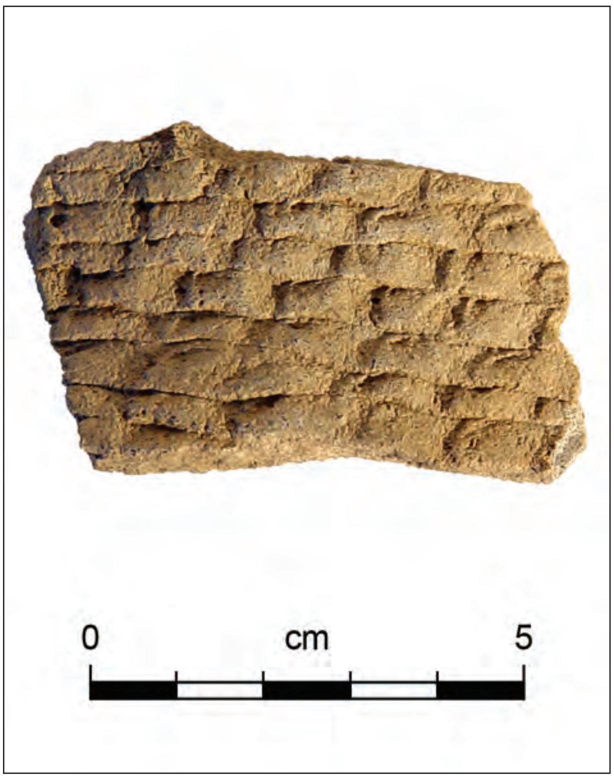


Figure 10.19. LA 104106, example of Chuska Corrugated pottery.

Figure 10.20. LA 104106, example of Alma Plain pottery.

Figure 10.21. LA 104106, Study Unit 2, example of Dinetah Gray pottery.

Figure 10.22. LA 104106, Study Unit 2, example of Acoma/Zuni Polychrome pottery.

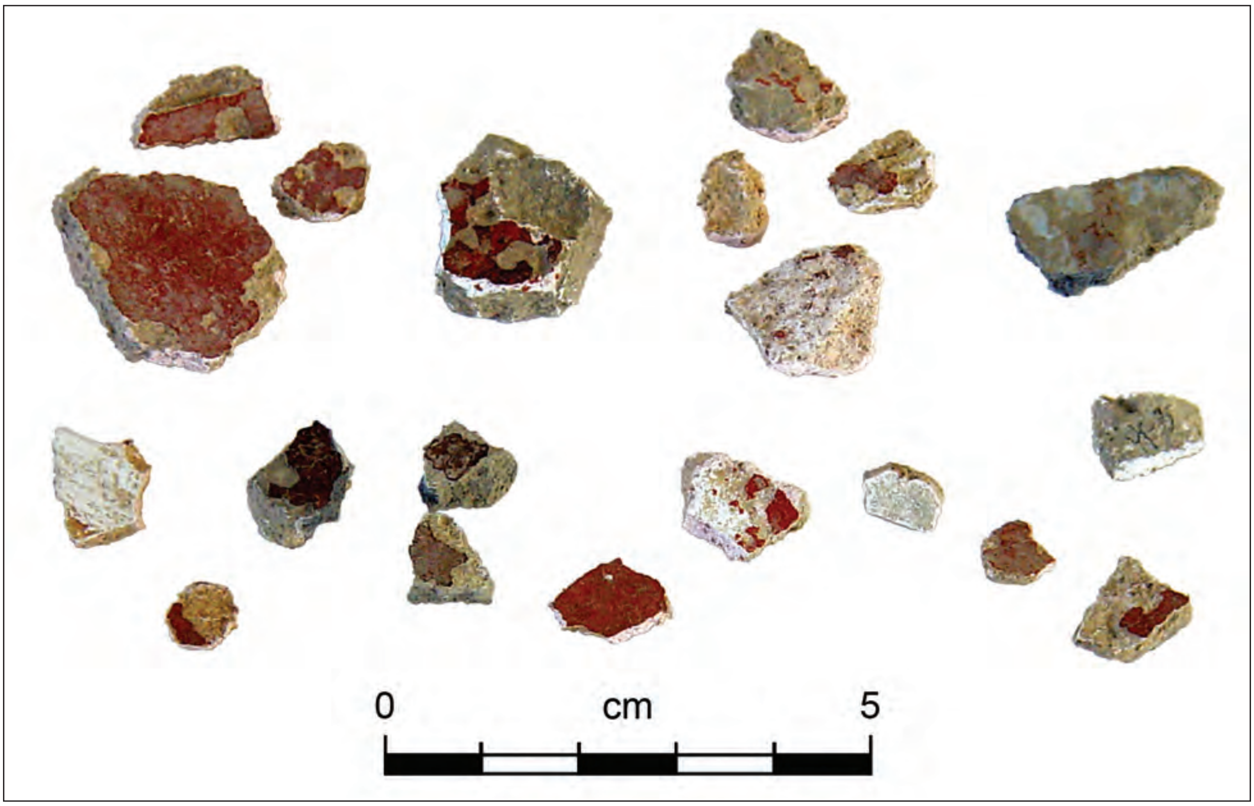


Figure 10.23. LA 104106, Study Unit 2, partial vessel of Acoma/Zuni Polychrome (Vessel 5).

Figure 10.24. LA 104106, Study Unit 2, partial vessel of Acoma/Zuni Polychrome (unpainted) (Vessel 4).

2000). Pecos periods, originally defined for the entire Southwest (Kidder 1927), reflect the most basic temporal units and include a series of periods spanning from the Basketmaker I through Basketmaker III and the Pueblo I through Pueblo IV periods. Recent studies in the southern Chuska Valley have divided previously defined Pecos periods into a series of phases based on slight variations noted in pottery distributions (L. Reed et al. 2000). Ceramic distributions have been recently used to further divide the Basketmaker III period into two phases (Muddy Wash and Tohatchi), the Pueblo I into two phases (Red Willow and Flowing Well), the Pueblo II into two phases (Coyote Canyon and Whirlwind), and the Pueblo III into one phase (Twin Lakes) (Kearns and McVickar 1996). Each of these phases were defined based on frequencies of pottery types (L. Reed et al. 2000), and provided a framework for determining the age of the various components in the Twin Lakes assemblage.

Temporal Components at Twin Lakes Project Sites

The great majority of the pottery examined during this project was recovered from Basketmaker III features and contexts at LA 104106. Pottery types postdating the Basketmaker III at LA 104106 and other Twin Lakes sites are limited to a small number of types known to have been produced during the Pueblo Anasazi or Historic periods. Thus, the major focus of the present study will involve the documentation and examination of trends associated with the Basketmaker III component at LA 104106. Additional discussions will present evidence of occupations during the Pueblo and Historic periods as represented by very small samples of Twin Lakes sherds. Table 10.1 illustrates the distribution of pottery types from all sites investigated during the Twin Lakes project. Discussions on identification and dating of ceramic-based periods, and associated trends for various occupations identified during the present study follow.

Identification of Basketmaker III components. Most of what is known about Basketmaker III occupation in the Twin Lakes area is based on relatively recent investigations associated with the NSEP (Kearns et al. 2000) and the N30–N31 project (Damp 1999a). During the NSEP, a total of 10,5714 ceramic artifacts were recovered from 18 Basketmaker III components at 16 sites. Similar to the NSEP, pottery distributions during this project were used to divide Basketmaker III components into two distinct Muddy Wash and Tohatchi phases (Reed and Hensler 1998).

Contexts thought to date to the earliest span of the Basketmaker III period (AD 500 to 600) were assigned to the Muddy Wash phase. This phase is characterized by a preponderance of Obelisk Gray, Tohatchi Red, Lino Gray, Tohatchi Red-on-brown, plain gray/brown types, and the absence of La Plata Black-on-white (L. Reed et al. 1998). This represents the only phase defined for this region where local brown ware pottery is common. Assignments of pottery to ware categories dating to this period were often difficult in that ceramics from these components included a mixture of vessels produced with alluvial and geological clay sources. Ceramic traits represented in assemblages dating to this phase reflect experimentation with clay, paint, and technology.

Late Basketmaker III occupations were assigned to the Tohatchi phase (AD 600–725). Assemblages dating to the Tohatchi phase are characterized by La Plata Black-on-white, Lino Gray, Tallahogan Red, and Obelisk Gray. The dramatic decrease in the frequency of brown ware types in Tohatchi phase assemblages indicates a significant change in manufacturing technologies and resources from the preceding Muddy Wash phase. Investigations conducted as part of the N30–N31 Archaeological Project documented some possible changes during the Tohatchi phase as defined here (Waterworth 1999). A comparison of assemblages dating to the late AD 600s and early AD 700s indicate the dominance of similar sand-tempered plain gray wares (Waterworth 1999). Differences noted indicate a decrease in the frequency of utility ware types, including Obelisk Gray and Tallahogan Red, and an overall increase in white ware types (Waterworth 1999).

Ceramic distributions associated with Basketmaker III components. Tables 10.2 and 10.3 illustrate frequencies of sherds assigned to various types, traditions, and ware groups for the 8,496 Basketmaker III sherds recovered from LA 104106. Gray ware types commonly associated with Basketmaker III components comprise 94.5 percent of the sherds recovered from the LA 104106 assemblage. Furthermore, 88.3 percent of the Basketmaker III assemblage from LA 104106 was recovered from SU 1, a habitation location. Examinations of distributions of Basketmaker III pottery from LA 104106 provide an opportunity to examine trends in Basketmaker III pottery change. Thus, data from Basketmaker III components dominating LA 104106 comprise the major focus of Twin Lakes pottery studies.

Basketmaker pottery from LA 104106 dominated the total ceramic assemblage (91.6 percent) (Table 10.2). These types include plain gray ware forms; neckbanded types were not recovered from this site. Almost all (99.7 percent, n = 7,738) of the gray ware from this site were manufactured using "local" sand or sandstone temper. Other local types include unfired sandstone tempered utility wares (0.1 percent), Mudware (0.1 percent), and Lino Smudged (trace). Early utility ware pottery not containing local temper was limited to a single plain ware sherd tempered with crushed andesite or diorite and classified as Chapin Gray.

A total of 661 sherds (7.2 percent) associated with the Basketmaker III occupation represent types that could have been derived from Basketmaker III white ware vessels. The great majority (98.4 percent) of these sherds were tempered with a combination of sand or a variety of sandstone (Table 10.4) and assigned to the Cibola Tradition. This pottery includes a combination of descriptive and formal types including Unpainted Polished White Ware, Mineral Undifferentiated, Basketmaker III/Pueblo I Black-on-white, White Mound Black-on-white, and La Plata Black-on-white. The remaining (2.6 percent) of the white ware represented pottery assigned to the San Juan Tradition based on the presence of andesite or diorite temper. These include Unpainted White, Undifferentiated Mineral, Piedra Black-on-white, Chapin Black-on-white, and Basketmaker III–Pueblo I Black-on-white.

A total of 62 sherds (0.01 percent) represent Mogollon Brown Ware types. These contain a high iron-paste and tuff temper in addition to brown polished

Table 10.2. LA 104106, distribution of Basketmaker III pottery types.

	Frequency	Percent
Cibola		
Plain rim	308	3.60%
Unknown rim	26	0.30%
Plain body	7421	87.40%
Unfired plain gray ware	11	0.10%
Mudware	10	0.10%
Lino Smudged	2	0%
Unpainted polished white ware	228	2.70%
Mineral Paint (undifferentiated)	21	0.20%
Basketmaker III–Pueblo I (indeterminate mineral)	169	2.00%
White Mound Black-on-white	14	0.20%
La Plata Black-on-white	158	1.90%
Tallahogan Red (red slip over white paste)	39	0.50%
Tohatchi Red (red slip over red paste)	1	0%
Tohatchi Red–on brown	3	0%
Unpainted white ware (undifferentiated)	4	0%
Mineral paint (undifferentiated)	2	0%
Northern San Juan		
Plain gray	1	0%
Piedra Black-on-white	1	0%
Chapin Black-on-white	6	0.10%
Basketmaker III–Pueblo I (indeterminate)	3	0%
Tusayan		
Lino Black-on-white	1	0%
Mogollon		
San Francisco Red	4	0%
Alma Plain rim	5	0.10%
Alma Plain body	57	0.70%
Total	**8496**	**100.00%**

Table 10.3. LA 104106, distribution of ceramic tradition by ware group for Basketmaker III pottery.

		Ware Group				
Tradition		**Gray**	**White**	**Red**	**Brown Plain**	**Total**
Cibola	Count	7778	601	40	–	**8419**
	Row%	100%	98.40%	90.90%	–	**99.10%**
Northern San Juan	Count	1	10	–	–	**11**
	Row%	0%	1.60%	–	–	**0.10%**
Mogollon Highlands	Count	–	–	4	62	**66**
	Row%	–	–	9.10%	100%	**0.80%**
Total	**Count**	**7779**	**611**	**44**	**62**	**8496**
	Row%	**91.60%**	**7.20%**	**0.50%**	**0.70%**	**100.00%**

Table 10.4. LA 104106, distribution of temper type by ware group for Basketmaker III pottery.

		Ware Group				
		Gray	White	Red	Brown Plain	Total
Sand	Count	2106	276	25	–	**2407**
	Col. %	27.1%	45.2%	56.8%	–	**28.3%**
Sherd	Count	26	51	–	–	**77**
	Col. %	0.3%	8.3%	–	–	**0.9%**
Sherd and sand	Count	15	36	–	–	**51**
	Col. %	0.2%	5.9%	–	–	**0.6%**
Crushed andesite or diorite	Count	1	16	–	–	**17**
	Col. %	0.0%	2.6%	–	–	**0.2%**
Self-tempered	Count	13	–	–	–	**13**
	Col. %	0.2%	–	–	–	**0.2%**
Mogollon volcanics	Count	–	–	–	8	**8**
	Col. %	–	–	–	12.9%	**0.1%**
Sand and Mogollon volcanics	Count	–	–	4	54	**58**
	Col. %	–	–	9.1%	87.1%	**0.7%**
Oblate shale and sand	Count	12	13	–	–	**25**
	Col. %	0.2%	2.1%	–	–	**0.3%**
Multilithic sand	Count	–	1	8	–	**9**
	Col. %	–	0.2%	18.2%	–	**0.1%**
Dark matrix sandstone	Count	5605	218	7	–	**5830**
	Col. %	72.1%	35.7%	15.9%	–	**68.6%**
Total	**Count**	**7779**	**611**	**44**	**62**	**8496**
	Col. %	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

surfaces characteristic of pottery produced in the Mogollon Highlands. Mogollon Brown Ware types identified include Alma Plain Body, Alma Plain Rim, and San Francisco Red.

A total of 40 sherds (0.01 percent) represent Cibola Tradition red ware forms known to have been produced during the Basketmaker III period. These include those assigned to Tallahogan Red, Tohatchi Brown, and Tohatchi Red-on-brown. While a very small number of sherds represent types such as Tohatchi Red-on-brown that could have been produced during the Muddy Wash phase, most represent pottery types associated with a late Basketmaker III or Tohatchi phase occupation.

Another trend that may have temporal implications is frequencies of fugitive red on the exterior of gray ware (6.9 percent) and white ware (6.7 percent) sherds. The presence was relatively common at other late Basketmaker III assemblages in this area (L. Reed et al. 1998; Waterworth 1999).

The range of types and manipulations that dominated assemblages at LA 104106 were very similar to those noted for Tohatchi phase of Basketmaker III sites investigated during the NSEP and N30–N31 projects. This observation agrees well with the associated archaeomagnetic dates, which suggest fairly brief occupations for the main Basketmaker III component at LA 104106 during the middle seventh century or from about AD 630 and AD 670. A fairly short occupation during the Basketmaker III period is also supported by the similarity of distribution of types from different stratigraphic deposits. The combination and frequency of types from the lowermost Basketmaker III deposits were very similar to the uppermost deposits at this site.

The other Twin Lakes site with a Basketmaker III component was LA 32964. While pottery from this site also indicated the presence of a late Pueblo II component, 76.5 percent represented types that could be associated with a Basketmaker III component. Types associated with this component include Plain Rim, Plain Body, and White Mound Black-on-white.

Examination of ceramic trends for Basketmaker

***III components*.** Distributions of pottery forms and surface manipulations from LA 104106 were similar to those documented for other contemporary sites in the eastern slope of the Chuska Valley (Hays-Gilpin et al. 1999; Kearns et al. 2000; Morris 1980; Reed and Hensler 1998; Reed and Wilcox 2000), and the Northern San Juan region of the Colorado Plateau (Hayes and Lancaster 1975; O'Bryan 1950; L. Reed et al. 2000; Toll and Wilson 2000). Similarities in pottery from seventh-century Basketmaker sites from a very wide area include the overwhelming dominance of plain utility pottery and presence of the wide mouth jar, seed jar, and bowl. White wares from various areas exhibit similar design styles assumed to have been derived from basketry. Possible causes of widely shared traits noted in Basketmaker III pottery include common derivation of Basketmaker III pottery manufacturing technologies, interaction between dispersed Basketmaker III settlements, and the influence of population mobility patterns on pottery forms (L. Reed et al. 2000).

As noted previously, the Twin Lakes ceramic investigations will focus on the examination of distributions and patterns associated with the Basketmaker III components at LA 104106. Large samples of Basketmaker III pottery provide an opportunity to examine trends in production, decoration, exchange, and use of pottery vessels during the Basketmaker III period. Basketmaker III pottery from LA 104106 provides an opportunity to evaluate and expand interpretations discussed for Tohatchi phase ceramic assemblages from ceramic studies described for other projects in the area including the recent NSEP and N30–N31 projects (Reed and Hensler 1998; Waterworth 1999).

A comparison of pottery from Muddy Wash phase and Tohatchi phase sites indicates that in the Chuska Valley, the Basketmaker III occupation represents a period of experimentation by potters with firing technologies and resources that eventually resulted in major changes in clay selection and associated technology (L. Reed et al. 1998). This experimentation ultimately lead to a shift from the production of "brown ware" pottery, which reflects the use of self-tempered silty alluvial clays (L. Reed et al. 1998) found in most environmental settings, to "gray and white" wares, which reflect the use of geological clays with added temper requiring a more formal firing regime (Table 10.4) (L. Reed et al. 2000). This change in paste recipe is also associated with a shift to higher fired more durable vessels needed to meet the requirements of various activities stemming from the increased dependence of agriculture (L. Reed et al. 1998).

By the beginning of the Tohatchi phase (AD 600), the transition from pottery technologies using alluvial clays to those appropriate for geological clays common in the Four Corners region was almost complete. By the seventh century, assemblages dominated by polished "brown" utility ware characteristic of the Muddy Wash phase to unpolished "gray" utility ware pottery had been replaced by Anasazi gray ware and white ware pottery types characteristic of the Tohatchi phase (L. Reed et al. 1998). By the late Basketmaker III period, similar gray ware and white ware pottery was produced over almost all the Colorado Plateau. This period is also associated with a major expansion of ceramic-using groups into previously unpopulated areas. These observations were supported by investigations conducted during the NSEP that resulted in the analysis of 74,424 sherds from assemblages assigned to the Tohatchi phase from 12 sites.

While temporal trends similar to those noted for Basketmaker III pottery from other areas of the Cibola region were noted for the LA 104106 assemblage, the sandstone temper identified at LA 104106 was distinct from materials identified from many other areas of the Cibola region. Most of the gray wares examined were tempered with a dark matrix sandstone. This distinct temper appears to reflect the use of local sandstone in utility ware production at or near LA 104106. Other temper types noted in early gray wares include sand, sherd, self-tempered, and oblate shale and sand.

Tempers in Basketmaker III white wares from this site were slightly different. The most common temper noted in these white wares was sand, although examples tempered with sandstone with a dark matrix were also fairly common. Not surprisingly, Mogollon volcanics dominate Mogollon Brown Ware assemblages (Table 10.4).

As suggested previously, the Basketmaker III assemblage from LA 104106 appears to contrast with those from many other areas of the Cibola or Eastern Chuska regions by the dominance of fine sandstone. A high frequency of sandstone-tempered ceramics was noted from Tohatchi phase sites examined during the NSEP, where it was observed in 59 percent of all gray pastes (L. Reed et al. 1998).

Studies of pottery from Basketmaker III sites investigated during the N30–N31 project indicate that multi-lithic sand was probably used in the middle site clusters while white matrix sandstone was more common at the southeast end of the project area. These data suggest both a dominance as well as possible geographic variation in the types of sandstone used as temper in the production of Basketmaker III pottery at sites along the Tohatchi Flats and surrounding areas. While pottery tempered with both sandstone and sand were assigned to the Cibola tradition, the sandstone pottery recovered from LA 104106 and nearby sites was most likely produced locally. If this is the case, a higher frequency of the gray ware pottery assigned to Cibola types was produced locally compared to Cibola White or Red Ware pottery. While pottery assigned to gray ware types indicate a very low amount of long-distance exchange, 2.8 percent of the white wares were assigned to Northern San Juan types and 14.5 percent of the slipped red and all brown wares were assigned to Mogollon Tradition types. These patterns are consistent with other studies of Anasazi pottery production and exchange which indicate that during all temporal periods gray wares were more consistently produced locally than pottery associated with other ware groups (Wilson and Blinman 1995a).

Distributions in paste color of refired sherds may also provide clues concerning the nature of production and exchange of pottery vessels (Table 10.5). The small sample (87 sherds) of refired Basketmaker III pottery from LA 104106 was dominated by those with buff pastes. A similar range of refired colors was observed in pottery assigned to early gray ware and early white ware types, as well as pottery tempered with sandstone and sand. Examinations conducted during the NSEP indicated that more than 50 percent of the gray wares from Tohatchi phase components refired to buff colors, and an even higher frequency of early white wares fired to buff colors (L. Reed et al. 1998). These pattens contrasted with those noted for clay samples collected in the vicinity of these sites which mainly fired to red and yellow-red colors. During the NSEP, these differences were interpreted as evidence that pottery vessels were imported from outside the project area (L. Reed et al. 1998). It is also possible that the dominance of buff-firing pottery for both gray ware and white ware types reflects the use of local clay sources that have not yet been documented.

The lack of buff-firing clay sources, however, may also suggest a preference for a particular clay sources in the production of pottery. Similar sources appear to have also been utilized at later Pueblo I-period occupations that were also dominated by buff gray ware and white ware pottery.

Sherd and vessel distributions from the Basketmaker III occupation of LA 104106 also provide clues about the types of activities for which ceramic vessels were used. Aspects of vessel use are reflected in ceramic ware and vessel form categories. Other attributes relating to vessel size, wear patterns, soot deposits, post-firing, and manipulation may also reflect uses of vessels in various activities (Blinman 1985).

Distributions of pottery ware type and vessel form categories for Basketmaker III sherds from LA 104106 were compared to that noted in assemblages documented during other projects in this

Table 10.5. LA 104106, distribution of refired paste color for Basketmaker III pottery.

Category	5YR		7.5YR		10YR		Total
	Count	%	Count	%	Count	%	Count
Cibola, gray ware (sandstone)	1	1.8	3	5.3	53	93.0	**57**
Cibola, gray ware (sand)	–	–	–	–	6	100.0	**6**
Early Cibola, white ware (sandstone)	–	–	–	–	14	100.0	**14**
Early Cibola, white ware (sand)	–	–	1	10.0	9	90.0	**10**
Total	**1**	**1.1**	**4**	**4.6**	**82**	**94.3**	**87**

area (Table 10.6). Distributions from the N30–N31 project were taken almost directly out of Table 1.14 presented in the ceramic report (Waterworth 1999:28) while that presented for the NSEP involved combining several tables including those presented for generic and typological sherds as well as combining gray ware and gray-brown ware into a single category. Sherd assemblages from all three of these projects were overwhelmingly dominated by plain gray ware sherds. Ware frequencies from LA 104106 and contemporaneous proveniences from the N30–N31 project were almost identical. The frequencies of gray ware from Tohatchi phase sites investigated during the NSEP was higher than that noted for the two Basketmaker III sites on other projects. This may partly reflect differences in the use of the gray-brown ware category, but may also reflect slight functional differences, as reflected by a higher frequency of gray ware jars from NSEP sites.

Because associated form is difficult to determine for early body sherds (particularly gray ware), distributions of vessel form categories noted for various wares are presented for both the sample of all sherds (Table 10.7) as well as for rim sherds (Table 10.8). Gray ware sherds were represented by a very wide range of forms. While the great majority of body sherds were assigned to jar neck or jar body categories, rim sherds reflect a very wide range of forms including those derived from bowls (36.7 percent), seed jars (27.8 percent), cooking storage jar (23.4 percent), Indeterminate (8.6 percent), canteen (1.5 percent). Extremely low frequencies of gray ware rim sherds were derived from gourd dippers, miniature jars, and jars with strap handles. The great majority of white ware body and rim sherds represent bowl forms. All the brown and red ware rim sherds were derived from bowls.

Information relating to possible use is also reflected in the range of potential vessel size, which. is reflected in measurements of rim radius. Rim radius data are illustrated for various vessel forms including bowl, cooking/storage jar, and seed jar forms (Table 10.9). A wide range in the size of bowl vessel radii were noted for both utility and decorated wares but sizes were commonly between 5 cm and 14 cm. Although vessel sizes overlap between ware groups, decorated wares tended to be slightly larger with most (9 percent) being 7 cm or greater. Gray ware cooking/storage jars tended to be fairly small, with most (77 percent) of the sherds exhibiting rim radii 7 cm or less (Table 10.10). Seed jars also tended to be fairly small, however 30 percent are 7 cm or larger (Table 10.11). Thus, a great deal of variability exists not only in the range of forms noted, but the range in size of vessels assigned to a particular form. Trends in vessel size may be related to vessel function. Larger bowl size may indicate serving vessels as compared to the closed jar forms with smaller openings. Functional differences may also be reflected between closed jar forms. Based on the consistent size of cooking/storage jars compared to the variety of sizes among seed jar forms, these trends may reflect specialized and generic functions, respectively.

Table 10.6. Distribution of vessel ware from three projects in the Tohatchi Flats area.

		Ware Group				
		Gray	White	Red	Brown Plain	Total
N30–N31* late AD 600s, floors[1]	Count	2962	215	56	32	**3265**
	Row %	90.7	6.6	1.7	1	**100.00%**
NSEP** (Tohatchi Phase Contexts)[2]	Count	55237	2189	422	25	**57873**
	Row %	95.5	3.8	0.8	0	**100.00%**
LA 104106 (Twin Lakes)	Count	7779	611	44	62	**8496**
	Row %	91.5	7.2	0.5	0.7	**100.00%**

*Mexican Springs Project

**El Paso Natural Gas North System Expansion Project

[1]Waterworth 1999

[2]Reed and Hensler 1996

Table 10.7. LA 104106, distribution of vessel form by ware group for all Basketmaker III pottery.

		Ware Group				
Vessel Form		**Gray**	**White**	**Red**	**Brown Plain**	**Total**
Indeterminate	Count	24	6	1	2	**33**
	Col. %	0.3	1.00%	2.20%	3.20%	**0.40%**
Bowl rim	Count	124	114	6	4	**248**
	Col. %	1.6	18.70%	13.60%	6.50%	**2.90%**
Bowl body	Count	21	358	30	1	**410**
	Col. %	0.3	58.60%	68.20%	1.60%	**4.80%**
Jar neck	Count	333	3	–	–	**336**
	Col. %	4.3	0.50%	–	–	**4.00%**
Jar rim	Count	79	3	–	–	**82**
	Col. %	1	0.50%	–	–	**0.90%**
Jar body	Count	7044	102	7	–	**7153**
	Col. %	90.60%	16.70%	15.90%	–	**84.20%**
Jar body with strap or coil handle	Count	4	–	–	–	**4**
	Col. %	0.10%	–	–	–	**0%**
Jar body with lug handle	Count	5	1	–	–	**6**
	Col. %	0.10%	0.20%	–	–	**0.10%**
Gourd dipper	Count	2	1	–	–	**3**
	Col. %	0.00%	0.20%	–	–	**0%**
Indeterminate coil/strap handle	Count	3	–	–	–	**3**
	Col. %	0.00%	–	–	–	**0%**
Canteen rim	Count	5	1	–	–	**6**
	Col. %	0.10%	0.20%	–	–	**0.10%**
Miniature jar	Count	1	–	–	–	**1**
	Col. %	0.00%	–	–	–	**0%**
Miniature pinch pot rim	Count	2	–	–	–	**2**
	Col. %	0.00%	–	–	–	**0%**
Miniature pinch pot body	Count	4	–	–	–	**4**
	Col. %	0.10%	–	–	–	**0%**
Jar rim w/ strap handle	Count	1	1	–	–	**2**
	Col. %	0.00%	0.20%	–	–	**0%**
Seed jar rim	Count	94	14	–	–	**108**
	Col. %	1.20%	2.30%	–	–	**1.30%**
Fired coil	Count	3	–	–	–	**3**
	Col. %	0%	–	–	–	**0%**
Body sherd, polished interior/ exterior	Count	–	–	–	35	**35**
	Col. %	–	–	–	56.50%	**0.40%**
Body sherd unpolished	Count	–	–	–	1	**1**
	Col. %	–	–	–	1.60%	**0%**
Body sherd polished interior/unpolished exterior	Count	–	–	–	18	**18**
	Col. %	–	–	–	29%	**0.20%**
Indeterminate rim	Count	29	7	–	–	**36**
	Col. %	0.40%	1.10%	–	–	**0.40%**
Double bowl	Count	1	–	–	–	**1**
	Col. %	0.00%	–	–	–	**0.00%**
Total	**Count**	**7779**	**611**	**44**	**62**	**8496**
	Col. %	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**

Table 10.8. LA 104106, distribution of vessel form by ware group for Basketmaker III rim sherds.

		Ware Group				
Vessel Form		**Gray**	**White**	**Red**	**Brown Plain**	**Total**
Bowl rim	Count	124	114	6	4	**248**
	Col. %	36.70%	80.90%	100.00%	100.00%	**50.70%**
Wide-mouth jar rim	Count	79	3	–	–	**82**
	Col. %	23.40%	2.10%	–	–	**16.80%**
Gourd dipper	Count	2	1	–	–	**3**
	Col. %	0.60%	0.70%	–	–	**0.60%**
Canteen rim	Count	5	1	–	–	**6**
	Col. %	1.50%	0.70%	–	–	**1.20%**
Miniature jar	Count	1	–	–	–	**1**
	Col. %	0.30%	–	–	–	**0.20%**
Miniature pinch pot rim	Count	2	–	–	–	**2**
	Col. %	0.60%	–	–	–	**0.40%**
Jar rim w/ strap handle	Count	1	1	–	–	**2**
	Col. %	0.20%	7.10%	–	–	**0.40%**
Seed jar rim	Count	94	14	–	–	**108**
	Col. %	27.80%	9.90%	–	–	**22.10%**
Indeterminate rim	Count	29	7	–	–	**36**
	Col. %	8.60%	5.00%	–	–	**7.40%**
Double bowl	Count	1	–	–	–	**1**
	Col. %	0.30%	–	–	–	**0.20%**
Total	**Count**	338	141	6	4	**489**
	Col. %	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**

Table 10.9. Rim radius by ware group and vessel form.

		Ware Group				
Rim Radius		**Gray**	**White**	**Red**	**Brown Plain**	**Total**
3–5 cm	Count	12	4	–	–	**16**
	Row %	22.60%	6.60%	–	–	**13.60%**
6–7 cm	Count	9	13	–	–	**22**
	Row %	17%	21.30%	–	–	**18.60%**
8–9 cm	Count	12	16	–	–	**28**
	Row %	22.60%	26.30%	–	–	**23.70%**
10–11 cm	Count	15	16	–	–	**31**
	Row %	28.30%	26.30%	–	–	**26.30%**
12+ cm	Count	5	12	1	3	**21**
	Row %	9.40%	19.60%	100%	100%	**17.80%**
Total		**53**	**61**	**1**	**3**	**118**

Table 10.10. Rim radius for gray ware cooking/storage jars.

Rim Radius		Gray Ware
3–5 cm	Count	18
	Row %	60%
6–7 cm	Count	6
	Row %	20%
8–9 cm	Count	3
	Row %	10%
10–11 cm	Count	1%
	Row %	3.3
12+ cm	Count	2
	Row %	6.70%
Total		**30**

Table 10.11. Rim radius by ware group for seed jar forms.

		Ware Group		
Rim Radius (cm)		**Gray**	**White**	**Total**
3.0	Count	2	1	**3**
	Row %	3.50%	7.70%	**4.30%**
4.0	Count	6	–	**6**
	Row %	10.50%	–	**8.60%**
5.0	Count	16	7	**23**
	Row %	28.10%	53.80%	**32.90%**
6.0	Count	9	2	**11**
	Row %	15.80%	15.40%	**15.70%**
7.0	Count	17	1	**18**
	Row %	29.80%	7.70%	**25.70%**
8.0	Count	5	2	**7**
	Row %	8.80%	15.40%	**10%**
9.0	Count	1	–	**1**
	Row %	1.80%	–	**1.40%**
10.0	Count	1	–	**1**
	Row %	1.80%	–	**1.40%**
Total		**57**	**13**	**70**

Distribution of post-firing alteration and modification also provides clues concerning the utilization of pottery at LA 104106 (Table 10.12). A total of 12.9 percent of the sherds examined were recorded as exhibiting some kind of post-firing modification. Evidence of drilled holes used for repair and reshaping into ceramic scrapers were limited to white ware. Beveled edges were represented in both gray and white war sherds. A single smudged sherd and been shaped into a pendant and two gray ware sherds were shaped on all sides. Most of the other sherds assigned to modification categories exhibited some kind of wear or spalling indicating cooking or serving. The majority of sherds assigned to such categories represented gray wares.

Trends in pottery ware types and vessel forms noted at LA 104106 are consistent with those noted at other Basketmaker III sites in the Colorado Plateau, and may reflect the role of pottery containers in overall subsistence patterns (Hayes 1993; Mills 1989). It has been suggested that increased sedentism and reliance on agriculture accounts for shifts in manufacture and firing technologies to produce diverse and durable forms more suitable for more sedentary populations in various areas of the Southwest. Mills (1989) argues such changes reflect a shift from maintainable to reliable ceramic technologies. For example, Basketmaker III and Pueblo I ceramic components fit a model of maintainable technology, which reflect ease of manufacture and repair, less lag between manufacture and use, a lack of backup systems, and portability. The most striking example of a maintainable technology is reflected in exclusive production of plain brown ware vessels during the earliest ceramic stage in most southwestern regions (L. Reed et al. 1998).

These vessels were produced using easily obtainable self-tempered clays not requiring much preparation, and fired in an uncontrolled atmosphere at a fairly low temperature. Vessels were often polished, but never textured or painted. Vessel forms were limited to a few primary shapes such as seed jars, wide mouth jars, and bowls. Assemblages dominated by plain gray ware pottery with similar ranges of forms represent the next step in such a technology. Subsistence patterns associated with dispersed settlements, during both the Basketmaker III and Pueblo I occupations, may have resulted in an emphasis on the use of plain utility vessels in most activities (Mills 1989). The earliest production of plain gray wares reflects a basic technology that appears to have developed out of brown wares and appeared in the Colorado Plateau during the sixth century or the early Basketmaker III period (L. Reed et al. 1998).

The common production of gray ware vessels during the later Basketmaker III period reflects a technology more suited to the shale-based clays common in Colorado Plateau (Wilson et al. 1996), but forms and manipulations can still be characterized as maintainable technology. The purposeful

Table 10.12. LA 104106, distribution of post-firing modifications by ware group for Basketmaker pottery.

		Ware Group				
Post-firing Modification		**Gray**	**White**	**Red**	**Brown Plain**	**Total**
None	Count	6740	563	48	55	**7406**
	Col. %	86.80%	92.10%	77.40%	88.70%	**87.10%**
Drill hole (complete)	Count	–	4	–	–	**4**
	Col. %	–	0.70%	–	–	**0.00%**
Ceramic scraper	Count	–	1	–	–	**1**
	Col. %	–	0.20%	–	–	**0.00%**
Beveled edge	Count	7	1	–	–	**8**
	Col. %	0.10%	0.20%	–	–	**0.10%**
Interior worn from cooking	Count	527	–	–	–	**527**
	Col. %	6.80%	–	–	–	**6.20%**
Abraded surface (exterior)	Count	266	12	9	2	**289**
	Col. %	3.40%	2.00%	14.50%	3.20%	**3.40%**
Drill hole (incomplete)	Count	–	1	–	–	**1**
	Col. %	–	0.20%	–	–	**0.00%**
Interior surface, partially worn	Count	11	1	–	1	**13**
	Col. %	0.10%	0.20%	–	1.60%	**0.20%**
Abraded surface (interior)	Count	36	25	3	2	**66**
	Col. %	0.50%	4.10%	4.80%	3.20%	**0.80%**
Rim wear	Count	4	–	–	–	**4**
	Col. %	0.10%	–	–	–	**0.00%**
Interior/exterior erosion	Count	135	–	–	2	**137**
	Col. %	1.70%	–	–	3.20%	**1.60%**
Exterior partially exfoliated (erosion)	Count	35	3	2	–	**40**
	Col. %	0.50%	0.50%	3.20%	–	**0.50%**
Shaped (all sides)	Count	2	–	–	–	**2**
	Col. %	0.00%	–	–	–	**0.00%**
Shaped pendant	Count	1	–	–	–	**1**
	Col. %	0.00%	–	–	–	**0.00%**
Total	**Count**	**7764**	**611**	**62**	**62**	**8499**
	Col. %	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**

addition of temper to such clays resulted in pastes that when formed into vessels and fired, resulted in containers that were stronger and better suited to repeated use in cooking. The production of very low frequencies of white and red ware vessels, by painting or slipping gray wares, represent the first steps toward ware specialization. This move in vessel manufacture would eventually be reflected by the production of different wares ware groups and specialized vessel forms. Still, the dominance of unpolished plain gray ware vessels representing a wide range of forms illustrates the consistent use of very basic manufacturing conventions and is consistent with a maintainable technology. The overall distribution of vessel forms including seed jars, necked jars, and bowls is similar to those noted during the earlier brown ware period. Seed jars in particular appear to represent forms that were probably associated with a very wide range of activities including cooking and storage. The wide variation in vessel size, as reflected by rim radius, also reflects an absence of standardization in forms associated with late reliable technologies. The common occurrence of seed jar sherds also reflects the importance of a generalized form that could have been utilized in a wide variety of tasks. Finally, the dominance of gray wares in a range of forms is a pattern noted for other Basketmaker III assemblages throughout the northern Southwest, which contrast with ceramic assemblage patterns dating to later Pueblo periods (Wilson and Blinman 1995).

Three whole or nearly complete vessels were recovered from the antechamber and main chamber of a late Basketmaker III pit structure (Structure 1) at LA 104106 (Table 10.13). A La Plata Black-on-white seed jar (Vessel 1) was recovered from the antechamber (Fig. 10.7) and two other vessels recovered from the main chamber represent a large fugitive red olla (Vessel 2) and a plain gray miniature seed jar (Vessel 3) (Figs. 10.2a, 10.2b).

Ceramic Evidence of Pueblo-Period Occupations

Low frequencies of pottery types known to date after the Basketmaker III period were identified during Twin Lakes analysis. Therefore, discussions regarding the recognition and identification of later Anasazi occupations are brief. Later Twin Lakes pottery types include those associated with Pueblo II, Pueblo III, and historic Navajo components.

As previously indicated, most of the pottery from LA 32964 represents types probably associated with a Basketmaker III component. Types associated with later Anasazi (Pueblo II and Pueblo III) components from this site are represented by 24 sherds; 19 of these are represented by Cibola Plain Corrugated, consisting of 79.2 percent of all Pueblo-period pottery types here (Table 10.14). White wares at LA 32964 represent 12.5 percent of the Pueblo II/III pottery here, and are classified as Escavada Black-on-white, Gallup Black-on-white, and Mancos Black-on-white. White Mountain Redware comprises 8.3 percent of the Pueblo II/II pottery at this site.

In all, 273 sherds from Twin Lakes project sites represent pottery types associated with either Pueblo II or Pueblo III occupations (Tables 10.14, 10.15). Pueblo-period sites are common in this part of the Tohatchi Valley, and a number of substantial sites are located just outside the project boundaries. Most of the Pueblo-period pottery recovered during Twin Lakes project investigations is represented by the 230 sherds recovered during the excavations of LA 104106. The late Anasazi sherds from this site are dominated (77.4 percent) by sherds assigned to gray ware types. The majority (99.4 percent) of these represent Cibola Gray Ware types, including Indented Corrugated, Plain Corrugated, and Alternating Corrugated. A single corrugated sherd was classified as Chuska Tradition Corrugated Body based on the presence of trachyte temper. While most of the Pueblo-period pottery types identified cannot be attributed to a particular phase or period, some decorated sherds indicate pottery associated with two different phases. Most of the late Anasazi white wares appear to be derived from mineral painted Cibola Tradition types such as Puerco/Escavada Black-on-white and Gallup Black-on-white associated with the late Pueblo II period or Whirlwind phase. Sherds assigned to Chaco/McElmo and St. Johns Polychrome reflect pottery produced during the Pueblo III period or Twin Lakes phase. Assemblages associated with the Whirlwind and Twin Lakes phases are dominated by similar corrugated utility ware types.

While the occurrence of this wide range of Pueblo types could indicate activities at contexts within this site during the Pueblo II and Pueblo III periods, the occurrence of this pottery at proveniences assigned to the historic Navajo component (see discussion below), could also indicate the reuse of Pueblo-period pottery by Navajo groups.

Table 10.13. LA 104106, characteristics of whole vessels.

Vessel	Provenience	Type	Temper	Vessel Form	Wear	Rim Radius (cm)	Height (cm)
1	Structure 1, antechamber	Lino Black-on-white	dark matrix sandstone	seed jar (85%)	slight interior abrasion	10.0	15.0
2	Structure 1, main chamber	plain gray	dark matrix sandstone	olla (25%)	moderate to heavy interior abrasion	–	28.0
3	Structure 1, main chamber	Lino Gray	dark matrix sandstone	miniature seed jar (100%)	none	3.5	4.0

Table 10.14. Distribution of pottery type by site for Pueblo-period types.

Pottery Type		LA 32964	LA 103446	LA 104106	LA 116035	Total
Cibola						
Indented corrugated	Count	–	–	58	–	**58**
	Col. %	–	–	25.20%	–	
Plain corrugated	Count	19	4	117	13	**153**
	Col. %	79.20%	66.70%	50.90%	100.00%	
Alternating corrugated	Count	–	–	2	–	**2**
	Col. %	–	–	0.90%	–	**0.70%**
Pueblo II (indeterminate mineral)	Count	–	–	7	–	**7**
	Col. %	–	–	3.00%	–	**2.60%**
Escavada Black-on-white (solid designs)	Count	1	–	21	–	**22**
	Col. %	4.20%	–	9.10%	–	**8.10%**
Pueblo II (thick parallel lines)	Count	–	–	2	–	**2**
	Col. %	–	–	0.90%	–	**0.70%**
Gallup Black-on-white	Count	1	1	13	–	**15**
	Col. %	4.20%	16.70%	5.60%	–	**5.40%**
Chaco McElmo Black-on-white	Count	–	–	1	–	**1**
	Col. %	–	–	0.40%	–	**0.30%**
Pueblo III (indeterminate organic)	Count	–	–	5	–	**5**
	Col. %	–	–	2.20%	–	**1.80%**
White Mountain Red Ware						
White Mountain Red (painted, undifferentiated)	Count	1	–	1	–	**2**
	Col. %	4.20%	–	0.40%	–	**0.70%**
St. Johns Polychrome	Count	–	–	1	–	**1**
	Col. %	–	–	0.40%	–	**0.30%**
White Mountain Red (unpainted, undifferentiated)	Count	1	–	–	–	**1**
	Col. %	4.20%	–	–	–	**0.30%**
Northern San Juan						
Mancos Black-on-white (hachured)	Count	–	–	1	–	**1**
	Col. %	–	–	0.40%	–	**0.30%**
Mancos Black-on-white (solid and hachured)	Count	1	–	–	–	**1**
	Col. %	4.20%	–	–	–	**0.30%**
Chuska						
Chuska Corrugated	Count	–	1	1	–	**2**
	Col. %	–	16.70%	0.4	–	**0.70%**
Total	**Count**	**24**	**6**	**230**	**13**	**273**
	Col. %	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**

Table 10.15. Distribution of ceramic tradition by ware group for Pueblo-period pottery.

		Ware Group			
Tradition		**Gray**	**White**	**Red**	**Total**
Cibola	Count	213	52	4	**269**
	Row %	99.10%	96.30%	100%	**98.50%**
San Juan	Count	–	2	–	**2**
	Row %	–	3.70%	–	**0.7%**
Chuska	Count	2	–	–	**2**
	Row %	0.90%	–	–	**0.70%**
Total	**Count**	**215**	**54**	**4**	**273**
	Row %	**78.80%**	**19.80%**	**1.50%**	**100%**

Pueblo-period vessels would have been common at sites scattered throughout this area during the eighteenth and early nineteenth centuries.

Despite presence of plain gray wares at LA 103446, the overall pottery assemblage indicates an occupation during the late Pueblo II–Pueblo III period. Pottery noted at this site includes plain gray, plain corrugated, and Gallup Black-on-white. The 13 corrugated sherds from LA 116035 also reflect a component dating sometime to the Pueblo II or Pueblo III periods.

The very small assemblage size of pottery from the Pueblo-period contexts greatly limits any interpretations beyond the recognition of Pueblo-period components at all Twin Lakes sites. The majority (78.8 percent) of the Pueblo-period types are represented by gray wares while 19.8 percent are white wares and 1.5 percent are red wares (Table 10.15). The majority (98.5 percent) of this pottery represents Cibola Tradition types while very low frequencies of Pueblo-period sherds represent San Juan Tradition (0.7 percent) and Chuska Tradition (0.7 percent) types (Table 10.15). Both white wares and gray wares assigned to Cibola types represent a mixture of pottery tempered sand or sand and sherd (Table 10.16). The majority of utility ware sherds appear to be derived from cooking/storage while most of the white wares derived from bowls (Table 10.17).

Evidence of Early Historic Navajo Occupations

The latest occupation defined during the Twin Lakes project was based, in part, on the identification of historic pottery types representing vessels discarded by Navajo groups. These types include Dinetah Gray and the historic Western Pueblo polychrome types. Given the long time span of Dinetah Gray and the Western polychrome series, produced from the eighteenth to the end of the nineteenth century, it is difficult to assign a specific date to this occupation based on associated pottery alone.

A total of 267 sherds of the pottery from LA 104106, SU 2 represent historical Navajo and Pueblo types. These include 218 (or 96.1 percent of the historical types) assigned to Dinetah Gray and 9 (or 3.9 percent) sherds assigned to Acoma/Zuni Polychrome. Functionally, the area was an activity area utilized by early historic Navajo groups. The pottery at two Twin Lakes project sites and the archaeomagnetic and radiometric data recovered from features at LA 104106 SU 2 suggest the occupation occurred between AD 1750 and AD 1825 (Table 10.18). Chronological data are consistent with the span of time that would be associated with the combination of these pottery types. It is likely that this site is associated with the early Cabezon phase, assumed to date from

Table 10.16. Distribution of temper type by ware group for Pueblo-period pottery.

Temper Type		**Ware Group**			
		Gray	**White**	**Red**	**Total**
Sand	Count	30	4	–	**34**
	Row %	14%	7.40%	–	**12.50%**
Sherd	Count	115	11	2	**128**
	Row %	53.50%	21.40%	50%	**46.90%**
Sherd and sand	Count	64	36	2	**102**
	Row %	29.80%	66.70%	50%	**37.45**
Crushed andesite or diorite	Count	–	1	–	**1**
	Row %	–	1.90%	–	**0.40%**
Andesite diorite and sand	Count	–	1	–	**1**
	Row %	–	1.90%	–	**0.40%**
Gray crystalline basalt	Count	1	–	–	**1**
	Row %	0.50%	–	–	**0.40%**
Basalt and sand	Count	1	–	–	**1**
	Row %	0.50%	–	–	**0.40%**
Dark matrix sandstone	Count	4	1	–	**5**
	Row %	1.90%	1.90%	–	**1.80%**
Total	**Count**	**215**	**54**	**4**	**273**
	Row %	**78.80%**	**19.8**	**1.5**	**100.00%**

Table 10.17. Distribution of vessel form by ware group for Pueblo-period pottery.

Vessel Form		Ware Group			
		Gray	White	Red	Total
Indeterminate	Count	–	–	1	**1**
	Row %	–	–	25%	**0.40%**
Bowl rim	Count	1	7	–	**8**
	Row %	0.40%	13.00%	–	**2.90%**
Bowl body	Count	–	31	3	**34**
	Row %	–	57.40%	75%	**12.50%**
Jar neck	Count	13	2	–	**15**
	Row %	6.00%	3.70%	–	**5.50%**
Jar rim	Count	6	–	–	**6**
	Row %	2.70%	–	–	**2.20%**
Jar body	Count	194	12	–	**206**
	Row %	90.20%	22.20%	–	**75.50%**
Indeterminate rim	Count	1	–	–	**1**
	Row %	0.50%	–	–	**0.40%**
Pitcher body	Count	–	1	–	**1**
	Row %	–	1.90%	–	**0.40%**
Canteen rim	Count	–	1	–	**1**
	Row %	–	1.90%	–	**0.40%**
Total		**215**	**54**	**4**	**273**

Table 10.18. Distribution of Historic ceramic types by site.

Type		LA 32964	LA 104106	Total
Acoma/Zuni Polychrome (undifferentiated)	Count	–	22	**22**
	Col. %	–	8.1	**7.9**
Acoma/Zuni Polychrome (indeterminate)	Count	–	27	**27**
	Col. %	–	9.9	**9.7**
Dinetah Gray	Count	4	224	**228**
	Col. %	100.00%	82.1	**82.3**
Total	**Count**	**4**	**273**	**277**
	Col. %	**100.00%**	**100.00%**	**100.00%**

AD 1770 to 1863 (Noisat 1978; Vogler et al 1993). This period post-dates the Gobernador phase of the Upper San Juan (Brugge 1983) and represents a time of the coalescing of populations into an area that is now encompassed by the present-day Navajo Reservation. Occupations dating to the early Cabezon phase are consistent with the combination of Navajo Utility Ware and Matte Painted Pueblo pottery types and lithics. Historic artifacts of European or American manufacture are usually not present until the later part of this phase. It is more difficult to assign a date based on the four Dinetah gray shreds from LA 32964 although an association during the eighteenth or nineteenth century is likely.

The Dinetah Gray sherds exhibit a combination of sand temper and dark paste characteristic of this type, and may reflect vessels produced by Navajo potters in this area (Table 10.19). The Pueblo sherds exhibit manipulations, light pastes, and sand and sherd temper indicating they were produced at either Acoma or Zuni Pueblo (Table 10.19), and reflect the high level of interaction between Navajo and Western Pueblo groups during the Historic period. All of the Dinetah Gray sherds identified originated from cooking/storage jars while the historic Western Pueblo types represent a mixture of sherds derived from bowls and jars (Table 10.20).

Table 10.19. Distribution of temper type by ceramic tradition for Historic pottery types.

		Acoma/Zuni Historic Polychrome	Navajo	Total
Sand	Count	–	228	**228**
	Col. %	–	100.00%	**82.30%**
Sherd and sand	Count	49	–	**49**
	Col. %	100.00%	–	**17.70%**
Total	**Count**	**49**	**228**	**277**
	Col. %	**100.00%**	**100.00%**	**100.00%**

Table 10.20. Distribution of ceramic tradition by vessel form for Historic pottery types.

		Acoma/Zuni Historic Polychrome (undifferentiated)	Navajo Utility	Total
Bowl body	Count	13	–	**13**
	Col. %	26.50%	–	**4.70%**
Jar neck	Count	2	16	**18**
	Col. %	4.10%	7.00%	**6.50%**
Jar rim	Count	6	6	**12**
	Col. %	12.20%	2.60%	**4.30%**
Jar body	Count	26	206	**232**
	Col. %	53.10%	90.40%	**83.80%**
Jar body with handle	Count	2	–	**2**
	Col. %	4.10%	–	**0.70%**
Total	**Count**	**49**	**228**	**277**
	Col. %	**100.00%**	**100.00%**	**100.00%**

11 | Flaked Stone Artifacts

Chris T. Wenker

Preceding chapters have summarized and described the flaked stone tools and debris from each of the Twin Lakes project sites. This chapter will evaluate, compare, and interpret the assemblage data from the Basketmaker and Navajo components at the two largest sites: LA 32964 and LA 104106.

Analysis Methods

All flaked stone artifacts were analyzed according to the standardized procedures outlined in the *Office of Archaeological Studies Lithic Analysis Handbook* (OAS Staff 1994a). This recording system tracks raw material type and quality, artifact morphology and function, presence and type of cortex, type of thermal alteration, artifact portion, and length, width, thickness, and weight for all artifacts. Flake attributes such as platform type, platform lipping, presence of dorsal scars, and distal morphology are recorded, as are tool attributes including wear patterns and used edge angles. All data were coded and entered in SPSS[7] data files.

The Twin Lakes flaked lithic analysis was organized and primarily conducted in 1998–1999 by Jesse Murrell, who was assisted by Theresa Fresquez and Byron Hamilton. Artifacts were examined under 20- to 80-power magnification to facilitate the identification of raw material types and use wear. All items were weighed with balance-beam scales. Dimensions were measured with metric calipers. Tool edges were measured with a goniometer.

In 2003 the author reviewed all formal and informal tools and spot checked some of the flaking debris for analytic consistency. Few data changes were necessary, but several raw material classifications were revised. Some items that were originally identified as used or retouched flakes were reclassified as unused debitage, and other use-wear patterns were revised, reflecting the author's conservative approach to low-magnification use-wear identification (e.g., Young and Bamforth 1990).

As in preceding chapters, in the following discussion, parametric tests in SPSS[7] (such as t-tests and ANOVA) were used to compare sample means whenever normally distributed data were available. Most samples were skewed away from normal distributions (usually, heavily toward the left with many extreme outliers to the right), as confirmed by one-sample Kolmogorov-Smirnov tests. Non-parametric tests such as Mann-Whitney U were used in these instances. Sample means are still reported for continuity and ease of interpretation, however, even though such non-parametric tests use the ranks of the cases rather than the sample means.

Applying Lithic Data to the Research Design

The study of flaked stone tools and debris from the Twin Lakes sites can provide information relevant to several of the project's research design questions (Blinman 1997a). Prior to excavation, many of the sites were thought to contain material dating to the Pueblo I and II periods, and accordingly, the initial research orientation focused on outlining functional complementarity among sites to understand changes in Puebloan community structure.

Because some of the Twin Lakes sites contained unanticipated components (such as Basketmaker II and early historic Navajo), and no substantial Pueblo I or II deposits were encountered, the research design does not specifically provide a framework in which to interpret much of the material. However, many of the same basic questions can be answered (e.g., "What functions or activities took place at each particular location?" [Blinman 1997a:24]), and the main goal of the research design (that of identifying functional complementarity among southern Chuska Valley sites) can still be achieved. But, because the sites are mainly Basketmaker in age, the interpretive contexts in which to evaluate the information must be revised, and the study of Pueblo I–II community structure must be set aside.

This interpretive realignment is particularly germane to the lithic analysis. In the Basketmaker II and III materials, we can study some of the processes through which communities were forming (Dohm 1994). In this light, issues of residential mobility or stability, as related to the advent of horticulture, rise to the forefront of research topics. As outlined below, these subjects are perhaps more directly and effectively addressed through flaked and ground stone artifact analysis than Pueblo I–II community structure might have been.

In the archaeology of the American Southwest, aceramic Archaic-period people have typically been considered hunter-gatherers who moved across the landscape most or all of the year. Conversely, Formative-period farmers who made ceramic vessels have been considered residentially sedentary. The stark dichotomy of this perception has yielded in past decades to an acknowledgment that, although this general trend holds true, the degree of residential sedentism or mobility can vary among hunter-gatherers and farmers of all time periods (J. Moore 1999a:8). Further, many variations of the concepts of sedentism and mobility can be forwarded (P. Reed 2000). Accordingly, mobility studies continue to provide new insight on past life ways by illuminating related research topics such as subsistence, scheduling, and social organization.

Sites dating to the transitional period of nascent horticulturalists are of special interest in sedentism and mobility studies. In the trajectory of Anasazi cultural evolution, this period is marked by the early Basketmaker II period. The processes that drove the initial use of horticulture on the Colorado Plateau are debatable (e.g., Matson 1991; Wills 1988), but the Twin Lakes sites cannot address this question. Basketmaker II sites such as LA 32964 are better poised to answer questions about the life ways that followed soon after that threshold. Maize horticulture was certainly an emphasis of Basketmaker II people, but the subsistence and land-use strategies of these emergent horticulturalists remain obscure. Were these groups completely tethered to their field plots or were they partly or fully engaged in a seasonal or year-long transhumant hunter-gatherer life way, similar to that of their Archaic-period antecedents (Barlow 2002; Lipe 1994; Wills 1988; Smiley 1994)? Flaked stone artifact data can inform some aspects of Basketmaker residential mobility (e.g., R. Nelson 1994; Simmons 1986; Torres 1999, 2000), which has bearing on these questions.

Similar questions apply to the Basketmaker III period, where the relative degree of residential stability can also be debated (although their reliance on horticulture can no longer be denied [e.g., P. Reed 2000]). Gilman (1987) proposes that Southwestern pithouses (such as those of the Basketmaker III period) were winter residences, which indicates, at minimum, a biseasonal pattern of residential mobility. Other researchers have also proposed a high degree of Basketmaker III mobility (e.g., Wills and Windes 1989), but recent work (see P. Reed [ed.] 2000) indicates that "many Basketmaker III houses were permanent structures occupied year-round by logistically mobile, but residentially sedentary, populations" (P. Reed 2000:12). Again, flaked stone data can be used to evaluate these topics.

Many questions can also be asked of the early historic Navajo component, because little is known of early historic Cabezon phase life ways in the Chuska Valley. Interpretations of Navajo lithic assemblages can be directly pertinent to the study of such topics as residential mobility or stability, subsistence, and even acculturation.

Studying Mobility with Lithic Data

Some aspects of residential mobility can be examined through an evaluation of a society's technological organization. The study of the organization of technology reviews the "spatial and temporal juxtaposition of the manufacture of different tools . . . [and] their use, reuse, and discard" and "aims to elucidate how technological changes reflect large-scale behavioral changes in a prehistoric society" (Kelly 1988:717).

Among lithic technologies in the American Southwest, two basic organizational strategies are commonly identified: curated and expedient. Curated strategies often involved the production of large bifaces that flexibly served as either tools or cores. Expedient strategies relied on informal flake tools produced from informal cores. "Curated strategies are usually associated with a high degree of residential mobility, while expedient strategies are typically associated with sedentism" (J. Moore 1999a:11).

Expectations of the types of archaeological assemblages resulting from curated and expedient strategies are outlined by J. Moore (1999a), who relies heavily on Bamforth's (1986) and Kelly's (1988) models of hunter-gatherer biface manufacture. Essentially, sites produced by mobile foragers and collectors should contain a range of generalized and specialized bifaces, reflecting a curated technology. Bifaces commonly doubled as cores to produce flake-tools. Signs of on-site biface manufacture may or may not be present, however, depending on the specific site function (e.g., logistic versus residential camps). Raw material availability also profoundly affects these expectations, because reliable tools may have been less important when suitable stone types were immediately available, and in those cases expedient strategies may have occasionally been used by mobile people. Conversely, sites occupied by sedentary farmers (even logistic sites) should contain informal tools made entirely of expediently produced flakes. Bifaces may be present, but they should not have served as cores for flake tools. The preceding, generalized description of mobility studies necessarily simplifies a complex set of factors, such as lithic reduction strategies and archaeological assemblage formation, that affect our interpretations of the mobility/sedentism spectrum (see also Bamforth 1986; Bleed 1986; Kelly 1988; J. Moore 1999a; Parry and Kelly 1987).

The presence of exotic raw material types at a site can also indicate mobility (Vierra 1994a, 1994c) if it can be demonstrated that the materials were directly procured by the site residents. Exogenous stone types could also have been distributed through exchange systems, however, so their presence can also be markers of social interaction (Vierra 1993a).

These perspectives on technology and raw-material use will frame the interpretations of mobility derived from flaked lithic artifact data. This chapter will address applicable aspects of the research design (Blinman 1987a) while working within the revised interpretive structure described above.

Local and Regional Lithic Resources

The valley floor of the Tohatchi Flats is a broad, open sheet of incised alluvium directly overlying an expanse of the Menefee Formation, which consists primarily of shale and sandstone. The Menefee Formation is exposed along the escarpments of mesas, cuestas, and benches that ring the edges of the valley floor. Fluvial gravels from the Chuska Mountains containing sandstone, silicified wood, quartzite, chert, and siltstone mantle the peripheral landforms of the northern and central Tohatchi Flats, providing a ready source of stone tool materials and building stones in that area (Kearns 1998e; Sant et al. 1999).

Kearns (1998a) notes that the Twin Lakes vicinity, at the southern end of the Tohatchi Flats, is not bounded by the Chuska Mountains but rather is delimited on the west by the Manuelito Plateau and on the south and southeast by Lobo Mesa. Hence the gravels common in the north are absent in the southern Tohatchi Flats. Local lithic resources are "restricted primarily to sandstone and shale, with some grainy petrified wood available in the uplands" (Kearns 1998a:17).

Regionally, Warren (1967) documents a wide range of usable stone types available in the Chuska Valley. Many varieties of silicified wood, chert, chalcedony, quartzite, and igneous rocks are common along the eastern slope of the Chuska Mountains. Concretions, hematite, and baked sedimentary rocks are found throughout the San Juan Basin (Gunderson and Kearns 1999; Skinner 1999b; Warren 1967). Because these materials are not known to be point-specific and can occur throughout the Chuska Valley and Tohatchi Flats, they must be considered local materials for the present study. Some definitely exogenous stone types of known nonlocal provenance are present in the Twin Lakes assemblages, however.

Narbona Pass chert (also called Washington Pass chert) is a chalcedonic or opaline chert, "usually orange pink to reddish orange" (Warren 1967:121). This high-quality chert derives mainly from vesicular basalt flows atop the Chuska Mountains at Narbona Pass, 40 km (24.8 miles) north of the Twin Lakes area, although redeposited cobbles can be found in drainages 15 km (9.3 miles) east of the source as well (Vierra 1993b:161). This material was commonly used at sites throughout the Chuska Valley and surrounding region (Jacobson 1984).

Roughly 75 km (46.6 miles) southeast of the Twin Lakes region, the Zuni Mountains yield two distinctive varieties of chert. Zuni Mountain chert is a yellowish brown to (occasionally) reddish material with black dendritic inclusions (Warren 1967:132). In the past, this distinctive stone has suffered numerous unfortunate appellations, such as “Chinle chert,” “yellow brown spotted chert,” or “mossy yellow chert,” but Drake and Phagan’s (2004) geographic descriptor for the type seems preferable. The other type, San Andres chert or “fingerprint chert” is white or grayish with narrow concentric bands of darker coloration. Both types of chert derive from San Andres Limestone in the Zuni Mountain area (Vierra 1993b:163). Although Drake and Phagan (2004) lump them together under “Zuni Mountain chert,” the two types are distinguished here because the San Andres chert also outcrops in far southeastern New Mexico (Banks 1990:71; Wiseman 2003:221).

Many sources of obsidian are known in the American Southwest (Baugh and Nelson 1987; Shackley 1988, 1995), and obsidian is relatively common in the project assemblage. Energy-dispersive X-ray fluorescence analyses (EDXRF) was used to identify the sources of a sample of the obsidian from the project sites, although many of the flakes are too small for EDXRF analysis and remain chemically unidentified. The known types of obsidian found at the Twin Lakes sites derive from some of the closest available areas to the southeast (Mount Taylor) and northeast (Valles Caldera in the Jemez Mountains). The geologic source for Mount Taylor lies roughly 110 km (68.4 miles) southeast of the project area sites. This obsidian is typically a black opaque material (Vierra 1993b:163), and much of the Twin Lakes assemblage also contains tiny phenocrysts, perhaps indicating material from the Grants Ridge locality (Shackley 1998). Obsidian from Cerro del Medio in the Valles Caldera, 210 km (130.5 miles) to the east, is commonly glassy, black, and translucent or nearly transparent (Vierra 1993b:161).

Outlining Twin Lakes Site Chronologies with Lithic Data

The use of projectile points as temporal markers at horticulturalists’ sites in the American Southwest is hampered by the lack of well-defined typologies that are linked to chronometric data. This shortcoming does not exist because of a lack of interest or effort in typology development (e.g., K. Brown 1993; Kearns and Silcock 1999; Lekson 1987; J. Moore 1999b), but the problem seems to lie in categorizing the great variability in contemporaneous projectile forms and accommodating the late persistence of dart-sized points during the period of bow-and-arrow use. Ceramic and chronometric data are more commonly used to determine horticultural site occupation dates, and unless these data are not available, point styles generally provide only supporting evidence.

Further, the study of projectile point forms associated with northwestern New Mexico’s Oshara Tradition (Irwin-Williams 1973) has suffered from the lack of a systematic typology (the efforts of G. Brown et al. [1993], R. Moore and Brown [2002], and Turnbow [1997] notwithstanding). The lack of discrete, diagnostic attributes hinders distinguishing some forms ostensibly associated with the various Oshara phases. Further, the ranges of point and assemblage variability remain unqualified, and relatively few points are linked to contexts with chronometric data. Other traditionally defined projectile point typologies that are commonly used in the northern Southwest often derive from adjacent regions, such as the Great Basin (e.g., Heizer and Hester 1978) or High Plains (Gunnerson 1987), which may not be directly applicable.

The tendency for later site occupants to scavenge and reuse points from earlier periods also dilutes the sensitivity of point types as temporal markers of occupation. This problem is especially acute at post-Archaic period sites (e.g., Kearns and Silcock 1999).

Regardless, some general trends in morphological change are recognized in Basketmaker and Puebloan point forms, and these trends can be roughly tracked through time. One fundamental change is represented by the shift from the use of darts to arrows, which occurred sometime during the late Basketmaker II period in the southern

Chuska Valley (Kearns and Silcock 1999:6–18). Hence, at sites in this region, arrow points provide good evidence for a post-AD 150–500 period of occupation, although distinguishing dart- and arrow-sized points can sometimes be difficult (e.g., Kearns and Silcock 1999; J. Moore 1999b).

Kearns and Silcock (1999:6-1) also point out an overall general trend "for stemmed arrow points to be replaced by corner-notched styles by the Pueblo I period, and corner-notched points to be replaced by side-notched points starting during the Pueblo II period" in the northern Southwest (also see Lekson 1987). While not a diagnostic trait, this trend can be used to independently evaluate other lines of dating evidence at sites with these types of points.

Basketmaker II Projectile Points

The Basketmaker II assemblage at LA 32964 contained two large, whole or nearly whole projectile points made of local chert: one side-notched and one corner-notched (see Fig. 5.32a, b). Although no named type is assigned to either tool, their styles match well with points attributed to the En Medio phase (Irwin-Williams 1973, Fig. 6i) and with other Archaic or Basketmaker II–III occupations in the San Juan Basin (K. Brown 1993; Chapman 1977; Kearns and Silcock 1999; Simmons 1982a). These two dart points support the Basketmaker II age ascribed to the buried feature complex in SU 1.

The two other broken points from the mixed later component at LA 32964 cannot be typed, but they appear sufficiently large to be dart points as well (see Fig. 5.32:c, d). Because the later component contains Basketmaker III to Navajo materials, their temporal association must remain unknown, and, unfortunately, the points themselves are not useful for refining the dating of this component.

Basketmaker III Projectile Points

The Basketmaker III assemblage at LA 104106 contained a mix of dart and arrow points (see Fig. 8.68:a). Six are probably dart points, but only one has an intact, unreworked hafting element. This large, untyped corner-notched point (FS 1137) closely resembles tools reported by Kearns and Silcock (1999:6-11, 6-16) from Archaic through Pueblo II sites in the San Juan Basin.

Three small corner-notched arrow points are also present in the Basketmaker III component at LA 104106 (see Fig. 8.68:b). Kearns and Silcock (1999:6-11, 6-16) describe similar points from the Tohatchi Flats area that occur almost exclusively at Basketmaker III sites. Lekson (1987:667) also illustrates nearly identical points from late Basketmaker III sites in Chaco Canyon. Brown's (1993) type BIVA is of a similar style, although those points derive mainly from PI/PII sites in the San Juan Basin.

These three LA 104106 arrow points derive entirely from floor-associated proveniences in Structure 1. This strong contextual association indicates that the arrow points were related to the occupation and abandonment of this house, which dates to the late Basketmaker III Tohatchi phase. Structure 1 completely lacked dart points, however. All of the dart points at this site were recovered from extramural locations, but no direct evidence for multiple occupations is present. Accordingly, an argument for the concurrent use of darts and arrows may explain this pattern of point distribution. Finally, LA 104106 completely lacks the stemmed arrow points that are common at early Basketmaker III sites (Kearns and Silcock 1999:6-16; Lekson 1987). Being a late Basketmaker III-period site, the LA 104106 data further reinforce the idea of a temporal shift from stemmed to corner-notched points during the Basketmaker period.

Navajo Projectile Points and Tools

Thirteen projectile points (including one that was reworked into a drill) derive from SU 2 at LA 104016, which contains a late eighteenth- or early nineteenth-century Navajo component as well as features and ceramics of the Basketmaker II and Basketmaker III periods. None of the dart and arrow points were recovered from features or deposits of known age.

Seven of the eight arrow-sized points (including a preform) are probably Navajo-produced projectile tips (see Fig. 8.69). Together, these small triangular points form a somewhat heterogeneous group, but they all differ substantially from the eighth arrow point (discussed below). One of the seven probable Navajo points is unnotched and the rest are characterized by either shallow, broad side notches, a concave base, or both. Together, these points resemble those reported by Brugge (1986:125) and

Lekson (1987:679) from an early historical Navajo site in Chaco Canyon. Kearns and Silcock (1999:6-18), Keur (1941:57), and Skinner (1999a:59, 127) report low counts of similar points from ethnohistoric and historic Navajo sites in the San Juan Basin. A similar point is noted at an Anasazi site by Simmons (1982a:210), however. Because none of the points from LA 104106 were found in definite Navajo features or deposits, their association with that occupation cannot be confirmed. Regardless, their resemblance to other known Navajo point assemblages strongly indicates such an affiliation.

Finally, six other dart or arrow points (see Fig. 8.69), some of which are extensively reworked or reused, were present in SU 2, possibly due to Navajo collection and reuse of earlier artifacts (although they could also derive from the Basketmaker II or III occupations of this study unit). The reworked obsidian arrow point (FS 2105) strongly resembles side-notched points found at regional Puebloan sites, suggesting that it may have been collected locally. One complete stemmed point (FS 2346) resembles an Augustin point, which is commonly attributed to the Middle Archaic period (J. Moore 1999b). This point was reused, however, and represents a scavenged item. Because none of these six points were recovered from dated contexts, and due to the possibility of scavenging and reuse (Kearns 1996d; Lekson 1987:679), these items are of little use in refining the dates of this component's occupation.

Regional and Temporal Comparison of Stone Tool Use

Contemporary Navajo sites are known from the nearby western slope of the Chuska Mountains (Gilpin 1996; James 1976). In the Canyon de Chelley area, chipped stone artifacts are relatively common at Del Muerto phase sites (dating to 1750–1800), but stone tools and debris "show a marked decrease from 1813 to about 1900" (James 1976:66). James (1976:66,100–101) proposes that most of the Navajo flaked stone items were probably collected from earlier sites, although "some rudimentary flaking took place, probably providing flakes as needed." These observations run counter to other studies of Navajo lithic technology (e.g., Kearns 1996d), which indicate substantial flake and tool production at ethnohistoric and early historic Navajo sites. Kearns (1996d:141) does point out a decline in bifacially retouched tool production in the Gobernador phase that could be related to a switch from stone to metal cutting implements.

Around Canyon de Chelley, James (1976:100–101) reports occasional metal, beads, glass, and leather artifacts at pre-Fort Sumner-period Navajo sites. A probable metal arrowhead from an eighteenth-century site in that region indicates the fairly early use of non-stone projectile tips. Window or bottle glass was only present at Canyon de Chelley sites after the mid-1800s, and did not become common until after 1900 (James 1976:94–95). Even when it was available, glass does not appear to have been extensively used for flaked tools, as Kearns (1996n:131) notes that "modified glass artifacts are not typical elements in ethnohistoric and early historic Navajo assemblages."

No industrially produced items were recovered from the study unit containing the Navajo component at LA 104106. Although Euroamerican metal and glass products were available in the region by this time, the residents of this site still relied on stone arrow tips. The lithic-reliant assemblage may indicate a fair measure of self-sufficiency, or the absence of industrially produced artifacts could be taken as a sign of an early Navajo occupation that predated the common use of such tools and materials. The absence of industrial materials in the archaeological record does not unequivocally indicate they were not used at the site, however. Unfortunately, because the full range of stone artifacts attributable to the Navajo occupation cannot be segregated from artifacts of the other components, the degree of Navajo reliance on stone tools at this site cannot be measured. Site function and occupation duration would also profoundly affect the numbers, materials, and types of tools used and discarded at this site.

Twin Lakes Site Activities and Structure

Preceding chapters have described and evaluated the Twin Lakes flaked stone assemblages according to the particular artifact classes that are present. The following sections review the assemblages' functional characteristics to gain a better understanding of overall site activities and site structure.

Basketmaker II Site Activities and Structure at LA 32964

Morphological, functional, and technological aspects of the Basketmaker II flaked stone tool assemblage at LA 32964 suggest a dual focus on the manufacture of small pressure-flaked bifaces (accompanied by the disposal of small pressure-flaked biface fragments) and the production and use of shaped or unshaped flake tools. The low absolute count of tools relative to the combined duration of site occupation and the volume of excavated and screened sediment suggests that site activities rarely centered on flaked stone tool use and production.

The collection of small bifaces shows little obvious evidence of use-induced wear or fractures, but some of the edge fragments appear to represent broken projectile point shoulders, tangs, or tips that could have broken during use. Conversely, signs of pressure-flaked biface manufacture are relatively common. Given the low frequency of flake-cores and the exceptionally low proportion of cortical flaking debris, however, these small bifaces appear to have been made from blanks or preforms that were roughed out elsewhere and transported to the site in a relatively advanced state of reduction.

LA 32964 may represent a locale where occasional retooling occurred (i.e., where exhausted or broken tools were replaced with newly manufactured ones), but this use was probably incidental to other site activities (given the probable focus on crop storage and processing that occurred on-site). If late-stage biface production were conducted at this site on an opportunistic or unscheduled basis (e.g., when allowed by other activities), a necessary prerequisite would have been the preparation and curation of a portable lithic tool kit containing biface blanks. These observations imply that the production of formal tools at this site was a task that required prior planning, indicating substantial logistical organization on the part of the tool makers.

Used/retouched flakes show equivalent proportions of unidirectional and bidirectional use, indicating a variety of tasks. Some of the used flakes (particularly those of obsidian) were probably curated items that were not produced on-site. The unpatterned local cores (from which the local flake blanks were probably produced) show little effort toward the conservation of material. This tool class indicates a relatively expedient approach to tool production.

The ratio of formal to informal tools (i.e., bifaces to used/retouched flakes) in the Basketmaker II assemblage approaches 1.1:1. This ratio is substantially lower than that of 2.5:1 reported by Vierra (1994d:422) for four Arizona/New Mexico Basketmaker II sites, but is still higher than Vierra's BMIII/PI and PII/PIII sites (0.8:1 and 0.9:1, respectively). These results all differ dramatically from those of R. Nelson (1994), who reports exceptionally low proportions of formal to expedient tools at sites on Cedar Mesa, Utah (where, based on the presented data, the Basketmaker II ratio is 0.12:1, and later Basketmaker III and Puebloan periods exhibit ratios of 0.14:1 and 0.10:1, respectively). Different tool definitions or analytic procedures may account for some of these discrepancies, as might different site functions. Regardless, the LA 32964 Basketmaker II assemblage displays a balance in the use of formal and informal tools.

No strong cases of *de facto* archaeological deposits are present in the lithic assemblage at LA 32964; most flaked stone material was found in secondary disposal contexts. Hence an examination of site structure based on intra-site lithic artifact distributions actually represents a study of artifact disposal patterns and site-formation processes. Still, some interesting distributions are evident among the Basketmaker II flaked stone tools (see Figs. 5.31, 5.32).

An assessment of the overall tool distribution in the Basketmaker II component reveals two subjective observations that may signal differential use of eastern and western site space (divided along an axis between the western edge of Feature 1 and Features 8 and 14). First, the distribution and density of bifaces, cores, and used/retouched flakes differs between these areas. To the west, around the main cluster of pits, flaked stone tools were generally uncommon but ground stone tools were dominant. Bifaces were present (n = 2), but used/retouched flakes were proportionally more frequent (n = 4). Both of the unused cores lie in this area as well. In the eastern area, surrounding Feature 1 and the features to the south, bifaces and used/retouched flakes were ubiquitous, but many were found in refuse contexts. All three hammerstones lie in this area as well, far from the cores to the west. No differences in used flake wear patterns, biface production types, or biface fracture types were apparent between the two areas.

Second, all tools made of exotic lithic material occupy the eastern site area. Flaking debris, however, does not follow this pattern, and obsidian and Narbona Pass chert flaking debris was common in both the western and eastern areas. Together, these observations may indicate that the western site area, with its common ground stone tools and pits, may represent a vegetal processing area that mainly required informal flake tools, while the eastern site area witnessed the bulk of flaked stone tool production and maintenance, and possibly, meat processing (suggested by the prevalence of faunal bone in the eastern site area).

Basketmaker III Site Activities and Structure at LA 104106

The morphological, functional, and technological aspects of the Basketmaker III flaked stone tool assemblage suggest a primary focus on the production and use of shaped or unshaped flake tools. Used/retouched flakes most commonly display unidirectional or bidirectional use, but the presence of rotary and other unidentified-use categories indicates a range of tasks. The unpatterned cores from which the flake tools were probably produced show little effort toward the conservation of material, even among nonlocal material types, indicating a relatively expedient approach to flake-tool production.

Small pressure-flaked bifaces constitute the second main class of flaked stone tools. Projectile points were relatively common in the assemblage. Most were large, dart-sized points, but three small corner-notched points probably indicate the presence of the bow and arrow as well. All three arrow-sized points were from floor-associated contexts in Structure 1, while all dart-sized points were from extramural areas in SU 1, one being from a bell-shaped pit (Feature 137).

The remaining nondiagnostic small pressure-flaked bifaces show little obvious evidence of use-induced wear or fractures, but some of the edge fragments appear to represent broken projectile point shoulders, tangs, or tips that could have broken during use. Relatively little evidence for on-site tool manufacture is available.

The ratio of formal to informal tools (i.e., bifaces and scrapers to used/retouched flakes) in the Basketmaker III assemblage was calculated at 0.45:1. This ratio is lower than but comparable to that of 0.8:1 reported by Vierra (1994d:422) for Arizona/New Mexico Basketmaker III sites. As noted in the LA 32964 discussion, R. Nelson's (1994) results from sites on Cedar Mesa, Utah, are not directly comparable. The LA 104106 Basketmaker III assemblage shows a strong reliance on the use of informal tools. The expedience with which these tools were produced indicates a relatively sedentary life way (Parry and Kelly 1987).

Most material at the site was found in secondary disposal contexts, so an examination of site structure based on intra-site artifact distributions represents a study of artifact disposal patterns and site-formation processes. Some spatially distinct artifact distributions were apparent, however, that may point to general functional differences across the site.

Sixty-one percent (n = 1,235) of all flaked stone debris in SU 1 was recovered from extramural contexts, but only 34 percent (n = 58) of flaked stone tools came from such proveniences (Table 11.1), indicating a structure-focused disposal pattern for tools. Although only a single *de facto* context was identified in the study unit (see cache discussion, below), this pattern could indicate that the tools were discarded in or near the structures where they were originally used. The following discussion will examine tool distribution under this tentative assumption (cf. Binford 1981).

Of all structural proveniences, Structure 1 contained the overwhelming majority of tools, and the pit structure's antechamber contained the largest assemblage of any structure (partly because PP 58, a ceramic vessel, contained a cache of lithic tools and flakes; see below). Structure 1 also contained 66 percent of all tools made of exotic raw material types (Table 11.2). Fifty of the Structure 1 flaked stone tools were found on the floor or in floor-associated fill, including all projectile points, nine of the bifaces, and roughly one-half of the used/retouched flakes, cores, and hammerstones. Many of the remaining tools were among the roof-fall deposits. Given that Structure 1 is interpreted as the Basketmaker III component's primary domiciliary feature, one where diverse activities presumably occurred, the abundance of tools in this structure is not surprising.

Table 11.1. LA 104106, lithic artifact function by provenience.

		Architectural Unit										
			Structure									
Artifact Function		**Extra-mural Area**	**1 (Main Chamber)**	**1 (Bench)**	**1 (Ante-chamber)**	**2**	**3**	**5**	**6**	**7**	**9**	**Table Total**
Study Unit 1												
Debitage	Count	1235	267	80	249	63	71	11	23	43	–	**2042**
	Row %	60.48	13.08	3.92	12.19	3.09	3.48	0.54	1.13	2.11	–	**100.00**
	Col. %	59.15	93.36	97.56	92.57	86.30	100.00	84.62	100.00	86.00	–	**68.92**
Flaked and battered tools	Count	31	19	2	20	10	–	2	–	7	–	**91**
	Row %	34.07	20.88	2.20	21.98	10.99	–	2.20	–	7.69	–	**100.00**
	Col. %	1.48	6.64	2.44	7.43	13.70	–	15.38	–	14.00	–	**3.07**
Group Total	**Count**	**1266**	**286**	**82**	**269**	**73**	**71**	**13**	**23**	**50**	**–**	**2133**
	Row %	**59.35**	**13.41**	**3.84**	**12.61**	**3.42**	**3.33**	**0.61**	**1.08**	**2.34**	**–**	**100.00**
	Col. %	**60.63**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**–**	**71.99**
Study Unit 2												
Debitage	Count	786	–	–	–	–	–	–	–	–	8	**794**
	Row %	98.99	–	–	–	–	–	–	–	–	1.01	**100.00**
	Col. %	37.64	–	–	–	–	–	–	–	–	100.00	**26.80**
Flaked and battered tools	Count	35	–	–	–	–	–	–	–	–	–	**35**
	Row %	100.00	–	–	–	–	–	–	–	–	–	**100.00**
	Col. %	1.68	–	–	–	–	–	–	–	–	–	**1.18**
Group Total	**Count**	**821**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**8**	**829**
	Row %	**99.03**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**0.97**	**100.00**
	Col. %	**39.32**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**100.00**	**27.98**
Study Unit 4												
Debitage	Count	1	–	–	–	–	–	–	–	–	–	**1**
	Row %	100.00	–	–	–	–	–	–	–	–	–	**100.00**
	Col. %	0.05	–	–	–	–	–	–	–	–	–	**0.03**
Group Total	**Count**	**1**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**1**
	Row %	**100.00**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**100.00**
	Col. %	**0.05**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**0.03**
Total	**Count**	**2092**	**288**	**83**	**269**	**73**	**78**	**13**	**23**	**50**	**8**	**2977**
	Row %	**70.27**	**9.67**	**2.79**	**9.04**	**2.45**	**2.62**	**0.44**	**0.77**	**1.68**	**0.27**	**100.00**
	Col. %	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

The tool assemblage in SU 1 also indicates some other aspect of possible functional diversification within and among the structures. For example, in Structure 1, the antechamber and the main chamber (including the bench) both contain fairly abundant pressure-flaked bifaces in all stages of production. Bifaces with use wear were uncommon, but some unidirectionally used bifaces were present in both rooms. Evidence of biface production is present only in the main structure, but biface use otherwise appears relatively comparable between the two chambers. Conversely, although used/retouched flakes were also common in both the main chamber and antechamber, their use-wear patterns are markedly dissimilar. The main structure contains 11 used flakes showing unidirectional use and three showing bidirectional use. The antechamber flakes also exhibit much evidence of unidirectional use (n = 10 flakes), but 11 flakes showing signs of bidirectional use were present. These 11 flakes constitute one-half of all bidirectionally used flakes in the whole of SU 1, indicating that the antechamber may have served in a functionally specific capacity where informal cutting tools were necessary. Finally, as noted above, the only arrow-sized projectile points from SU 1 were found in floor-associated

Table 11.2. LA 104106, lithic material source by provenience.

		Architectural Unit										
			Structure									
Lithic Source		**Extra-mural Area**	**1 (Main Chamber)**	**1 (Bench)**	**1 (Ante-chamber)**	**2**	**3**	**5**	**6**	**7**	**9**	**Table Total**
Study Unit 1												
Local	Count	1235	267	80	249	63	71	11	23	43	–	**2042**
	Row %	60.48	13.08	3.92	12.19	3.09	3.48	0.54	1.13	2.11	–	**100.00**
	Col. %	59.15	93.36	97.56	92.57	86.30	100.00	84.62	100.00	86.00	–	**68.92**
Non-local	Count	31	19	2	20	10	–	2	–	7	–	**91**
	Row %	34.07	20.88	2.20	21.98	10.99	–	2.20	–	7.69	–	**100.00**
	Col. %	1.48	6.64	2.44	7.43	13.70	–	15.38	–	14.00	–	**3.07**
Group Total	**Count**	**1266**	**286**	**82**	**269**	**73**	**71**	**13**	**23**	**50**	**–**	**2133**
	Row %	**59.35**	**13.41**	**3.84**	**12.61**	**3.42**	**3.33**	**0.61**	**1.08**	**2.34**	**–**	**100.00**
	Col. %	**60.63**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**–**	**71.99**
Study Unit 2												
Local	Count	786	–	–	–	–	–	–	–	–	8	**794**
	Row %	98.99	–	–	–	–	–	–	–	–	1.01	**100.00**
	Col. %	37.64	–	–	–	–	–	–	–	–	100.00	**26.80**
Non-local	Count	35	–	–	–	–	–	–	–	–	–	**35**
	Row %	100.00	–	–	–	–	–	–	–	–	–	**100.00**
	Col. %	1.68	–	–	–	–	–	–	–	–	–	**1.18**
Group Total	**Count**	**821**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**8**	**829**
	Row %	**99.03**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**0.97**	**100.00**
	Col. %	**39.32**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**100.00**	**27.98**
Study Unit 4												
Local	Count	1	–	–	–	–	–	–	–	–	–	**1**
	Row %	100.00	–	–	–	–	–	–	–	–	–	**100.00**
	Col. %	0.05	–	–	–	–	–	–	–	–	–	**0.03**
Group Total	**Count**	**1**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**1**
	Row %	**100.00**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**100.00**
	Col. %	**0.05**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**	**0.03**
Total	**Count**	**2092**	**288**	**83**	**269**	**73**	**78**	**13**	**23**	**50**	**8**	**2977**
	Row %	**70.27**	**9.67**	**2.79**	**9.04**	**2.45**	**2.62**	**0.44**	**0.77**	**1.68**	**0.27**	**100.00**
	Col. %	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

contexts in both rooms of Structure 1 (which completely lacks large, dart-sized points). This observation indicates a functional distinction between this structure and the rest of the study unit, where only large points were recovered.

Of the three other structures containing flaked stone tools, Structures 2 and 7 show the greatest diversity and richness (see Tables 8.52, 8.53), although few items in any structure were from floor-associated contexts. Structure 5 contains only cores and used flakes made of local materials. Structures 2 and 7, conversely, contain relatively similar assemblages in terms of functional diversity and raw material selection. These structures both contain pressure and percussion-flaked bifaces, although Structure 7 contains early and middle-stage bifaces while Structure 2 contains middle and late-stage bifaces. Structure 2 also contains more hammerstones and cores. Structures 2 and 7, located next to each other northeast of Structure 1, may have served complementary or parallel roles. Structure 5, located well away from much of the rest of the habitation area, appears to have served in a different capacity, one that required a less diverse set of tools.

Extramural tool distributions show no strong patterns, although two moderately dense clusters of used/retouched flakes (mixed with other tools) were apparent to the southwest and east of Structure 1's antechamber. The cluster to the southwest, containing seven flake tools, extends between the antechamber and Structure 5. The cluster to the east, between the antechamber and Structure 3, contains eight used/retouched flakes. These two clusters contain 58 percent of all extramural used/retouched flakes, and may represent discrete work areas or refuse disposal zones.

A limited refitting exercise of selected stone tool classes and raw material types provides some additional evidence of associated proveniences across the site. For example, the broken end scraper found above the roof fall in the main room of Structure 1 fits with a fragment found on the modern surface roughly 8 m northeast of the structure (Pair A). Ten other pieces of Zuni Mountain chert debitage in SU 1 form five additional refitting pairs. Two of the flakes in Structure 1 roof fall and floor fill refit (Pair B), and three other flakes from Structure 1 roof and floor fill fit with three extramural flakes from nearby locations, none of which lie farther than 3 m from the house margin (Pair C, D, and E). The remaining refitted flake pair (Pair F) derives from fill in Structure 7 and from an extramural area 5 m northwest of that structure (Fig. 11.1). These distributions suggest that debris associated with individual structures was not subjected to substantial horizontal displacement after flake production. Further, it appears that no common or formal refuse area for lithic artifacts exists in the Basketmaker III component.

Additional sets of associated flakes are also apparent in the assemblage of Zuni Mountain chert, and in a specific variety of local gray chert (Set 103). Although no definite refits could be established, characteristics of luster, texture, coloration, vugs, and inclusions were examined to identify flakes that may have been produced from the same cores. Five sets of artifacts, each containing three to six flakes, represent sets that probably derive from discrete cores. Two of these sets (Set 101 and 102) are made of Zuni Mountain chert that also strongly resembles refitted flake Pairs E and C, respectively.

All five sets have at least one artifact present in Structure 1 (Fig. 11.2), and the distribution of four of the sets simply demonstrate that flakes from within Structure 1 were associated with flakes in extramural areas immediately surrounding the pithouse. No directional patterns were evident in the distribution of the Structure 1 extramural flakes, and all flakes were within 7 m of the structure. Again it appears that flaking debris associated with Structure 1 was not concentrated in a discrete midden area, but instead formed a halo of refuse surrounding the immediate vicinity of the feature.

The last set (Set 105) of related Zuni Mountain chert flakes (n = 4) was dispersed among three structure areas. One flake was from fill in Structure 2, one was from fill in an extramural space adjacent to Structure 2, one was from extramural fill adjacent to Structure 5, and the last flake was from the floor of the main room of Structure 1. This association could indicate either the contemporaneous occupation of these three structures or the use of Structures 2 and 5 as refuse depositories during the occupation of Structure 1.

Ceramic Vessel Cache Contents at LA 104016

A single strong case of a *de facto* archaeological deposit (Schiffer 1972) is present at LA 104106 that can provide an exceptional view of the use and curation of flaked stone tools and debris. This case is represented by a ceramic vessel (PP 58) in the antechamber of Structure 1 that contained a cached collection of flaked stone tools, flaking debris, bone tools, and ornaments. Three additional cores or hammerstones lay adjacent to the vessel, and two large fragments of fossilized bone were excavated from a nearby vicinity.

The 152 flaked stone items inside this vessel (and the three items next to it) represent all stages of flake and tool manufacture and use (Table 11.3). The vessel contents can be inferred to represent a carefully selected collection of useful items that one or more site residents considered to be worthy of retention. The intended functional sphere of the cache (i.e., secular or ceremonial) remains unclear, however. The associated esoteric items (such as stone pendants, shell, and fossils) imply something other than a strictly utilitarian role for the cache's lithic assemblage. Further, even if the flaked stone items were once part of a utilitarian tool kit, the cache cannot be identified as a complete, discrete kit due to the apparent planned abandonment of Structure 1, which may have affected the cache contents. Still, this assemblage can provide insight into the types of flaked stone characteristics that the Basketmaker III residents considered important during their decision-making processes about lithic retention and discard.

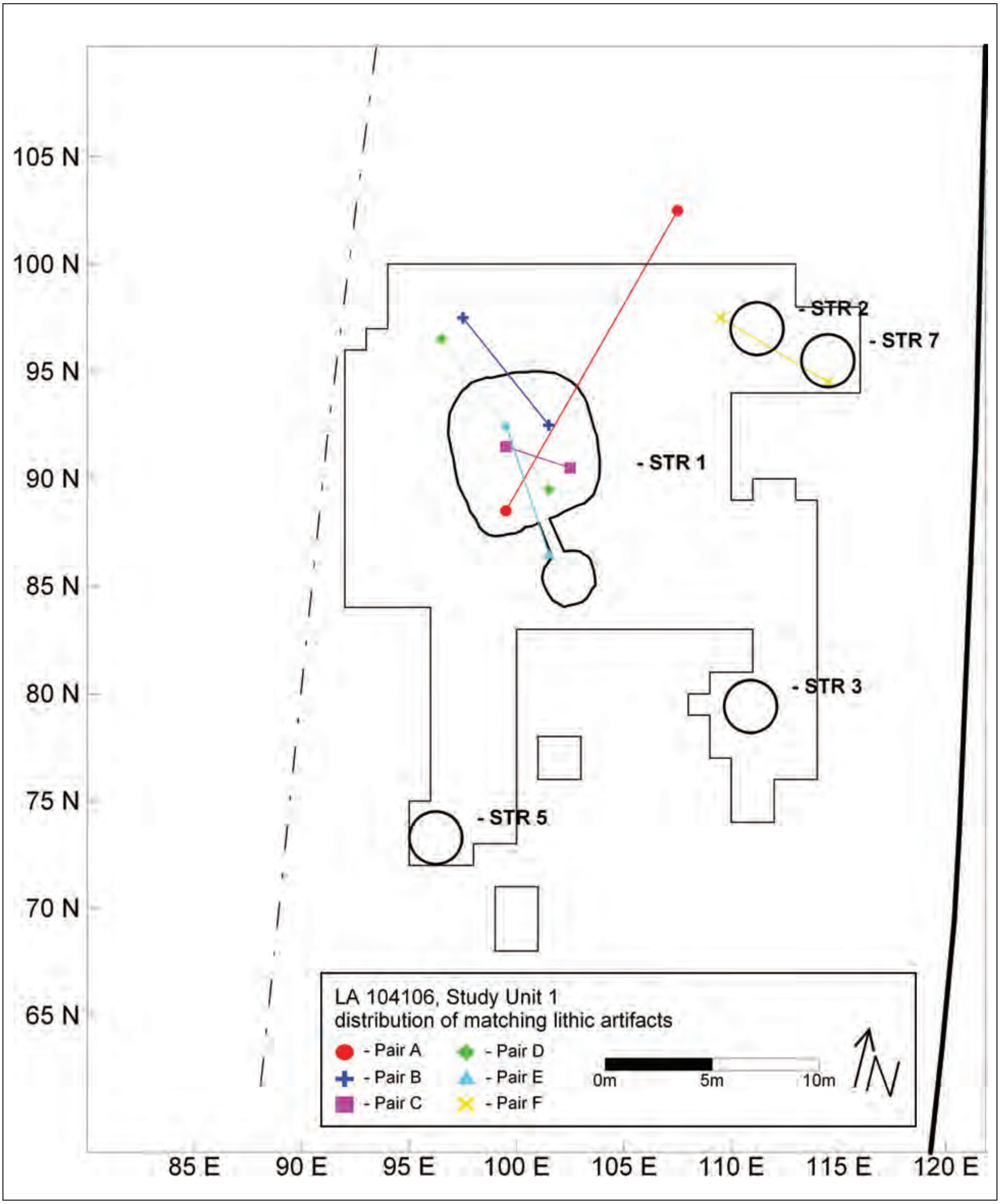


Figure 11.1. LA 104106, Study Unit 1, distribution of refitted Basketmaker III chipped stone artifacts.

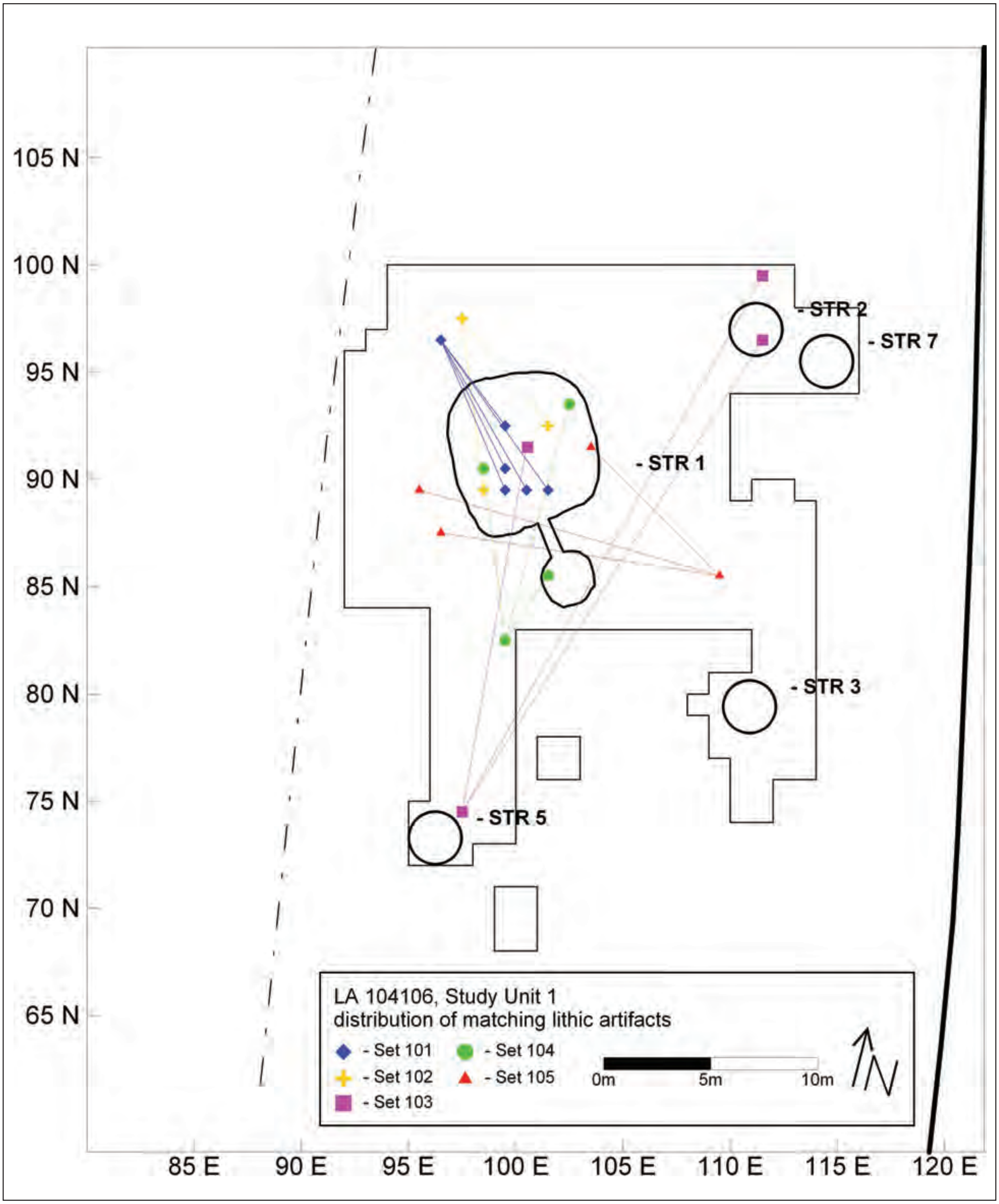


Figure 11.2. LA 104106, Study Unit 1, distribution of flakes originating from single cores in the Basketmaker III component.

Table 11.3. LA 104106, Feature 112, lithic artifact morphology.

	Material Type						
	Chert, Local	Silicified Wood	Quartzite	Narbona Pass	Chinle Chert	Obsidian	Total
Unused Debitage							
Angular debris	1	8	0	0	1	2	**12**
Core flake	2	61	1	0	2	3	**69**
Biface flake	0	3	0	0	0	10	**13**
Bipolar flake	0	1	0	0	0	0	**1**
Flake	3	15	0	1	2	4	**25**
Used/Retouched Debitage							
Angular debris	0	4	0	0	0	0	**4**
Core flake	0	10	0	0	1	0	**11**
Biface flake	0	0	0	0	0	1	**1**
Flake	1	2	0	1	0	0	**4**
Bidirectional core	1	0	0	0	0	0	**1**
Bipolar core	0	1	0	0	0	1	**2**
Early stage biface	1	1	0	0	1	0	**3**
Middle stage biface	0	0	0	0	0	1	**1**
Late stage biface	0	3	0	0	0	0	**3**
Small corner-notched projectile point	0	0	0	0	0	1	**1**
Reworked tool	0	0	0	1	0	0	**1**
Unidirectional core	0	1	0	0	0	0	**1**
Multidirectional core	0	1	0	0	0	0	**1**
Hammerstone*	0	1	0	0	0	0	**1**
Total	**9**	**112**	**1**	**3**	**7**	**23**	**155**

Overall, the vessel's lithic assemblage appears to fairly mirror the morphological, functional, and raw material characteristics of the general Basketmaker III assemblage (Table 11.3). Used/retouched and unused flaking debris made of local materials constitute the most common artifact types in the vessel, and obsidian and Zuni Mountain chert are the most prevalent exogenous materials. Several subtle differences exist between the cached assemblage and that of SU 1, however, and the following sections compare and contrast the vessel contents against the remaining study unit assemblage.

The frequencies of local chert, silicified wood, nonlocal chert, and obsidian debitage (both unused and used/retouched) in the cache differ significantly from those in the study unit (χ^2 = 13.9, df = 3, p = .003). A review of significant adjusted residuals indicates that the cache contains less local chert and more obsidian than would be expected. The frequencies of flake types in the cache also differ from the study unit's flakes (χ^2 = 19.4, df = 4, p = .001), with more biface flakes and fewer pieces of angular debris being present than expected in the cache. The fact that the vessel cache contains 11 (31 percent) of the component's 36 total obsidian biface flakes may partly explain these differences.

Overall, the weight of flake classes in the cache is also significantly different than in SU 1 (Table 11.4). Core flakes mainly appear to drive this trend, because no other individual flake categories strongly reflect this tendency. Although the mean weights of angular debris appear highly dissimilar, the samples do not differ statistically (Table 11.4), probably because the SU 1 assemblage mean is disproportionately weighted by a few heavy outliers. Angular debris made only of silicified wood, however, does significantly differ in weight between the cache and the rest of the study unit, reinforcing the overall trend for the cache to contain smaller items.

Among the raw materials present in the cache, silicified wood and obsidian represent the only material classes with statistically manipulatable

Table 11.4. Comparisons between weights of flaking debris (used and unused) from the cache in vessel PP 58 and all remaining Study Unit 1 debitage.

			Mann-Whitney U Test	
Comparison	**Cache Mean Weight (g)**	**Study Unit 1 Mean Weight (g)**	**Z Score**	**Significance**
All debitage	1.5	3.1	−4.072	p < .001
All angular debris	1.3	4.5	−1.563	p = .118
All core flakes	1.3	3.1	−4.231	p < .001
All biface flakes	0.58	0.61	−1.476	p = .14
All flake fragments	2.3	2.0	−0.317	p = .751
All obsidian debitage	0.66	0.68	-1.343	p = .179
Obsidian biface flakes	0.59	0.29	-2.553	p = .011
All silicified wood debitage	1.5	3.5	−4.316	p < .001
Silicified wood flake fragments	3.2	2.3	−0.534	p = .593
Silicified wood angular debris	1.0	5.3	−2.04	p = .041
Silicified wood core flakes	1.3	3.3	−4.576	p < .001

sample sizes. The weight of all obsidian flakes in the cache does not significantly differ from obsidian in the study unit, but if only obsidian biface flakes are considered, the mean weight of the cache flakes does differ significantly from the remaining study unit (Table 11.4). Silicified wood flake fragments show no significant difference in weight, but the weights of silicified wood core flakes and angular debris from the cache also differ significantly from those in SU 1.

Two initial observations derive from these exploratory statistical comparisons. First, the data indicate a strong trend toward the selection of the largest available obsidian biface flakes for inclusion in the vessel cache (although these obsidian flakes are still smaller than most other non-obsidian flakes in the cache). Second, silicified wood core flakes in the cache are substantially smaller than other SU 1 silicified wood core flakes, indicating that the selection process for these items focused on attributes other than sheer size. Angular debris in the cache, particularly that made of silicified wood, also displays a similar tendency toward smaller pieces of shatter.

When unused and used/retouched debitage are examined separately, additional differences are also apparent. Overall, the cache's unused debitage weight (mean = 1.3) significantly differs from the unused debitage in the rest of the study unit (mean = 3.0) in a Mann-Whitney U test ($Z = -4.317$, $p < .001$). The weight of all used/retouched flakes in the cache (mean = 2.4 g) also differs significantly from the used/retouched flakes in the rest of SU 1 (mean = 5.0 g) in a Mann-Whitney U test ($Z = -2.399$, $p = .016$). Unused flake weights in the cache are also significantly different from the used/retouched flakes within the cache, but not all flake categories reflect this trend (Table 11.5). The primary difference between the subsamples appears to lie again in the core-flake category, particularly in the core flakes made of silicified wood.

To summarize, the cache in the ceramic vessel contains unused and used/retouched flakes that weigh less, on average, than the flakes in the rest of SU 1. Further, the cache's unused flakes weigh even less than the cache's used/retouched flakes, and much less than unused or used/retouched flaked from the rest of SU 1. These observations strongly suggest functional differences among these debitage subsets. An examination of used/retouched flake characteristics reinforces this assertion.

The four morphological classes of used/retouched flakes in the cache show no significant differences among their used edge angles (core flake mean = 37.2 degrees, angular debris mean = 41.0 degrees, flake fragment mean = 38.0 degrees, biface flake mean = 33.0 degrees) in an ANOVA test ($F = .218$, $p = .882$). Bidirectional use was most common

Table 11.5. Comparisons between weights of unused flaking debris and used/retouched debitage from the cache in vessel PP 58.

			Mann-Whitney U Test	
Comparison	Unused Debitage Mean Weight (g)	Used/ Retouched Debitage Mean Weight (g)	Z Score	Significance
All debitage	1.3	2.4	−2.141	p = .032
All angular debris	1.5	0.6	−1.901	p = .058
All core flakes	1.1	2.9	−2.978	p = .003
All flake fragments	2.1	3.7	−.794	p = .427
All silicified wood debitage	1.4	2.3	−1.88	p = .060
Silicified wood core flakes	1.1	2.2	−2.663	p = .008

Table 11.6. Tool wear or edge modification types from the cache in vessel PP 58 (excluding unused cores).

	Wear Orientation				
	Unidirectional Use	Bidirectional Use	Rounding/ Polish	Retouch Only	Total
Used/Retouched Debitage					
Core flake	3	6	0	2	**11**
Angular debris	1	0	1	2	**4**
Flake fragment	1	1	0	2	**4**
Biface flake	0	1	0	0	**1**
Total	**5**	**8**	**1**	**6**	**20**

among the used cached flakes, and most items with this type of wear are core flakes (Table 11.6). The mean used edge angles of cached flakes in the two main use categories (unidirectional use mean = 40.2 degrees; bidirectional use mean = 33.4 degrees) also do not differ significantly in a t-test ($t = 1.12$, $p = .321$). Hence, the cached used/retouched flakes represent a fairly homogeneous sample.

No significant difference exists between the cache and study unit in the frequencies of unidirectional or bidirectional use or retouch ($\chi^2 = 5.110$, df = 2, $p = .078$, 1 cell [16.7 percent] with expected count < 5), although the significant adjusted residuals do indicate that fewer cases of unidirectional use are present in the cache than expected. No significant difference exists between the cache and study unit in the proportions of core and biface flakes, flake fragments, and angular debris that were selected for use or retouch ($\chi^2 = .957$, df = 3, $p = .812$, 4 cells [50 percent] with expected counts < 5).

A significant difference is apparent in a t-test ($t = 4.148$, $p < .001$) when the mean edge angle of all the cached used/retouched flakes (mean = 37.9 degrees) is compared to all other SU 1 used/retouched flakes (mean = 49.8 degrees). The edge angles of unidirectional and bidirectional used flakes do not consistently reflect this trend, however. Unidirectionally used flakes from the cache and the rest of the study unit do not statistically differ ($t = 1.341$, $p = .189$), although the cached mean edge angle for unidirectional use (mean = 40.2 degrees) is substantially smaller than that of the rest of the study unit (mean = 50.0 degrees). Bidirectionally used edges in the cache (mean = 33.4 degrees) do significantly differ from those in the rest of the study unit (mean = 45.2 degrees, t = 3.396, p = .004). Flakes with only retouch also fail to show a significant difference between the cache (mean = 43.3 degrees) and study unit samples (mean = 54.0 degrees; t = 1.728, p = .106), although the lower mean of retouched flakes certainly contributes to the lower overall mean of all used/retouched flake edge angles in the cache. The primary motivator for this overall trend appears to be the bidirectionally used flakes, which form the most numerous category and show the greatest departure from the study unit assemblage.

The weights of used flakes in the cache with unidirectional use (mean = 0.7 g), bidirectional use (mean = 3.1 g), and retouch (mean = 3.3 g) do not differ significantly (Kruskal-Wallis $\chi^2 = 3.88$, df = 2, p = .144), probably due to high standard deviations in the latter two categories. A similar trend is apparent in the SU 1 assemblage, where flakes with unidirectional use (mean = 4.3 g), bidirectional use (mean = 6.4 g), and retouch (mean = 2.7 g) vary in weight, but not significantly (Kruskal-Wallis $\chi^2 = 2.0$, df = 2, p = .368). As noted above, however, almost all classes of flake tools in the cache weigh significantly less than comparable classes in the study unit.

If the unused flaking debris in the cache was selected and retained for an anticipated utilitarian function, its purpose may be discerned by comparisons with used flakes. The cache's unused debris weighs less, on average, than the cache's bidirectionally used flakes and the retouched flakes. The cached flakes with unidirectional use, however, weigh less than the mean of unused flakes. This hierarchical relationship may indicate that the unused flakes could have served as blanks for unidirectional flake tools, but they may have been too small for ultimate bidirectional use or retouch.

As illustrated by the line graphed in Figure 11.3, the weight distribution of the cache's unused flakes is roughly bimodal, with a size-class break at about 0.9 g. Four of the five unidirectionally used flakes (shown by bars) also weigh 0.9 g or less, but five bidirectional or retouched flakes also occupy this size class. Conversely, only one unidirectionally used flake weighs more than 0.9 g, while most of the remaining used/retouched flakes fall in the larger size class. These observations may suggest that the cache's unused flakes smaller than 0.9 g could have served as blanks for all types of used/retouched flake tools (but mainly for unidirectional use), and that the unused flakes larger than 0.9 g were intended mainly for bidirectional use or for retouch.

Overall, the ceramic vessel cache contains 26 percent of the entire Basketmaker III component's used/retouched flake assemblage. As consistently noted above, when the cache material is segregated from the overall assemblage and the mean flake weights and edge angles are recalculated for both subassemblages, the cache appears to contain a disproportionate number of flake tools with low (i.e., sharp) edge angles (Fig. 11.4), and most of these tools are markedly smaller (measured by weight) than those in the study unit. Conversely, the general study unit assemblage consistently contains larger items, and while the study unit's flake-tool assemblage does include many items with low edge angles, tools with blunt edge angles (greater than 50 degrees, for example) are nearly exclusively found in the assemblage of SU 1.

The PP 58 cache also contains two bipolar cores and a single bidirectional core. The vessel lay in fill near a hammerstone and two additional cores (one unidirectional and one multidirectional), one of which was also reused as a hammerstone. All three cores from within the vessel are notably small (obsidian bipolar core = 2.4 g; silicified wood bipolar core = 3.1 g; local chert bidirectional core = 18.7 g), but none show use wear. The chert core, a small river pebble that may have been bipolarly reduced, is one of only three lithic artifacts in the entire vessel weighing more than 10 g (the other two items were silicified wood flake fragments).

The unidirectional silicified wood core/hammerstone outside the vessel weighs 201.7 g, and the accompanying unused silicified wood multidirectional core weighs 608.9 g. The silicified wood hammerstone weighs 299.1 g. These three items could represent tools of three graduated size classes, although the largest core shows no signs of use wear.

The PP 58 cache also contains eight pressure-flaked bifaces, including three early-stage, one middle-stage, and four late-stage items (including a single projectile point), made of a variety of materials (Table 11.3). All early and middle-stage bifaces are made from flake blanks, and all are only partially shaped or flaked around their perimeter. These items

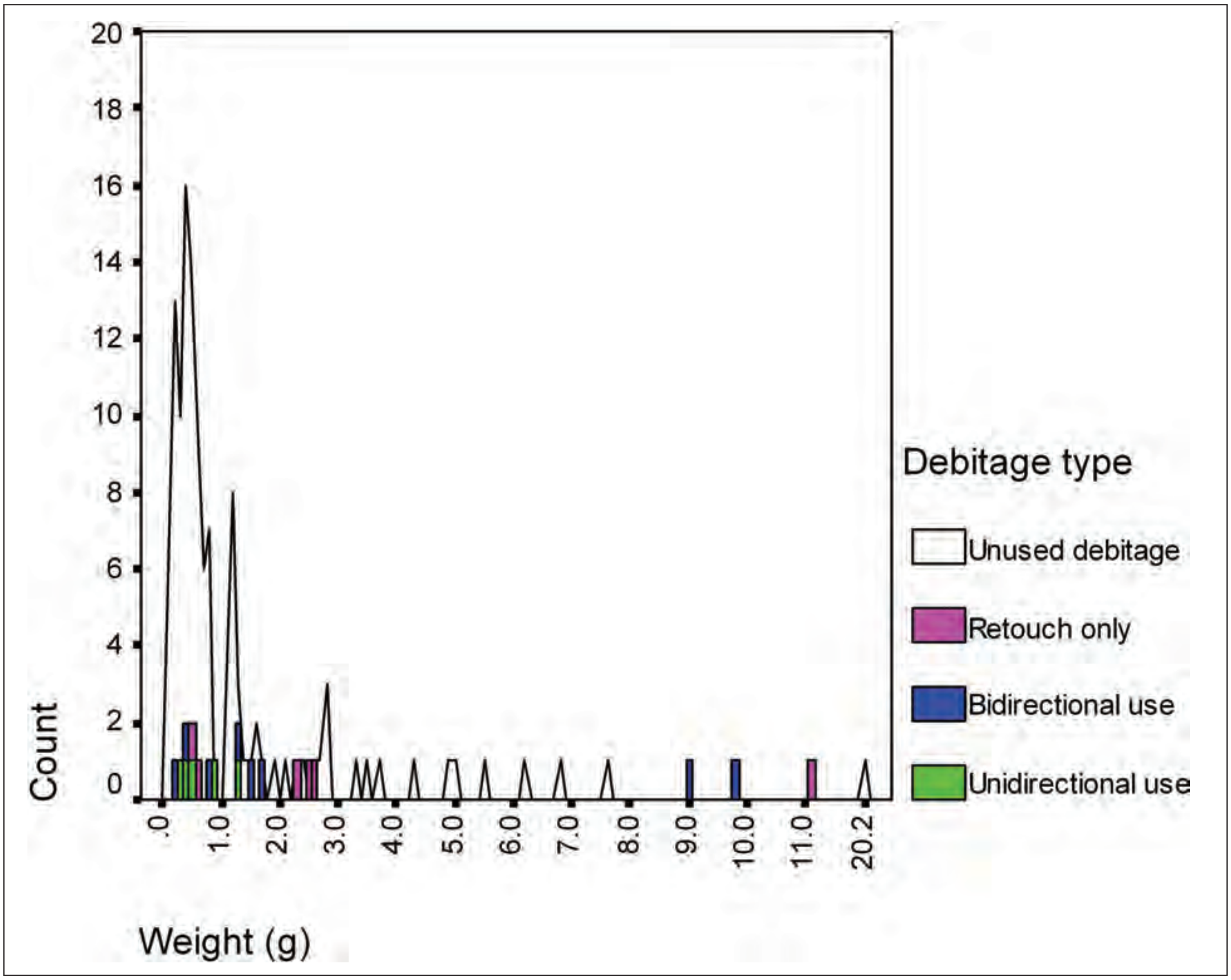


Figure 11.3. Weight distribution of unused and used/retouched flakes from the ceramic vessel cache (PP 58).

lack use wear and could represent either extensively retouched flakes or bifacial tool preforms.

Only one late-stage biface is complete. This silicified wood tool, a small, oval biface with a broad, pointed end, shows extensive edge rounding, abrasive smoothing, and striations, indicating heavy unidirectional use as a side scraper. The use wear is restricted to both edges of the distal end, and the use wear ends abruptly at about the same point on each edge, indicating that the proximal two-thirds of the tool was probably encased in a haft when the tool was in use.

The single obsidian projectile point consists of a proximal fragment of a small (arrow-sized) corner-notched tool showing a break of indeterminate cause (i.e., use or manufacture). A second distal portion of a pointed, late-stage, silicified wood biface with a bending break (probably also a projectile point) shows edge rounding and abrasive smoothing on its bifacial edge, but it cannot be determined if the wear was formed before or after the tool was broken. A second distal portion of a pointed, late-stage, silicified wood biface with a bending break (probably another projectile point) shows no sign of use.

A reworked fragment of a heavily patinated Narbona Pass biface rounds out the cache's stone tools. The relatively common presence of broken, late-stage biface fragments indicates a tendency toward the conservation of material, even though the exceptionally small size of these fragmentary tools (mean = 0.63 g) places them among some of the smallest objects in the cache.

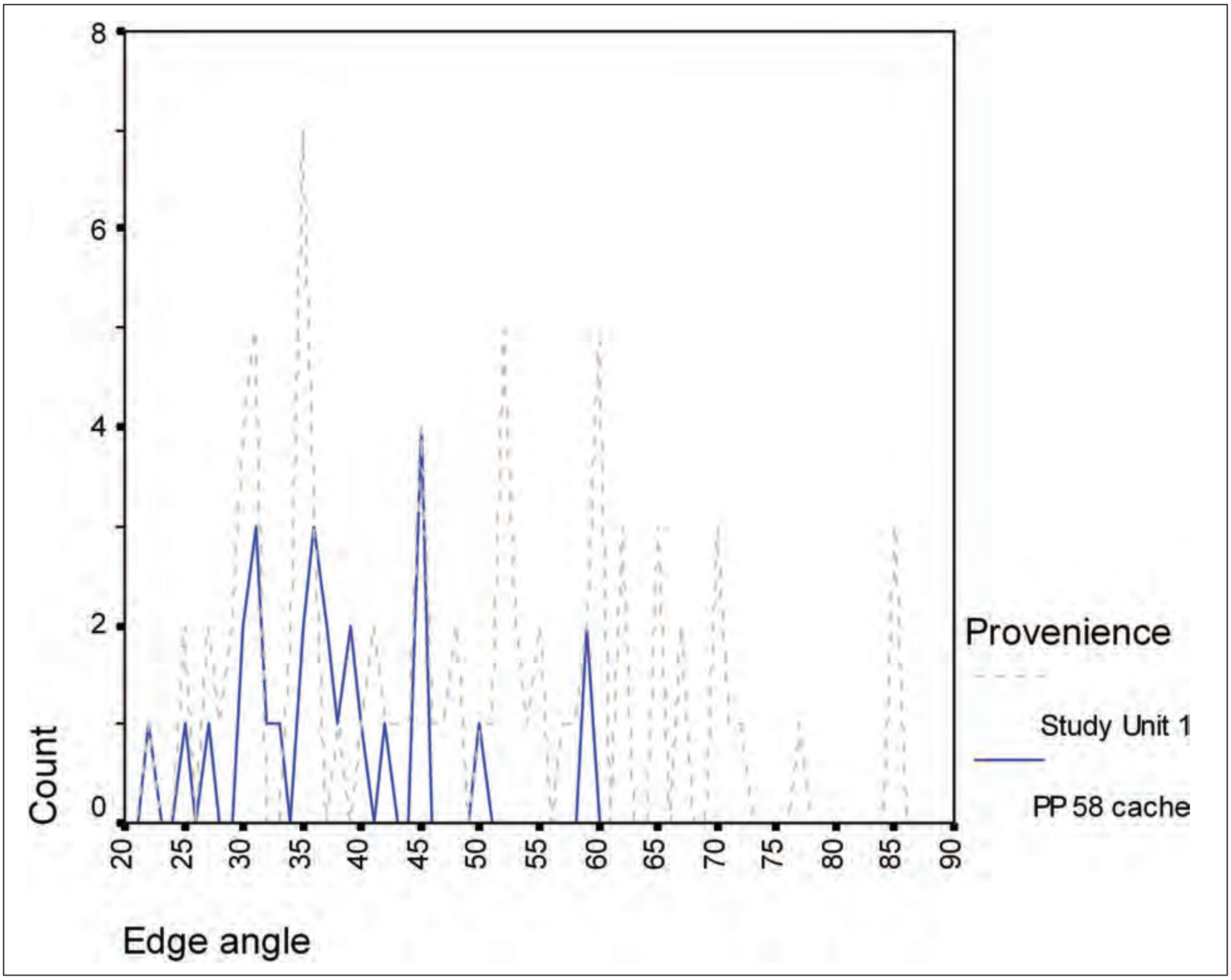


Figure 11.4. LA 104106, Study Unit 1, frequency and range of edge angles on used/retouched flakes from the ceramic vessel cache (PP 58).

Three bone tools classified as coarse-point awls and one classified as a fine-point awl are also part of the cache (see Akins, Chapter 13). Although their pointed tips appear to be too fragile for flintknapping use, the coarse-point awls could have hypothetically served as light-duty pressure-flaking tools. The tips of these items are extensively exfoliated, however, and they show no evidence of use wear or of embedded microflakes (e.g., Geib 2001) under microscopic examination.

The preceding description and evaluation of the flaked stone items in the cached vessel necessarily views the assemblage from a technological and functional perspective. From a utilitarian view, the abundance in the cache of small, informal tools and, presumably, tool blanks (in the form of unused flakes) suggests that the collection could represent a stockpile of tools or tool parts. The "informal tool" analytic designation given to used/retouched flakes does not preclude their potential use in specialized or delicate tasks. These items could also have been intended for use as components of composite tools, for example.

Hafted and unhafted formal stone tools such as projectile points, knives, and drills are commonly known from Basketmaker sites in Southwestern dry caves and rockshelters (e.g., Morris 1980:69–71), and the range of functions that these types of items served is thereby fairly well established. Conversely, relatively few examples of used or retouched flake tools, especially those with perishable components such as hafts, are reported from such well-preserved contexts. This circumstance limits the comparisons that can be made with flake tools from open-air sites such as LA 104016.

Examples of the uses to which flakes may have been put include a composite tool from Broken Flute Cave (Morris 1980:130), interpreted as a scarifier or lancet, that consists of a retouched, pointed flake mounted in a split twig. Guernsey (1931:109) reports similar objects from Basketmaker III and Pueblo III sites in northeastern Arizona.

Examples of flakes or flake tools that were probably not originally hafted are also known. Interestingly, some of these flakes are not in obviously utilitarian contexts. For example, Morris (1980:71) notes a single flake found in a hide bundle from a Prayer Rock District cave, and a second "chip . . . of rock . . . smeared with blue paint" from Broken Flute Cave. Lindsay and others (1968:43) report two used flakes associated with shadscale leaves and corn in a hide bag from the Basketmaker or Puebloan occupation of Sand Dune Cave. Nusbaum and others (1922:149) noted "two minute flakes of quartz" in a hide bag with a projectile point, a worked bone cylinder, and several organic items. These well-preserved examples of hafted and unhafted flake tools provide tantalizing glimpses of informal flaked stone tool use, but provide few direct clues to the intended function of the PP 58 cache.

In sum, the analysis of the flaked stone cache assemblage from PP 58 at LA 104106 fails to discern a clear utilitarian function for the collected flakes and tools. The few statistically significant differences between the cache and the overall study unit (e.g., larger obsidian biface flakes, smaller silicified wood flakes, and sharper used/retouched flake edge angles in the cache) are diagnostically insufficient to mark the cache as a specialized tool kit that differs dramatically in its functionality from the overall LA 104106 Basketmaker III flaked stone industry. The cache may simply represent a collection of typical tools deemed worthy of storage.

Importantly, the traditional archaeological lithic analysis techniques that have been applied here would probably fail to capture any potential ceremonial characteristics of an assemblage such as this. In the absence of morphological or technological attributes that are capable of establishing or identifying the possible ritual nature of the assemblage, we must turn to an examination of other characteristics such as archaeological context and overall assemblage composition to evaluate that possibility. In the analysis of the esoteric items associated with the cache, Lakatos (Chapter 5) further explores the cache assemblage in light of its possible relationship to the ritual abandonment of the structure (as suggested by the items left in the main chamber's sipapu) or other ceremonial contexts.

Early Historic Navajo Site Activities and Structure at LA 104106

Due to the lack of certainty in the segregation of Navajo lithic artifacts from this mixed assemblage, little can be added regarding site function. If, however, the seven triangular projectile points are of Navajo origin, their relatively common occurrence may indicate a focus on hunting or on offensive/defensive activities. Five of the six finished triangular points are base fragments with bending or indeterminate distal fractures. These characteristics could indicate that the arrow tips were broken during use and the bases were returned to the site to be removed and discarded. The diversity of non-domesticated faunal remains in this component reinforces the inference that hunting was a common site activity.

Poyer and Zimmerman (1999:47–54) indicate that the southeastern slope of the Chuska Mountains was well populated by Navajos throughout the nineteenth century, but the locations of residential areas and the types of subsistence activities are not well understood. This period witnessed increasing social stratification as wealthy Navajo herd owners hired poorer Navajos to tend their flocks. "Families of less wealthy Navajos might have used the area to graze small herds and to hunt and gather" (Poyer and Zimmerman 1999:53). If the Navajo occupation at LA 104106 truly involved hunting, it could represent part of this postulated livestock-grazing/hunter-gatherer strategy.

Evaluating Twin Lakes Basketmaker Mobility and Sedentism

The presence, proportions, and uses of exogenous stone types at project-area Basketmaker sites can inform some aspects of past technological organization and may therefore serve as proxy measures of residential mobility or sedentism. Conversely, imported raw material may also indicate the direction and degree of past regional exchange networks rather than short- or long-term population movement. The following sections consider nonlocal raw material use in light of tool and debris characteristics to evaluate these topics.

Twin Lakes Basketmaker II Residential Mobility

Early Basketmaker II sites such as LA 32964 provide a view of an important transitional period in Anasazi cultural evolution. Non-habitation sites such as this certainly articulated in the regional land-use strategy as important loci of work or storage that may have been used over many generations (cf. Kearns et al. 1998:458), but these sites' roles in an annual or seasonal cycle are still poorly understood. By the time LA 32964 was occupied, nascent horticultural groups had incorporated cultigens (primarily maize) into their subsistence regime, but the degree to which this early horticulture was a specialization that impacted residential mobility or sedentism is presently debated (e.g., Barlow 2002; Wills 1988; Smiley 1994).

Twin Lakes Basketmaker II Use of Obsidian and Nonlocal Chert

Obsidian is the most common nonlocal material found in the Basketmaker II component at LA 32964. The assemblage contains 286 flakes (13 percent of the debitage) and 6 tools (24 percent of the tools). Obsidian was put to relatively mundane use at the site, where it took the form of unused flakes (including many biface flakes), used/retouched flakes, and unfinished biface fragments.

Twelve obsidian artifacts were submitted for EDXRF analysis, eight from the Basketmaker II strata and four from the mixed, more recent component. Shackley (Appendix 3) presents the analysis results. Eleven items from both site components produced element signatures that correlate with sources in the Valles Caldera. The twelfth artifact, from the Basketmaker II strata, did not match any known source area.

Hence, 87.5 percent of the Basketmaker II obsidian (n = 7) can be confidently ascribed to a Jemez Mountains provenance through EDXRF data. Visual inspection of the obsidian during analysis identified two flakes that resembled Mount Taylor obsidian, but the remaining flakes were simply coded as undifferentiated obsidian. An informal review of the assemblage by the author indicates that most of the site's obsidian strongly resembles the Valles Caldera material.

These results indicate a strong preference for, or reliance on, obsidian from far to the east, to the near exclusion of material from the closer Mount Taylor area. Kearns (1999b) reports a similar Tohatchi Flats Basketmaker II focus on Jemez obsidian sources, although the assemblage sizes were markedly smaller than at LA 32964 (see below).

Nonlocal chert types in the LA 32964 assemblage are dominated by Narbona Pass chert (n = 32). Southern cherts include small amounts of Zuni Mountain chert (n = 5) and San Andres chert (n = 1). Chert from the south typically plays little role in Archaic or Basketmaker II lithic assemblages of the San Juan Basin (Kearns 1999a; Vierra 1994a:390), as reflected in this assemblage (see Table 5.34).

The preference for eastern obsidian at Tohatchi Flats Basketmaker II-period sites may have carried over from the preceding Archaic period. Vierra (1994a, 1994c) observes that, although the *Northern* San Juan Basin was well populated during the Late Archaic period, little obsidian from the Jemez Mountains is present. This, despite a high level of contemporaneous occupation in the Jemez area. Vierra (1994c:130–131) proposes that it was the Late Archaic groups from the *Southern* San Juan Basin (ostensibly including the Tohatchi Flats area) that made use of the Jemez Mountains, as well as the Chuska Mountains (Vierra 1994a:388). Kearns (1999b) found only Jemez obsidian at an Archaic component at Tohatchi Flats, supporting Vierra's inference. The Twin Lakes Basketmaker II data reflect this pattern, possibly indicating a continuation, at some level, of an Archaic obsidian-procurement strategy.

Notably, LA 32964 contains a substantially higher frequency of obsidian flakes than any of the roughly contemporaneous Figueredo phase sites reported by Kearns (1999b; Table 11.7). This phenomenon can only partially be attributed to the common use of 1/8-inch screen at LA 32964. Even when the LA 32964 data are "normalized" in the second row of Table 11.7 to include only those items larger than 7 mm across (to approximate the recovery rate of screens with 1/4-inch hardware cloth), the propor-

Table 11.7. Local and exogenous stone material proportions among tool and flaking debris assemblages at four Basketmaker II sites in the Tohatchi Flats area.

	Tools				Debris			
	All Local Material	Narbona Pass Chert	Chinle Chert	Obsidian	All Local Material	Narbona Pass Chert	Chinle Chert	Obsidian
LA 32964 (all)	25	1	1	6	1923	31	5	286
	76%*	3%	3%	18%	86%	1%	0.20%	13%
LA 32964 (>7 mm)	21	0	1	3	791	9	2	76
	84%	0%	4%	12%	90%	1%	0.20%	9%
LA 80419†	37	0	0	0	1595	6	0	0
	100%	0%	0%	0%	99.60%	0.40%	0%	0%
LA 6444†	25	0	0	0	922	0	0	0
	100%	0%	0%	0%	100%	0%	0%	0%
LA 6448†	21	2	0	0	133	9	0	2
	91%	9%	0%	0%	93%	6%	0%	1%

*Row percent within tool or debris class. †Data from Baugh et al. 1998.

tions of nonlocal chert and, especially, obsidian, greatly outstrip any other local Basketmaker II-period site. This observation indicates some strong organizational dissimilarities between the lithic technology at LA 32964 and other nearby sites. The difference may be functional, but we do not yet know enough about Figueredo phase site functions to ascribe the difference solely to this factor. LA 32964 also appears to pre-date many of the other Figueredo phase sites, and diachronic change in lithic technology may also account for these differences.

Although LA 32964 contains a fairly high proportion of exogenous material (compared to other local Basketmaker II sites), virtually none of the nonlocal stone displays cortex (1 percent of debitage, 0 percent of tools), indicating that it arrived in a fairly advanced stage of reduction. Flake attributes indicate additional differences in the reduction procedures of local and nonlocal materials. The proportions of core flakes, flake fragments, angular debris, and biface flakes differ significantly between local and exotic material types ($\chi^2 = 42.6$, df = 3, $p < .001$). Adjusted residuals from the chi-square test indicate that the nonlocal sample contains slightly more biface flakes and flake fragments than expected, and the local materials exhibit more angular debris and core flakes than expected. This observation may be related to the advanced reduction state of the exotic materials rather than their preferential use for bifaces. For example, if the exogenous material was already partially reduced when it arrived on-site, less initial trimming and shaping would be needed before final tool shaping commenced. This practice could produce flake assemblages with proportionally less angular debris and fewer core flakes and proportionally more tool production debris (such as biface flakes), such as noted in this sample.

Biface flake data, which ostensibly relates to the production of a specific class of tool, provide additional insight into local and nonlocal material use. The flaking platforms of many biface flakes show evidence of platform preparation, which reflects the labor investment and care invested in biface production. The proportions of unprepared, prepared, and broken platforms between local and nonlocal stone material categories differ significantly ($\chi^2 = 24.4$, df = 2, $p < .001$). Adjusted residuals from the chi-square test show that local materials display platform preparation more commonly and suffered platform breakage less commonly than would be expected. Nonlocal materials displayed fewer cases of platform preparation and more cases of platform breakage than expected. These observations further emphasize that the nonlocal materials were not treated more conservatively than local materials.

Evaluating Transhumance

If LA 32964 were occupied by highly mobile people (who were not strongly tethered to fields or permanent habitations), the site could be postulated to represent a node in an Archaic-period style transhumant cycle that involved residential mobility through an annual range covering an area as large as the San Juan Basin (Vierra 1994a, 1994c). Had the site functioned as a locus in such a system, many heavily used, exhausted, or broken tools made of nonlocal raw materials would have been brought to the site and discarded, and those tools would reflect a portable, flexible, hunter-gatherers' tool kit. Correspondingly, in such a system, if new tools had been produced of local material to replace the broken tools, the raw material proportions in the resultant flaking debris assemblage would be highly dissimilar from the materials of the discarded tools. The Basketmaker II component at LA 32964 fails to fulfill these expectations.

Although tool counts are fairly low at LA 32964, the raw material proportions of tools and debitage generally correspond (see Table 5.34 and Table 5.41). Tools made of exotic materials generally do not represent heavily used or exhausted items. Large percussion-flaked bifaces, the hallmark of a portable, flexible tool kit (Kelly 1988), are nearly absent. Those that are present are made of local materials, but the flaking debris of local materials does not indicate extensive percussive biface production. These observations provide evidence to suggest that this site was not occupied by widely traveled people.

Although residential mobility on a regional scale may be ruled out, LA 32964 may have played a part in a cycle of residential mobility on a local level (in the Tohatchi Flats/Chuska Valley area, for example). If, prior to their arrival, the site residents traversed a lithic landscape similar to that surrounding LA 32964, their imported tool kits might appear essentially identical to a locally produced kit. Residential mobility within a restricted range, or even relative sedentism, cannot be discounted, perhaps indicating some local ties to field plots or favored habitation sites.

Twin Lakes Basketmaker III Logistical Mobility

Relying on diverse architectural, botanical, and faunal data, P. Reed (2000:8–13) argues that Basketmaker III people were fully dependent on horticulture (while still also using wild resources) and were residentially sedentary (meaning that part of the population resided at one location throughout the year). Seasonal logistical mobility probably remained a necessary component of the annual resource-procurement cycle, however. The role that this purported procurement strategy played in the acquisition of nonlocal lithic material is evaluated below.

Twin Lakes Basketmaker III Use of Obsidian and Nonlocal Chert

Obsidian, the most common nonlocal lithic material found in the Basketmaker III component at LA 104106, is represented by 162 flakes (8 percent of the debitage) and 12 cores and bifaces (7 percent of the tools). Obsidian shows relatively diverse use at this site. Most of the material is represented by unused flakes, but used/retouched flakes, bipolar cores, unfinished biface fragments, and projectile points are present.

Five obsidian artifacts from LA 104106 (3 percent of the Basketmaker III obsidian) were submitted for EDXRF analysis (Shackley, Appendix 3). All analyzed artifacts came from structures in SU 1. Three of the items from Structure 1 and the single item from Structure 3 derive from Mount Taylor. The fifth artifact, from Structure 1, is made of obsidian from the Valle Grande. This 4:1 proportion of Mount Taylor to Jemez obsidian is not representative of the component-wide assemblage, however. During analysis, two-thirds of all obsidian items (n = 116) were classified as Mount Taylor material and the remainder as undifferentiated obsidian. A visual assessment by the author indicates most of the untyped material probably represents Valles Caldera obsidian, producing an overall two-to-one Mount Taylor-to-Jemez ratio. These results indicate a mixed reliance on obsidian from the south and from the east. Conversely, of the 23 obsidian artifacts from the cached seed pot (PP 58) in Structure 1, only 39 percent appears to derive from the Mount

Taylor source and 61 percent is from Jemez or other sources, indicating different selection factors for the contents of the cache (described above).

Kearns (1999b:8-7) reports a similarly substantial increase in the use of Mount Taylor material in the early Basketmaker III period at Tohatchi Flats sites, when fully two-thirds of obsidian derived from this southern source. During the late Basketmaker III period, Mount Taylor obsidian constituted an even greater proportion of the obsidian (94 percent). Although the Twin Lakes Basketmaker III component at LA 104106 is temporally associated with the late Basketmaker III period, the proportions of obsidian types are more similar to the early period sites (i.e., 66 percent Mount Taylor). The residents of LA 104106 may have maintained their ties with the Jemez Mountains obsidian sources later than other nearby consumers, but the prevalence of exotic chert types from the south speaks to strong ties in that direction as well.

Nonlocal chert types in the LA 104106 Basketmaker III assemblage are dominated by Zuni Mountain chert (n = 177), accompanied by a small quantity of San Andres chert (n = 2). Narbona Pass chert is relatively uncommon (n = 12). Further, at least two of the Narbona Pass items appear to have been scavenged from nearby, earlier sites, based on patination differences between retouch-flake scars. This observation further illustrates the low level of effort invested in obtaining Narbona Pass chert.

The strong emphasis on southern chert sources at the expense of Narbona Pass material at LA 104106 is dissimilar from contemporary Tohatchi Flats site assemblages reported by Kearns (1999a). At those sites, Narbona Pass chert dominates Zuni Mountain chert when measured by count, and the two chert types are relatively equivalent when measured by weight. The proportions of these two chert types at LA 104106 are basically reversed from those seen at other contemporary Tohatchi Flats sites, but the processes causing this difference remain unclear. This observation may simply indicate that Muddy Wash and Tohatchi phase Basketmaker III lithic organization remains incompletely understood, based on the limited number of excavated sites.

Direct Procurement versus Exchange

Vierra (1993c:358) asserts that obsidian was entering San Juan Basin Archaic and Basketmaker II sites "as prepared cores and tools…[Narbona] Pass chert as nodules and cores, and Chinle [*sensu* Zuni Mountain] chert as prepared cores," although these patterns are not clearly evident at LA 32964. The processes through which the nonlocal material arrived on-site remain unclear, partly because the methods of stone quarrying and the controls over distribution at the source areas remain largely unknown.

Regardless, Kearns et al. (2000:138) note that the exotic lithic materials found at Tohatchi Flats sites "are not significantly superior, technically, to many of the local lithic resources." Further, exogenous stone types are commonly put to uses that differ little from those of local materials, such as the manufacture of used/retouched flakes. Tools made of these materials were commonly discarded with little sign of conservation. Kearns (1996b:4–18) proposes that "the relative paucity of nonlocal lithic materials" in early Basketmaker II Figueredo phase sites in the Tohatchi Flats area indicates "reduced mobility or provincial settlement" from preceding periods.

Kearns (1999a:3–30) proposed that "indirect procurement [of exotic materials] via exchange may have been the norm" during Basketmaker III times, although he grants that Mount Taylor obsidian may also have been obtained directly (Kearns 1999b:8-7). If Mount Taylor obsidian were directly procured, the prevalence of Zuni Mountain chert at LA 104106 could indicate the concurrent, direct procurement of that material as well.

In SU 1 at LA 104106, 9 of the 12 obsidian cores and tools lack cortex, but, conversely, 51 percent (n = 83) of the debitage is cortical, indicating that a substantial proportion of obsidian retained cortex when it arrived at the site. Obsidian from both the Mount Taylor and the Jemez Mountains sources displays this tendency. Conversely, only 10 percent of nonlocal chert flaking debris (n = 18) displays cortex (including the trace amount of Narbona Pass chert). This dichotomy between the debitage cortex frequencies of obsidian and nonlocal chert belies a standardized procurement method for all exogenous material. Kearns (1999b:8-7) observed that obsidian (Mount Taylor obsidian, in particular) was occasionally present at Tohatchi Flats Basketmaker III-period sites in the form of cortical, unmodified nodules, indicating direct procurement (cf. Skinner 1999a:136). A similar process is apparent at LA 104106. Conversely, Kearns (1999a:3–30) proposed that some of the material (e.g., Narbona Pass chert, and some obsidian) was probably brought to the sites as finished, formal implements, implying indirect procurement through exchange. Zuni Mountain chert appears to follow the latter pattern at LA 104106.

Kearns et al. (2000:139) suggest that, during the Tohatchi Flats Basketmaker III period, the use of "exotic lithic material may have functioned merely to perpetuate the exchange system and the established social ties." This proposal requires that Basketmaker III residential mobility was low (Kearns et al. 2000:124) and implies that logistical forays or seasonal moves for the purposes of lithic procurement were uncommon. The present Twin Lakes data tentatively reaffirm one of Kearns's (1999b:8-7) contrasting proposals that some of the obsidian at these Basketmaker III sites may have been collected by the site residents themselves, implying a fairly high level of logistical mobility under certain circumstances. At the present time, however, evaluation of lithic technological organization of the Basketmaker II and III residents of the southern Tohatchi Flats is hindered primarily by relatively small sample sizes from a limited number of sites. Equally constraining, however, is the lack of knowledge about the modes of lithic resource procurement.

Little is known about the techniques of procurement or about the controls over quarry use or toolstone distribution at many of the Southwestern lithic source areas, particularly those where high-quality material is present in a confined area. The amount of stone that was obtained directly or indirectly from locales such as these is not easily quantified, but direct procurement is inferred more commonly than down-the-line exchange. For example, Shackley (1988:768) found no indications that Southwestern obsidian sources were directly controlled or guarded by habitation sites, suggesting informal or uncontrolled access. Similarly, procurement models by Findlow and Bolognese (1982) indicate that nearly all obsidian procurement in New Mexico was through direct access to the source areas. Vierra (1994a) infers that Archaic groups practiced direct procurement as an embedded component of their subsistence-related rounds. Skinner (1999a:136) suspects much of the exotic material at nearby Mexican Springs Anasazi sites was directly obtained, based on the cortical form in which the stones arrived at the sites.

Conversely, Kearns (1999a:3–30) proposes that Tohatchi Flats Basketmaker III residents obtained much of their exotic material through exchange. Still, only in exceptional cases, such as the Chaco regional network, can indirect lithic procurement certainly be inferred with some certainty (Cameron 1984; Cameron and Sappington 1984; Jacobson 1984). Consequently, until the synchronic and diachronic processes driving exogenous stone distribution in the San Juan Basin are better understood, exotic materials at sites must be viewed dually as signs of either direct procurement (and, hence, logistical or residential mobility) or of exchange-network interaction.

The resolution of some of these issues may require the examination of obsidian and chert quarries and proximate workshop or habitation sites for the presence or absence of bulk lithic processing, or even craft specialization, during different occupation periods. Examinations of the synchronic and diachronic regional distributions of discrete stone types may also reveal social access or barriers to procurement areas (cf. Findlow and Bolognese 1982a, 1982b; Phagan 2004). A better understanding of the organization of lithic procurement and distribution, when taken in conjunction with knowledge of other contemporaneous commodity distribution systems (e.g., ceramics, maize, construction timbers) holds great significance for the better understanding of pan-regional social organization through time.

12 | Ground Stone Artifacts

Jesse B. Murrell

This analysis is an attempt toward a greater understanding of Basketmaker-period ground stone technology as expressed by the ground stone assemblages from LA 32964 and LA 104106. A technological approach similar to that of Adams (1993:331–332, 1996, 1999:476) was employed. An understanding of technological organization (Binford 1979:255; Kelly 1988:717; M. Nelson 1996:185) necessitates consideration of an artifact's entire historical continuum, from initial material selection to discard or abandonment in archaeological context. Intermediate stages in this continuum may include manufacture, use, maintenance, and reuse. These may leave morphological or wear pattern signatures on ground stone tools, such as the flaking of tool margins that reflects manufacture, striations across the tool's surface that reflect use, or pecking across the tool's use surface that reflects maintenance. Detailed description of these signatures, contextual information, and tabulation of the metric attributes of ground stone tools from LA 32964 and LA 104106 will provide technologically relevant data on the Basketmaker II and the Basketmaker III periods, respectively.

Analytical Approach

The objective of technological studies is to clarify how technological changes reflect behavioral changes (Kelly 1988:717). Studies of chipped stone assemblages have explored the relationships between technological organization and mobility as well as land use (Shott 1986; Bamforth 1991), while studies of ground stone assemblages have explored the technological aspect of tool efficiency, as measured by use-surface area and its relation to subsistence strategies, namely the users' relative degree of agricultural dependence (Plog 1974:139–141; Lancaster 1983:2–3, 1984:256, 1986:188; Hard 1986:9–10,103,105–108, 1990:136–138; Mauldin 1991:59, 61; Mauldin 1993:318–322; Diehl 1996:105–106). Data relevant to such a study, primarily use surface area, will be collected during this analysis. Unfortunately, for Basketmaker-period assemblages, comparable data are scarce in the archaeological literature. Thus, the data will be presented primarily as a baseline for future study of Basketmaker ground stone technology.

All ground stone was inspected macroscopically and most was inspected microscopically with the aid of a binocular microscope set at 8x to 40x. Large artifacts, namely the metates, were inspected with an 8x hand lens rather than the binocular microscope. This low-power magnification was especially useful in making determinations of material texture, wear pattern, and the presence of adhesions.

Raw Material

An artifact's historical continuum is initiated with material selection. Glassy and cryptocrystalline materials, such as obsidian and chert, are not well suited for most ground stone tool functions. These materials are better suited to but are not limited to cutting, scraping, and piercing functions. Fine to coarse-grained materials are better suited or more easily modified to accommodate ground stone tool functions. Only sedimentary materials were utilized for ground stone tools (n = 92) at the investigated sites. The majority of these materials are sandstone (92.4 percent) followed by orthoquartzite (7.6 percent).

The primary geologic formation exposed in the project area is the Upper Cretaceous aged Menefee Formation of the Mesaverde Group (Silver 1950; Dane and Bachman 1965; Cooley et al. 1969). The Menefee Formation is comprised of alternating beds of sandstone, shale, and coal (Silver 1950; Silver 1951:113; Cooley et al. 1969; Hewett 1982:26,30). The tan and brown, fine to medium-grained sandstones, which makes up the bulk of the ground stone assemblage, are likely derived from this local source. Orthoquartzite or quartzitic sandstone is a sedimentary rock with a preponderance of quartz grains cemented in a calcareous or siliceous matrix. Kearns (1999a) states that this material, among others, is present in the Quaternary alluvium of the outwash deposits in the western portion of the southern Chuska Valley.

Some ground stone tools have a less complicated history than others. Expedient or *informal tools* are modified only through use, and, therefore, retain much of their natural form. They lack evidence of production input and maintenance. Conversely, *formal tools* may exhibit some degree of production input that includes the initial shaping of a raw material usually through pecking, flaking, and/or grinding. Formal tools may also exhibit evidence of maintenance in the form of pecking across a well-worn ground surface, which serves to rejuvenate the use surface. This is usually accomplished by repeatedly striking the worn use surface of the tool with a hammerstone (Bartlett 1933:4, Lancaster 1983:62). Bartlett (1933:4) reports that the historic Hopi engaged in this type of maintenance as often as once every five days, and that it, too, may lead to a significant amount of wear. Horsfall (1987:341), who studied the contemporary ground stone tools of the San Mateo Indians of Ixtatan, Guatemala, reports that metates need sharpening about three times a year or more. Ground stone tools of vesicular igneous materials, which can include basalt, rhyolite, scoria, and tuff, are considered self-sharpening because they maintain a coarse grinding texture without the need for pecking. The nature of vesicular material can obscure definitive evidence of production input, especially pecking.

Tool Use

Several use-related variables were monitored during the course of this analysis. These include wear patterns, use surface cross-section form, presence of adhesions, and the number of use surfaces.

The examination of wear patterns provide clues as to how the tool was used. Indications of wear on the surfaces of ground stone tools include polish, striations, battering, and grinding/faceting. Polish, a lustrous sheen, is usually formed by an abrasive or a depositional process (Zier 1981:14). Adams (1988:310) attributes the polish on hide processing stones to the deposition of tribochemical reaction products enhanced by the friction created by contacting surfaces. A striation is a linear scratch from which surface material has been displaced or deformed (Zier 1981:14). The orientation and linearity of striations point to how the handstone or ground material was moved across the netherstone (Adams 1996:8). For instance, curvilinear striations reflect a rotary motion, while unidirectional linear striations reflect a consistently oriented reciprocal motion. Battering wear is a crushing of the grains of a material through impact with another hard and resistant material. Grinding/faceting wear is expressed by the creation of planes on a use surface or in some instances of the individual grains of a material. Striations or polish are not visible if grinding/faceting wear is recorded. An example is a well-worn cobble mano with a slightly convex faceted use surface, but lacking striations or polish.

The use surface cross-section form variable was especially useful in classifying ground stone fragments. Generally, handstones have a convex or flat use surface cross-section, while netherstones have a concave or flat cross-section. For fragments, the cross-section form was recorded for the artifact's longitudinal axis. Fragmentary formal tools with convex, concave, and flat cross-section forms were classified as fragmentary manos, fragmentary metates, and indeterminate ground stone fragments, respectively. Fragments of ground stone lacking clear evidence for assigning a tool type, regardless of cross-section form, were classified as indeterminate ground stone fragments. For grinding slabs, expedient handstones, and manos, the longitudinal cross-section was taken into account. For metates, the transverse cross-section form was recorded in anticipation of more variability than that expressed in the longitudinal cross-section form, which was likely to be consistently concave.

Adhesions provide indications of how ground stone tools were used. In this assemblage, adhesions include a red pigment residue, most likely derived from hematite, that suggest pigment processing activities. Cooley et al. (1969) indicate that ironstone or hematite is present in the Menefee Formation.

The multiple-use variable refers to one or more wear patterns that occupy discrete areas of a single tool. These different patterns suggest that the tool served multiple functions. An example is a handstone that exhibits facial striations as well as a battered end suggesting that it was employed in both grinding and hammering. A similar wear pattern evidenced on adjoining surfaces or two opposing use surfaces indicates the practice of a wear management technique (Mauldin 1993:322; Adams 1993:335–336, 1996:5–6) whereby the rotation of the proximal and distal ends of a mano or the opposing surfaces of a mano or metate prolongs the tool's use-life. This type of wear also reflects grinding intensity.

Reuse

On occasion, an artifact that has become inefficient or that can no longer function in its original capacity will neither be rejuvenated through maintenance nor discarded, but rather reused in another way. Two types of reuse were recognized during this analysis.

As defined by Schiffer (1987:29), "recycling is the return of an artifact after some period of use to a manufacturing process." Regarding ground stone, recycling is identifiable from morphological and wear pattern evidence. A prime example is a metate fragment that was reshaped through flaking and was then used as a chopper. If the artifact is entirely reshaped, evidence of its primary use may be lost, but, in this case, the metate's original edge provided a good backing for a new chopper edge flaked along its fractured margin. The artifact's primary wear pattern remained discernible, but the artifact could no longer function in its original capacity.

Modification is unnecessary for an artifact's secondary use (Schiffer 1987:30). Secondary use occurs when an artifact is used in a different way without revisiting the manufacturing stage of its historical continuum. Secondary use can be identified through wear pattern or contextual evidence (Schiffer 1987:30). A mano reused in a rock-filled roasting pit and a mano reused as a grooved abrader are examples of secondary use. Regarding wear patterns, secondary use is identifiable when one wear pattern overlies another. If there is no superimposition, the tool may exemplify multiple use rather than secondary use.

Discard and Abandonment

An artifact enters the archaeological context with its discard or abandonment (Schiffer 1987:47, 89). This refuse can take one of several forms. As defined by Schiffer (1987:47, 58, 89–90), nonfunctioning artifacts are discarded as primary or secondary refuse depending on whether they are in their location of use or elsewhere, respectively. Caching, or storage of ground stone tools in anticipation of future use or reuse, occurs when useable or functional artifacts are transported from their use location to another. An evaluation of archaeological context can be key in determining where ground stone artifacts were actually used, stored for reuse, or simply discarded (Adams 1996:10).

Artifact Types

This section presents a brief definition for each of the artifact types identified during this analysis. Two types of metates are defined in the literature, but were not identified during the analysis. They are included here for comparative purposes.

Anvils are large informal netherstones that may exhibit facial battering, crushing, pecking, and/or occasional striations. This type of use wear is the result of repeated hammerstone blows.

Indeterminate ground stone fragments may exhibit a variety of wear patterns including striations, polish, and/or faceting. Wear may be minimal or patchy. These fragments are either formal tools with flat use surfaces that cannot be positively identified as mano or metate fragments or they are informal tools exhibiting a wide range of use surface cross-section forms.

Mano fragments exhibit a convex use surface cross-section form and can exhibit a variety of wear patterns. Their fragmentary condition precludes classification as either one or two-hand manos. A ground, upturned end may indicate that the original mano was used in a trough metate.

One-hand manos first appear in the Archaic period when the subsistence base was more diversified with little if any dependence on agriculture

(Lancaster 1983:17). One-hand manos are a more general grinding tool serving multiple functions including processing agricultural and wild food resources, hides, pigments, and pottery clays (Lancaster 1983:34; Adams 1989:307; Mauldin 1993:321). *Two-hand manos* are primarily used for processing agricultural grains (Lancaster 1983:17; Mauldin 1993:321). One-hand manos are usually thought to have been utilized with basin metates in a rotary fashion, while two-hand manos were utilized with trough or slab metates in a reciprocal fashion (Eddy 1964:3).

Different researchers have employed different criteria for defining mano types. Based on a cluster analysis of a scattergram plot of the lengths and widths of whole manos from the Mimbres Valley, Lancaster (1983:18–20) proposes that one-hand manos (Type I) are less than or equal to 13.2 cm in length and less than or equal to 11.5 cm in width, while two-hand manos (Type II) are greater than these measurements. Diehl (1996:109) observes a bimodal distribution in the grinding area measurements of 1,007 manos from the Upland Mogollon Pithouse period. There is not a complete break, but there is an overlap at 128 sq cm. He proposes that one-hand manos have a grinding area of less than 128 sq cm and that two-hand manos have a grinding area that is greater than this measurement. Mauldin (1991:63, 1993:323) observes a bimodal distribution in a histogram of use-surface area measurements for 1,300 manos from the Upland Mogollon Pithouse and Pueblo periods. This pattern suggests a break at approximately 75 sq cm. This measurement became his separation point between the larger manos that were probably involved in food processing and those more likely involved in other activities.

In this analysis, one-hand manos were defined as having use-surface areas that measure 130 sq cm or under, while two-hand manos have use surface areas that were greater than 130 sq cm. This criteria is roughly comparable to that established by Diehl (1996:109). Both types likely manifest a convex use surface cross-section and an oval to subrectangular plan view outline. Two-hand manos are less likely to exhibit curvilinear or multidirectional linear striations, which indicate movement in a rotary or inconsistently oriented manner. These wear patterns more likely occur on one-hand manos used in a basin metate. If striations were present, two-hand manos generally exhibit unidirectional linear striations indicating movement in a consistently oriented reciprocal manner. One-hand manos may also display evidence of use in this manner. A lack of wear on the ends of a two-hand mano may suggest that it was used with a slab metate, whereas ground upturned ends suggest use with a trough metate.

Metate fragments exhibit evidence of production input and/or maintenance. They display a concave use-surface cross-section form and can display a variety of wear patterns. Lateral edge fragments of trough metates can be positively identified by their characteristic elevated edge with an abrupt high angled concavity. Slab or basin metate fragments may not be identifiable unless a large end fragment, which contains an end and lateral edges, is recovered.

Grinding slabs are informal netherstones that exhibit a diversity of use-surface cross-section forms including flat, concave, convex, and irregular or sinuous. They also exhibit a relatively wide range of sizes and could be described as hand-held, lap-held, and self-supported. Wear can be minimal or patchy and can include a diversity of wear patterns, such as striations, polish, and faceting. Grinding slabs may be used with a handstone or by grinding a hand-held material directly on the use surface.

Slab metate refers to flat/concave metates (Adams 1996:24, 1999:482) or slab or flat netherstones (Haury 1950:305–308; Dick 1965:51–53; Sayles 1983:68–69). They were commonly used with a two-hand mano, giving the metate a flat or slightly concave transverse use-surface cross section. Generally, the use surface covers the entire face of the artifact. If the cross section is slightly concave, it measures under 1 cm in maximum depth. The longitudinal use-surface cross section is usually concave. If striations were apparent on the use surface, they were generally linear, unidirectional, and parallel the metate's longitudinal axis indicating that the metate was used with a mano that was moved in a reciprocal manner paralleling the metate's longitudinal axis. Slab metates lack edges that contain the ground product, so they were commonly set in mealing bins (see Bartlett 1933:14–15, Figs. 5 and 7 for modern Hopi examples).

Basin metates are formal netherstones that have an oval to elliptical use surface in plan view and a concave use surface in both longitudinal and transverse cross section. The basin is usually centrally located and encircled by the higher elevated edges.

Generally, the basin use surface does not cover the entire face of the artifact. The basin can be shallow to deep with gently to steeply sloping walls, respectively. The basin metate's edges can contain the ground product. If striations were apparent on the use surface, they can be linear and unidirectional indicating reciprocal mano movement, they can be linear and multidirectional indicating either reciprocal mano movement that is not consistently oriented or rotary mano movement, or they can be curvilinear indicating rotary mano movement. Basin metates are generally used with one-hand manos that allow for the wear of the characteristic concave basin.

Trough metates are formal netherstones that have subrectangular use surfaces in plan view and have a concave use surface in both longitudinal and transverse cross section. In transverse cross section, the concavity is high angled at the edges and rounds out to a slight concavity across the base. These steep edges act to contain the ground product. Trough metates have several end configurations including forms with both ends open, one end open, and both ends closed. Trough metates with both ends open are also known as through troughs (Lancaster 1983:111). If striations were apparent on the use surface, they were generally linear and unidirectional indicating reciprocal mano movement. Trough metates are generally used with two-hand manos that are not long enough to span the entire width of the metate. This gives the metate its characteristic form.

Expedient handstones are informal tools that exhibit a flat or convex use surface cross section. Wear can be minimal or patchy and can include a diversity of wear patterns, such as striations, polish, and faceting. Expedient handstones may be used with a netherstone or by direct application on the worked material without the use of a netherstone.

Axes are formal tools that show evidence of production input in the form of flaking, pecking, and/or grinding. This shaping is usually restricted to the manufacture of the bit through flaking and the hafting element, which is either notched through flaking or grooved through pecking and/or grinding. The wear pattern may include crushing and/or step fracturing along the bit edge as well as facial striations. Axes probably functioned in a variety of chopping and wedging tasks.

Shaped slabs show no evidence of use. They are modified strictly through manufacture, which usually consists of the flaking of margins. They are commonly used as architectural elements, such as bin walls, vent covers or dampers, entryway hatch covers, or as lids for ceramic containers.

Stone balls are small spheres with relatively equal lengths, widths, and thicknesses and circular plan view outlines. They may display definitive evidence of production input or use, or they may lack such evidence. If they lack such evidence, they may be considered manuports that were collected because of their natural spherical form.

Formal netherstones have morphological configurations that are smaller or otherwise atypical of a metate. They display evidence of production input and/or maintenance. These netherstones may be used with a handstone or by grinding a hand-held material directly on the use surface. Those with an adhering pigment residue suggest that some of these tools were used for processing pigment.

Measuring Dimensions, Calculating Use Surface Area, and Presenting Descriptive Statistics

Maximum linear dimensions were measured using calipers with a 15 cm capacity. Calipers with a 50 cm capacity were used for larger artifacts, namely metates. Length, width, and thickness are perpendicular maximum linear dimensions. These measurements are presented in centimeters. Weights are presented in kilograms. Lengths and widths of the use surfaces of whole artifacts were measured. These are also maximum linear dimensions.

For oval-shaped use surfaces, use-surface area was calculated using the following equation: use-surface area = (use-surface length) (use-surface width) (0.8).

For subrectangular use surfaces, use-surface area was calculated using the following equation: use-surface area = (use-surface length) (use-surface width) (0.9).

For circular use surfaces, use-surface area was calculated using the following equation: use-surface area = (π) (use-surface radius)5.

Use-surface areas are presented in square centimeters. The maximum depths of all whole metates were measured by placing a straight edge across the artifact's transverse cross section and recording the maximum linear measurement between this straight edge and the base of the artifact's use surface. Depth measurements are presented in millimeters. Depth or curvature is not taken into account in calculating use-surface area, therefore all use-surface areas are approximations. In the site data presentation chapters, a table that includes mean and standard deviation statistics as well as a minimum and maximum range for each measurement is presented if the sample size is greater than or equal to five.

Food Processing Tool Efficiency

Work by several researchers has attempted to relate ground stone tool morphology with the user's degree of agricultural dependency (Lancaster 1983; Hard 1990; Mauldin 1991, 1993; Diehl 1996). These researchers agree that grinding efficiency is related to use-surface area. As use surfaces become increasingly larger, they become more efficient. Increased efficiency means that more agricultural grain, in this case maize, can be processed in less time (Adams 1993:333). Recent ethnographic studies by Mauldin (1993:319) in a Bolivian village support the correlation between use-surface area and efficiency. This correlation is also supported by Hard's (1990:138–141) comparison of ethnographically known Southwestern groups. In response to increasing agricultural dependency, which would mean increased time allotments for maize grinding, prehistoric groups would have readily embraced technology geared toward larger, more efficient, time-saving ground stone tools (Diehl 1996:107).

Adams (1999:491, 492) is of a somewhat different opinion, contending that ground stone tool morphology is related to food processing strategies rather than subsistence strategies. She seems to agree that tools with larger use surface areas are more efficient, but after experimentation, she argues that other factors come into play such as tool configuration, grinding motor habits, mano weight, and material texture (Adams 1999:486–487, 492). It is agreed that these factors require consideration, but the analytic utility of use-surface area measurements should not be discounted. Furthermore, it seems that food processing strategies are integrally linked to subsistence strategies.

Assessments of use-surface area have most often been conducted with mano assemblages. During the excavation phase of this project, no whole manos were recovered from the early Basketmaker II component at LA 32964; however, ten manos were collected from LA 104106. Eight of these manos were recovered from contexts with a preponderance of late Basketmaker III-period ceramic types. Table 12.1 presents use-surface metric attributes and Table 12.2 presents the descriptive statistics for these manos. FS 712 has two opposing use surfaces, both of which are included. The scarcity of comparable data for other Basketmaker III assemblages from the area precludes comparison. The data are presented as a baseline.

Considering other attributes that may be related to mano efficiency, late Basketmaker III-period mano weights are presented in Table 12.1. Heavier manos may be more efficient tools (Adams 1999:485). Associated descriptive statistics are presented in Table 12.2. Only two of these manos (FS 347 and FS 1183) exhibit wear patterns that permit an assessment of grinding motor habits. Both display unidirectional linear striations that parallel the mano's transverse axis. This suggests that they were moved across a netherstone in a consistently oriented reciprocal motion. Both of these manos exhibit use surfaces with upturned ends suggesting use in a trough metate. The remaining late Basketmaker III-period manos display only grinding/faceting wear precluding an assessment of grinding motor habits. Based on experimentation, Adams (1999:486) states that two-hand manos and trough metates are more efficient when processing dried kernels and seeds, but are no more efficient when processing soaked kernels. Interestingly, all two-hand manos are of fine-grained sandstone and all one-hand manos are of medium-grained orthoquartzite. This may be the product of naturally occurring flattened cobbles of orthoquartzite being better suited than tabular chunks of sandstone for the manufacture of one-hand manos.

Three basin metates were recovered from the Basketmaker II component at LA 32964. Table 12.3 and Table 12.4 present the efficiency and intensity related metric attributes and associated descriptive statistics, respectively. Two basin metates (FS 357 and FS 698) were recovered from contexts with a preponderance of late Basketmaker III-period ceramics. Another, FS 1087, recovered from Feature 137 is also interpreted to be the result of the Bas-

Table 12.1. LA 104106, Late Basketmaker III-period manos, efficiency-related metric attributes by provenience.

FS	Provenience	Artifact Type	Use Surface Length (cm)	Use Surface Width (cm)	Use Surface Area (cm^2)	Weight (kg)
345	Structure 1, floor fill	Two-hand mano	19.00	11.00	167.20	1.35
347	Structure 1, floor fill	Two-hand mano	19.40	9.20	142.78	0.65
712	Structure 2, fill	One-hand mano	10.70	9.10	77.90	0.75
			10.80	9.40	81.22	–
778-1	Structure 2, fill	One-hand mano	7.80	7.10	44.30	0.51
778-2	Structure 2, fill	Two-hand mano	16.00	11.40	145.92	0.90
909	Structure 1, antechamber, fill	Two-hand mano	18.90	10.10	152.71	1.25
941	Structure 1, Feature 73	Two-hand mano	21.30	13.60	260.71	5.80
1182	Structure 1, bench contact	Two-hand mano	195.00	118.00	18408.00	1100.00

Table 12.2. LA 104106, Late Basketmaker III-period manos, efficiency-related metric attributes, descriptive statistics.

	N	Minimum	Maximum	Mean	Standard Deviation
Use surface length (cm)	9	7.80	213.00	159.33	48.94
Use surface width (cm)	9	7.10	13.60	10.30	18.90
Use surface area (cm^2)	9	44.30	260.71	139.65	65.12
Weight (kg)	8	0.51	5.80	1.54	1.75

ketmaker III occupation. Table 12.5 and Table 12.6 present the efficiency and intensity-related metric attributes and associated descriptive statistics, respectively. Admittedly, this is not a representative sample for the late Basketmaker III period.

As previously mentioned, several of the two-hand manos recovered from LA 104106 exhibit use surfaces that suggest that they were used with trough metates. Trough metates co-occur with basin metates in other Basketmaker III-period ground stone assemblages. In fact, the trough configuration may be an addition to the ground stone technology that comes into play during the Basketmaker III period. Curiously, no trough metates were recovered from the Basketmaker III component at LA 104106.

Roberts (1929, plate 26,134) presents pertinent metric attributes for a sample of three trough metates from Shabik'eschchee Village, a late Basketmaker III-period site in Chaco Canyon, which are also tabulated in Tables 12.5 and 12.6. Examination of mean measurements shows that the use surfaces of trough metates are consistently larger and deeper than the basin metates recovered during the Twin Lakes project. Interestingly, the Basketmaker

Table 12.3. LA 32964, Basketmaker II basin metates, provenience and metric attribute summary.

FS	Provenience	Length (cm)	Width (cm)	Thickness (cm)	Use Surface Length (cm)	Use Surface Width (cm)	Use Surface Area (cm^2)	Depth (cm)	Weight (kg)
512	Feature 6	53.40	46.90	3.90	29.10	2.10	488.88	2.00	14.6
618–619	Feature 8	56.20	31.20	5.30	35.00	17.50	490.00	1.40	13.9
521	Feature 5	58.60	43.00	4.60	35.10	23.50	659.88	1.90	15.1

Table 12.4. LA 32964, Basketmatker II basin metates, metric attributes and descriptive statistics.

	N	Minimum	Maximum	Mean	Standard Deviation
Length (cm)	3	53.40	58.60	56.10	2.60
Width (cm)	3	31.20	46.90	40.37	8.18
Thickness (cm)	3	3.90	5.30	4.60	0.70
Use Surface Length (cm)	3	29.10	35.10	33.07	3.44
Use Surface Width (cm)	3	17.50	23.50	20.67	3.01
Use Surface Area (cm^2)	3	488.88	659.88	546.25	98.41
Depth (cm)	3	1.40	2.00	1.77	0.32
Weight (kg)	3	13.90	15.10	14.53	0.60

II-period basin metate use surfaces are consistently larger than the late Basketmaker III-period basin metates. This suggests that the Basketmaker II basin metates were more intensively used compare to the Basketmaker III basin metates. Based on the presence of two-hand manos with upturned ends recovered from the late Basketmaker III at LA 104106, trough metates were once likely to be present, or still are present outside the project area. The efficiency and production input of trough metates compared to basin metates may have placed a higher value on these item, which encouraged the inhabitants to transport them to another location at the time of site abandonment.

A single basin metate (FS 357) from the late Basketmaker III component at LA 104106 exhibits obliquely oriented, unidirectional, linear striations indicating that manos were also moved across basin metates in consistently oriented reciprocal motion. All other metates show only grinding/faceting wear precluding an assessment of grinding motor habits. All metates were manufactured from thin to medium slabs of fine-grained sandstone. After experimentation, Adams (1999:487) concludes that tools of vesicular material are most efficient when processing dried kernels or seeds, but she does not recommend using a tool of this material for processing soaked kernels or seeds. A granular material, such

Table 12.5. Late Basketmaker III-period metates, efficiency and intensity-related metric attributes.

FS	Provenience	Use Surface Length (cm)	Use Surface Width (cm)	Use Surface Area (cm^2)	Depth (cm)
Basin Metate					
357	Structure 1, floor contact	23.50	21.50	404.20	0.70
698	Structure 3, fill	23.00	18.50	340.40	0.40
Trough Metate					
A	Shabik'eshchee Village†	40.60	20.30	741.76	5.10
B	Shabik'eshchee Village	39.40	22.90	812.03	5.10
C	Shabik'eshchee Village	36.80	22.90	758.45	3.80

Table 12.6. Late Basketmaker III-period metates, efficiency and intensity-related metric attributes, descriptive statistics.

	N	Minimum	Maximum	Mean	Standard Deviation
Basin Metate					
Use surface length (cm)	2	23.00	23.50	23.25	0.35
Use surface width (cm)	2	18.50	21.50	20.00	2.10
Use surface area (cm^2)	2	340.40	404.20	372.30	45.11
Depth (cm)	2	0.40	0.70	0.55	0.21
Trough Metate†					
Use surface length (cm)	3	36.80	40.60	38.93	1.94
Use surface width (cm)	3	20.30	22.90	22.03	1.50
Use surface area (cm^2)	3	741.76	812.03	770.75	36.72
Depth (cm)	3	3.80	5.10	4.67	0.75

†Roberts 1929

as sandstone, may be preferred. Vesicular materials are not available in the vicinity of the project area, which may explain the absence of these materials from the analyzed ground stone assemblage.

Taken by themselves, the mano and metate assemblages recovered during the Twin Lakes project fail to demonstrate that technological innovation moved towards increasingly efficient tools from the Basketmaker II to the late Basketmaker III periods. However, the presence of the two-hand manos that were likely used with trough metates in the late Basketmaker III-period assemblage, and the metric assessment of the late Basketmaker period trough metates from Shabik'eschchee Village suggest that this trend may still find support in future studies.

13 | Faunal Remains

Nancy J. Akins

Faunal remains were recovered from three sites during the Twin Lakes project (Table 13.1). LA 116035 has a very small sample (n = 3); however, LA 32964, with Basketmaker II (BM II) deposits, and LA 104106, with BM II, Basketmaker III (BM III), and early historic Navajo components have sufficient samples to compare and contrast subsistence practices in the Twin Lakes area. One of the challenges is to separate the modern and road-side additions from the prehistoric deposits in order to provide a better view of these important time periods.

This chapter begins with an overview of analysis methods and definitions of terms used in this report. It is followed by brief descriptions and summaries of the taxa found. The site assemblages are then discussed followed by an evaluation of Basketmaker and Navajo subsistence with respect to other data from the same general area.

Analysis Methods

Recording followed the established OAS computer coded format that identifies the animal and body part represented, how and if the animal and part was processed for consumption or other use, and how environmental conditions have affected the specimen. The following briefly describes the variables.

Provenience-Related Variables

Detailed proveniences and screen size information was linked to the faunal data file through the LA and field specimen (FS) numbers. Each line contained the proveniences information, the FS number, and a lot number that identifies a specimen or group of specimens that fit the description recorded on that line. The count indicates how many specimens are described by that data line.

Taxon

The bulk of the collection was identified using OAS comparative specimens. Museum of Southwest Biology, Mammals Division collections were used to determine the species on the fetal deer and one of the pronghorn specimens. Taxonomic identifications are made to the most specific level possible. When an identification is less than certain, this is indicated as fairly or less than certain in the certainty variable. Specimens that could not be identified to the species, family, or order were assigned to a range of indeterminate categories based on the size of the animal and whether it is a mammal, bird, other animal, or even this cannot be determined. Exactly how these taxa are defined depends on the individual project, the number of components represented, how well bone is preserved, and the taxa observed and expected for that area. For example, when a site contains both domestic and native artiodactyls, the indeterminate category of small to medium artiodactyl is used for small fragments of artiodactyl bone. In deposits that are strictly prehistoric, the medium artiodactyl taxon applies. Similarly, when preservation is good, the analyst is better able to distinguish artiodactyl bone from the more inclusive large mammal taxon category. Unidentifiable fragments often constitute the bulk of a faunal assemblage. By identifying these as precisely as possible, the information gained can be used to supplement that from the identified taxa.

Each bone or egg shell (specimen) was counted

Table 13.1. Fauna recovered from Twin Lakes project sites.

Common Name or Size	LA 32964		LA 104106		LA 116035	
	Count	Col. %	Count	Col. %	Count	Col. %
Unknown small animal	–	–	1	0.10%	–	–
Small mammal/ medium–large bird	2	0.40%	7	0.80%	–	–
Jackrabbit or smaller	253	56.10%	89	9.70%	1	33.30%
Small–medium mammal	13	2.90%	11	1.20%	–	–
Jackrabbit to dog size	–	–	2	0.20%	–	–
Medium–large mammal	52	11.50%	91	9.90%	–	–
Wolf or larger	19	4.20%	20	2.20%	–	–
Large squirrels	6	1.30%	–	–	–	–
Gunnison's prairie dog	10	2.20%	143	15.50%	–	–
Botta's pocket gopher	4	0.90%	14	1.50%	–	–
Ord's kangaroo rat	3	0.70%	–	–	–	–
Banner-tailed kangaroo rat	–	–	4	0.40%	–	–
Deer, cactus or piñon mouse	1	0.20%	6	0.70%	–	–
Woodrats	2	0.40%	1	0.10%	–	–
Mexican woodrat	1	0.20%	1	0.10%	–	–
Bushy-tailed woodrat	–	–	2	0.20%	–	–
Smaller than woodrat	–	–	6	0.70%	–	–
Woodrat or larger	–	–	15	1.60%	–	–
Desert cottontail	20	4.40%	158	17.10%	–	–
Black-tailed jack rabbit	19	4.20%	70	7.60%	–	–
Dog or bobcat size	–	–	2	0.20%	–	–
Wolf or mountain lion size	–	–	1	0.10%	–	–
Dog, coyote, wolf	–	–	6	0.70%	–	–
Dog	8	1.80%	31	3.40%	–	–
Badger	–	–	3	0.30%	–	–
Mountain lion	–	–	4	0.40%	–	–
Bobcat	–	–	1	0.10%	–	–
Domestic cat	7	1.60%	–	–	–	–
Sheep to deer size	16	3.50%	89	9.70%	–	–
Deer or pronghorn size	3	0.70%	16	1.70%	–	–
Deer to elk size	–	–	22	2.40%	–	–
Deer or elk	–	–	3	0.30%	–	–
Elk	–	–	16	1.70%	–	–
Mule deer	–	–	12	1.30%	–	–
Pronghorn	–	–	6	0.70%	–	–
Domestic sheep or goat	7	1.60%	20	2.20%	–	–
Horse	–	–	1	0.10%	–	–
Crow or larger	–	–	4	0.40%	–	–
Turkey-sized	–	–	9	1.00%	–	–
Eggshell	3	0.70%	25	2.70%	2	66.70%
Hawks and harriers	–	–	1	0.10%	–	–
Turkey	–	–	5	0.50%	–	–
Domestic chicken	1	0.20%	1	0.10%	–	–
Nonvenomous snakes	1	0.20%	3	0.30%	–	–
Total	**451**	**100.00%**	**922**	**100.00%**	**3**	**100.00%**

only once, even when broken into a number of pieces by the archaeologist. In most instances when the break occurred prior to excavation, the pieces were counted separately and their articulation noted in a variable that identifies conjoinable pieces, parts that were articulated when found, and pieces that appear to be from the same individual (e.g., virtually all pieces of a rabbit foot). Exceptions were made when deterioration has reduced a piece of bone or antler to a large number of pieces. In such cases, the pieces were treated as a single specimen. Animal skeletons were considered as single specimens so as not to vastly inflate the counts for accidentally and intentionally buried taxa.

Element (Body Part)

The skeletal element (e.g., cranium, mandible, humerus) is identified then described by side, age, and recovered portion. Side is recorded for the element itself or for the portion recovered when it is axial, such as the left transverse process of a lumbar vertebra. Age is recorded at a general level: fetal or neonate, immature (one-third to two-thirds mature size), young adult (near or full size with unfused epiphysis or young porous bone), and mature (full size with compact bone). Further refinements based on dental eruption or wear are noted under comments. The criteria used for assigning an age is also recorded, generally the size, epiphysis closure, or the texture of the bone. The portion of the skeletal element represented in a particular specimen is recorded in detail for estimating the number of individuals represented in an assemblage and to discern patterns related to processing.

Completeness

Completeness refers to how much of a skeletal element is represented by the specimen (analytically complete, more than 75 percent complete but not analytically complete, between 50 and 75 percent complete, between 25 and 50 percent, or less than 25 percent complete). Completeness is used in conjunction with the portion represented to estimate the number of individuals present. This ultimately provides information about processing, environmental deterioration, animal activity, and thermal fragmentation, or whether a species is intrusive.

Taphonomic Variables

Taphonomy is the study of preservation processes and how these affect the information obtained from a faunal assemblage. The goal of taphonomy is to identify and evaluate at least some of the nonhuman processes affecting the condition of the bone and the frequencies found in an assemblage (Lyman 1994:1). The taphonomic processes that were expressly monitored in this analysis are environmental, animal, and burning. Environmental alteration is recorded as degrees (light, medium, and heavy) of pitting or corrosion from soil conditions, sun bleaching from extended exposure, checking or exfoliation from exposure, root etching from the acids excreted by roots, and polish or rounding from sediment movement. Animal alteration is recorded by source or probable source and where it occurs on the element. Choices include carnivore gnawing, punctures, and crushing, scatological or probable scat, rodent gnawing, and agent uncertain. Burning, when it occurs after burial, is also a taphonomic process and both intentional and unintentional burning affects the preservation and completeness of individual bones.

Burning

Burning can occur as part of the cooking process, part of the disposal process when bone is used as fuel or discarded into a fire, or after burial. The color, location, and presence of crackling or exfoliation were recorded. Burn color is a gauge of burn intensity. A light tan color or scorch is superficial burning, while charred or blackened bone becomes black when the collagen is carbonized. Conversely when the carbon is completely oxidized, it becomes white or calcined (Lyman 1994:385, 388). Burns can be graded, reflecting the thickness of the flesh protecting portions of the bone, or dry. Dry burns are light brown or unburned-looking on the exterior and black at the core or burns can color only a shallow surface layer, indicating the burn occurred well after disposal when the bone was dry. Graded or partial burns can indicate a particular cooking process, generally roasting, while complete charring or calcined bone does not. Uniform degrees of burning are possible only after the flesh has been removed and generally indicate a disposal practice (Lyman 1994:387). A small minority of those recorded as dry burned have a medium gray discoloration on the surface altered by root etching that has destroyed the surface and exposed lighter unaltered bone. In this analysis, since the color did not penetrate far beneath the surface and not all bone within the proveniences was similarly affected, these were considered as dry burns.

Potential boiling is recorded in a separate variable recorded as brown and rounded, brown with no rounding, rounded only, waxy, and brown and waxy. Unfortunately, highly processed and boiled bone resembles scatological bone in terms of the fragmentation, rounding, and color, so that the distinction between two remains somewhat arbitrary.

Butchering and Processing

Evidence of butchering is recorded as various orientations of cuts, grooves, chops, abrasions, saws, scrapes, peels, and intentional breaks. The location of these on the element is also recorded. A conservative approach was taken to the recording of marks and fractures that could be indicative of processing animals for food, tools, or hides since many natural processes result in similar marks and fractures. Spiral fractures were recorded based on their morphology while recognizing there are other causes and that these can occur well after discard. Impacts are identified by the presence of flake scars or other evidence of percussion. These were not recorded when they were ambiguous or accompanied by carnivore gnawing.

Modification

Tools or ornaments, manufacturing debris, utilized bone, possible modification, and pigment stains are recorded as modification. The tools, manufacturing debris, and utilized bone are described in a separate section of this report.

Data Analysis

Once the data were entered and checked, the project director was consulted on dating and grouping proveniences for table generation. Data were tabulated and analyzed using SPSS[7], density plots were generated through the use of Surfer[7] software. Some of the more specific provenience information is included in the site descriptions. For presentation of the more general data tables, the sites were divided into components representing the major site divisions. LA 32964 had three units based on stratigraphy. The upper two disturbed layers of fill and surface material are referred to as recent, the Feature 1 midden as midden, and the Stratum 4 fill and features as extramural. Divisions at LA 104106 are equivalent to SU 1 and SU 2. The single piece of bone that was found half-way between the areas (SU 4) and the three specimens from LA 116035 are generally not included because of small sample sizes.

Recovered Taxon

Unidentified taxa. Pieces of bone that could not be identified beyond the size of the animal ranged from 21.2 to 82.9 percent of the main components at the two larger sites (Table 13.2). Almost all are small thermally altered fragments that exhibit a fair amount of environmental alteration. LA 32964 has considerably more evidence of burning and smaller sized animals while the unidentifiable bone from LA 104106 comprise far less of the assemblage. Some of this patterning may be the result of sampling strategy. The proportion of unidentified small forms (small mammal and small mammal/bird) is highly correlated with the amount of bone recovered from the smaller screen size (Pearson's Correlation .970, sig. = .006) and the smaller screen size is negatively correlated with the proportion of large forms (medium to large and large mammal), but not significantly so (Pearson's Correlation -.570, sig. = .316).

Prairie dog and large squirrel. Gunnison's prairie dog (*Cynomys gunnisoni*) is the only sciurid identified in the Twin Lakes fauna. Other specimens are incomplete and could belong to the other squirrels inhabiting the general area (rock squirrel, *Spermophilus variegatus*) or nearby mountains (tassel-eared squirrels or *Sciurus aberti* and red squirrels or *Tamiasciurus hudsonicus*).

Gunnison's prairie dogs inhabit grasslands from low valleys to montane meadows feeding on grasses, forbs, sedges, and occasionally on insects. They live in loosely organized towns and remain

Table 13.2. Percentages of unidentified taxa from main components at Twin Lakes sites.

	LA 32964			LA 104106	
	Recent	**Midden**	**Extramural**	**SU 1**	**SU2**
Sample Size	**61**	**223**	**167**	**717**	**204**
Unknown small	–	–	–	0.1%	–
Small mammal/ medium–large bird	–	–	1.2%	1.0%	–
Small mammal	6.6%	61.9%	66.5%	11.6%	22.9%
Small–medium mammal	6.6%	3.1%	1.2%	0.3%	4.4%
Medium mammal	–	–	–	0.3%	–
Medium–large mammal	16.4%	17.0%	2.4%	6.1%	23.0%
Large mammal	11.5%	0.9%	6.0%	1.8%	3.4%
Total unknown	41.1%	82.9%	77.3%	21.2%	33.7%
Proportion burned	22.0%	58.9%	70.5%	8.6%	47.8%
Proportion fragmented (< 25%)	92.0%	100.0%	100.0%	96.7%	97.1%
Environmental alteration medium-heavy	22.0%	24.3%	15.6%	29.6%	33.3%
1/4-inch screen	84.0%	0.5%	20.9%	52.6%	79.7%
1/8-inch screen	16.0%	93.0%	79.1%	36.2%	13.0%
Flotation	–	6.5%	–	6.6%	–

underground during the coldest part of the winter emerging in February or even March when snows are late. Breeding is in March and April with a litter of two to six young born about 30 days later. Young are half grown by late June. Burrows are not deep and have several surface entrances and lateral tunnels. Badgers are significant predators that catch their prey by digging into their burrows (Bailey 1931:127–129; BISON n.d.).

As the name suggests, rock squirrels prefer rocky habitats or dense vegetation under which they can burrow. They rarely inhabit open grassland or deserts unless there are steep-sided arroyos where they can burrow (BISON n.d.). The closest reports of this species are in the Chuska Mountains and Fort Wingate (Findley et al. 1975:127–128). Tassel-eared squirrels are restricted to ponderosa and mixed coniferous forests, while red squirrels are restricted to mixed coniferous and spruce-fir forests (Findley et al. 1975:135, 138). Given the project location, the large squirrel remains are most likely from this species.

Both Gunnison's prairie dog and large squirrel remains are present in the two main site assemblages, a few at LA 32964 and greater numbers at LA 104106. Those from the midden at LA 32964 are generally fragmentary (seven of eight) and most are cranial or mandible pieces (six of eight). Only one is burned and it is a dry burn. An equal number of specimens were recovered from the extramural area, but most are prairie dog. Mandibles are the most common element (n = 3) and most are fragmentary (6 of 8). All but two are burned (one light to heavy, one dry, two heavily burned, and two heavy to calcined), suggesting prairie dogs were used for food at this site.

Prairie dogs are second only to cottontail rabbits in the LA 104106 faunal assemblage, where most came from LA 104106, SU 1. A variety of body parts were found with crania and mandibles (42.1 percent) comprising the most. Ribs, innominates, and front and hind limbs are well represented. A significant amount are immature (13.5 percent) and juvenile (7.1 percent) animals. If cultural, rather than intrusive, these young prairie dogs suggest a late spring to early summer occupation. None of the immature specimens are burned but two of the juvenile bones are dry burned. Just over 20 percent are complete or nearly complete elements, mostly from mature individuals. Dry burns are the most common form of burning (4.8 percent) followed by light (3.2 percent), heavy (2.4 percent), then calcined (1.6 percent).

LA 104106, SU 2 had fewer prairie dogs but these are similar in many respects. Cranial and mandible parts are common (37.6 percent) as are front and hind limb elements. Immature (6.3 percent) and juvenile animals (18.8 percent) are present, although none in these age groups are burned. Relatively few specimens are complete or nearly complete (18.8 percent) but more are burned than in SU 1, light to heavy roasting burns (12.5 percent), heavy (12.5 percent), and calcined (6.3 percent). The presence of young prairie dogs again suggests spring to summer-fall occupation and that at least some prairie dogs were roasted.

Rodents. At least six species of rodents were found and most of the bone identified as small or medium to large rodent probably are from the same species. Botta's pocket gophers (*Thomomys bottae*) are fairly ubiquitous in the western two-thirds of the state, occupying any habitat where soils are suitable (Findley et al. 1975:144). Pocket gophers are solitary and spend almost all of their time underground. Burrows range from 10 to 30 cm beneath the surface with deep tunnels to 61 cm deep (Chase et al. 1982:246). Several of the Twin Lakes specimens are from juveniles. One from SU 1 at LA 104106 has a light to heavy graded or roasting burn. A fair number are complete or nearly complete (7 of 18).

Two species of kangaroo rat were found, one at LA 32964 and the other at LA 104106. The smaller or Ord's kangaroo rat (*Dipodomys ordii*) lives below mid-woodlands almost everywhere that the soil is friable. The larger banner-tailed woodrat (*Dipodomys spectabilis*) inhabits well-developed grasslands with heavier soils that can support complex and deep burrow systems (Findley et al. 1975:174–175, 183–184). All of the specimens are from mature individuals and none are burned. Those from Ord's kangaroo rat are all complete or nearly complete while those from the larger variety are more often complete or nearly complete than fragmentary.

Several species of *Peromyscus* inhabit this part of the San Juan Basin including the canyon mouse (*Peromyscus crinitis*), the deer mouse (*Peromyscus maniculatus*), and the piñon mouse (*Peromyscus truei*). The canyon mouse lives among jumbles of rocks at the base of cliffs in the piñon-juniper zone. Deer mice live just about everywhere while piñon mice also live in piñon-juniper forests (Findley et al. 1975:200–223). No attempt was made to determine species for these mice; however, all or most are the size of deer mice and that is the most likely species given the site location. The *Peromyscus* specimens are almost equally divided between juvenile and mature mice. None are burned and they tend to be complete or nearly so (all but one are greater than half of the element).

At least two woodrat species are found. The smaller Mexican woodrat (*Neotoma mexicana*) is primarily a mountain species but is also found in mixed shrub and piñon juniper habitats (BISON n.d.). Two specimens seem to represent this species, both are represented by portions of mandibles with first molars that are most consistent with those of the Mexican woodrat (cf. Hoffmeister and Torre 1960:477). Both are from mature woodrats and neither is burned. The larger or bushy-tailed woodrat (*Neotoma cinerea*) is found in piñon-juniper habitats in San Juan and McKinley counties, particularly in rocky habitats (BISON n.d.). Identified on the basis of their much larger size, both specimens are mature, unburned, and are represented by less than half of the element.

A third of the medium to large rodent specimens are immature and almost as many are juvenile. Two are burned and all are fairly fragmentary. The small rodents are mature, only one was burned, and they tend towards complete elements.

No rodents were found in the recent fill of LA 32964. Those recovered from the midden are all small rodents recovered from either flotation samples or by 1/8-inch screening. The majority (four of six) are complete or nearly complete elements and unlike this component as a whole where over half of the bone is burned, none are burned. The extramural component from this site has a more diverse array of rodents. Again, none are burned and all but one tend toward being more complete elements captured by 1/8-inch screen. This strongly suggests that most of the midden and extramural rodents are accidental additions to these deposits, especially the burrowing pocket gophers and kangaroo rats.

LA 104106, SU 1 had the greatest variety of rodents as well as evidence that at least some were eaten. A pocket gopher bone has graded burns typical of roasting and three of the unidentified rodents bones are heavily burned. Other specimens from the burrowing rodents tend to be more complete and some could be post-occupational. Of the rodents from this component, 19 were recovered by 1/4-inch screen, 25 by c-screen, and 3 from flotation samples. SU 2 produced no identifiable rodents and the two found are burned and fragmentary medium to large rodent bones recovered by 1/8-inch screening.

Rabbits. Cottontail rabbit is the most numerous taxon found at Twin Lakes. The desert cottontail (*Sylvilagus audubonii*) occurs everywhere from piñon-juniper woodlands and below (Findley et al. 1975:83). Short-lived but prolific breeders, cottontail rabbits can produce up to five litters of three to four per year. Young are born from late March into September and are ready to leave the nest in two weeks (BISON n.d.). The most common species in many prehistoric faunal assemblages, cottontails were exploited because their rapid breeding potential provided an ample food supply and they have a propensity to invade agricultural fields.

Jackrabbits (*Lepus californicus*), some considerably larger than comparative specimens from San Juan County, are found in all habitats below the ponderosa forest zone (Findley et al. 1975:93). Almost as a prolific as cottontails, females average about 14 young per year. Breeding occurs from January through July and adult size is reached by seven months (BISON n.d.).

At LA 32964, cottontail rabbit specimens barely outnumber those of jackrabbits. Both rabbit bones from the recent deposits are from jackrabbits, lumbar vertebra and tibia fragments. One was burned. In the midden, cottontails are the more common (n = 12 and n = 9). Half are cranial and mandible fragments. A good number (41.7 percent) are burned ranging from heavy to calcined burns. None are complete or nearly complete elements and one was from a juvenile rabbit. All but one were recovered by 1/8-inch screen or flotation (n = 1). Jackrabbit bones from the midden are largely leg and foot bones (eight of nine). Again, a large proportion are burned (66.7 percent) mainly heavy and calcined burns but there are also two dry burns. Most are small fragments (seven of nine) and all but one (from flotation) were recovered by 1/8-inch screening. The extramural deposits produced equal numbers of cottontails and jackrabbits. Parts are diverse for both and the majority have heavy to calcined burns (50 percent of the cottontail and 62.5 percent of the jackrabbit). An additional two jackrabbit bones are scorched. Most are fragmentary with two cottontail and three jackrabbit bones recovered from 1/4-inch screen and the rest from 1/8-inch screen.

All of the rabbit bones from LA 104106 were from SU 1. Most parts are represented with fragmentation tending to be either mostly complete or fragmentary with the full range between. Cottontail bones come from all age groups including neonate (n = 1), immature (n = 4) and juvenile (n = 30). Jackrabbits are much less common and are all juvenile (n = 4) or mature. Burning was relatively common for the cottontails (15.8 percent) with dry (n = 14), lightly burned (n = 5), graded (n = 2) burns, and heavy (n = 4) burns. Fewer jackrabbit bones are burned (5.7 percent) with dry burns (n = 2), heavy burns (n = 1), and calcined (n = 1). Cottontail rabbits were recovered mainly from 1/8-inch screen (55.1 percent) and jackrabbits from 1/4-inch screen (57.1 percent). Flotation samples produced relatively few bones, seven cottontail and two jackrabbit.

Dogs and Canis sp. Small fragments of bone that could be from a dog (*Canis familiaris*) or a coyote (*Canis latrans*) were left at the canid level (*Canis* sp.). Most are small fragments that are not diagnostic as either species. Given the amount of dog that was identified, most are probably dog.

Dogs descended from wolves and have been morphologically distinct for 10,000 to 15,000 years (Reitz and Wing 1999:284). Evidence of dogs in the Southwest goes back to at least 2000 BC (Schwartz 1997:87). Haag (1948:253–254) has suggested that dogs were originally used for hunting and lost much of their importance with the adoption of agriculture. Where they survived in large numbers, dogs were used for transportation, as food, or for companionship. Indeed, the Hopi consider dogs to be warriors, hunters, and watchers. They were used to hunt rabbits, deer, and antelope and also watched the fields, driving away coyotes (Bradfield 1973:242). The prehistoric distribution also supports a change in status for dogs. In the Mancos Mesa Verde area, dog burials were most common in the period from AD 900 to 975 after which they decreased to where just scattered bones are reported during the Pueblo III period (Emslie 1978:181). A similar distribution was noted in Chaco Canyon where dog burials were most common during Pueblo II when dogs of all ages were found in pit structures and vent shafts. Only scattered dog bones were found at the Great House site of Pueblo Alto (Akins 1985a:349–353).

Some of the dog specimens in the Twin Lakes assemblage are probably road-killed modern dogs. All of those from LA 32964 are from recent deposits. None are burned and half are from dogs about the size of a German shepherd (a zygomat, an atlas vertebra, a humerus fragment, and a metatarsal). The other half (all crania or mandible parts) are the size of prehistoric dogs, but these, too, could be modern. All but the axis vertebra are checked or exfoliating from shallow burial or exposure.

Most of the dog and canid bones found at LA 104106 were from SU 1 (Table 13.2). These include the possible burial of a six- to eight-month-old dog (Feature 35) southwest of Structure 1. The bone is in poor condition, heavily etched and pitted. Few parts were recovered including a single cervical, thoracic, and lumbar vertebrae and most of the front leg and foot bones. The rest could have been removed by mechanical blading. Although the excavators felt this dog could be modern because the excavation grid held fill from a pipeline trench 2.0 m to the west, the preservation and size are consistent with prehistoric dogs. A cranium and mandible from another dog (Feature 139) were found in Structure 7. These, too, are the badly checked and pitted remains of a small dog, probably female, with much wear on the maxillary carnassials and anterior tooth damage consistent with the breakage and missing teeth that can occur when dogs pursue and are kicked by artiodactyls. Based on age, these represent at least one immature (that could be modern) specimen and another that probably is not, one that was four to five months, the six to eight-month-old dog, another juvenile that is large and probably recent, and a scattering of parts from mature dogs. At least three mature dogs are represented by mandibles. If the spatial distribution is considered, the number of mature dogs is more like six potentially prehistoric dogs. None of the SU 1 mature dog specimens are overly large but one is greasy and undoubtedly recent. Those noted as sun bleached could also be recent, although old bone brought to the surface will become sun bleached. Two pieces of a canid tibia have graded burns ranging from heavy to calcined, but most are unburned and widely scattered. The only possible processing is what looks like a beveled cut or small portion removed from the distal end of a metatarsal. This could have been done by carnivores but appears too sharp so is more likely human made.

Two of the three canid bones from SU 1 were identified as dog. The unidentified part is a fragment of an auditory bulla from the first excavation level. One of the dog elements is a complete cervical vertebra from a juvenile and the other a partial innominate. The innominate is checked and greasy, which along with a somewhat different shape suggesting a modern breed, indicate it was a recent addition. It, and the cervical vertebra, are surface finds and both are sun bleached (Table 13.3).

Carnivores. A few bones are from carnivores, including two dog or bobcat-sized specimens and one more like a wolf or mountain lion in size. The medium carnivore bones include a partial patella from SU 1 and a lightly burned ulna shaft fragment from SU 1 at LA 104106. The large carnivore part is the distal end of a rib that was either graded light to heavy or dry burned from SU 1. Badger, bobcat, and mountain lion were recovered from LA 104106. Only the bobcat was from SU 2.

Badgers (*Taxidea taxus*) are most common in grasslands but range into other nonforested areas. Their presence is often related to that of burrowing rodents (Findley et al. 1975:308). Nocturnal and solitary, badgers generally remain underground during the day (Lindzey 1982:656). The Hopi consider badgers medicine animals but will kill them when their raids on cornfields do too much damage (Bradfield 1973:220). The three specimens in the Twin Lakes assemblage include heavily burned pieces of a cranium and a mandibular condyle and a complete unburned phalanx from two adjacent grids and the same elevation within SU 1.

Bobcats (*Felis rufus*) are found in almost all habitats (Findley et al. 1975:320). Most of an unburned tibia with no evidence of processing was recovered from floor fill in Structure 1, Room 1, at LA 104106.

Parts of a mountain lion (*Felis concolor*) were mainly found in SU 2, in grid areas 22–23N/94–96E and 27N/98E and at elevations 8.64 to 9.00. These remains are spatially associated with a concentration of Dinetah Gray ceramics and sheep/goat bones, suggesting they are also the result of the Navajo occupation within SU 2 at LA 104106. Rare in San Juan County today, these large cats live in broken and mountainous country including oak woodlands, piñon juniper woodlands, chaparral,

Table 13.3. Study Unit 1, spatial distribution of dogs and canids by age and grid proveniences.

Age	Structure	North	South	Top Elevation (cm)	Bottom Elevation (cm)	Taxon	Element	Part	Comments
Immature	–	76	98	10.46	10.60	cf. dog	thoracic vertebrae	partial	checked and sun bleached; recent?
Immature	Structure 1 (ante-chamber)	94	102	10.13	10.50	–	cranium	canine	–
Juvenile	Structure 1 (ante-chamber)	76	98	10.46	10.60	dog	radius	distal epiphysis	large, probably recent
Juvenile	Structure 1 (ante-chamber)	76	98	0.46	101.60	–	carpals (n=2)	complete	large, probably recent
Juvenile	Structure 1 (ante-chamber)	80	110	10.05	10.20	–	rib	proximal	checked and sun-bleached
Juvenile	Structure 1 (ante-chamber)	83	110	10.10	10.20	–	lumbar vertebra	complete	–
Juvenile	Structure 1 (ante-chamber)	85	98	9.62	9.73	cf. dog	thoracic vertebrae	epiphysis	–
Juvenile	Structure 1 (ante-chamber)	87	93	9.40	9.50	dog	partial skeleton	front limbs and vertebrae	6–8 months, Feature 35
Juvenile	Structure 1 (main chamber)	89	99	9.75	11.63	–	mandibles	fragments of both	4–5 months
Mature	Structure 1 (main chamber)	77	98	9.48	9.60	–	rib	proximal shaft	greasy--recent
Mature	Structure 3	80	111	10.60	10.70	–	axis vertebra	partial arch	–
Mature	Structure 3			11.10	11.20	–	mandible	horizontal ramus	–
Mature	Structure 1 (ante-chamber)			11.08	11.20	canid	cranium	molar	just above floor; roots twisted
Mature	Structure 1 (ante-chamber)	86	103	9.90	10.00	–	innominate	ilium fragment	checked and sun-bleached
Mature	Structure 1 (main chamber)	89	99	9.75	11.53	tibia	proximal and shaft fragment	–	–
Mature	Structure 1 (main chamber)	90	100	11.59	11.73	canid	tibia	shaft fragment	heavy to calcined burn
Mature	Structure 7	93	115	11.50	11.60	dog	cranium	nasal	–
Mature	Structure 7	93	115	11.50	11.60	–	innominate	ilium and ischium	–
Mature	Structure 1 (ante-chamber)	94	102	10.13	10.50	canid	cranium	occipital condyle	checked and sun-bleached
Mature	Structure 7	94	114			–	cranium and mandibles		Feature 139; probably female
Mature	Structure 7	94	115	11.17	11.48	–	innominate	acetabulum	
Mature	Structure 7	96	96	9.60	9.80	–	scapula	glenoid and partial body	slightly larger than prehistoric; partially sun-bleached
Mature	Structure 7	96	111	10.70	10.80	canid	mandible	incisor	–
Mature	Structure 2	97	111	11.19	11.58	dog	cranium	canine	–
Mature	Structure 2	97	111	1.19	11.58	–	metatarsal 5	complete	possible beveled cut distal
Mature	Structure 2	98	112	10.62	11.16	–	mandibles	partial	small female?
Mature	Structure 6	116	108	10.21	10.73	–	astragalus	complete	–

cf. = resembles taxon

and coniferous forests (BISON n.d.). This example was probably transported to the site area and is an unlikely road kill. The skeletal parts include a parietal, two metatarsals, and a partial tibia. None are burned but one of the metatarsals is a proximal end that was cut off of the shaft. Many of the spatially associated sheep/goat bones are burned.

Native artiodactyls. Elk (*Cervus elaphus*), mule deer (*Odocoileus hemionus*), and pronghorn (*Antilocapra americana*) remains were recovered from LA 104106. None of the LA 32964 artiodactyl bone was identified to the species level. Elk once inhabited the major montane areas of the state, occupying mountain meadows and coniferous forests in summer and moving to lower woodlands, grasslands, or even desert scrub in winter (BISON n.d.). The elk bones found at LA 104106 are all rib shaft fragments recovered from SU 1. Of the 16 pieces found, 7 have light to heavy graded burns, suggestive of roasting, and two have impact breaks. These rib fragments have a wide distribution, occurring in the fill and floor fill of Structure 1 main chamber (n = 1 each), the fill of the antechamber (n = 12), and the fill of Structures 2 and 3 (1 each). Additional rib fragments (n = 5) identified as medium to large artiodactyl are from the same structures and may also be from elk.

Mule deer range throughout most habitats and elevations occupying mixed shrub, sagebrush, piñon-juniper, juniper, and agricultural land on Zuni tribal land. In some areas, they move to higher elevations in hot weather and return to the foothills and valleys in winter. Fawning is usually from late May to early June (BISON n.d.). Deer grow rapidly in their first six months of life. By six months of age they weigh six times as much as at birth and their weight doubles between six and twelve months of age (Mackie et al. 1982:863).

Deer specimens are not as common as elk in the Twin Lakes faunal assemblage, but the parts are more diverse and include a fetal browse pad, a juvenile metacarpal, mature teeth, an ilium fragment, a distal humerus, parts of metatarsals and a metacarpal, and a phalanx. Six are burned, including a lightly burned tooth, metatarsal shaft fragment, a browse pad, a metacarpal fragment, and two heavily burned metatarsals fragments. The browse pad, from 27N/101E, Level 2, is from a near-term fawn suggesting it was acquired in May. The juvenile metacarpal was fashioned into an awl and one of the three pieces of antler, from a deer or elk, was made into a spatulate tool. Even though Structure 1 had the largest sample size for the structures, none of the deer were from there. Instead, both pieces of deer bone were from the floor and floor fill context (the awl) of Structure 2. Deer bone was more common in SU 2 and included an ilium fragment that had a portion cut off, probably with a metal tool (23N/93E, Level 1 in the concentration of Dinetah Gray ceramics) and metatarsal shaft fragments with impact and spiral (n = 2) breaks. All of the burned deer bone was from this area.

Pronghorn prefer areas with grass and scattered shrubs in rolling or dissected hilly or mesa areas. Once abundant, they were intensively hunted in the early 1900s. In central Arizona, young are born between April and June (BISON n.d.) and are in their best condition in late summer during the rainy season. Large herds form during winter, breaking up into bachelor and nursery herds, and finally into smaller groups or solitary animals in late summer (Kitchen and O'Gara 1982:963–965).

Pronghorn were found in both areas at LA 104106. All three specimens are tools or raw material for manufacturing tools. These specimens were recovered from the fill of the main chamber and antechamber of Structure 1 and from a ceramic vessel with other bone tools in the antechamber. All three of the SU 1 specimens are burned, including a mandible fragment that has graded light to heavy burns, an acetabulum fragment that was calcined, and a partial rib that was heavily burned.

In addition to the artiodactyl bone identified to species, medium (most likely deer or pronghorn) and medium to large artiodactyl (probably deer, pronghorn, or elk) bone was found at LA 32964 (n = 3) and SU 1 (n = 31) and SU 2 (n = 7) at LA 104106. Larger amounts were considered small to medium artiodactyl because they could be from a native artiodactyl or domestic sheep or goat.

Modern domesticates. Domestic sheep or goat (*Ovis/Capra*) along with horse (*Equus caballus*), cat (*Felis domesticus*), and chicken (*Gallus gallus*) occur in the Twin Lakes assemblage. A Franciscan missionary reported in 1625 that the Navajos practiced agriculture in 1625 but not livestock. The Rabal documents for the period between 1706 and 1743 report that Navajos lived in small communities away from the fields and still practiced agriculture but that sheep and goats, as well as a few horses and cows, were kept (Kluckhohn and Leighton 1962:35). Archaeological data from Gobernador phase middens in the Gobernador area support the Rabal account of the presence of sheep, goats, and horses in addition to the presence of elk, deer, and dog remains (Carlson 1965:11, 21, 38). It is unlikely that domestic sheep, goats, or horses were present during the earlier Dinetah phase (e.g., Reed and Horn 1990:293). The absence of domesticated animals from sites of this period indicates that these species became available only after the return of the Spanish following the Pueblo Revolt.

No attempt was made to distinguish sheep from goat specimens in the Twin Lakes assemblage. As noted by Lyman (1982), the morphologic attributes that work for Old World sheep and goats do not work for the Southwest. He did find that he could use metric data to distinguish complete distal metapodials recovered from sites northeast of this project area (Lyman 1982:1008). Unfortunately, the only metapodial in the Twin Lakes assemblage is from a juvenile and lacks the condyles. Most of the complete and near complete elements from Twin Lakes are tarsals and carpals. Other parts include ribs, lumbar vertebra, innominate, ulna, and femur fragments.

The sheep/goat specimens from LA 32964 are from the recent deposits. All but one come from the same grid (85N/89E) in Levels 1 through 3. Elements are either from feet or are rib shaft fragments (n = 2). None are burned or have evidence of processing. Parts identified as small to medium artiodactyl are from the same grid as the sheep/goat and are mostly rib fragments (n = 10). None are burned and all but one exhibit the rounded dissolved look typical of bone from scat. Several pieces of tooth enamel from the midden were also from artiodactyls of indeterminate size. Given the absence of historic domesticates in the midden, these are probably from medium artiodactyls.

The sheep/goat specimens from LA 104106 were recovered from extramural areas. Elements from SU 1 are again foot parts and rib fragments along with a spinous process from a lumbar vertebra. All but one are from the first excavation level of five different grid units. None are burned and none have evidence of processing. The small to medium artiodactyl specimens from this area are almost all from Level 1 (all but 1) and most are rib fragments (seven of eleven). Other parts include a cervical vertebra body fragment and long and flat bone fragments. None are burned but one has been crushed by a carnivore and four others are probably scatological.

Sheep/goat elements recovered from LA 104106, SU 2, are more diverse and include fragments of an ulna, a femur, astragalus (three pieces of the same bone), a calcaneus, and a complete sesamoid. All are from the first level of fill and five different grids but all fall in the area between 23N and 24N and 93E to 95E and between 1.45 and 1.20 mbd in elevation. All but two are burned, ranging from graded light to heavy (the astragalus), to dry (n = 3), and graded heavy to calcined (n = 2). Such a discrete area suggests that the ash/trash pile is discard where the burned bone was disposed. Specimens that could be from either small or medium-sized artiodactyls are numerous (n = 79) and often burned. Parts are largely long bone fragments (55.7 percent), but also include flat bones (n = 2), cranial fragments (n = 3), a vertebra fragment, rib fragments (n = 8), and single fragments of a humerus, radius, and a metapodial. The vast majority are burned (83.5 percent) and one appears scatological. Unlike the sheep/goats, the small to medium artiodactyl bones cluster between 26N to 28N and 101E to 103E at elevations of 8.72 to 9.31 (n = 52) with most (n = 31) falling between 9.10 and 9.20 (see Fig. 8.66).

The horse specimen is an unburned piece of a humerus shaft found in SU 1 at LA 104106. It was from the first level of fill but none of the other domesticates are from the same or even adjacent grids. It was recovered from an upper fill level above near Structures 2 and 7. While horses were in the Southwest during the Dinetah phase, remains have not been found in archaeological assemblages dating from this period. However, horse remains are reported from Gobernador phase sites, along with evidence of skinning (Gillespie 1986:175). Alternatively, the Twin Lakes specimen could also be more recent road-related debris.

Chickens were undoubtedly introduced to the Southwest by the Spanish at a relatively early date but are absent from early Navajo sites. Both of the major Twin Lakes sites have single chicken elements from the uppermost levels of sediment. The parts, a partial pelvis and a coracoid, a portion of which was removed with a sharp knife, are from juvenile birds and bear a remarkable resemblance to modern commercially sold birds and thus are most likely modern roadside debris.

Like the chicken, the domestic cat found in the same grid and level (195N 25E) at LA 32964 is probably recent. The parts, a partial cranium, pieces of both mandibles, and an atlas vertebra, are from a fairly large cat that could have escaped from a passing vehicle or strayed from a nearby household. Valued for their rodent-catching ability, cats do quite well when they turn feral and can live entirely by hunting (Clutton-Brock 1999:133).

Birds. Beside the chicken, turkey (*Meleagris gallopavo*), hawk (Accipitridae), unidentifiable bird bone, and eggshell were found. None of the bird bone was burned.

Merriam's wild turkey once inhabited both the Chuska and Zuni Mountains but were extinct in the Chuskas by 1925. Turkey populations declined from habitat degradation, hunting, predation, severe winters or drought, and loss of winter range. This species inhabits mountain ranges where ponderosa pine is an essential component of their habitat (Lignon 1946:1–2, 29, Figs. 1 and 2). Turkeys were kept, if not domesticated, by AD 500, as shown by a Basketmaker II cave site in north-central Arizona where a cist was filled with 10 cm of turkey dung along with corn cobs, kernels, and a bean (Geib and Spurr 2000:198).

Eggshell, consistent in color and thickness to those of turkeys, is more numerous and widespread than actual turkey bones. Most of the eggshell was recovered from the upper fill (at least 10.60 mbd) to the floor of the antechamber of Structure 1 (n = 21). Other proveniences with eggshell include the Structure 2 floor, Structure 3 fill, and Structure 7 fill. The shell from Structure 3 was recovered from a relatively shallow depth (10.40 to 10.50 mbd), while that from the other structures was from considerably deeper.

Turkey bones have a different spatial distribution than the eggshell. All are from fill with single pieces found in Structures 3 and 7 and most in Structure 6 (n = 3). Parts are small pieces of long bones (ulna, humerus, tibiotarsus, and femur) that represent parts of two birds. One humerus fragment has an abrasion on the shaft, which could have resulted from smashing with a hammerstone.

Fragments of very large nondiagnostic bird bone, most of which are probably turkey, occur in the same proveniences as the turkey and eggshell. The Structure 1 antechamber had only eggshell while Structure 2 had very large bird bone and eggshell, Structure 3 had very large bird, eggshell, and turkey, Structure 6 had very large bird and turkey bones, and Structure 7 had eggshell and turkey bone. Two pieces of the very large bird bone, a long bone and a humerus fragment, both from Structure 2 have impact breaks.

The other bird bone includes a radius shaft fragment from a hawk that resembles but is slightly smaller than a Cooper's hawk found in the main chamber of Structure 1 in addition to four pieces of medium to large bird bone recovered from the bench of that same structure. None are burned or have evidence of processing.

Snakes. Vertebrae from one or more nonvenomous snakes were found, one from upper fill at LA 32964 and three from LA 104106. The antechamber of Structure 1 produced two, one from fill and one from the floor, and the third from the extramural area between Structures 1 and 3. None are burned or have evidence of processing and could be post-occupational additions to the site deposits. Relatively few species of nonvenomous snakes are reported for the general project area, but others may be as yet unreported or no longer live in the area. Degenhardt et al. (1996:260–336) list the following as currently present: *Coluber constrictor* (racer), *Masticophis taeniatus* (striped whipsnake), *Pituophis melanoleucus* (bullsnake or gopher snake), and *Thamnophis elegans* (western terrestrial garter snake).

Site Assemblages

LA 32964

The 451 specimens recovered from this site were divided into three components for discussion (Table 13.4). The upper two layers of fill are recent but may also contain some prehistoric material brought to the surface by burrowing rodents and other ground-altering activities. The midden (Feature 1) was a discrete area of refuse and the extramural deposits include the features and extramural fill in areas other than the midden, dating to the Basketmaker II era.

All of the potentially modern domestic fauna come from the recent deposits. None are burned and a good proportion of the elements are complete or nearly complete, comprising more than 75 per-

Table 13.4. LA 32964, fauna by major stratigraphic division.

	Recent/ Surface		Midden (Feature 1)		Extramural		Total	
Taxon	**Count**	**Col. %**	**Count**	**Col. %**	**Count**	**Col. %**	**Count**	**Col. %**
Small mammal/ medium–large bird	–	–	–	–	2	1.2%	**2**	**0.4%**
Small mammal	4	6.6%	138	61.9%	111	66.5%	**253**	**56.1%**
Small–medium mammal	4	6.6%	7	3.1%	2	1.2%	**13**	**2.9%**
Medium–large mammal	10	16.4%	38	17.0%	4	2.4%	**52**	**11.5%**
Large mammal	7	11.5%	2	0.9%	10	6.0%	**19**	**4.2%**
Large squirrels	–	–	5	2.2%	1	0.6%	**6**	**1.3%**
Gunnison's prairie dog	–	–	3	1.3%	7	4.2%	**10**	**2.2%**
Botta's pocket gopher	–	–	2	0.9%	2	1.2%	**4**	**0.9%**
Ord's kangaroo rat	–	–	2	0.9%	1	0.6%	**3**	**0.7%**
Permyscus sp.	–	–	–	–	1	0.6%	**1**	**0.2%**
Woodrats	–	–	2	0.9%	–	–	**2**	**0.4%**
Mexican woodrat	–	–	–	–	1	0.6%	**1**	**0.2%**
Desert cottontail	–	–	12	5.4%	8	4.8%	**20**	**4.4%**
Black-tailed jack rabbit	2	3.3%	9	4.0%	8	4.8%	**19**	**4.2%**
Dog	8	13.1%	–	–	–	–	**8**	**1.8%**
Domestic cat	7	11.5%	–	–	–	–	**7**	**1.6%**
Small–medium artiodactyl	11	18.0%	1	0.4%	4	2.4%	**16**	**3.5%**
Medium artiodactyl	–	–	2	0.9%	1	0.6%	**3**	**0.7%**
Domestic sheep or goat	7	11.5%	–	–	–	–	**7**	**1.6%**
Eggshell	–	–	–	–	3	1.8%	**3**	**0.7%**
Domestic chicken	1	1.6%	–	–	–	–	**1**	**0.2%**
Nonvenomous snakes	–	–	–	–	1	0.6%	**1**	**0.2%**
Table Total	61	100.0%	223	100.0%	167	100.0%	**451**	**100.0%**
Age								
Not applicable/eggshell	–	–	–	–	3	1.8%	**3**	**0.7%**
Juvenile (2/3+ grown)	5	8.2%	16	7.2%	12	7.2%	**33**	**7.3%**
Mature	56	91.8%	207	92.8%	152	91.0%	**415**	**92.0%**
Completeness								
Complete	8	13.1%	4	1.8%	5	3.0%	**17**	**3.8%**
>75% complete	3	4.9%	1	0.4%	4	2.4%	**8**	**1.8%**
50–75% complete	2	3.3%	2	0.9%	2	1.2%	**6**	**1.3%**
25–50% complete	3	4.9%	2	0.9%	1	0.6%	**6**	**1.3%**
<25% complete	45	73.8%	214	96.0%	155	92.8%	**414**	**91.8%**
Burning								
Unburned	57	93.4%	102	45.7%	58	34.7%	**217**	**48.1%**
Light or scorched	–	–	3	1.3%	11	6.6%	**14**	**3.1%**
Light to heavy	–	–	2	0.9%	5	3.0%	**7**	**1.6%**
Dry burn	–	–	37	16.6%	15	9.0%	**52**	**11.5%**
Heavy or charred	3	4.9%	52	23.3%	40	24.0%	**95**	**21.1%**
Heavy to calcined	–	–	2	0.9%	3	1.8%	**5**	**1.1%**
Calcined	1	1.6%	25	11.2%	35	21.0%	**61**	**13.5%**

cent of the element: dog (25.0 percent), cat (42.9 percent), and sheep/goat (71.4 percent). At least two sizes of dog are present, including a large German shepherd-sized dog and one that is more the size of a prehistoric dog. Spatially, the dog specimens occur in a roughly diagonal line across the site from southwest to northeast (29N/83E to 62N/91E). The cat is from a single grid (25N/92E), the sheep/goat specimens are from two widely separated grids (25N/92E and 85N/89E), and the chicken is well within the road toss zone (18N/83E). In addition, at the far north end of the project area, much of the bone is rounded and bleached and is probably derived from scat. This is particularly true of grid 85N/89E where 26 of the 30 specimens exhibit the rounded, dissolved appearance of scatological remains. These are exclusively from animals in the medium to large range, including sheep/goat (n = 6), and are mainly rib and foot elements. Only one other piece of bone also appears scatological and it is from the far south end and jackrabbit. The furthest south of the dog specimens is crushed by carnivore gnawing. Just over half of the recent bone (52.5 percent) is checked and exfoliated from exposure. Potentially prehistoric fauna, burned jackrabbit and small mammal bone, are clustered at the south end of the project area (south of 22N). This distribution suggests that most of the fauna from the recent deposits are unrelated to the prehistoric use of the site area. The only exception are the jackrabbit and small mammal bone along the southern border of the main excavation block.

The faunal distributions for the midden and extramural area were remarkably similar and any minor differences could have been the result of collection methods. The midden had a greater amount collected through 1/8-inch screening (90.6 percent versus 78.4 percent) and through flotation (8.1 percent versus none).The greatest difference between the two areas, in terms of taxa, was that the midden had a larger proportion of animals that were medium to large and greater in size (19.2 percent versus 11.4 percent) and most of those from the midden were more ambiguous in size (17.0 percent are medium to large mammal). Small mammal was the most common taxon in both areas with relatively small counts for specimens identified to the species level. No immature animals were found in either area and the proportions of juveniles were similar. Fragmentary bone was predominant in both. More of the midden bone was burned but this was largely because of the dry burns. The overall proportions of heavily burned bone are essentially equivalent, although the extramural area has more calcined and scorched burns. In both, much of the burned bone was rabbit and unidentified forms. Extramural prairie dog specimens are often burned (Table 13.5). The lack of burning and completeness or near completeness of the rodent and snake remains suggests most or all are the result of post-occupational burrowers.

Virtually all of the unburned (93.1 percent of the midden and 87.9 percent of the extramural), and some of the burned (8.3 and 23.8 percent) bone was environmentally altered. Most are pitted or corroded from soil conditions (82.4 and 70.7 percent of the unburned) with small amounts that are checked, root etched, or polished.

Few of the extramural features contained bone (Table 13.6) and none have much of a sample. Most are small forms and the burning was mainly on small mammal and prairie dog bone. A single cottontail bone was scorched and a medium to large mammal has a dry burn.

All and all, the midden and extramural samples were similar enough to suggest they represent the same occupation, series of occupations, or enduring subsistence practices. The large amount of burning and fragmentation is, in part, a function of preservation. Heavily burned bone is more friable than unburned bone and tends to break into small pieces or be reduced to powder by trampling and soil compaction (Stiner et al. 1995:229). Furthermore, under conditions where organic material is not well preserved, burned bone survives better than unburned (Buikstra and Swegle 1989:248; Nicholson 1993:411).

LA 104106

This large site has components dating from Basketmaker II, Basketmaker III, and early Navajo time periods along with a few ceramics from Pueblo II–III. Fauna was recovered from three of four excavation areas (Table 13.7); however, Area 4 only produced two prairie dog bones and will not be discussed. SU 1 had the largest sample of fauna (Table 13.6) associated with late Basketmaker III structures. SU 2 contained both Navajo and Basketmaker II deposits and features.

Table 13.5. LA 32964, midden and extramural area, proportion of burned taxa.

	Midden			Extramural		
	Unburned	Scorch/ Dry	Heavy/ Calcined	Unburned	Scorch/ Dry	Heavy/ Calcined
Small mammal/bird	–	–	–	50.0%	–	50.0%
Small mammal	42.0%	12.3%	45.5%	29.7%	14.4%	55.8%
Small–medium mammal	–	50.0%	50.0%	–	–	–
Medium–large mammal	34.2%	52.6%	13.2%	50.0%	50.0%	–
Large mammal	–	–	100.0%	20.0%	20.0%	60.0%
Large squirrel	80.0%	20.0%	–	–	–	100.0%
Prairie dog	100.0%	–	–	28.6%	14.3%	57.2%
Pocket gopher	100.0%	–	–	100.0%	–	–
Ord's kangaroo rat	100.0%	–	–	100.0%	–	–
Woodrat	100.0%	–	–	100.0%	–	–
Cottontail	58.3%	–	41.7%	50.0%	12.5%	37.5%
Jackrabbit	33.3%	22.2%	44.5%	12.5%	25.0%	62.5%
Small–medium artiodactyl	100.0%	–	–	100.0%	–	–
Medium artiodactyl	100.0%	–	–	–	100.0%	–
Snake	–	–	–	100.0%	–	–

Structure 1. Structure 1 in SU 1 was a classic Basketmaker III structure with an antechamber. The other structures (2, 3, 5, 6, and 7) were smaller, less formal structures. Bone was also collected from 46 extramural grids. Of these, 31 have sample sizes of 1 and the highest count is 15. The greatest concentration of extramural bone (n = 30 from three grid units) was in grids 85N/98E–100E where most were from the first level of fill and were dog, sheep/goat, or indeterminate categories the size of those two taxa. The only exceptions were seven cottontail bones from the third level of fill in 85N/100E. All of the potentially recent fauna (sheep/goat, horse, chicken, and some dog) were from the extramural grids. The chicken and horse were from just southwest of Structure 2 and most of the sheep/goat were at or around 85N or east and southeast of Structure 5.

Except for Structure 1, sample sizes for the structures are small (Table 13.8). Small forms (prairie dog, rabbit, rodent, and small mammal) were more common in Structures 1, 2, 3, and 7. Proportions of artiodactyl and potential artiodactyl (medium to large and large mammal) bone vary with only the extramural area having large amounts (56 percent). Otherwise, the totals range from a low of 11.2 percent in Structure 1, Room 1 to 20.9 percent in the Structure 1 antechamber. The small sample from Structure 6 is unusual in the large proportion of turkey and possible turkey bone (40.0 percent). Eggshell was mainly found in the Structure 1 antechamber (n = 21) but was also recovered from Structure 2 (n = 1), 3 (n = 1) and Structure 7 (n = 2). The small sample of neonate and immature animals found in all structures indicate warm weather deposition. Proportions of fragmentary bone were high throughout with the lowest proportions found in the Structure 1 main chamber and in Structure 2. Burned bone was relatively rare.

A closer look at Structure 1 (Table 13.9), divided into units that reflect general post-abandonment fill and potential cultural fill (roof fall, floor fill, floor, and floor features), showed that the potential cultural fill in the main chamber had the highest proportion of small forms (small mammals, prairie dogs, and rabbits) and the fewest artiodactyl remains. Cottontails were uniformly the most abundant taxon with more found on and near floors than in fill. Immature and neonate animals were found in all: medium artiodactyl (n = 1) in the main chamber fill, prairie dog (n = 1) and cottontail (n = 4) in the occupational fill of the main chamber, and prairie dog in the antechamber fill and occupational fill (n = 1 each). This combination suggests that the procurement and deposition of these fauna occurred around June while the juvenile cottontails, jackrabbits, and prairie dog specimens in these same units indicate some were deposited later in the warm

Table 13.6. LA 32964, extramural features, fauna recovered.

	Feature 6 Storage Facility		Feature 7 Hearth		Feature 9 Cist		Feature 13 Pit	
	Count	Col. %	Count	Col. %	Count	Col. %	Count	Col. %
Taxa								
Small mammal	3	100.0%	4	80.0%	5	45.5%	2	66.7%
Medium–large mammal	–	–	–	–	–	–	1	33.3%
Large mammal	–	–	–	–	–	–	–	–
Gunnison's prairie dog	–	–	1	20.0%	1	9.1%	–	–
Mexican woodrat	–	–	–	–	1	9.1%	–	–
Desert cottontail	–	–	–	–	4	36.4%	–	–
Black-tailed jackrabbit	–	–	–	–	–	–	–	–
Group Total	**3**	**100.0%**	**5**	**100.0%**	**11**	**100.0%**	**3**	**100.0%**
Age								
Juvenile (2/3+ grown)	2	66.7%	–	–	–	–	–	–
Mature	1	33.3%	5	100.0%	11	100.0%	3	100.0%
Completeness								
Complete	–	–	–	–	2	18.2%	–	–
>75% complete	–	–	–	–	–	–	–	–
50-75% complete	–	–	–	–	1	9.1%	–	–
<25% complete	3	100.0%	5	100.0%	8	72.7%	3	100.0%
Burning								
Unburned	2	66.7%	3	60.0%	10	90.9%	–	–
Light or scorched	–	–	–	–	1	9.1%	–	–
Light to heavy	–	–	–	–	–	–	2	66.7%
Dry burn	–	–	–	–	–	–	1	33.3%
Heavy or charred	1	33.3%	–	–	–	–	–	–
Heavy to calcined	–	–	1	20.0%	–	–	–	–
Calcined	–	–	1	20.0%	–	–	–	–

season. Complete and nearly complete bones were more common in the potential occupational fill. Appreciable amounts of burning were only found in the main chamber where burned bone from the hearth (Feature 64) contributes significantly to the total. Potential evidence of processing was identified include cut off portions of a medium to large mammal flat bone and a cottontail tibia and an impact break on an elk rib recovered from the main chamber fill, a cut off cottontail metatarsal, a jackrabbit tibia with a spiral break, and three medium to large artiodactyl long bones with impacts recovered from the main chamber roof fall and floor context; and a cottontail femur with an impact fracture, a jackrabbit femur, and a tibia with spiral breaks, and a medium to large artiodactyl rib with an impact break recovered from the antechamber fill. Small numbers of rodent-gnawed bones were found throughout, but scatological (n = 3), possible scat (n = 4), and a punctured bone were almost all from the antechamber fill with the single exception of one possible scat from the main chamber roof and floor.

Of the features, only the hearth contained an appreciable amount of bone (n = 54). The vent tunnel (included with the antechamber floor) also had a small but better sample (n = 27) than most features.

Table 13.7. LA 104106, fauna by study unit.

	Study Unit							
	1		2		3		Total	
	Count	Col. %	Count	Col. %	Count	Col. %	Count	Col. %
Unknown small	1	0.1%	–	–	–	–	**1**	**0.1%**
Small mammal/ medium–large bird	7	1.0%	–	–	–	–	**7**	**0.8%**
Small mammal	83	11.6%	6	2.9%	–	–	**89**	**9.7%**
Small–medium mammal	2	0.3%	9	4.4%	–	–	**11**	**1.2%**
Medium mammal	2	0.3%	–	–	–	–	**2**	**0.2%**
Medium–large mammal	44	6.1%	47	23.0%	–	–	**91**	**9.9%**
Large mammal	13	1.8%	7	3.4%	–	–	**20**	**2.2%**
Gunnison's prairie dog	126	17.6%	16	7.8%	1	100.0%	**143**	**15.5%**
Botta's pocket gopher	14	2.0%	–	–	–	–	**14**	**1.5%**
Banner-tailed kangaroo rat	4	0.6%	–	–	–	–	**4**	**0.4%**
Permyscus sp.	6	0.8%	–	–	–	–	**6**	**0.7%**
Woodrats	1	0.1%	–	–	–	–	**1**	**0.1%**
Mexican woodrat	1	0.1%	–	–	–	–	**1**	**0.1%**
Bushy-tailed woodrat	2	0.3%	–	–	–	–	**2**	**0.2%**
Small rodent	6	0.8%	–	–	–	–	**6**	**0.7%**
Medium to large rodent	13	1.8%	2	1.0%	–	–	**15**	**1.6%**
Desert cottontail	158	22.0%	–	–	–	–	**158**	**17.1%**
Black-tailed jack rabbit	70	9.8%	–	–	–	–	**70**	**7.6%**
Medium carnivore	1	0.1%	1	0.5%	–	–	**2**	**0.2%**
Large carnivore	–	–	1	0.5%	–	–	**1**	**0.1%**
Dog, coyote, wolf	5	0.7%	1	0.5%	–	–	**6**	**0.7%**
Dog	29	4.0%	2	1.0%	–	–	**31**	**3.4%**
Badger	–	–	3	1.5%	–	–	**3**	**0.3%**
Mountain lion	–	–	4	2.0%	–	–	**4**	**0.4%**
Bobcat	1	0.1%	–	–	–	–	**1**	**0.1%**
Small–medium artiodactyl	11	1.5%	78	38.2%	–	–	**90**	**9.8%**
Medium artiodactyl	16	2.2%	–	–	–	–	**16**	**1.7%**
Medium–large artiodactyl	15	2.1%	7	3.4%	–	–	**22**	**2.4%**
Deer or elk	3	0.4%	–	–	–	–	**3**	**0.3%**
Elk	16	2.2%	–	–	–	–	**16**	**1.7%**
Mule deer	2	0.3%	10	4.9%	–	–	**11**	**1.2%**
Pronghorn	3	0.4%	3	1.5%	–	–	**5**	**0.5%**
Domestic sheep or goat	13	1.8%	7	3.4%	–	–	**21**	**2.3%**
Horse	1	0.1%	–	–	–	–	**1**	**0.1%**
Medium–large bird	4	0.6%	–	–	–	–	**4**	**0.4%**
Very large bird	9	1.3%	–	–	–	–	**9**	**1.0%**
Eggshell	25	3.5%	–	–	–	–	**25**	**2.7%**
Hawks and harriers	1	0.1%	–	–	–	–	**1**	**0.1%**
Turkey	5	0.7%	–	–	–	–	**5**	**0.5%**
Domestic chicken	1	0.1%	–	–	–	–	**1**	**0.1%**
Nonvenomous snakes	3	0.4%	–	–	–	–	**3**	**0.3%**
Table Total	**717**	**100.0%**	**204**	**100.0%**	**1**	**100.0%**	**922**	**100.0%**

Table 13.8. LA 104106, fauna by provenience.

	Extramural Area		Structure 1, Main Chamber		Structure 1, Bench		Structure 1, Ante-chamber		Structure 1 Total		Structure 2, Room 1		Structure 3, Room 1		Structure 5, Room 1		Structure 6, Room 1		Structure 7, Room 1	
	Count	Col. %	Count	Col. %	Count	Col. %	Count	Col. %	Count	Col. %	Count	Col. %	Count	Col. %	Count	Col. %	Count	Col. %	Count	Col. %
Taxon																				
Unknown small	–	–	1	0.4%	–	–	–	–	1	0.2%	–	–	–	–	–	–	–	–	–	–
Small mammal/ medium–large bird	1	1.0%	–	–	–	–	1	0.7%	1	0.2%	3	2.8%	1	2.8%	–	–	1	6.3%	–	–
Small mammal	2	2.0%	47	20.1%	1	3.6%	17	11.3%	65	15.8%	5	4.7%	5	13.9%	–	–	1	6.3%	5	11.1%
Small–medium mammal	1	1.0%	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	6.3%	–	–
Medium mammal	–	–	–	–	1	3.6%	–	–	1	0.2%	–	–	1	2.8%	–	–	–	–	–	–
Medium–large mammal	22	21.8%	4	1.7%	2	7.1%	6	4.0%	12	2.9%	2	1.9%	5	13.9%	–	–	1	6.3%	2	4.4%
Large mammal	7	6.9%	2	0.9%	1	3.6%	2	1.3%	5	1.2%	–	–	–	–	–	–	1	6.3%	–	–
Gunnison's prairie dog	2	2.0%	51	21.8%	2	7.1%	18	12.0%	71	17.2%	42	39.6%	5	13.9%	-	-	1	6.3%	5	11.1%
Botta's pocket gopher	5	5.0%	3	1.3%	–	–	4	2.7%	7	1.7%	1	0.9%	–	–	1	100.0%	–	–	–	–
Banner-tailed kangaroo rat	–	–	1	0.4%	–	–	–	–	1	0.2%	3	2.8%	–	–	–	–	–	–	–	–
Permyscus sp.	–	–	–	–	1	3.6%	4	2.7%	5	1.2%	1	0.9%	–	–	–	–	–	–	–	–
Woodrats	–	–	–	–	–	–	1	0.7%	1	0.2%	–	–	–	–	–	–	–	–	–	–
Mexican woodrat	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	2.2%
Bushy-tailed woodrat	–	–	–	–	1	3.6%	–	–	1	0.2%	–	–	1	2.8%	–	–	–	–	–	–
Small rodent	1	1.0%	4	1.7%	–	–	–	–	4	1.0%	–	–	–	–	–	–	–	–	1	2.2%
Medium–large rodent	–	–	2	0.9%	–	–	2	1.3%	4	1.0%	3	2.8%	–	–	–	–	–	–	6	13.3%
Desert cottontail	12	11.9%	61	26.1%	9	32.1%	33	22.0%	103	25.0%	28	26.4%	9	25.0%	–	–	1	6.3%	5	11.1%
Black-tailed jack rabbit	6	5.9%	31	13.2%	4	14.3%	17	11.3%	52	12.6%	4	3.8%	1	2.8%	–	–	1	6.3%	6	13.3%
Medium carnivore	1	1.0%	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Dog, coyote, wolf	–	–	2	0.9%	–	–	2	1.3%	4	1.0%	1	0.9%	–	–	–	–	–	–	–	–
Dog	12	11.9%	3	1.3%	–	–	1	0.7%	4	1.0%	4	3.8%	2	5.6%	–	–	1	6.3%	6	13.3%
Bobcat	–	–	1	0.4%	–	–	–	–	1	0.2%	–	–	–	–	–	–	–	–	–	–
Small–medium artiodactyl	11	10.9%	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Medium artiodactyl	2	2.0%	7	3.0%	1	3.6%	4	2.7%	12	2.9%	1	0.9%	1	2.8%	–	–	–	–	–	–
Medium–large artiodactyl	–	–	10	4.3%	1	3.6%	1	0.7%	12	2.9%	–	–	–	–	–	–	1	6.3%	2	4.4%
Deer or elk	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3	6.7%
Elk	–	–	2	0.9%	–	–	12	8.0%	14	3.4%	1	0.9%	1	2.8%	–	–	–	–	–	–
Mule deer	–	–	–	–	–	–	–	–	–	–	2	1.9%	–	–	–	–	–	–	–	–
Pronghorn	–	–	1	0.4%	–	–	2	1.3%	3	0.7%	–	–	–	–	–	–	–	–	–	–

(Table 13.8, continued)

	Extramural Area		Structure 1, Main Chamber		Structure 1, Bench		Structure 1, Ante-chamber		Structure 1 Total		Structure 2, Room 1		Structure 3, Room 1		Structure 5, Room 1		Structure 6, Room 1		Structure 7, Room 1	
	Count	**Col. %**	**Count**	**Col. %**	**Count**	**Col. %**	**Count**	**Col. %**	**Count**	**Col. %**	**Count**	**Col. %**	**Count**	**Col. %**	**Count**	**Col. %**	**Count**	**Col. %**	**Count**	**Col. %**
Domestic sheep or goat	13	12.9%	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Horse	1	1.0%	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Medium–large bird	–	–	–	–	4	14.3%	–	–	4	1.0%	–	–	–	–	–	–	–	–	–	–
Very large bird	–	–	–	–	–	–	–	–	–	–	4	3.8%	2	5.6%	–	–	3	18.8%	–	–
Eggshell	–	–	–	–	–	–	21	14.0%	21	5.1%	1	0.9%	1	2.8%	–	–	–	–	2	4.4%
Hawks and harriers	–	–	1	0.4%	–	–	–	–	1	0.1%	–	–	–	–	–	–	–	–	–	–
Turkey	–	–	–	–	–	–	–	–	–	–	–	–	1	2.8%	–	–	3	18.8%	1	2.2%
Domestic chicken	1	1.0%	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Nonvenomous snakes	1	1.0%	–	–	–	–	2	1.3%	2	0.5%	–	–	–	–	–	–	–	–	–	–
Total	**101**	**100.0%**	**234**	**100.0%**	**28**	**100.0%**	**150**	**100.0%**	**412**	**100.0%**	**106**	**100.0%**	**36**	**100.0%**	**1**	**100.0%**	**16**	**100.0%**	**45**	**100.0%**
Age																				
Not applicable/egg shell	–	–	–	–	–	–	21	14.0%	21	5.1%	1	0.9%	1	2.8%	–	–	–	–	2	4.4%
Fetal, neonate	–	–	2	0.9%	–	–	–	–	2	0.5%	–	–	–	–	–	–	–	–	–	–
Immature (1/2-2/3 grown)	2	2.0%	6	2.6%	–	–	3	2.0%	9	2.2%	13	12.3%	–	–	–	–	–	–	6	13.3%
Juvenile (2/3+ grown)	31	30.7%	16	6.8%	3	10.7%	22	14.7%	41	10.0%	9	8.5%	2	5.6%	–	–	2	12.5%	5	11.1%
Mature	68	67.3%	210	89.7%	25	89.3%	104	69.3%	339	82.3%	83	78.3%	33	91.7%	1	100.0%	14	87.5%	32	71.1%
Element Completeness																				
Complete	5	5.0%	25	10.7%	–	–	10	6.7%	35	8.5%	20	18.9%	–	–	–	–	–	–	5	11.1%
>75% complete	16	15.8%	28	12.0%	2	7.1%	9	6.0%	39	9.5%	7	6.6%	–	–	–	–	1	6.3%	2	4.4%
50–75% complete	4	4.0%	31	13.2%	5	17.9%	18	12.0%	54	13.1%	17	16.0%	2	5.6%	1	100.0%	–	–	4	8.9%
25–50% complete	4	4.0%	16	6.8%	6	21.4%	8	5.3%	30	7.3%	15	14.2%	4	11.1%	–	–	2	12.5%	4	8.9%
<25% complete	72	71.3%	134	57.3%	15	53.6%	105	70.0%	254	61.7%	47	44.3%	30	83.3%	–	–	13	81.3%	30	66.7%
Burn Type																				
Unburned	96	95.0%	181	77.4%	25	89.3%	141	94.0%	347	84.2%	103	97.2%	32	88.9%	1	100.0%	16	100.0%	43	95.6%
Light or scorched	–	–	11	4.7%	–	–	1	0.7%	12	2.9%	–	–	1	2.8%	–	–	–	–	–	–
Light to heavy	–	–	36	1.3%	–	–	4	4.0%	9	2.2%	–	–	1	2.8%	–	–	–	–	–	–
Dry burn	1	1.0%	26	11.1%	–	–	–	–	26	6.3%	1	0.9%	–	–	–	–	–	–	–	–
Heavy or charred	1	1.0%	7	3.0%	2	7.1%	1	0.7%	10	2.4%	2	1.9%	1	2.8%	–	–	–	–	2	4.4%
Heavy to calcined	–	–	2	0.9%	1	3.6%	–	–	3	0.7%	–	–	–	–	–	–	–	–	–	–
Calcined	3	3.0%	4	1.7%	–	–	1	0.7%	5	1.2%	–	–	1	2.8%	–	–	–	–	–	–
Collection Method																				
Surface collection	1	1.0%	–	–	–	–	–	–	–	–	3	2.8%	–	–	–	–	–	–	2	4.4%
Shovel	–	–	25	10.7%	1	3.6%	–	–	26	6.3%	25	23.6%	36	100.0%	1	100.0%	16	100.0%	29	64.4%
Quarter inch	91	90.0%	17	7.3%	25	89.3%	113	75.3%	155	37.6%	–	–	–	–	–	–	–	–	–	–
Eighth inch	6	5.9%	170	72.6%	1	3.6%	30	20.0%	201	48.8%	–	–	–	–	–	–	–	–	–	–
In situ	–	–	5	2.1%	–	–	7	4.7%	12	2.9%	–	–	–	–	–	–	–	–	–	–
Flotation	3	3.0%	17	7.3%	1	3.6%	–	–	18	4.4%	–	–	–	–	–	–	–	–	–	–

Table 13.9. LA 104106, Structure 1, faunal data.

	Main Chamber Fill		Main Chamber Roof and Floor		Antechamber Fill		Antechamber Floor		Total	
	Count	Col. %	Count	Col. %	Count	Col. %	Count	Col. %	Count	Col. %
Taxon										
Unknown small	–	–	1	0.5%	–	–	–	–	**1**	**0.2%**
Small mammal/ medium-large bird	–	–	–	–	1	0.9%	–	–	**1**	**0.2%**
Small mammal	2	3.4%	46	22.5%	13	11.5%	4	10.8%	**65**	**15.8%**
Medium mammal	1	1.7%	–	–	–	–	–	–	**1**	**0.2%**
Medium–large mammal	3	5.2%	3	1.5%	6	5.3%	–	–	**12**	**2.9%**
Large mammal	1	1.7%	2	1.0%	–	–	2	5.4%	**5**	**1.2%**
Gunnison's prairie dog	6	10.3%	47	23.0%	15	13.3%	3	8.1%	**71**	**17.2%**
Botta's pocket gopher	1	1.7%	2	1.0%	2	1.8%	2	5.4%	**7**	**1.7%**
Banner-tailed kangaroo rat	–	–	1	0.5%	–	–	–	–	**1**	**0.2%**
Permyscus sp.	1	1.7%	–	–	1	0.9%	3	8.1%	**5**	**1.2%**
Woodrats	–	–	–	–	–	–	1	2.7%	**1**	**0.2%**
Bushy-tailed woodrat	1	1.7%	–	–	–	–	–	–	**1**	**0.2%**
Small rodent	–	–	4	2.0%	–	–	–	–	**4**	**1.0%**
Medium–large rodent	–	–	2	1.0%	–	–	2	5.4%	**4**	**1.0%**
Desert cottontail	15	25.9%	55	27.0%	23	20.4%	10	27.0%	**103**	**25.0%**
Black-tailed jack rabbit	10	17.2%	25	12.3%	15	13.3%	2	5.4%	**52**	**12.6%**
Dog, coyote, wolf	–	–	2	1.0%	2	1.8%	–	–	**4**	**1.0%**
Dog	3	5.2%	–	–	1	0.9%	–	–	**4**	**1.0%**
Bobcat	–	–	1	0.5%	–	–	–	–	**1**	**0.2%**
Medium artiodactyl	5	8.6%	3	1.5%	1	0.9%	3	8.1%	**12**	**2.9%**
Medium–large artiodactyl	3	5.2%	8	3.9%	1	0.9%	–	–	**12**	**2.9%**
Elk	1	1.7%	1	0.5%	12	10.6%	–	–	**14**	**3.4%**
Pronghorn	1	1.7%	–	–	1	0.9%	1	2.7%	**3**	**0.7%**
Medium–large/ large bird	4	6.9%	–	–	–	–	–	–	**4**	**1.0%**
Eggshell	–	–	–	–	18	15.9%	3	8.1%	**21**	**5.1%**
Hawks and harriers	–	–	1	0.5%	–	–	–	–	**1**	**0.2%**
Nonvenomous snakes	–	–	–	–	1	0.9%	1	2.7%	**2**	**0.5%**
Total	**58**	**100.0%**	**204**	**100.0%**	**113**	**100.0%**	**37**	**100.0%**	**412**	**100.0%**
Age										
Not applicable/ eggshell	–	–	–	–	18	15.9%	3	8.1%	**21**	**5.1%**
Fetal, neonate	1	1.7%	1	0.5%	–	–	–	–	**2**	**0.5%**
Immature (1/2–2/3 grown)	–	–	6	2.9%	2	1.8%	1	2.7%	**9**	**2.2%**
Juvenile (2/3+ grown)	7	12.1%	12	5.9%	6	5.3%	16	43.2%	**41**	**10.0%**
Mature	50	86.2%	185	90.7%	87	77.0%	17	45.9%	**339**	**82.3%**
Completeness										
Complete	3	5.2%	22	10.8%	2	1.8%	8	21.6%	**35**	**8.5%**
>75% complete	7	12.1%	23	11.3%	9	8.0%	–	–	**39**	**9.5%**
50-75% complete	11	19.0%	25	12.3%	16	14.2%	2	5.4%	**54**	**13.1%**
25-50% complete	8	13.8%	14	6.9%	6	5.3%	2	5.4%	**30**	**7.3%**
<25% complete	29	50.0%	120	58.8%	80	70.8%	25	67.6%	**254**	**61.7%**
Burning										
Unburned	53	91.4%	153	75.0%	104	92.0%	37	100.0%	**347**	**84.2%**
Light or scorched	1	1.7%	10	4.9%	1	0.9%	–	–	**12**	**2.9%**

(Table 13.9, continued)

	Main Chamber Fill		Main Chamber Roof and Floor		Antechamber Fill		Antechamber Floor		Total	
	Count	Col. %	Count	Col. %	Count	Col. %	Count	Col. %	Count	Col. %
Light to heavy	1	1.7%	2	1.0%	6	5.3%	–	–	**9**	**2.2%**
Dry burn	–	–	26	12.7%	–	–	–	–	**26**	**6.3%**
Heavy or charred	2	3.4%	7	3.4%	1	0.9%	–	–	**10**	**2.4%**
Heavy to calcined	1	1.7%	2	1.0%	–	–	–	–	**3**	**0.7%**
Calcined	–	–	4	2.0%	1	0.9%	–	–	**5**	**1.2%**
Modification										
Manufacturing debris - split	–	–	–	–	1	25.0%	–	–	**1**	**5.3%**
Tool - piercing	6	85.7%	1	14.3%	1	25.0%	1	100.0%	**9**	**47.4%**
Bead or tube	–	–	–	–	1	25.0%	–	–	**1**	**5.3%**
Tool - scraper/ spatulate	–	–	1	14.3%	–	–	–	–	**1**	**5.3%**
Other tool	–	–	1	14.3%	–	–	–	–	**1**	**5.3%**
Tool	1	14.3%	–	–	1	25.0%	–	–	**2**	**10.5%**
Tinkler	–	–	4	57.1%	–	–	–	–	**4**	**21.1%**

Little of the hearth bone was burned (29.6 percent) and includes roasted and heavily burned small mammal (n = 3 each), roasted and heavily burned prairie dog (n = 2 each), roasted pocket gopher (n = 1), heavily burned rodent (n = 1), and heavily burned cottontail (n = 2) bone. Body parts are largely waste parts. For prairie dogs, these include cranial, thorax, and a metapodial; for cottontails, these are a mandible, thorax, and a femur fragment. The only jackrabbit is a femur part.

Bone tools and objects of bone were fairly common in this structure. Several awls and mat weaving tools were recovered from the fill, a tinkler from the roof fall, an awl, a spatulate tool, and two tinklers from the floor fill. Fill of the antechamber produced a split metapodial preform, a fragment of a tool, an awl, and a bead. A pot (Feature 112) on or near the floor contained a fine-point awl and three coarse-point awls (see tool discussion below).

Structure 2. Much of the Structure 2 fauna (Table 13.10) was from the general fill and one of the floor features. Prairie dogs and cottontail rabbits comprise much of the assemblage (79.3 percent) with very few artiodactyl bones. This and the presence of eggshell are reminiscent of the Structure 1 main chamber assemblage.

Proportions of prairie dog were particularly high in the fill and in Feature 81. In the feature, at least four prairie dogs, one or two cottontails, a jackrabbit, two species of mice, a dog, a medium artiodactyl, and a deer (the awl FS 805) are represented. Bones from immature (n = 12) and juvenile prairie dogs (n = 3), juvenile cottontails (n = 3), and a jackrabbit suggest more than one season of deposition beginning during the summer months. The only burned bone from this feature is a small piece of rodent flat bone. Potential processing was noted on several specimens: two cottontail femur fragments have spiral breaks; a dog metatarsal had a portion of the distal end cut off, and a medium artiodactyl rib shaft had oblique cuts. As an assemblage, the fill of this feature probably could represent more than just the results of disposal events. Some material such as an awl with the tip missing and a canine tooth and metatarsal from a dog may have been deliberately left behind; the mouse parts (both mandibles) could represent post-occupational burrowers; and much of the rest of the assemblage could represent disposal and natural filling.

Feature 83 contained only eggshell and Feature 89 contained only cottontail bones. Nearly all of the cottontail (at least 15 and as many as 17) specimens are from the same rear foot, beginning at the distal tibia and continuing through the first or second phalanges. One of the exceptions, a cottontail innominate, had a carnivore tooth puncture.

Table 13.10. LA 104106, Structure 2, faunal data.

	Level				Surface or Floor						Total	
	General Fill		Feature 94 Pit		Feature 81 Pit		Feature 83 Storage Facility		Feature 89 Posthole		Total	
	Count	Col. %	Count	Col. %	Count	Col. %	Count	Col. %	Count	Col. %	Count	Col. %
Taxon												
Small mammal/ medium–large bird	3	10.7%	–	–	–	–	–	–	–	–	**3**	**2.8%**
Small mammal	–	–	–	–	5	8.6%	–	–	–	–	**5**	**4.7%**
Medium–large mammal	1	3.6%	–	–	1	1.7%	–	–	–	–	**2**	**1.9%**
Gunnison's prairie dog	6	21.4%	1	100.0%	35	60.3%	–	–	–	–	**42**	**39.6%**
Botta's pocket gopher	–	–	–	–	1	1.7%	–	–	–	–	**1**	**0.9%**
Banner-tailed kangaroo rat	3	10.7%	–	–	–	–	–	–	–	–	**3**	**2.8%**
Permyscus sp.	–	–	–	–	1	1.7%	–	–	–	–	**1**	**0.9%**
Medium–large rodent	1	3.6%	–	–	2	3.4%	–	–	–	–	**3**	**2.8%**
Desert cottontail	2	7.1%	–	–	8	13.8%	–	–	18	100.0%	**28**	**26.4%**
Black-tailed jack rabbit	3	10.7%	–	–	1	1.7%	–	–	–	–	**4**	**3.8%**
Dog, coyote, wolf	1	3.6%	–	–	–	–	–	–	–	–	**1**	**0.9%**
Dog	2	7.1%	–	–	2	3.4%	–	–	–	–	**4**	**3.8%**
Medium artiodactyl	–	–	–	–	1	1.7%	–	–	–	–	**1**	**0.9%**
Elk	1	3.6%	–	–	–	–	–	–	–	–	**1**	**0.9%**
Mule deer	1	3.6%	–	–	1	1.7%	–	–	–	–	**2**	**1.9%**
Very large bird	4	14.3%	–	–	–	–	–	–	–	–	**4**	**3.8%**
Eggshell	–	–	–	–	–	–	1	100.0%	–	–	**1**	**0.9%**
Total	**28**	**100.0%**	**1**	**100.0%**	**58**	**100.0%**	**1**	**100.0%**	**18**	**100.0%**	**106**	**100.0%**
Age												
Not applicable/eggshell	–	–	–	–	–	–	1	100.0%	–	–	**1**	**0.9%**
Immature (1/2–2/3 grown)	–	–	–	–	13	22.4%	–	–	–	–	**13**	**12.3%**
Juvenile (2/3+ grown)	2	7.1%	–	–	7	12.1%	–	–	–	–	**9**	**8.5%**
Mature	26	92.9%	1	100.0%	38	65.5%	–	–	18	100.0%	**83**	**78.3%**
Completeness												
Complete	1	3.6%	–	–	3	5.2%	–	–	16	88.9%	**20**	**18.9%**
>75% complete	2	7.1%	–	–	5	8.6%	–	–	–	–	**7**	**6.6%**
50–75% complete	6	21.4%	–	–	11	19.0%	–	–	–	–	**17**	**16.0%**
25–50% complete	4	14.3%	–	–	10	17.2%	–	–	1	5.6%	**15**	**14.2%**
<25% complete	15	53.6%	1	100.0%	29	50.0%	1	100.0%	1	5.6%	**47**	**44.3%**
Burning												
Unburned	26	92.9%	1	100.0%	57	98.3%	1	100.0%	18	100.0%	**103**	**97.2%**
Dry burn	1	3.6%	–	–	–	–	–	–	–	–	**1**	**0.9%**
Heavy or charred	1	3.6%	–	–	1	1.7%	–	–	–	–	**2**	**1.9%**
Modification												
Tool - piercing	–	–	–	–	1	100.0%	–	–	–	–	**1**	**100.0%**

Structure 3. The small sample of bone from Structure 3 was from general fill (see Table 13.8). Like Structures 1 and 2, the relatively high proportions of cottontail and prairie dog bone and the higher proportion of artiodactyl and potential artiodactyl bone are consistent with proportions found in the fill of Structure 1 (main chamber and antechamber). None of the specimens were from immature animals but a juvenile cottontail tibia suggests summer or fall procurement. The evidence for burning was found on a lightly burned flat bone from a medium to large mammal, a heavily burned cottontail ilium, and a roasted cottontail tibia. The elk specimen, a rib fragment, had an impact break. Carnivore gnawing or punctures were noted on a medium to large mammal long bone and a prairie dog humerus, and a cottontail humerus is rounded as in scat with a tooth puncture, indicating some of the bone from this structure was deposited by carnivores.

Structure 5. The only bone from this structure is a fairly complete mandible from a pocket gopher. Since this is one of the larger bones for this species, this is most likely the remains of a post-occupational burrower and any other bones could have been lost through 1/4-inch screens.

Structure 6. The small sample of bone recovered from Structure 6 (see Table 13.8) was all from fill. Other than the large proportion of turkey and potential turkey remains, there is little of note in this assemblage. One of the turkey specimens had an abrasion on the shaft that could result from processing. The juvenile elements are small and small to medium mammal long bone shaft fragments. Carnivore gnawing is present on a large mammal flat bone fragment, and a small to medium mammal long bone fragment, a jackrabbit humerus, and a dog astragalus all look as though they could be scat.

Structure 7. More of the assemblage from this structure was from the fill than the floor (Table 13.11). The sample size is small and it is somewhat different from those of the other structures. It had the highest proportion of rodents and dog as well as essentially equivalent numbers of prairie dog, cottontail, and jackrabbit bones. Immature prairie dog and juvenile cottontail specimens suggest some deposition in early to mid summer. Burned specimens are a rodent caudal vertebra and fragment of a cottontail ilium. A single specimen, a dog innominate, had carnivore gnaws and punctures. Out of the ordinary finds for this structure include a dog cranium and mandibles, a jackrabbit tinkler, and fragment of an antler tool.

Study Unit 2, extramural area. A fairly small sample of bone (n = 204) was recovered from excavations in this area that had features dating from the Basketmaker II and Navajo periods along with later Pueblo ceramics. For discussion, and to try to isolate the two major components, this area was divided into four quadrants of unequal sizes, east–west along the 22N and north–south along the 99E. This division (Table 13.12) results in few bones in the southwest (n = 6) and southeast (n = 15) quadrants. The sheep/goat, badger, and mountain lion were all from the northwest quadrant and the pronghorn from the northeast (Fig. 13.1). Few SU 1 features contained bone (Table 13.13).

Much of the northwest sample was probably from the Navajo component. In this quadrant, the sample was largely (77.2 percent) from the first level of fill with only two pieces of bone (prairie dog and deer) recovered from the numerous features. Intensive surface collection accounts for a small number (n = 3) as does a second excavation level (14.0 percent). The six grids (22–24N/93–95E) with a concentration of Dinetah Gray, the sheep/goat remains and mountain lion bones, produced much of the sample from this quadrant (61.4 percent). No taxon was unique to the lower fill levels a smaller proportion of burned bone (70.5 percent) was recovered from this context (87.5 percent). Burning was almost equally divided between light and graded roasting-like burns, dry burns, and heavily charred discard burns. Taxa with burning include medium to large mammal (n = 3), large mammal (n = 2), badger (n = 2), small to medium artiodactyl (n = 3), and sheep/goat (n = 5). A small number of bones have characteristics of processing, a prairie dog humerus with a spiral break, a mountain lion metatarsal and a deer innominate with portions cut off, and a flake of bone from a large mammal. Two pieces of bone from possible scat were recovered from modern sediment. Nearly all of the bone is environmentally altered in some manner (87.7 percent), including those mainly pitted from soil conditions (40.4 percent) or checked from exposure (36.8 percent) but also including some that were sun bleached (7.0 percent) and root etched (3.5 percent).

The northeast had the largest sample of bone, much (94.5 percent) of which was concentrated east

Table 13.11. LA 104106, Structure 7, faunal data.

	Fill		Floor		Total	
	Count	Col. %	Count	Col. %	Count	Col. %
Taxon						
Small mammal	3	9.7%	2	18.2%	**5**	**11.1%**
Medium–large mammal	1	3.2%	1	9.1%	**2**	**4.4%**
Gunnison's prairie dog	3	9.7%	2	18.2%	**5**	**11.1%**
Mexican woodrat	1	3.2%	–	–	**1**	**2.2%**
Small rodent	1	3.2%	–	–	**1**	**2.2%**
Medium–large rodent	–	–	6	54.5%	**6**	**13.3%**
Desert cottontail	5	16.1%	–	–	**5**	**11.1%**
Black-tailed jack rabbit	6	19.4%	–	–	**6**	**13.3%**
Dog	3	9.7%	–	–	**6**	**13.3%**
Medium–large artiodactyl	2	6.5%	–	–	**2**	**4.4%**
Deer or elk	3	9.7%	–	–	**3**	**6.7%**
Eggshell	2	6.5%	–	–	**2**	**4.4%**
Turkey	1	3.2%	–	–	**1**	**2.2%**
Total	**31**	**100.0%**	**11**	**100.0%**	**45**	**100.0%**
Age						
Eggshell	2	6.5%	–	–	**2**	**4.4%**
Immature (1/2–2/3 grown)	1	3.2%	5	45.5%	**6**	**13.3%**
Juvenile (2/3+ grown)	4	12.9%	1	9.1%	**5**	**11.1%**
Mature	24	77.4%	5	45.5%	**32**	**71.1%**
Element Completeness						
Complete	4	12.9%	1	9.1%	**5**	**11.1%**
>75% complete	–	–	–	–	**2**	**4.4%**
50–75% complete	3	9.7%	–	–	**4**	**8.9%**
25–50% complete	4	12.9%	–	–	**4**	**8.9%**
<25% complete	20	64.5%	10	90.9%	**30**	**66.7%**
Burning						
Unburned	29	93.5%	11	100.0%	**43**	**95.6%**
Heavy or charred	2	6.5%	–	–	**2**	**4.4%**
Collection Method						
Nonintensive, shoveled	2	6.5%	–	–	**2**	**4.4%**
Screened (1/4")	29	93.5%	–	–	**29**	**64.4%**
Screened (1/8")	–	–	11	100.0%	**14**	**31.1%**

and southeast of Feature 39 (see Fig. 8.66), in an area containing a concentration of Lino Gray, Indented corrugated, and historic polished red ceramics (see Fig. 8.62). Most of this sample was recovered from three arbitrary levels of sediment (Level 1, 31.7 percent; Level 2, 36.5 percent; and Level 3, 4.8 percent). In addition, a portion of this sample was recovered from the modern ground surface (13.5 percent) and Feature 39 (13.5 percent). Prairie dog (seven of eight), deer (seven of eight), and pronghorn (two of three) specimens were from the feature and lower two levels of fill. Small animals were rare either because they were not preserved or because few were utilized during this occupation of the site. A burned browse pad from a probable near-term deer suggests some deposition in the second level of fill took place in late spring. A vast majority of bone were small (93.7 percent were less than a quarter of the element) and burned (87.3 percent) bone. Burning is mainly of the discard varieties (blackened and calcined) with little indication of roasting (light or light to heavy burns). All sizes of taxa contributed to the small number of unburned bones, including an immature prairie dog femur and the only dog

Table 13.12. LA 104106, Study Unit 2, fauna broken down by quadrant.

	Northwest		Southwest		Northeast		Southeast		Total	
	Count	Col. %	Count	Col. %	Count	Col. %	Count	Col. %	Count	Col. %
Taxon										
Small mammal	1	1.8%	–	–	5	4.0%	–	–	**6**	**2.9%**
Small–medium mammal	4	7.0%	–	–	5	4.0%	–	–	**9**	**4.4%**
Medium–large mammal	18	31.6%	1	16.7%	18	14.3%	10	66.7%	**47**	**23.0%**
Large mammal	3	5.3%	1	16.7%	3	2.4%	–	–	**7**	**3.4%**
Gunnison's prairie dog	7	12.3%	–	–	8	6.3%	1	6.7%	**16**	**7.8%**
Medium–large rodent	–	–	–	–	2	1.6%	–	–	**2**	**1.0%**
Medium carnivore	–	–	–	–	1	0.8%	–	–	**1**	**0.5%**
Large carnivore	–	–	–	–	1	0.8%	–	–	**1**	**0.5%**
Dog, coyote, wolf	–	–	1	16.7%	–	–	–	–	**1**	**0.5%**
Dog	1	1.8%	–	–	1	0.8%	–	–	**2**	**1.0%**
Badger	3	5.3%	–	–	–	–	–	–	**3**	**1.5%**
Mountain lion	4	7.0%	–	–	–	–	–	–	**4**	**2.0%**
Small–medium artiodactyl	7	12.3%	–	–	67	53.2%	4	26.7%	**78**	**38.2%**
Medium–large artiodactyl	–	–	3	50.0%	4	3.2%	–	–	**7**	**3.4%**
Mule deer	2	3.5%	–	–	8	6.3%	–	–	**10**	**4.9%**
Pronghorn	–	–	–	–	3	2.4%	–	–	**3**	**1.5%**
Domestic sheep or goat	7	12.3%	–	–	–	–	–	–	**7**	**3.4%**
Total	**57**	**100.0%**	**6**	**100.0%**	**126**	**100.0%**	**15**	**100.0%**	**204**	**100.0%**
Age										
Fetal, neonate	1	1.8%	–	–	1	0.8%	–	–	**2**	**1.0%**
Immature (1/2–2/3 grown)	–	–	–	–	2	1.6%	–	–	**2**	**1.0%**
Juvenile (2/3+ grown)	5	8.8%	–	–	13	10.3%	1	6.7%	**19**	**9.3%**
Mature	51	89.5%	6	100.0%	110	87.3%	14	93.3%	**181**	**88.7%**
Element Completeness										
Complete	4	7.0%	–	–	–	–	–	–	**4**	**2.0%**
>75% complete	3	5.3%	–	–	–	–	–	–	**3**	**1.5%**
50–75% complete	5	8.8%	–	–	6	4.8%	1	6.7%	**12**	**5.9%**
25–50% complete	6	10.5%	–	–	2	1.6%	–	–	**8**	**3.9%**
<25% complete	39	68.4%	6	100.0%	118	93.7%	14	93.3%	**177**	**86.8%**
Burning										
Unburned	42	73.7%	6	100.0%	16	12.7%	14	93.3%	**78**	**38.2%**
Light or scorched	1	1.8%	–	–	10	7.9%	–	–	**11**	**5.4%**
Light to heavy	3	5.3%	–	–	6	4.8%	–	–	**9**	**4.4%**
Dry burn	4	7.0%	–	–	30	23.8%	1	6.7%	**35**	**17.2%**
Heavy or charred	7	12.3%	–	–	50	39.7%	–	–	**57**	**27.9%**
Heavy to calcined	–	–	–	–	4	3.2%	–	–	**4**	**2.0%**
Calcined	–	–	–	–	10	7.9%	–	–	**10**	**4.9%**
Collection Method										
Intensive surface collection	3	5.3%	1	16.7%	17	13.5%	3	20.0%	**24**	**11.8%**
Screened (1/4")	52	91.2%	5	83.3%	90	71.4%	11	73.3%	**158**	**77.5%**
Screened (1/8")	2	3.5%	–	–	19	15.1%	1	6.7%	**22**	**10.8%**

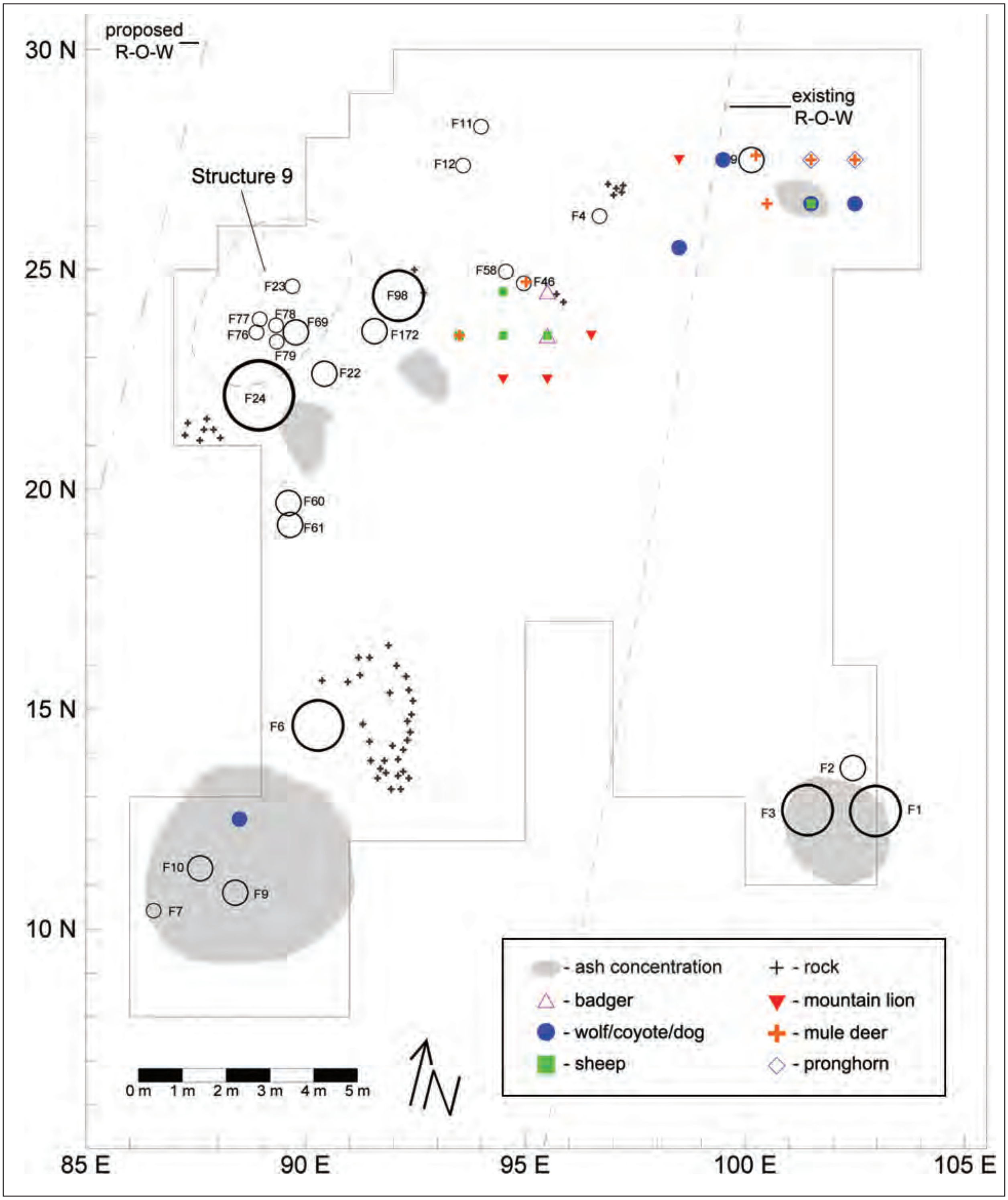


Figure 13.1. LA 104106, Study Unit 2, plan view, distribution of identifiable faunal species.

Table 13.13. LA 104106, Study Unit 2, fauna by feature number.

	Northwest		Northeast				Southeast	
	Feature 24		Feature 46		Feature 39		Feature 2	
	Count	Col. %	Count	Col. %	Count	Col. %	Count	Col. %
Taxon								
Small mammal	–	–	–	–	5	29.4%	–	–
Small–medium mammal	–	–	–	–	3	17.6%	–	–
Medium–large mammal	–	–	–	–	1	5.9%	–	–
Gunnison's prairie dog	1	100.0%	–	–	1	5.9%	1	100.0%
Medium–large rodent	–	–	–	–	2	11.8%	–	–
Small–medium artiodactyl	–	–	–	–	3	17.6%	–	–
Mule deer	–	–	1	100.0%	2	11.8%	–	–
Total	**1**	**100.0%**	**1**	**100.0%**	**17**	**100.0%**	**1**	**100.0%**
Age								
Immature (1/2–2/3 grown)	–	–	–	–	1	5.9%	–	–
Juvenile (2/3+ grown)	1	100.0%	–	–	2	11.8%	–	–
Mature	–	–	1	100.0%	14	82.4%	1	100.0%
Element Completeness								
>75% complete	1	100.0%	–	–	–	–	–	–
50–75% complete	–	–	–	–	1	5.9%	–	–
<25% complete	–	–	1	100.0%	16	94.1%	1	100.0%
Burning								
Unburned	1	100.0%	1	100.0%	4	23.5%	1	100.0%
Light or scorched	–	–	–	–	2	11.8%	–	–
Light to heavy	–	–	–	–	2	11.8%	–	–
Heavy or charred	–	–	–	–	7	41.2%	–	–
Calcined	–	–	–	–	2	11.8%	–	–

specimen from this quadrant, suggesting that one or both could have been post-occupational additions to the site. Potential processing was all observed on large forms and limited to spiral breaks on a medium to large mammal long bone, a small to medium artiodactyl long bone, two mule deer metatarsals, and impact breaks on small to medium artiodactyl long bones (n = 2) and a deer metatarsal. The only evidence of carnivore activity was on species recovered from the modern ground surface. Even though much of the bone was burned, several were also pitted (25.4 percent), root etched (16.7 percent), sun bleached (1.6 percent), or checked from exposure (3.2 percent).

The small samples from the southwest and southeast part of the site produced little of note. Those from the southwest were scattered over five grids and only one had more than a single specimen. Bone in the southeast was largely from two grids, 16N /00E (n = 4) and 17N/99E (n = 6), in a featureless area with a concentration of lithic debitage and Lino gray ceramics. Bone from this quadrant is all indeterminate, probably artiodactyl and a prairie dog tooth from Feature 2. Only one was burned and no processing was observed. Two pieces could be scat.

LA 116035

The assemblage from this site consists of a single FS with two pieces of eggshell and a small mammal bone from Level 4 in Grid 88N/104E. The bone was burned. Little can be deduced from this sample, however the eggshell, if not roadside debris, suggests the deposits are Basketmaker III or later based on the ceramic assemblages recovered at this site.

Early Basketmaker Subsistence

Basketmaker II occupations are characterized by shallow pit structures, storage pits, and a heavy reliance on corn horticulture but also by nonhabitation sites that reflect hunting or gathering activities (Fuller 1988:347–349; Gilpin 1994:205). In the southern Chuska Valley, site types range from camps to habitation sites as well as storage sites (Blinman 1997a:5). Unfortunately, well-quantified samples of bone are fairly rare. A brief review of the literature produced sufficient data from only three projects.

The Basketmaker II assemblage from LA 32964, SU 1 was compared to the Basketmaker II assemblage from the NSEP, ENRON, and Navajo Indian Irrigation Project (NIIP). The following numbers (Table 13.14) are not exact and should be considered only rough estimation of faunal assemblages at these sites since a considerable amount of interpretation was necessary to group the indeterminate categories. Only the very small mammal and small mammal taxa were presented separately from the general unidentified taxon in the ENRON data (K. Brown and Brown 1994b).

The LA 32964 and nearby NSEP assemblages were similar in the unusually large proportions of prairie dog, the lack of rabbits and identified artiodactyls, and in the high proportions of unidentifiable bones and burning. LA 32964 had a larger proportion of large mammal/artiodactyl, but these may have been placed in one of the other indeterminate taxa in the NSEP analysis. The low number of rabbits in the LA 32964 and NSEP assemblages contrasts with the ENRON and NIIP fauna assemblages where rabbits were much more common, approaching the proportions and lagomorph indices found in later Basketmaker III residential sites. This contrast may reflect differences in site function since habitation sites were excavated on the ENRON and NIIP projects and camp sites identified at LA 32964 and during the NSEP. Alternatively, it may be that the occupants at the former two sites were far less mobile and more devoted to raising corn.

Table 13.14. Comparative faunal data for Basketmaker II sites.

Project	Twin Lakes[1]			NSEP[2]			ENRON[3]	NIIP[4]
Area	Chuska Valley			Chuska Valley			Chuska Valley	Block IX
Site	LA 32964	LA 104106	LA 6444	LA 6448	LA 80419	LA 80434	423-158	H-26-56
Dates	750 BC–AD 400						900 BC–AD 100	425 BC–AD 460
Sample size	390	126	607	5457	14680	501	6333	4159
% small mammal	79.7	14.3	54.2	15.3	42.7	77	44.5+	97.6
% rodent	2.8	7.9	7.9	3.6	1.5	1	4.6+	0.1
% medium mammal	–	2.4	–	0.2	45.8	0.2	.1+	1.2
% large mammal/ artiodactyl	15.9	67.5	0.3	0.2	trace	0.2	trace+	0.3
% bird	–	–	1.5	0.3	1	–	.1+	0.3
% unidentifiable	80.5	24.7	93.2	92.7	94.1	92.2	53.4	65.8
% cottontail	5.1	–	–	0.1	1.6	1.6	31	19.3
% jackrabbit	4.3	–	–	–	1.8	1	10	13.6
% prairie dog/ large squirrel	4.1	6.3	4.3	4.4	0.1	2.6	0.7	0.1
% deer	–	6.3	–	–	–	–	trace	trace
% pronghorn	–	2.4	–	–	–	–	–	trace
Lagomorph index	0.54	–	–	1	0.47	0.61	0.75	0.59
Artiodactyl index	0.35	1	1	0.67	0	0.07	.01*	0.01
% burned	59	87.3	46.1	1.6	53.6	35.3	27.5	9.2

[1]This report; [2]Rippel and Walth (1999:14-99-100, 14-79-81); [3]Brown and Brown (1994b:142–145); [4]Henderson (1983:391); *Brown and Brown (1994b:351)

What is unequivocal is that the LA 104106, SU 2 assemblage does not resemble any other site in this sample. It is the only site with appreciable amounts of large mammal/artiodactyl bone and very little small mammal bone. If the assemblage is indeed Basketmaker II, it could be a different kind of site, such as a camp associated with hunting or large game processing as opposed to an agricultural or gathering site. Alternatively the difference may reflect subsistence behaviors from different temporal components.

The diversity in taxon seems to support the presence of at least a bi-part subsistence strategy during Basketmaker II. In such cases, more permanent residential sites are characterized by a higher dependence on local small mammals, especially cottontail rabbits, and have less evidence of artiodactyl exploitation. Whether these Basketmaker II sites represent seasonal farmsteads or year-round habitations cannot be resolved by the faunal analysis, but the evidence does suggest that at least part of the group remained at these sites during the growing season probably to tend fields. The lack of artiodactyl remains and focus on small mammals at residential sites can be interpreted in a number of ways. In general, groups that are sedentary exploit a wider variety of animals, depend more on smaller animals, and use more traps, ambush hunting, and logistical hunting than more mobile groups inhabiting the same area (Kent 1989:3; Speth and Scott 1989:76). The maintenance of even small field areas requires that some of the group remain close to these locations subsisting on local resources. As such, hunting would have been directed towards field predators and other nearby small mammals. Furthermore, when groups rely on garden hunting, hunters may travel considerable distances to exploit artiodactyls (Kent 1989:3; Speth and Scott 1989:76). Finding so little artiodactyl at these residential sites could reflect such a pattern of long distance hunting where few skeletal parts were returned to the residential base and those parts returned were mainly those that could be used to make tools. Alternatively, it could reflect the rate of hunting success or targeted environmental zones of the resident group.

Hunting small mammals is a low-risk strategy with a relatively high success rate accomplished with simple expedient technology, e.g., snares and traps, capture from burrows, and the use of stones and sticks. This kind of hunting is often done by women and children, especially when the commitment to agriculture is less intense and women do not have to spend as much time processing food as when the commitment is greater. On the other hand, large game hunting is a high risk strategy that involves a wider range and more specialized technology and is primarily a male activity (S. Nelson 1997:98; Reitz and Wing 1999:241; Szuter 1994:60, 2000:199–205, 220). Thus, sites with less substantial architecture could represent extraction sites aimed at obtaining and processing seasonally availably wild resources or exploiting productive agricultural locations. The overall lack of fauna usually associated with garden hunting makes the former possibility less likely. Relatively large samples of highly fragmented and burned bones from small mammals may suggest a pattern of repeated use of a location where bones were broken and boiled to extract the maximum amount of nutrition, then burned. The burning could have served to limit the attractiveness of the camp to scavengers. Concentrations of burned material including burned bone may have also provided a visual marker to identify previous camp locations or used to signal ownership to other similarly mobile groups.

When lagomorph (cottontail rabbit ÷ cottontail + jackrabbit) and artiodactyl (artiodactyl + large + medium to large ÷ artiodactyl + lagomorph) index data from Tables 13.14, 13.15, and 13.16 are graphed (Fig. 13.2), several of the Basketmaker II assemblages (LA 32964, LA 14680, LA 80419, LA 80434, 423–158, and H-26–56) suggest more of a focus on cottontail rabbits with respect to jackrabbits and relatively little use of artiodactyls, which is consistent with early horticulture. Low artiodactyl indices at these sites could signal seasonal use with the site residents focusing on growing and protecting crops from predators. LA 6448, with both very high lagomorph and artiodactyl indices could suggest a more permanent settlement that included long-distance hunting. The remaining two assemblages (LA 104106 and LA 6444) are more of what would be expected of camp sites of hunters focusing on large game.

Refinements in chronology and a larger sample of sites would certainly aid in defining subsistence behaviors during this early period. At present, these sites suggest a pattern where some sites were occupied during the growing season and procurement of protein centered around rabbits and other small

Table 13.15. Comparative faunal data for Basketmaker III sites.

Project	Twin Lakes[1]	Chaco[2]		ENRON[3]		NSEP[4]						NSEP[4]						
Area	Chuska Valley	Chaco Canyon		Upper Rio Puerco		Chuska Valley						Chuska Valley						
Site	LA 104106 Area 1	29 SJ 423	29 SJ 628	423–131	423–138	LA 2506	LA 80415	LA 80416	LA 80417	LA 80422	LA 80434	LA 2501	LA 2506	LA 2507	LA 80407	LA 80422	LA 80425	LA 11610
Date	AD 650–980	Early BM III	Late BM III	Late BM III–P I	BM III	Early BM III	Early BM III	Early BM III	Early BM III	Early BM III	Early BM III	Late BM III	Late BM III	Late BM III	Late BM III	Late BM III	Late BM III	Late BM III
Sample Size	**616**	**1381**	**3919**	**2117**	**1267**	**15510**	**50**	**345**	**58**	**28**	**41**	**1780**	**6220**	**1376**	**1085**	**6853**	**6098**	**508**
% small mammal	68.5	92.7	84.7	47.9	43.1	76.2	16	–	37.9	7.1	78	54.8	90.5	49.9	22.8	65.8	66.2	21.2
% rodent	6.5	.4+	1.2+	9.8	0.5	7	38	–	12	7.1	7.3	2.5	3.4	5.2	67.8	6.4	3.4	7.1
% medium mammal	4.1	.9+	1.7+	9.1	3.9	3.4	–	–	–	7.1	–	5.4	2	5.8	0.4	2	5.9	1.6
% large mammal/artio	13.1	6.3	6.4	1.4	0.8	1.8	26	100	3.4	7.1	–	3.3	1.9	8.3	0.4	1.7	4.9	13.4
% bird	3.1	0.2	3.1	3.5	0.2	5.3	6	–	12.1	3.6	–	11.3	1.3	1.2	4.9	2	11	0.4
% unidentifiable	19.3	57.6+	9.1+	34	54.8	70.6	64	–	86.2	92.9	75.6	62.6	76.5	83.3	73.7	42.9	78	89.8
% cottontail	23.7	36.1	41.8	29.8	3.9	10.9	–	–	1.7	–	12.2	6.6	9.5	4.3	0.8	16.5	4.3	3
% jackrabbit	10.4	4.3	35.9	4.4	30.1	3.3	4	–	–	–	4.9	6.7	7.5	4.5	0.1	7.7	2.8	1.8
% prairie dog/ large squirrel	20.1	0.4	3.4	9.8	2.5	1.9	–	–	–	–	–	3.3	0.8	2	1.3	20.1	0.9	3.3
% deer	0.3	–	0.1	0.8	–	0.6	26	–	–	–	–	–	trace	–	–	trace	0.9	–
% pronghorn	0.4	0.2	0.5	trace	–	0.1	–	–	–	–	–	0.1	–	0.8	–	trace	–	–
% bighorn	–	0.4	0.1	–	–	0.4	–	–	–	–	–	–	–	–	–	–	–	–
% elk	2.6	–	–	–	–	trace	–	–	–	–	–	–	–	–	–	–	–	–
Lagomorph index	0.69	0.89	0.54	0.87	0.11	0.77	0	–	1	–	0.71	0.5	0.56	0.49	0.9	0.68	0.69	0.62
Artiodactyl index	0.22	0.14	0.08	0.01	0.02	0.1	0.87	1	0.67	–	0	0.11	0.09	0.47	0.23	0.06	0.43	0.74
% burned	12	–	–	3.2?	–	20	38	100	32.8	32.1	21.9	11.4	21.7	21.8	10.1	2.7	7.5	–

BM = Basketmaker; P = Pueblo

[1]Twin Lakes, this report; [2] Akins 1985a and unpublished data; [3] Brown and Brown 1994b:217–218; 423–138: AU 14 and 15, B-34; [4] Rippel and Walth 1999:14–111,156

Table 13.16. Comparative data for early Navajo faunal assemblages.

Project	Twin Lakes[1]	NSEP[2]			Cortez CO_2[3]	La Plata Mine[4]	Navajo Reservoir[5]
Area	**Chuska Valley**	**Bloomfield/Largo**			**N of Huerfano**	**La Plata**	**Navajo Reservoir**
Site	**LA 104106**	**LA 80986**	**LA 80969**	**LA 80358**	**LA 38946**	**multiple?**	**LA 80854**
Date		**Dinetah**	**Dinetah**	**Dinetah**	**Dinetah**	**Dinetah?**	**Dinetah?**
Sample size	**57**	**844**	**105**	**521**	**65**	**336**	**907**
% small mammal	21	18.6	82.9	1.9	87.7	45.2	86.3
% rodent	–	4.4	–	1.1	–	0.9	7.4
% medium mammal	7	0.3	2.9	36.7	–	4.2	0.2
% large mammal/ artiodactyl	71.9	7.5	14.3	0.6	12.3	44.3	4
% bird	–	4.3	–	–	–	1.5	–
% unidentifiable	45.6	87.2	97.1	98.3	73.8	65.8	58.2
% cottontail	–	0.6	1.9	0.2	4.6	18.7	33.7
% jackrabbit	–	0.6	0.9	–	9.2	3.9	–
% prairie dog/large squirrel	12.3	–	–	–	–	–	–
% deer	3.5	6.5	–	0.9	–	–	0.7
% pronghorn	–	–	–	–	–	–	–
% sheep/goat	12.3	–	–	–	6.1 (surface)	–	–
% elk	–	–	–	–	–	–	–
Lagomorph index	–	1	0.67	1	0.33	0.83	1
Artiodactyl index	1	0.83	0.83	1	0.08	0.47	0.1
% burned	26.3	49.2	47.6	98.3	81.5	23.5	?

[1] this report; [2] Rippel and Walth 1999:14-229, 231; [3] Akins 1985b:255;
[4] Higgins and Acklen 1991:618–619; [5] Brown et al.1992:62

mammals. Subsistence practices at other nearby sites include repeated use for resource extraction, primarily plants and the taking of small mammals if encountered. The anomalous LA 104106 SU 2 assemblage could represent a rare hunting episode related to an early Navajo occupation.

Late Basketmaker Subsistence

Most researchers accept that Basketmaker III populations were fairly sedentary agriculturalists who built more substantial structures and were heavily dependent on corn agriculture. In the general area, Basketmaker III sites range from storage facilities with scattered artifacts to pithouse villages, at least one site with larger structures indicative of community or household integration. The nature of these settlements is not yet fully understood (Kearns 1995:171–173).

As with the Basketmaker II assemblage, the Twin Lakes Basketmaker III faunal assemblage was compared with data from other sites, primarily from the NSEP and an early and a late Basketmaker III assemblage from Chaco Canyon (Table 13.15). The LA 104106 sample only includes materials from structure fill. Even if the smaller structures are earlier, the bulk of the fauna is consistent with a Basketmaker III date or, at the very least, with a similar site function. An abundance of prairie dog, more cottontail than jackrabbit, and eggshell make the floor and floor features of Structure 2 and the Structure 3 sample quite similar to Structure 1. Structures 5, 6, and 7 produced little bone. The two Chaco Canyon

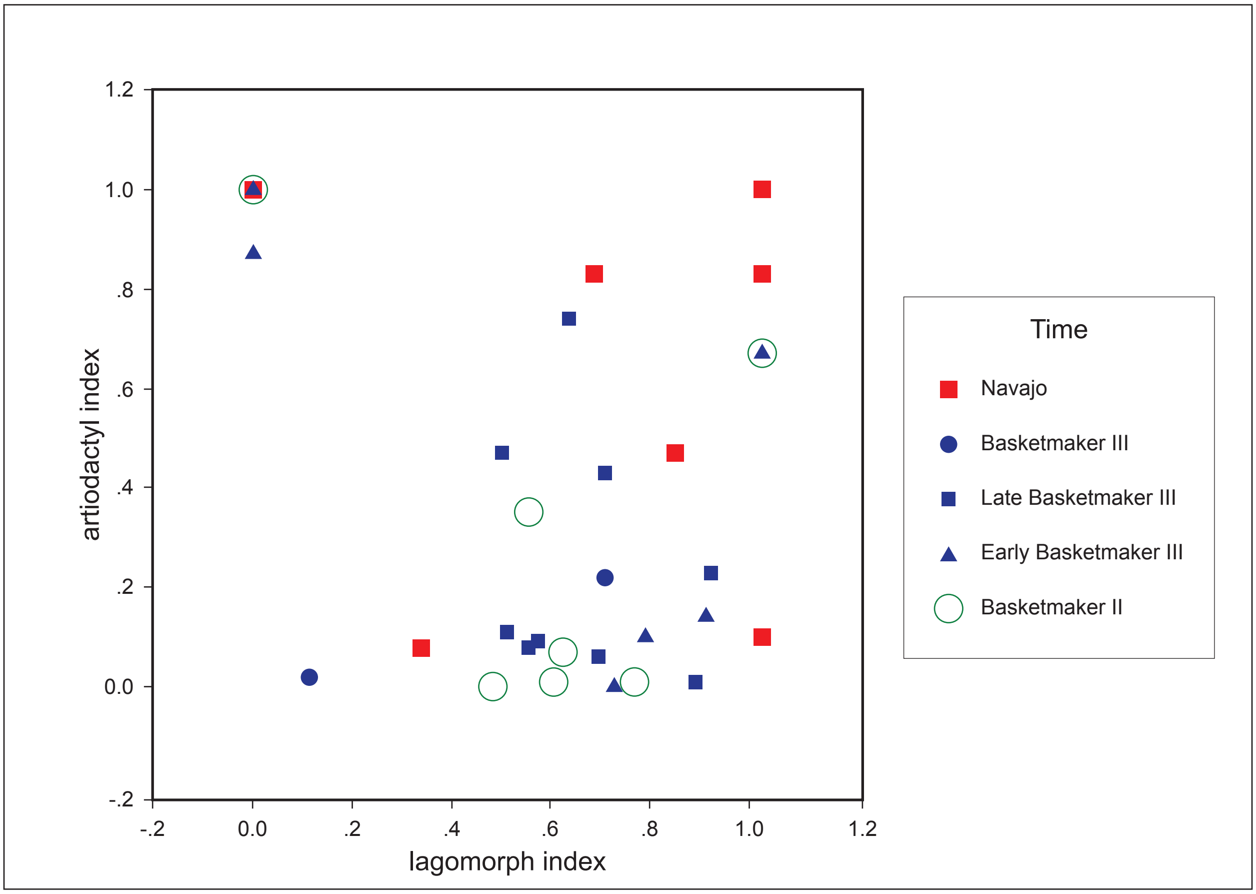


Figure 13.2. Scatter plot of indices of regional sites.

sites were excavated before screening became a standard practice so that the counts and ratios probably overemphasize the larger animals (jackrabbits and artiodactyls). Few Basketmaker III sites have appreciable amounts of artiodactyl, yet these assemblages show a great deal of diversity (Fig. 13.2), especially the early ones.

In sum, the Basketmaker III assemblages suggest a continuation in the range of site types from camp to habitation sites and a range of faunal subsistence options related to the degree of horticultural commitment. Hunting field pests or garden hunting appears to have been the more common strategy early in the period (e.g., 29SJ423, LA 2506, LA 80417, LA 80434) and in some of the later and undifferentiated Basketmaker assemblages (LA 104106, 423-131, LA 80407, LA 80422, LA 80425, LA 11610). The rise in jackrabbit use (e.g., 29SJ628, 423-138, LA 2501, LA 2506, LA 2507) could be the result of larger community size and an increase in the amount of communal hunting made possible by larger group sizes rather than a decrease in reliance on corn due to less favorable climatic conditions (e.g., Kearns et al. 2000:141). Large amounts of artiodactyl bone with little or none from rabbits (LA 80415, LA 80416, LA 11610) suggest seasonal camps of hunters focusing on large game. Those with a higher proportion of jackrabbit combined with considerable artiodactyl (LA 2057 and LA 80425) may indicate more permanent settlements that engaged in a good amount of logistic hunting of artiodactyls.

Early Historic Navajo Subsistence

Since the range of radiocarbon dates for the Navajo component at LA 104106 suggest either a Dinetah or Cabezon phase occupation, one goal of this analysis was to determine which was more probable given the fauna recovered. In a 1990 article, Reed and Horn (1990:292–293) proposed a number of attributes that could be used to distinguish Dinetah phase sites. In their view, settlements of this era should be comprised of one or a few substantial circular brush and earth structures, dating between about AD 1350 and 1700 and should be associated with Dinetah Gray ceramics with virtually no other types.

European trade goods and domestic animals should be absent with evidence of a hunting-and-gathering economy augmented by corn horticulture. Spatial organization should differ little from that found at later sites. Others (e.g., Reed and Reed 1996:86) describe the phase as characterized by brush structures, forked-pole hogans, or both along with light ceramic and lithic artifact scatters. Subsistence was hunting and gathering by mobile bands that used both the high and lowland areas of northwestern New Mexico. Groups appear to have been at least seasonally mobile with temporary camps of brush shelters or ramadas and extramural hearths representing summer residences and hogans winter camps (Kearns 1995:188).

Subsequent Gobernador phase (AD 1700–1775) sites show extensive Puebloan influence from refugees fleeing the Spanish reconquest. Habitation structures are more variable with the addition of masonry pueblitos, lean-tos, and ramadas. Ceramic wares are also more variable (Reed and Reed 1996:86–87). Excavations at a Chaco Canyon site with structures dating between 1740 and 1800, Brugge (1986:133–139) found evidence of farming in the form of granaries, and dwelling orientations suggesting construction during spring, summer, and fall. Trash was disposed of in ash heaps, abandoned structures, and scattered about the site. Bone distributions suggested that butchering was accomplished to the northeast of the structure and lithic waste material was deposited to the northeast and southeast. Pastoralism was important and sheep and goats were used for food and probably for hides, wool, and milk. Neither deer nor pronghorn bones were common and small animals were considered minor resources. The main European trade good was glass beads and possibly the metal knives and axes used at the site. Few chopping, cutting, and scraping tools were made of stone as though these had been largely replaced by metal tools. Piercing tools, such as arrow points and awls, were still made of stone and bone.

While in theory, early or Dinetah phase Navajos in the San Juan Basin could have obtained an occasional sheep or goat, it is unlikely that they raised livestock. As Bailey and Bailey note (1986:14), maintaining cattle, sheep, and goats requires a knowledge of animal husbandry and well-developed strategy to prevent depletion of the herd. Therefore, this aspect of their economy probably developed when the Pueblos, who had a knowledge of Spanish animal husbandry, joined the Navajos after the reconquest, i.e., during the Gobernador phase. In addition it has been argued that groups generally do not turn to pastoralism just to provide a protein source. They usually chose to do so for another product such as wool. The earliest dated reference to Navajo weaving is in 1706 (Carrillo 1992:324), supporting the idea that sheep and goats are a good indication that a site dates to the Gobernador phase.

The small sample of bone attributed to the Navajo occupation was compared with other early sites (Table 13.16). Surprisingly, all of the quantified data found was for the Dinetah phase, although the Navajo Reservoir area Gobernador phase site was interpreted as Gobernador in acculturation but dated prior to the Pueblo Revolt (G. Brown et al. 1992:i). Unquantified or small sample data suggests that domestic sheep/goat is common in Gobernador phase faunal assemblages. At the Doll House site in Chaco Canyon, where data are not quantified, sheep made up the majority of the bone with deer restricted to one locality and represented by far fewer specimens. Goats, horse, and pronghorn were found as well as a few small animals, including cottontail, jackrabbit, woodrat, and kangaroo rat. The age distribution for the sheep/goat indicates deliberate selection of one- to two-year-old animals for butchering (Gillespie 19886:173–175). Only 10 bones were recovered from the ENRON Gobernador phase Navajo site with a possible burned hogan. Four of the specimens are sheep/goat with one additional large ungulate and a large mammal. Half of the bones are burned including at least two that are sheep/goat (K. Brown and Brown 1994a:489–490).

No two of the quantified assemblages (Table 13.16) are substantially similar. Some of this may reflect the biseasonal residence pattern suggested for the Dinetah phase or the presence and proximity of agricultural fields. The Cortez CO_2 site with only a ramada and reliance on small mammal remains is interpreted as a summer residence that was probably adjacent to an agricultural plot (Marshall 1985:93). The only other site with this amount of small mammal bone was the Navajo Reservoir site that had a forked-stick hogan, interpreted as an upland year-round habitation whose residents practiced a generalized pattern of gathering, hunting, and farming (G. Brown et al. 1992:109).

Worked Bone

In all, 26 bone objects were analyzed from Twin Lakes, all from LA 104106, SU 1, and most dated to the late Basketmaker III period. Of these, 25 were collected and analyzed in the laboratory and 1 was drawn to scale in the field. The later object, a pendant made from an elk mandibular incisor, resembles a human tooth so it was sketched with no cleaning or photographs and buried within the site limit, but outside the construction zone. Much too large to be from a human and with the distinctive bevel and wear found on artiodactyl mandibular incisors, it also had the same kind of enamel root juncture found in cervids. Based on this morphology and the size, it is tentatively considered to be from an elk. Measurements and shape variables were estimates based on the scale drawing. This specimen was not included in the faunal data base.

The worked bone assemblage was analyzed following an established OAS recording format. In addition to provenience information, other attributes were recorded. These included taxon, element, side, element portion, tool condition, tool completeness, heat alteration, item or tool type, modification, shape, and cross-section of the proximal end, the shaft, and butt end. Additional modification such as drill holes, wear, and a variety of measurements when a dimension was complete were also recorded.

Tool types mostly follow Kidder's (1932:200–287) classification developed for the Pecos collection. Most are well-known forms and will not be described in detail. Fragmentary was used for fragments that are too incomplete to determine the tool type. Two types plus an indeterminate category are used for awls. The difference between a fine and a coarse-point awl is in the size of the tip. Coarse tips are larger and presumably used for enlarging punctures while fine-point awls were for puncturing. Objects called mat weaving tools are long, thin, and flat in cross-section with a drill hole at one end, and were presumably used in basket and mat construction. Spatulate tools have a convex end and were probably used for scraping a variety of materials. Tinklers are small mammal long bones, usually cottontail or jackrabbit tibias, that have the proximal end cut off and often ground. Distal ends are often but not invariably cut off and ground and sometimes have a hole drilled just above the end. Most believe the long tubes that result from this modification were used to make a noise, somewhat like a wind chime or the turtle shells used in modern Pueblo ceremonial gear.

None of the Twin Lakes specimens are in good condition. All are either heavily pitted or root etched so that very little information could be obtained on manufacture or wear. Additional pieces of worked bone may have been missed because of the poor surface condition. Many of those identified were done so on the basis of overall shape so that it is possible that some heavily pitted tool fragments may have gone undetected. Table 13.17 lists the objects by proveniences and Table 13.18 gives a summary of the complete measurements for most types.

Three objects were worked but too fragmentary to confidently assign a function. Two are end fragments and one was a midsection. A deliberately split pronghorn metacarpal with no further modification was coded as a preform.

Awls are the most common tool type (n = 12). Four have broken tips and could not be assigned to a subcategory. Most are made from artiodactyl bones but two are from jackrabbits. For the proximal or butt end, four have unmodified natural ends, one has minimal grinding, and two are well ground and shaped. The rest are missing the proximal end (Fig. 13.3). Shafts range from no modification (n = 3), to well shaped and polished (n = 2) with one that has minimal grinding and four with moderate shaping. Distal modification ranges from moderate polishing and grinding (n = 3), to well shaped and ground (n = 5), or completely modified (n = 1). One awl with no tip has a hole for suspension (Fig. 13.3). Most are far too eroded to discern use wear, although polish was still present on the tips of three fine-point awls and one each fine and coarse-point awl has polish and stria that could be from shaping or from wear.

The mat weaving tools are some of the more interesting artifacts. Often lumped with needles or

Table 13.17. LA 104106, bone tools recovered, listed by provenience.

Provenience	Tool Type	Portion	Condition	Common Name	Element	Element Fragment	Count
Structure 1 main chamber fill	awl with no tip	proximal	poor	large mammal	long bone	shaft fragment	1
				pronghorn	metacarpal	shaft fragment	1
	fine point awl	distal	poor	medium–large mammal	long bone	shaft fragment	1
		complete	poor	medium–large mammal	long bone	shaft fragment	1
			fair	medium artiodactyl	long bone	shaft fragment	1
	mat weaving tool	complete	fair	medium-large artiodactyl	rib	shaft fragment	2
Structure 1 main chamber roof and floor	awl with no tip	proximal	poor	black-tailed jack rabbit	ulna	proximal and 2/3 shaft	1
	spatulate	distal	poor	large mammal	long bone	shaft fragment	1
	tinkler	complete	poor	desert cottontail	tibia	shaft (2/3+)	1
			poor	black-tailed jack rabbit	tibia	distal and shaft	1
			fair	black-tailed jack rabbit	tibia	distal and shaft	1
Structure 1 hearth, Feature 167	mat weaving tool	complete	poor	large mammal	long bone	shaft fragment	1
Structure 1 antechamber fill	fragmentary tool	end	poor	small mammal	long bone	shaft fragment	1
	split metapodial preform	complete	poor	pronghorn	metacarpal	shaft split lengthwise	1
	fine point awl	distal	poor	black-tailed jack rabbit	radius	proximal shaft fragment	1
	bead/short tube	complete	fair	black-tailed jack rabbit	femur	shaft fragment	1
Structure 1 antechamber, Feature 112	fine point awl	complete	poor	pronghorn	metatarsal	shaft split - distal and lateral	1
	coarse point awl	proximal damaged	poor	medium artiodactyl	long bone	shaft fragment	1
		complete	poor	medium artiodactyl	long bone	shaft fragment	2
Structure 7 Feature 81	awl with no tip	proximal	poor	mule deer	metacarpal	shaft fragment	1
Structure 7 fill	fragmentary tool	end	poor	deer or elk	antler	shaft fragment	1
	tinkler	proximal	fair	black-tailed jack rabbit	tibia	shaft (2/3+)	1
	pendant	complete		elk(?)	mandible	incisor	1
Extramural Area 1, 86N 103E L.1	fragmentary	mid-section/ shaft	fair	small–medium mammal	long bone	shaft fragment	1

Table 13.18. LA 104106, measurements for selected tool types.

		Total Length (mm)	Functional Length (mm)	Proximal Width (mm)	Width at Midshaft (mm)	Distal Width (mm)	Tip Width (mm)	Proximal Thick-ness (mm)	Shaft Thick-ness (mm)	Distal Thick-ness (mm)
Awl - no tip	N	–	–	4	3	–	–	4	3	1
	Minimum	–	–	8.1	4.1	–	–	2.1	3.2	1.7
	Maximum	–	–	19.9	14.3	–	–	12.8	8.6	1.7
	Mean	–	–	13.78	8.23	–	–	6.83	5.03	1.7
	SD	–	–	5.36	5.37	–	–	4.62	3.09	–
Fine-point awl	N	3	5	3	5	5	4	3	5	5
	Minimum	43.8	13	5.5	5.4	5.3	0.7	3.2	3	2.8
	Maximum	83.3	33.8	20.4	14.1	13.1	1.2	13.1	7.6	7.8
	Mean	62.67	22.28	10.70	9.64	8.90	1.05	6.53	4.44	4.24
	SD	19.81	7.63	8.41	3.53	3.15	0.24	5.69	1.89	2.08
Coarse-point awl	N	2	2	2	3	3	2	2	3	3
	Minimum	100.5	28.8	17.5	10.2	8.4	2.4	1.8	4.9	3.9
	Maximum	108.2	41.8	27.2	17.7	15.5	4.8	4.9	7.1	6.6
	Mean	104.35	35.30	22.35	15.07	12.67	3.60	3.35	5.93	5.53
	SD	5.45	9.19	6.86	4.22	3.76	1.70	2.19	1.11	1.44
Mat weaving tool	N	3	3	3	3	3	3	3	3	3
	Minimum	107.1	2.2	2.3	5.7	4.9	1	1.5	1.2	0.9
	Maximum	160	3.4	8	7.9	6	2.3	2.9	2.7	2.7
	Mean	129.17	2.73	5.67	6.67	5.60	1.50	2.00	1.97	1.87
	SD	27.52	0.61	2.99	1.12	0.61	0.70	0.78	0.75	0.91
Spatulate	N	–	1	–	1	1	1	–	1	1
	Minimum	–	8.9	–	23.9	23.1	13.8	–	11.4	8.5
	Maximum	–	8.9	–	23.9	23.1	13.8	–	11.4	8.5
	Mean	–	8.9	–	23.9	23.1	13.8	–	11.4	8.5
	SD	–	–	–	–	–	–	–	–	–
Bead/short tube	N	1	1	1	1	1	1	1	1	1
	Minimum	12.2	12.2	8.9	9.1	9.4	9.4	7.5	7.2	7.1
	Maximum	12.2	12.2	8.9	9.1	9.4	9.4	7.5	7.2	7.1
	Mean	12.2	12.2	8.9	9.1	9.4	9.4	7.5	7.2	7.1
	SD	–	–	–	–	–	–	–	–	–
Tinkler	N	3	–	3	4	2	–	3	4	2
	Minimum	66.9	–	13.8	4.3	9.6	–	7.1	4.4	8
	Maximum	141.6	–	16.7	8.1	10.1	–	15.1	7.9	8.6
	Mean	116.00	–	15.27	6.60	9.85	–	12.07	6.63	8.30
	SD	42.54	–	1.45	1.75	0.35	–	4.34	1.55	0.42

SD = Standard Deviation

Figure 13.3. LA 104106, bone awls and mat weaving tools.

bodkins because of the holes at one end, these tools are long, flat in cross section, very thin, and fairly delicate with a somewhat pointed end that would be ideal for weaving mats (Fig. 13.3). They are extensively modified and manufactured from large mammal long bones or medium to large artiodactyl ribs. All three are complete and were found in Structure 1. Proximal ends are moderately (n = 1) to well shaped (n = 2) and their shafts and distal ends are all well shaped. All have polish wear. Similar tools were reported from the nearby site of LA 2507 (Griffitts 1999:10–53, 109). Similar objects dating from about the same time are more common in the Rio Grande area. Several were recovered from recent excavations at Developmental-period sites near Peña Blanca (Moga 2012:121–123). These are much better preserved and have the same very thin cross section and drilled ends. The distal or working ends are more blunt than those from Twin Lakes and all are highly polished and bleached from use with vegetal material.

A finely made spatulate object (Fig. 13.4) is missing an end (FS 328). The spatulate end is well polished and beveled. It is much more U-shaped in cross section than the more common humerus "scraper" and may have served a different purpose.

A single bone bead and the drilled elk tooth are the only bone ornaments found. The bead has minimal grinding on the ends or body and has no sign of wear from a suspension cord.

The tinklers (Fig. 13.5) include a matched (right and left) pair from the Structure 1 main chamber roof and floor fill (FS 257), the single cottontail tinkler from the same proveniences (FS 1058), and a single jackrabbit tinkler from the fill of Structure 7 (FS 310). The matched pair have the lateral corners of the distal ends cut off at an angle and ground. The distal end of the cottontail tinkler is cut off at a right angle and polished and that end is missing on the other jackrabbit tinkler. All have flat proximal ends that are ground. Only the matched pair exhibit a smoothed area where the fibula was removed. Tin-

Figure 13.4. LA 104106, spatulate bone tool.

klers recovered from the NSEP had either unmodified, notched, or completely removed distal ends. All were from jackrabbits (Griffitts 1999:10-8–10-9).

All and all, the Twin Lakes worked bone assemblage is consistent with others from the northern Southwest. Awls are the most common form and the cache found in a pot (Feature 112) in the antechamber (Fig. 13.6) suggests that a typical tool kit includes several awls ranging from fine to coarse points. These and the mat weaving tools indicate that sewing and weaving were common domestic activities in at least Structure 1. Structure 7 was the only other structure with an array of types and these include one that is a fragmentary end, a tinkler, and the elk's tooth pendant.

Figure 13.5. LA 104106, bone tinklers.

Figure 13.6. LA 104106, Feature 112, bone awls.

14 | Flotation and Macrobotanical Analysis

Pamela J. McBride and Mollie S. Toll

Flotation and macrobotanical samples were collected from three sites in west-central New Mexico near the modern town of Twin Lakes, approximately 20 km (12.4 miles) north of Gallup in McKinley County, New Mexico. LA 32964 is a limited-activity site with some of the earliest dated Basketmaker II features in the southern Chuska Valley. LA 104106 is a multicomponent site with contexts dating to the Basketmaker II, Basketmaker III, and the Cabezon phase of the Navajo period. Floral remains document a subsistence repertoire that remained in place throughout the occupation of the area. Corn, although markedly reduced in abundance during the Cabezon occupation, was a major element of the diet during all three occupations as well as a wide variety of weedy annuals, a few perennials, and at least two grasses.

The project area is in Great Basin desertscrub, at the interface between Great Basin conifer woodland and the Plains and Great Basin grassland (D. Brown 1994c). The dominant species in this biotic community are sagebrush (*Artemisia* sp.) and shadscale (*Atriplex confertifolia*). Winterfat (*Ceratoides lenata*), greasewood (*Sarcobatus vermiculatus*), and rabbitbrush (*Chrysothamnus*) may comprise a considerable percentage of shrubby vegetation as well. Species diversity is low and a single species may occur with the virtual exclusion of other woody taxa. Scattered juniper can be found in this biotic community with piñon more common in the foothills of the Chuska Mountains to the west. Ponderosa pine occurs in the higher elevation Montane conifer forest of the Chuskas.

Weather conditions at Twin Lakes are similar to those found at the Zuni Reservation about 33 miles (53.1 km) to the south (Brandt 1995). Rainfall is bimodal and comes in the form of snowfall in the months of December through February and torrential rainstorms in late summer (see Table 2.1). High winds in the spring can be detrimental to young plants. The average growing season at Zuni is about 100 to 120 days. With these factors perhaps mitigating success, farming could have been a difficult endeavor.

Methods

Flotation

The 158 soil samples collected during excavation were processed at the Museum of New Mexico's Office of Archaeological Studies by the simplified "bucket" version of flotation (see Bohrer and Adams 1977). Flotation soil samples ranged in volume from 0.13 to 6.3 liters. Each sample was immersed in a bucket of water, and a 30–40 second interval allowed for settling out of heavy particles. The solution was then poured through a fine screen (about 0.35 mm mesh) lined with a square of "chiffon" fabric, catching organic materials floating or in suspension. The squares of fabric were lifted out and laid flat on coarse mesh screen trays until the recovered material had dried.

Full-Sort Analysis

Each sample was sorted using a series of nested geological screens (4.0, 2.0, 1.0, 0.5 mm mesh), and then reviewed under a binocular microscope at 7x–45x. Charred and uncharred reproductive plant parts (seeds and fruits) were identified and counted. Table 14.1 lists all carbonized plant taxa encoun-

Table 14.1. Twin Lakes sites charred plant taxa recovered from flotation, macrobotanical, and wood samples.

	Latin Name	Common Name	Plant Part
Annuals	*Amaranthus*	Pigweed	seed
	Chenopodiaceae	Goosefoot family	seed
	Chenopodium/ Amaranthus	Cheno-Am	embryo, seed
	Chenopodium	Goosefoot	embryo, seed
	Corispermum	Bugseed	seed
	Cycloloma	Winged pigweed	seed
	Descurainia	Tansy mustard	seed
	Helianthus	Sunflower	seed
	Mentzelia albicaulis	Stickleaf	seed
	Portulaca	Purslane	embryo, seed
Cultivars	*Zea mays*	Corn	cob, cupule, glume, kernel
Grasses	Gramineae	Grass family	*Caryopsis* , embryo
	Oryzopsis	Ricegrass	*Caryopsis*
Other	Compositae	Composite family	seed, wood
	Labiatae	Mint family	seed
	Malvaceae	Mallow family	seed
	Salvia	Sage	seed
	–	Unidentifiable	seed
	–	Unknown	embryo, unknown, wood
Perennials	*Amelanchier*	Antelope bush	wood
	Artemisia	Sagebrush	wood
	Atriplex canescens	Four-wing saltbush	embryo, fruit, seed
	Atriplex/Sarcobatus	Saltbush/greasewood	wood
	Cercocarpus	Mountain mahogany	wood
	Chrysothamnus	Rabbitbrush	wood
	Cowania	Cliffrose	wood
	Cylindropuntia	Cholla	seed
	Echinocereus	Hedgehog cactus	seed
	Gymnospermae	Conifer	wood
	Juniperus	Juniper	seed, twig, wood
	Lycium	Wolfberry	wood
	–	nonconifer	wood
	Pinus	Pine	fascicle, needle
	Pinus edulis	Piñon	needle, nutshell, wood
	Pinus ponderosa	Ponderosa pine	wood
	Platyopuntia	Pricklypear cactus	seed
	Quercus	Oak	wood
	Rosaceae	Rose family	wood
	Salicaceae	Willow family	wood

tered in Twin Lakes samples by Latin and common names and the anatomical parts. Flotation data are reported as a standardized count of seeds per liter of soil, rather than an actual number of seeds recovered. Relative abundance of nonreproductive plant parts such as pine needles and grass stems was estimated per liter of soil processed.

To aid the reader in sorting out botanical occurrences of cultural significance from the considerable noise of post-occupational intrusion, data in tables are sorted into categories of "Cultural" (all carbonized remains), "Possibly Cultural" (indeterminate cases, usually of unburned, economically useful taxa either found together with burned specimens of the same taxon, or found in large numbers), and "Noncultural" (unburned materials, especially when of taxa not economically useful, and when found in disturbed contexts together with modern roots, insect parts, scats, or other signs of recent biological activity).

Charcoal Identification

From each flotation sample with at least 20 pieces of wood charcoal present, a sample of 20 pieces was identified (a maximum of 10 pieces from each screen size). In smaller samples, all charcoal from the 4 mm and 2 mm screens was identified. Each piece was snapped to expose a fresh transverse section, and then identified at 45x. Identified charcoal from each taxon was weighed on a top-loading digital balance to the nearest tenth of a gram and placed in labeled plastic bags. Low-power, incident light identification of wood specimens does not often allow species- or even genus-level precision, but can provide reliable information useful in distinguishing broad patterns of utilization of a major resource class. To augment wood specimens collected in the field for carbon-14 dating, flotation samples were dry screened prior to flotation to remove corn and shrubby wood for immediate identification before selecting specimens for radiocarbon dating. The results of this analysis are reported in separate tables.

Macrobotanical Samples

Macrobotanical wood specimens (generally bigger pieces than those recovered in flotation samples) were examined in the same manner as for flotation charcoal. Charcoal was separated by taxon, weighed, and placed in labeled foil packets for potential submission as radiocarbon specimens.

Corn specimens (all carbonized) were measured to the nearest 0.1 mm using dial calipers, following parameters detailed in Bird (1994) and Toll and Huckell (1996). To be considered measurable, cob fragments needed to possess a full circumference, and kernels needed to be complete in two of the three possible dimensions (length, width, and thickness). Other specimens were identified as to taxon and part by comparison with modern reference specimens. When necessary, fragile specimens were wrapped in acid-free tissue and/or polyester fiber and placed in durable archival containers, to protect them from further breakage.

Analysis Results

LA 32964

LA 32964 consisted of a midden, three thermal features, four pits, and one deflated slab-lined cist in addition to cached ground stone tools. The cist and one of the pits (Feature 12) date slightly earlier than the other features at LA 32964. There were no obvious differences in plant remains recovered from the two features versus other features (Tables 14.2, 14.3). Corn was found in all of the features and in every grid sampled in the midden (Tables 14.4, 14.5). The greatest concentrations of corn by weight in grams were found in the midden and from the Feature 14 bell-shaped pit (see Fig. 5.24). A few occurrences of carbonized weedy annual genera document the possible use of sunflower, goosefoot, and purslane seeds. Carbonized juniper seeds in both midden and feature samples may simply represent fuel wood debris (although juniper comprises a very small percentage of the wood charcoal assemblage (Tables 14.6, 14.7, 14.8) The resinous fleshy cones have little nutritional value and make an occasional dietary contribution as seasoning.

Uncarbonized floral remains included goosefoot, ricegrass, sunflower, juniper, and spurge seeds along with juniper twigs and male cones. The small number of seeds recovered, the newness and lack of oxidation of seed coats, and the ubiquity of juniper duff in nearly every sample, implies that these unburned floral parts were introduced by rodents, insects, or some form of bioturbation. These taxa are

Table 14.2. LA 32964, all features excluding midden, flotation plant remains (frequency and abundance per liter).

Feature	4 Thermally Altered Pit		6 Pit with Cached Metate		9 Cist	10 Thermally Altered Pit		12 Pit		13 Pit		14 Pit	15 Thermally Altered Pit	
FS	**510 S1/2**	**511 N1/2**	**501 N1/2**	**502 S1/2**	**550**	**500 N1/2**	**522 S1/2**	**483**	**499**	**505 W1/2**	**506 E1/2**	**508**	**608 E1/2**	**624 W1/2**
								27.28N/ 85.64E	**24.6N/ 85.44E**					
Volume	**2.05**	**3.62**	**3.3**	**4.42**	**4.7**	**3.44**	**3.05**	**4.83**	**2.92**	**3.6**	**3.3**	**2.96**	**3.5**	**3.3**
Cultural														
Annuals:														
Chenopodium	0.98	–	–	–	0.21	–	–	–	0.34	–	–	–	–	–
Portulaca	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Cultivars:														
Zea mays	+c	+c	+c	+c	–	+c	+c	+c	+c	+c	+c	+c	+c	+c
Perennials:														
Juniperus	0.49	0.28	–	–	–	0.29	–	–	–	0.28	–	–	0.29	–
Noncultural														
Annuals:														
Chenopodium	–	–	1.82	1.13	–	–	–	0.21	–	0.28	4.24	1.01	0.29	–
Grasses:														
Oryzopsis	0.98	–	–	–	–	0.58	0.33	–	0.68	–	–	–	–	–
Perennials:														
Juniperus	.98 male cone	.28 male cone, + twig	.30 male cone	.45 male cone	–	+twig	–	.62 male cone	.34 male cone	.28 male cone	.30 male cone	–	.57 male cone	–

Table 14.3. LA 32964, all features excluding midden, macrobotanical plant remains by count and weight in grams

Feature	6 Pit with Cached Metates		9 Cist	10 Thermally Altered Pit	13 Pit
FS	**501 N ½**	**502 S ½**	**564**	**500 N ½**	**504**
Cultural					
Cultivars:					
Zea mays	1 cupule./.02, 1 kernel/.02	1 cob/.17, 3 cupules/.06, 1 kernel/.02	1 cob frag./.03, 4 cupules/.05	2 cob frag./.06	3 kernels/.06
Other:					
Unknown		1pp/.02			
Wood:					
Unknown nonconifer	–	1/.02	–	–	–

All cultural plant remains are carbonized.

Table 14.4. LA 32964, Feature 1 midden, flotation plant remains (frequency and abundance per liter).

FS	**299**	**300**	**302**	**303**	**304**	**348**	**352**	**400**	**402**	**406**	**566**	**567**
Sample Volume	**1.82**	**1.79**	**1.75**	**2.10**	**1.82**	**2.19**	**2.12**	**2.31**	**2.10**	**2.10**	**2.80**	**3.80**
Cultural												
Annuals:												
Chenopodium	–	–	0.57	–	–	–	–	–	–	–	–	–
Cultivars:												
Zea mays	–	+c	+c	+c	+c	+c	+c	+c	+c	+c	+c	+c, 0.26k
Other:												
Unidentifiable	–	–	–	–	–	–	–	–	–	–	–	0.26
Perennials:												
Juniperus	–	–	–	–	–	–	–	–	–	–	–	0.26
Noncultural												
Annuals:												
Chenopodium	20.33	0.56	0.57	–	–	–	–	–	–	0.48	1.107	–
Euphorbia	–	–	–	0.48	–	–	–	–	–	–	–	–
Helianthus	–	–	–	–	–	–	–	–	–	–	–	0.36
Perennials:												
Juniperus	–	–	–	–	0.55	–	+twig	+twig	–	0.48 mc	1.07 mc	0.26 mc

All cultural plant remains are carbonized. Plant remains are seeds unless indicated otherwise.
c = cupule, k = kernel, pp = plant part, mc = male cone, + = 1–10/liter, ++ = 11–25/liter

ubiquitous in the modern vegetation community at LA 32964 and could have been introduced as recently as during the excavation of the site.

Six cobs, four from the midden, one from Feature 6 and one from Feature 13, were measurable (Table 14.9). Average row number was nine, but the majority were eight-rowed. Cupules were u-shaped and more closely resembled Archaic corn; average cupule width of five of the six cobs was 3.21 mm. In contrast, the average cupule width of Basketmaker/Pueblo I carbonized cobs at Chaco Canyon was 5.8 mm (Toll 1993:Table 26) and that of unburned cobs at the Archaic Sheep Camp Shelter just east of the Chaco monument border was 5.5 mm (Donaldson 1984:Table 31). The considerably wider cupule measurements of the Sheep Camp Shelter corn can be accounted for by the lack of shrinkage that is caused by carbonization.

Greasewood/saltbush was the most common wood taxon found in both features and the midden (78 percent and 71 percent by weight, respectively). The wood assemblage from features was more diverse than that from midden contexts, where ponderosa pine, cottonwood/willow, and mountain mahogany were not present. mountain mahogany was identified in the Feature 4 thermal pit, ponderosa pine in thermal pit 10 and the Feature 12 pit, and cottonwood/willow in thermal pit 10.

The high occurrence of corn and scarcity of other taxa at LA 32964 suggests the focus of subsistence activity was the cultivation of corn. The site could have been that part of a seasonal round where corn was processed for immediate consumption as well as winter use. Activity could have been similar to that described in *Havasupai Habitat* (Weber and Seaman 1985). Family groups would travel to their garden plots in the spring to prepare the land for planting and to plant crops. Until green corn was available, groups would roam out of Cataract Canyon onto the plateau to hunt with only occasional trips to the fields to weed and irrigate. When the green corn could be harvested, families would camp near their fields in brush shelters, guarding the crops against rodents and other pests. The corn was harvested in late August and September, processed, and stored. As winter approached, small family groups would wander off and establish winter camps. When food ran low, forays would be made back to the vicinity of fields and storage areas.

Lithic and faunal evidence at LA 32964 suggests a slightly different scenario than that just described for the Havasupai. Bone was highly fragmented and consists entirely of small mammals. Evidence of late stage core reduction and biface maintenance or manufacture at the site indicates occupants were very busy making tools, perhaps for use during the winter to hunt larger game. Occupants could have gone on hunting forays during the early stages of the growing season and may very well have been snaring small animals a short distance away that were not yet attracted to corn fields.

There was no evidence of any kind of shelter within the project area, but the presence of a stratified midden and caching of ground stone suggests that the same family groups may have been returning to the area year after year as part of an established seasonal round of subsistence activities and remnants of structures may be outside the boundary of excavation. Long-term large storage features were also lacking, indicating that the occupants took the fruits of the harvest with them when they left for the winter, rather than storing a portion of the crops and returning periodically during the winter as the Havasupai did.

Table 14.5. LA 32964, Feature 1 midden, cultural macrobotanical plant remains by count and weight in grams.

	FS																	
	155	165	174	203	239	241	299	302	347	357	401	403	405	406	407	409	411	434
Zea mays	1 cob/.08	8 c /.18	5 k/.20	1/cob/.4	1 k/.02	2 cf/.27	1 c/.01	1 cob/.09 1 cf/.08, 1 c/.02, 1 k/.23	1 cf./.10	1 cf/.05	1 k/.04	7 c/.24	1 k/.03	1 cf/.03, 1 c/.01, 1 g/.01, 3 k/.03	1 c/.01, 2 k/.02	1 c/.01	–	–
Unknown	–	–	–	5 pp/.06	–	–	1 pp/.01	–	–	–	–	–	–	–	–	–	1 pp/.07	1 pp/.01

All cultural plant remains are carbonized.
cf = cob fragment, c = cupule, g = glume, k = kernel, pp = plant part

LA 104106

LA 104106 is a multicomponent habitation and limited-activity site located on a high ridge overlooking Tohatchi Flats to the northeast. A thermal feature (Feature 69) within a possible brush structure associated with a Navajo Cabezon phase use of the site and three extramural features in SU 2 date to a Basketmaker II occupation. A pit structure with an antechamber (Structures 1), a possible cooking or processing room (Structure 2), three shallow storage/sleeping structures (Structure 3, 5 and 7), and an extramural activity area were associated with a Basketmaker III occupation. Along with the possible brush house (Structure 9), the remaining extramural features in SU 1 and another extramural area were associated with the Navajo component.

Basketmaker II component. Corn and goosefoot, ricegrass, and mallow family seeds were recovered from the fire pit (Feature 69) that was in use during the Basketmaker II period prior to the

Table 14.6. LA 32964, all features excluding midden, cultural flotation wood charcoal and dry screen by count and weight in grams.

		Thermally Altered Pit			Pit				Pit with Cached Metate			
		F 4	F 15	F 10	F 12		F13	F 14	F 6		Total Wood	
		510 S½	608 E½	500 N½	483 N½	499 S½	505 W½, 506 E½	508	501 N½	502 S½	Weight	%
Annuals	Compositae	–	–	–	–	–	–	–	2/.01	–	**–**	**–**
	Helianthus	–	–	–	–	1/.01	–	–	–	–	**–**	**–**
Cultivars	*Zea mays*	1k/.07	2k/.01	2k/.11	1k/.26	5k/.01	1 cob/.04, 2k/.11	1cf/.19, 4k/.01	1k/.01	1k/.13	**–**	**–**
Perennials	*Juniperus*	–	–	–	–	–	–	–	–	–	**–**	**–**
Conifers	*Juniperus*	1/.01	–	–	9/.12	6/.14	–	–	2/.05	5/.02	**0.38**	**3**
	Pinus edulis	–	–	1/.01	2/.04	5/.11	2/.01, 1/.04	–	1/.15	–	**0.36**	**3**
	Pinus ponderosa	–	–	–	–	1/.07	–	–	–	–	**0.08**	**1**
	Unknown conifer	–	–	4/.02	–	3/.03	2/.08	1/.01	3/.06	–	**0.21**	**2**
Nonconifers	*Artemisia*	–	–	3/.03	1/.02	2/.06	15/.16, 7/.11	2/.04	5/.06	4/.05	**0.58**	**5**
	Cercocarpus	3/.03	–	–	–	–	–	–	–	–	**0.05**	**<1**
	Compositae	–	–	–	–	–	–	–	–	1/.01	**0.02**	**<1**
	Cowania	–	–	–	–	6/.09	–	–	–	–	**0.09**	**1**
	Lycium	–	–	–	–	–	1/.01	1/.01	–	–	**0.02**	**<1**
	Rosaceae	–	–	–	2/.01	5/.08	2/.02	–	1/.01	–	**0.12**	**1**
	Salicaceae *(Populus/ Salix)*	–	–	–	–	–	–	–	–	–	**0.08**	**1**
	Sarcobatus/ Atripex	32/.72	45/.43	49/.70	69/1.46	117/ 1.66	82/1.19, 30/.27	47/.56	45/.65	48/.45	**8.9**	**78**
	Unknown nonconifer	8/.01	1/.01	12/.08	7/.07	3/.08	7/.03, 9/.07	8/.05	5/.04	8/.07	**0.54**	**5**
	Total Wood	**44/.77**	**46/.44**	**69/.84**	**90/1.72**	**148/ 2.32**	**111/1.5, 47/.49**	**59/.67**	**62/1.02**	**66/.60**	**11.43**	**100**

All cultural plant remains are carbonized. Plant remains are seeds unless indicated otherwise.
k = kernel; cf = cob fragment

Table 14.7. LA 32964, Feature 1 midden, cultural macrobotanical wood and 14C by count and weight in grams.

					Total	
		FS 299	FS 401	FS 407	Weight	%
Conifers	*Juniperus*	1/.02	–	1/.02	**0.04**	**2**
Nonconifers	*Artemisia*	15/.49	1/.05	–	**0.54**	**27**
	Chrysothamnus	1/.01	–	–	**0.01**	**<1**
	Rosaceae	4/.15	–	–	**0.15**	**8**
	Sarcobatus/Atriplex	57/1.15	–	1/.02	**1.17**	**59**
	Unknown nonconifer	6/.08	–	–	**0.08**	**4**
	Total	**84/1.9**	**1/.05**	**2/.04**	**1.99**	**100**

Table 14.8. LA 32964, Feature 1 midden, cultural flotation wood and dry screen by count and weight in grams.

	FS 299	FS 300	FS 302	FS 303	FS 304	FS 348	FS 352	FS 358	FS 400	FS 402	FS 406	FS 566	Total Weight	%
Cultivars														
Zea mays	–	1k/.06	–	1k/.08	–	1k/.21	1 cob/.10, 1/.21	–	2k/.08	1c/.01, 3k/.01, 1g/.01	2c/.27, 1g/.01	2c/.02, 3g/.01	**–**	**–**
Perennials														
Juniperus	–	–	–	–	–	1 s/.01	–	–	–	–	–	–	**–**	**–**
Wood conifers														
Juniperus	–	3/.03	–	–	2/.02	2/.04	8/.13	–	1/.01	2/.01	3/.05	–	**0.29**	**4**
Pinus edulis	–	2/.09	1/.01	–	–	–	1/.03	–	1/.05	–	1/.01	–	**0.19**	**3**
Unknown conifer	–	2/.02	–	–	–	3/.03	–	–	–	–	–	2/.01	**0.06**	**1**
Nonconifers														
Artemisia	6/.12	6/.03	11/.16	2/.02	5/.03	1/.01	3/.06	2/.01	–	3/.11	2/.05	–	**0.6**	**9**
Compositae	–	–	–	–	–	2/.01	–	–	–	–	1/.01	–	**0.02**	**<1**
Cowania	–	–	–	–	–	1/.01	–	–	–	–	–	–	**0.01**	**<1**
Lycium	–	–	–	–	–	–	–	–	–	–	1/.01	–	**0.01**	**<1**
Sarcobatus/ Atriplex	21/.18	24/.26	17/.22	26/.59	24/.15	69/.91	72/.94	1/.01	20/.31	41/.43	68/.84	14/.07	**4.91**	**71**
Unknown nonconifer	–	5/.05	13/.15	11/.10	9/.04	1/.01	–	7/.02	10/.06	6/.09	19/.22	7/.06	**0.8**	**12**
Unknown	–	–	–	–	–	–	–	–	–	1/.01	–	–	**0.01**	**<1**
Total Wood	**27/.30**	**42/.48**	**42/.54**	**39/.71**	**40/.24**	**79/1.02**	**84/1.16**	**10/.04**	**32/.43**	**53/.65**	**95/1.19**	**23/.14**	**6.9**	**100**

All cultural plant remains are carbonized; c = cupule, g = glume, k = kernel, s = seed

Table 14.9. LA 32964, midden and features, Zea mays cob morphometrics.

FS	Provenience	Portion	Rows	Type	Cob	Intact Glumes			No Glumes		
					Length (mm)	Cob Diameter (mm)	Glume Width (mm)	RSL (mm)	Rachis Diameter (mm)	Cupule Width (mm)	Cupule Height (mm)
155	Midden	M	8	ST, T	9.69	–	–	–	4.48	2.96	3.60
203	Midden	M	12	ST, T	14.29	–	–	–	7.83	3.30	2.82
302	Midden	M	8	ST, T	10.44	–	–	–	4.70	2.81	3.05
352	Midden	M	8	ST, T	12.67	5.97	3.98	2.46	–	–	–
502	F. 6, Pit with cached metate, S½	Tip	10	ST, IR	11.43	–	–	–	6.38	3.92	2.94
505	F. 13, Pit, W½	Tip	8	ST, T	6.31	–	–	–	4.42	3.08	4.02
Averages		67% M 33% Tip	9	90% ST, T, 10% ST, IR	10.81	5.97	3.98	2.46	5.56	3.21	3.29

IR = irregular, M = midsection, RSL = rachis segment length, ST = straight, T = tesselated construction of the possible brush house during the Navajo occupation. Wood was predominantly juniper and cottonwood/willow with small amounts of piñon and unknown non-conifer. The floral assemblage from SU 2 extramural features consisted of weedy annual seeds, corn, grasses, and juniper twigs (Table 14.10). Wood diversity was greatest in the extramural cist (Feature 24) and included fragments of ponderosa pine and rabbitbrush, taxa not found in Basketmaker III contexts. Saltbush/greasewood dominated the wood assemblage, followed by juniper and piñon. Small amounts of ten other taxa were also present (Tables 14.11, 14.12). The major difference in plant remains between the two areas was in wood taxa dominance. Juniper and cottonwood/willow were more common in the sample from the fire pit and saltbush/greasewood was the dominant wood type from extramural features in SU 2. Whether this reflects an actual difference in wood use or sample size bias is questionable.

Basketmaker III component. Corn had the highest occurrence of all plant taxa in flotation samples, followed at much lower rates by piñon, goosefoot, amaranth, and ricegrass. The hearth and possible roof or extramural feature in the structure fill of Structure 1 had the most diverse plant assemblages (eight taxa in each feature). Juniper was the dominant wood taxon by weight from all contexts except from the one floor sample examined from the antechamber of Structure 1 and the extramural area of SU 1, where piñon comprised a larger part of

Table 14.10. LA 104106, Study Unit 2, extramural features, Basketmaker II, full-sort plant remains (frequency and abundance per liter).

	Feature 3 Fire Pit	Feature 22 Fire Pit	Feature 24 Cist		
	FS 2108	FS 2284	FS 2309	FS 2320	FS 2320
	Bag 1	Bag 1	Bag 1	Bag 1	Bag 2
Sample Volume	**4.10**	**4.41**	**4.70**	**3.96**	**3.35**
			Cultural		
Annuals:					
Chenopodium	1.22	1.13	–	–	–
Helianthus	–	–	0.21	–	–
Portulaca	–	–	0.21	–	–
Cultivars:					
Zea mays	+ c	+ c	–	–	–
Grasses:					
Gramineae	–	–	0.21	–	–
Oryzopsis	–	0.23	–	–	0.30
Other:					
Unidentifiable	0.73	–	–	0.51	–
Perennials					
Juniperus	–	–	–	+ twig	–
			Noncultural		
Annuals:					
Chenopodium	–	5.9	1.7	–	0.3
Euphorbia	0.24	–	–	–	–
Grasses:					
Oryzopsis	–	0.23	–	–	–
Perennials:					
Juniperus	–	.23 mc	+ twig	–	–

All cultural plant remains are carbonized.
Plant remains are seeds unless indicated otherwise.
c = cupule, mc = male cone + = 1–10/liter

Table 14.11. LA 104106, Study Unit 2, extramural features, Basketmaker II, dry screen plant remains by count and weight in grams.

	Feature 3 Fire Pit	Feature 22 Fire Pit	Feature 24 Cist		Total	
	FS 2108	FS 2284	FS 2309	FS 2320	Weight (g)	%
Dry Screen Other						
Monocot	–	–	1 stem/.01	9 stem/.02	**–**	**–**
Unknown	–	1 pp/.09	–	–	**–**	**–**
Wood						
Conifers:						
Juniperus	25/.65	–	17/.46	35/.79	**1.90**	**29%**
Pinus edulis	21/.55	9/.19	2/.02	12/.21	**0.97**	**15%**
Pinus ponderosa	1/.04	–	–	1/.01	**0.05**	**1%**
Unknown conifer	9/.13	–	–	–	**0.13**	**2%**
Nonconifers:						
Artemisia	–	–	–	1/.01	**0.01**	**<1%**
Cercocarpus	2/.03	–	–	–	**0.03**	**<1%**
Chrysothamnus	–	–	–	1/.01	**0.01**	**<1%**
Cowania	6/.09	–	1/.01	7/.11	**0.21**	**3%**
Lycium	–	–	–	1/.01	**0.01**	**<1%**
Rosaceae	1/.08	–	–	–	**0.08**	**1%**
Prunus	–	–	–	3/.03	**0.03**	**<1%**
Sarcobatus/Atriplex	9/.25	69/.95	52/.36	50/1.14	**2.70**	**42%**
Unknown nonconifer	1/.01	10/.12	20/.04	18/.20	**0.37**	**6%**
Total Wood	**75/1.83**	**88/1.26**	**92/.89**	**129/2.52**	**6.50**	**100%**

pp = plant part

Table 14.12. LA 104106, Study Unit 2, extramural features, Basketmaker II, ^{14}C wood by count and weight in grams.

	Feature 24		Total Wood	
	FS 2312	FS 2321	Weight (g)	%
Conifers:				
Juniperus	61/11.8	49/15.7	**27.5**	**73%**
Pinus edulis	17/3.46	4/3.33	**6.79**	**18%**
Unknown conifer	10/.59	–	**0.59**	**2%**
Nonconifers:				
Sarcobatus/Atriplex	9/1.49	3/1.19	**2.68**	**7%**
Unknown nonconifer	1/.02	–	**0.02**	**<1%**
Total Wood	**98/17.36**	**56/20.22**	**37.58**	**100%**

the assemblages. The extramural Feature 137 (pit) yielded the greatest diversity of wood taxa (7).

Structure 1. Low frequencies of weedy annuals occur both in features and on the floor of Structure 1 (Tables 14.13a, 14.13b, 14.14). An unusually large number of unburned goosefoot seeds were found in the sipapu (Feature 19), a posthole (Feature 74), and in a floor sample. The large number of seeds in the floor sample could be explained by the presence of a rodent burrow in the vicinity, but the recovery of several hundred seeds in the sipapu and the posthole (equivalent to even higher numbers on a per liter basis) cannot be so easily explained. "The Zuni declare that the seeds of this plant . . . were among their principle foods when they first came to this world" (Stevenson 1915:66). With this in mind, it would not be outlandish to suggest that the seeds were an offering along with the other artifacts found in the sipapu. However, the pristine condition of the seeds casts doubt on this hypothesis. The

Table 14.13a. LA 104106, Structure 1, Features 13–67, flotation full-sort plant remains (frequency and abundance per liter).

Feature	**F 13 Posthole**	**F 14 Posthole**	**F 18 Shallow Basin**	**F 19 Sipapu**	**F 21 Pit**	**F 31 Storage**	**F 40 Posthole**		**F 48 Heating Pit**	**F 59 Pit**	**F 64 Hearth**	**F 67 Ash Pit**
FS	**1333**	**498**	**495**	**502**	**496**	**659**	**607**	**608**	**666**	**784**	**785**	**939**
Sample Volume (l)	**3.22**	**3.7**	**1.4**	**2.58**	**1.03**	**2.1**	**2.42**	**3.45**	**2.65**	**2.22**	**2.5**	**2.4**
						Cultural						
Annuals:												
Amaranthus	–	–	–	–	–	–	1.65	–	–	–	–	6.13
Cheno–Am	–	–	–	–	–	–	–	–	–	–	–	3.33
Portulaca	–	–	–	–	–	–	–	–	–	–	–	5.33
Salvia	–	–	–	–	–	–	–	–	–	–	–	1.20
Cultivars:												
Zea mays	+ c	+ c	–	+ c	–	+ c	+ c	–	+ c	+ c	++ c, +cf, +g, 1.60k	+ c, 0.42 e
Grasses:												
Oryzopsis	–	–	–	–	–	–	–	–	–	–	–	0.40
Perennials:												
Atriplex canescens	0.62 fruit, 0.31	–	–	–	–	–	89.66 fruit, ++leaf, 29.34	0.29 fruit	–	–	–	–
Juniperus	–	–	–	–	–	+twig	–	–	–	–	+ twig	+ twig
Pinus	–	–	–	–	–	–	–	–	–	–	++ needle	+ needle
Pinus edulis	–	–	–	–	–	–	++ ns	–	–	+ ns	–	+ ns
						Possibly Cultural						
Chenopodium	–	–	–	1051.55	–	–	–	–	–	–	–	–
						Cultural						
Annuals:												
Chenopodium	–	0.54	–	–	–	2.38	–	0.29	1.13	–	1.33	–
Euphorbia	1.55	–	–	–	–	–	–	–	–	–	–	–
Salvia	–	–	–	–	–	–	–	–	–	–	1.20	–
Grasses:												
Oryzopsis	–	–	–	–	–	–	–	–	0.75	–	0.4	0.42
Perennials:												
Juniperus	1.2 mc	–	0.71 mc	0.39 mc	2.9 mc	0.48 mc	–	+ twig	–	–	–	–

All cultural plant remains are carbonized. Plant remains are seeds unless indicated otherwise.
+ = 1–10/liter, ++ = 11–25/liter, +++ = 25–100/liter
c = cupule, cf = cob fragment, e = embryo, g = glume, k = kernel, ns = nutshell, mc = male cone

Table 14.13b. LA 104106, Structure 1, Features 74–177, flotation full-sort plant remains (frequency and abundance per liter).

Feature	**F 74 Posthole**	**F 80 Posthole**	**F 100 Wing Wall**	**F 102 Ladder Rest**	**F 108 Deflector**	**F 111 Posthole**	**F 115 Wing Wall**	**F 123 Pit**	**F 127 Pit**	**F 130 Pit**	**F 132 Pit**	**F 173 Posthole**	**F 177 - Roof/ Extramural Feature**
FS	**864**	**1098**	**942**	**943**	**944**	**872**	**874**	**875**	**1099**	**1100**	**1101**	**1281**	**244**
Sample Volume (l)	**3.53**	**0.63**	**2.36**	**0.43**	**2.00**	**0.41**	**3.36**	**2.25**	**2.35**	**2.55**	**2.65**	**2.73**	**2.95**
Cultural													
Annuals:													
Amaranthus	–	–	–	–	0.50	–	–	–	–	–	–	–	–
Chenopodiaceae	–	–	–	–	–	–	–	–	–	–	–	–	–
Chenopodium	–	–	–	–	–	–	0.30	0.44	–	–	–	–	–
Cheno–Am	–	–	–	–	0.50	–	–	–	–	–	–	–	–
Cultivars:													
Zea mays	+ c	–	+ c, + g	+ c, + g	+ c	+ c	+ c	+ cf, + c	+ c	+ c	+ c	–	+ c
Other:													
Unidentifiable	–	–	–	–	1.00	–	–	–	–	–	–	–	–
Perennials:													
Atriplex canescens	–	–	–	–	–	–	0.6	–	–	–	–	–	9.83 fruit, leaf, 9.5
Juniperus	–	–	–	–	–	–	–	+ twig	–	–	–	–	–
Pinus edulis	–	–	–	–	–	–	–	–	–	–	–	–	+ ns
Grasses:													
Gramineae	–	–	–	–	–	–	–	–	–	–	–	–	–
Noncultural													
Annuals:													
Amaranthus	–	–	–	–	–	–	0.30	–	–	0.78	–	–	–
Chenopodium	716.71	3.17	0.85	11.63	–	–	1.19	35.11	–	–	34.34	1.10	–
Descurainia	277.62	–	–	–	–	–	–	0.44	–	–	–	–	–
Euphorbia	–	6.35	–	–	–	–	–	2.22	–	–	0.38	–	–
Helianthus	2.83	–	–	–	–	–	–	–	–	–	–	–	–
Lappula	–	–	–	–	–	–	–	–	–	–	0.38	–	–
Mentzelia albicaulis	512.18	–	–	–	–	–	–	0.89	–	–	–	–	–
Portulaca	–	–	–	–	–	–	–	0.44	–	–	–	4.03	–
Other:													
Oenothera	1.98	–	–	–	–	–	–	–	–	–	–	–	–
Sphaeralcea	–	–	–	–	–	–	0.3	–	–	–	–	–	–
Perennials:													
Cyperaceae	–	–	–	–	–	–	–	0.44	–	–	–	–	–
Scirpus	–	–	–	–	–	–	–	0.44	–	–	–	–	–
Juniperus	–	–	–	–	–	–	–	–	–	–	+ twig	–	–

All cultural plant remains are carbonized. Plant remains are seeds unless indicated otherwise.
c = cupule, cf = cob fragment, g = glume, k = kernel, ns = nutshell, + = 1–10/liter, ++ = 11–25/liter, +++ = 25–100/liter

Table 14.14. LA 104106, Structure 1 main chamber and antechamber floor samples, flotation full-sort plant remains (frequency and abundance per liter).

FS[1]	258	260	262	265	267	269	308	310	312	314	315	317	319	329	331	334	336	338	909
Sample Volume (l)	**3.00**	**4.00**	**3.77**	**3.00**	**3.91**	**2.75**	**4.00**	**4.04**	**3.05**	**3.70**	**3.41**	**0.20**	**4.20**	**4.20**	**0.94**	**3.45**	**4.40**	**4.00**	**3.85**
Cultural																			
Annuals:																			
Amaranthus	–	–	–	–	–	–	–	–	–	–	0.29	–	–	–	–	–	2.16	–	–
Chenopodium	0.33	–	–	–	0.26	–	–	–	0.66	–	–	–	–	0.24	–	–	0.57	–	0.26
Cheno-Am	–	–	0.53	–	–	–	–	0.25	–	–	–	–	–	–	–	–	–	–	–
Helianthus	–	–	–	–	–	–	–	–	–	–	–	–	0.24	–	–	–	–	–	–
Mentzelia albicaulis	–	–	–	0.36	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Portulaca	–	–	–	–	–	–	–	–	1.64	–	–	–	–	–	–	–	0.57	–	–
Cultivars:																			
Zea mays	+c	+c	++c	+c, +g	+c	+c	+c, +g	+c	+c	+c	+c	–	+c	+c, +g	+c	+c	+cf, +++c	+c	+c
Other:																			
Unidentifiable	–	–	–	–	–	0.36	–	–	–	–	0.29	–	–	–	–	–	–	–	–
Unknown	–	–	–	–	–	–	–	–	–	0.27 pp	–	–	–	–	–	–	+pp	–	–
Perennials:																			
Juniperus	–	–	–	–	–	–	–	–	–	–	–	–	+twig	–	–	–	–	–	–
Pinus edulis	–	–	–	–	–	–	+ns	+ns	–	–	–	–	+n	+n, +ns	–	–	–	–	–
Possibly Cultural																			
Annuals:																			
Chenopodium	–	–	–	–	–	–	–	–	–	–	–	55.00	–	584.68	–	–	–	–	–
Noncultural																			
Annuals:																			
Amaranthus	–	–	–	–	–	–	–	–	–	–	0.29	–	–	–	–	–	0.57	–	–
Chenopodium	–	0.25	–	–	0.26	0.36	1.25	1.49	0.98	–	–	–	0.95	–	–	0.29	4.55	–	–
Cheno-Am	–	–	–	–	–	–	–	0.50	–	–	–	–	–	–	–	–	0.23	–	–
Corispermum	–	–	–	–	–	–	–	0.25	–	–	–	–	–	–	–	–	–	–	–
Euphorbia	–	–	–	0.33	–	–	–	0.25	–	–	–	10.00	–	–	–	2.03	–	–	–
Mentzelia albicaulis	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Portulaca	–	–	–	–	–	–	–	–	–	–	–	–	–	4.76	–	–	0.57	–	–
Suaeda	–	–	–	–	–	–	–	–	–	–	–	–	0.48	–	–	–	–	–	–
Grasses:																			
Oryzopsis	0.33	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Perennials:																			
Echinocereus	0.33	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Juniperus	0.33 mc	–	–	0.33 mc	+twig, 0.26 mc	–	–	0.25 mc	0.66 mc	0.54 mc	1.17 mc	0.48 mc	–	0.23 mc	1.06 mc, + twig	0.67 mc	–	–	–

All cultural plant remains are carbonized. Plant remains are seeds unless indicated otherwise.

+ = 1–10/liter, ++ = 11–25/liter, +++ = 25–100/liter, cf = cob fragment, c = cupule, g = glume, n = needle, ns = nutshell, pp = plant part, mc = male cone

[1]See Figure 8.34 for flotation locations.

seeds from the posthole are in a similar condition and occur with a large number of stickleaf seeds, adding further uncertainty.

Corn occurs in all but four features and one floor sample. Besides juniper twigs and unidentifiable seeds, corn was the only carbonized plant remain identified from postholes in the bench (Table 14.15). In fact, corn was the sole plant identified in 43 percent of the samples with carbonized remains. Nine kernels and one cob recovered from the hearth were measured. The average kernel height was 7.2 mm, average width was 6.9 mm, and average thickness was 4.9 mm (Table 14.16). The cob was 12-rowed and measured 18.23 mm long, 12.12 mm in diameter, 6.93 mm in glume width, and had a 3.72 mm rachis segment length. Finding kernel measurements to compare to those of LA 104106 proved impossible and one cob is not statistically viable.

Ricegrass was found in the hearth and an unknown grass was identified from the possible roof or extramural feature (Feature 177). Perennial plant remains consisted of firewood debris like pine needles and juniper twigs, piñon nutshell, and four-wing saltbush fruits and seeds (which could also be residue of firewood use).

Juniper was by far the most abundant wood taxon by weight from floor and features, while as previously mentioned, the single sample from the antechamber had more piñon than other taxa (Tables 14.17, 14.18). Half of the 10 postholes sampled from the bench and floor of Structure 1 produced wood charcoal remains and of those, carbonized juniper was most common in four of them (Tables 14.17, 14.19). The exception was Feature 40, where saltbush/greasewood was more abundant. Unburned piñon wood was also identified from the one posthole from the bench, which could represent fragments of the actual post.

Structure 2. Corn was recovered from all ten samples analyzed from Structure 2 (Table 14.20), including seven cob fragments identified in a macrobotanical sample from Feature 82. Carbonized pigweed and *Chenopodium/amaranthus* seeds occurred in three features, an unusually low distribution of these normally ubiquitous weedy annuals. Ricegrass was restricted to the Feature 81 pit, which was the feature with the highest diversity of plant remains. Perennial plants were represented by piñon nutshell as well as hedgehog cactus and cholla seeds. A large number of unburned goosefoot seeds were recovered from Feature 81, but again, the pristine condition of the seeds suggests they were

Table 14.15. LA 104106, Study Unit 1, Structure 1 bench, flotation full-sort plant remains (frequency and abundance per liter).

	Posthole						Thermal Pit	Ash/ Oxidized Area
Feature	**157**	**162**	**163**	**166**	**168**	**171**	**167**	**176 NE¼**
FS	**1256**	**1259**	**1274**	**1276**	**1277**	**1279**	**1340**	**2338**
Sample Volume (l)	**2.24**	**1.02**	**0.78**	**0.9**	**4.68**	**0.54**	**4.1**	**0.55**
				Cultural				
Cultivars:								
Zea mays	+cupule	+cupule	+cupule	+cupule	+cob frag., +cupule	+cupule	–	–
Other:								
Unidentifiable	–	0.98	–	–	–	–	–	1.82
Perennials:								
Juniperus	+twig	–	–	–	–	–	–	–
				Noncultural				
Annuals:								
Chenopodium	0.45	–	–	–	–	–	0.49	–

All cultural plant remains are carbonized. Plant remains are seeds unless indicated otherwise.
+ = 1–10/liter

Table 14.16. LA 104106, Structure 1, *Zea mays* kernel morphometrics.

Lacks Embryo?	Swollen?	Height (mm)	Width (mm)	Thickness (mm)
N	N	9.17	8.02	4.67
Y	N	7.82	7.49	4.43
Y	N	9.37	7.93	4.09
N	N	8.64	7.98	5.33
Y	Y	7.40	8.68	6.07
N	N	6.00	5.92	4.32
N	N	8.23	6.45	4.84
N	Y	4.62	7.19	6.02
N	Y	3.83	5.76	4.71
Mean measure-ments	–	**7.20**	**6.90**	**4.90**

modern or noncultural in origin. Wood was predominately juniper and piñon with small amounts of sagebrush, mountain mahogany, cliffrose, and saltbush/greasewood present (Table 14.21).

Structure 3. One sample (Feature 117, posthole) out of the three analyzed from Structure 3 produced carbonized plant remains, consisting of corn cupules and juniper wood (Table 14.22). Unburned piñon wood was also recovered from the feature and may actually be the remains of the post.

Structure 5. A corn kernel fragment was the sole cultural plant remain recovered from the floor sample from the structure. Unburned goosefoot seeds were identified in the sample from a posthole that are most likely modern intrusives.

Structure 7. Cultural floral remains consisted of a single incidence each of pigweed and goosefoot seeds, corn from all contexts, and a prickly pear cactus seed from the Feature 142 pit (Table 14.23). Charred pine needles from one posthole probably represent residue from firewood use or from roof closing material. Juniper and piñon were the most abundant wood charcoal taxa in samples with small amounts of cliffrose, rose family, and saltbush greasewood (Table 14.24). Like the posthole in Structure 3, Feature 152 posthole contained unburned piñon that may represent the remains of the post.

Extramural Area, Study Unit 1

A roasting pit, seven pits, and a fire pit were identified as Basketmaker III extramural features. As with the structures, corn was the most common taxon, with isolated occurrences of pigweed, *Chenopodium/amaranthus*, and grass seeds (Table 14.25). Ricegrass was identified in three samples, while piñon nutshell was found in two. The only cultural plant remain recovered in the roasting pit was a ricegrass grain, leaving the question of what was processed in the pit unanswered. Wood charcoal was a repetition of that found in structures, primarily juniper and piñon with small amounts of cliffrose, mountain mahogany, sagebrush, and saltbush/greasewood recovered only in the Feature 137 pit (Table 14.26).

Early Historic Navajo Component

Corn, ricegrass, and goosefoot were the most frequently encountered plant taxa in samples from Navajo contexts. Goosefoot was more common in extramural features and banana yucca was restricted to two extramural features. Feature 76 in Structure 9 had the richest array of plant taxa including goosefoot, bugseed, corn, ricegrass, and piñon. As during Basketmaker III times, the wood assemblage was dominated by juniper with piñon coming in a close second. An extramural cist (Feature 98) yielded the greatest number of wood taxa, including a fragment of ponderosa pine wood (a taxon found in Basketmaker II contexts but not in Basketmaker III contexts).

Structure 9. Weedy annual seeds, corn, mallow family, ricegrass, wolfberry, and piñon nutshell were recovered from the five intramural features identified in Structure 9 (Table 14.27). Feature 76 yielded the most diverse plant remains, including goosefoot, *Chenopodium/amaranthus,* bugseed, corn, ricegrass, and piñon. Ricegrass and goosefoot were far more common in Navajo samples than in those from the Basketmaker III, suggesting more extensive use of these two resources. The wolfberry seed from Feature 78 was the only representative of this taxon identified from the project that was somewhat surprising considering that wolfberry is a fairly common shrub found in the area today. Yarnell (1965) noted in a survey of Southwestern sites that wolfberry was virtually confined to growth on

Table 14.17. LA 104106, Structure 1 features, flotation wood charcoal by count and weight in grams.

Feature	Posthole				Pit, nfs	Hearth	Ash Pit	Heating Pit	Deflector	Wing Wall		Storage Pit		Adobe Floor Patch	Roof or Post-abandonment Feature	Total	
Feature	13	40	74	111	59	64	67	48	108	100	115	31	123	130	177		
FS	1333	607	864	872	784	785	939	666	944	942	874	659	875	1100	244	Weight (g)	%
Conifers																	
Juniperus	13/.30	3/.01	18/.20	11/.10	6/.10	10/2.5	11/.10	18/2.0	8/.40	17/.10	14/.10	12/.10	16/.30	16/.60	–	6.91	59%
Pinus edulis	5/.10	–	1/.01	2/.01	2/.01	4/1.60	5/.01	–	3/.10	1/.01	5/.01	3/.01	1/.01	4/.10	–	1.98	17%
Nonconifers																	
Cercocarpus	–	–	–	–	–	–	–	1/.01	–	–	–	–	–	–	–	0.01	<1%
Cowania	–	–	–	–	–	–	–	–	1/.01	–	–	–	–	–	–	0.01	<1%
Rosaceae	–	–	–	–	1/.01	2/.20	2/.01	1/.01	1/.01	–	–	4/.01	–	–	–	0.25	2%
Quercus	–	–	–	–	–	–	–	–	1/.01	–	–	–	–	–	–	0.01	<1%
Salicaceae (*Populus/Salix*)	–	–	–	–	–	–	–	–	–	1/.01	–	–	–	–	–	0.01	<1%
Sarcobatus/ Atriplex	2/.01	17/.50	1/.01	5/.01	11/.20	4/.40	1/.01	–	5/.30	1/.01	1/.01	1/.10	2/.01	–	19/.90	2.47	21%
Unknown	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1/.01	0.01	<1%
Total	20/.41	20/.51	20/.22	18/.12	20/.32	20/4.7	19/.13	20/2.02	19/.83	20/.13	20/.12	20/.22	19/.32	20/.70	20/.91	11.66	100%

nfs = not further specified

prehistoric sites and was rarely found growing elsewhere. He suggests that this could be an indication that the plants were brought to the sites by prehistoric people in order to have easy access to certain plant products. If this were the case, then a reasonable expectation would be the recovery of carbonized seeds, which was not the case at Twin Lakes until the Navajo period and then confined to an isolated occurrence.

Wood charcoal from Structure 9 was primarily juniper, but where piñon was most often the second most common taxon in Basketmaker contexts, cottonwood/willow fills that position in the wood assemblage from the possible brush structure (Table 14.28). Out of all the Basketmaker contexts, only one minute fragment of cottonwood/willow was identified in the wing wall sample from Structure 1. The abundance of cottonwood may indicate that the framework of the structure was cottonwood/willow branches. Piñon and saltbush/greasewood occur in nearly equal amounts. Rabbitbrush, which does not occur at all Basketmaker contexts, was recovered from Feature 23 and Feature 79. These differences suggest wood selection criteria changed from the Basketmaker III to Navajo occupations.

Extramural Area, Study Unit 2

The carbonized plant assemblage from this part of the site was comprised of weedy annual seeds, grasses, corn and conifer duff (Table 14.29). The most notable floral remains came from the Feature 11 and 12 cists where over 50 and 100 purslane seeds were recovered, respectively (over 100 and 600 when calculated on a per liter basis). An equally large number of unburned purslane seeds were recovered from the features. If the seeds were stored in the cists, then it is difficult to explain the presence of both charred and uncharred seeds in the same features along with goosefoot seeds (charred and uncharred), a banana yucca seed (in the Feature 12 macrobotanical sample); (Table 14.30), corn, bark, pine needles, and four other unburned taxa. A more likely scenario is that the features contained redeposited fill.

The contents of four out of five thermal features may represent evidence for specialized processing locales: Ricegrass was recovered from Feature 1, tansy mustard from Feature 6, purslane from Fea-

Table 14.18. LA 104106, Structure 1 main chamber and antechamber floor samples, flotation wood charcoal by count and weight in grams.

FS[1]	262	265	310	312	314	315	319	329	334	336	338	909	Total	
													Weight (g)	%
Conifers														
Juniperus	13/.20	5/.20	13/.20	9/.60	14/.40	10/.20	16/.60	10/.30	12/.20	11/.60	14/.30	7/.01	3.81	52%
Pinus edulis	4/.10	5/.30	5/.10	3/.01	5/.20	5/.20	–	5/.20	5/.10	4/.01	5/.10	8/.80	2.12	29%
Unknown conifer	2/.01	5/.10	–	–	–	–	1/.01	–	–	–	–	–	0.12	2%
Nonconifers														
Cowania	–	1/.01	–	3/.01	–	3/.30	3/.20	2/.10	–	–	–	5/.01	0.63	9%
Lycium	–	–	–	–	–	–	–	–	1/.01	–	–	–	0.01	<1%
Rosaceae	–	1/.01	–	–	1/.01	–	–	–	–	–	–	–	0.02	<1%
Sarcobatus/ Atriplex	–	.2/20	2/.01	5/.20	–	2/.01	–	3/.10	–	5/.10	1/.01	–	0.63	9%
Unknown nonconifer	–	1/.01	–	–	–	–	–	–	–	–	–	–	0.01	<1%
Total	19/.31	20/.83	20/.31	20/.82	20/.61	20/.71	20/.81	20/.70	18/.31	20/.71	20/.41	20/.82	7.35	100%

[1]See Figure 8.34 for sample location.

Table 14.19. LA 104106, Structure 1 bench, flotation and dry screen wood by count and weight in grams.

	Feature 157 Posthole	Feature 176 NE¼ Ash and Oxidized Area
	FS 1256	FS 1354
Cultural		
Flotation Wood		
Conifers:		
Juniperus	7/0.20	–
Pinus edulis	1/0.01	–
Nonconifers:		
Sarcobatus/Atriplex	1/0.01	–
Dry Screen		
Conifers:		
Unknown conifer	–	2/0.01
Nonconifers:		
Sarcobatus/Atriplex	–	24/0.39
Unknown conifer	–	8/0.02
Noncultural		
Conifers:		
Pinus edulis	6/1.40u	–

u = uncarbonized

Table 14.20. LA 104106, Structure 2, flotation full-sort plant remains (frequency and abundance per liter).

	Pit				Roasting		Posthole		Storage	
Feature	**81**		**85**	**94**	**82**		**88**	**89**	**91**	**83**
FS	**799**	**800**	**836**	**827**	**822**	**952**	**834**	**832**	**957**	**828**
Sample Volume (l)	**3.51**	**1.78**	**2.42**	**2.17**	**2.97**	**2.1**	**1.03**	**3.33**	**2.19**	**2.82**
Cultural										
Annuals:										
Amaranthus	1.06	–	–	–	–	–	–	–	–	–
Cheno-Am	–	–	–	–	–	–	0.97	0.3	–	–
Cultivars:										
Zea mays	+++c, +g, .85 k	+c	+c, +g	+c	++c, .67 k	+c	+c	+c	+c	+c,.35 e
Grasses:										
Oryzopsis	0.28	–	–	–	–	–	–	–	–	–
Other:										
Unidentifiable	0.28	–	–	–	–	–	–	–	–	–
Perennials:										
Echinocereus	–	0.56	–	–	–	–	–	–	–	–
Cylindropuntia	–	–	–	–	0.67	–	–	–	–	–
Pinus edulis	+ns	–	+ns	–	–	–	–	–	–	–
Possibly Cultural										
Annuals:										
Chenopodium	254.04	–	–	–	–	–	–	–	–	–
Noncultural										
Annuals:										
Chenopodium	–	–	–	–	0.34	0.48	0.97	1.2	–	3.19
Grasses:										
Oryzopsis	0.57	–	0.41	–	–	–	–	–	0.46	–
Other:										
Polygonaceae	–	–	0.41	–	–	–	–	–	–	–
Perennials:										
Juniperus	–	–	+twig	2.76 mc	–	–	–	–	–	1.77 mc

All cultural plant remains are carbonized. Plant remains are seeds unless indicated otherwise.
c = cupule, g = glume, e = embryo, k = kernel, mc = male cone, + = 1–10/liter, ++ = 11–25/liter, ++++ = >100/liter

ture 7, and goosefoot from Feature 10. One feature contained only uncharred ricegrass (probably intrusive).

The wood assemblage from extramural features is more like that from Basketmaker III contexts, dominated by juniper and piñon with less than 1 percent cottonwood/willow present (Table 14.31). However, ponderosa pine and *Prunus*, taxa identified in extramural features that were absent from Basketmaker III samples, reinforces the idea that there were changes in wood procurement choices.

Extramural Area, Study Unit 3

The two thermal features excavated and sampled in SU 3 contained corn cupules, goosefoot, and purslane (Table 14.32). Juniper, piñon, and unknown conifer were used for fuel wood. The use of SU 3 located to the south of SU 2, could be contemporaneous with the Navajo occupation of SU 2 or represents an earlier or later visit to the site.

Subsistence activities seem to be focused more

Table 14.21. LA 104106, Structure 2, flotation wood charcoal by count and weight in grams.

	Pit				Roasting Pit		
Feature	**81**		**85**	**94**	**82**	**Total**	
FS	**799**	**800**	**836**	**827**	**822**	**Weight (g)**	**%**
Conifers							
Juniperus	3/.60	10/.40	9/.10	4/.01	16/.70	**1.81**	**59%**
Pinus edulis	14/4.20	6/.30	8/.20	2/.01	–	**0.71**	**23%**
Nonconifers							
Artemisia	–	1/.01	–	–	–	**0.01**	**<1%**
Cercocarpus	–	–	–	15/.30	–	**0.3**	**10%**
Cowania	–	3/.10	3/.10	–	–	**0.2**	**7%**
Rosaceae	3/.01	–	–	–	1/.01	**0.02**	**1%**
Sarcobatus/Atriplex	–	–	–	–	2/.01	**0.01**	**<1%**
Unknown nonconifer	–	–	–	–	1/.01	**0.01**	**<1%**
Total	**20/.81**	**20/.81**	**20/.40**	**21/.32**	**20/.73**	**3.07**	**100%**

on corn agriculture and procurement of perennial taxa in the Basketmaker III period than during the Basketmaker II and Navajo occupations of LA 104106. The percent presence of piñon was nearly equal from Basketmaker III and Navajo contexts and appears to be the only resource consistently targeted by both groups. The range of perennial taxa exploited by Basketmaker III populations seems greater than that of Navajo site occupants, but three perennial taxa were represented by a single occurrence and the difference in sample size may account for the absence of these low-use taxa in Navajo contexts. The presence of bugseed and tansy mustard in Navajo samples (two annual taxa that do not occur in Basketmaker contexts), together with large increases in the percent presence of goosefoot and purslane suggests a possible change in focus towards collecting agrestals (plants that are adapted to disturbed soil related to modern agricultural practices; Stuckey and Barkley 2000), that were more easily collected and prepared.

Wood assemblages from the Basketmaker III and Navajo periods were predominately juniper and piñon, although an increase in the number of wood taxa in the Navajo assemblage may indicate differences in wood procurement practices. In contrast, wood from Basketmaker II extramural features was dominated by saltbush/greasewood, suggesting a possible preference for shrub wood as fuel during this occupation.

LA 116035

LA 116035 is a multicomponent site located on a gentle southwest to northeast trending ridge overlooking Tohatchi Flats to the east. This limited-activity site was occupied periodically for short intervals during the Basketmaker III, Pueblo II, and Pueblo III time periods resulting in ceramic and lithic artifact scatters and two thermal features.

Two flotation samples, one from the south half of Feature 1 and one from the north half produced uncarbonized goosefoot and ricegrass seeds that are probably not cultural in origin (Table 14.33). Thus, the botanical remains do not help to identify site function.

Discussion

Situated in gently rolling terrain at the western margin of Tohatchi Flats, runoff agriculture would have been one method available to Basketmaker II farmers at LA 32964. Figueredo and Dye Bush washes are the two primary drainages in the area; ditches could have been dug to divert water to fields.

Table 14.22. LA 104106, Structure 3, flotation full-sort plant remains (frequency and abundance per liter).

	Pit		Posthole
Feature	**114**	**116**	**117**
FS	**840**	**839**	**842**
Sample Volume (l)	**3.71**	**0.30**	**22.25**
Cultural			
Cultivars:			
Zea mays	–	–	+cupule
Noncultural			
Annuals:			
Chenopodium	0.81	–	52.53
Euphorbia	0.27	–	28.04
Grasses:			
Oryzopsis	–	–	3.11

Table 14.23. LA 104106, Structure 7, flotation full-sort plant remains (frequency and abundance per liter).

	Posthole				Fill	Pit	Floor
Feature	**140**	**143**	**151**	**152**		**142**	
FS	**1145**	**1154**	**1157**	**1160**	**1056**	**1151**	**1073**
Sample Volume (l)	**1.9**	**1.52**	**1.45**	**2.54**	**0.46**	**1.13**	**2.72**
Cultural							
Annuals:							
Amaranthus	–	–	–	–	4.35	–	–
Chenopodium	–	1.97	–	–	–	–	–
Cultivars:							
Zea mays	+cupule	+cupule	+cupule	+cupule	+cupule, 2.17 kernel	+cupule	+cupule
Perennials:							
Pinus	+needle	–	–	–	–	–	–
Platyopuntia	–	–	–	–	–	0.88	–
Noncultural							
Annuals:							
Chenopodium	43.68	5.26	0.69	–	–	23.01	0.74
Euphorbia	–	0.66	–	–	–	–	0.37
Portulaca	3.16	–	–	–	–	–	0.37
Grasses:							
Oryzopsis	1.58	5.92	2.76	–	–	1.77	6.25
Other:							
Malvaceae	–	–	–	–	–	–	0.37
Perennials:							
Juniperus	–	–	–	–	2.17 mc	–	–

All cultural plant remains are carbonized.
Plant remains are seeds unless indicated otherwise.
mc = male cone, + = 1–10/liter

Table 14.24. LA 104106, Structure 7, flotation wood charcoal by count and weight in grams.

	Posthole			Pit	Fill	Floor		
Feature	**140**	**141**	**152**	**142**			**Total**	
FS	**1145**	**1147**	**1160**	**1151**	**1056**	**1073**	**Weight (g)**	**%**
Cultural								
Conifers:								
Juniperus	13/.70	5/.10	7/.30	9/.30	15/.50	27/1.00	**2.9**	**61%**
Pinus edulis	7/.20	11/.40	3/.10	7/.10	3/.10	12/.80	**1.7**	**36%**
Nonconifers:								
Cowania	–	–	–	–	1/.01	1/.01	**0.02**	**<1%**
Rosaceae	–	4/.10	–	1/.01	–	–	**0.11**	**2%**
Sarcobatus/ Atriplex	–	–	1/.01	1/.01	1/.01	–	**0.03**	**<1%**
Unknown nonconifer	–	–	–	2/.01	–	–	**0.01**	**<1%**
Possibly Cultural								
Conifers:								
Pinus edulis	–	–	8/1.20 u	–	–	–	**–**	**–**
Total Cultural	**20/.90**	**20/.60**	**11/.41**	**20/.43**	**20/.62**	**40/1.81**	**4.77**	**100%**

u = uncarbonized

Crops could have also been planted at the base of slopes to take advantage of runoff and deeper sandy soils, which can act as a natural mulch (Page 1964:49, 61; Bradfield 1971:34). The Hopis have used dunes for planting certain crops to good affect: "The dunes have been skillfully utilized by the Hopis and planted to orchard, melon and squash crops, where there exists sufficient under-dune circulation of moisture and the dunes are so oriented as to be exposed to plenty of sunlight" (Bradfield 1971:55).

Out of nine experimental garden plots at Chaco Canyon, corn planted on a plot placed at the base of a dune and near a small inner channel of a side drainage fared the best. However, it was apparent that during normal or even above normal precipitation conditions, adequate moisture must be delivered to plants from at least March through August and that some form of irrigation or hand watering would have been necessary to produce an edible crop (Toll et al. 1985). Soil type and plot location were also mitigating factors. Prehistoric farmers on the Tohatchi Flats, then, may have had to supplement under-dune moisture with irrigation of some kind.

Differences in plant use through time at Twin Lakes can be seen primarily in the dramatic reduction in the percent presence of corn from Navajo contexts compared to Basketmaker contexts (Table 14.34). The number of perennial taxa found in Basketmaker III samples could be a factor of sample size differences or could reflect a real difference in diet whereby burgeoning Basketmaker III populations exploited a wider variety of plant resources. The consistent use of weedy annuals, piñon, and a limited number of grasses is present throughout the occupation of the area. Wood exploitation reflects the probable collection of driftwood and a preference for juniper, saltbush, and piñon (Table 14.35).

Three sites from the NSEP dated to the Figueredo phase or early Basketmaker II and along with one site (LA 88526; Hammett and McBride 1993b) from the ENRON project were the only other Basketmaker II sites with a significant number of flotation samples in the southern Chuska Valley to date. LA 6444 (Freuden 1998c) and LA 80419 (Freuden 1998b) were on the Tohatchi Flats valley floor. LA 6444 was a seasonal camp with small ephemeral brush shelters, interior and exterior hearths, and various pits, while LA 80419 was a pithouse habitation site. Pit-

Table 14.25. LA 104106, Study Unit 1, extramural area, flotation full-sort plant remains (frequency and abundance per liter).

	Pit									Fire Pit	Roasting Pit
Feature	**136**	**137**			**154**		**175**	**145**	**146**	**139**	**150**
FS	**1016**	**1086**		**1118**	**1162**		**1330**	**1127**	**1128**	**1329**	**1117**
Sample Volume (l)	**2**	**1**	**5.25**	**6.88**	**5.78**	**1.00**	**6.3**	**3.52**	**3.43**	**2.73**	**5.59**
Cultural											
Annuals											
Amaranthus	–	–	–	–	0.17	–	–	–	–	–	–
Cheno-Am	–	–	–	–	0.17	–	–	–	–	–	–
Cultivars:											
Zea mays	+c	+c, 2.0 k	+c	+++c, +g, 1.5 k	+c, .17 k	+c	+c	–	–	+c	–
Grasses:											
Gramineae	–	–	–	–	0.35	–	–	–	–	–	–
Oryzopsis	–	–	–	0.3	–	–	–	–	–	–	0.18
Other:											
Labiatae	–	–	–	0.15	–	–	–	–	–	–	–
Perennials:											
Pinus edulis	–	–	–	+ns	+ns	–	–	–	–	–	–
Noncultural											
Annuals:											
Amaranthus	–	–	–	–	–	1.00	–	–	–	0.37	–
Chenopodium	0.49	–	–	–	6.4	9.00	10.51	1.99	0.58	0.73	0.72
Euphorbia	0.49	–	–	–	–	–	0.35	–	–	–	–
Portulaca	–	–	–	–	–	–	3.18	–	–	–	–
Grasses:											
Oryzopsis	–	–	–	–	–	1.00	–	–	–	–	–
Other:											
Sphaeralcea	–	–	–	–	0.17	–	–	–	–	–	–
Perennials:											
Juniperus	–	–	.38 mc, +twig	–	–	–	.16 mc	–	–	–	–

c = cupule, g = glume, k = kernel, ns = nutshell, mc = male cone

Table 14.26. LA 104106, Study Unit 1, extramural area, flotation wood charcoal by count and weight in grams.

	Pit				
Feature	**136**	**137**	**145**	**Total**	
FS	**1016**	**1118**	**1127**	**Weight (g)**	**%**
Conifer					
Juniperus	16/.80	9/.20	–	**1**	**35%**
Pinus edulis	2/.10	13/.02	20/1.10	**1.22**	**43%**
Unknown conifer	–	1/.01	–	**0.01**	**<1%**
Nonconifer					
Artemisia	–	1/.01	–	**0.01**	**<1%**
Cercocarpus	–	5/.10	–	**0.1**	**4%**
Cowania	–	9/.30	–	**0.3**	**11%**
Sarcobatus/Atriplex	–	12/.20	–	**0.2**	**7%**
Unknown nonconifer	2/.01	–	–	**0.01**	**<1%**
Total	**20/.91**	**50/.84**	**20/1.10**	**2.85**	**100%**

Table 14.27. LA 104106, Study Unit 2, Structure 9, flotation full-sort plant remains (frequency and abundance per liter).

	Hearth	Fire Pit			
Feature	**23**	**76**	**77**	**78**	**79**
FS	**2286**	**2353**	**2316**	**2318**	**2319**
Sample Volume (l)	**1.33**	**4.72**	**4.45**	**3.7**	**4.52**
Cultural					
Annuals:					
Amaranthus	–	–	0.22	–	–
Chenopodium	–	1.27	–	–	0.44
Cheno-Am	–	0.21	–	–	–
Corispermum	–	0.21	0.22	–	–
Cultivars:					
Zea mays	+c	+c, .21 k	+c	+c	+c
Grasses:					
Oryzopsis	0.75	0.21	0.45	–	–
Other:					
Malvaceae	–	–	–	–	–
Unidentifiable	–	0.21	–	–	–
Perennials:					
Lycium	–	–	–	0.27	–
Pinus edulis	–	–	+ns	+ns	+ns
Noncultural					
Annuals:					
Amaranthus	–	–	–	–	–
Chenopodium	0.75	3.81	5.39	4.86	4.65
Portulaca	–	0.21	–	–	–
Perennials:					
Juniperus	.75 mc	–	–	–	–

All cultural plant remains are carbonized.
Plant remains are seeds unless indicated otherwise.
c = cupule, k = kernel, ns = nutshell, mc = male cone,
+ = 1–10/liter

Table 14.28. LA 104106, Study Unit 2, Structure 9, dry screen plant remains by count and weight in grams.

	Hearth	Fire Pit					
Feature	**23**	**76**	**77**	**78**	**79**	**Total Wood**	
FS	**2286**	**2353**	**2316**	**2318**	**2319**	**Weight (g)**	**%**
Cultivars:							
Zea mays	–	–	1/.04 k	–	–	**–**	**–**
Grasses:							
Oryzopsis	–	–	1/.01	–	2/.01	**–**	**–**
Perennials:							
Pinus edulis	–	–	1/.01 ns	–	1/.01 ns	**–**	**–**
Wood							
Conifers:							
Juniperus	24/.65	14/.12	24/.29	8/.13	28/.27	**1.46**	**36%**
Pinus edulis	29/.46	7/.06	1/.02	1/.02	2/.02	**0.58**	**14%**
Unknown conifer	2/.05	–	4/.03	–	5/.02	**0.10**	**2%**
Nonconifers:							
Artemisia	6/.14	–	–	–	–	**0.14**	**3%**
Chrysothamnus	9/.13	–	–	–	1/.01	**0.14**	**3%**
Compositae	2/.08	–	–	–	–	**0.08**	**2%**
Cowania	–	–	–	–	1/.01	**0.01**	**<1%**
Quercus	–	–	–	–	1/.01	**0.01**	**<1%**
Salicaceae *(Populus/Salix)*	–	32/.44	–	23/.18	–	**1.04**	**25%**
Sarcobatus/Atriplex	10/.21	–	31/.36	–	25/.17	**0.32**	**8%**
Unknown nonconifer	4/.08	8/.07	4/.03	8/.03	5/.02	**0.23**	**6%**
Total Wood	**86/1.8**	**61/.69**	**64/.73**	**40/.36**	**68/.53**	**4.11**	**100%**

k = kernel, ns = nutshell

houses at LA 80419 were shallow (43 cm and 4 cm in depth) and covered by brush superstructures. Time invested in construction of the two structures indicated that they would have been occupied for a longer period of time than brush structures at LA 6444. LA 6448, in the southern Tohatchi Flats area, was a storage or cache locale that included 53 large storage pits and three hearths. LA 88526, also in the southern Tohatchi Flats area, consisted of a shallow pit structure, a possible structure, and an extramural activity area. With the exception of LA 80419 and LA 88526, corn was the most common plant remain recovered from all sites compared in Table 14.36; piñon and possible squash rind have a higher percent presence in samples from LA 80419 and at LA 88526 goosefoot was found in more samples than corn. *Chenopodium/amaranthus* seeds were the second most common plant remains found at LA 6444 and LA 6448, whereas juniper seeds have that distinction at LA 32964.

Diversity of weedy annuals was the highest of the plant categories compared, including as many as 11 taxa (LA 6448). With the high percentage of corn, the equally high percentages and diversity of weedy annuals is an indicator of multiple cropping. Bye (1981) discusses the practice of the Tarahumara in southwestern Chihuahua, Mexico of allowing emerging weedy plants to grow in the spring when other resources are limited. Weeds are the first crop and the second crop of maize is available later. The encouragement of weedy annuals allows for the harvest of greens before and during the crop growing season.

Eating the greens when young and tender reduces the consumption of oaxalic acid that accumulates in the senescent leaves of older plants. When 100 g of greens were added to the diet, the RDA for the USA is met for calcium, vitamin A, thiamine, riboflavin, and vitamin C (Bye 1981:115).

Ricegrass shows up the most consistently of all

Table 14.29. LA 104106, Study Unit 2, extramural features, full-sort plant remains (frequency and abundance per liter).

	Charcoal Stain	Fire Pit						Cist						Pit			
Feature	**147**	**149**	**1**	**2**	**6**	**7**	**10**	**11**	**12**	**24**	**98**			**39**	**61**	**172**	
FS	**1112**	**1113**	**2106**	**2107**	**2277**	**2279**	**2278**	**2280**	**2282**	**2291**	**2329**	**2332**	**2333**	**2301**	**2326**	**2334**	**2336**
Sample Volume (l)	**2.71**	**2.5**	**1.6**	**2.4**	**1.62**	**3.62**	**2.91**	**6**	**4.82**	**4.15**	**1.75**	**2.34**	**2.75**	**2.96**	**0.51**	**2.5**	**1.15**
Cultural																	
Annuals:																	
Chenopodium	–	–	–	–	–	–	0.34	–	1.45	0.72	1.14	–	4.73	0.68	1.96	0.4	1.74
Cheno–Am	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0.4	–
Cycloloma	–	–	–	–	–	–	–	–	–	0.24	–	–	–	–	–	–	–
Descurainia	–	–	–	–	0.62	–	–	–	–	–	–	–	–	–	–	–	–
Helianthus	–	–	–	–	–	–	–	–	–	–	–	–	–	0.68	–	–	–
Portulaca	–	–	–	–	–	0.28	–	130.23	669.71	–	–	–	–	4.05	–	–	–
Cultivars																	
Zea mays	–	–	–	–	–	–	–	+c, +g	–	+c	+c	+c	–	+c, +g	–	+c	–
Grasses:																	
Oryzopsis	–	–	0.63	–	–	–	–	–	–	1.45	1.14	–	–	–	–	0.4	–
Other:																	
Unidentifiable	–	0.4	–	–	–	–	–	0.6	–	–	–	–	–	–	–	0.4	–
Unknown	–	–	–	–	–	–	–	–	+bark	–	–	–	–	–	–	–	–
Perennials:																	
Pinus	–	–	–	–	–	–	–	–	+fascicle	–	–	–	–	–	–	–	–
Possibly Cultural																	
Annuals:																	
Chenopodium	–	–	–	–	–	–	–	17.87	16.18	–	–	–	–	–	–	–	–
Portulaca	–	–	–	–	–	–	–	648.32	490.87	–	–	–	–	–	–	–	–
Noncultural																	
Annuals:																	
Amaranthus	–	–	–	–	–	–	–	0.17	–	–	–	–	–	–	–	–	0.87
Chenopodium	–	–	–	–	–	–	0.34	–	–	6.99	–	–	–	6.08	–	–	–
Cheno–Am	–	–	0.63	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Cycloloma	–	–	–	–	–	–	–	–	–	24	–	–	–	–	–	–	–
Euphorbia	–	–	–	–	–	–	–	–	1.04	–	–	–	–	–	–	–	–
Helianthus	–	–	–	–	–	–	–	0.17	–	–	–	–	–	–	–	–	–
Portulaca	0.37	–	–	–	–	–	–	–	–	24	–	–	–	2.36	–	–	–
Grasses:																	
Oryzopsis	–	–	–	0.42	–	0.28	–	–	–	–	–	–	–	–	–	–	–
Perennials:																	
Juniperus	–	–	–	–	–	–	–	.17 mc	–	–	–	–	–	–	–	–	–

All cultural plant remains are carbonized.
Plant remains are seeds unless indicated otherwise.
c = cupule, g = glume, mc = male cone, + 1–10/liter.

Table 14.30. LA 104106, Study Unit 2, extramural features, ^{14}C and macrobotanical wood and plant remains by count and weight in grams.

			Fire Pit	Cist				Posthole		
	26N/101E	28N/103E	F 2	F 11		F 12	F 24	F 58	Total Wood	
FS	**2053**	**2097**	**2107**	**2280**	**2137**	**2282**	**2190**	**2323**	**Weight (g)**	**%**
				Perennials						
Yucca baccata	–	1/.04	–	–	–	1/.01	–	–	**–**	**–**
				^{14}C Wood						
Juniperus	26/.94	–	4/.14	30/3.78	37/6.1	45/3.4	33/3.8	–	**18.16**	**45%**
				Conifers						
Pinus edulis	–	–	4/.02	33/4.49	19/2.24	18/2.0	4/.58	–	**9.39**	**23%**
Unknown conifer	–	–	4/.07	2/.17	4/.89	10/.19	4/.45	–	**1.77**	**4%**
				Nonconifers						
Artemisia	–	–	–	3/.42	–	–	–	–	**0.42**	**1%**
Cercocarpus	–	–	10/.13	–	–	–	–	–	**0.13**	**<1%**
Cowania	–	–	7/.21	9/.63	1/.01	6/.25	–	–	**1.1**	**3%**
Diffuse porous	–	–	–	22/2.75	–	–	–	–	**2.75**	**7%**
Prunus	–	–	1/.01	–	3/.44	16/1.2	–	–	**1.68**	**4%**
Sarcobatus/Atriplex	–	–	–	1/.10	–	–	–	–	**0.1**	**<1%**
Unknown nonconifer	–	–	–	–	–	1/.02	–	–	**0.02**	**<1%**
				Macrobotanical Wood Conifers						
Sarcobatus/Atriplex	–	–	–	–	–	–	–	1/4.74	**4.74**	**12%**
Total Wood	**26/.94**	**1/.04**	**30/.58**	**100/12.3**	**64/9.68**	**96/7.1**	**41/4.8**	**1/4.74**	**40.26**	**100%**

identified grasses, occurring at all sites except LA 32964 and dropseed was the second most common. Indian ricegrass was an especially important resource, maturing in late May to June when food stores were low and other plant resources were scarce (Bohrer 1975). The ground seeds of dropseed grass were used by the Navajo to make dumplings, rolls, and griddle cakes, and the Hopi ground the seeds and mixed them with cornmeal (Castetter 1935:28). Even though dropseed grass grains are very small, the positive qualities of abundant seed production and the retention of the grains by the plant after maturation, preventing their loss before harvesting (Doebley 1984), outweigh the problem of small seed size.

Perennial plant use is represented by juniper, piñon, four-wing saltbush, prickly pear cactus, lemonade berry, and hedgehog cactus. As already mentioned, the resinous cones of juniper are used occasionally as a seasoning or as a starvation food, but may be prevalent in the record as residue from fuel wood use. Piñon nuts are a rich source of amino acids and are high in calories (3,000 calories a pound) and protein (Dunmire and Tierney 1995:97). Four-wing saltbush seeds were ground and cooked as a cereal and saltbush ash was an important addition to cornmeal as a dye and as a leavening agent (Dunmire and Tierney 1995:130). Also, adding ash frees up the virtually unavailable niacin contained in the inner grain, thus increasing the nutritional value (Snow 1990:296). The fruits of lemonade berry were eaten fresh or ground into a meal or used as a seasoning (Castetter 1935:48–49), while those of prickly pear and hedgehog cactus were eaten raw, dried or boiled (Jones 1930:35–36; Standley 1911:450).

Wood assemblage composition was variable, but with the exception of LA 88526 where juniper was dominant, saltbush/greasewood was the most common type present in flotation samples (Table 14.37). Rabbitbrush, pine, cottonwood/willow, and sagebrush were the second most commonly occurring woods depending on the site. Variability in

Table 14.31. LA 104106, Study Unit 2, extramural features, flotation wood and dry screen plant remains by count and weight in grams.

	Charcoal Stain		Fire Pit		Cist							Pit					
Feature	**147**	**149**	**1**	**2**	**12**	**24**		**98**				**39**	**60**	**172**		**Total Wood**	
FS	**1112**	**1113**	**2106**	**2107**	**2282**	**2290**	**2291**	**2287**	**2329**	**2332**	**2333**	**2301**	**2325**	**2334**	**2336**	**Weight (g)**	**%**
								Flotation Wood									
Conifers:																	
Juniperus	7/.10	20/.70	–	–	–	–	–	–	–	–	–	–	–	–	–	**0.8**	**–**
Pinus edulis	13/.30	–	–	–	–	–	–	–	–	–	–	–	–	–	–	**0.3**	**–**
								Dry Screen									
Cultivars:																	
Zea mays	–	–	–	–	–	–	–	–	–	–	–	1 k/.11, 9 s/.16	–	–	–	**–**	**–**
Perennials:																	
Pinus edulis	–	–	–	–	–	–	–	–	–	–	–	–	–	1 ns/.01	–	**–**	**–**
Wood conifers:																	
Juniperus	–	–	7/.10	8/.07	93/2.15	79/1.88	35/.25	51/1.71	3/.02	24/.29	17/.14	23/1.29	8/.06	13/.12	4/.06	**8.94**	**35%**
Pinus edulis	–	–	1/.02	6/.07	46/3.47	33/1.73	6/.06	1/.06	–	5/.25	4/..08	6/.22	5/.08	–	–	**6.34**	**25%**
Pinus ponderosa	–	–	–	–	–	–	–	–	–	1/.01	–	–	–	–	–	**–**	**–**
Unknown conifer	–	–	1/.02	12/.12	15/.67	3/.17	–	–	–	2/.02	4/.23	1/.21	–	1/.01	–	**1.45**	**6%**
Nonconifers:																	
Artemisia	–	–	–	–	30/.42	34/.36	–	–	–	1/.01	–	–	–	–	–	**0.79**	**3%**
Cercocarpus	–	–	–	–	–	–	–	–	–	–	–	–	–	1/.01	–	**0.01**	**<1%**
Cowania	–	–	–	2/.02	5/.58	7/.16	–	–	–	1/.01	3/.01	–	–	–	–	**0.78**	**3%**
Diffuse porous	–	–	–	–	–	–	–	–	–	–	–	–	2/.01	2/.01	1/.01	**0.03**	**<1%**
Lycium	–	–	1/.01	–	–	–	–	–	–	–	1/.02	–	–	–	–	**0.03**	**<1%**
Rosaceae	–	–	–	–	2/.40	7/.42	–	–	–	–	–	–	–	–	1/.01	**0.83**	**3%**
Prunus	–	–	–	–	14/1.75	5/1.08	–	–	–	–	2/.02	–	1/.01	2/.04	–	**2.9**	**11%**
Salicaceae *(Populus/Salix)*	–	–	–	–	–	–	–	–	–	–	–	–	1/.01	–	–	**0.01**	**< 1%**
Sarcobatus/ Atriplex	–	–	–	6/.25	–	2/.02	–	–	16/.13	22/.31	37/.39	–	–	31/.33	20/.38	**2.08**	**8%**
Unknown nonconifer	–	–	9/.08	–	–	–	–	–	1/.01	2/.01	7/.08	5/.17	–	3/.02	–	**0.62**	**2%**
Other:																	
Unknown	–	–	–	–	–	2/.25	–	2/.15	–	–	–	–	–	–	–	**0.4**	**2%**
Total Wood	**20/.40**	**20/.70**	**19/23**	**34/.53**	**205/9.44**	**172/6.07**	**66/.84**	**54/1.92**	**20/.16**	**58/.91**	**75/.97**	**35/1.89**	**17/.17**	**52/.53**	**22/.40**	**25.22**	**100%**

k = kernel, ns = nutshell, s = stem

Table 14.32. LA 104106, Study Unit 3, extramural features, flotation full-sort plant remains (frequency and abundance per liter).

	Fire Pit	
Feature	**5**	**8**
FS	**2350**	**2351**
Sample Volume (l)	**5.24**	**0.32**
Cultural		
Annuals:		
Chenopodium	0.19	–
Portulaca	0.19	–
Cultivars:		
Zea mays	+cupule	+cupule
Noncultural		
Annuals:		
Chenopodium	0.95	6.25
Portulaca	0.19	–

All cultural plant remains are carbonized.
Plant remains are seeds unless indicated otherwise.
+ = 1–10/liter

Table 14.33. LA 116035, Feature 1, flotation plant remains (frequency per liter).

	Thermal Feature, S 1/2	Thermal Feature, N 1/2
FS	**39**	**40**
Sample Volume (l)	**3.78**	**3.47**
Noncultural		
Annuals:		
Chenopodium	0.79	0.29
Grasses:		
Oryzopsis	–	0.58

Table 14.34. Flotation plant remains through time.

Project/ Site	Samples	Annuals	Grasses	Trees	Other Perennials	Cultivars
Basketmaker II LA 32964	25	*Chenopodium* 12% *Helianthus* 4% *Portulaca* 4%	Gramineae 3% *Sporobolus* 3%	*Juniperus* 31%	*Platyopuntia* 5%	*Zea mays* 96%
Basketmaker III LA 104106	75	*Amaranthus* 12% *Cheno-Am* 11% *Chenopodium* 13% *Helianthus* 1% *Mentzelia* 1% *Portulaca* 4% *Salvia* 1%	Gramineae 1% *Oryzopsis hymenoides* 7%	*Pinus edulis* nutshell 15%	*Atriplex canescens* 7% *Cylindropuntia* 1% *Echinocereus* 1% *Platyopuntia* 1%	*Zea mays* 96%
Navajo LA 104106	24	*Amaranthus* 4% *Cheno-Am* 8% *Chenopodium* 50% *Corispermum* 8% *Cycloloma* 4% *Descurainia* 4% *Portulaca* 21%	*Oryzopsis hymenoides* 29%	*Pinus edulis* nutshell 13%	*Lycium* 4%	*Zea mays* 54%

Table 14.35. Flotation wood charcoal through time.

Project/Site	Samples	*Juniperus*	*Pinus*	Other Species
Basketmaker II LA 32964	23	57%	*Pinus edulis* 48%	*Artemisia* 83%
			Pinus ponderosa 9%	*Atriplex/Sarcobatus* 100%
				Cercocarpus 9%
				Compositae 17%
				Cowania 9%
				Lycium 13%
				Rosaceae 17%
				Salicaceae 4%
				unknown conifer 39%
				unknown nonconifer 91%
Basketmaker III LA 104106	44	95%	*Pinus edulis* 86%	*Artemisia* 5%
				Atriplex/Sarcobatus 61%
				Cercocarpus 9%
				Cowania 30%
				Lycium 2%
				Quercus 2%
				Rosaceae 27%
				Salicaceae 2%
				unknown conifer 11%
				unknown nonconifer 11%
Navajo LA 104106	23	96%	*Pinus edulis* 78%	*Artemisia* 17%
				Atriplex/Sarcobatus 48%
				Cercocarpus 9%
				Chrysothamnus 9%
				Compositae 9%
				Cowania 26%
				Quercus 9%
				Populus/Salix 13%
				unknown nonconifer 61%
				unknown conifer 57%

species composition could be associated with the collection of driftwood from intermittent washes (demonstrated as a viable possibility by Reed and Walle for the NSEP project; A. Reed 1999:12–16, 12-41-42), making selection of fuel wood random explaining the presence of several species that were not available on the Tohatchi Flats.

Basketmaker III sites are compared in Tables 14.38 and 14.39. The N-33 road extends between Red Valley and Cove, Arizona in Apache County. The project was at the northern extent of the Chuska Valley, where N-33 runs through Redrock Valley, bordered by the Lukachukai Mountains on the west, the Carrizo Mountains to the northwest and the San Juan Basin to the east. The N30–N31 road is between Mexican Springs and Navajo, New Mexico in the Tohatchi Flats approximately 6 to 12 miles (9.7 to 19.3 km) northwest of the current project.

Corn was the most common taxon recovered from all Basketmaker III sites compared in Table 14.38., except for the N-33 project where goosefoot had a higher percent presence. Squash was recovered at three of the sites compared and beans at two. Of all the weedy annual taxa recovered from projects, the 87 percent goosefoot found at N-33 and the 54 percent goosefoot at LA 16029 were the highest percentages. Otherwise, diversity of weedy annuals is high, but percent presence is low. Ricegrass was the only grass that shows up at all five projects. Common reedgrass, present at N33 and N30–N31, probably represents remnants of roof closing material. Perennial plant diversity greatly increases from that documented for the Basketmaker II, and includes more cacti species, yucca, datura, and sedge family plants. As during the Basketmaker II period, saltbush, juniper, and piñon continue to be consis-

Table 14.36. Comparison of carbonized flotation plant remains from Basketmaker II sites in the Chuska Valley (percent of samples found).

Project/ Site	Samples	Annuals	Grasses	Trees	Other Perennials	Cultivars
NSEP [LA 6444] [1]	26	*Amaranthus* 58%	*Bouteloua* 8%	*Juniperus* 8%	*Atriplex canescens* 23%	*Cucurbita* 23%
		Cheno-Am 81%	*Elymus* 4%	*Pinus edulis* nutshell 19%	*Opuntia* 4%	*Zea mays* 100%
		Chenopodium 62%	Gramineae 50%			
		Corispermum 62%	*Oryzopsis hymenoides* 27%			
		Cycloloma 12%				
		Descurainia 12%	*Sporobolus* 8%			
		Helianthus 19%				
		Lepidium 12%				
		Portulaca 31%				
NSEP [LA 6448] [2]	27	*Acanthochiton wrightii* 4%	*Elymus* 4%	*Juniperus* 7%	*Atriplex canescens* 56%	*Cucurbita* 4%
		Amaranthus 37%	*Oryzopsis hymenoides* 41%			*Zea mays* 100%
		Cheno-Am 67%	*Sporobolus* 11%			
		Chenopodium 48%				
		Cleome 11%				
		Corispermum 26%				
		Cycloloma 19%				
		Descurainia 11%				
		Helianthus 30%				
		Iva 7%				
		Portulaca 11%				
		Salvia 7%				
NSEP [LA 80419] [3]	18	*Amaranthus* 67%	*Oryzopsis hymenoides* 6%	*Juniperus* 6%	*Atriplex canescens* 83%	*Cucurbita* 94%
		Cheno-Am 78%		*Pinus edulis* nutshell 94%		*Zea mays* 89%
		Chenopodium 56%				
		Cleome 6%				
		Corispermum 22%				
		Cycloloma 28%				
		Descurainia 11%				
		Helianthus 33%				
		Iva 6%				
		Portulaca 11%				
ENRON [LA 88526] [4]	22	*Amaranthus* 36%	*Oryzopsis hymenoides* 5%	*Juniperus* 5%	*Echinocereus* 5%	*Zea mays* 50%
		Cheno-Am 18%		*Pinus edulis* nutshell 9%	*Lycium* 5%	
		Chenopodium 68%			*Opuntia* 5%	
		Corispermum 41%				
		Lepidium 5%				
		Portulaca 5%				
Twin Lakes [LA 32964] [5]	25	*Chenopodium* 12%	Gramineae 3%	*Juniperus* 31%	*Platyopuntia* 5%	*Zea mays* 96%
		Helianthus 4%	*Sporobolus* 3%			
		Portulaca 4%				

[1](Freuden 1998c:Tables 9.22, 9.23, and 9.24); [2](Baught et al. [ed.] 1998b:Appendix B); [3](Freuden 1998b:Tables 8.24 and 8.25); [4](Hammett and McBride 1993b:Table 65); [5](Current report, Tables).

Table 14.37. Comparison of flotation wood charcoal from Basketmaker II sites in the Chuska Valley (percent of samples found).

Project/ Site	Samples	*Juniperus*	*Pinus*	Other Species
NSEP [LA 6444][1]	26	77%	*Pinus* 73% *Pinus edulis* 15%	*Amelanchier* 54%
				Atriplex/Sarcobatus 100%
				Cercocarpus 15%
				Chrysothamnus 92%
				Cowania 4%
				Forestiera 65%
				Lycium 4%
				Quercus 23%
				Purshia 4%
				Rhus 12%
				Rosaceae 62%
				Salicaceae 35%
				unknown conifer 81%
NSEP [LA 6448][2]	28	6%	*Pinus* 14%	*Atriplex/Sarcobatus* 96%
				Chrysothamnus 54%
				Lycium 7%
				Quercus 4%
				Salicaceae 36%
NSEP [LA 80419][3]	18	6%	*Pinus* 22%	*Atriplex/Sarcobatus* 94%
				Chrysothamnus 33%
				Quercus 6%
				Salicaceae 67%
				unknown conifer 50%
ENRON [LA 88526][4]	22	73%	*Pinus* 68%	*Artemisia* 5%
				Atriplex/Sarcobatus 5%
				cf. *Pseudotsuga* 5%
				Quercus 9%
				Rhus trilobata 5%
				Salicaceae 5%
				unknown conifer 64%
				unknown nonconifer 5%
Twin Lakes [LA 32964][5]	23	57%	*Pinus edulis* 48% *Pinus ponderosa* 9%	*Artemisia* 83%
				Atriplex/Sarcobatus 100%
				Cercocarpus 9%
				Compositae 17%
				Cowania 9%
				Lycium 13%
				Rosaceae 17%
				Salicaceae 4%
				unknown conifer 39%
				unknown nonconifer 91%

[1] (Freuden 1998c:Tables 9.22, 9.23, and 9.24); [2] (Baught et al. [ed.] 1998b:Appendix B);
[3] (Freuden 1998b:Tables 8.24 and 8.25); [4] (Hammett and McBride 1993:Table 65);
[5] (Current report, Tables).
cf. = resembles taxon

Table 14.38. Comparison of carbonized flotation plant remains from Basketmaker III sites in Chaco Canyon and the Chuska Valley (percent of samples found).

Project/ Site	Sample Count	Annuals	Grasses	Trees	Other Perennials	Cultivars
Chaco (BM III/PI) [29SJ299, 29SJ423, 29SJ628, 29SJ721, 29SJ724, 29SJ1659][1]	91	*Amaranthus* 1%	*Oryzopsis hymenoides* <1%	*Juniperus* 13%	*Atriplex* 8%	*Cucurbita* 2%
		Chenopodium 12%		*Pinus edulis* 3%	*Sphaeralcea* 1%	*Zea mays* 53%
		Corispermum 6%				
		Cycloloma 4%				
		Descurainia 3%				
		Nicotiana 5%				
		Portulaca 5%				
		Xanthium 1%				
Little Water (BM III/PI) [LA 16029][2]	24	*Amaranthus* 8%	Gramineae 8%	*Juniperus* 17%	*Atriplex* 8%	*Zea mays* 71%
		Chenopodium 54%	*Oryzopsis hymenoides* 17%	*Pinus edulis* 21%		
		Cheno-Am 21%	*Sporobolus* 4%			
		Cycloloma 25%				
		Descurainia 4%				
		Mentzelia 4%				
		Physalis 4%				
		Portulaca 13%				
N33 Cove and Redrock Valley [AZ-I-25-47, AZ-I-26-37, AZ-I-26-41][3]	31	*Amaranthus* 3%	*Eragrostis* 3%	*Juniperus* 6%	*Asclepias* 3%	*Cucurbita* 10%
		Cheno-Am 10%	Gramineae 26%	*Pinus* conescale 13%	*Atriplex* 3%	cf. *Phaseolus* 6%
		Chenopodium 87%	*Oryzopsis hymenoides* 29%		cf. *Carex* 6%	*Phaseolus* 3%
		C. berlandieri 10%	*Phragmites* 55%		Cyperaceae 3%	*Zea mays* 77%
		Cleome 3%	cf. *Sporobolus* 6%		*Mammillaria* 3%	
		Corispermum 23%	*Sporobolus* 3%		*Opuntia* 3%	
		cf. *Descurainia* 6%			*Scirpus* 3%	
		Helianthus 6%			*Yucca* 3%	
		Nicotiana 6%				
		Portulaca 16%				
		Salvia 13%				
N30-N31 [Period A: Antechamber architecture][4]	194	*Amaranthus* 7%	Gramineae 46%	*Juniperus* 44%	*Atriplex* 14%	*Cucurbita* 1%
		Cheno-Am 46%	*Oryzopsis hymenoides* 9%	*Pinus* 70%	Cactaceae 5%	*Phaseolus* 2%
		Chenopodium 3%	*Phragmites* 28%	*Pinus edulis* 14%	Cyperaceae 1%	*Zea mays* 82%
		Cleome 1%	*Sporobolus* 2%		*Datura* 1%	
		Corispermum 20%			*Echinocereus* 1%	
		Cycloloma 5%			*Opuntia* 1%	
		Helianthus 8%			*Platyopuntia* 3%	
		Nicotiana 5%			*Sphaeralcea* 2%	
		Physalis 3%			*Yucca* 14%	
		Portulaca 8%				
Twin Lakes [LA 104106][2]	75	*Amaranthus* 12%	Gramineae 1%	*Pinus edulis* nutshell 15%	*Atriplex canescens* 7%	*Zea mays* 96%
		Cheno-Am 11%	*Oryzopsis hymenoides* 7%		*Cylindropuntia* 1%	
		Chenopodium 13%			*Echinocereus* 1%	
		Helianthus 1%			*Platyopuntia* 1%	
		Mentzelia 1%				
		Portulaca 4%				
		Salvia 1%				

[1](Toll 1993: Table 25); [2] (Struever 1982: Table 60); [3](McVickar 1999:Tables 25-7, 25-11, and 25-13); [4](Brandt 1999: Table 13.13);
[5](Current report, Tables); cf. = resembles taxon

Table 14.39. Comparison of flotation wood charcoal from Basketmaker III sites in Chaco Canyon and the Chuska Valley (percent of samples found).

Project/ Site	Samples	*Juniperus*	*Pinus*	Other Species
Chaco (BM III/PI) [29SJ299, 29SJ423, 29SJ628, 29SJ721, 29SJ724, and 29SJ1659] [1]	26	69%	*Pinus* 8% *Pinus edulis* 19% *Pinus ponderosa* 19%	*Artemisia* 46% *Atriplex/Sarcobatus* 81% *Chrysothamnus* 19% cf. *Eurotia* 4% cf. *Gutierrezia* 8% *Lycium* 12% Rosaceae 23% Salicaceae 46% unknown conifer 31% unknown nonconifer 54%
N-33 [AZ-I-25-47, AZ-I-26-37, AZ-I-26-41] [2]	31	97%	*Pinus* 48% *Pinus edulis* 29%	cf. *Amelanchier* 3% *Artemisia* 29% *Atriplex/Sarcobatus* 61% *Cercocarpus* 6% *Chrysothamnus* 6% *Pseudotsuga menziesii* 39% *Quercus* 29% Rosaceae 3% Salicaceae 77% unknown conifer 26%
N30-N31 [Period A: Antechamber architecture] [3]	47	83%	*Pinus* 9% *Pinus edulis* 66% *Pinus ponderosa* 49%	*Amelanchier* 15% *Atriplex/Sarcobatus* 38% *Cercocarpus* 21% *Chrysothamnus* 9% Compositae 4% *Cowania* 13% *Ephedra* 6% *Fraxinus* 9% *Quercus* 6% *Rhus* 4% Salicaceae 17% unknown conifer 17% unknown nonconifer 6%
Twin Lakes [LA 104106] [4]	44	95%	*Pinus edulis* 86%	*Artemisia* 5% *Atriplex/Sarcobatus* 61% *Cercocarpus* 9% *Cowania* 30% *Lycium* 2% *Quercus* 2% Rosaceae 27% Salicaceae 2% unknown conifer 11% unknown nonconifer 11%

[1] (Toll 1993: Tables 3, 9, 13, 15, 18, 23); [2] (McVickar 1999: Tables 25-8, 25-12, and 25-14);
[3] (Brandt 1999: Table 13.18); [4] (Current report, Tables).
cf. = resembles taxon

tent perennial resources utilized during the Basketmaker III period.

The most marked difference in wood assemblages between the Basketmaker II and Basketmaker III periods was the increase in the percent presence of juniper, compared to saltbush/greasewood, as the dominant wood taxon recovered. One exception is on the N-33 project where juniper was most common (Table 14.39). Pines also increased greatly in ubiquity during the Basketmaker III period, and together with the increase in juniper collection, may indicate a cultural shift in wood procurement preferences. Non-conifer wood taxa continued to be diverse particularly at N30–N31, and as in the Basketmaker II, ubiquities of all but saltbush/greasewood are low. Once again, variation in ubiquity of taxa may be a function of driftwood collection.

Only three projects with sites dating to the Navajo period are found in the Tohatchi Flats, the rest are in the San Juan Basin or Navajo Reservoir area (Table 14.40, perhaps indicating a change in settlement pattern in which higher elevation locales near permanent water sources were targeted. The Navajo sites on the Arkansas Loop, Trunk S, and Fruitland projects have diverse weedy annual assemblages compared to those of other projects. The differences are not due to sample size disparity (Fruitland with only 4 samples had as many annual taxa as Arkansas Loop with 106 samples); neither can they be attributed to site type because Fruitland samples derived solely from several areas of a single midden and samples from the N30–N31 and Cortez CO_2 projects with few weedy annuals consistently came from hogans, middens, and extramural features. There were either real differences in diet, variability in the duration of occupation, or the vagaries of preservation were at work.

Corn was either absent or had a relatively low percent presence compared to earlier time periods. One sample from the Trunk S project provided evidence of beans, the only other cultivar recovered from Navajo sites. Grasses also made a limited appearance in the record, while juniper and piñon were the most common perennial plant taxa recovered.

The strong focus on juniper as fuel material by Navajo populations is illustrated in Table 14.41. Even at Twin Lakes, N30–N31, and NSEP, project areas in the Plains and Great Basin grassland biotic community where shrubs like saltbush or greasewood are more abundant, juniper was the dominant wood taxon. The Navajo preference for juniper has been noted previously by Toll (1983:337) at Navajo Mines where despite the site's location at some distance from abundant juniper, it was the most common wood taxon recovered in flotation samples. The Navajo Mine sites primarily date to the early and mid-twentieth century and Toll assumes the majority of juniper was brought in by pick-up trucks. Inhabitants of the three Tohatchi Flats sites did not have that luxury, as they date to the Dinetah, Gobernador, and Cabezon periods, where even in the later Cabezon period, vehicles were probably not readily available, although wagons were a viable option.

The high diversity of shrubby woods at Trunk S and Twin Lakes demonstrates a longer period of site occupation and at Twin Lakes, the possible continuation of driftwood collection.

Summary and Conclusions

Flotation and macrobotanical analysis results indicate a subsistence regime based on maize agriculture and collection of agrestals along with a few perennial and grass species began early in the Basketmaker II period and continued into the Cabezon phase of the Navajo occupation of the Twin Lakes area. Caching behaviors at LA 32964 suggest the return of the same family groups to the site possibly for generations and that the site was probably that part of a seasonal round that concentrated on corn agriculture. The presence of structures and storage features suggests that LA 104106 was occupied on a more permanent basis and was an inviting enough location to attract the reoccupation of the site by the Navajo.

Carbonized seeds from Basketmaker II contexts at LA 32964 are from plants that mature in the late summer and early fall, indicating occupation during the growing season for corn at the very least. Plant remains from all occupations at LA 104106 yielded carbonized ricegrass seeds, one of the first resources available in the spring, as well as seeds from a larger variety of plants available throughout late summer and fall indicating, if not year-round, a longer duration of occupation.

Table 14.40. Comparison of carbonized flotation plant remains from Navajo sites in the Navajo Reservoir area, San Juan Basin, and Chuska Valley (percent of samples found).

Project/Site	Samples	Annuals	Grasses	Trees	Other	Cultivars
ENRON [1]	6	*Amaranthus* 50%	Gramineae 17%	*Juniperus* 50%	*Astragalus* 17%	–
(AD 1850–early 1900s)		*Chenopodium* 67%			*Opuntia* 17%	
[LA 17383, LA 83941,		*Cheno-Am* 50%			*Verbena* 17%	
LA 88264]		*Portulaca* 33%				
N30-N31[2]	11	*Helianthus* 9%	*Oryzopsis hymenoides* 9%	*Juniperus* 9%	*Astragalus* 9%	*Zea mays* 63%
(Period J: AD 1800–		*Portulaca* 18%	*Sporobolus* 9%	*Pinus edulis* 9%	Compositae 9%	
early 1900s)					*Croton* 9%	
[LA 61953]						
Fruitland [3]	4	*Amaranthus* 100%		*Juniperus* 25%	*Yucca* 25%	*Zea mays* 100%
[LA 104202]		*Chenopodium* 100%				
		Cleome 50%				
		Cycloloma 25%				
		Descurainia 25%				
		Mentzelia 25%				
		Nicotiana 25%				
		Portulaca 100%				
Arkansas Loop [4]	106	*Amaranthus* 1%	Gramineae 5%	*Juniperus* 31%	*Artemisia* 2%	*Zea mays* 18%
[LA 79097, LA 80315,		*Chenopodium* 3%	*Oryzopsis hymenoides* 5%	*Pinus* 20%	*Quercus* 1%	
LA 80316, LA 80318,		*Cheno-Am* 12%	*Sporobolus* 1%	*Pinus edulis* 15%	*Rhus* 1%	
LA 80319, LA 80321,		*Cleome* 1%			*Platyopuntia* 1%	
LA 80910, LA 80911,		*Helianthus* 2%			*Yucca* 4%	
LA 80963, LA 81169,		*Mentzelia* 1%				
LA 81172, LA 81175]		*Nicotiana* 1%				
		Portulaca 1%				
NSEP [5]	12	*Chenopodium* 8%	*Oryzopsis hymenoides* 8%		*Astragalus* 8%	*Zea mays* 50%
[LA 80986]		*Cheno-Am* 83%	*Sporobolus* 17%		*Juncus* 8%	
		Corispermum 17%			*Juniperus* 33%	
		Nicotiana 8%				
Cortez CO2 [6]	16	*Amaranthus* 13%	*Sporobolus* 6%			*Zea mays* 31%
[LA 38946, LA 38949,		*Chenopodium* 19%				
LA 38951, LA 44533]		*Corispermum* 6%				
		Descurainia 6%				
		Portulaca 13%				
Morris I [7]	11	*Chenopodium* 27%		*Juniperus* 9%		*Zea mays* 27%
[LA 11196, LA 88766]		*Cheno-Am* 18%				
		Descurainia 9%				
		Portulaca 18%				
Morris[8]	21	*Amaranthus* 14%	Gramineae 24%	*Juniperus* 19%	*Atriplex* 10%	*Phaseolus* 5%
		Chenopodium 62%	*Oryzopsis hymenoides* 5%	*Pinus edulis* 38%	*Echinocereus* 5%	*Zea mays* 57%
		Cheno-Am 62%	*Sporobolus* 29%		*Opuntia* 14%	
		Corispermum 14%			*Rhus* 19%	
		Cycloloma 19%			*Yucca* 5%	
		Descurainia 19%			*Yucca baccata* 24%	
		Helianthus 19%				
		Mentzelia 10%				
		Nicotiana 14%				
		Physalis 5%				
		Portulaca 24%				
Twin Lakes [9]	24	*Amaranthus* 4%	*Oryzopsis hymenoides* 29%	*Pinus edulis* nutshell 13%	*Lycium* 4%	*Zea mays* 54%
[LA 104106]		*Cheno-Am* 8%				
		Chenopodium 50%				
		Corispermum 8%				
		Cycloloma 4%				
		Descurainia 4%				
		Portulaca 21%				

[1] (McBride 1993: Tables 78, 79, 80); [2] (Brandt 1999: Table 13.13); [3] (Matthews 1996: Table F.2); [4] (Brandt 1994: Table 26-7);
[5] (Latady and Goff 1996: Table 17.11); [6] (Toll 1985: Table II.12); [7] (Toll and McBride 1997: Tables 1, 2);
[8] (Toll and McBride 1998: Tables 1, 9); [9] (Current report, Tables).

Table 14.41. Comparison of flotation wood charcoal from Navajo sites in Navajo Reservoir area, San Juan Basin, and Chuska Valley (percent of samples found).

Project/ Site	**Samples**	***Juniperus***	***Pinus***	**Other Species**
Transwestern (AD 1850–early 1900s) [LA 17383, LA 83941, LA 88264] [1]	6	100%	*Pinus* 50% *Pinus edulis* 17%	*Chrysothamnus* 19% *Ephedra* 19%
N30-N31(Period J: AD 1800–early 1900s) [LA 61953, LA 61964, LA 61965] [2]	12	100%	*Pinus* 50% *Pinus edulis* 33%	*Atriplex* 8% unknown conifer 58%
Fruitland [LA 104202] [3]	4	100%	*Pinus edulis* 75%	*Quercus* 50% unknown nonconifer 50%
Arkansas Loop [LA 79097, LA 80315, LA 80316, LA 80318, LA 80319, LA 80321, LA 80910, LA 80911, LA 80963, LA 81169, LA 81172, LA 81175] [4]	108	90%	*Pinus* 18% *Pinus edulis* 40% *Pinus ponderosa* 5%	*Artemisia* 20% *Atriplex* 5% *Ephedra* 3% *Quercus* 8% unknown conifer 35% unknown nonconifer 3%
NSEP [LA 80986] [5]	12	100%		*Artemisia* 8% *Populus* 8%
Cortez CO2 [LA 38946, LA 38949, LA 38951, LA 44533] [6]	8	100%	*Pinus edulis* 50%	*Atriplex* 25% unknown conifer 13% unknown nonconifer 13%
Morris I [LA 11196, LA 88766] [7]	11	100%	*Pinus* 27% *Pinus edulis* 73% *Pinus ponderosa* 9%	*Artemisia* 18% *Cercocarpus* 27% *Chrysothamnus* 9% unknown conifer 82%
Trunk S [LA 78178, LA 79496] [8]	21	100%	*Pinus* 24% *Pinus edulis* 52%	cf. *Acer negundo* 9% cf. *Amelanchier* 10% *Artemisia* 24% *Atriplex/Sarcobatus* 19% cf. *Cercocarpus* 9% cf. *Lycium* 9% *Populus/Salix* 9% *Quercus* 9% Rosaceae 10% unknown nonconifer 10%
Twin Lakes [LA 104106] [9]	23	96%	Pinus edulis 78%	*Artemisia* 17% *Atriplex/Sarcobatus* 48% *Cercocarpus* 9% *Chrysothamnus* 9% Compositae 9% *Cowania* 26% *Quercus* 9% *Populus/Salix* 13% unknown nonconifer 61% unknown conifer 57%

[1] (McBride 1993: Tables 78, 79, 80); [2] (Brandt 1999: Table 13.14); [3] (Matthews 1996: Table F.2);
[4] (Brandt 1994: Table 26-15); [5] (Latady and Goff 1996: Table 17.11); [6] (Toll 1985: Table II.7);
[7] (Toll and McBride 1997:Table 3); [8] (Toll and McBride 1998: Tables 2, 10); [9] (Current report, Tables).
cf. = resembles taxon

15 | Discussions and Conclusions

The Twin Lakes project has provided new and important information about the occupation, land use, and subsistence practices pursued in the southern Chuska Valley during the Basketmaker II, Basketmaker III, and early historic Navajo periods. Although Basketmaker III occupations in the area have been recognized and studied for decades, Basketmaker II and pre-Bosque Redondo Navajo occupations, until relatively recently, have rarely been identified or systematically investigated. Patterns in chronometric data, material culture, and occupation locations offer an opportunity to examine changes in settlement, subsistence, and interaction behaviors for these different periods.

Basketmaker II

In examining Basketmaker II chronology in the southern Chuska Valley, Kearns (1996) points out that phases should be defined by changes in a suite of material remains that correspond to trends in chronometric data. Unlike the temporal control provided by Basketmaker III dendrochronologic and associated ceramic data and their high visibility in the southern Chuska Valley, changes in Basketmaker II developments are more challenging to recognize. This is due, in part, to variations in site function and the relatively high mobility of residential group(s). Also, the dating of Basketmaker II occupations cannot benefit from the ceramic-based chronologies and other dating methods, such as radiometric techniques, do not allow researchers to distinguish between occupations that occurred during or between generations. This challenge is compounded by the fact that relatively few Basketmaker II sites have been identified in the southern Chuska Valley compared to the northern Colorado Plateau. Nevertheless, through the use of statistically similar suites of radiometric dates and feature data (i.e., contents, morphology, and condition) from the Twin Lakes project Basketmaker II components and other Basketmaker II components, the chronology presented by Kearns (1996b) may be refined and settlement and subsistence practices may be illuminated for this period.

Many of the early Basketmaker II sites investigated in the southern Chuska Valley and San Juan Basin are spatially extensive, extending beyond the limits of various data recovery projects. This suggests that Basketmaker II populations occupied dispersed habitation and activity areas. These populations relied heavily on woody perennial trees and shrubs, especially juniper and *Atriplex*, for building materials, fuel, and possibly in the case of *Atriplex*, as a food additive. During the growing season, corn agriculture was a primary economic pursuit supplemented by the gathering and processing of wild annual plants and seeds. The capture and processing of small mammal species, including cottontail, jackrabbit, and rodents, were also common economic activities. Long-term on-site storage is not widely reported from Basketmaker II sites (Lipe 1993), however small, short-term storage features similar to those identified at LA 32964 are common. During the growing season, early Basketmaker II Ear Rock phase communities in the southern Chuska Valley appear to have focused on a generalized economy of corn agriculture and exploitation of the desert scrub environment (Wills and Huckell 1994:51).

In the Twin Lakes project area, open-air Ear Rock phase settlements included two or three shallow pit structures with and without intramural features. Structures with internal features, few thermally altered, were interpreted as habitation structures and structures that lacked internal features were interpreted as storage structures or work areas. Spatially associated extramural activity areas contained a range of features, sometimes superimposed. Most features were shallow basins, less than 40 cm in diameter. Fewer steep-sided, slab-lined, or bell-shaped pits are reported. While thermal alteration or oxidation was infrequent and often patchy among basin features (n = 1 [7 percent]), well-oxidized feature limits were more commonly identified in deeper features (n = 4 [29 percent]) than shallow facilities. This pattern suggests a difference in feature function. Perhaps basin features were more suited to a variety of mundane needs such as heating, parching, and cooking while deeper pits served more specialized roles such as baking or roasting. The size and morphology of these features suggests that long-term on-site storage of biotic resources was not emphasized.

Culture material was diverse at these early Basketmaker II sites, yet the quantity of cultural material at habitation locations was limited compared to that reported from processing and production locations. Among habitation areas, lithic artifacts, derived primarily from locally available raw materials, are represented by flake stone debitage resulting from core reduction and few battered or fragmentary bifacial tools. At processing areas, there was greater evidence of bifacial tool maintenance or manufacture derived from both local and nonlocal material types. Remnant cortex patterns combined with flake dimensions associated with these assemblages strongly suggests that these materials were reduced elsewhere and transported to these locations by the Basketmaker II occupants for further refinement. Nonlocal material types included Narbona Pass chert, Zuni Mountain chert, and obsidian. It is likely that these materials were acquired through interaction with surrounding communities or extended families and were generally not derived directly from their primary sources. The lithic technology of these early Basketmaker II occupants suggest that they were seasonally mobile yet remained within the catchment area of these raw material types. Perhaps these early agriculturalists farmed the lowlands and retreated to higher elevations around the perimeter of the valley for the winter and then returned seasonally to the family or group farming location during the spring.

Ground stone tools, when present, consisted of indeterminate fragments, one-hand manos, milling slabs, and basin metates. Sometimes these tools were cached within features and fragments refit into single tools. Notably, few whole transportable ground stone tools, such as manos or abraders were recovered from these early agricultural sites (cf. Dello-Russo 1997:146). Patterns in flake stone debitage showed an emphasis on small bifacial tool maintenance or manufacture from previously reduced core lithic material. Spatial patterning of these materials suggest the occupants maintained extramural space, keeping processing areas relatively free of flake stone debris. This behavior combined with cached ground stone tools, indicates logistical hunting preparation and the anticipated reoccupation of a particular site to pursue agricultural activities were common.

The faunal assemblages consisted of burned, fragmentary, small mammal bone with few examples of artiodactyl remains. The repeated and redundant use of these faunal species indicates a persistence in subsistence practices. The macrobotanical assemblages were dominated by perennial trees and shrubs. However, wild annual seeds and corn were also commonly identified. Although these favorable flood water agricultural locations may have attracted independent farming groups or families, extramural areas at some repeatedly occupied locations were also maintained free of bone and burned botanical debris. This behavior indicates the planned use of space expressed as a maintainable site structure that suggests the occupants had prior knowledge of the extramural spatial organization or site activity spaces (Binford 1978; 1982). The settlement and reoccupation of similar locations over several hundred years may also indicate the emergence of some type of land tenure system during this time.

Basketmaker II populations occupied the southern Chuska Valley, especially Tohatchi Flats, by 800 cal BC and continually or repeatedly occupied this area until approximately AD 200. The size, frequency, and spatial patterning of habitation sites indicates that the early Basketmaker II communities, during the growing season, were likely comprised of several extended families inhabiting prime locations along the margins of the valley floor. These locations offered expanses of agricultural land and access to upland resources including water, plants, flake stone, and animals. Based on the spatial distribution of these components, intervening space between settlements may have reduced competition for resources supporting the observation of a land tenure system (see Fig. 5.42). During the winter months these groups likely dispersed to more protected locations such as wooded upland areas or perhaps rock shelters, transporting processed foodstuffs and ready made tools needed for anticipated logistical forays.

Statistically similar suites of radiocarbon dates obtained from published reports indicate that prior to 3000 BC, occupations in the southern Chuska Valley were temporally and spatially dispersed. In addition, Early Archaic sites were relatively rare compared to identified San Jose phase sites, which were more common, especially during the period from 2500 to 2000 cal BC (cf. Vierra 1994a:389). Although the relative frequency of San Jose phase sites was higher, occupations were still temporally and spatially disbursed. Again, dated contexts during the Armijo phase of the Late Archaic period are few in number and are widely separated in time and space. It is not until the widespread dependence on corn agriculture, which ushered in the early Basketmaker II Ear Rock phase (800–300 cal. BC), that sites became more numerous and dated contexts overlapped to form suites of statistically similar temporal ranges (Fig. 15.1). These groups of statistically similar dates, combined with feature data, can be used to model temporal changes to settlement and subsistence to refine the chronology for this early period in the southern Chuska Valley.

During the Ear Rock phase, feature morphology, oxidation, evidence of caching, economic interest, and estimated volume are consistent with preceding Archaic-period features, until approximately 250 BC (Tables 15.1, 15.2, 15.3). Continuity in feature technology and contents indicate that, although agriculture was a perused economic activity, seasonal mobility remained high and generalized subsistence practices remained stable. It was not until the subsequent phase (400[250] BC–AD 100[200]) that significant changes in dated contexts and feature characteristics occurred.

The Figueredo phase, defined using radiocarbon dates and feature data, follows the Ear Rock phase. During this phase there was a significant increase in the number of dated contexts, the ubiquity of cultigens (Tables 15.1, 15.2, 15.3), the amount of estimated feature volume, and the variety of feature types (Fig. 15.2). Some Figueredo phase sites have clusters of large, oxidized bell-shaped pits, which may indicate organized communal labor used to harvest and roast agricultural produce. These fire-hardened pits became de facto storage cists used to cache tools, food, or human remains, hinting at the groups' anticipated return within a relatively short period of time. In addition to an increase in feature volume, oxidation, and caching behavior, the frequency of fire-cracked rock and unburned bone also increases (Table 15.4). Interestingly, burned bone frequencies appear to be similar to the preceding Ear Rock phase suggesting that the exploitation of small mammals was an enduring subsistence practice perhaps linked to the creation and maintenance of agricultural plots. Spatially, Figueredo phase sites are positioned along washes or arroyos and in similar if not identical locations as Ear Rock phase sites. Together, suites of contemporaneous features, anticipated sequential reoccupation of land forms, and on-site storage during this period suggests agricultural intensification and that "place" was becoming more significant, perhaps signaling an emerging land tenure system (Adler 1994, 1996b; Kearns 1996c). Alternatively, these locations were the most favorable or productive areas for flood water farming.

By AD 100, the frequency of dated contexts in the southern Chuska Valley and San Juan Basin tails off with only three dates reported from the AD 100–400 time interval, suggesting an interruption in occupation. Interesting, this is precisely the time period when there was an increase in the frequency of dated contexts on the northern Colorado Plateau (cf. Berry 1982, Fig. 10; Geib and Spurr 2000, Fig. 9.4; Charles et al. 2006, Fig. 2; Matson 1994). In addition, large bell-shaped pits yielding abundant corn, a high volume of on-site storage, and flood water farming practices were also reported. Although this could simply be the result of sampling error in each area, these trends could represent population movement from south to north. The bloom of dated contexts on the northern Colorado Plateau during the AD 100–300 could represent a population increase, while the paucity of dates in the southern Chuska Valley could represent an occupational hiatus. This hiatus ends with the reoccupation of the area by ceramic-bearing Basketmaker III groups between AD 300–400. A refined chronology for

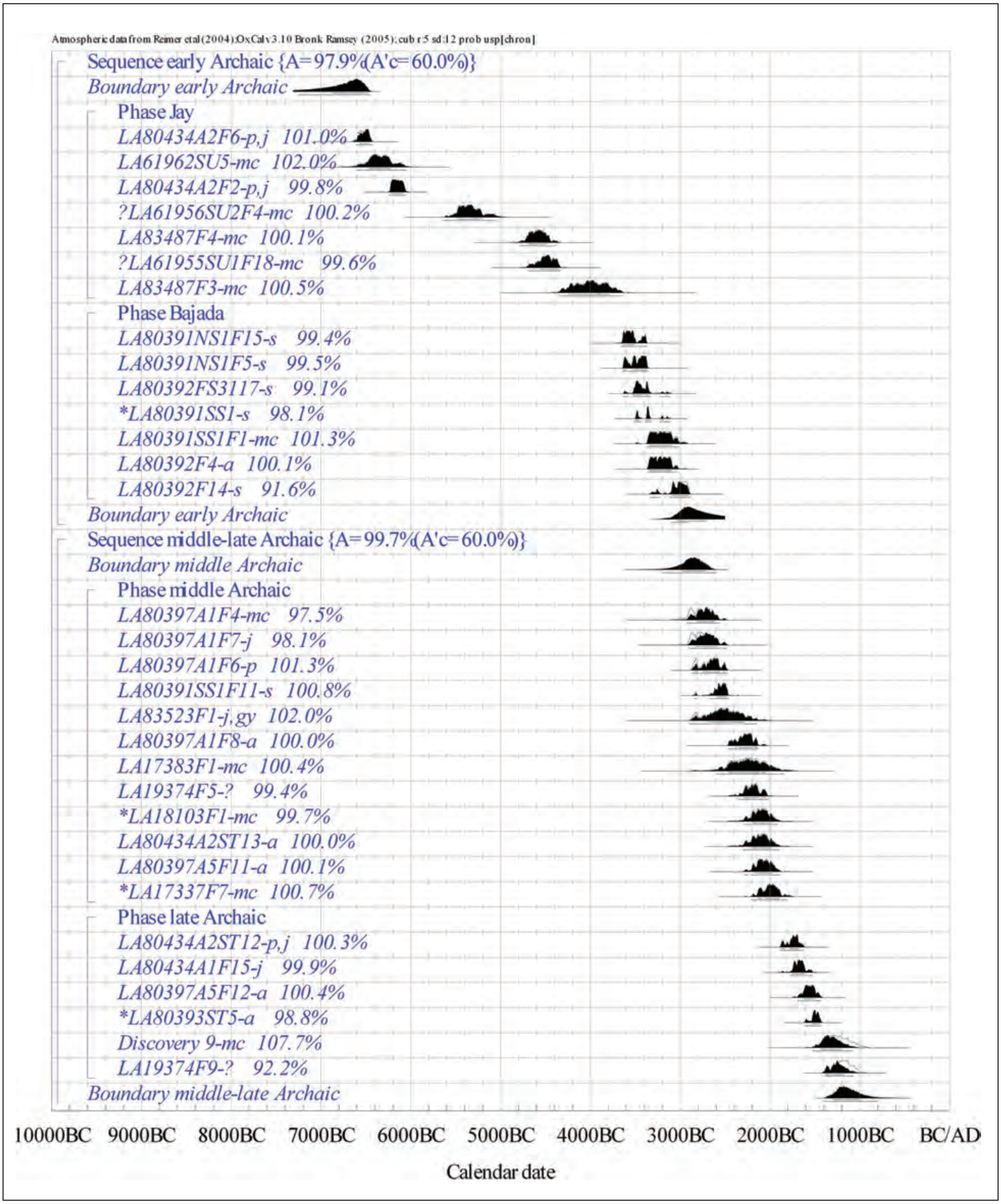
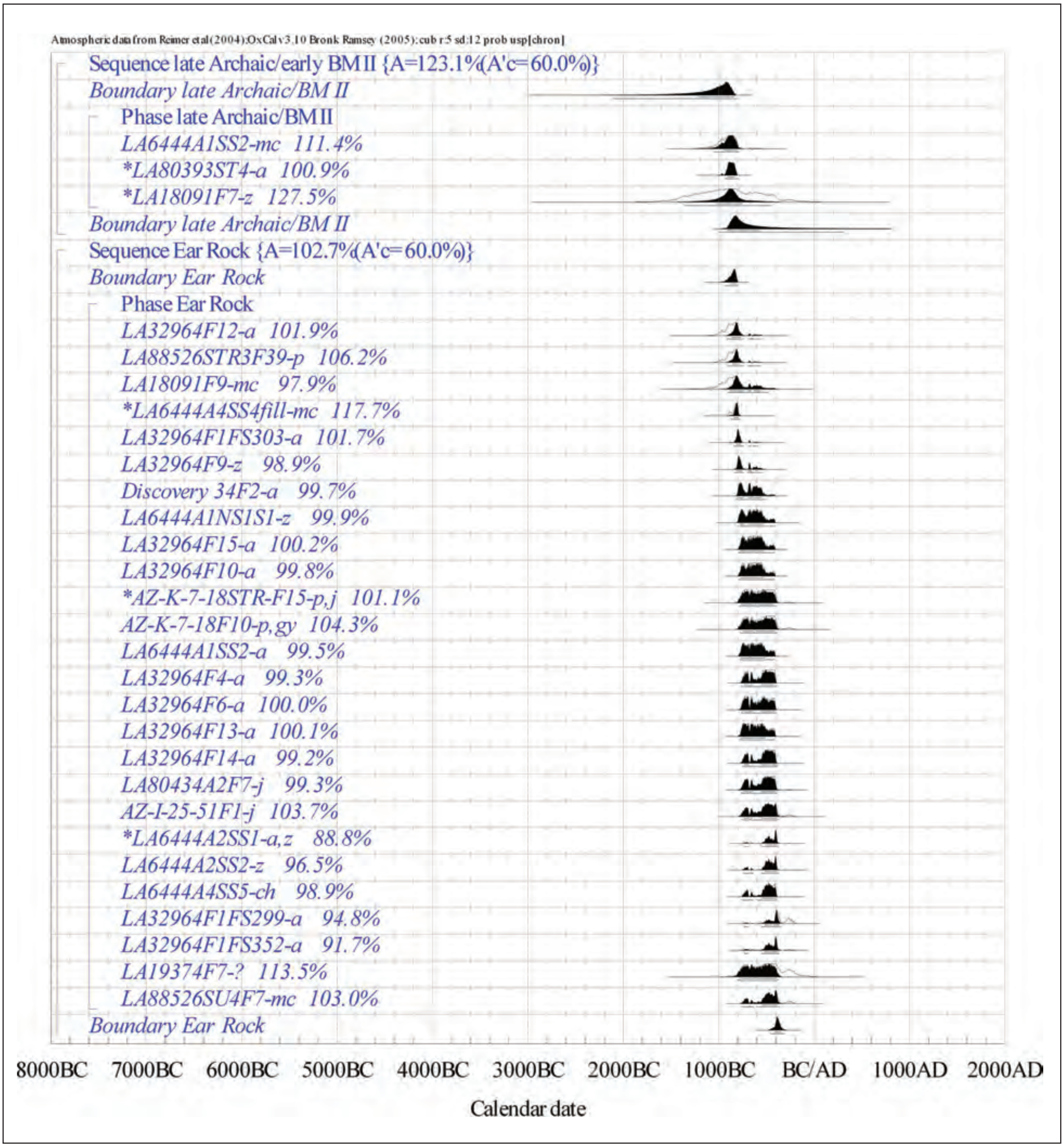
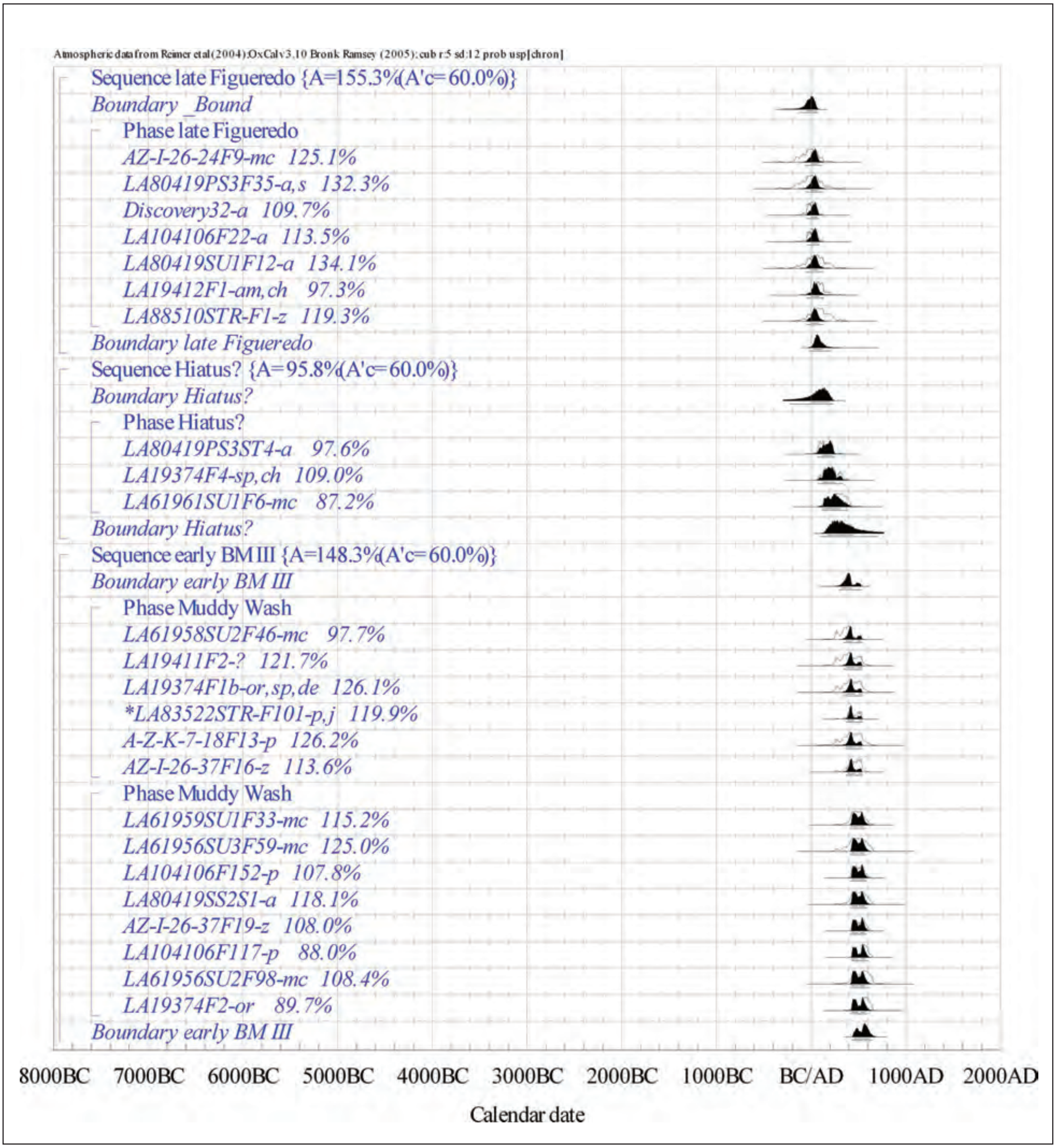


Figure 15.1. Modeled radiocarbon dates for the middle Archaic–early Basketmaker III period.



(Figure 15.1, continued)

(Figure 15.1, continued)



(Figure 15.1, continued)

Table 15.1. Archaic–Basketmaker II occupation period by estimated feature volume.

		Estimated Volume (cu m)		
Occupation Period	**Calibrated Group**	**Mean**	**N**	**Standard Deviation**
Archaic	Jay	0.13	2	0.04
	San Jose	0.11	1	–
	Armijo	0.41	2	0.57
	850–750 BC	0.05	1	–
	Total	**0.21**	**6**	**0.30**
Ear Rock	800–700 BC	0.11	1	–
	700–500 BC	0.07	3	0.03
	700–400 BC	0.08	1	–
	600–400 BC	0.02	2	0.01
	500–400 BC	0.05	1	–
	Total	**0.06**	**8**	**0.04**
Figueredo	300–200 BC	0.48	6	0.30
	350–150 BC	1.13	4	1.02
	250–100 BC	1.21	4	0.71
	200–100 BC	1.45	2	0.43
	AD 0–100	0.02	1	–
	Total	**0.89**	**17**	**0.72**
Total	**Jay**	**0.13**	**2**	**0.04**
	San Jose	**0.11**	**1**	**–**
	Armijo	**0.41**	**2**	**0.57**
	850–750 BC	**0.05**	**1**	**–**
	800–700 BC	**0.11**	**1**	**–**
	700–500 BC	**0.07**	**3**	**0.03**
	700–400 BC	**0.08**	**1**	**–**
	600–400 BC	**0.02**	**2**	**0.01**
	500–400 BC	**0.05**	**1**	**–**
	300–200 BC	**0.48**	**6**	**0.30**
	350–150 BC	**1.13**	**4**	**1.02**
	250–100 BC	**1.21**	**4**	**0.71**
	200–100 BC	**1.45**	**2**	**0.43**
	AD 0–100	**0.02**	**1**	**–**
	Total	**0.54**	**31**	**0.67**

the Basketmaker II period in the southern Chuska Valley is presented in Figure 15.3.

Basketmaker III

As previously discussed, early Basketmaker III or Muddy Wash phase (AD 500–600) occupation in the southern Chuska Valley was situated along the valley floor in locations similar to the preceding Basketmaker II occupations. These early Basketmaker III occupations are represented by shallow pit structures, plain gray-brown pottery, and small arrow points (Kearns et al. 2000). During the Twin Lakes project, evidence for Muddy Wash occupations was limited to relatively few ceramic types manufactured during this period, including Tohatchi Red-on-brown and Tallahogan Red. In addition, two radiometric samples were recovered that are statistically similar to other dated Muddy Wash contexts in the region. Although Muddy Wash phase ceramic types and dated contexts were identified, the radiometric determinations were derived from charred piñon wood, which commonly generate a date older than the associated event. Therefore, the presence of a few Muddy Wash ceramic types but a lack of securely dated features suggests the ceramics were previously present or were transported to this location perhaps during the early AD 600s. Although tenuous, the later observation suggests that some Muddy Wash populations may have migrated off the valley floor to the valley margins during the Tohatchi phase (AD 600–725) as proposed by Kearns and others (2000) .

The most robust evidence for Basketmaker III occupations in the project area is during the Tohatchi phase (AD 600–725) (Kearns 1996a). Tohatchi phase sites are common along the eastern slope of the Chuska Valley, forming spatial clusters of contemporaneous habitation loci (sites) with intervening areas of open space, together interpreted as communities (Mahoney et al. 2000). The movement of Basketmaker populations into higher environmental settings during the Tohatchi phase could represent a means of controlling the headwaters of drainages that feed onto the valley floor, possibly signaling differentiation in status or rank among late Basketmaker III populations or communities. Although data recovery investigations during the Twin Lakes project only identified one brief, yet intense Tohatchi phase occupation, the habitation complex at LA 104106 yielded evidence of a community structure and several smaller pocket or satellite structures.

In has been pointed out that communities are not static, temporally or spatially, but are part of dynamic processes (B. Nelson 1994:3–7). Community, therefore, refers to "a human group" composed of "social units" that are "united for a purpose" (B. Nelson 1994:3). Although not all-inclusive, social units can be related to various activities, such as production, consumption, politics, or ceremony where individuals roles and responsibilities con-

Table 15.2. Archaic–Basketmaker II occupation period by feature morphology, oxidation, and caching.

			Occupation Period			
Profile Shape	**Oxidation**	**Cache**	**Archaic**	**Ear Rock**	**Figueredo**	**Table Total**
Gentle basin	None	none	1	–	3	**4**
	Present	none	1	–	1	**2**
Vertical	Present	none	–	–	1	**1**
	Rind	none	–	–	2	**2**
		tool(s), burial(s)	–	–	1	**1**
Steep-sided basin	None	none	2	2	–	**4**
	Present	none	1	2	–	**3**
	Rind	none	–	1	–	**1**
Bell-shaped	None	none	–	–	1	**1**
		tool(s)	–	1	–	**1**
	Present	none	–	–	3	**3**
		tool(s)	–	–	1	**1**
	Rind	none	–	–	3	**3**
		human burial(s)	–	–	1	**1**
Sightly bell-shaped	None	none	1	1	–	**2**
	Present	none	–	1	–	**1**
Table Total			**6**	**8**	**17**	**31**

Table 15.3. Archaic–Basketmaker II occupation period by economic resource and seasonal availability.

		Occupation Period			
Seasonal Availability	**Economic Resource**	**Archaic**	**Ear Rock**	**Figueredo**	**Table Total**
Absent	Absent	1	–	–	**1**
Spring, Summer	Agrestals and Oryzopsis	–	–	1	**1**
Spring, Fall	*Oryzopsis* and *Zea*	–	1	–	**1**
Summer, Fall	*Zea* maize	–	–	4	**4**
	Agrestals	3	1	–	**4**
	Agrestals and *Zea*	–	6	4	**10**
	Agrestals, *Cucurbita* and *Zea*	–	–	1	**1**
	Agrestals and ruderals	1	–	1	**2**
Spring, Summer, Fall	Agrestals, *Oryzopsis,* and *Zea*	1	–	3	**4**
	Agrestals, *Cucurbita, Oryzopsis, Yucca,* and *Zea*	–	–	1	**1**
	Agrestals, Ruderals, *Oryzopsis,* and *Zea*	–	–	1	**1**
	Agrestals, Ruderals, *Cucurbita, Oryzopsis,* and *Zea*	–	–	1	**1**
Table Total		**6**	**8**	**17**	**31**

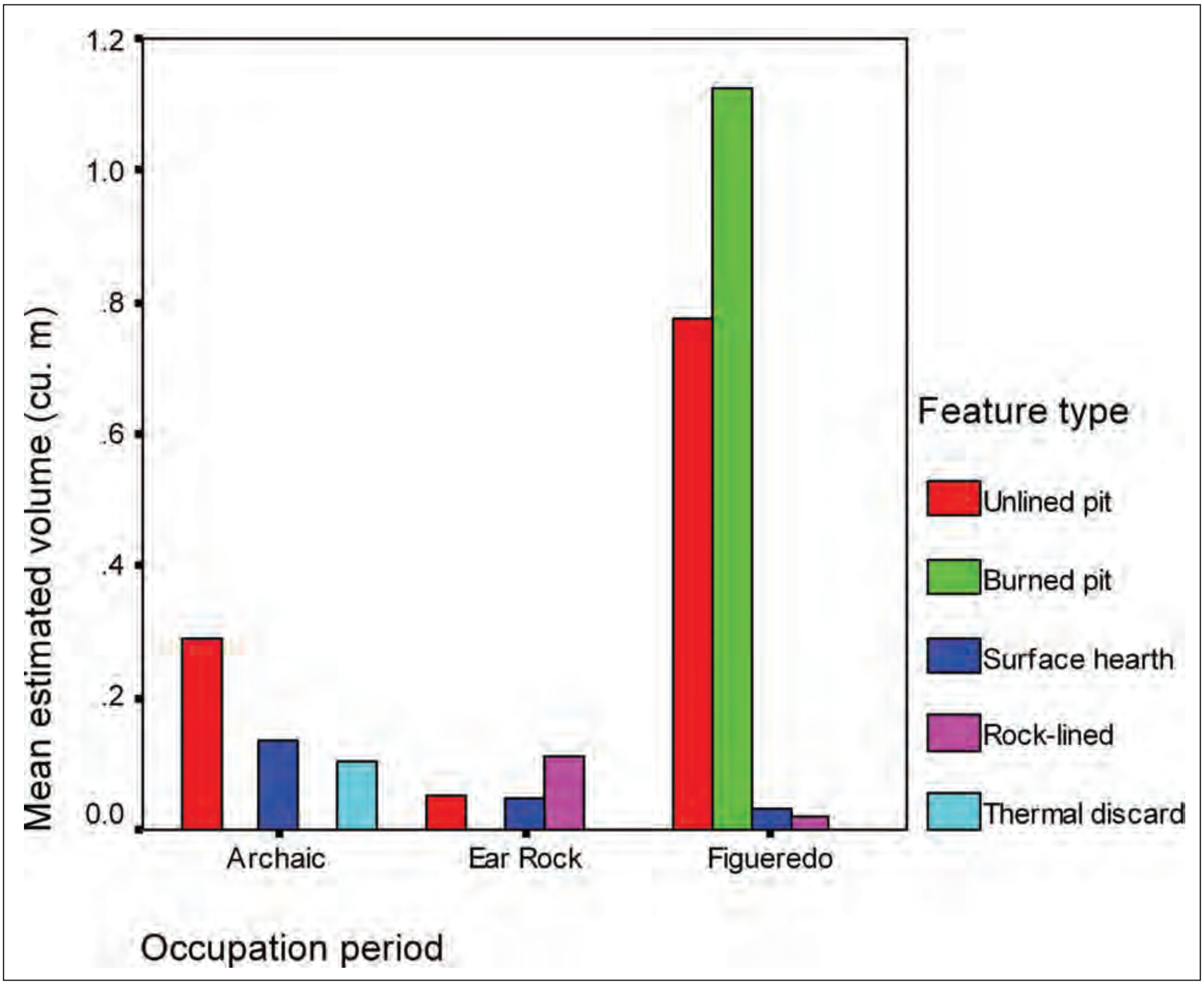


Figure 15.2. Archaic–Basketmaker II feature volume, condition, and contents.

Table 15.4. Archaic–Basketmaker II occupation period by burned bone and thermally altered rock.

			Occupation Period			
Bone Condition			**Archaic**	**Ear Rock**	**Figueredo**	**Table Total**
Absent	Thermally altered rock	Absent	5	4	3	**12**
		<10	–	–	2	**2**
Unburned	Thermally altered rock	Absent	1	1	7	**9**
		10–50	–	–	3	**3**
		>50	–	–	2	**2**
Burned	Thermally altered rock	Absent	–	3	–	**3**
Table Total			**6**	**8**	**17**	**31**

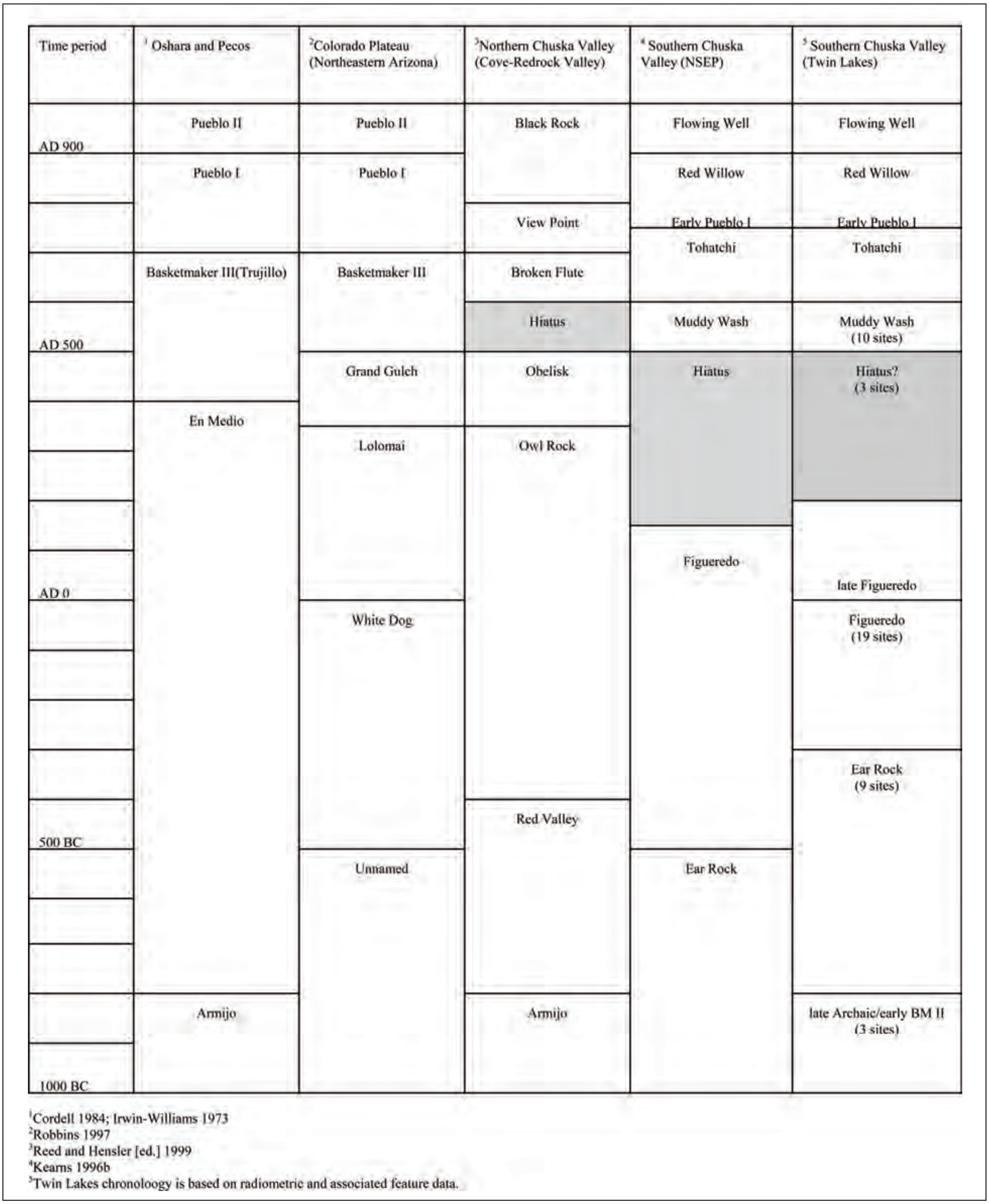


Figure 15.3. Comparative and refined chronology for the Basketmaker II Period in the southern Chuska Valley.

stantly change within and between these various social units (Fletcher 1977; B. Nelson 1994). For social units to work toward a common purpose in the form of a community requires "members to interact with one another on some regular basis" (Wills and Leonard 1994:xiii).

Depending on the role of a given social unit, interaction on a "regular basis" should be viewed on a sliding scale that requires a range of geographic limits if individuals are to interact regularly, and effectively (Glassow 1977:187–189). For example, more immediate and regular interaction between community members is required for tasks that have finite time frames and are elemental to the survival of all community members such as the planting, caring for, and harvesting of crops. Other social units, such as political or ceremonial units, may require less frequent interaction, but can be geographically more extensive. In such cases, for example, access to exogenous materials, such as obsidian, shell, or turquoise may be required or the success of the social unit. Late Basketmaker III communities in the southern Chuska Valley, therefore, may be defined as "a group of people living and interacting with one another in the same locality or area" (Damp and Kotyk 2000:106).

Material culture associated with the roles and responsibilities of various social units is also important for identifying the geographic and social scale of a particular community or social unit. Similarity in architectural style observed among late Basketmaker III villages in the southern Chuska Valley indicates that structure morphology, size, and internal feature patterning continually met community and household requirements and, perhaps, represents an architectural or ethnic tradition. The spatial data, although not systematically collected, do indicate that early and late Basketmaker III communities share some distinctive settlement characteristics. First, these communities appear to be drainage-based with hamlets clustered along well-watered tracts with large intervening tracts of land (Kearns et al. 2000; Mahoney et al. 2000). Second, the communities appear to have been associated with prominent land forms located on the valley floor, a characteristic of some later Pueblo-period communities (e.g., Fajada Butte, Chimney Rock, Mitten Rock, Bluff Great House). Third, Basketmaker III communities developed in locations similar to those settled by early agricultural or Basketmaker II occupations indicating that these were highly favorable locations for flood water agricultural practices. Finally, Basketmaker III communities are associated with large elaborate pit structures that likely served as low-level integrative structures (Adler 1989). Perhaps these integrative structures provided venues for Tohatchi phase communities to regularly participate in intra- and inter-regional trade or barter evidenced by the quantity and diversity of nonlocal material remains (i.e., ceramics, lithics, minerals, and shell) identified at sites like LA 104106. Alternatively, community structures may have served specific ceremonial roles relating to curing, warfare, or agrarian-related activities.

Early Historic Period

Early historic Navajo occupations, well documented in some areas of the Southwest such as the Dinetah region, Canyon de Chelley, and the San Juan Basin, are vastly underrepresented in the southern Chuska Valley (Blinman 1997b; Brugge 1985; Reher 1977; Gilpin 1994; Kearns 1998b; Winter 1994c). Survey and excavation data from the southern Chuska Valley indicate that only a handful of sites contemporaneous with the Navajo occupation at LA 104104, SU 2 have been identified or systematically studied. Thus, while there is little direct comparative data available, protohistoric and early historic Navajo sites from the surrounding area can provide data for some general comparative statements regarding the pre-reservation Navajo occupation in the southern Chuska Valley.

Excavation data from LA 83491 displayed general characteristics similar to LA 104106, SU 2 (Burchett and Morris 1994). These characteristics include the identification of a shallow structure with a central hearth and a ceramic assemblage comprised of spatially discrete partial vessels of Acoma/Zuni polychrome, "Quemado" gray, White Mountain Redware, and Cibola wares (Zadeño cited in Burchett and Morris 1994:486). Based on ceramic and ethnographic data, the Navajo occupations at LA 83491 are reported to date to the "late 1700's and probably late 1800's" (Burchett and Morris 1994:490). Brugge (cited in Burchett and Morris 1994:490–92) interprets the site as a herding or lambing camp, a wild plant gathering area, or hunting location occupied between AD 1760 and 1830.

These observations are consistent with the data recovery results from LA 104106, SU 2, which indicate the presence of Navajo "communities" in the southern Chuska Valley prior to their incarceration at Fort Summer in 1864. Evidence for the manufacture of stone tools and pottery, the accumulation ready-made tools from Anasazi sites, and faunal and botanical data indicate that pre-reservation Navajo groups pursued a mixed or generalized hunting, herding, and agricultural economy, similar in some respects, to the economic strategies described for earlier phases (Bailey and Bailey 1986). Finally, the absence of Euroamerican artifacts at LA 83491 and LA 104106, SU 2, supports a pre-Bosque Redondo occupation.

As already fading traditions, the knowledge of basketry, pottery, and chipped stone tool manufacture was further impacted by the incarceration at Bosque Redondo. Although basketry and pottery still made up the majority of utilitarian items in 1868, these items may have been acquired from neighboring tribes and were rapidly replaced by the distribution of annuity goods (Bailey and Bailey 1986). By the 1870s, with the economic shift to herding and the increased availability of commercially manufactured consumer goods, social sanctions were placed on the manufacture process of traditional implements. The shift in subsistence strategies from generalized hunting, gathering, and limited agriculture to grazing and agriculture, starting in the mid 1800s (Bailey and Bailey 1986; Brugge 1963), led to further decline in hunting and the manufacture of chipped stone and hide dressing tools (Brugge 1986; Gunnerson 1959). As a result, the manufacture of chipped stone tools became increasingly more taboo for Navajos (Gunnerson 1959).

The CGP Survey reported the exponential increase of Navajo habitation sites starting in 1875 based on the presence of diagnostic Euroamerican artifacts (Ward et al. 1977). By the 1890s, as commercially produced containers became readily available, the manufacture of traditional containers, including pottery and baskets, was discontinued (Bailey and Bailey 1986; Kluckhohn and Leighton 1946:66). Due to the ubiquity of commercial-made containers, the roles of baskets and pottery are interpreted to have shifted from utilitarian to ritual objects. As these items took on more ceremonial functions, many restrictions were imposed on the manufacture of these items and their association with the supernatural increased (Tschopik 1938:262). Hence, individuals were afraid or unwilling to go through the ritual sanctions imposed on the manufacture of these items leading to a decline in their production (Kluckhohn and Leighton 1946:66).

Interestingly the use and acquisition of baskets, pottery, or chipped stone tools was not prohibited. These items still seemed to play an important role in Navajo ceremonial activities (Bailey and Bailey 1986:177), thus increasing their association with the supernatural. By demonstrating knowledge of their manufacture, an individual may have been able to suggest a connection to the past or communication with ancestors, which may be interpreted as witchcraft. Although witchcraft may have always been part of Navajo culture, it appears to be a post-Bosque Redondo phenomena. Witchcraft was reported as a "growing problem on the reservation" in the years following Navajo incarceration (Brugge 1980:24; Bailey and Bailey 1986:33).

During their incarceration, many aspects of Navajo ceremonial practice, including mythology and sacred stories, were lost as they could only be told during specific times of the year. Accordingly, they could not be transmitted to young Navajos who attended school. In addition, the hierarchy of Navajo values was disrupted. Ceremonial knowledge could not compete with economic means as a form of power. Even individuals motivated to assimilate were strained, leading to bouts of interpersonal conflict (Rapoport 1954). Interpersonal conflict resulted in an increase in ailments stemming from acute anxiety (Leighton and Leighton 1942). Traditional treatment of these ailments not only affected the victims but also their relatives. The expense and anxiety of the healing ceremony led to other members of the community being accused of witchcraft (Kluckhohn 1944 :71). Following their release from Bosque Redondo, herding was promoted as an acceptable way of life. However, soon after their release and relocation, younger members of some Navajo bands returned to raiding. Headman Ganado Mucho and Manuelito believed these men to be "witches" for their renewal of the old ways and purged over 40 individuals (Spicer 1962).

Navajo sites containing lithic and ceramic artifacts but lacking manufactured items are more likely to be the result of pre-Bosque Redondo occupations. The manufacture of utilitarian objects such as baskets, pottery and chipped stone tools is reported to have declined in the mid 1800s. This decline was a direct result of shifting economic strategies from hunting and limited agriculture to herding and the use of commercially made items. Traumatized by experiences at Bosque Redondo, under subsequent pressure to become pastoralists and to accept annuity goods, knowledge and manufacture of utilitarian items faded along with the generation of Navajos who used them. Taboo, ritual, and association with the supernatural surrounded the manufacture, but not the use, of these once commonly produced objects. These items could have been collected or acquired through trade for use in a ceremonial context; however, by demonstrating knowledge of past manufacturing technologies, one could be implicated as a "witch." The ability to ritualize former utilitarian objects in such a short period of time highlights the adaptive qualities of Navajo culture.

Conclusions

Results of the Twin Lakes Archaeological Project have helped to illuminate the history of human occupations in the southern Chuska Valley. While many of the visible archaeological remains in the area are the result of Basketmaker III and Pueblo-period occupations, less visible Basketmaker II and ethnohistoric Navajo may be masked by eolian activity and spatially extensive ceramic-bearing occupations. With refined spatial and chronometric control, broader questions about community formation, land tenure, population mobility, and site function can be asked of the data.

Chronometric analysis reveled that prior to the Pueblo period, the southern Chuska Valley experienced prolonged periods of occupation punctuated by shorter intervals of near abandonment. Importantly, these punctuated intervals of population decline frame the Basketmaker II period, which marks both the adoption of domesticated plants on one end and the initial adoption of pottery on the other. The decline in Basketmaker II settlements in the southern Chuska Valley is countered by an increase in Basketmaker II sites on the north-central Colorado Plateau potentially representing a population shift. The subsequent population increase in the southern Chuska Valley during the early Basketmaker III is marked by changes in material culture and architecture, which may actually represent the return of antecedent populations possessing a newly acquired or developed cultural repertoire.

Suites of radiocarbon dates, archaeomagnetic samples, and dendrochronological data were also utilized in refining the chronology and land-use patterns of the Basketmaker III period in the southern Chuska Valley. As previously mentioned, late Basketmaker III populations occupied a similar environmental setting as preceding Basketmaker II populations, presumably to take advantage of a similar resource base and an environmental setting with deep alluvial soil and drainage that act as natural canals, ideal for flood water agriculture (Kearns et al. 2000). The continued dependence on small mammal species represented in the faunal data from Basketmaker II and Basketmaker III sites supports this observation. Reoccupation of this area not only indicates adherence to similar subsistence practices, but may also point to populations observing a sense of place during the Basketmaker III period.

Based on similarities in architecture (Northern style pit structure) and ceramic types, it appears that by the late Basketmaker III period the valley margins were being occupied by the same populations abandoning the valley floor (Kearns et al. 2000). The shift to higher elevations during the late Basketmaker III period may be environmentally driven or may also represent a form of social hierarchy among late Basketmaker III communities expressed as proximity to landscape-based resources. As with widely shared ceramic assemblage traits, the synchronic patterns in the range of variation among contemporaneous Basketmaker III structures may indicate functional, social, or ethnic similarities shared between disbursed village or hamlets. Perhaps by defining diachronic patterns and the spatial limits of "Northern style" pit structures, information about the origin and developmental trajectory of this unique architectural style can be discerned.

While similarities in architectural form and material culture patterns were used to infer intra-regional community interaction during the late Basketmaker III period, the presence of exogenous material recovered during the Twin Lakes project not only support this observation but also suggests that other southern Chuska Valley communities participated in interregional trade, exchange, or barter. The presence of imported ceramics, lithics, minerals, and marine shell, indicate that the catchment area of interregional exchange was quite extensive. These interactions may have helped foster social or ideological ties between late Basketmaker III inhabitants of the southern Chuska Valley and those occupying the Mogollon Highlands region and the northern San Juan region. Similarly, the presence of Hopi, Acoma/Zuni, and Rio Grande pottery identified at early historic Navajo sites may be indicative of alliances between various bands and Pueblo villages extant during the post-Pueblo Revolt era (Keur 1944:82–83).

Analysis of merged temporal and spatial data can be important when evaluating the spatial relationships between material culture and other archaeological remains such as features and architectural remains. For the Twin Lakes project, analysis of these data proved useful for distinguishing between pottery types and lithic tools associated with an early historic Navajo occupation and those likely associated with the Basketmaker II or Basketmaker III periods. Spatial analysis also helped to infer the locations of midden features, extramural and intramural areas of maintained space, and chipped stone reduction locales. Although spatial analysis was an important research tool, its resolution was strongly determined by recovery strategies used in the field. To further our knowledge of past human behavior at open-air Basketmaker II and ethnohistoric occupations through the spatial analysis of material culture, it is necessary to excavate spatially extensive areas (cf. Hester and Shiner 1963, Figs. 4, 5) using recovery methods that offer high, three-dimensional spatial resolution (e.g., Carmichael and Franklin 1999; Stiger 2006). Although the understanding of complex distributions of material remains demands meticulous and labor-intensive recovery methods, an enduring benefit is the preservation of spatial relationships for future researchers.

The single component early Basketmaker II, late Basketmaker III, and early historic Navajo components identified during the Twin Lakes project have provided baseline data for comparison with similar components in other parts of the southern Chuska Valley. They have also provided an opportunity to refine larger regional patterns of chronology, to elaborate on site function, and to examine community interaction. Even though this research has helped refine the temporal depth and diversity of human occupation in the southern Chuska Valley, more synthetic work is still needed to enhance our understanding of sociopolitical differentiation and to determine what role environment played in the ebb and flow of populations and community formation.

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Appendix 1 | Lagomorph and Artiodactyl Indices

Table A1.1. Lagomorph and artiodactyl indices from the Twin Lakes project and selected sites.

Site	Age	Sample Size	Lagomorph Index	Artiodactyl Index
LA 32964	Basketmaker II	390	0.54	0.35
LA 104106	Basketmaker II	126	0.00	1.00
LA 6444	Basketmaker II	607	0.00	1.00
LA 6448	Basketmaker II	5457	1.00	0.67
LA 80419	Basketmaker II	14680	0.47	0.00
LA 80434	Basketmaker II	501	0.61	0.07
LA 423158	Basketmaker II	6333	0.75	0.01
LA 2656	Basketmaker II	4159	0.59	0.01
LA 423	Early Basketmaker III	1381	0.89	0.14
LA 2506	Early Basketmaker III	15510	0.77	0.10
LA 80415	Early Basketmaker III	50	0.00	0.87
LA 80416	Early Basketmaker III	345	0.00	1.00
LA 80417	Early Basketmaker III	58	1.00	0.67
LA 80434	Early Basketmaker III	41	0.71	0.00
LA 628	Late Basketmaker III	3919	0.54	0.08
LA 423131	Late Basketmaker III	2117	0.87	0.01
LA 2501	Late Basketmaker III	1780	0.50	0.11
LA 2506	Late Basketmaker III	6220	0.56	0.09
LA 2507	Late Basketmaker III	1376	0.49	0.47
LA 80407	Late Basketmaker III	1085	0.90	0.23
LA 80422	Late Basketmaker III	6853	0.68	0.06
LA 80425	Late Basketmaker III	6098	0.69	0.43
LA 11610	Late Basketmaker III	508	0.62	0.74
LA 104106	Basketmaker III	616	0.69	0.22
LA 423138	Basketmaker III	1267	0.11	0.02
LA 104106	Navajo	57	0.00	1.00
LA 80986	Navajo	844	1.00	0.83
LA 80969	Navajo	105	0.67	0.83
LA 80358	Navajo	521	1.00	1.00
LA 38946	Navajo	65	0.33	0.08
LA 999	Navajo	336	0.83	0.47
LA 80854	Navajo	907	1.00	0.10

Appendix 2 | Pollen Report for Twin Lakes Project Sites

Pollen Results from the US 666 Twin Lakes Data Recovery Project

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Introduction

The results from 19 pollen samples from two archaeological sites near Twin Lakes, New Mexico are presented in this report. LA 32964 is a Basketmaker II camp (770 to 410 BC), and LA 104106 includes early nineteenth century Navajo, Basketmaker II, and Basketmaker III components. Sixteen of the pollen samples are from contexts inside 5 structures at LA 104106. At LA 32964, 3 extramural contexts were sampled. The distribution of samples by site and context is summarized in Table 1. The pollen data provide evidence that a variety of wild plants were used to complement a farming economy.

Limitations of Pollen Analysis

Pollen is a more difficult botanical artifact to interpret than macrobotanical remains. A seed recovered from an archaeological context will have originated from plants at the site or been imported by people, but pollen can be transported long distances by air, water, and other vectors (Faegri and Iversen 1989). The pollination ecology of plant taxa fall into two main systems, wind- and insect-pollinated. Grass, sagebrush, trees, and some shrubs are wind-pollinated and tend to be over-represented in pollen assemblages because these plants produce abundant aerodynamic pollen that can disperse 100's of kilometers. Insect-pollinated plants (the cacti and majority of herb species) produce small amounts of poorly dispersed pollen and are generally under-represented. The recognition of ethnobotanic pollen from archaeological contexts is tempered by consideration of human behavior, ethnographic information, the complexity and dynamics of pollination ecology (Faegri and van der Pijl 1979), and the integrity of the sites and contexts sampled.

Methods

Subsamples (20 cc volume) from the sample bags were spiked with a known concentration (25,084 grains) of exotic spores (*Lycopodium*) to monitor any degradation from the chemical extraction procedure and to allow pollen concentration calculations. Processing steps included overnight hydrochloric and hydrofluoric acid treatments, followed by a density separation in a heavy liquid (lithium polytungstate, 1.9 specific gravity).

Pollen assemblages were identified by counting slide transects at 400x magnification to a 200 grain sum, if possible, then scanning the entire slide at 100x magnification to record additional taxa. Aggregates (clumps of the same pollen type) were counted as one grain per occurrence, and the taxon and size recorded separately. Numerous large aggregates in protected archaeological contexts can reflect plant processing. Pollen identifications were made to the lowest taxonomic level possible base on published keys (Faegri and Iversen 1989; Kapp et al. 2000), and the Laboratory of Paleoecology pollen reference collection at Northern Arizona University (http://www4.nau.edu/becbase/).

One unique pollen type separated here is sunflower (*Helianthus* type). The broad Asteraceae family is typically divided into the Hi-Spine and Low Spine types, based on length of spines using 2.0 µm as a cutoff. Low Spine types include ragweed and bursage (*Ambrosia*), and Hi-Spine encompass several genera (Table 2). In this analysis, grains with spines greater than 3.0 µm and a tricolporate aperture system with pores aligned transverse to furrows were assigned to the cf. sunflower type (*Helianthus*). Other northern Colorado Plateau Asteraceae taxa with the same grain structure include *Layia*, fetid marigold (*Pectus*), coneflower (*Rudbeckia*), marigold (*Tagetes*), crown-beard (*Verbesina*), and *Viguiera*.

Four numerical measures were calculated from the data: sample frequency, pollen percentages, taxa richness, and pollen concentration. Pollen percentages or concentrations help smooth statistical display of the wind-pollinated taxa, and the under-represented, insect-pollinated taxa are interpreted with sample frequency measures. Sample frequency is the number of samples recording a particular pollen type or attribute usually calculated as the percent of samples. Pollen percentages represent the relative importance of each taxon in a sample ([pollen counted/pollen sum]*100), and taxa richness is the number of different pollen types identified in a sample. Pollen concentration was estimated by calculating the ratio of the pollen count to the tracer count and multiplying by the initial tracer concentration. Dividing this result by the sample volume yields the number of pollen grains per cubic centimeter of sample sediment, abbreviated gr/cc.

Results and Interpretations

The samples were productive and all 19 samples yielded significant counts of 100 grains or more. A diverse list of 34 taxa was identified and these are listed in Table 2 by common and scientific name. The sample frequency is also listed for each pollen type and for types that produced aggregates. Pollen preservation was moderate to excellent with an average of 9 percent degraded pollen. Pollen concentration was moderate to high with a range of 740 to 25,362 gr/cc. All of the samples produced diverse assemblages represented by taxa richness values of 7 to 19 with an average of 13.5 pollen types per sample. A summary pollen diagram is presented in Figure 1, and all of the data are documented in Table 3. (Table 3 is an excel file) OR DATA APPENDIX ??

The dominant pollen type is Cheno-Am (12 to 64 percent of the pollen sums) followed by sunflower family (8 to 24 percent) and grass (0 to 23 percent). Local to regional forests of pine, piñon, and juniper are reflected in these samples with combined frequencies ranging from 1 to 40 percent. Willow, maple, and walnut occur in one sample each, and although rare, these taxa record a riparian signal that could represent imported resources or use of creek water carrying upstream pollen. Several shrub taxa are visible in the data (Table 2), including Rhamnus type, rose family, lemonade berry, Mormon tea, sagebrush, and greasewood.

Sunflower family and grass are two broad pollen categories that encompass a range of valued plant species. Cheno-Am is a catch-all category that subsumes a variety of plants (Table 2), many of which are weeds that thrive in disturbed soil, such as would exist around sites. The Cheno-Am group also includes important food plants that for some tribes were staples (Moerman 1998; Rea 1997). There is a rich archaeobotanical record of Cheno-Am use in the region from Basketmaker sites near Mexican Springs (Brandt 1999) to multi-component sites in the Cove-Redrock Valley area at the north end of the Chuska Mountains (McVickar 1997; Smith 1997).

All 34 pollen types from the Twin Lakes project samples represent plants with known ethnobotanical uses, but 9 pollen types stand out as economics (Table 2): maize, squash, cholla, prickly pear, beeweed, Cheno-Am, grass, sunflower type, and lily family. Two additional types that occur in only one sample each, parsley family and plantain, may reflect important resources.

The prehistoric importance of cacti, such as cholla and prickly pear, has probably been under-estimated. All of the cacti produce delicious, dependable crops of flower buds, fruits, and young pads or joints, that could be dried and stored. Cholla is especially notable in project samples at 42 percent sample frequency (Table 2). The consistent record of cholla pollen at sites, its abundance in cultural contexts, and cholla plants found growing at sites well outside their range (e.g. Bohrer 1986) has fueled speculation that cholla was cultivated (Bohrer 1991; Smith 1994), or at a minimum, native plots were probably managed and conserved. Beeweed is another ethnobotanical resource that is usually more abundant in the pollen record than the macrobotanical record. Beeweed was used for food, medicine, and ceremony, and a superior pottery paint is made from boiling the whole plant (Adams et al. 2002).

Plantain is a small spring annual prized for its seeds (Moerman 1998). Parsley family is represented by plants found in wet areas or along riparian corridors. There is also a dry land parsley family genus – *Cymopteris* (biscuit root or wafer parsnip), which grows in sandy soils on dry plains and bajadas. The Hopi collect *Cymopteris* roots in the spring, when they are filled with sugar and are said to be a great delicacy (Whiting 1939:20), and Elmore (1943:67) documented Navajo use of *Cymopteris* leaves for a spice.

LA 104106

Pits

Most of the pollen samples analyzed for the Twin Lakes project came from intramural pits (9 samples) from 4 structures at LA 104016 (Table 1). Six pit samples are from Structure 1, Room 1, and 3 samples are from rooms in Structures 2, 3, and 5. The structures dated to AD 400 to AD 750.

There are significant contrasts in the pollen spectra from Structure 1 pits, compared to the other structures. First, pit samples from Structure 1 were characterized by low pollen concentration at 740-3300 gr/cc, yet taxa richness was high (average 14 taxa), compared to the greater than 7000 gr/cc concentrations in the other 3 structure pits and richness values of 12 pollen types. This pattern suggests Structure 1 pits were more protected from dilution affects of atmospheric pollen rain. The frequency of economic pollen types is certainly higher in all the Structure 1 pits, including cholla, maize, prickly pear, and lily family. Cholla and maize pollen were notable in the samples from pit Features 99, 123, and 127.

Beeweed was more abundant in Structure 1 pit samples. The assemblage from pit Feature 57 was almost half beeweed (43 percent). If this outlier is excluded, the average beeweed value from 5 Structure 1 pits is 6.5 percent, compared to less than 1 percent beeweed in just one of the 3 pits from other structures.

Four rare types were concentrated in a single pit (Feature 99), which recorded sunflower type, pea family, evening primrose, and plantain. Sunflower type, pea family and evening primrose were also recovered from pit Feature 123. The pea family type is not the cultivated bean (*Phaseolus*), but represents several native genera (Table 2). Spikes in grass and juniper pollen in specific features may relate to packing or layering material. Grass may also have been harvested and stored for seed (Doebley 1984). Pit Feature 99 in Structure 1 was characterized by a maximum value of grass pollen at 23 percent, and Features 123 and 127 produced grass values greater than 6 percent. There were high juniper values in two Structure 1 pits (5 percent in Feature 99 and 10 percent in Feature 127).

The intramural pits in Structures 2, 3, and 5 (Features 89, 114, and 125) are characterized by maximum piñon values at greater than 13 percent. This attribute combined with high pollen concentrations (7000-14000 gr/cc) indicates piñon was associated with these features. Pine pollen would not be expected from mature cones, so perhaps boughs or green cones were stored in the pits. There was no maize pollen recovered, but squash and beeweed pollen were identified in the sample from Feature 114.

Other Contexts

Three floor samples and a sample from a sipapu were submitted from Structure 1, Room 1, and a sample from the fill of a bowl was collected from Room 3 in Structure 1. Single samples from a fire pit in Structure 7 and a cist in an extramural area were also analyzed. In the sipapu sample, maize and rose pollen were notable. The bowl fill sample (1349) from Room 3 produced a diverse assemblage that included cholla, prickly pear, lily, maize, and parsley family pollen, which is a unique signature from a single sample. It is difficult to interpret a food or activity that would leave such an array of economic pollen, and it is possible there is a ceremonial significance to the artifact and the pollen results. There was no definitive information from the Structure 7 fire pit sample, and the assemblage is interpreted to reflect background environmental pollen rain. The cist Feature 98 from an extramural area was also characterized by background pollen, except for the occurrence of lily family pollen, which could reflect several important economic plants such as yucca and sego lily (Table 2).

LA 32964

Three samples from extramural areas were submitted from this site. Sample 513 was collected from beneath a metate in a storage feature, and samples 514 and 518 were taken from a groundstone cache. Cheno-Am values were high from all 3 samples (44-57 percent). Maize and squash pollen were identified from sample 514, which was collected from between metates. The presence of cultigens indicates either imported resources or farming nearby. Sunflower type was recovered from the two samples associated with groundstone cache (514 and 518), which may reflect processing sunflower (*Helianthus*).

Conclusions

Archaeobotanical studies from northeast Arizona and western New Mexico have documented a consistent suite of economic plants associated with farming sites. The wild and cultivated plants that sustained prehistoric peoples in this diverse region included maize, squash, beans, piñon nuts, juniper, several Cheno-Am taxa, sunflower, beeweed, mustard, purslane, cacti, yucca, grass, ground cherry, and tobacco with rare evidence for use of globemallow, Indian hemp, datura, and possibly buckwheat and evening primrose (Boher 1986; Brandt 1994, 1999; Minnis 1989; Smith 1994, 1999; Stiger 1979; Toll 1985; Winter 1993). And there is evidence that several wild plants were either cultivated or managed, such as Cheno-Am (Berlin et al. 1990; Brandt 1999), beeweed (Martin and Byers 1965), sunflower (Brandt 1994; 1999), and cholla (Smith 1994).

The results from the Twin Lakes project are comparable to this regional picture of prehistoric subsistence. A 50 percent sample frequency of maize and presence of squash pollen at the habitation site, LA 10410, is evidence of a productive agricultural site. In addition to farming, residents at LA 10410 harvested several wild plants, including sunflower (cf. *Helianthus*), cholla, prickly pear, lily family, beeweed, Cheno-Am, grasses, and possibly plantain and plants from the pea family.

At LA 10410, patterns in the occurrence and abundance of economic pollen types from intramural pits in Structure 1, Room 1, could reflect specialized activities. Cholla may have been stored or processed in Features 99, 123, and 127. Other resources associated with these pits include maize, prickly pear, beeweed, sunflower type, grass, and juniper. Pit Features 42, 50, and 57, produced less evidence of economic pollen taxa, which suggests these pits may not have been used for food processing, or were more all-purpose.

Maize and squash were recovered from LA 32964, the Basketmaker camp, which suggests the camp may have functioned as a farming site, or produce was imported. Sunflower type (cf. *Helianthus*) is another resource visible in the LA 32964 samples.

Table 1. Pollen Samples Provenience.

Site	Context	Floor or Wall Patch	Pits	Fire Pit	Sipapu	Bowl Fill	Other
LA 104106 Multi-Component Site – Study Unit 1 occupation AD 400-750	Structure 1, Room 1	3	6	-	1	1	-
	Structure 2, Room 1	-	1	-	-	-	-
	Structure 3, Room 1	-	1	-	-	-	-
	Structure 5, Room 1	-	1	-	-	-	-
	Structure 7, Room 1	-	-	1	-	-	-
	Extramural Area	-	-	-	-	-	1 (cist)
LA 32964 Basketmaker II	Extramural Areas	-	-	-	-	-	3 (storage feature, ground stone cache)
Total Number of Samples		3	9	1	1	1	4

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Table 2. Pollen Types Identified.

		Common Name	Taxa Name	Sample Frequency as % of 19 samples
Local to Regional Native Trees and Shrubs	1	Pine	*Pinus*	100
	2	Pinyon	*Pinus* pinyon type	95
	3	Juniper	*Juniperus*	89
	4	Oak	*Quercus*	26
	5	Maple	*Acer*	5
	6	Willow	*Salix*	5
	7	Walnut	*Juglans*	5
	8	Rhamnus type	*Rhamnus* includes buckbrush (*Ceanothus*), birch leaf buckthorn, & others	11
	9	Rose	Rosaceae includes cliffrose, Apache plume (*Purshia* spp.), mountain mahogany (*Cercocarpus*), & others	47
	10	Sumac, Lemonade Berry	*Rhus*	5
	11	Mormon Tea	*Ephedra*	42
	12	Sagebrush	*Artemisia*	95
	13	Greasewood	*Sarcobatus*	5
Economics	14	Cholla	Cholla	42
		Cholla Aggregates		5
	15	Prickly Pear	Prickly Pear	16
	16	Beeweed	*Cleome*	79
	17	Maize	*Zea*	42
		Maize Aggregates		5
	18	Squash	*Cucurbita*	16
	19	Cheno-Am	Cheno-Am includes winterfat (*Eurotia*), goosefoot (*Chenopodium*), pigweed (*Amaranthus*), bugseed (*Corispermum*), & others	100
		Cheno-Am Aggregates		37
	20	Grass	Poaceae	89
	21	Sunflower type	*Helianthus*	26
	22	Parsley Family	Apiaceae	5
	23	Lily	Liliaceae includes yucca, onion (*Allium*), mariposa/sego lily (*Calochortus*), & others	16
	24	Plantain	*Plantago*	5

Herbs, Weeds, & Possible Economics	25	Sunflower Family	Asteraceae includes groundsel (*Senecio*), rabbitbrush (*Chrysothamnus*), snakeweed (*Gutierrezia*), & others	100
		Sunflower Family Aggregates		5
	26	Ragweed/Bursage	*Ambrosia*	68
	27	Buckwheat	*Eriogonum*	53
	28	Globemallow	*Sphaeralcea*	11
	29	Mustard	Brassicaceae	58
	30	Spurge	Euphorbiaceae	53
	31	Pea Family	Fabaceae includes locoweed (*Astragalus*), lupine (*Lupinus*), & others	11
	32	Evening Primrose	Onagraceae	16
	33	Phlox	*Phlox*	11
	34	Other Phlox Family	Other Polemoniaceae	5

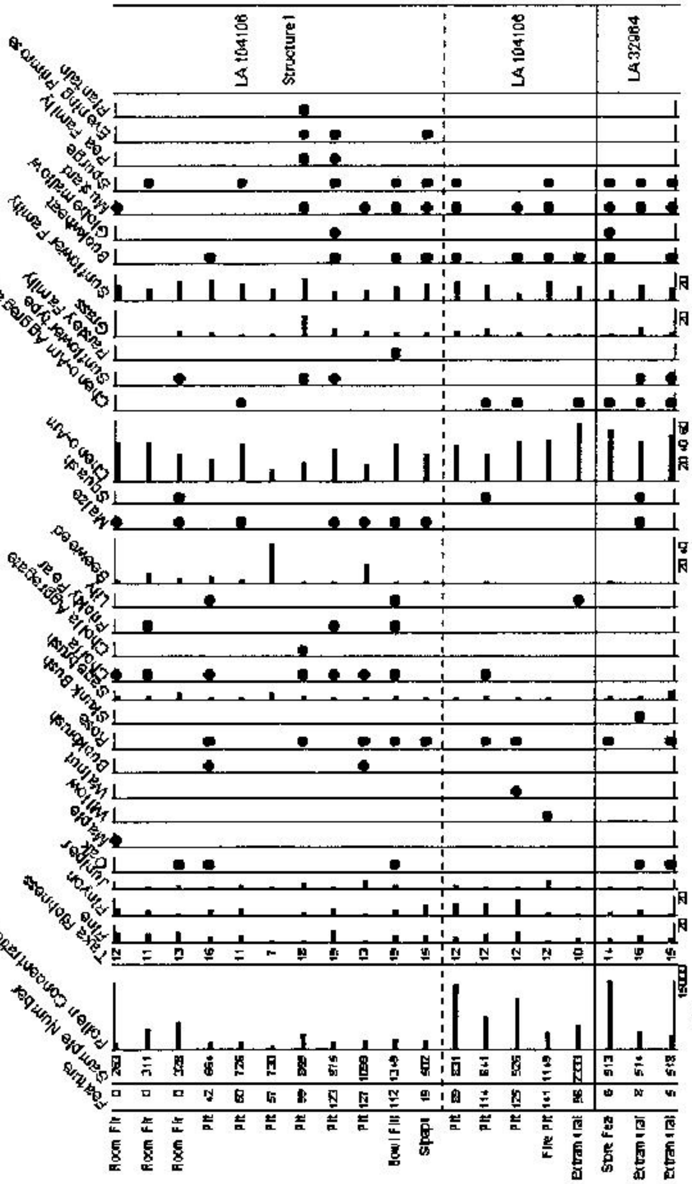
	Site	Sample Number	Feature Number	Context		Sample Volume cc	Tracers	Pollen Sum	Pollen Concentration gr/cc
1	LA 104106	263		Structure 1, Room 1	floor or wall patch	30	148	261	1474.5
2	LA 104106	311		Structure 1, Room 1	floor or wall patch	30	48	265	4616.2
3	LA 104106	328		Structure 1, Room 1	floor or wall patch	30	44	326	6195.0
4	LA 104106	664	42	Structure 1, Room 1	pit	30	103	178	1445.0
5	LA 104106	726	50	Structure 1, Room 1	pit	30	166	265	1334.8
6	LA 104106	730	57	Structure 1, Room 1	pit	30	140	124	740.6
7	LA 104106	865	99	Structure 1, Room 1	pit	30	56	221	3299.7
8	LA 104106	875	123	Structure 1, Room 1	pit	30	144	280	1625.8
9	LA 104106	1099	127	Structure 1, Room 1	pit	30	104	229	1841.1
10	LA 104106	1349	112	Structure 1, Room 3	bowl fill	30	100	276	2307.7
11	LA 104106	502	19.01	Structure 1, Room 1	complex sipapu	30	120	267	1860.4
12	LA 104106	831	89	Structure 2, Room 1	pit	30	13	221	14214.3
13	LA 104106	841	114	Structure 3, Room 1	pit	30	28	242	7226.6
14	LA 104106	926	125	Structure 5, Room 1	pit	30	17	232	11410.8
15	LA 104106	1149	141	Structure 7, Room 1	fire pit	30	58	271	3906.8
16	LA 104106	2333	98	Extramural Area	cist	30	38	236	5192.8
17	LA 32964	513	6	Extramural Area	storage feature, un	30	9	273	25362.7
18	LA 32964	514	8	Extramural Area	groundstone cache	30	64	291	3801.8
19	LA 32964	518	5	Extramural Area	groundstone cache	30	73	268	3069.6

Site	Sample Number	Taxa Richness	Degraded	Unknown	Pinus	Pinus pinyon type	Juniperus	Quercus	Acer	Salix	Juglans	Rhamnus	Rosaceae
1 LA 104106	263	12	26	3	27	20	0	0	1	0	0	0	0
2 LA 104106	311	11	14	8	27	14	4	0	0	0	0	0	0
3 LA 104106	328	13	16	12	39	8	14	2	0	0	0	0	0
4 LA 104106	664	16	24	14	10	10	4	2	0	0	0	2	2
5 LA 104106	726	11	18	2	20	20	10	0	0	0	0	0	0
6 LA 104106	730	7	18	8	2	0	2	0	0	0	0	0	0
7 LA 104106	865	18	20	0	2	8	12	0	0	0	0	0	2
8 LA 104106	875	19	34	6	36	21	4	0	0	0	0	0	0
9 LA 104106	1099	13	44	10	2	4	22	0	0	0	0	4	3
10 LA 104106	1349	19	28	0	18	16	10	2	0	0	0	0	2
11 LA 104106	502	15	36	0	20	31	0	0	0	0	0	0	2
12 LA 104106	831	12	12	0	11	31	11	0	0	0	0	0	0
13 LA 104106	841	12	22	6	24	32	4	0	0	0	0	0	4
14 LA 104106	926	12	6	8	26	41	7	0	0	0	1	0	3
15 LA 104106	1149	12	34	0	4	10	24	0	0	1	0	0	0
16 LA 104106	2333	10	21	0	7	4	7	0	0	0	0	0	0
17 LA 32964	513	14	20	5	12	10	6	0	0	0	0	0	1
18 LA 32964	514	16	12	12	19	16	8	1	0	0	0	0	0
19 LA 32964	518	15	20	6	12	6	1	1	0	0	0	0	2

	Site	Sample Number	Rhus	Ephedra	Artemisia	Sarcobatus	Cholla	Prickly Pear	Cleome	Zea	Cucurbita	Cheno-Am	Asteraceae	Ambrosia	Poaceae
1	LA 104106	263	0	2	6	0	X	0	8	1	0	114	44	5	0
2	LA 104106	311	0	0	6	0	X	X	28	0	0	116	32	10	0
3	LA 104106	328	0	0	20	0	0	0	16	1	X	100	66	10	16
4	LA 104106	664	0	2	2	0	X	0	12	0	0	44	38	2	7
5	LA 104106	726	0	4	2	0	0	0	8	4	0	110	50	0	4
6	LA 104106	730	0	0	8	0	0	0	53	0	0	15	16	0	2
7	LA 104106	865	0	2	6	0	X	0	2	0	0	44	54	3	50
8	LA 104106	875	0	0	2	1	X	2	6	6	0	100	26	6	19
9	LA 104106	1099	0	0	4	0	1	0	45	X	0	43	25	0	14
10	LA 104106	1349	0	0	6	0	X	X	2	2	0	114	38	4	12
11	LA 104106	502	0	0	4	0	0	0	6	6	0	80	50	14	10
12	LA 104106	831	0	0	4	0	0	0	0	0	0	89	43	2	13
13	LA 104106	841	0	0	6	0	X	0	2	0	X	74	40	8	18
14	LA 104106	926	0	1	3	0	0	0	0	0	0	100	18	0	6
15	LA 104106	1149	0	0	1	0	0	0	0	0	0	120	54	4	2
16	LA 104106	2333	0	1	0	0	0	0	0	0	0	151	32	2	6
17	LA 32964	513	0	0	6	0	0	0	5	0	0	156	31	5	5
18	LA 32964	514	1	1	8	0	0	0	1	X	X	128	46	0	29
19	LA 32964	518	0	1	23	0	0	0	1	0	0	137	33	0	7

	Site	Sample Number	Helianthus type	Eriogonum	Sphaeralcea	Brassicaceae	Euphorbiaceae	Fabaceae	Onagraceae	Apiaceae	Liliaceae	Plantago	Phlox
1	LA 104106	263	0	0	0	4	0	0	0	0	0	0	0
2	LA 104106	311	0	0	0	0	6	0	0	0	0	0	0
3	LA 104106	328	6	0	0	0	0	0	0	0	0	0	0
4	LA 104106	664	0	2	0	0	0	0	0	0	1	0	0
5	LA 104106	726	0	0	0	0	12	0	0	0	0	0	0
6	LA 104106	730	0	0	0	0	0	0	0	0	0	0	0
7	LA 104106	865	2	0	0	2	0	3	4	0	0	1	4
8	LA 104106	875	1	6	X	0	2	2	X	0	0	0	0
9	LA 104106	1099	0	0	0	8	0	0	0	0	0	0	0
10	LA 104106	1349	0	4	0	6	2	0	0	2	8	0	0
11	LA 104106	502	0	2	0	2	2	0	2	0	0	0	0
12	LA 104106	831	0	1	0	2	1	0	0	0	0	0	1
13	LA 104106	841	0	0	0	0	0	0	0	0	0	0	0
14	LA 104106	926	0	9	0	1	0	0	0	0	0	0	0
15	LA 104106	1149	0	6	0	1	10	0	0	0	0	0	0
16	LA 104106	2333	0	1	0	0	0	0	0	0	1	0	0
17	LA 32964	513	0	1	1	5	1	0	0	0	0	0	0
18	LA 32964	514	1	0	0	2	6	0	0	0	0	0	0
19	LA 32964	518	1	2	0	5	5	0	0	0	0	0	0

Site	Sample Number	Polemoniaceae	Total Aggregates	Cheno-Am	Sunflower Family Aggregate	Cholla Aggregate	Maize Aggregate
1 LA 104106	263	0	0	0	0	0	0
2 LA 104106	311	0	0	0	0	0	0
3 LA 104106	328	0	0	0	0	0	0
4 LA 104106	664	0	0	0	0	0	0
5 LA 104106	726	0	1	1(6)	0	0	0
6 LA 104106	730	0	0	0	0	0	0
7 LA 104106	865	0	0	0	0	X(6)	0
8 LA 104106	875	0	0	0	0	0	0
9 LA 104106	1099	0	0	0	0	0	0
10 LA 104106	1349	0	0	0	0	0	X(8)
11 LA 104106	502	X	0	0	0	0	0
12 LA 104106	831	0	0	0	0	0	0
13 LA 104106	841	0	2	2(6)	0	0	0
14 LA 104106	926	0	2	2(12)	0	0	0
15 LA 104106	1149	0	0	0	0	0	0
16 LA 104106	2333	0	3	3(20+)	0	0	0
17 LA 32964	513	0	3	2(8)	1(6)	0	0
18 LA 32964	514	0	0	X(100+)	0	0	0
19 LA 32964	518	0	5	5(100+)	0	0	0



Dots note presence for low count types.

Figure 1. Twin Lakes Summary Pollen Diagram

Appendix 3 | Obsidian Sourcing Results from Twin Lakes Project Sites

BERKELEY ARCHAEOLOGICAL
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LETTER REPORT

AN ENERGY-DISPERSIVE X-RAY FLUORESCENCE ANALYSIS OF OBSIDIAN ARTIFACTS FROM ARCHAEOLOGICAL SITES NEAR GALLUP, NEW MEXICO

30 January 2003

Steven Lakatos
Office of Archaeological Studies
Museum of New Mexico
PO Box 2087
Santa Fe, NM 87504-2087

Dear Steven,

The artifact assemblage exhibited a somewhat diverse source provenance. While dominated by northern New Mexico obsidian, overall most of the artifacts were produced from obsidian from the Valles Rhyolite obsidian source in Valles Caldera, Jemez Mountains, rather than the nearby Mount Taylor sources (see Shackley 1998, 2003; Table 1 and Figure 1 here). The Valles obsidian does not erode outside the caldera and had to be originally procured in the caldera proper. The one unknown could be from the Jemez Mounains area, but does not match any known sources from there or surrounding regions. A crosstabulation of source by the two sites is provided (Table 2).

The samples were analyzed with a Spectrace (ThermoNoran) *QuanX* EDXRF spectrometer in the Archaeological XRF Laboratory, University of California, Berkeley. Instrumental methods can be found at http://obsidian.pahma.berkeley.edu/anlysis.htm. Analysis of the USGS RGM-1 standard indicates high machine precision for the elements of interest (Govnidaraju 1994; Table 1 here). Source determination was made using source standards at Berkeley, and reference to Glascock et al. (1999) and Shackley (1995, 2003).

Sincerely,

M. Steven Shackley, Ph.D.
Director

VOICE: (510) 643-1193 ext. 3
INTERNET: shackley@uclink.berkeley.edu
http://obsidian.pahma.berkeley.edu/

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2003 *Little Black Rocks in the Desert: The Geology and Archaeology of Obsidian in the North American Southwest.* University of Arizona Press, in press.

SAMPLE	Ti	Mn	Fe	Rb	Sr	Y	Zr	Nb	Th	Source
LA 104104										
316-1	945	583	8912	480	16	85	130	217	17	Mount Taylor
748-2	0	795	8162	512	12	78	110	190	9	Mount Taylor
908-11	980	807	8239	535	13	69	112	189	25	Mount Taylor
1349-41	1142	402	10035	160	19	48	173	59	10	Valles Rhyolite
1349-29	916	568	9052	517	15	88	129	222	41	Mount Taylor
LA 32964										
613-1	1107	437	10548	169	13	45	166	55	22	Valles Rhyolite
534-1	1218	389	10017	157	15	47	167	56	10	Valles Rhyolite
523-1	1211	433	10683	159	12	49	161	40	11	Valles Rhyolite
407-1	1043	376	9129	138	18	25	141	54	16	unknown
296-4	1235	443	10204	169	12	45	166	55	26	Valles Rhyolite
283-1	1160	358	9490	154	13	45	154	59	14	Valles Rhyolite
270-3	1112	355	9707	161	17	38	156	55	12	Valles Rhyolite
243-3	1105	407	10680	167	14	47	168	55	6	Valles Rhyolite
452-1	1105	404	9987	156	16	43	165	59	16	Valles Rhyolite
167-1	1180	379	9847	156	13	43	161	55	21	Valles Rhyolite
136-1	1083	353	9421	151	15	44	155	53	10	Valles Rhyolite
122-1	1146	397	10259	164	15	39	164	59	30	Valles Rhyolite
RGM-H1	1660	312	14232	146	112	27	222	11	4	standard

Table 2. Crosstabulation of obsidian source provenance by site.

			SOURCE			
			Mount Taylor	Valles Rhyolite	unknown	Total
SAMPLE	LA 104106	Count	4	1		5
		% within SAMPLE	80.0%	20.0%		100.0%
		% within SOURCE	100.0%	8.3%		29.4%
		% of Total	23.5%	5.9%		29.4%
	LA 32964	Count		11	1	12
		% within SAMPLE		91.7%	8.3%	100.0%
		% within SOURCE		91.7%	100.0%	70.6%
		% of Total		64.7%	5.9%	70.6%
Total		Count	4	12	1	17
		% within SAMPLE	23.5%	70.6%	5.9%	100.0%
		% within SOURCE	100.0%	100.0%	100.0%	100.0%
		% of Total	23.5%	70.6%	5.9%	100.0%

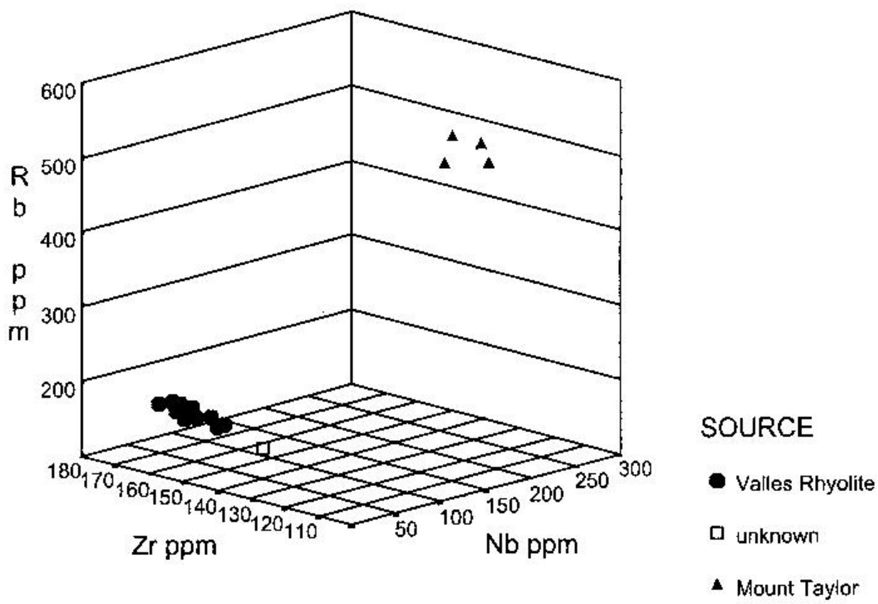

Figure 1. Rb, Zr, Nb three-dimensional plot of the elemental concentrations for the archaeological samples.

Appendix 4a. Beta Analytic, Inc., Radiocarbon Dating Results from Twin Lakes Project Sites

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MR. DARDEN HOOD
Director

Mr. Ronald Hatfield
Mr. Christopher Patrick
Deputy Directors

March 8, 2002

Mr. Timothy D. Maxwell
Museum of New Mexico
Office of Archeological Sciences
P.O. Box 2087
Santa Fe, NM 87504
USA

RE: Radiocarbon Dating Results For Samples TL32964FS299, TL32964FS303, TL32964FS352, TL32964F4, TL32964F6, TL32964F10, TL32964F12, TL32964F13, TL32964F14, TL32964F15, TL104106F3, TL104106F5, TL104106F11, TL104106F12, TL104106F22, TL104106F23, TL104106F24FS2290, TL104106F24FS2320, TL104106F64, TL104106F69, TL104106F81, TL104106F117, TL104106F152

Dear Tim:

Enclosed are the radiocarbon dating results for 23 samples recently sent to us. They each provided plenty of carbon for accurate measurements and all the analyses went normally. As usual, the method of analysis is listed on the report with the results and calibration data is provided where applicable.

As always, no students or intern researchers who would necessarily be distracted with other obligations and priorities were used in the analyses. We analyzed them with the combined attention of our entire professional staff.

If you have specific questions about the analyses, please contact us. We are always available to answer your questions.

Our invoice is enclosed. Please, forward it to the appropriate officer or send VISA change authorization. Thank you. As always, if you have any questions or would like to discuss the results, don't hesitate to contact me.

Sincerely,

Darden Hood

Consistent Accuracy
Delivered On Time.

Beta Analytic Inc.
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Miami, Florida 33155 USA
Tel: 305 667 5167
Fax: 305 663 0964
beta@radiocarbon.com
www.radiocarbon.com

MR. DARDEN HOOD
Director

Mr. Ronald Hatfield
Mr. Christopher Patrick
Deputy Directors

March 20, 2002

Mr. Timothy D. Maxwell
Museum of New Mexico
Office of Archeological Sciences
P.O. Box 2087
Santa Fe, NM 87504
USA

RE: Radiocarbon Dating Result For Sample TL32964F9

Dear Tim:

Enclosed is the radiocarbon dating result for one sample recently sent to us. It provided plenty of carbon for an accurate measurement and the analysis went normally. As usual, the method of analysis is listed on the report sheet and calibration data is provided where applicable.

As always, no students or intern researchers who would necessarily be distracted with other obligations and priorities were used in the analysis. It was analyzed with the combined attention of our entire professional staff.

If you have specific questions about the analyses, please contact us. We are always available to answer your questions.

The cost of analysis was previously invoiced. As always, if you have any questions or would like to discuss the results, don't hesitate to contact me.

Sincerely,

Darden Hood

BETA ANALYTIC INC.

DR. M.A. TAMERS and MR. D.G. HOOD

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REPORT OF RADIOCARBON DATING ANALYSES

Mr. Timothy D. Maxwell — Report Date: 3/8/02

Museum of New Mexico — Material Received: 1/28/02

Sample Data	Measured Radiocarbon Age	13C/12C Ratio	Conventional Radiocarbon Age(*)
Beta - 164321	2090 +/- 50 BP	-11.3 o/oo	2310 +/- 50 BP

SAMPLE : TL32964FS299
ANALYSIS : AMS-Standard delivery
MATERIAL/PRETREATMENT : (charred material): acid/alkali/acid
2 SIGMA CALIBRATION : Cal BC 420 to 350 (Cal BP 2370 to 2300) AND Cal BC 300 to 220 (Cal BP 2250 to 2170)

Sample Data	Measured Radiocarbon Age	13C/12C Ratio	Conventional Radiocarbon Age(*)
Beta - 164322	2390 +/- 40 BP	-11.8 o/oo	2610 +/- 40 BP

SAMPLE : TL32964FS303
ANALYSIS : AMS-Standard delivery
MATERIAL/PRETREATMENT : (charred material): acid/alkali/acid
2 SIGMA CALIBRATION : Cal BC 820 to 780 (Cal BP 2780 to 2730)

Sample Data	Measured Radiocarbon Age	13C/12C Ratio	Conventional Radiocarbon Age(*)
Beta - 164324	2130 +/- 40 BP	-11.7 o/oo	2350 +/- 40 BP

SAMPLE : TL32964FS352
ANALYSIS : AMS-Standard delivery
MATERIAL/PRETREATMENT : (charred material): acid/alkali/acid
2 SIGMA CALIBRATION : Cal BC 500 to 460 (Cal BP 2450 to 2410) AND Cal BC 430 to 380 (Cal BP 2380 to 2330)

Sample Data	Measured Radiocarbon Age	13C/12C Ratio	Conventional Radiocarbon Age(*)
Beta - 164325	2210 +/- 40 BP	-11.4 o/oo	2430 +/- 40 BP

SAMPLE : TL32964F4
ANALYSIS : AMS-Standard delivery
MATERIAL/PRETREATMENT : (charred material): acid/alkali/acid
2 SIGMA CALIBRATION : Cal BC 770 to 400 (Cal BP 2720 to 2350)

Sample Data	Measured Radiocarbon Age	13C/12C Ratio	Conventional Radiocarbon Age(*)
Beta - 164326	2230 +/- 40 BP	-11.8 o/oo	2450 +/- 40 BP

SAMPLE : TL32964F6
ANALYSIS : AMS-Standard delivery
MATERIAL/PRETREATMENT : (charred material): acid/alkali/acid
2 SIGMA CALIBRATION : Cal BC 780 to 400 (Cal BP 2730 to 2350)

Dates are reported as RCYBP (radiocarbon years before present, "present" = 1950A.D.). By International convention, the modern reference standard was 95% of the C14 content of the National Bureau of Standards' Oxalic Acid & calculated using the Libby C14 half life (5568 years). Quoted errors represent 1 standard deviation statistics (68% probability) & are based on combined measurements of the sample, background, and modern reference standards.

Measured C13/C12 ratios were calculated relative to the PDB-1 international standard and the RCYBP ages were normalized to -25 per mil. If the ratio and age are accompanied by an (*), then the C13/C12 value was estimated, based on values typical of the material type. The quoted results are NOT calibrated to calendar years. Calibration to calendar years should be calculated using the Conventional C14 age.

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BETA ANALYTIC INC.

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REPORT OF RADIOCARBON DATING ANALYSES

Mr. Timothy D. Maxwell — Report Date: 3/20/02

Museum of New Mexico — Material Received: 1/28/02

Sample Data	Measured Radiocarbon Age	13C/12C Ratio	Conventional Radiocarbon Age(*)
Beta - 164327	2350 +/- 40 BP	-11.1 o/oo	2580 +/- 40 BP

SAMPLE : TL32964F9
ANALYSIS : AMS-Standard delivery
MATERIAL/PRETREATMENT : (charred material): acid/alkali/acid
2 SIGMA CALIBRATION : Cal BC 820 to 760 (Cal BP 2760 to 2710) AND Cal BC 620 to 590 (Cal BP 2560 to 2540)

Dates are reported as RCYBP (radiocarbon years before present, "present" = 1950A.D.). By International convention, the modern reference standard was 95% of the C14 content of the National Bureau of Standards' Oxalic Acid & calculated using the Libby C14 half life (5568 years). Quoted errors represent 1 standard deviation statistics (68% probability) & are based on combined measurements of the sample, background, and modern reference standards.

Measured C13/C12 ratios were calculated relative to the PDB-1 international standard and the RCYBP ages were normalized to -25 per mil. If the ratio and age are accompanied by an (*), then the C13/C12 value was estimated, based on values typical of the material type. The quoted results are NOT calibrated to calendar years. Calibration to calendar years should be calculated using the Conventional C14 age.

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REPORT OF RADIOCARBON DATING ANALYSES

Mr. Timothy D. Maxwell

Report Date: 3/8/02

Sample Data	Measured Radiocarbon Age	13C/12C Ratio	Conventional Radiocarbon Age(*)
Beta - 164328	2270 +/- 40 BP	-11.4 o/oo	2490 +/- 40 BP

SAMPLE : TL32964F10
ANALYSIS : AMS-Standard delivery
MATERIAL/PRETREATMENT : (charred material): acid/alkali/acid
2 SIGMA CALIBRATION : Cal BC 790 to 420 (Cal BP 2740 to 2370)

Sample Data	Measured Radiocarbon Age	13C/12C Ratio	Conventional Radiocarbon Age(*)
Beta - 164329	2470 +/- 80 BP	-11.1 o/oo	2690 +/- 80 BP

SAMPLE : TL32964F12
ANALYSIS : Radiometric-Standard delivery (with extended counting)
MATERIAL/PRETREATMENT : (charred material): acid/alkali/acid
2 SIGMA CALIBRATION : Cal BC 1000 to 780 (Cal BP 2950 to 2730)

Sample Data	Measured Radiocarbon Age	13C/12C Ratio	Conventional Radiocarbon Age(*)
Beta - 164330	2250 +/- 40 BP	-11.3 o/oo	2470 +/- 40 BP

SAMPLE : TL32964F13
ANALYSIS : AMS-Standard delivery
MATERIAL/PRETREATMENT : (charred material): acid/alkali/acid
2 SIGMA CALIBRATION : Cal BC 780 to 410 (Cal BP 2730 to 2360)

Sample Data	Measured Radiocarbon Age	13C/12C Ratio	Conventional Radiocarbon Age(*)
Beta - 164331	2200 +/- 40 BP	-11.5 o/oo	2420 +/- 40 BP

SAMPLE : TL32964F14
ANALYSIS : AMS-Standard delivery
MATERIAL/PRETREATMENT : (charred material): acid/alkali/acid
2 SIGMA CALIBRATION : Cal BC 760 to 620 (Cal BP 2710 to 2560) AND Cal BC 590 to 400 (Cal BP 2540 to 2350)

Sample Data	Measured Radiocarbon Age	13C/12C Ratio	Conventional Radiocarbon Age(*)
Beta - 164332	2280 +/- 40 BP	-12.0 o/oo	2490 +/- 40 BP

SAMPLE : TL32964F15
ANALYSIS : AMS-Standard delivery
MATERIAL/PRETREATMENT : (charred material): acid/alkali/acid
2 SIGMA CALIBRATION : Cal BC 790 to 420 (Cal BP 2740 to 2370)

Dates are reported as RCYBP (radiocarbon years before present, "present" = 1950A.D.). By International convention, the modern reference standard was 95% of the C14 content of the National Bureau of Standards' Oxalic Acid & calculated using the Libby C14 half life (5568 years). Quoted errors represent 1 standard deviation statistics (68% probability) & are based on combined measurements of the sample, background, and modern reference standards.

Measured C13/C12 ratios were calculated relative to the PDB-1 international standard and the RCYBP ages were normalized to -25 per mil. If the ratio and age are accompanied by an (*), then the C13/C12 value was estimated, based on values typical of the material type. The quoted results are NOT calibrated to calendar years. Calibration to calendar years should be calculated using the Conventional C14 age.

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REPORT OF RADIOCARBON DATING ANALYSES

Mr. Timothy D. Maxwell

Report Date: 3/8/02

Sample Data	Measured Radiocarbon Age	13C/12C Ratio	Conventional Radiocarbon Age(*)
Beta - 164333	2110 +/- 40 BP	-15.1 o/oo	2270 +/- 40 BP

SAMPLE : TL104106F3
ANALYSIS : AMS-Standard delivery
MATERIAL/PRETREATMENT : (charred material): acid/alkali/acid
2 SIGMA CALIBRATION : Cal BC 400 to 340 (Cal BP 2350 to 2290) AND Cal BC 320 to 210 (Cal BP 2270 to 2160)

Beta - 164334	320 +/- 60 BP	-25.0* o/oo	320 +/- 60* BP

SAMPLE : TL104106F5
ANALYSIS : Radiometric-Standard delivery (with extended counting)
MATERIAL/PRETREATMENT : (charred material): acid/alkali/acid
2 SIGMA CALIBRATION : Cal AD 1440 to 1670 (Cal BP 510 to 280)

Beta - 164335	340 +/- 70 BP	-25.0* o/oo	340 +/- 70* BP

SAMPLE : TL104106F11
ANALYSIS : Radiometric-Standard delivery
MATERIAL/PRETREATMENT : (charred material): acid/alkali/acid
2 SIGMA CALIBRATION : Cal AD 1430 to 1670 (Cal BP 520 to 280)

Beta - 164336	240 +/- 50 BP	-25.0* o/oo	240 +/- 50* BP

SAMPLE : TL104106F12
ANALYSIS : Radiometric-Standard delivery
MATERIAL/PRETREATMENT : (charred material): acid/alkali/acid
2 SIGMA CALIBRATION : Cal AD 1520 to 1590 (Cal BP 430 to 360) AND Cal AD 1620 to 1680 (Cal BP 330 to 260)
Cal AD 1730 to 1810 (Cal BP 220 to 140) AND Cal AD 1930 to 1950 (Cal BP 20 to 0)

Beta - 164337	1750 +/- 40 BP	-11.2 o/oo	1980 +/- 40 BP

SAMPLE : TL104106F22
ANALYSIS : AMS-Standard delivery
MATERIAL/PRETREATMENT : (charred material): acid/alkali/acid
2 SIGMA CALIBRATION : Cal BC 50 to Cal AD 100 (Cal BP 2000 to 1860)

Dates are reported as RCYBP (radiocarbon years before present, "present" = 1950A.D.). By International convention, the modern reference standard was 95% of the C14 content of the National Bureau of Standards' Oxalic Acid & calculated using the Libby C14 half life (5568 years). Quoted errors represent 1 standard deviation statistics (68% probability) & are based on combined measurements of the sample, background, and modern reference standards.

Measured C13/C12 ratios were calculated relative to the PDB-1 international standard and the RCYBP ages were normalized to -25 per mil. If the ratio and age are accompanied by an (*), then the C13/C12 value was estimated, based on values typical of the material type. The quoted results are NOT calibrated to calendar years. Calibration to calendar years should be calculated using the Conventional C14 age.

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REPORT OF RADIOCARBON DATING ANALYSES

Mr. Timothy D. Maxwell

Report Date: 3/8/02

Sample Data	Measured Radiocarbon Age	13C/12C Ratio	Conventional Radiocarbon Age(*)
Beta - 164338	101 +/- 0.5 pMC	-11.8 o/oo	140 +/- 40 BP

SAMPLE : TL104106F23
ANALYSIS : AMS-Standard delivery
MATERIAL/PRETREATMENT : (charred material): acid/alkali/acid
2 SIGMA CALIBRATION : Cal AD 1660 to 1950 (Cal BP 290 to 0)

Beta - 164339	350 +/- 50 BP	-25.0* o/oo	350 +/- 50* BP

SAMPLE : TL104106F24FS2290
ANALYSIS : Radiometric-Standard delivery (with extended counting)
MATERIAL/PRETREATMENT : (charred material): acid/alkali/acid
2 SIGMA CALIBRATION : Cal AD 1440 to 1650 (Cal BP 510 to 300)

Beta - 164340	1980 +/- 40 BP	-11.9 o/oo	2190 +/- 40 BP

SAMPLE : TL104106F24FS2320
ANALYSIS : AMS-Standard delivery
MATERIAL/PRETREATMENT : (charred material): acid/alkali/acid
2 SIGMA CALIBRATION : Cal BC 380 to 160 (Cal BP 2330 to 2100)

Beta - 164341	1030 +/- 70 BP	-11.1 o/oo	1250 +/- 80 BP

SAMPLE : TL104106F64
ANALYSIS : Radiometric-Standard delivery (with extended counting)
MATERIAL/PRETREATMENT : (charred material): acid/alkali/acid
2 SIGMA CALIBRATION : Cal AD 650 to 980 (Cal BP 1300 to 970)

Beta - 164342	2210 +/- 40 BP	-20.8 o/oo	2280 +/- 40 BP

SAMPLE : TL104106F69
ANALYSIS : AMS-Standard delivery
MATERIAL/PRETREATMENT : (charred material): acid/alkali/acid
2 SIGMA CALIBRATION : Cal BC 400 to 350 (Cal BP 2350 to 2300) AND Cal BC 310 to 210 (Cal BP 2260 to 2160)

Dates are reported as RCYBP (radiocarbon years before present, "present" = 1950A.D.). By International convention, the modern reference standard was 95% of the C14 content of the National Bureau of Standards' Oxalic Acid & calculated using the Libby C14 half life (5568 years). Quoted errors represent 1 standard deviation statistics (68% probability) & are based on combined measurements of the sample, background, and modern reference standards.

Measured C13/C12 ratios were calculated relative to the PDB-1 international standard and the RCYBP ages were normalized to -25 per mil. If the ratio and age are accompanied by an (*), then the C13/C12 value was estimated, based on values typical of the material type. The quoted results are NOT calibrated to calendar years. Calibration to calendar years should be calculated using the Conventional C14 age.

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REPORT OF RADIOCARBON DATING ANALYSES

Mr. Timothy D. Maxwell

Report Date: 3/8/02

Sample Data	Measured Radiocarbon Age	13C/12C Ratio	Conventional Radiocarbon Age(*)
Beta - 164343 SAMPLE : TL104106F81 ANALYSIS : Radiometric-Standard delivery MATERIAL/PRETREATMENT : (charred material): acid/alkali/acid 2 SIGMA CALIBRATION : Cal AD 540 to 690 (Cal BP 1410 to 1260)	1420 +/- 60 BP	-25.0* o/oo	1420 +/- 60* BP
Beta - 164344 SAMPLE : TL104106F117 ANALYSIS : AMS-Standard delivery MATERIAL/PRETREATMENT : (wood): acid/alkali/acid 2 SIGMA CALIBRATION : Cal AD 440 to 640 (Cal BP 1510 to 1310)	1480 +/- 40 BP	-22.9 o/oo	1510 +/- 40 BP
Beta - 164345 SAMPLE : TL104106F152 ANALYSIS : AMS-Standard delivery MATERIAL/PRETREATMENT : (wood): acid/alkali/acid 2 SIGMA CALIBRATION : Cal AD 420 to 610 (Cal BP 1530 to 1340)	1530 +/- 40 BP	-23.5 o/oo	1550 +/- 40 BP

Dates are reported as RCYBP (radiocarbon years before present, "present" = 1950A.D.). By International convention, the modern reference standard was 95% of the C14 content of the National Bureau of Standards' Oxalic Acid & calculated using the Libby C14 half life (5568 years). Quoted errors represent 1 standard deviation statistics (68% probability) & are based on combined measurements of the sample, background, and modern reference standards.

Measured C13/C12 ratios were calculated relative to the PDB-1 international standard and the RCYBP ages were normalized to -25 per mil. If the ratio and age are accompanied by an (*), then the C13/C12 value was estimated, based on values typical of the material type. The quoted results are NOT calibrated to calendar years. Calibration to calendar years should be calculated using the Conventional C14 age.

CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-11.3:lab. mult=1)

Laboratory number: **Beta-164321**

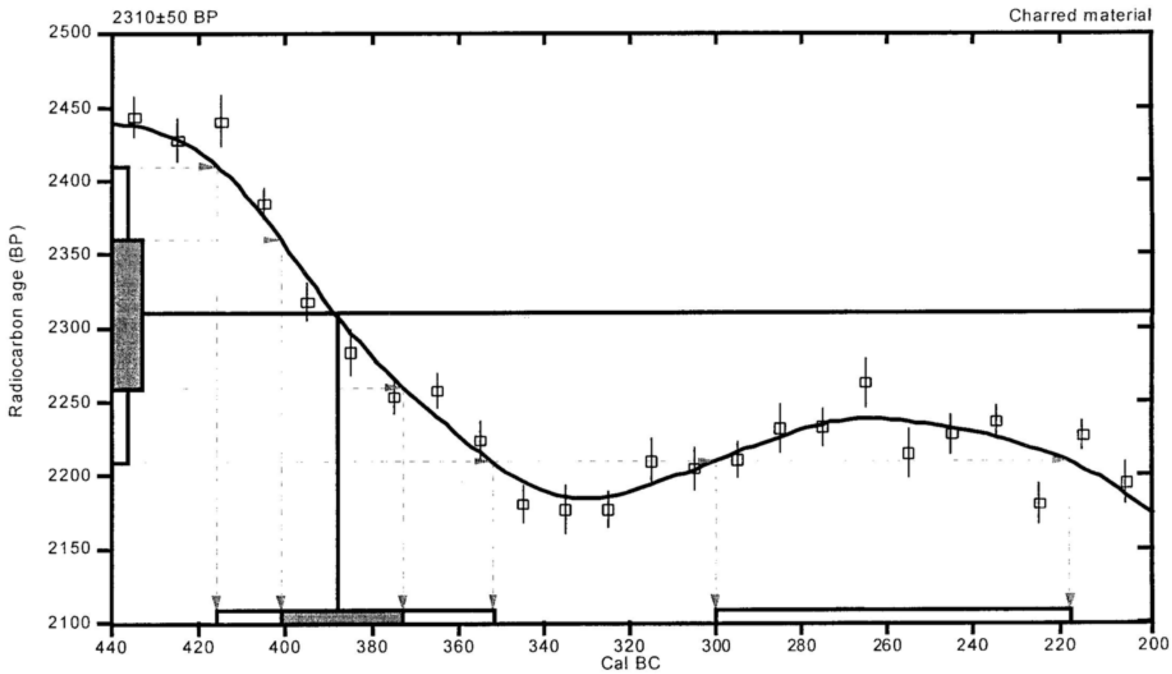
Conventional radiocarbon age: **2310±50 BP**

2 Sigma calibrated results: (95% probability) **Cal BC 420 to 350 (Cal BP 2370 to 2300) and Cal BC 300 to 220 (Cal BP 2250 to 2170)**

Intercept data

Intercept of radiocarbon age with calibration curve: Cal BC 390 (Cal BP 2340)

1 Sigma calibrated result: (68% probability) Cal BC 400 to 370 (Cal BP 2350 to 2320)



References:

Database used

Calibration Database

Editorial Comment

Stuiver, M., van der Plicht, H., 1998, Radiocarbon 40(3), pxii-xiii

INTCAL98 Radiocarbon Age Calibration

Stuiver, M., et. al., 1998, Radiocarbon 40(3), p1041-1083

Mathematics

A Simplified Approach to Calibrating C14 Dates

Talma, A. S., Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-11.8:lab. mult=1)

Laboratory number: **Beta-164322**

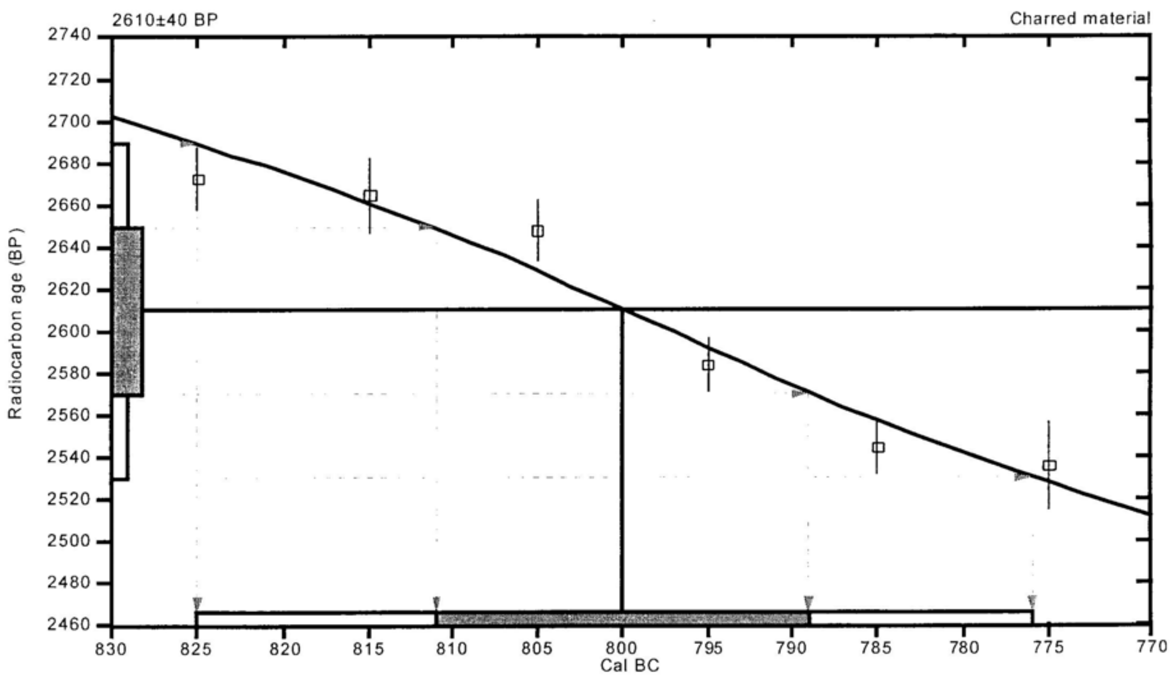
Conventional radiocarbon age: **2610±40 BP**

2 Sigma calibrated result: (95% probability) **Cal BC 820 to 780 (Cal BP 2780 to 2730)**

Intercept data

Intercept of radiocarbon age with calibration curve: Cal BC 800 (Cal BP 2750)

1 Sigma calibrated result: (68% probability) Cal BC 810 to 790 (Cal BP 2760 to 2740)



References:

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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-11.7:lab. mult=1)

Laboratory number: **Beta-164324**

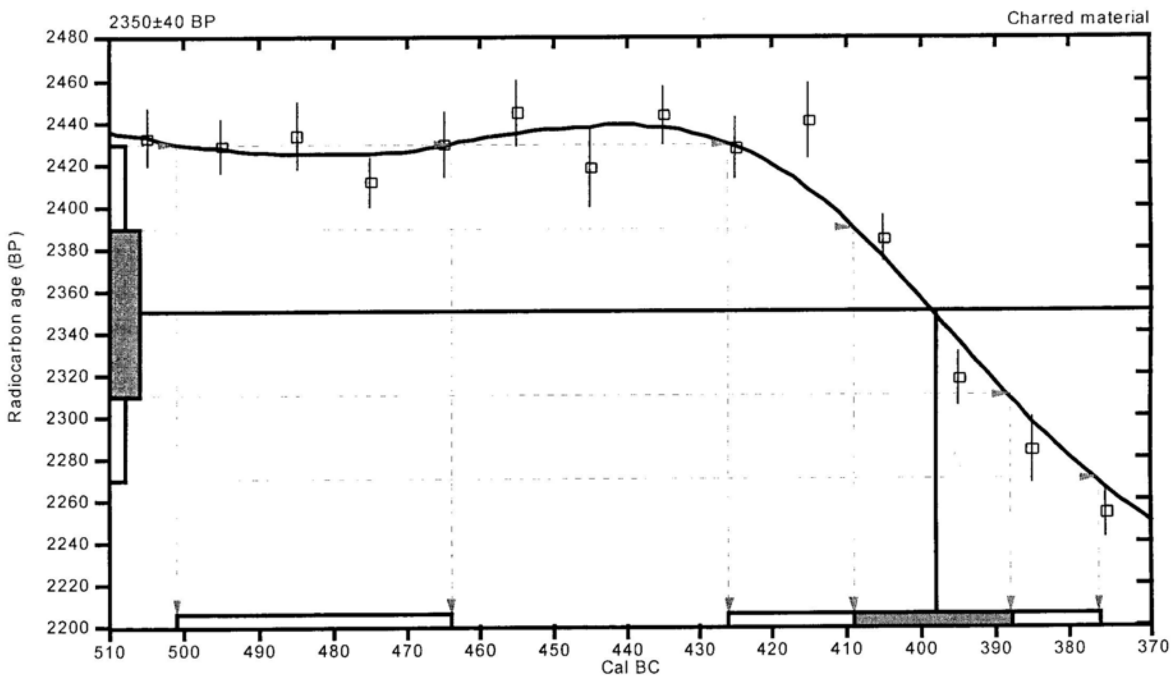
Conventional radiocarbon age: **2350±40 BP**

2 Sigma calibrated results: (95% probability) **Cal BC 500 to 460 (Cal BP 2450 to 2410) and Cal BC 430 to 380 (Cal BP 2380 to 2330)**

Intercept data

Intercept of radiocarbon age with calibration curve: Cal BC 400 (Cal BP 2350)

1 Sigma calibrated result: (68% probability) Cal BC 410 to 390 (Cal BP 2360 to 2340)



References:
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Calibration Database
Editorial Comment
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INTCAL98 Radiocarbon Age Calibration
Stuiver, M., et. al., 1998, Radiocarbon 40(3), p1041-1083
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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-11.4:lab. mult=1)

Laboratory number: **Beta-164325**

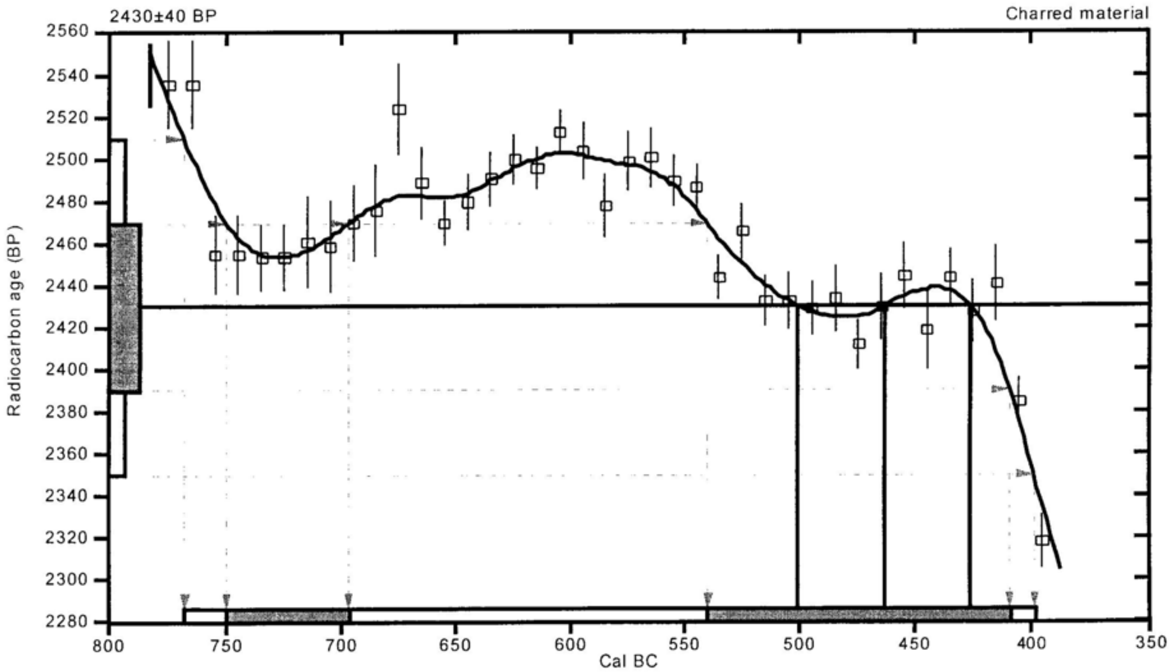
Conventional radiocarbon age: **2430±40 BP**

2 Sigma calibrated result: (95% probability) **Cal BC 770 to 400 (Cal BP 2720 to 2350)**

Intercept data

Intercepts of radiocarbon age with calibration curve: Cal BC 500 (Cal BP 2450) and Cal BC 460 (Cal BP 2410) and Cal BC 430 (Cal BP 2380)

1 Sigma calibrated results: (68% probability) Cal BC 750 to 700 (Cal BP 2700 to 2650) and Cal BC 540 to 410 (Cal BP 2490 to 2360)



References:

Database used

Calibration Database
Editorial Comment
Stuiver, M., van der Plicht, H., 1998, Radiocarbon 40(3), pxii-xiii
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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-11.8:lab. mult=1)

Laboratory number: **Beta-164326**

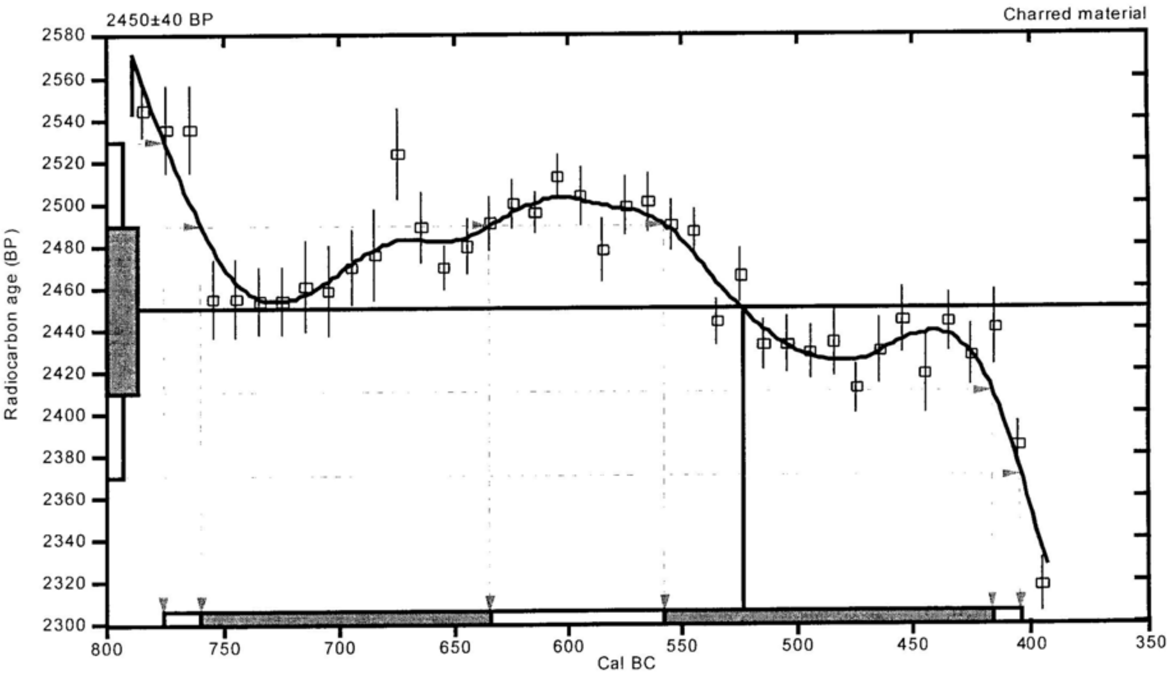
Conventional radiocarbon age: **2450±40 BP**

2 Sigma calibrated result: (95% probability) **Cal BC 780 to 400 (Cal BP 2730 to 2350)**

Intercept data

Intercept of radiocarbon age with calibration curve: Cal BC 520 (Cal BP 2470)

1 Sigma calibrated results: (68% probability) Cal BC 760 to 640 (Cal BP 2710 to 2580) and Cal BC 560 to 420 (Cal BP 2510 to 2370)



References:

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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-11.1:lab. mult=1)

Laboratory number: **Beta-164327**

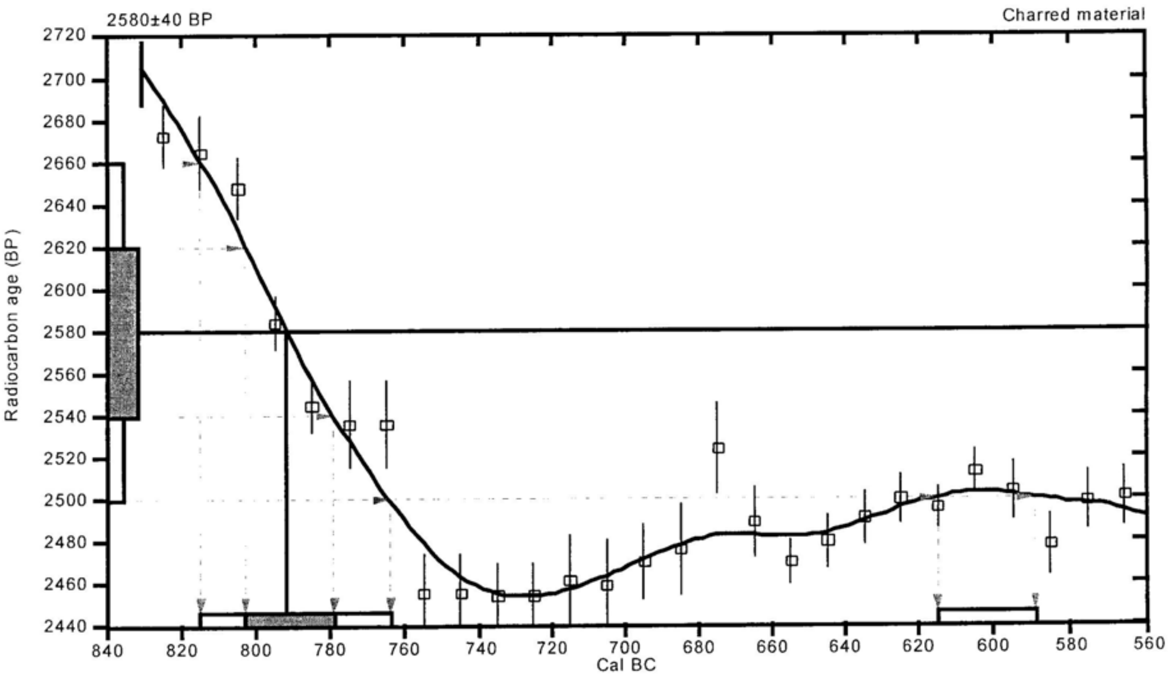
Conventional radiocarbon age: **2580±40 BP**

2 Sigma calibrated results: (95% probability) **Cal BC 820 to 760 (Cal BP 2760 to 2710) and Cal BC 620 to 590 (Cal BP 2560 to 2540)**

Intercept data

Intercept of radiocarbon age with calibration curve: Cal BC 790 (Cal BP 2740)

1 Sigma calibrated result: (68% probability) Cal BC 800 to 780 (Cal BP 2750 to 2730)



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Stuiver, M., van der Plicht, H., 1998, Radiocarbon 40(3), pxii-xiii

INTCAL98 Radiocarbon Age Calibration

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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-11.4:lab. mult=1)

Laboratory number: **Beta-164328**

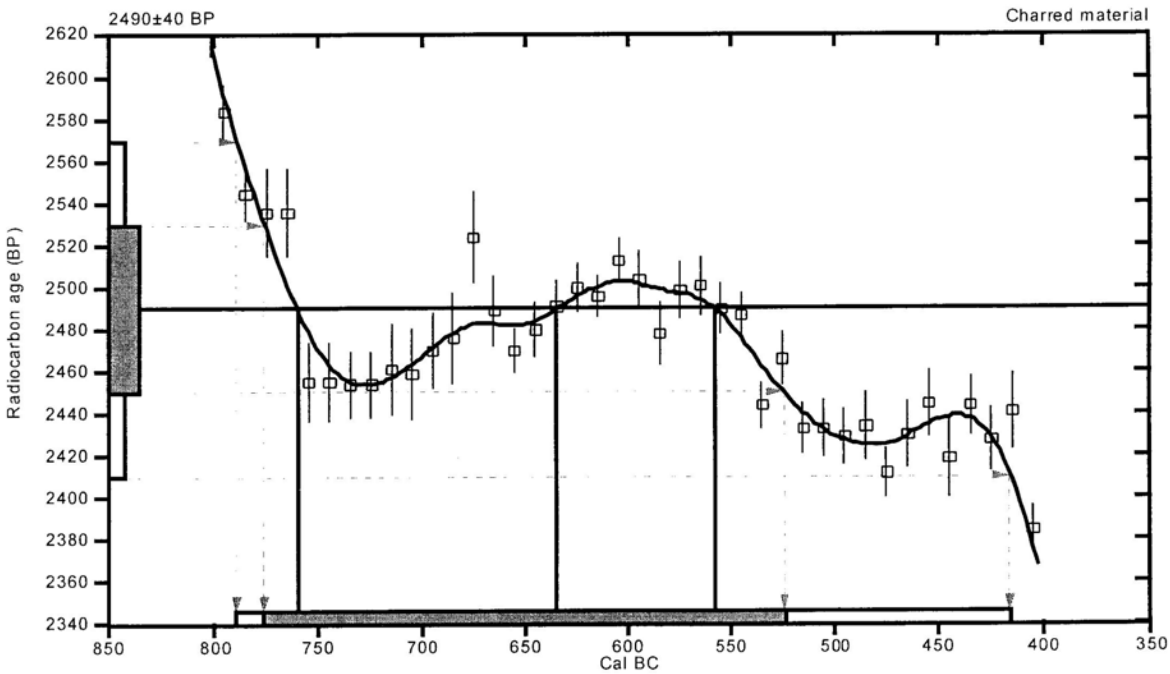
Conventional radiocarbon age: **2490±40 BP**

2 Sigma calibrated result: (95% probability) **Cal BC 790 to 420 (Cal BP 2740 to 2370)**

Intercept data

Intercepts of radiocarbon age with calibration curve: Cal BC 760 (Cal BP 2710) and
Cal BC 640 (Cal BP 2580) and
Cal BC 560 (Cal BP 2510)

1 Sigma calibrated result: (68% probability) Cal BC 780 to 520 (Cal BP 2730 to 2470)



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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-11.1:lab. mult=1)

Laboratory number: **Beta-164329**

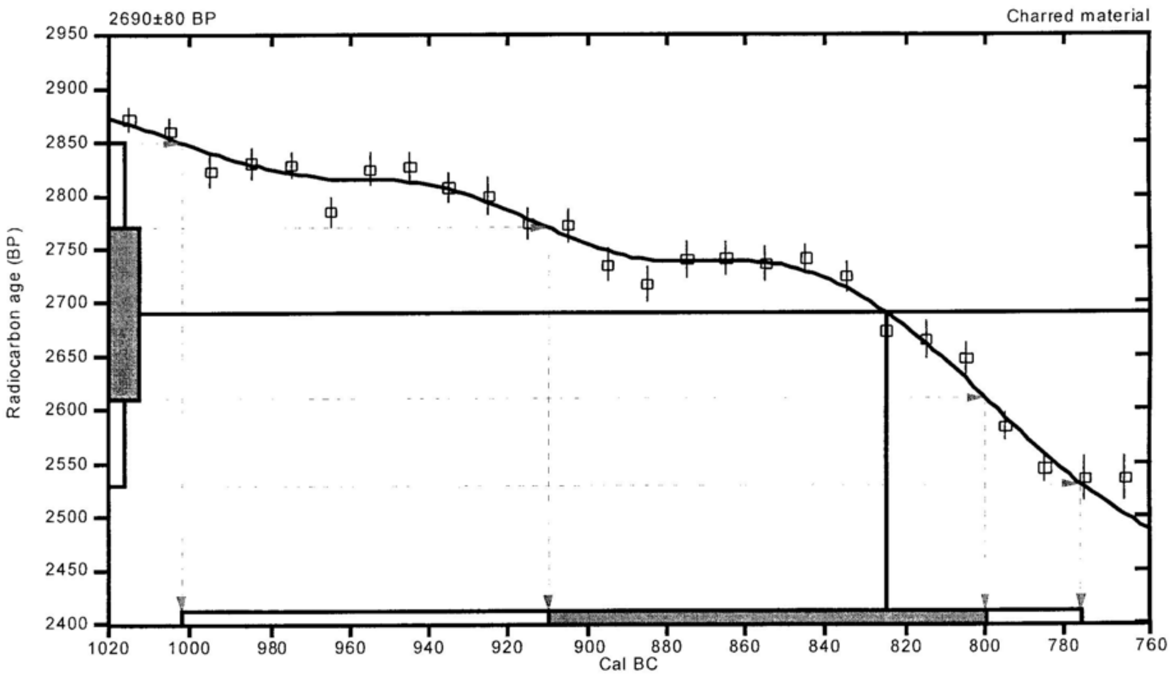
Conventional radiocarbon age: **2690±80 BP**

2 Sigma calibrated result: (95% probability) **Cal BC 1000 to 780 (Cal BP 2950 to 2730)**

Intercept data

Intercept of radiocarbon age with calibration curve: Cal BC 820 (Cal BP 2780)

1 Sigma calibrated result: (68% probability) Cal BC 910 to 800 (Cal BP 2860 to 2750)



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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-11.3:lab. mult=1)

Laboratory number: **Beta-164330**

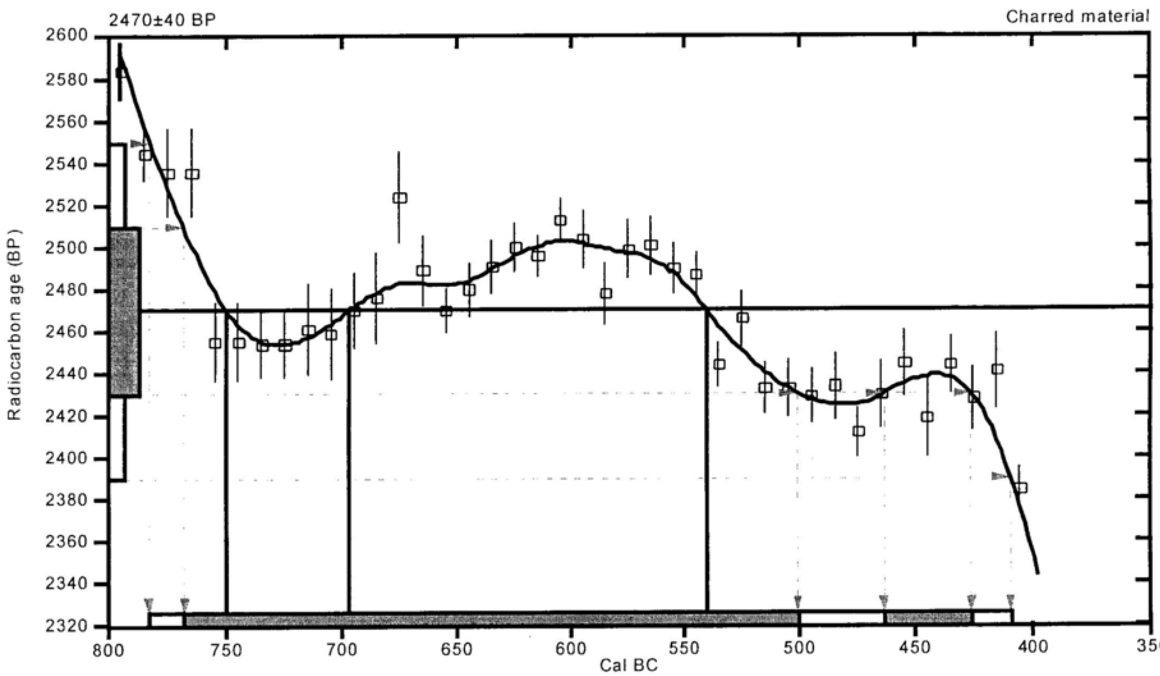
Conventional radiocarbon age: **2470±40 BP**

2 Sigma calibrated result: (95% probability) **Cal BC 780 to 410 (Cal BP 2730 to 2360)**

Intercept data

Intercepts of radiocarbon age with calibration curve: Cal BC 750 (Cal BP 2700) and
Cal BC 700 (Cal BP 2650) and
Cal BC 540 (Cal BP 2490)

1 Sigma calibrated results: (68% probability) Cal BC 770 to 500 (Cal BP 2720 to 2450) and
Cal BC 460 to 430 (Cal BP 2410 to 2380)



References:

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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-11.5:lab. mult=1)

Laboratory number: **Beta-164331**

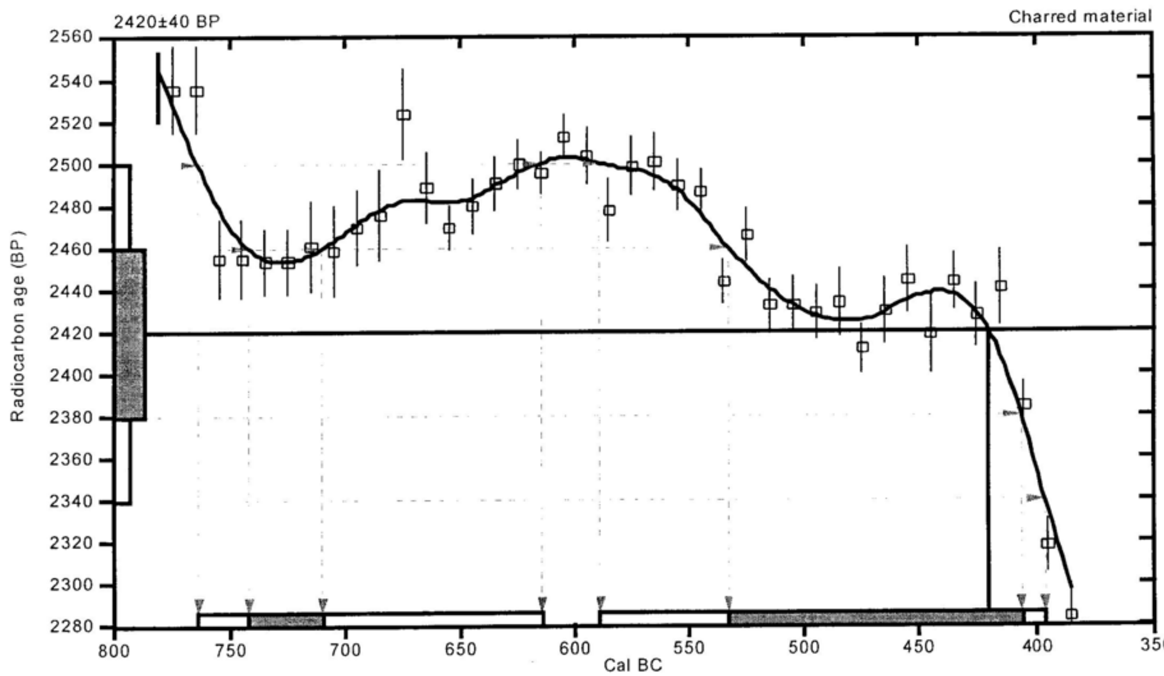
Conventional radiocarbon age: **2420±40 BP**

2 Sigma calibrated results: (95% probability) **Cal BC 760 to 620 (Cal BP 2710 to 2560) and Cal BC 590 to 400 (Cal BP 2540 to 2350)**

Intercept data

Intercept of radiocarbon age with calibration curve: Cal BC 420 (Cal BP 2370)

1 Sigma calibrated results: (68% probability) Cal BC 740 to 710 (Cal BP 2690 to 2660) and Cal BC 530 to 410 (Cal BP 2480 to 2360)



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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-12:lab. mult=1)

Laboratory number: **Beta-164332**

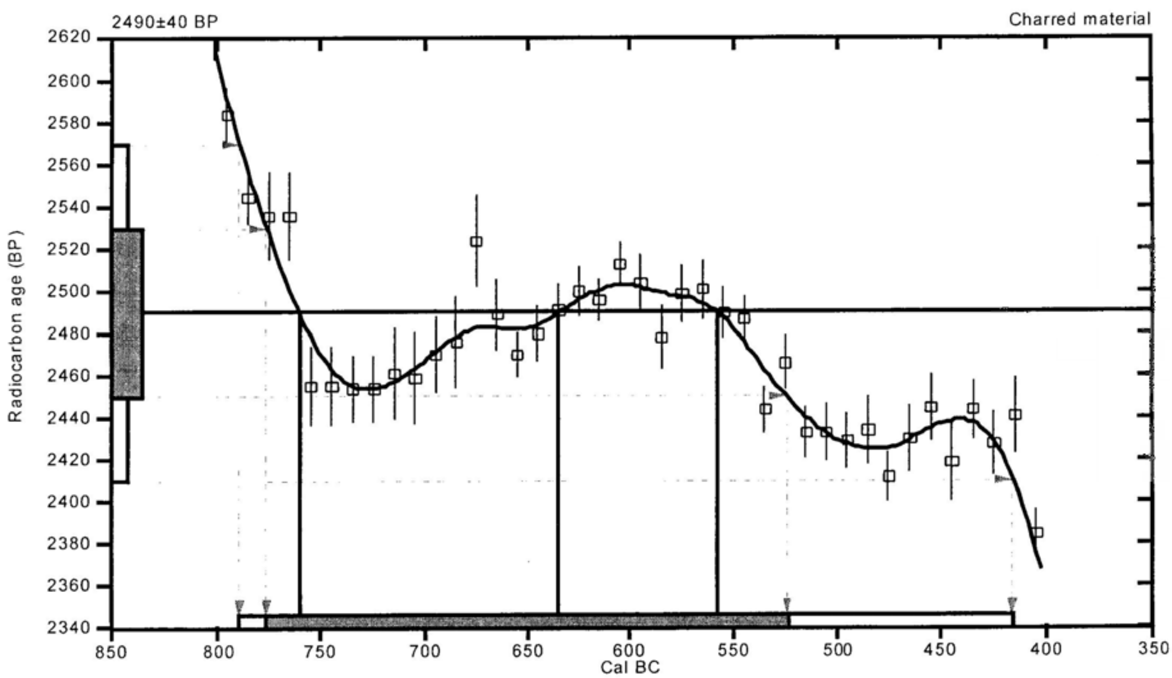
Conventional radiocarbon age: **2490±40 BP**

2 Sigma calibrated result: (95% probability) **Cal BC 790 to 420 (Cal BP 2740 to 2370)**

Intercept data

Intercepts of radiocarbon age with calibration curve: Cal BC 760 (Cal BP 2710) and
Cal BC 640 (Cal BP 2580) and
Cal BC 560 (Cal BP 2510)

1 Sigma calibrated result: (68% probability) Cal BC 780 to 520 (Cal BP 2730 to 2470)



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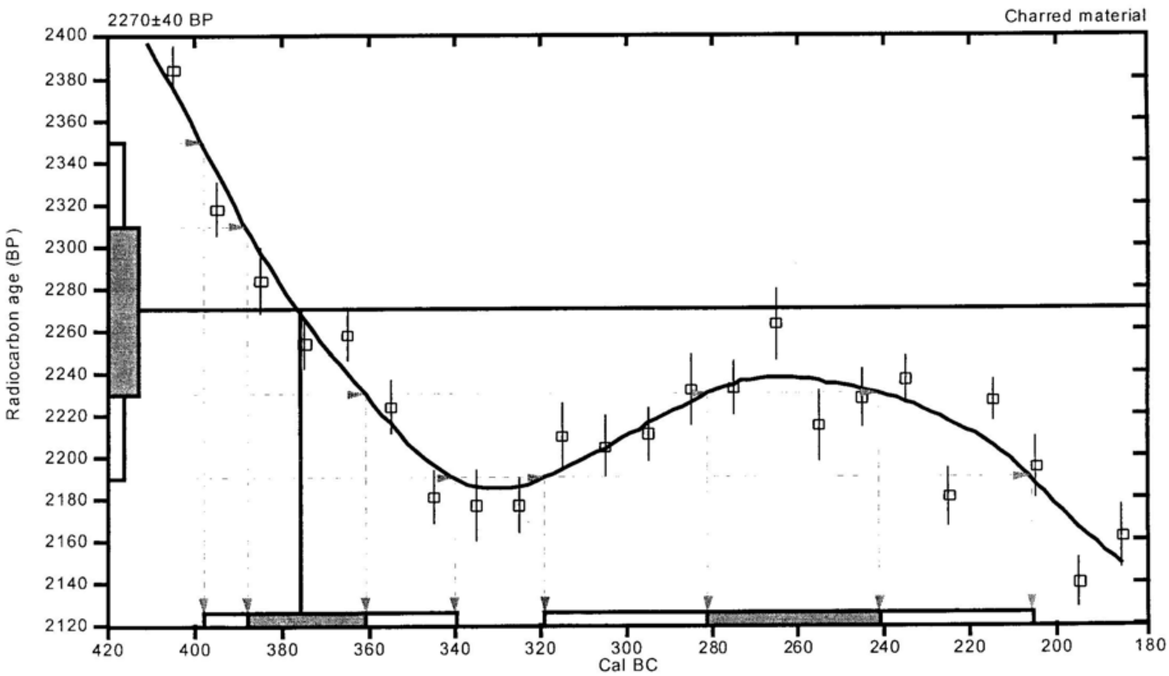
CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-15.1:lab. mult=1)

Laboratory number:	**Beta-164333**
Conventional radiocarbon age:	**2270±40 BP**
2 Sigma calibrated results: (95% probability)	**Cal BC 400 to 340 (Cal BP 2350 to 2290) and Cal BC 320 to 210 (Cal BP 2270 to 2160)**

Intercept data

Intercept of radiocarbon age with calibration curve:	Cal BC 380 (Cal BP 2330)
1 Sigma calibrated results: (68% probability)	Cal BC 390 to 360 (Cal BP 2340 to 2310) and Cal BC 280 to 240 (Cal BP 2230 to 2190)



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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: est. C13/C12=-25:lab. mult=1)

Laboratory number: **Beta-164334**

Conventional radiocarbon age[1]: **320±60 BP**

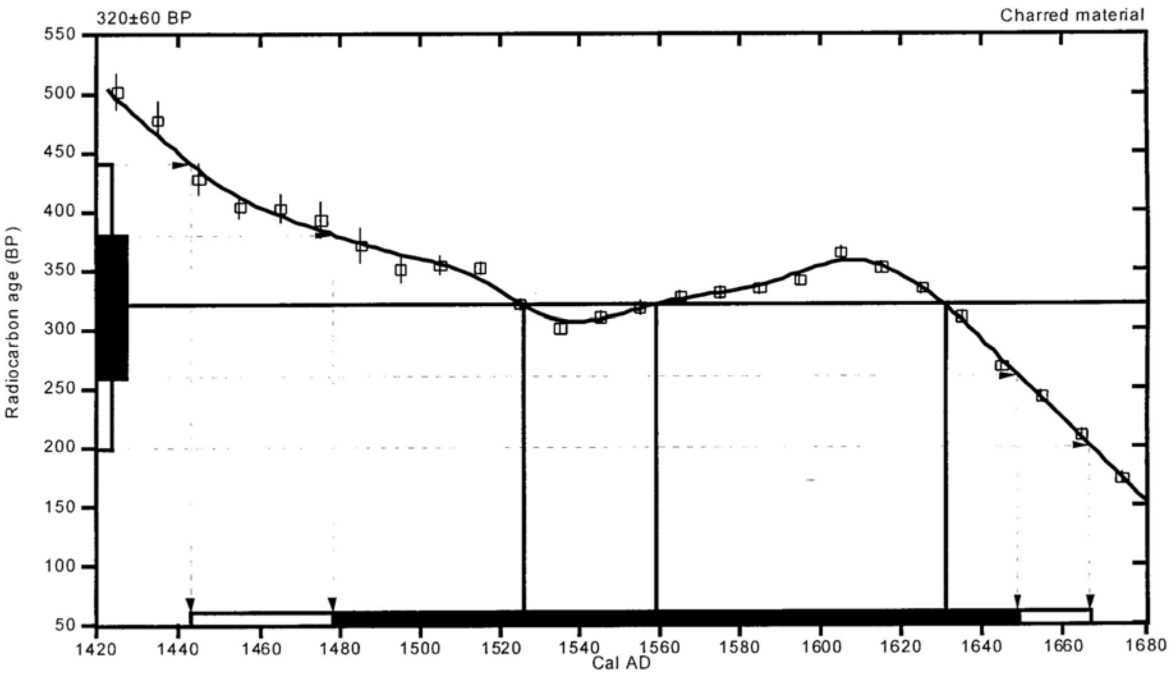
2 Sigma calibrated result: **Cal AD 1440 to 1670 (Cal BP 510 to 280)**
(95% probability)

[1] *C13/C12 ratio estimated*

Intercept data

Intercepts of radiocarbon age with calibration curve: Cal AD 1530 (Cal BP 420) and
Cal AD 1560 (Cal BP 390) and
Cal AD 1630 (Cal BP 320)

1 Sigma calibrated result: Cal AD 1480 to 1650 (Cal BP 470 to 300)
(68% probability)



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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: est. C13/C12=-25:lab. mult=1)

Laboratory number: **Beta-164335**

Conventional radiocarbon age[1]: **340±70 BP**

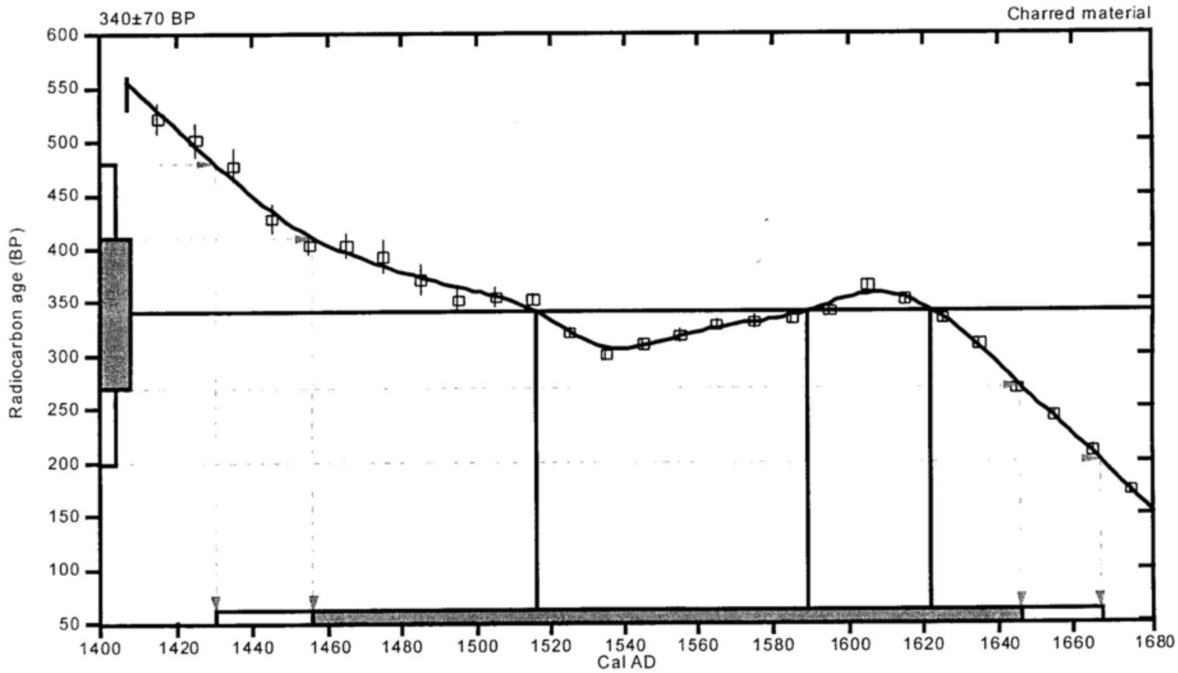
2 Sigma calibrated result: (95% probability) **Cal AD 1430 to 1670 (Cal BP 520 to 280)**

[1] C13/C12 ratio estimated

Intercept data

Intercepts of radiocarbon age with calibration curve: Cal AD 1520 (Cal BP 430) and
Cal AD 1590 (Cal BP 360) and
Cal AD 1620 (Cal BP 330)

1 Sigma calibrated result: (68% probability) Cal AD 1460 to 1650 (Cal BP 490 to 300)



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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

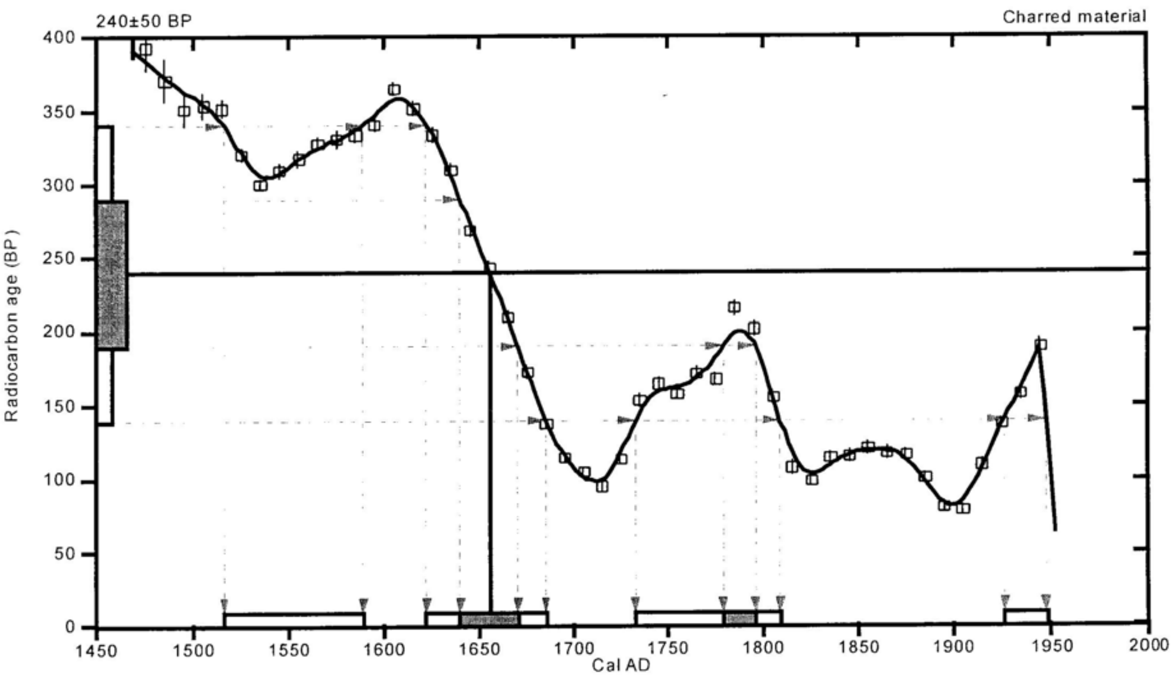
(Variables: est. C13/C12=-25:lab. mult=1)

Laboratory number:	**Beta-164336**
Conventional radiocarbon age[1]:	**240±50 BP**
2 Sigma calibrated results: (95% probability)	**Cal AD 1520 to 1590 (Cal BP 430 to 360) and Cal AD 1620 to 1680 (Cal BP 330 to 260) and Cal AD 1730 to 1810 (Cal BP 220 to 140) and Cal AD 1930 to 1950 (Cal BP 20 to 0)**

[1] C13/C12 ratio estimated

Intercept data

Intercept of radiocarbon age with calibration curve:	Cal AD 1660 (Cal BP 290)
1 Sigma calibrated results: (68% probability)	Cal AD 1640 to 1670 (Cal BP 310 to 280) and Cal AD 1780 to 1800 (Cal BP 170 to 150)



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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-11.2:lab. mult=1)

Laboratory number: **Beta-164337**

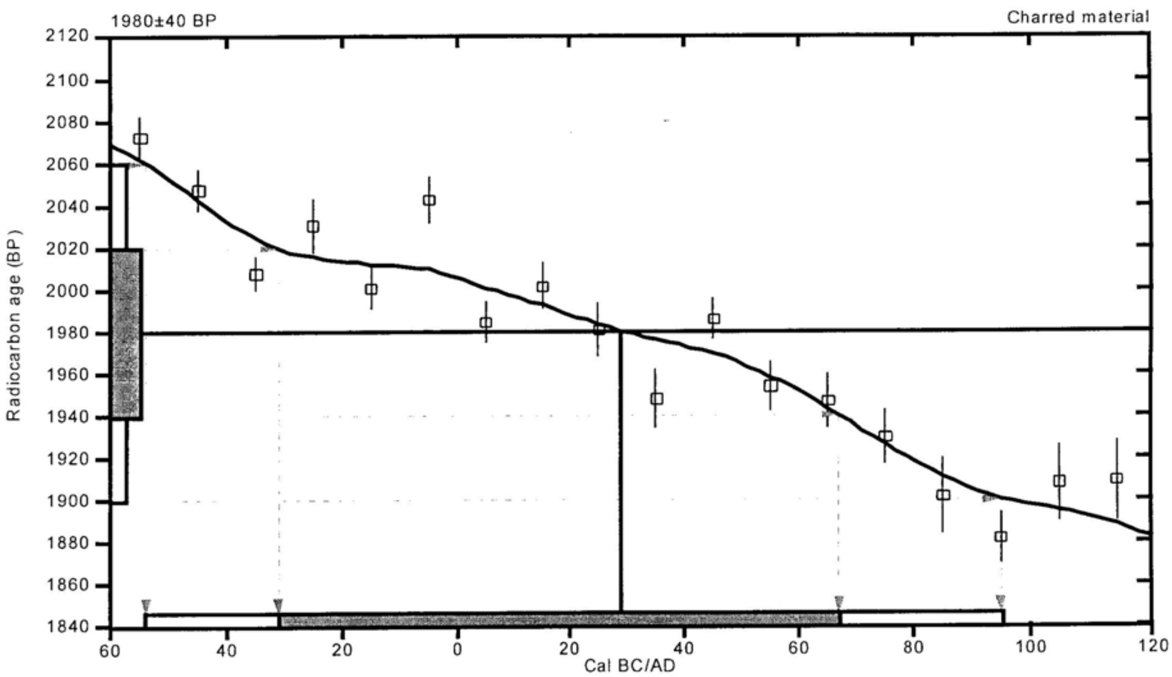
Conventional radiocarbon age: **1980±40 BP**

2 Sigma calibrated result: (95% probability) **Cal BC 50 to Cal AD 100 (Cal BP 2000 to 1860)**

Intercept data

Intercept of radiocarbon age with calibration curve: Cal AD 30 (Cal BP 1920)

1 Sigma calibrated result: (68% probability) Cal BC 30 to Cal AD 70 (Cal BP 1980 to 1880)



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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-11.8:lab. mult=1)

Laboratory number: **Beta-164338**

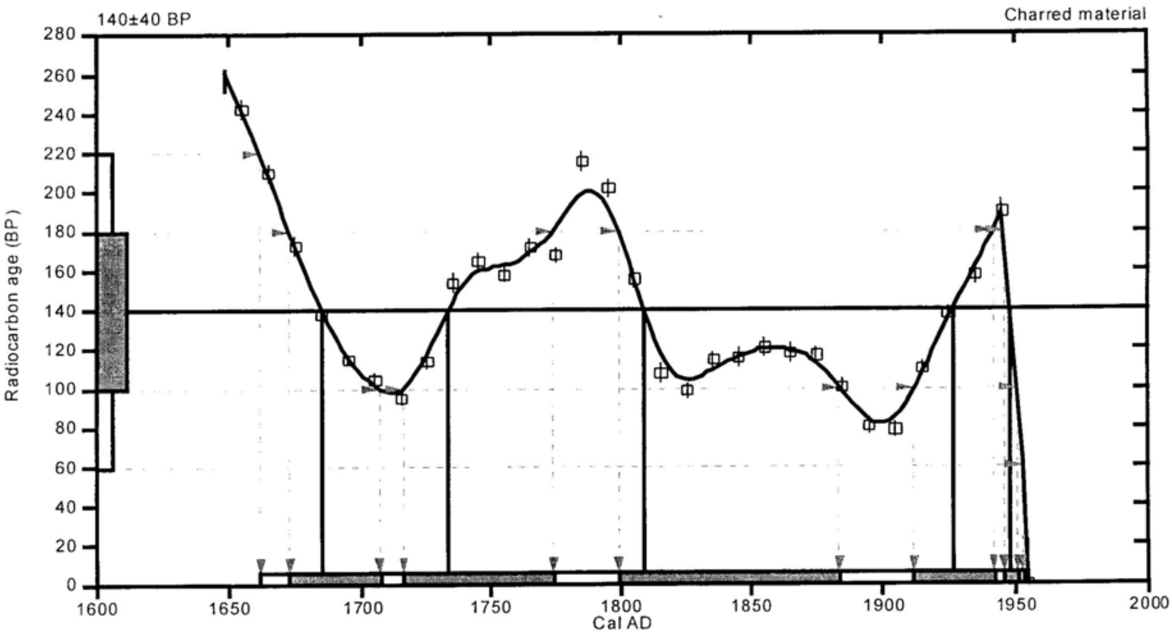
Conventional radiocarbon age: **140±40 BP**

2 Sigma calibrated result: (95% probability) **Cal AD 1660 to 1950 (Cal BP 290 to 0)**

Intercept data

Intercepts of radiocarbon age with calibration curve:
Cal AD 1680 (Cal BP 260) and
Cal AD 1730 (Cal BP 220) and
Cal AD 1810 (Cal BP 140) and
Cal AD 1930 (Cal BP 20) and
Cal AD 1950 (Cal BP 0)

1 Sigma calibrated results: (68% probability)
Cal AD 1670 to 1710 (Cal BP 280 to 240) and
Cal AD 1720 to 1770 (Cal BP 230 to 180) and
Cal AD 1800 to 1880 (Cal BP 150 to 70) and
Cal AD 1910 to 1940 (Cal BP 40 to 10) and
Cal AD 1950 to 1950 (Cal BP 0 to 0)



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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: est. C13/C12=-25:lab. mult=1)

Laboratory number: **Beta-164339**

Conventional radiocarbon age[1]: **350±50 BP**

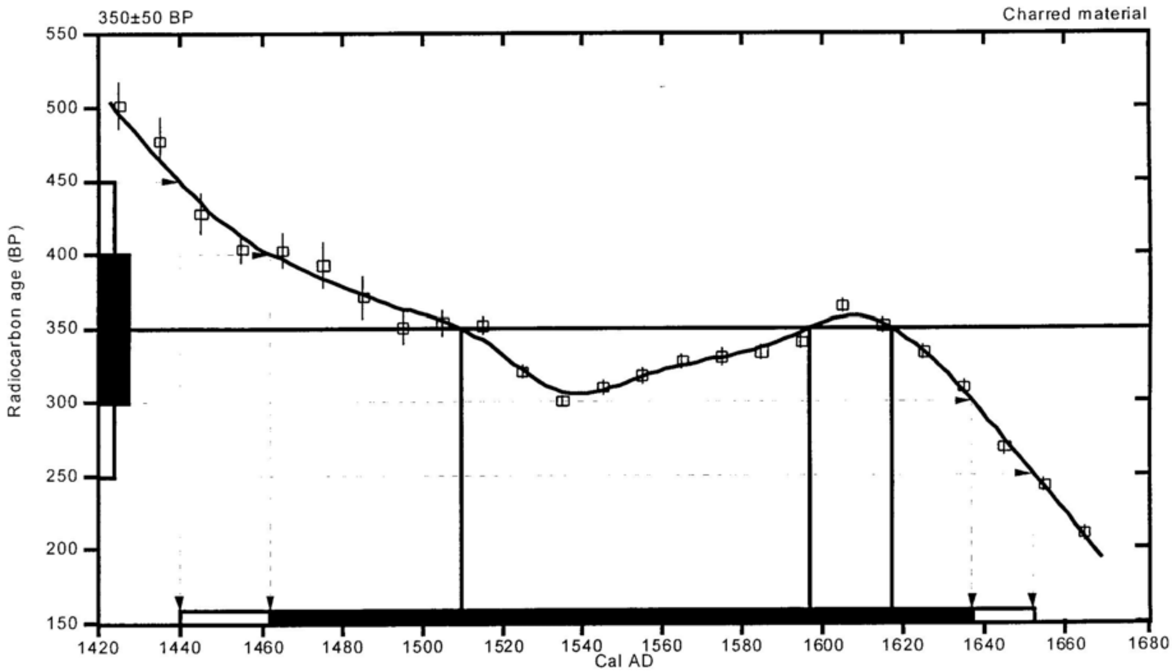
2 Sigma calibrated result: (95% probability) **Cal AD 1440 to 1650 (Cal BP 510 to 300)**

[1] C13/C12 ratio estimated

Intercept data

Intercepts of radiocarbon age with calibration curve: Cal AD 1510 (Cal BP 440) and Cal AD 1600 (Cal BP 350) and Cal AD 1620 (Cal BP 330)

1 Sigma calibrated result: (68% probability) Cal AD 1460 to 1640 (Cal BP 490 to 310)



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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-11.9:lab. mult=1)

Laboratory number: **Beta-164340**

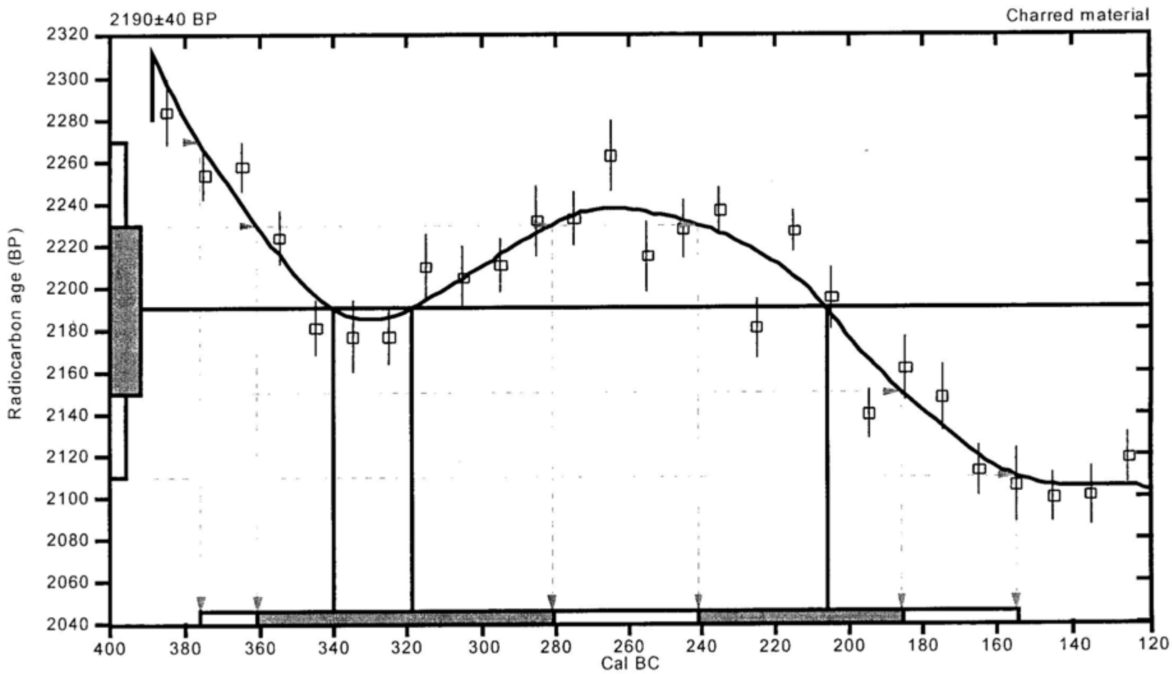
Conventional radiocarbon age: **2190±40 BP**

2 Sigma calibrated result: (95% probability) **Cal BC 380 to 160 (Cal BP 2330 to 2100)**

Intercept data

Intercepts of radiocarbon age with calibration curve: Cal BC 340 (Cal BP 2290) and Cal BC 320 (Cal BP 2270) and Cal BC 210 (Cal BP 2160)

1 Sigma calibrated results: (68% probability) Cal BC 360 to 280 (Cal BP 2310 to 2230) and Cal BC 240 to 190 (Cal BP 2190 to 2140)



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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-11.1:lab. mult=1)

Laboratory number: **Beta-164341**

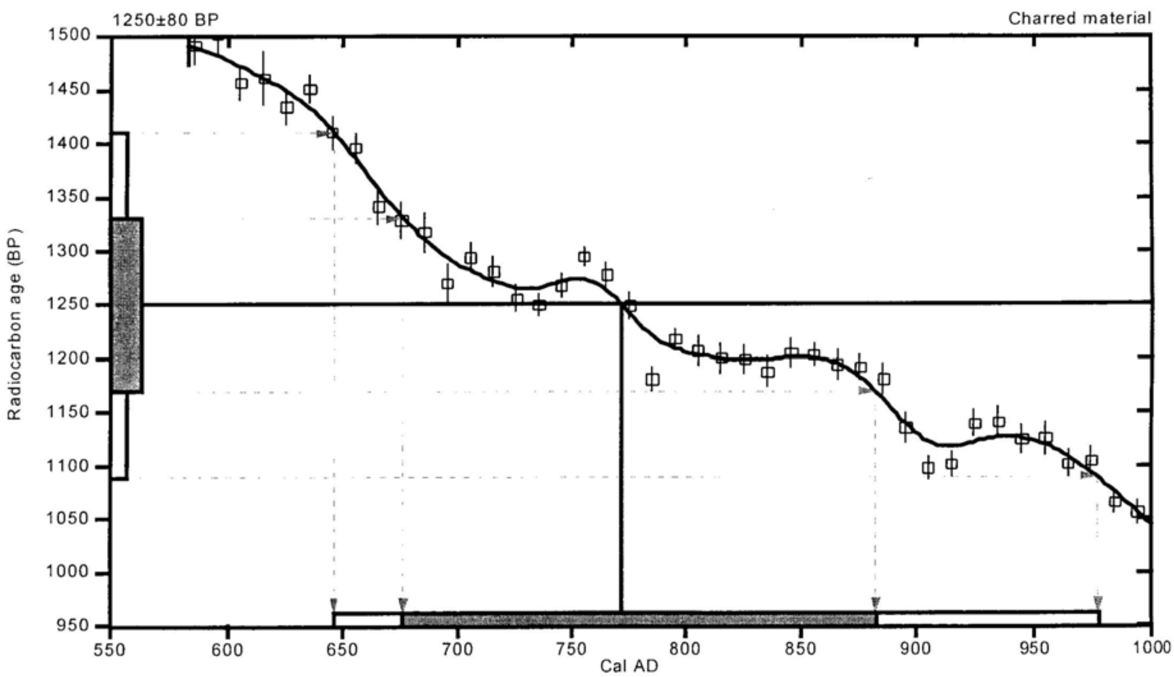
Conventional radiocarbon age: **1250±80 BP**

2 Sigma calibrated result: (95% probability) **Cal AD 650 to 980 (Cal BP 1300 to 970)**

Intercept data

Intercept of radiocarbon age with calibration curve: Cal AD 770 (Cal BP 1180)

1 Sigma calibrated result: (68% probability) Cal AD 680 to 880 (Cal BP 1270 to 1070)



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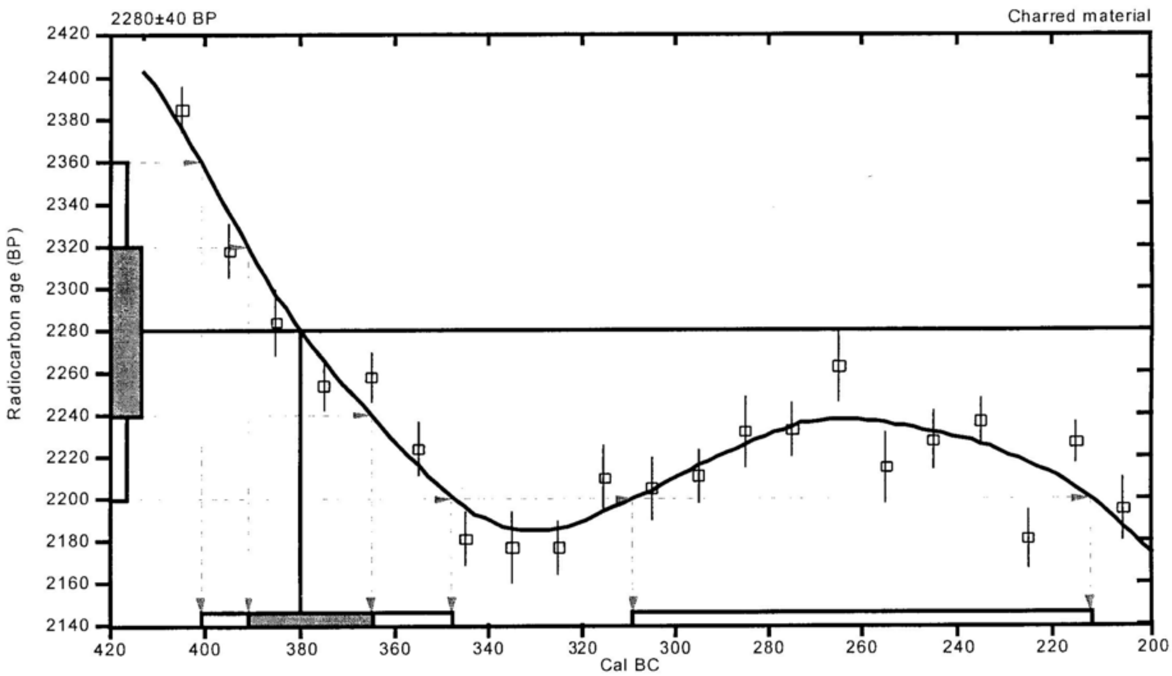
CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-20.8:lab. mult=1)

Laboratory number:	**Beta-164342**
Conventional radiocarbon age:	**2280±40 BP**
2 Sigma calibrated results: (95% probability)	**Cal BC 400 to 350 (Cal BP 2350 to 2300) and Cal BC 310 to 210 (Cal BP 2260 to 2160)**

Intercept data

Intercept of radiocarbon age with calibration curve:	Cal BC 380 (Cal BP 2330)
1 Sigma calibrated result: (68% probability)	Cal BC 390 to 360 (Cal BP 2340 to 2320)



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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: est. C13/C12=-25:lab. mult=1)

Laboratory number: **Beta-164343**

Conventional radiocarbon age[1]: **1420±60 BP**

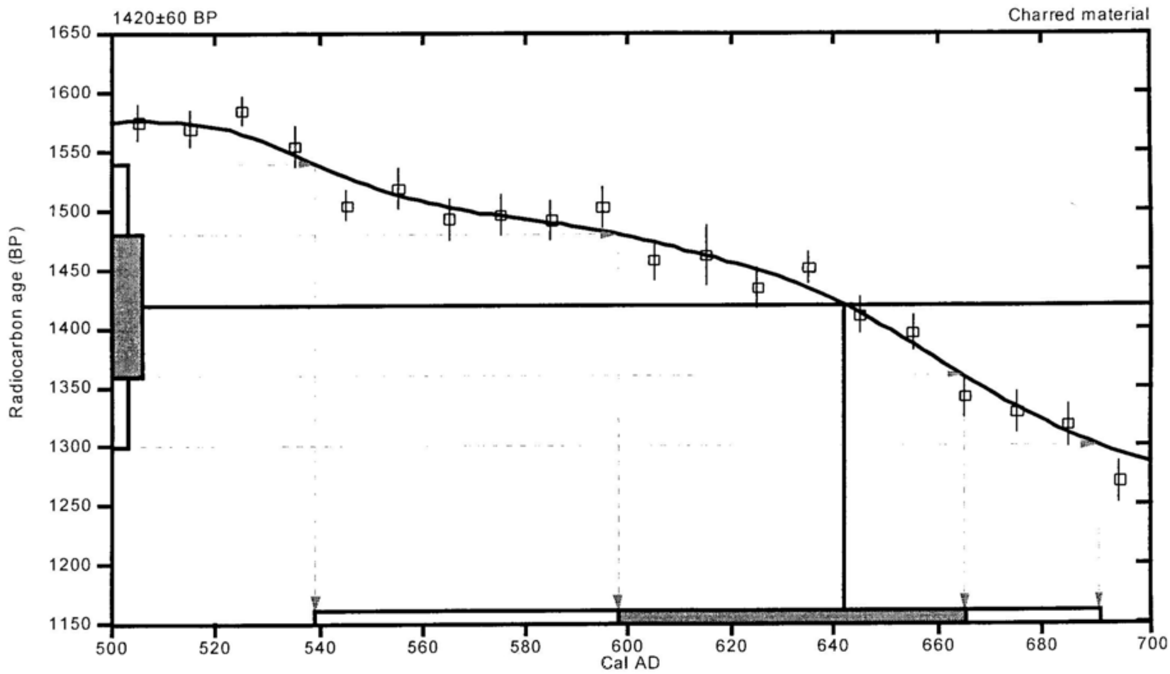
2 Sigma calibrated result: (95% probability) **Cal AD 540 to 690 (Cal BP 1410 to 1260)**

[1] C13/C12 ratio estimated

Intercept data

Intercept of radiocarbon age with calibration curve: Cal AD 640 (Cal BP 1310)

1 Sigma calibrated result: (68% probability) Cal AD 600 to 660 (Cal BP 1350 to 1280)



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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-22.9:lab. mult=1)

Laboratory number: **Beta-164344**

Conventional radiocarbon age: **1510±40 BP**

2 Sigma calibrated result: (95% probability) **Cal AD 440 to 640 (Cal BP 1510 to 1310)**

Intercept data

Intercept of radiocarbon age with calibration curve: Cal AD 560 (Cal BP 1390)

1 Sigma calibrated result: (68% probability) Cal AD 530 to 610 (Cal BP 1420 to 1340)

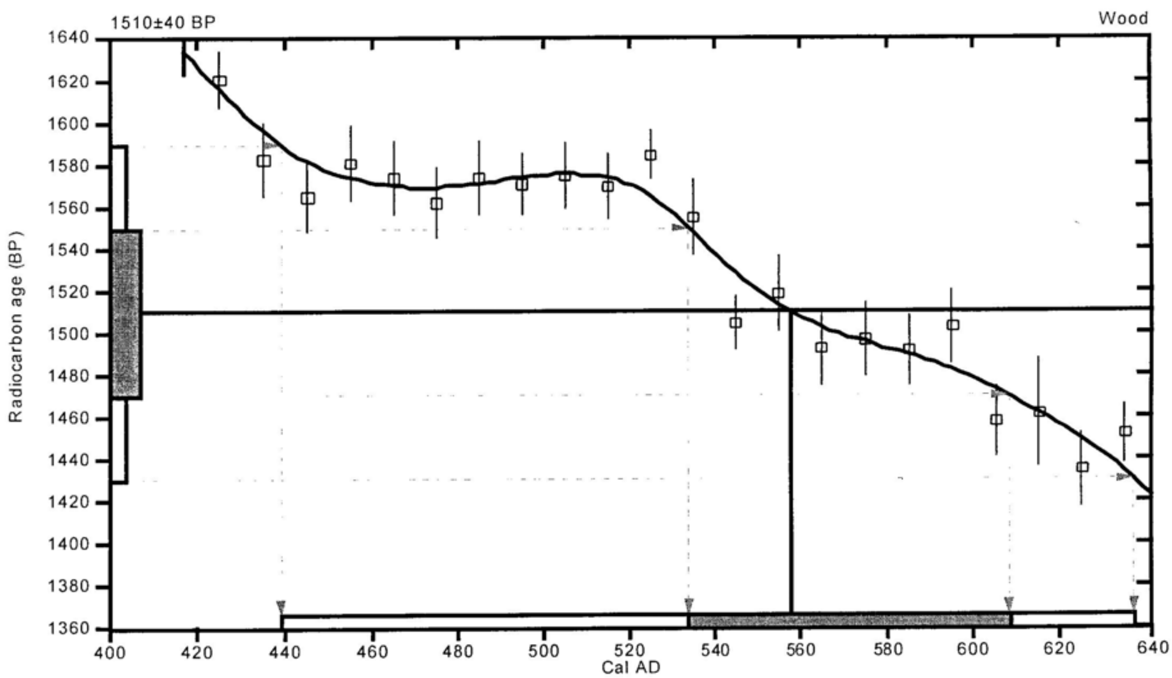

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Table A4.1. Results of radiocarbon analysis from Twin Lakes and selected sites..

Temporal Period[1]	Sample Provenience[2] and Type[3]	Conventional Radiocarbon Age	Laboratory Reference	Calibrated 1-Sigma Range	Calibrated 2-Sigma Range	MCMC** Calibrated 1-Sigma Range	MCMC Calibrated 2-Sigma Range	Primary Reference
Boundary early Archaic						6870 BC (68.2%) 6490 BC	7250 BC (95.4%) 6450 BC	Bronk Ramsey 2002; Stuiver et al. 1998
Jay	LA 80434, A2, F6-p,j	7680±50	UCI-334, UCR-2765	6590 BC (3.9%) 6580 BC	6610 BC (95.4%) 6440 BC	6570 BC (68.2%) 6460 BC	6610 BC (95.4%) 6430 BC	Freuden 1998a
				6570 BC (64.3%) 6460 BC				
	LA 61962, SU5-mc	7500±130	Beta-44830	6470 BC (68.2%) 6220 BC	6600 BC (95.4%) 6050 BC	6460 BC (68.2%) 6230 BC	6600 BC (95.4%) 6050 BC	Avallone and Kotyk 1999
	LA 80434, A2, F2-p,j	7290±40	UCI-354, UCR-2790	6220 BC (68.2%) 6090 BC	6230 BC (95.4%) 6060 BC	6220 BC (68.2%) 6090 BC	6230 BC (95.4%) 6060 BC	Freuden 1998a
	?LA 61956, SU2, F4-mc	6380±120	Beta-32939	5480 BC (57.9%) 5280 BC	5650 BC (95.4%) 5050 BC	5480 BC (59.5%) 5280 BC	5650 BC (95.4%) 5050 BC	Kotyk 1999
				5270 BC (10.3%) 5220 BC		5270 BC (8.7%) 5220 BC		
	LA 83487, F4-mc	5735±75	Beta-51600	4690 BC (68.2%) 4500 BC	4780 BC (93.3%) 4440 BC	4690 BC (68.2%) 4490 BC	4780 BC (93.8%) 4440 BC	Burchett and Bradley 1994
					4420 BC (2.1%) 4370 BC		4420 BC (1.6%) 4390 BC	
	?LA 61955, SU1, F18-mc	5650±80	Beta-32938	4550 BC (68.2%) 4360 BC	4690 BC (95.4%) 4340 BC	4560 BC (68.2%) 4360 BC	4690 BC (95.4%) 4340 BC	Morris and Kotyk 1999
	LA 83487, F3-mc	5180±150	Beta-51601	4230 BC (4.7%) 4190 BC	4350 BC (95.4%) 3650 BC	4230 BC (4.9%) 4190 BC	4350 BC (95.4%) 3650 BC	Burchett and Bradley 1994
				4170 BC (12.2%) 4090 BC		4170 BC (45.5%) 3910 BC		
				4080 BC (51.4%) 3790 BC		3900 BC (17.7%) 3790 BC		
Bajada	LA 80391, NS1, F15-s	4760±50	UCI-325, UCR-2750	3640 BC (68.2%) 3510 BC	3650 BC (74.7%) 3490 BC	3640 BC (68.2%) 3510 BC	3650 BC (74.6%) 3490 BC	Baugh 1998
					3460 BC (20.7%) 3370 BC		3460 BC (20.8%) 3370 BC	

(Table A4.1, continued)

Temporal Period[1]	Sample Provenience[2] and Type[3]	Conventional Radiocarbon Age	Laboratory Reference	Calibrated 1-Sigma Range	Calibrated 2-Sigma Range	MCMC** Calibrated 1-Sigma Range	MCMC Calibrated 2-Sigma Range	Primary Reference
	LA 80391, NS1, F5-s	4700±50	UCI-323, UCR-2848	3630 BC (10.4%) 3600 BC	3640 BC (23.8%) 3550 BC	3630 BC (10.5%) 3600 BC	3640 BC (24.1%) 3550 BC	Baugh 1998
				3530 BC (14.5%) 3490 BC	3540 BC (71.6%) 3360 BC	3530 BC (14.7%) 3490 BC	3540 BC (71.3%) 3360 BC	
				3470 BC (43.3%) 3370 BC		3470 BC (42.9%) 3370 BC		
	LA 80392, FS3117-s	4630±50	UCI-349, UCR-2780	3510 BC (52.1%) 3420 BC	3650 BC (90.6%) 3300 BC	3520 BC (52.2%) 3420 BC	3630 BC (3.8%) 3580 BC	McVickar 1998
				3390 BC (16.1%) 3350 BC	3250 BC (4.8%) 3100 BC	3390 BC (16.0%) 3350 BC	3530 BC (87.2%) 3330 BC	
							3220 BC (2.3%) 3180 BC	
							3160 BC (2.1%) 3120 BC	
	*LA 80391, SS1-s	4591±32	UCI-322, UCR-2747	3500 BC (23.7%) 3460 BC	3500 BC (31.6%) 3430 BC	3500 BC (23.6%) 3460 BC	3510 BC (31.8%) 3430 BC	Baugh 1998
				3380 BC (43.1%) 3330 BC	3380 BC (46.8%) 3320 BC	3380 BC (42.4%) 3330 BC	3390 BC (47.3%) 3320 BC	
				3210 BC (1.3%) 3190 BC	3220 BC (9.2%) 3170 BC	3210 BC (2.2%) 3190 BC	3220 BC (8.9%) 3170 BC	
					3160 BC (7.7%) 3110 BC		3160 BC (7.4%) 3110 BC	
	LA 80391, SS1, F1-mc	4500±60	Beta-47358	3340 BC (24.0%) 3260 BC	3370 BC (95.4%) 3010 BC	3340 BC (25.2%) 3260 BC	3370 BC (95.4%) 3010 BC	Baugh 1998
				3250 BC (44.2%) 3100 BC		3240 BC (43.0%) 3100 BC		
	LA 80392, F4-a	4500±40	UCI-348, UCR-2779	3340 BC (26.2%) 3260 BC	3360 BC (92.4%) 3080 BC	3340 BC (26.4%) 3260 BC	3360 BC (93.8%) 3080 BC	McVickar 1998
				3250 BC (29.0%) 3150 BC	3060 BC (3.0%) 3030 BC	3250 BC (12.4%) 3210 BC	3060 BC (1.6%) 3040 BC	

(Table A4.1, continued)

Temporal Period[1]	Sample Provenience[2] and Type[3]	Conventional Radiocarbon Age	Laboratory Reference	Calibrated 1-Sigma Range	Calibrated 2-Sigma Range	MCMC** Calibrated 1-Sigma Range	MCMC Calibrated 2-Sigma Range	Primary Reference
				3140 BC (13.0%) 3100 BC		3200 BC (29.4%) 3100 BC		
	LA 80392, F14-s	4370±50	UCI-350, UCR-2781	3090 BC (5.7%) 3060 BC	3320 BC (4.3%) 3230 BC	3100 BC (15.7%) 3050 BC	3330 BC (10.2%) 3230 BC	McVickar 1998
				3030 BC (62.5%) 2910 BC	3110 BC (91.1%) 2880 BC	3030 BC (52.5%) 2910 BC	3110 BC (85.2%) 2890 BC	
Boundary early Archaic						3030 BC (68.2%) 2700 BC	3100 BC (95.4%)	Bronk Ramsey 2002; Stuiver et al. 1998
Middle-Late Archaic begins					Boundary middle-late Archaic	2970 BC (68.2%) 2720 BC	3200 BC (95.4%) 2600 BC	Bronk Ramsey 2002; Stuiver et al. 1998
Middle Archaic	LA 80397, A1, F4-mc	4220±80	Beta-49141	2910 BC (23.3%) 2830 BC	3020 BC (95.4%) 2570 BC	2810 BC (68.2%) 2620 BC	2920 BC (95.4%) 2560 BC	Korgel 1998
				2820 BC (44.9%) 2670 BC				
	LA 80397, A1, F7-j	4180±80	UCI-293, UCR-2687	2890 BC (17.0%) 2830 BC	2920 BC (93.6%) 2560 BC	2820 BC (68.2%) 2590 BC	2900 BC (92.8%) 2560 BC	Kogel 1998
				2820 BC (51.2%) 2660 BC	2530 BC (1.8%) 2490 BC		2530 BC (2.6%) 2490 BC	
	LA 80397, A1, F6-p	4090±50	UCI-294, UCR-2709	2860 BC (14.0%) 2810 BC	2880 BC (19.3%) 2800 BC	2840 BC (3.6%) 2810 BC	2870 BC (10.6%) 2800 BC	Kogel 1998
				2750 BC (5.2%) 2720 BC	2780 BC (76.1%) 2490 BC	2750 BC (4.4%) 2720 BC	2780 BC (84.8%) 2480 BC	
				2700 BC (47.1%) 2570 BC		2700 BC (56.5%) 2560 BC		
				2520 BC (2.0%) 2500 BC		2520 BC (3.7%) 2500 BC		
	LA 80391, SS1, F11-s	4030±40	UCI-324, UCR-2749	2580 BC (68.2%) 2480 BC	2840 BC (3.2%) 2810 BC	2580 BC (68.2%) 2480 BC	2840 BC (1.4%) 2810 BC	Baugh 1998
					2670 BC (92.2%) 2460 BC		2670 BC (94.0%) 2460 BC	
	LA 83523 F1-j,gy	3990±120	Beta-51598	2850 BC (2.9%) 2800 BC	2900 BC (95.4%) 2200 BC	2670 BC (2.7%) 2650 BC	2900 BC (95.4%) 2150 BC	Freuden and Burgett 1994

(Table A4.1, continued)

Temporal Period[1]	Sample Provenience[2] and Type[3]	Conventional Radiocarbon Age	Laboratory Reference	Calibrated 1-Sigma Range	Calibrated 2-Sigma Range	MCMC** Calibrated 1-Sigma Range	MCMC Calibrated 2-Sigma Range	Primary Reference
				2700 BC (65.3%) 2250 BC		2640 BC (65.5%) 2290 BC		
	LA 80397, A1, F8-a	3820±50	UCI295, UCR-2710	2400 BC (2.2%) 2380 BC	2460 BC (95.4%) 2130 BC	2390 BC (1.2%) 2380 BC	2460 BC (95.4%) 2130 BC	Kogel 1998
				2350 BC (61.1%) 2190 BC		2350 BC (61.4%) 2190 BC		
				2170 BC (4.9%) 2140 BC		2170 BC (5.6%) 2140 BC		
	LA 17383, F1-mc	3800±130	Beta-51599	2460 BC (61.3%) 2120 BC	2650 BC (95.4%) 1850 BC	2460 BC (60.3%) 2120 BC	2600 BC (95.4%) 1850 BC	Eakin and Bradley 1994
				2090 BC (6.9%) 2040 BC		2100 BC (7.9%) 2050 BC		
	LA 19374, F5-mc	3770±50	DIC-2515	2290 BC (64.1%) 2130 BC	2350 BC (95.4%) 2030 BC	2290 BC (64.4%) 2130 BC	2350 BC (95.4%) 2020 BC	Eschman 1983
				2080 BC (4.1%) 2060 BC		2080 BC (3.8%) 2060 BC		
	*LA 18103, F1-mc	3707±65	UGa-3627; UGa-3628	2200 BC (65.5%) 2020 BC	2290 BC (95.4%) 1920 BC	2200 BC (65.5%) 2020 BC	2290 BC (95.4%) 1920 BC	Simmons 1982
				2000 BC (2.7%) 1980 BC		2000 BC (2.7%) 1980 BC		
	LA 80434, A2, ST13-a	3710±70	UCI-369, UCR-2684	2210 BC (64.8%) 2010 BC	2300 BC (95.4%) 1890 BC	2210 BC (64.7%) 2010 BC	2300 BC (95.4%) 1900 BC	Freuden 1998a
				2000 BC (3.4%) 1980 BC		2000 BC (3.5%) 1980 BC		
	LA 80397, A5, F11-a	3680±60	UCI-290, UCR2684	2190 BC (2.4%) 2180 BC	2280 BC (1.1%) 2250 BC	2190 BC (2.0%) 2180 BC	2280 BC (1.3%) 2250 BC	Kogel 1998
				2140 BC (65.8%) 1970 BC	2210 BC (94.3%) 1890 BC	2150 BC (66.2%) 1970 BC	2210 BC (94.1%) 1890 BC	
	*LA 17337, F7-mc	3627±64	UGa-3621; UGa-3622; UGa-3623	2130 BC (10.4%) 2090 BC	2200 BC (2.6%) 2160 BC	2130 BC (11.4%) 2090 BC	2200 BC (2.7%) 2160 BC	Simmons 1982
				2050 BC (57.8%) 1900 BC	2150 BC (88.2%) 1870 BC	2050 BC (56.8%) 1900 BC	2150 BC (90.5%) 1860 BC	
					1850 BC (4.6%) 1770 BC		1850 BC (2.2%) 1810 BC	

(Table A4.1, continued)

Temporal Period[1]	Sample Provenience[2] and Type[3]	Conventional Radiocarbon Age	Laboratory Reference	Calibrated 1-Sigma Range	Calibrated 2-Sigma Range	MCMC** Calibrated 1-Sigma Range	MCMC Calibrated 2-Sigma Range	Primary Reference
Late Archaic	LA 80434, A2, ST12-p,j	3430±40	UCI-332, UCR-2786	1870 BC (9.3%) 1840 BC	1880 BC (95.4%) 1630 BC	1870 BC (8.1%) 1840 BC	1880 BC (95.4%) 1630 BC	Freuden 1998a
				1810 BC (1.1%) 1800 BC		1780 BC (60.1%) 1680 BC		
				1780 BC (57.7%) 1680 BC				
	LA 80434, A1, F15-j	3380±40	UCI-281, UCR-2675	1740 BC (68.2%) 1620 BC	1770 BC (95.4%) 1530 BC	1740 BC (68.2%) 1620 BC	1770 BC (95.4%) 1530 BC	Freuden 1998a
	LA 80397, A5, F12-a	3280±50	UCI-291, UCR-2685	1620 BC (68.2%) 1500 BC	1690 BC (95.4%) 1440 BC	1620 BC (68.2%) 1500 BC	1690 BC (95.4%) 1440 BC	Kogel 1998
	*LA 80393, ST5-a	3232±31	UCR-2813; UCR-2815	1525 BC (68.2%) 1450 BC	1610 BC (95.4%) 1430 BC	1525 BC (68.2%) 1450 BC	1610 BC (9.3%) 1570 BC	Kearns 1998f
							1560 BC (86.1%) 1430 BC	
	Discovery 9, mc	3030±100	Beta-59671	1410 BC (68.2%) 1120 BC	1500 BC (95.4%) 1000 BC	1430 BC (68.2%) 1210 BC	1520 BC (95.4%) 1080 BC	Kearns 1998g
	LA 19374, F9-?	2960±55	DIC-2519	1290 BC (1.8%) 1280 BC	1380 BC (4.2%) 1330 BC	1380 BC (8.7%) 1340 BC	1400 BC (95.4%) 1070 BC	Eschman 1983
				1270 BC (64.5%) 1080 BC	1320 BC (91.2%) 1010 BC	1310 BC (59.5%) 1170 BC		
				1070 BC (1.8%) 1050 BC				
Boundary Middle-Late Archaic						1290 BC (68.2%) 1010 BC	1400 BC (95.4%) 800 BC	Bronk Ramsey 2002; Stuiver et al. 1998
Boundary Late Archaic/BM II						1210 BC (68.2%) 840 BC	2100 BC (95.4%) 800 BC	
	LA 6444, A1, SS2-mc	2740±80	Beta-50792	980 BC (68.2%) 810 BC	1120 BC (95.4%) 780 BC	940 BC (68.2%) 810 BC	1050 BC (95.4%) 790 BC	Freuden 1998c
	*LA 80393, ST4-a	2728±33	UCR-2812; UCR-2814	900 BC (68.2%) 830 BC	970 BC (1.0%) 960 BC	905 BC (68.2%) 835 BC	930 BC (95.4%) 800 BC	Kearns 1998f
					930 BC (94.4%) 800 BC			
	LA 18091, F7-z	2720±265	UGa-4179	1300 BC (68.2%) 500 BC	1600 BC (95.4%) 200 BC	1020 BC (68.2%) 760 BC	1350 BC (95.4%) 450 BC	Simmons 1982

(Table A4.1, continued)

Temporal Period[1]	Sample Provenience[2] and Type[3]	Conventional Radiocarbon Age	Laboratory Reference	Calibrated 1-Sigma Range	Calibrated 2-Sigma Range	MCMC** Calibrated 1-Sigma Range	MCMC Calibrated 2-Sigma Range	Primary Reference
Boundary Late Archaic/ Early Basketmaker II						910 BC (68.2%) 580 BC	1000 BC (95.4%) 300 AD	Bronk Ramsey 2002; Stuiver et al. 1998
Boundary Ear Rock						875 BC (68.2%) 810 BC	940 BC (95.4%) 800 BC	Bronk Ramsey 2002; Stuiver et al. 1998
Ear Rock	LA 32964, F12-a	2690±80	Beta-164329	930 BC (68.2%) 790 BC	1060 BC (92.1%) 740 BC	860 BC (68.2%) 770 BC	910 BC (83.3%) 740 BC	Chapter 5 this report
					690 BC (1.3%) 660 BC		690 BC (3.7%) 660 BC	
					650 BC (1.9%) 590 BC		650 BC (8.4%) 540 BC	
	LA 88526, STR3, F39-p	2680±70	Beta-51578	910 BC (68.2%) 790 BC	1020 BC (94.3%) 750 BC	855 BC (68.2%) 780 BC	900 BC (88.2%) 740 BC	Redd et al. 1994
					690 BC (1.1%) 660 BC		690 BC (3.2%) 660 BC	
							650 BC (4.1%) 560 BC	
	LA 18091, F9-mc	2675±105	UGa-4184	1000 BC (67.0%) 760 BC	1150 BC (95.4%) 500 BC	870 BC (54.7%) 740 BC	910 BC (95.4%) 480 BC	Simmons 1982
				680 BC (1.2%) 670 BC		690 BC (5.4%) 660 BC		
						630 BC (8.0%) 550 BC		
	*LA 6444, A4, SS4fill-mc	2660±40	UCR-2721	890 BC (0.7%) 880 BC	900 BC (95.4%) 780 BC	835 BC (68.2%) 795 BC	870 BC (95.4%) 770 BC	Freuden 1998c
				845 BC (67.5%) 795 BC				
	LA 32964, F1, FS303-a	2610±40	Beta-164322	820 BC (68.2%) 770 BC	900 BC (1.2%) 870 BC	815 BC (68.2%) 770 BC	840 BC (87.7%) 740 BC	Chapter 5 this report
					850 BC (85.7%) 740 BC		690 BC (4.9%) 660 BC	
					690 BC (4.9%) 660 BC		640 BC (2.7%) 590 BC	
					640 BC (3.6%) 590 BC			
	LA 32964, F9-z	2580±40	Beta-164327	810 BC (58.5%) 750 BC	820 BC (63.4%) 740 BC	810 BC (56.9%) 750 BC	830 BC (62.8%) 740 BC	Chapter 5 this report
				690 BC (9.7%) 660 BC	690 BC (12.0%) 660 BC	690 BC (10.5%) 660 BC	700 BC (12.9%) 660 BC	
					650 BC (20.0%) 540 BC	610 BC (0.9%) 600 BC	650 BC (19.6%) 540 BC	

(Table A4.1, continued)

Temporal Period[1]	Sample Provenience[2] and Type[3]	Conventional Radiocarbon Age	Laboratory Reference	Calibrated 1-Sigma Range	Calibrated 2-Sigma Range	MCMC** Calibrated 1-Sigma Range	MCMC Calibrated 2-Sigma Range	Primary Reference
	Discovery 34, F2-a	2540±50	UCR-2818	800 BC (23.1%) 740 BC	810 BC (95.4%) 500 BC	800 BC (23.7%) 740 BC	810 BC (95.4%) 500 BC	Kearns 1998c
				690 BC (10.9%) 660 BC		690 BC (11.1%) 660 BC		
				650 BC (34.1%) 550 BC		650 BC (33.3%) 550 BC		
	LA 6444, A1, NS1, S1-z	2510±50	UCI-299, UCR-2801	780 BC (16.2%) 730 BC	800 BC (91.2%) 480 BC	780 BC (16.0%) 730 BC	800 BC (90.8%) 480 BC	Freuden 1998C
				700 BC (52.0%) 540 BC	470 BC (4.2%) 410 BC	690 BC (52.2%) 540 BC	460 BC (4.6%) 410 BC	
	LA 32964, F15-a	2490±40	Beta-164332	770 BC (13.6%) 720 BC	780 BC (90.3%) 480 BC	770 BC (68.2%) 540 BC	790 BC (90.1%) 480 BC	Chapter 5 this report
				700 BC (54.6%) 540 BC	470 BC (5.1%) 410 BC		470 BC (5.3%) 420 BC	
	LA 32964, F10-a	2490±40	Beta-164328	770 BC (13.6%) 720 BC	780 BC (90.3%) 480 BC	770 BC (12.8%) 720 BC	790 BC (90.8%) 480 BC	Chapter 5 this report
				700 BC (54.6%) 540 BC	470 BC (5.1%) 410 BC	710 BC (55.4%) 540 BC	470 BC (4.6%) 420 BC	
	*AZ-K-7-18, STR, F15-p,j	2445±79	Beta-51604; Beta-51606	750 BC (16.7%) 680 BC	780 BC (95.4%) 390 BC	760 BC (16.7%) 680 BC	780 BC (95.4%) 400 BC	Redd 1994
				670 BC (6.2%) 640 BC		670 BC (11.1%) 610 BC		
				590 BC (45.3%) 400 BC		590 BC (40.4%) 420 BC		
	AZ-K-7-18, F10-p,gy	2420±90	Beta-51605	750 BC (15.4%) 680 BC	800 BC (95.4%) 360 BC	750 BC (16.1%) 680 BC	770 BC (95.4%) 390 BC	Redd 1994
				670 BC (5.5%) 640 BC		670 BC (6.6%) 630 BC		
				590 BC (47.3%) 400 BC		600 BC (45.5%) 410 BC		
	LA 6444, A1, SS2-a	2480±40	UCI-296, UCR-2711	760 BC (22.7%) 680 BC	770 BC (87.3%) 480 BC	760 BC (22.4%) 680 BC	780 BC (87.5%) 480 BC	
				670 BC (45.5%) 520 BC	470 BC (8.1%) 410 BC	670 BC (45.8%) 520 BC	470 BC (7.9%) 410 BC	
	LA 32964, F4-a	2430±40	Beta-164325	730 BC (12.1%) 690 BC	760 BC (19.8%) 680 BC	730 BC (12.6%) 690 BC	760 BC (19.5%) 680 BC	Chapter 5 this report
				540 BC (56.1%) 400 BC	670 BC (9.5%) 610 BC	660 BC (3.0%) 650 BC	670 BC (75.9%) 400 BC	
					600 BC (66.1%) 400 BC	550 BC (52.6%) 410 BC		
	LA 32964, F6-a	2450±40	Beta-164326	750 BC (20.4%) 680 BC	760 BC (23.0%) 680 BC	750 BC (21.6%) 680 BC	760 BC (23.7%) 680 BC	Chapter 5 this report

(Table A4.1, continued)

Temporal Period[1]	Sample Provenience[2] and Type[3]	Conventional Radiocarbon Age	Laboratory Reference	Calibrated 1-Sigma Range	Calibrated 2-Sigma Range	MCMC** Calibrated 1-Sigma Range	MCMC Calibrated 2-Sigma Range	Primary Reference
				670 BC (6.3%) 640 BC	670 BC (72.4%) 400 BC	670 BC (6.4%) 640 BC	670 BC (71.7%) 400 BC	
				560 BC (41.4%) 410 BC		560 BC (25.7%) 480 BC		
						470 BC (14.5%) 410 BC		
	LA 32964, F13-a	2470±40	Beta-164330	760 BC (23.4%) 680 BC	770 BC (95.4%) 410 BC	760 BC (23.5%) 680 BC	770 BC (95.4%) 410 BC	Chapter 5 this report
				670 BC (18.7%) 610 BC		670 BC (44.7%) 510 BC		
				600 BC (26.1%) 510 BC				
	LA 32964, F14-a	2420±40	Beta-164331	720 BC (8.4%) 690 BC	760 BC (17.8%) 680 BC	730 BC (8.5%) 690 BC	750 BC (18.0%) 680 BC	Chapter 5 this report
				540 BC (59.8%) 400 BC	670 BC (6.8%) 610 BC	540 BC (59.7%) 400 BC	670 BC (7.0%) 610 BC	
					600 BC (70.8%) 390 BC		600 BC (70.4%) 390 BC	
	LA 80434, A2, F7-j	2420±50	UCI-330, UCR-2754	730 BC (11.9%) 690 BC	760 BC (18.7%) 680 BC	730 BC (12.3%) 690 BC	760 BC (19.1%) 680 BC	Freuden 1998a
				660 BC (1.8%) 650 BC	670 BC (10.5%) 610 BC	670 BC (3.2%) 650 BC	670 BC (76.3%) 390 BC	
				550 BC (54.5%) 400 BC	600 BC (66.2%) 390 BC	550 BC (52.7%) 400 BC		
	AZ-I-25-51, F1-j	2380±70	Beta-103680	740 BC (10.2%) 690 BC	800 BC (94.3%) 350 BC	730 BC (10.4%) 690 BC	760 BC (17.2%) 680 BC	P. Reed 1999b
				660 BC (2.2%) 650 BC	300 BC (1.1%) 250 BC	660 BC (1.9%) 650 BC	670 BC (78.2%) 380 BC	
				550 BC (55.8%) 380 BC		550 BC (55.9%) 390 BC		
	*LA 6444, A2, SS1-a,z	2357±35	UCI-300; UCI-303, UCR-2720	510 BC (27.4%) 430 BC	720 BC (1.8%) 690 BC	510 BC (39.4%) 440 BC	720 BC (1.3%) 690 BC	Freuden 1998c
				420 BC (40.8%) 380 BC	540 BC (93.6%) 370 BC	420 BC (28.8%) 390 BC	540 BC (94.1%) 380 BC	
	LA 6444, A2, SS2-z	2370±40	UCI-302, UCR-2720	510 BC (68.2%) 390 BC	740 BC (6.7%) 680 BC	510 BC (68.2%) 390 BC	740 BC (7.5%) 680 BC	Freuden 1998c
					670 BC (1.3%) 640 BC		670 BC (1.4%) 640 BC	
					550 BC (87.4%) 380 BC		550 BC (86.5%) 380 BC	
	LA 6444, A4, SS5-ch	2400±40	UCI-307, UCR-2727	530 BC (68.2%) 400 BC	750 BC (13.5%) 680 BC	540 BC (68.2%) 400 BC	760 BC (13.8%) 680 BC	Freuden 1998c

(Table A4.1, continued)

Temporal Period[1]	**Sample Provenience[2] and Type[3]**	**Conventional Radiocarbon Age**	**Laboratory Reference**	**Calibrated 1-Sigma Range**	**Calibrated 2-Sigma Range**	**MCMC** Calibrated 1-Sigma Range**	**MCMC Calibrated 2-Sigma Range**	**Primary Reference**
					670 BC (3.6%) 640 BC		670 BC (3.8%) 640 BC	
					600 BC (78.3%) 390 BC		600 BC (77.7%) 390 BC	
	LA 32964, F1, FS299-a	2310±50	Beta-164321	410 BC (45.3%) 350 BC	520 BC (61.6%) 340 BC	510 BC (21.1%) 450 BC	730 BC (2.8%) 690 BC	Chapter 5 this report
				290 BC (22.9%) 230 BC	330 BC (33.8%) 200 BC	420 BC (47.1%) 370 BC	550 BC (92.6%) 350 BC	
	LA 32964, F1, FS352-a	2350±40	Beta-164324	510 BC (28.8%) 430 BC	730 BC (3.3%) 690 BC	510 BC (38.1%) 430 BC	730 BC (3.8%) 690 BC	Chapter 5 this report
				420 BC (39.4%) 380 BC	550 BC (92.1%) 360 BC	420 BC (30.1%) 380 BC	550 BC (91.6%) 370 BC	
	LA 19374, F7-mc	2390±140	DIC-2577	760 BC (14.0%) 680 BC	850 BC (95.4%) 100 BC	760 BC (15.5%) 680 BC	800 BC (95.4%) 380 BC	Simmons 1982
				670 BC (54.2%) 380 BC		670 BC (8.4%) 620 BC		
						610 BC (1.3%) 600 BC		
						590 BC (43.0%) 400 BC		
	LA 88526, SU4, F7-mc	2350±60	Beta-50577	710 BC (1.1%) 690 BC	800 BC (87.0%) 350 BC	540 BC (68.2%) 380 BC	760 BC (12.9%) 680 BC	Redd et al. 1994
				540 BC (67.1%) 360 BC	300 BC (8.4%) 200 BC		670 BC (3.6%) 640 BC	
							600 BC (78.9%) 360 BC	
Boundary Ear Rock						410 BC (68.2%) 350 BC	460 BC (95.4%) 310 BC	Bronk Ramsey 2002; Stuiver et al. 1998
Boundary Figueredo						345 BC (68.2%) 245 BC	400 BC (95.4%) 230 BC	Bronk Ramsey 2002; Stuiver et al. 1998
	LA 80434, A2, F7-a	2290±60	UCI-368, CAMS 15744	410 BC (32.7%) 350 BC	520 BC (95.4%) 190 BC	280 BC (68.2%) 205 BC	380 BC (2.4%) 350 BC	Freuden 1998a
				300 BC (35.5%) 200 BC			330 BC (93.0%) 170 BC	
	LA 80434, A2, F1-a	2290±60	UCI-367 CAMS 15743	410 BC (32.7%) 350 BC	520 BC (95.4%) 190 BC	280 BC (68.2%) 205 BC	380 BC (2.5%) 350 BC	Freuden 1998a
				300 BC (35.5%) 200 BC			330 BC (92.9%) 170 BC	
	LA 104106, F69-j	2280±40	Beta-164342	400 BC (40.8%) 350 BC	410 BC (45.6%) 340 BC	280 BC (59.7%) 225 BC	380 BC (2.8%) 350 BC	Chapter 5 this report

(Table A4.1, continued)

Temporal Period[1]	Sample Provenience[2] and Type[3]	Conventional Radiocarbon Age	Laboratory Reference	Calibrated 1-Sigma Range	Calibrated 2-Sigma Range	MCMC** Calibrated 1-Sigma Range	MCMC Calibrated 2-Sigma Range	Primary Reference
				290 BC (27.4%) 230 BC	320 BC (49.8%) 200 BC	220 BC (8.5%) 210 BC	320 BC (92.6%) 200 BC	
	LA 104106, F3-a	2270±40	Beta-164333	400 BC (33.5%) 350 BC	400 BC (39.6%) 340 BC	280 BC (58.6%) 225 BC	370 BC (2.0%) 350 BC	Chapter 5 this report
				290 BC (34.7%) 230 BC	330 BC (55.8%) 200 BC	220 BC (9.6%) 210 BC	320 BC (93.4%) 190 BC	
	LA 88526, SU4, F9-mc	2270±60	Beta-53268	400 BC (27.5%) 350 BC	420 BC (95.4%) 160 BC	280 BC (68.2%) 205 BC	370 BC (95.4%) 160 BC	Redd et al. 1994
				300 BC (40.7%) 210 BC				
	*LA 6444, A4, SS1-z	2265±30	UCI-304, UCR-2726; UCI-305, UCR-2802	400 BC (37.5%) 350 BC	400 BC (42.6%) 340 BC	280 BC (65.7%) 225 BC	380 BC (2.7%) 350 BC	Freuden 1998c
				290 BC (30.7%) 230 BC	310 BC (52.8%) 200 BC	220 BC (2.5%) 210 BC	310 BC (92.7%) 200 BC	
	LA 6444, A1, SS6-a	2260±40	UCI-298 UCR-2713	400 BC (29.1%) 350 BC	400 BC (34.7%) 340 BC	280 BC (68.2%) 205 BC	380 BC (2.2%) 350 BC	Freuden 1998c
				290 BC (39.1%) 230 BC	330 BC (60.7%) 200 BC		320 BC (93.2%) 190 BC	
	AZ-I-26-34, F5-mc	2240±60	Beta-95441	390 BC (18.5%) 340 BC	410 BC (95.4%) 160 BC	290 BC (68.2%) 195 BC	370 BC (94.4%) 150 BC	V. Hensler 1999
				310 BC (49.7%) 200 BC			140 BC (1.0%) 120 BC	
	LA 6448, F25-z	2230±60	UCI-319 UCR-2745	380 BC (15.5%) 340 BC	400 BC (94.4%) 160 BC	290 BC (68.2%) 195 BC	360 BC (93.3%) 150 BC	Kearns et al. 1998
				320 BC (52.7%) 200 BC	140 BC (1.0%) 110 BC		140 BC (2.1%) 110 BC	
	AZ-I-26-30, STR3-z	2210±40	Beta-100598	360 BC (8.5%) 340 BC	390 BC (95.4%) 180 BC	285 BC (68.2%) 195 BC	360 BC (95.4%) 160 BC	Wilcox 1999
				330 BC (59.7%) 200 BC				
	LA 6448, F59-z	2210±70	UCI-316 UCR-2735	370 BC (68.2%) 200 BC	400 BC (95.4%) 90 BC	290 BC (68.2%) 170 BC	350 BC (95.4%) 90 BC	Kearns et al. 1998
	LA 104106, F24, FS2320-a	2190±40	Beta-164340	360 BC (42.0%) 280 BC	390 BC (95.4%) 160 BC	300 BC (4.6%) 280 BC	360 BC (93.2%) 150 BC	Chapter 5 this report
				260 BC (26.2%) 190 BC		270 BC (63.6%) 170 BC	140 BC (2.2%) 110 BC	
	LA 80419, PS1, F10-a	2190±40	UCI-272 UCR-2702	360 BC (42.0%) 280 BC	390 BC (95.4%) 160 BC	300 BC (68.2%) 170 BC	360 BC (93.1%) 150 BC	Freuden 1998b
				260 BC (26.2%) 190 BC			140 BC (2.3%) 110 BC	

(Table A4.1, continued)

Temporal Period[1]	Sample Provenience[2] and Type[3]	Conventional Radiocarbon Age	Laboratory Reference	Calibrated 1-Sigma Range	Calibrated 2-Sigma Range	MCMC** Calibrated 1-Sigma Range	MCMC Calibrated 2-Sigma Range	Primary Reference
	LA 6448, F12-a	2190±40	UCI-312 UCR-2722	360 BC (42.0%) 280 BC	390 BC (95.4%) 160 BC	300 BC (68.2%) 170 BC	360 BC (93.3%) 150 BC	Kearns et al. 1998
				260 BC (26.2%) 190 BC			140 BC (2.1%) 110 BC	
	LA 6448, F23-z	2180±40	UCI-320 UCR-2746	360 BC (40.1%) 280 BC	380 BC (92.2%) 150 BC	310 BC (5.5%) 280 BC	350 BC (95.4%) 110 BC	Kearns et al. 1998
				240 BC (28.1%) 170 BC	140 BC (3.2%) 110 BC	270 BC (62.7%) 160 BC		
	AZ-I-26-30, STR1-z	2180±50	Beta-103682	360 BC (36.3%) 270 BC	390 BC (95.4%) 100 BC	300 BC (68.2%) 160 BC	350 BC (95.4%) 100 BC	Wilcox 1999
				260 BC (31.9%) 170 BC				
	LA 8043, A1, F12-a	2180±50	UCI-280 UCR-2707	360 BC (36.3%) 270 BC	390 BC (95.4%) 100 BC	300 BC (68.2%) 160 BC	350 BC (95.4%) 100 BC	Freuden 1998a
				260 BC (31.9%) 170 BC				
	LA 6444, A1, SS2-z	2180±100	Beta-50796	380 BC (63.1%) 150 BC	410 BC (95.4%) 30 AD	270 BC (68.2%) 120 BC	340 BC (95.4%) 70 BC	Freuden 1998c
				140 BC (5.1%) 110 BC				
	LA 88526, STR2fill-p	2160±50	CAMS 2887	360 BC (29.1%) 280 BC	370 BC (95.4%) 50 BC	260 BC (68.2%) 110 BC	350 BC (95.4%) 90 BC	Redd et al. 1994
				240 BC (32.1%) 150 BC				
				140 BC (7.0%) 110 BC				
	LA 6448, F18-z	2160±40	UCI-318 UCR-2737	360 BC (30.8%) 290 BC	370 BC (95.4%) 90 BC	240 BC (68.2%) 110 BC	350 BC (95.4%) 90 BC	Kearns et al. 1998
				240 BC (33.0%) 160 BC				
				140 BC (4.5%) 110 BC				
	LA 6448, F22-z	2160±60	UCI-313	360 BC (26.9%) 280 BC	380 BC (95.4%) 50 BC	260 BC (68.2%) 110 BC	350 BC (95.4%) 80 BC	Kearns et al. 1998
				260 BC (41.3%) 110 BC				
	AZ-K-7-19, STR-F11-p	2150±70	Beta-51581	360 BC (22.2%) 280 BC	390 BC (95.4%) 30 BC	260 BC (68.2%) 100 BC	340 BC (95.4%) 70 BC	Boden 1994
				240 BC (46.0%) 90 BC				
	LA 80434, A2, F4-j	2150±60	UCI-331 UCR-2769	360 BC (22.0%) 290 BC	380 BC (95.4%) 40 BC	240 BC (68.2%) 100 BC	340 BC (95.4%) 70 BC	Freuden 1998a

(Table A4.1, continued)

Temporal Period[1]	Sample Provenience[2] and Type[3]	Conventional Radiocarbon Age	Laboratory Reference	Calibrated 1-Sigma Range	Calibrated 2-Sigma Range	MCMC** Calibrated 1-Sigma Range	MCMC Calibrated 2-Sigma Range	Primary Reference
				230 BC (46.2%) 90 BC				
	LA 88526, STR1, F20-p	2140±70	Beta-51577	360 BC (17.8%) 290 BC	390 BC (95.4%) 20 BC	240 BC (68.2%) 100 BC	340 BC (95.4%) 70 BC	Redd et al. 1994
				230 BC (2.0%) 220 BC				
				210 BC (48.4%) 50 BC				
	LA 6444, A1, SS6-a	2130±40	UCI-297 UCR-2712	350 BC (6.2%) 320 BC	360 BC (16.1%) 290 BC	205 BC (68.2%) 115 BC	350 BC (5.3%) 290 BC	Freuden 1998c
				210 BC (62.0%) 90 BC	240 BC (79.3%) 40 BC		240 BC (90.1%) 50 BC	
	*LA 80397, A4, S1-mc	2130±37	Beta-47360; Beta-47361	340 BC (2.6%) 320 BC	360 BC (14.8%) 290 BC	205 BC (68.2%) 115 BC	350 BC (4.0%) 290 BC	Korgel 1998
				210 BC (65.6%) 90 BC	230 BC (80.6%) 40 BC		240 BC (91.4%) 50 BC	
	LA 80419, PS1, F1-a	2120±40	UCI-370 UCR-2793	200 BC (64.1%) 90 BC	360 BC (10.9%) 290 BC	200 BC (68.2%) 110 BC	340 BC (2.1%) 310 BC	Freuden 1998b
				70 BC (4.1%) 50 BC	230 BC (84.5%) 40 BC		240 BC (93.3%) 50 BC	
	LA 83522, F102-p	2120±70	Beta-50580	350 BC (9.2%) 310 BC	370 BC (95.4%) 20 AD	230 BC (2.2%) 220 BC	330 BC (95.4%) 60 BC	Burgett et al. 1994
				210 BC (59.0%) 40 BC		210 BC (66.0%) 90 BC		
	AZ-I-26-30, STR2-mc	2110±60	Beta-92187	340 BC (1.5%) 330 BC	360 BC (14.1%) 270 BC	210 BC (68.2%) 100 BC	340 BC (4.8%) 290 BC	Wilcox 1999
				210 BC (66.7%) 40 BC	260 BC (81.3%) 20 AD		260 BC (90.6%) 50 BC	
	LA 6448, F35-z	2110±70	UCI-314 UCR-2731	350 BC (6.7%) 320 BC	370 BC (95.4%) 30 AD	210 BC (68.2%) 90 BC	340 BC (95.4%) 50 BC	Kearns et al. 1998
				210 BC (61.5%) 40 BC				
	LA 6448, F55-z	2100±40	UCI-315 UCR-2734	180 BC (68.2%) 50 BC	350 BC (3.2%) 310 BC	185 BC (68.2%) 100 BC	210 BC (95.4%) 50 BC	Kearns et al. 1998
					210 BC (92.2%) AD			
	*AZ-I-26-24, F12-a,s	2095±57	Beta-92184; Beta-95439	200 BC (68.2%) 40 BC	360 BC (8.6%) 290 BC	200 BC (68.2%) 100 BC	340 BC (3.0%) 290 BC	Hensler and Vogler 1999
					240 BC (86.8%) 30 AD		260 BC (92.4%) 40 BC	
	LA 88524, F2-z	2090±80	Beta-60560	340 BC (1.2%) 330 BC	360 BC (95.4%) 70 AD	210 BC (68.2%) 90 BC	330 BC (95.4%) 50 BC	Herrmann 1994

(Table A4.1, continued)

Temporal Period[1]	Sample Provenience[2] and Type[3]	Conventional Radiocarbon Age	Laboratory Reference	Calibrated 1-Sigma Range	Calibrated 2-Sigma Range	MCMC** Calibrated 1-Sigma Range	MCMC Calibrated 2-Sigma Range	Primary Reference
				210 BC (67.0%) 10 AD				
	*AZ-K-7-19, STR-F12-p,mc	2088±47	Beta-51582; Beta-51608	170 BC (68.2%) 40 BC	350 BC (2.9%) 310 BC	185 BC (68.2%) 100 BC	230 BC (95.4%) 40 BC	Boden 1994
					210 BC (92.5%) 20 AD			
	LA 80419, PS3, ST1-a	2080±40	UCI-268 UCR-2672	170 BC (68.2%) 40 BC	210 BC (95.4%) 10 AD	175 BC (68.2%) 95 BC	200 BC (95.4%) 50 BC	Freuden 1998b
	LA 6448, F56-z	2070±40	UCI-317 UCR-2736	170 BC (68.2%) 40 BC	200 BC (95.4%) 20 AD	175 BC (68.2%) 95 BC	200 BC (95.4%) 50 BC	Kearns et al. 1998
	LA 80434, A1, ST4-z	2070±50	UCI-279 UCR-2706	170 BC (68.2%) 30 BC	210 BC (95.4%) 60 AD	175 BC (68.2%) 95 BC	210 BC (95.4%) 40 BC	Freuden 1998a
	LA 80419, SS1, S1-a	2070±40	UCI-266, UCR-2670	170 BC (68.2%) 40 BC	200 BC (95.4%) 20 AD	170 BC (68.2%) 95 BC	200 BC (95.4%) 50 BC	Freuden 1998b
	LA 80419, SU1, F29-a	2070±50	UCI-274 UCR-2705	170 BC (68.2%) 30 BC	210 BC (95.4%) 60 AD	175 BC (68.2%) 90 BC	210 BC (95.4%) 40 BC	Freuden 1998b
	AZ-K-7-19, F13-s	2060±65	Beta-51608	170 BC (68.2%) 10 AD	350 BC (3.7%) 300 BC	190 BC (68.2%) 95 BC	340 BC (1.1%) 310 BC	Boden 1994
					210 BC (91.7%) 80 AD		240 BC (94.3%) 40 BC	
	LA 80419, SPS3, F36-a	2050±80	UCI-275 UCR-2704	170 BC (68.2%) 30 AD	360 BC (5.7%) 290 BC	200 BC (68.2%) 95 BC	340 BC (2.4%) 290 BC	Freuden 1998b
					240 BC (89.7%) 130 AD		260 BC (93.0%) 40 BC	
	LA 88526, STR1, F30-p,j	2030±60	Beta-58267	150 BC (0.8%) 140 BC	200 BC (95.4%) 90 AD	175 BC (68.2%) 90 BC	210 BC (95.4%) 40 BC	Redd et al. 1994
				110 BC (67.4%) 60 AD				
	LA 88526, STR1, F32-p,j	2020±60	Beta-53266	100 BC (68.2%) 60 AD	190 BC (94.2%) 90 AD	170 BC (68.2%) 85 BC	210 BC (95.4%) 40 BC	Redd et al. 1994
					100 AD (1.2%) 120 AD			
Boundary Figueredo						115 BC (68.2%) 45 BC	150 BC (95.4%) 20 BC	Bronk Ramsey 2002; Stuiver et al. 1998
Boundary late Figueredo						45 BC (68.2%) 45 AD	120 BC (95.4%) 70 AD	Bronk Ramsey 2002; Stuiver et al. 1998
	AZ-I-26-24, F9-mc	2000±70	Beta-103681	100 BC (68.2%) 80 AD	200 BC (95.4%) 140 AD	AD (68.2%) 70 AD	60 BC (95.4%) 110 AD	Hensler and Vogler 1999
	LA 80419, PS3, F35-a,s	1990±80	UCI-270 UCR-2701	100 BC (64.9%) 90 AD	200 BC (95.4%) 220 AD	5 BC (68.2%) 70 AD	50 BC (95.4%) 120 AD	Freuden 1998b
				100 AD (3.3%) 120 AD				

(Table A4.1, continued)

Temporal Period[1]	Sample Provenience[2] and Type[3]	Conventional Radiocarbon Age	Laboratory Reference	Calibrated 1-Sigma Range	Calibrated 2-Sigma Range	MCMC** Calibrated 1-Sigma Range	MCMC Calibrated 2-Sigma Range	Primary Reference
	Discovery 32-a	1990±40	UCR-2820	40 BC (68.2%) 55 AD	100 BC (94.0%) 90 AD	AD (68.2%) 65 AD	40 BC (95.4%) 80 AD	Kearns 1998d
					100 AD (1.4%) 120 AD			
	LA 104106, F22-a	1980±40	Beta-164337	40 BC (5.4%) 25 BC	90 BC (1.0%) 70 BC	AD (68.2%) 65 AD	40 BC (95.4%) 80 AD	Chapter 5 this report
				20 BC (7.4%) 10 BC	60 BC (94.4%) 130 AD			
				5 BC (55.4%) 65 AD				
	LA 80419, SU, F12-a	1950±80	UCI-273 UCR-2703	50 BC (68.2%) 140 AD	170 BC (95.4%) 240 AD	AD (68.2%) 75 AD	50 BC (95.4%) 120 AD	Freuden 1998b
	LA 19412, F1-am,ch	1920±45	DIC-2408	20 AD (68.2%) 130 AD	20 BC (95.4%) 220 AD	5 AD (68.2%) 80 AD	40 BC (95.4%) 130 AD	Eschman 1983
	LA 88510, STR-F1-z	1920±80	Beta-60558	AD (63.0%) 180 AD	120 BC (94.1%) 260 AD	AD (68.2%) 75 AD	50 BC (95.4%) 130 AD	Herrmann and Freuden 1994
				190 AD (5.2%) 220 AD	290 AD (1.3%) 320 AD			
Boundary late Figueredo						30 AD (68.2%) 115 AD	20 BC (95.4%) 210 AD	Bronk Ramsey 2002; Stuiver et al. 1998
Boundary Hiatus?						AD (68.2%) 200 AD	220 BC (95.4%) 230 AD	Bronk Ramsey 2002; Stuiver et al. 1998
	LA 80419, PS3, ST4-a	1870±40	UCI-269 UCR-2673	80 AD (57.4%) 180 AD	50 AD (95.4%) 240 AD	120 AD (68.2%) 230 AD	70 AD (95.4%) 250 AD	Freuden 1998b
				190 AD (10.8%) 220 AD				
	LA 19374, F4-sp,ch	1810±55	DIC-2411	120 AD (64.8%) 260 AD	70 AD (95.4%) 350 AD	130 AD (68.2%) 250 AD	80 AD (95.4%) 330 AD	Eschman 1983
				300 AD (3.4%) 320 AD				
	LA 61961, SU1, F6-mc	1740±60	Beta-51556	230 AD (68.2%) 390 AD	130 AD (95.4%) 420 AD	130 AD (23.2%) 200 AD	120 AD (95.4%) 390 AD	Morris 1999
						210 AD (45.0%) 310 AD		
Boundary Hiatus?						180 AD (68.2%) 440 AD	100 AD (95.4%) 700 AD	Bronk Ramsey 2002; Stuiver et al. 1998
Boundary Muddy Wash						330 AD (68.2%) 430 AD	300 AD (95.4%) 530 AD	
Phase Muddy Wash	LA 61958, SU2, F46-mc	1670±50	Beta-51553	260 AD (8.3%) 290 AD	240 AD (86.7%) 470 AD	370 AD (63.8%) 440 AD		Avallone and Kotyk 1999
				320 AD (59.9%) 430 AD	480 AD (8.7%) 540 AD	500 AD (4.4%) 530 AD	340 AD (95.4%) 540 AD	

(Table A4.1, continued)

Temporal Period[1]	Sample Provenience[2] and Type[3]	Conventional Radiocarbon Age	Laboratory Reference	Calibrated 1-Sigma Range	Calibrated 2-Sigma Range	MCMC** Calibrated 1-Sigma Range	MCMC Calibrated 2-Sigma Range	Primary Reference
	LA 19411, F2-?	1650±75	DIC-2400	260 AD (4.9%) 280 AD	230 AD (95.4%) 580 AD	380 AD (63.0%) 460 AD		Eschman 1983
				320 AD (47.8%) 470 AD			350 AD (95.4%) 540 AD	
				480 AD (15.5%) 540 AD		500 AD (5.2%) 530 AD		
	LA 1937, F1b-or,sp,de	1630±75	DIC-2409	340 AD (68.2%) 540 AD	240 AD (95.4%) 590 AD	380 AD (64.5%) 460 AD		Eschman 1983
						510 AD (3.7%) 530 AD	360 AD (95.4%) 540 AD	
	*LA 83522, STR-F101-p,j	1625±30	Beta-53270; Beta-53272; Beta-53273; CAMS 2863	390 AD (42.2%) 440 AD	350 AD (2.7%) 370 AD	390 AD (65.8%) 450 AD		Burgett et al. 1994
				480 AD (26.0%) 530 AD	380 AD (92.7%) 540 AD	520 AD (2.4%) 530 AD	380 AD (95.4%) 540 AD	
	AZ-K-7-18, F13-p	1620±80	Beta-51579	340 AD (68.2%) 550 AD	240 AD (95.4%) 600 AD	380 AD (63.7%) 460 AD		Redd 1994
						510 AD (4.5%) 530 AD	360 AD (95.4%) 540 AD	
	AZ-I-26-37, F16-z	1610±50	Beta-92188	400 AD (68.2%) 540 AD	330 AD (95.4%) 570 AD	390 AD (64.8%) 460 AD		Hensler and Rohrer 1999
						510 AD (3.4%) 530 AD	370 AD (95.4%) 540 AD	
Phase Muddy Wash	LA 61959, SU1, F33-mc	1570±60	Beta-51554	420 AD (68.2%) 550 AD	340 AD (95.4%) 620 AD	430 AD (40.4%) 490 AD	420 AD (95.4%) 580 AD	Ruppé 1999
						510 AD (27.8%) 550 AD		
	LA 61956, SU3, F59-mc	1560±90	Beta-51549	410 AD (68.2%) 600 AD	260 AD (1.8%) 290 AD	430 AD (41.5%) 490 AD	420 AD (95.4%) 590 AD	Kotyk 1999
					320 AD (93.6%) 660 AD	510 AD (26.7%) 560 AD		
	LA 104106, F152-p	1550±40	Beta-164345	430 AD (68.2%) 560 AD	420 AD (95.4%) 600 AD	430 AD (42.3%) 490 AD	420 AD (95.4%) 580 AD	Chapter 5 this report
						510 AD (25.9%) 560 AD		
	LA 80419, SS2, S1-a	1550±70	UCI-267 UCR-2729	420 AD (68.2%) 580 AD	380 AD (95.4%) 650 AD	430 AD (41.1%) 490 AD	420 AD (95.4%) 590 AD	Freuden 1998b
						510 AD (27.1%) 560 AD		
	AZ-I-26-37, F19-z	1540±40	Beta-92189	430 AD (68.2%) 570 AD	420 AD (95.4%) 610 AD	430 AD (41.5%) 490 AD	420 AD (95.4%) 580 AD	Hensler and Rohrer 1999

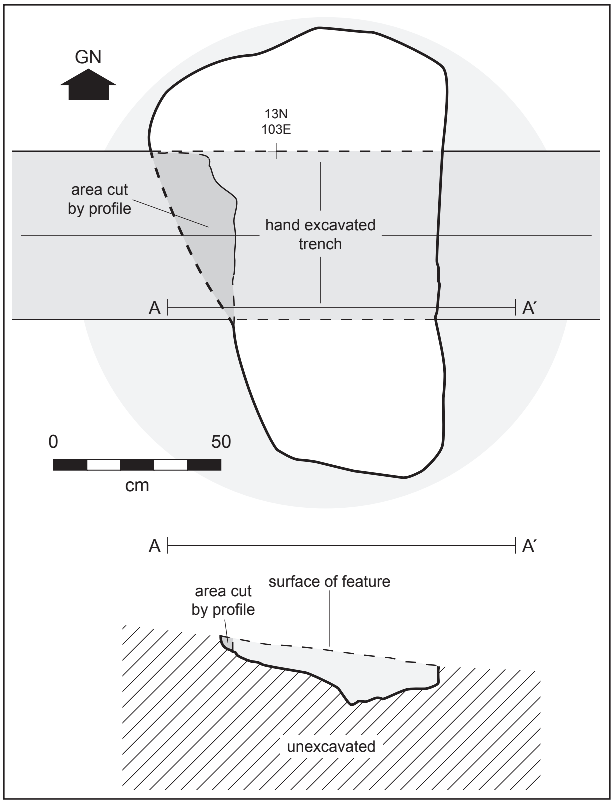
(Table A4.1, continued)

Temporal Period[1]	Sample Provenience[2] and Type[3]	Conventional Radiocarbon Age	Laboratory Reference	Calibrated 1-Sigma Range	Calibrated 2-Sigma Range	MCMC** Calibrated 1-Sigma Range	MCMC Calibrated 2-Sigma Range	Primary Reference
						520 AD (26.7%) 560 AD		
	LA 104106, F117-p	1510±40	Beta-164334	460 AD (7.0%) 490 AD	430 AD (95.4%) 640 AD	430 AD (37.3%) 490 AD	430 AD (95.4%) 600 AD	Chapter 5 this report
				530 AD (61.2%) 610 AD		530 AD (30.9%) 570 AD		
	LA 61956, SU2, F98-mc	1510±80	Beta-51551	430 AD (21.3%) 490 AD	390 AD (95.4%) 670 AD	430 AD (41.6%) 500 AD	420 AD (95.4%) 600 AD	Kotyk 1999
				500 AD (46.9%) 630 AD		520 AD (26.6%) 570 AD		
	LA 19374, F2-or	1500±55	DIC-2410	460 AD (5.0%) 480 AD	430 AD (95.4%) 650 AD	430 AD (38.5%) 490 AD	420 AD (95.4%) 600 AD	Eschman 1983
				530 AD (63.2%) 640 AD		530 AD (29.7%) 570 AD		
Boundary Muddy Wash						460 AD (17.9%) 510 AD	440 AD (95.4%) 640 AD	Bronk Ramsey 2002; Stuiver et al. 1998
						530 AD (50.3%) 620 AD		

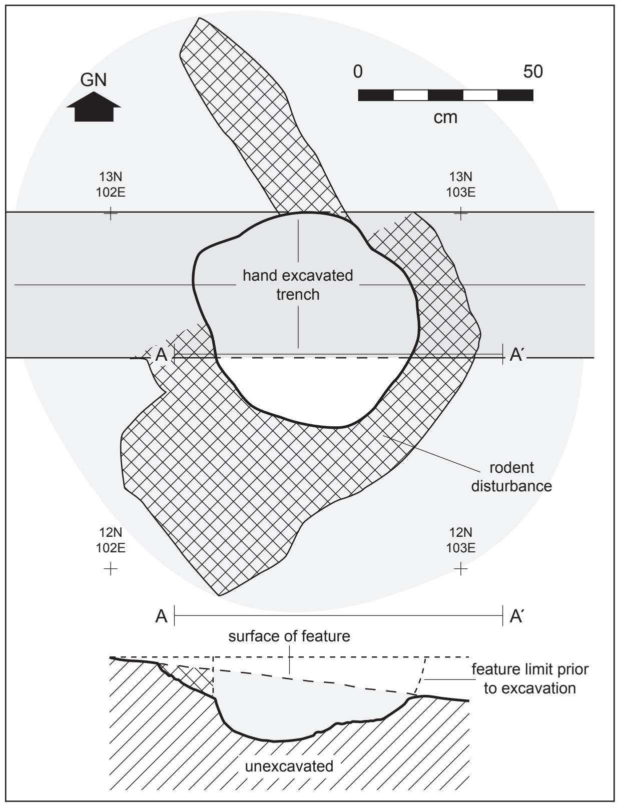
[1]based on calibrated dates derived from OxCal v3.8 analysis; [2]sample provenience and context, ?cultural context in question; *pooled date for similar sample types recovered from identical contexts; **Markov Chain Monte-Carlo sampling method

A = Area number, F = Feature number, FS = Field Specimen number, NS = Non-structure number, PS = Pit Structure, S = Surface number, SS = Surface structure number, ST = Stratum number, STR = Structure number, SU = Study Unit number, fill = general fill

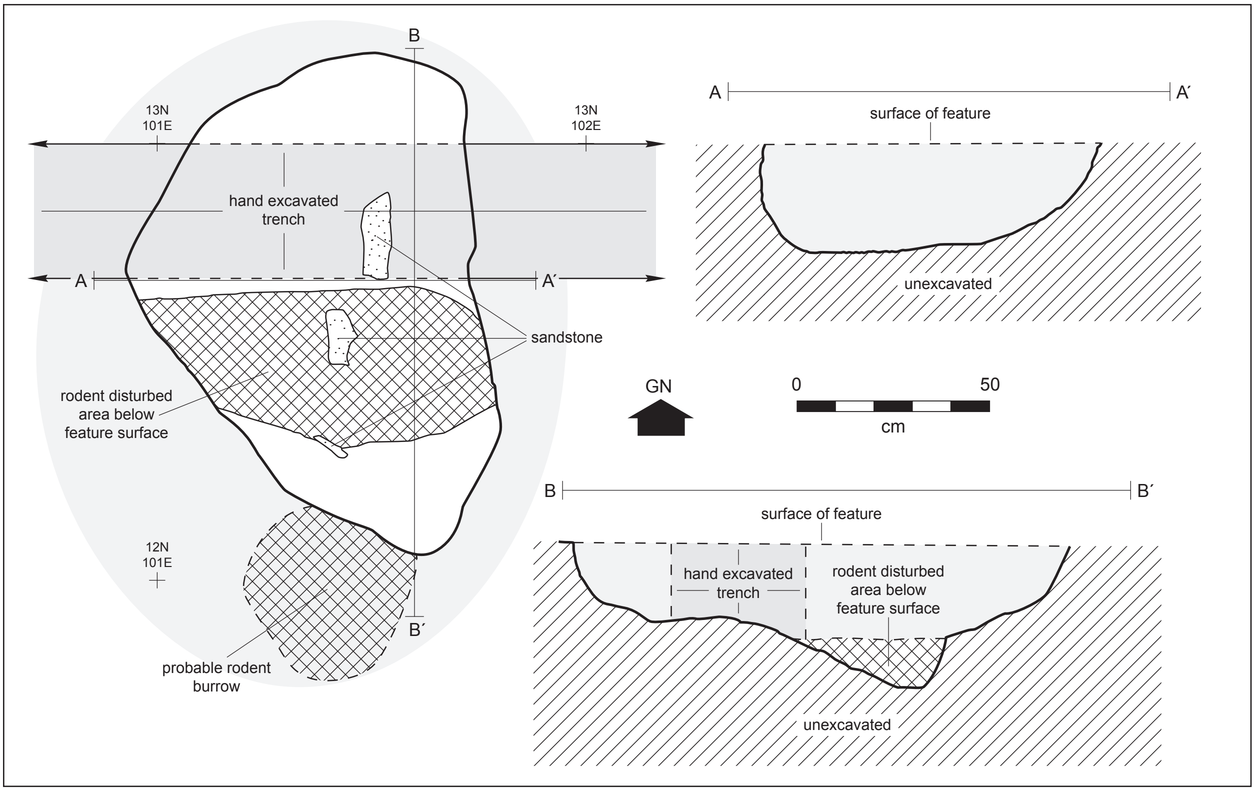
Appendix 5 | Feature Plans and Profiles, LA 104106



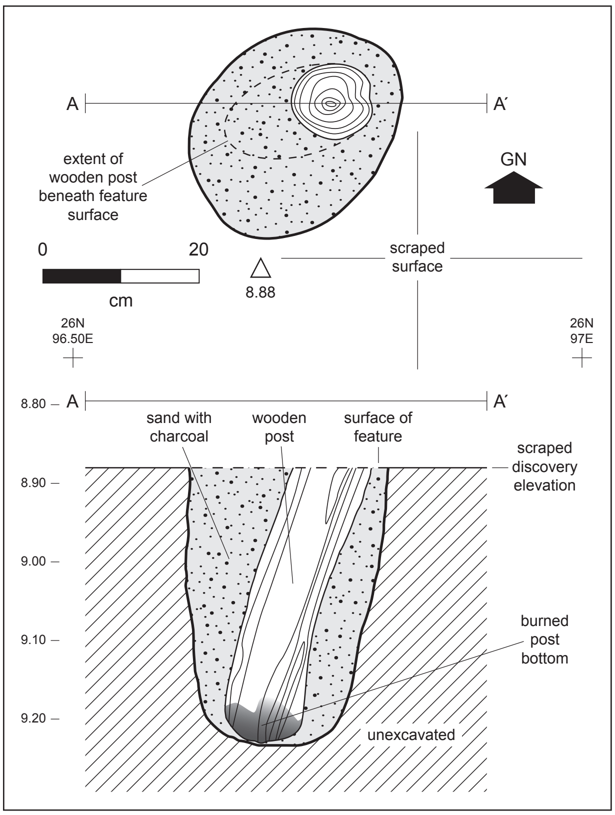
Feature 1, LA 104106.



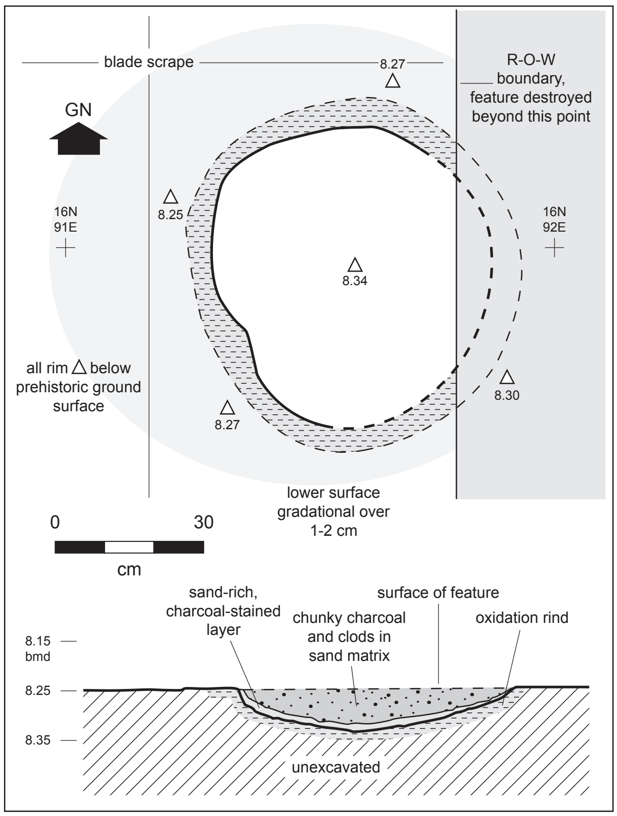
Feature 2, LA 104106.



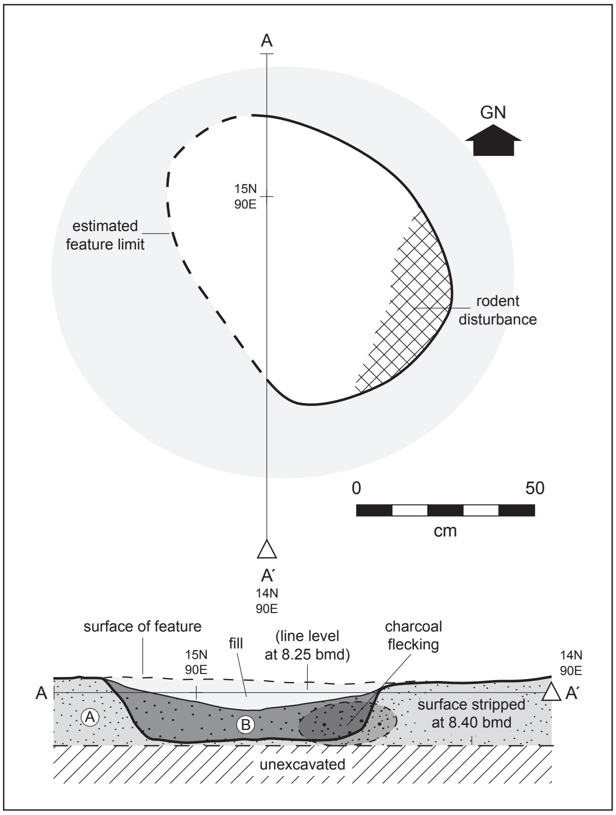
Feature 3, LA 104106.



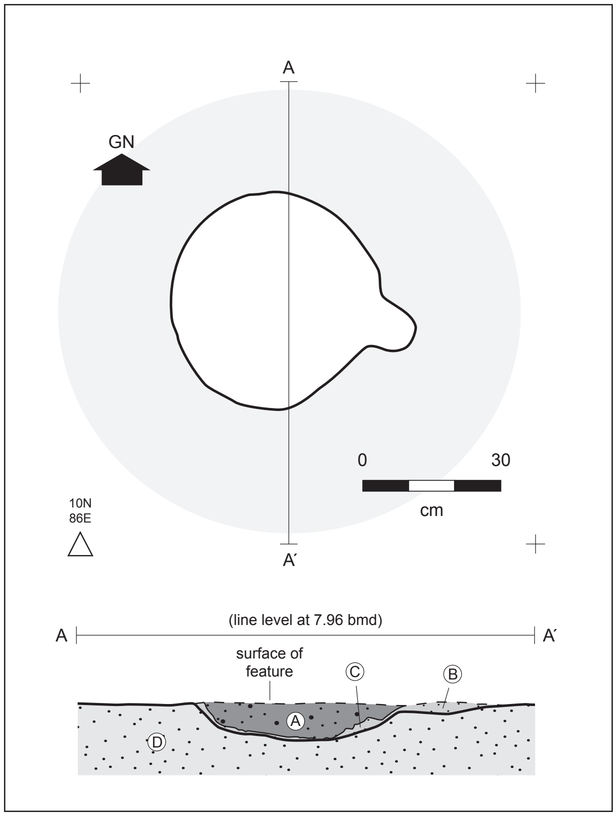
Feature 4, LA 104106.



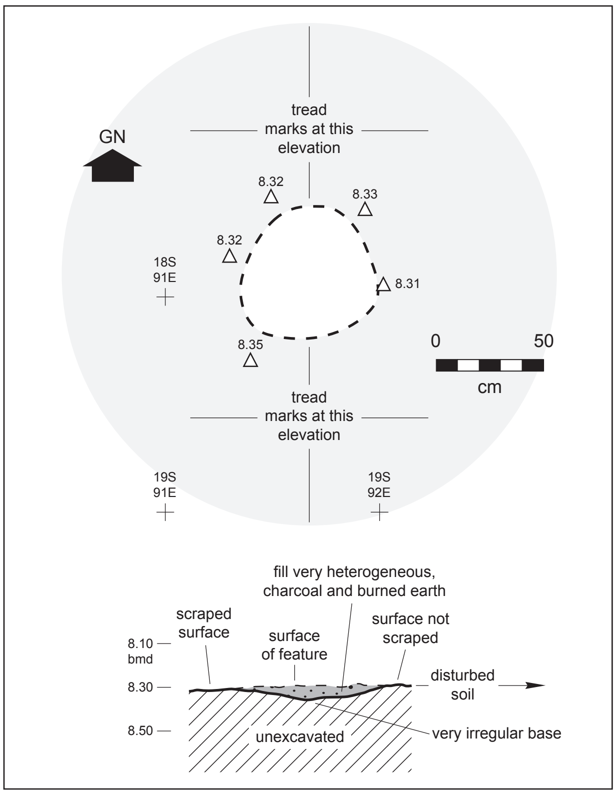
Feature 5, LA 104106.



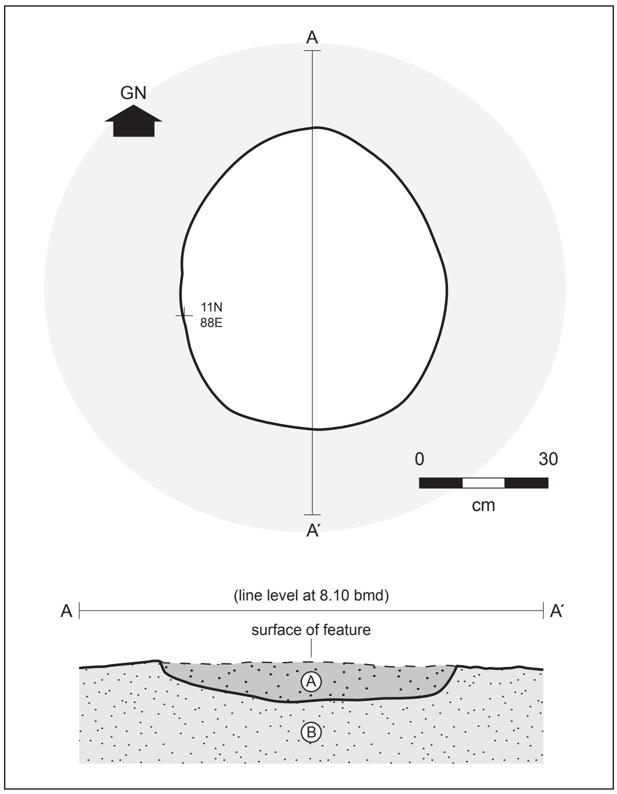
Feature 6, LA 104106.



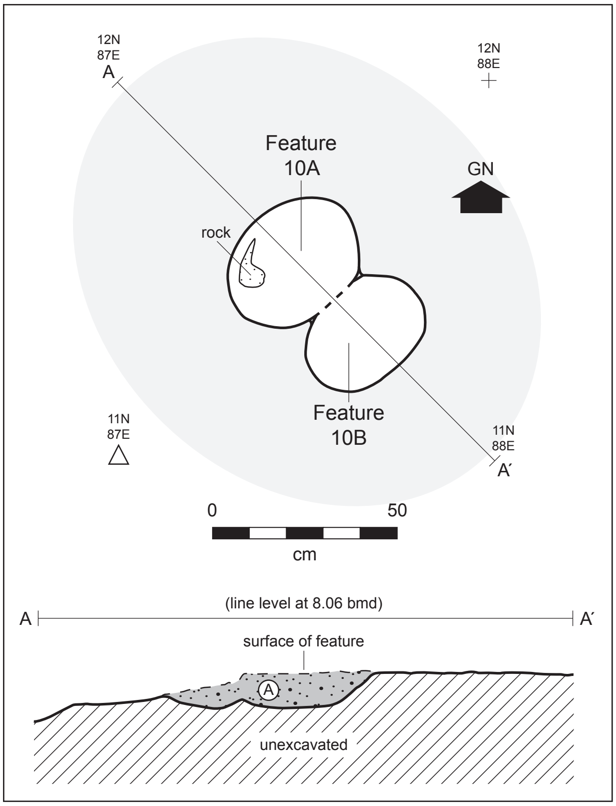
Feature 7, LA 104106.



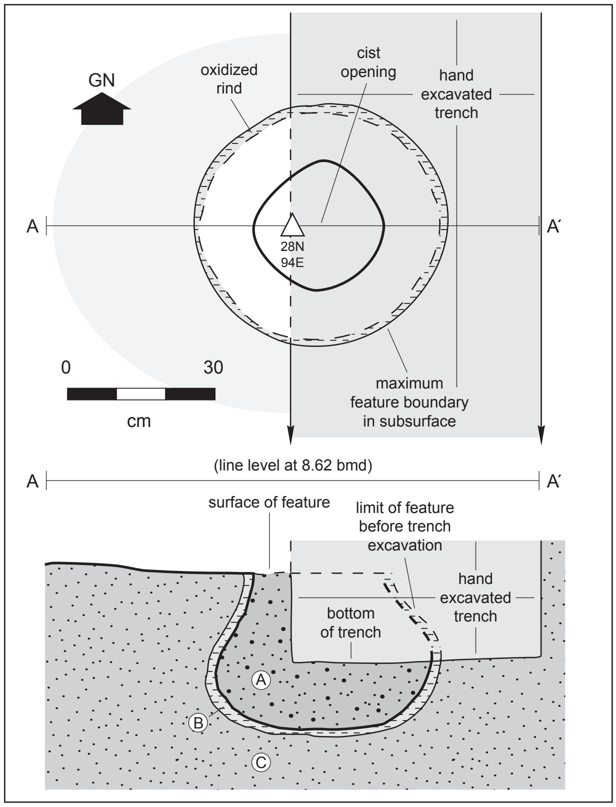
Feature 8, LA 104106.



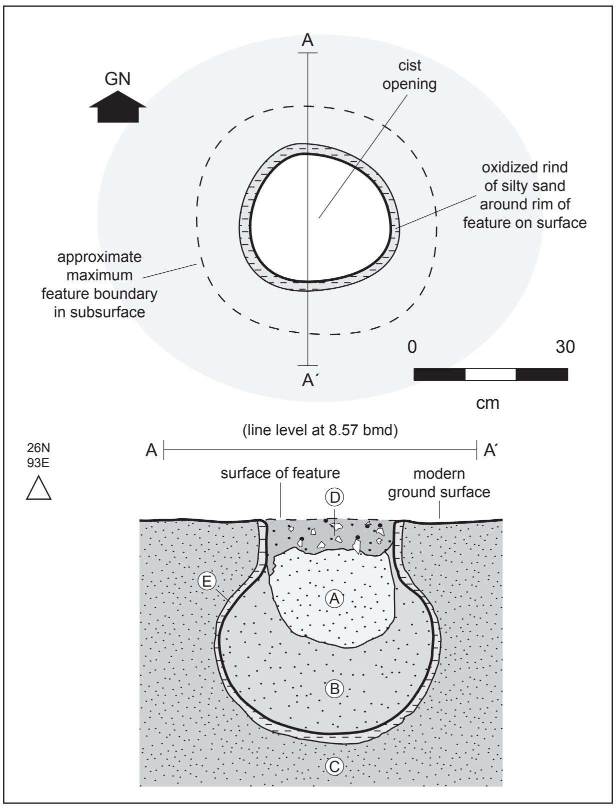
Feature 9, LA 104106.



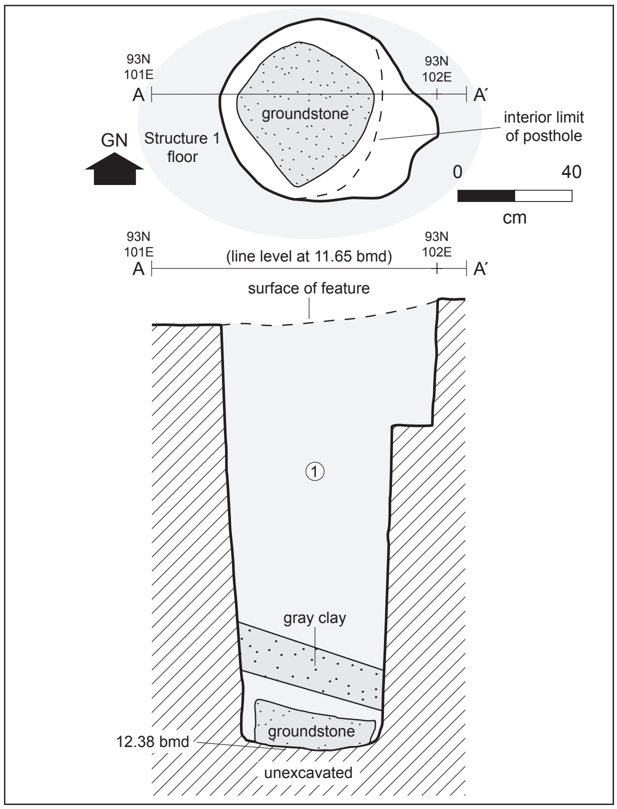
Feature 10, LA 104106.



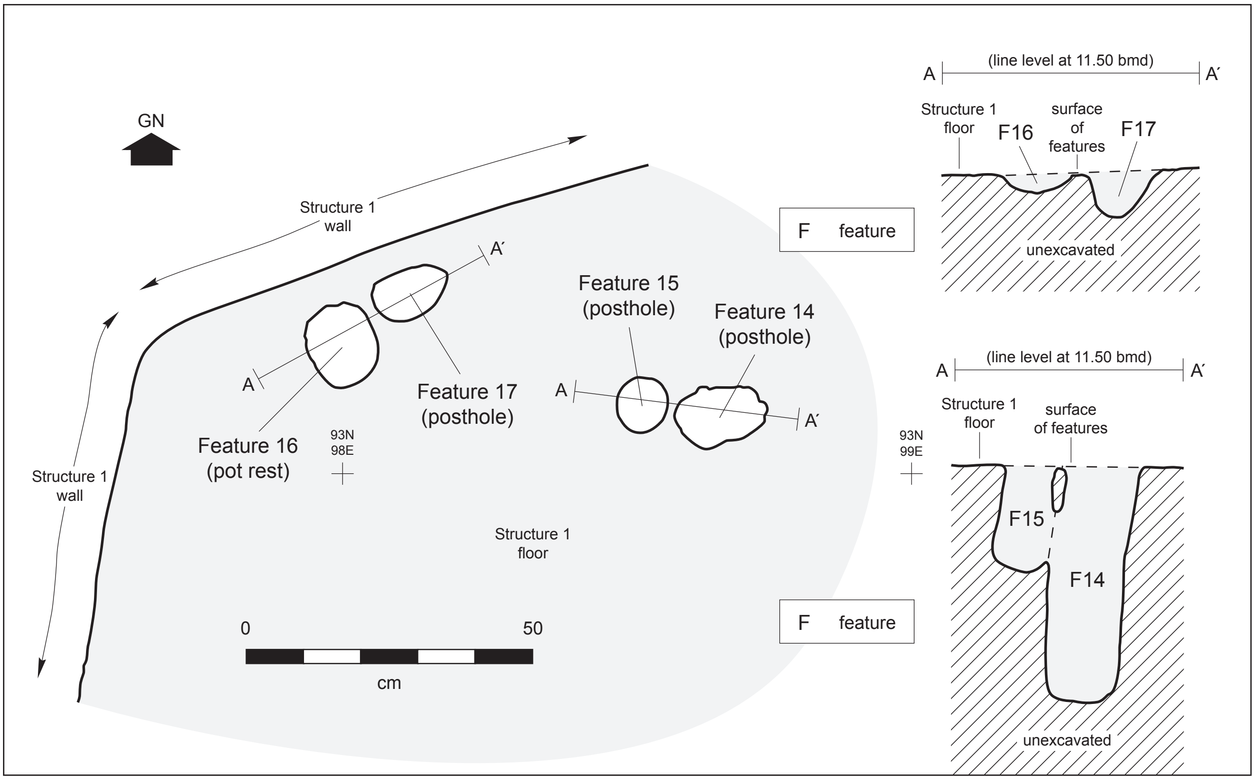
Feature 11, LA 104106.



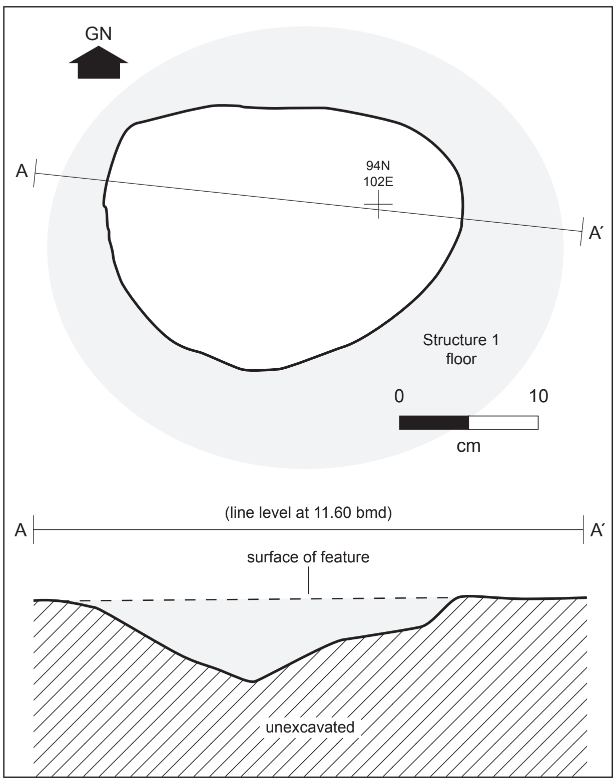
Feature 12, LA 104106.



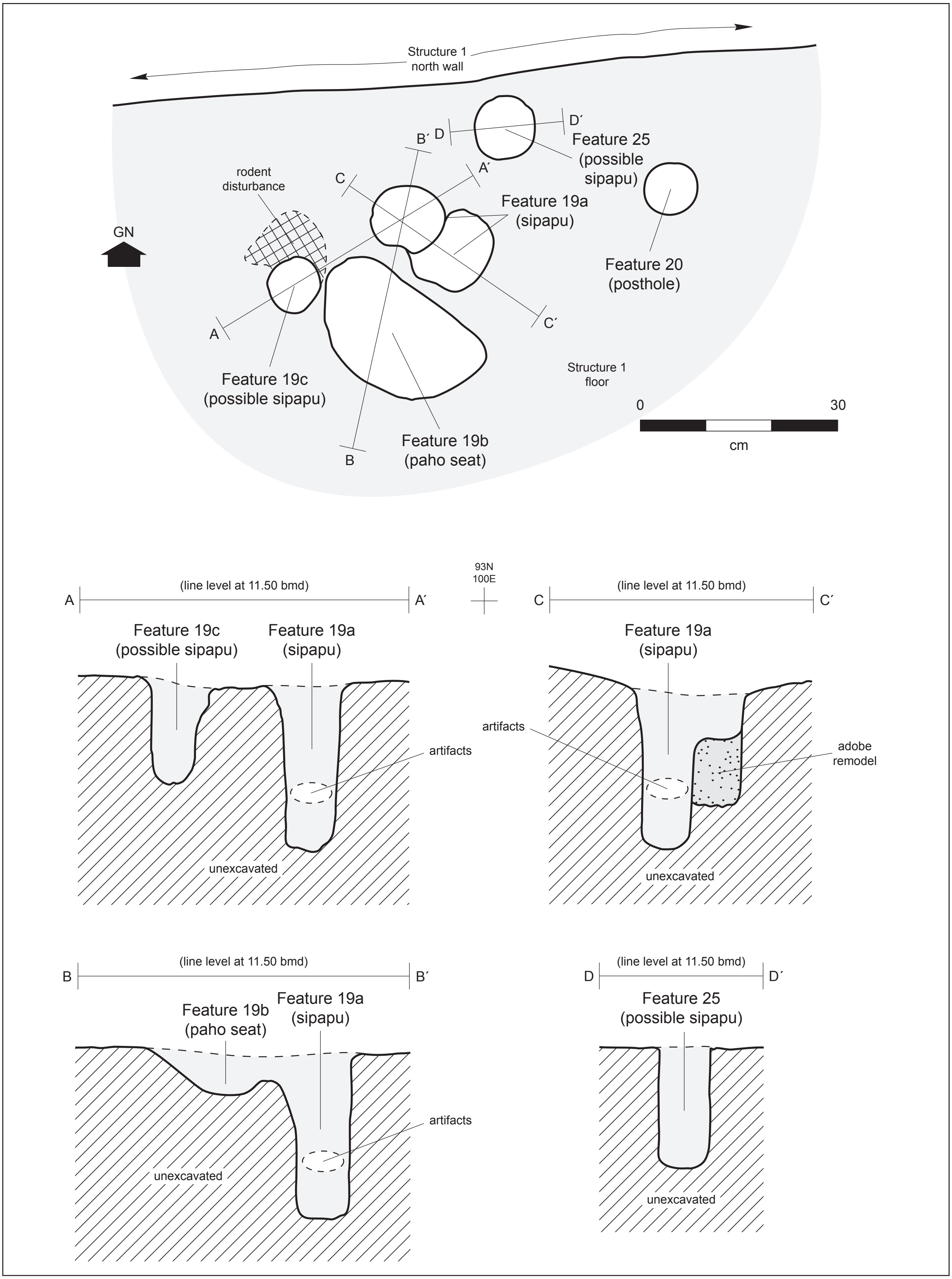
Feature 13, LA 104106.



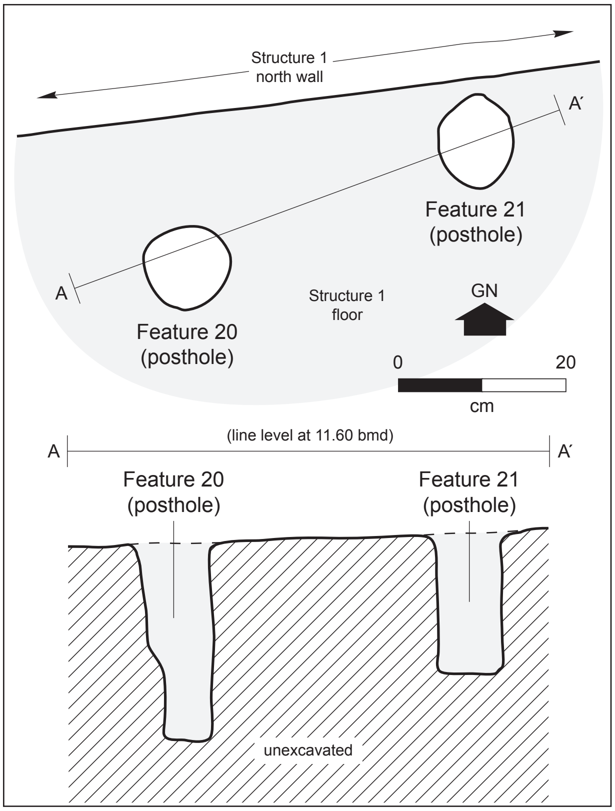
Features 14–17, LA 104106.



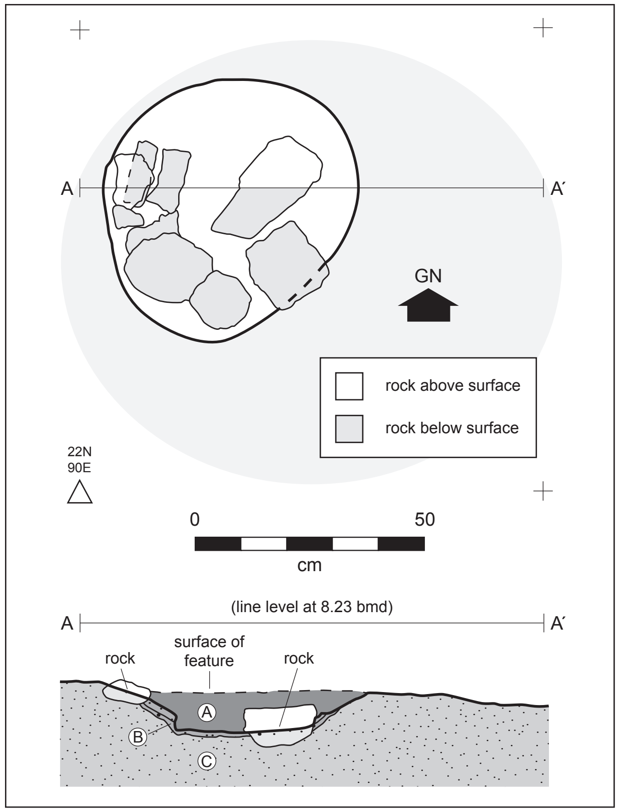
Feature 18, LA 104106.



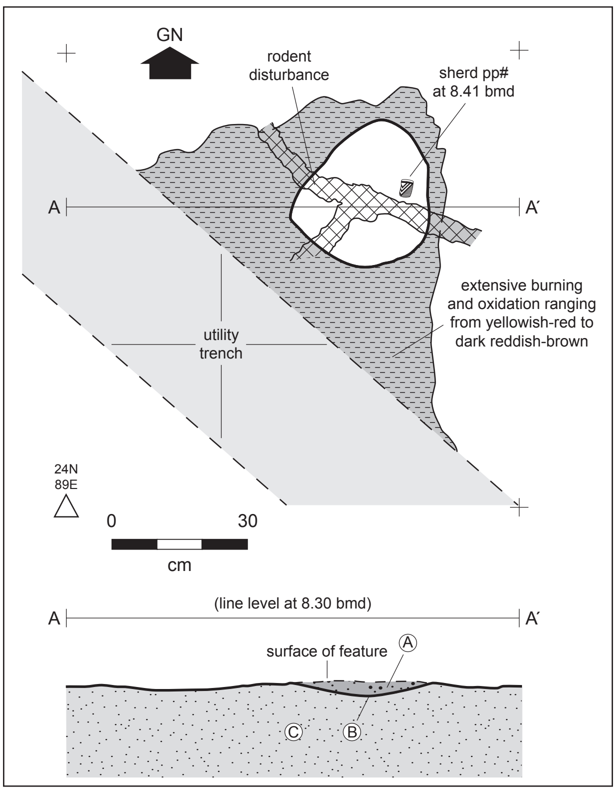
Features 19, 20, and 25, LA 104106.



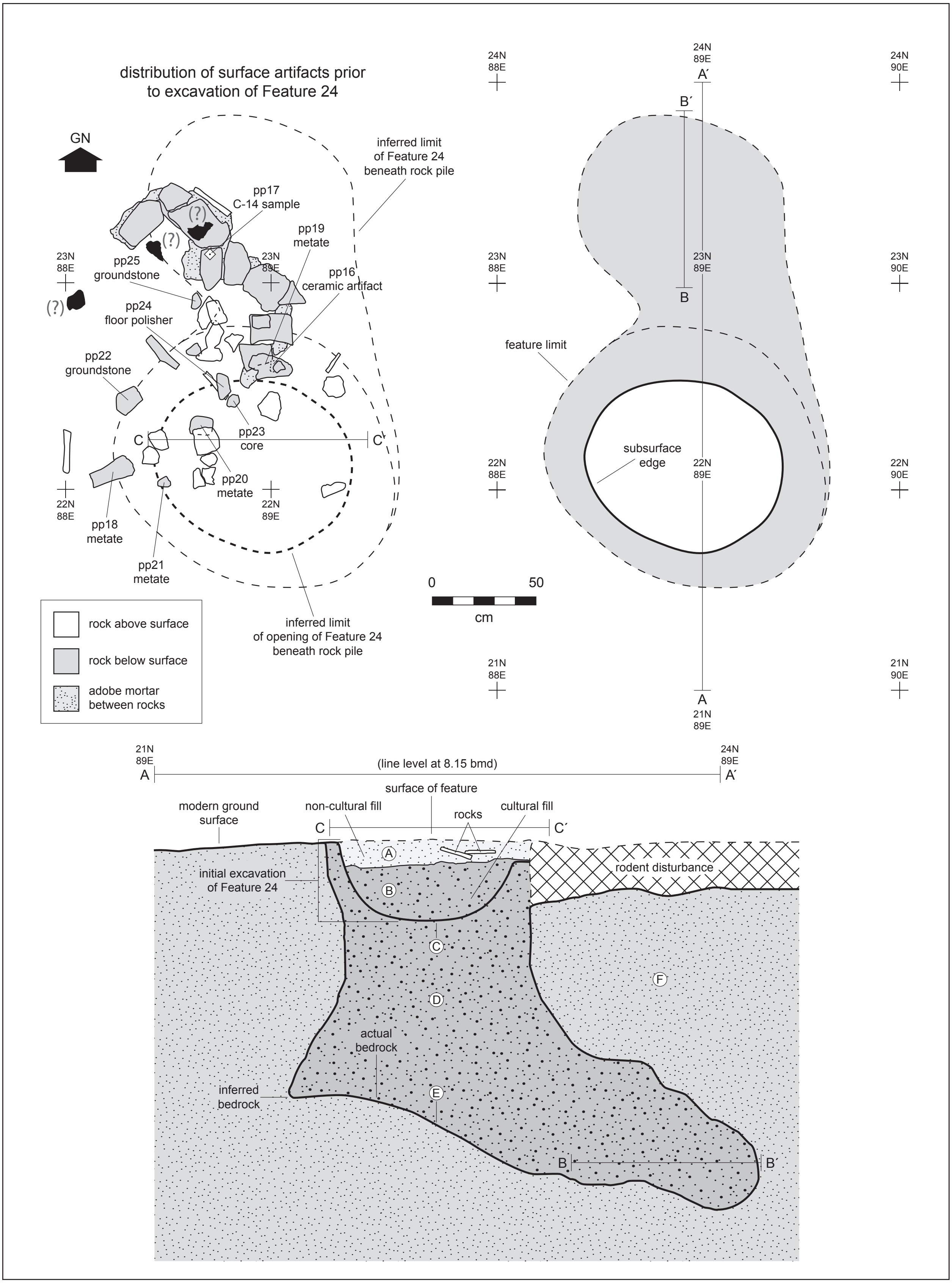
Features 20 and 21, LA 104106.



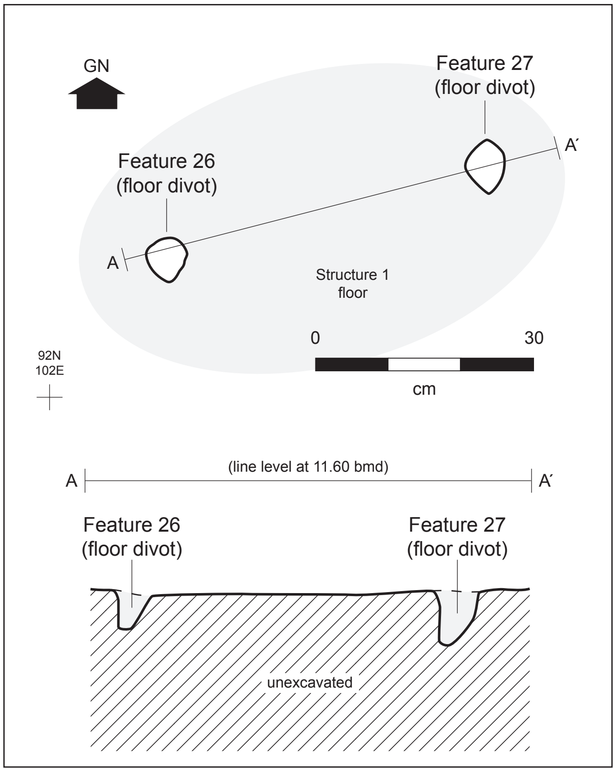
Feature 22, LA 104106.



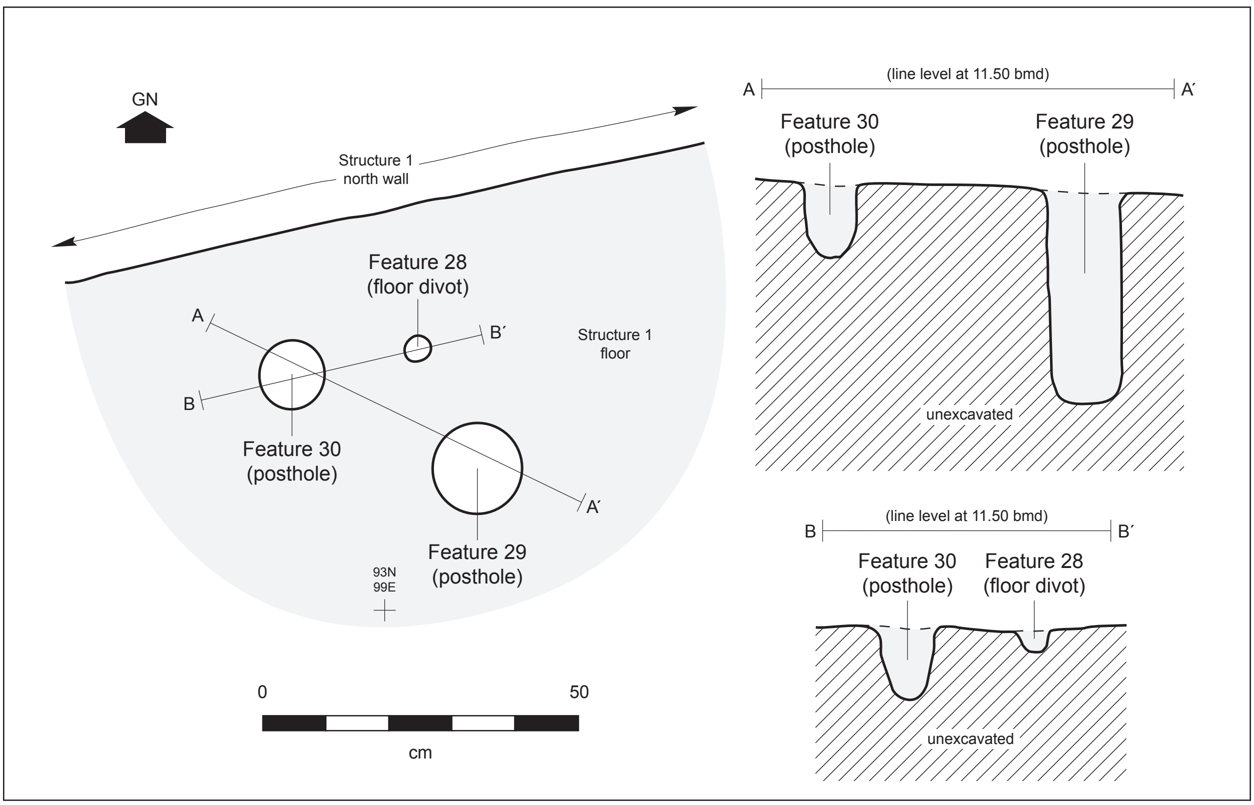
Feature 23, LA 104106.



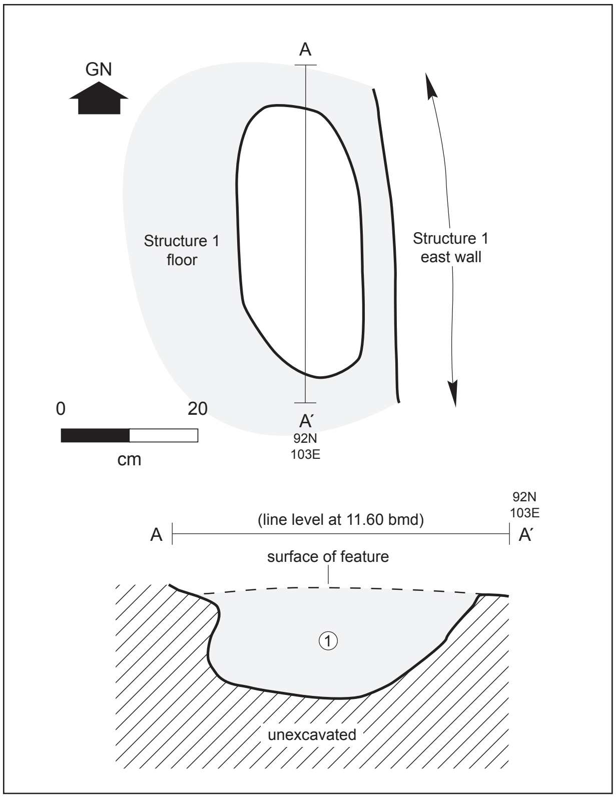
Feature 24, LA 104106.



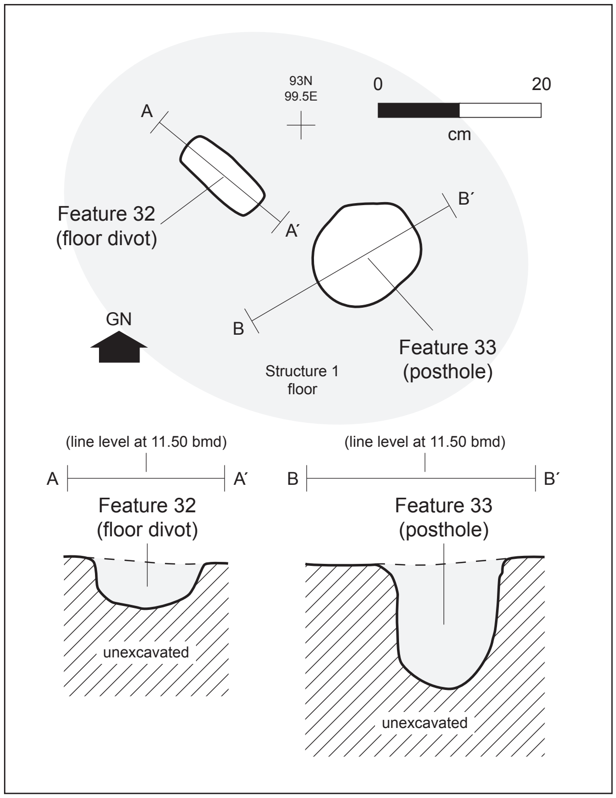
Features 26 and 27, LA 104106.



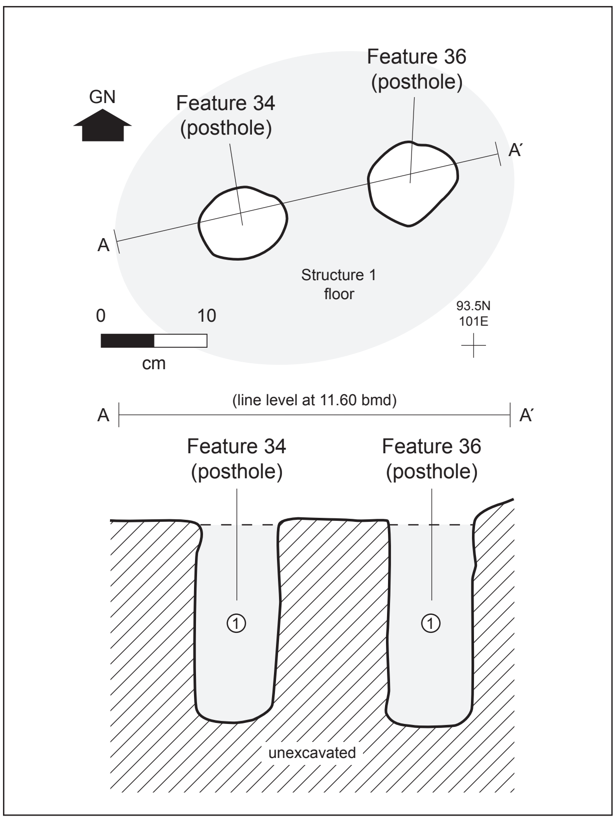
Features 28–30, LA 104106.



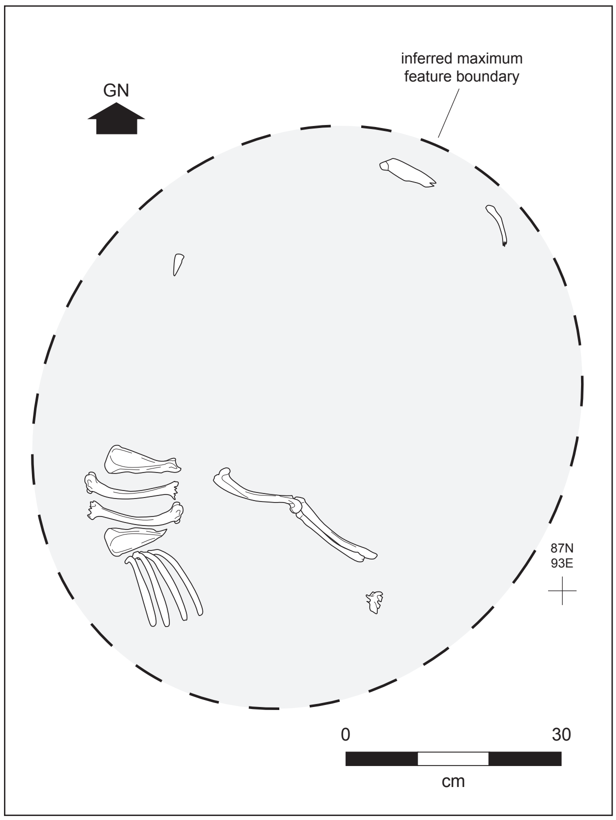
Feature 31, LA 104106.



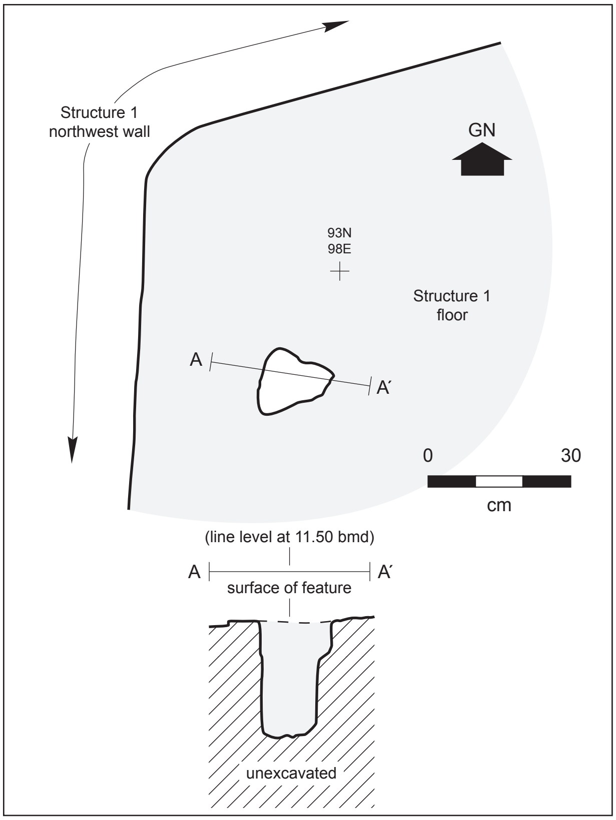
Features 32 and 33, LA 104106.



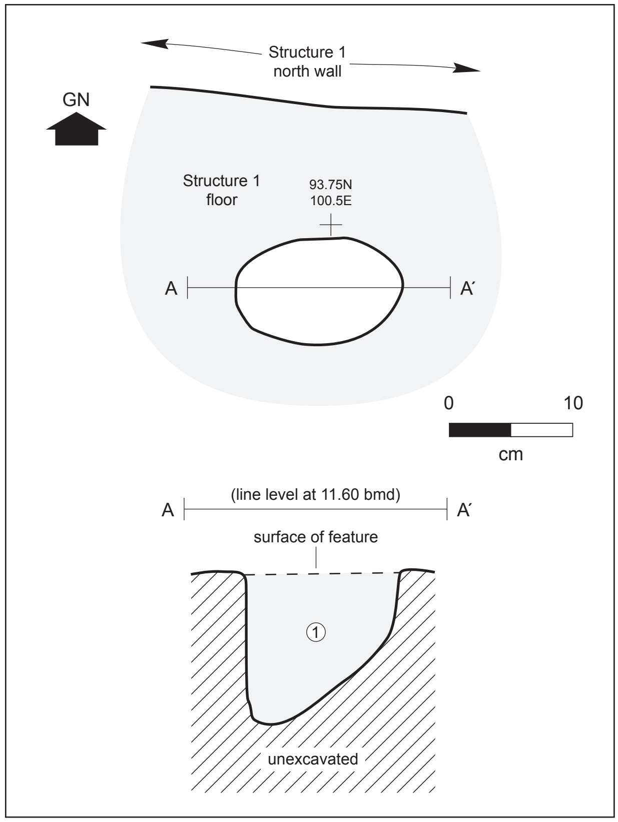
Features 34 and 36, LA 104106.



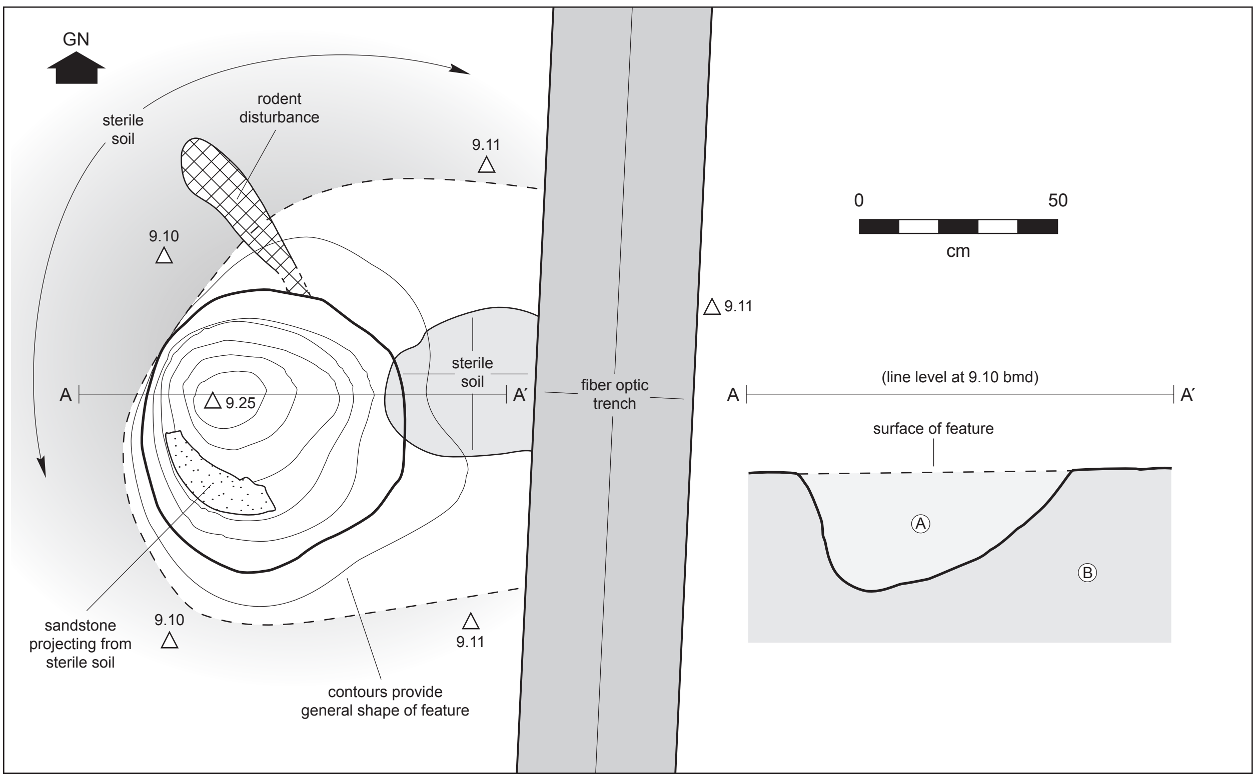
Feature 35, LA 104106.



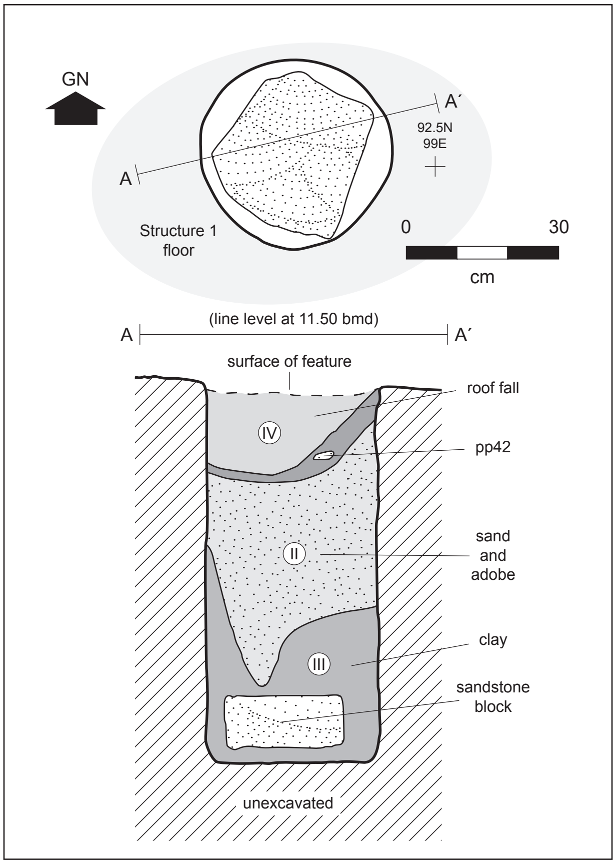
Feature 37, LA 104106.



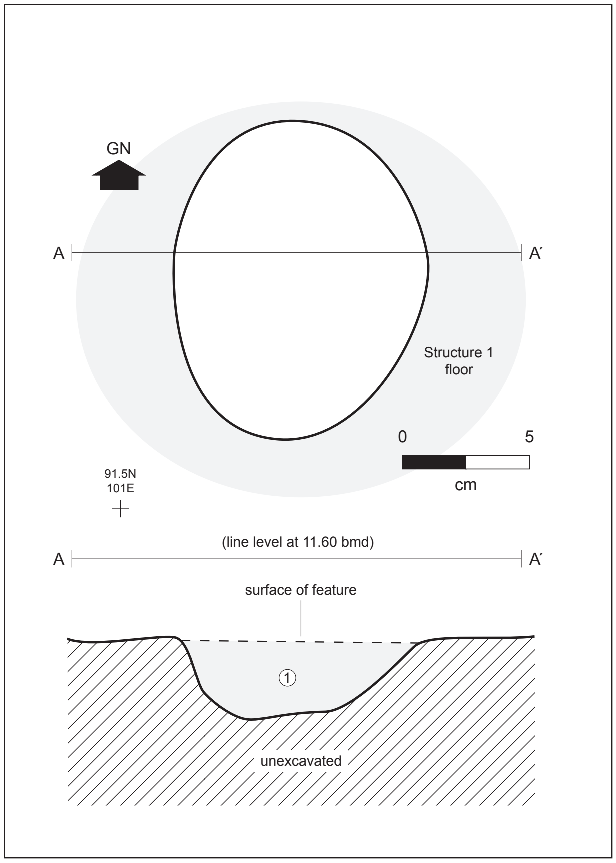
Feature 38, LA 104106.



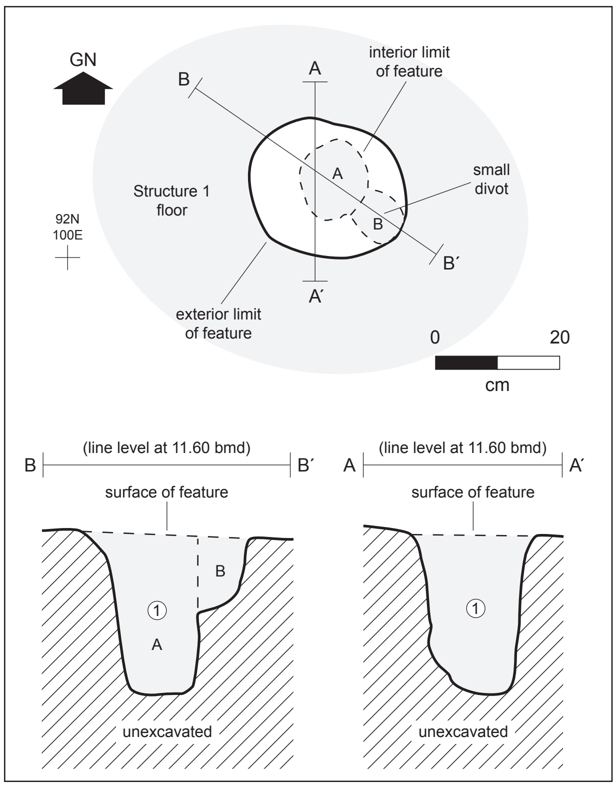
Feature 39, LA 104106.



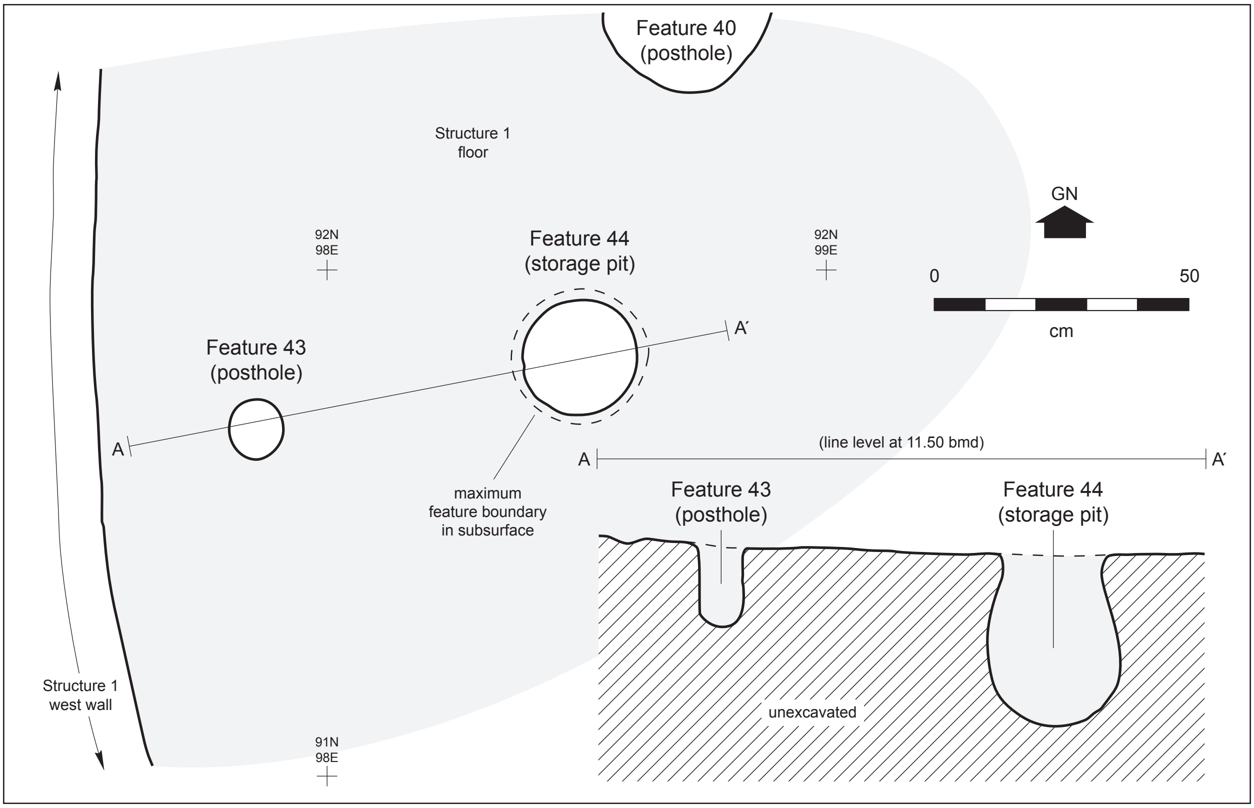
Feature 40, LA 104106.



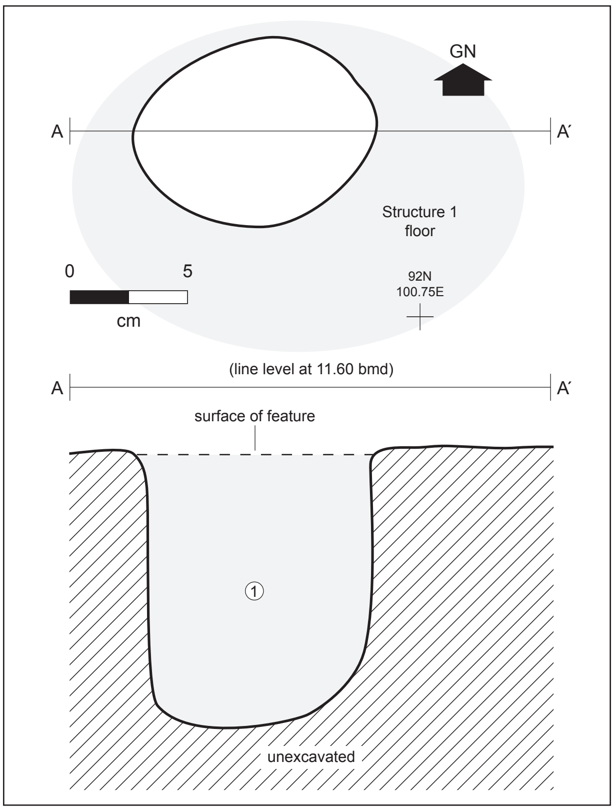
Feature 41, LA 104106.



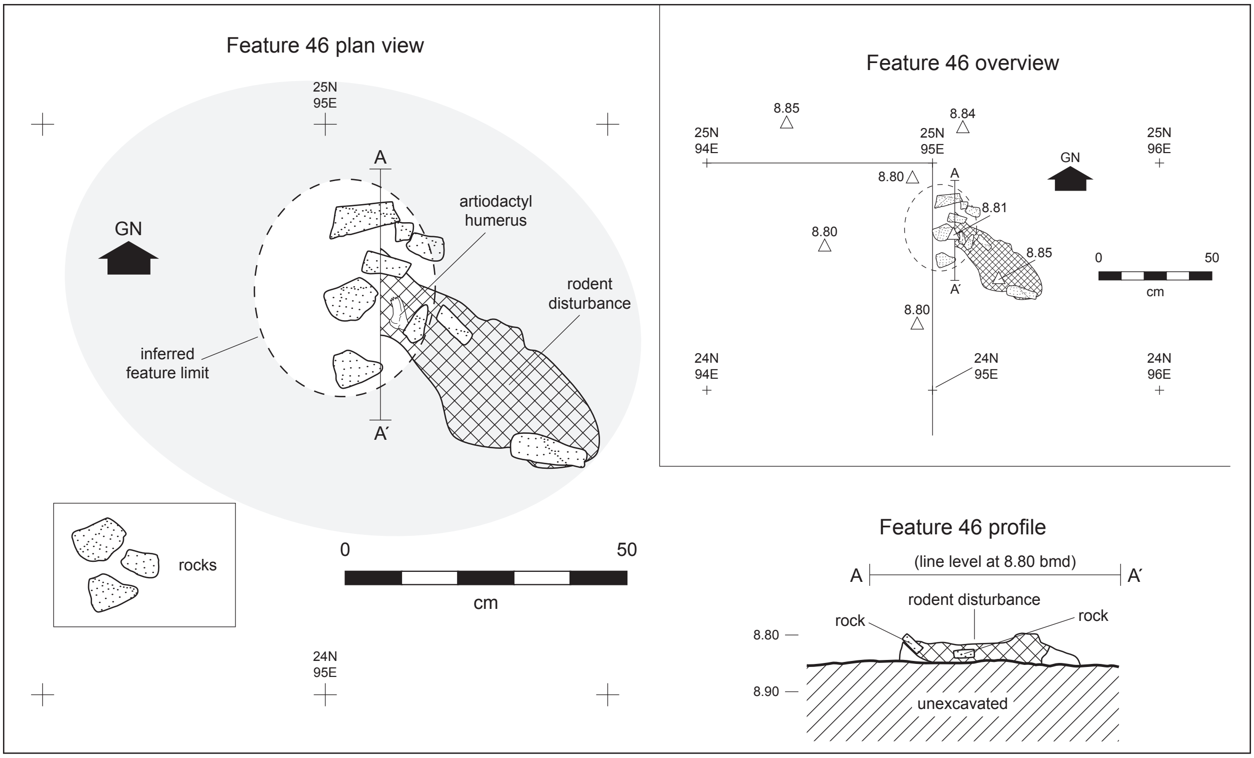
Feature 42, LA 104106 (right).



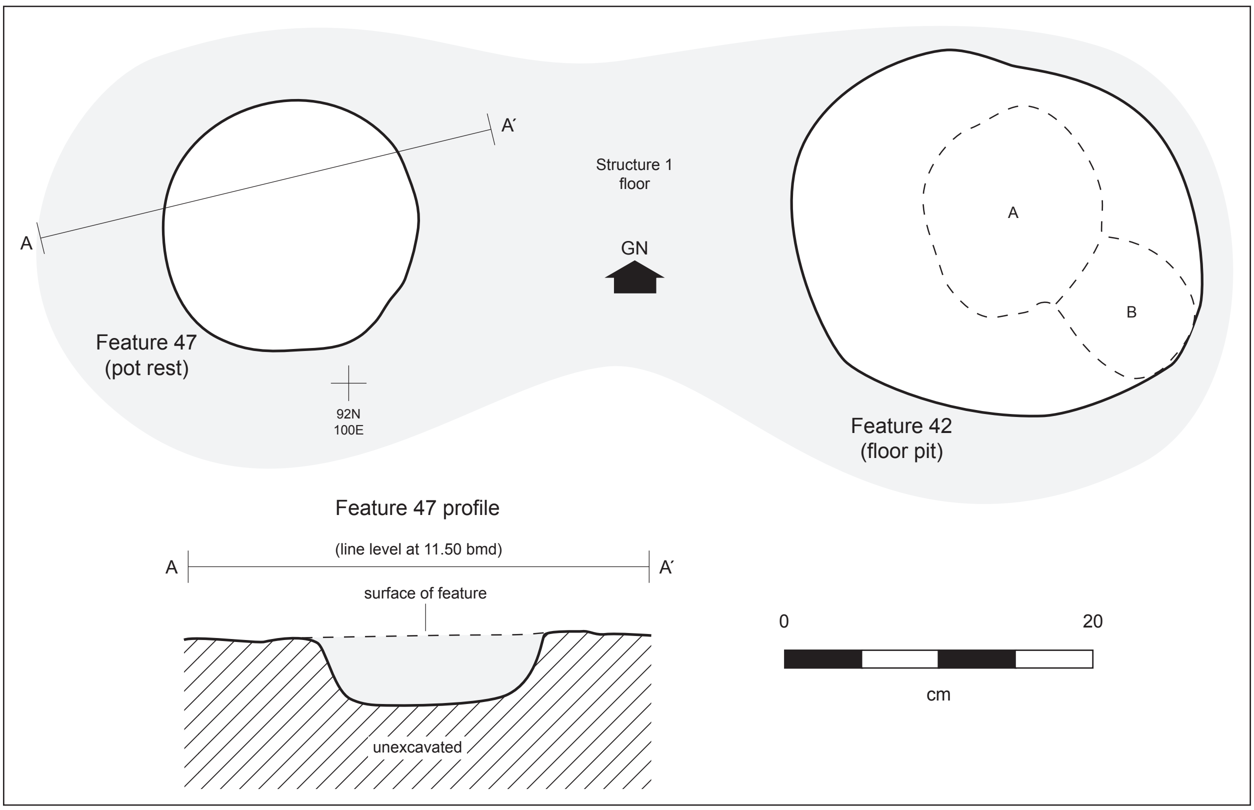
Features 43 and 44, LA 104106.



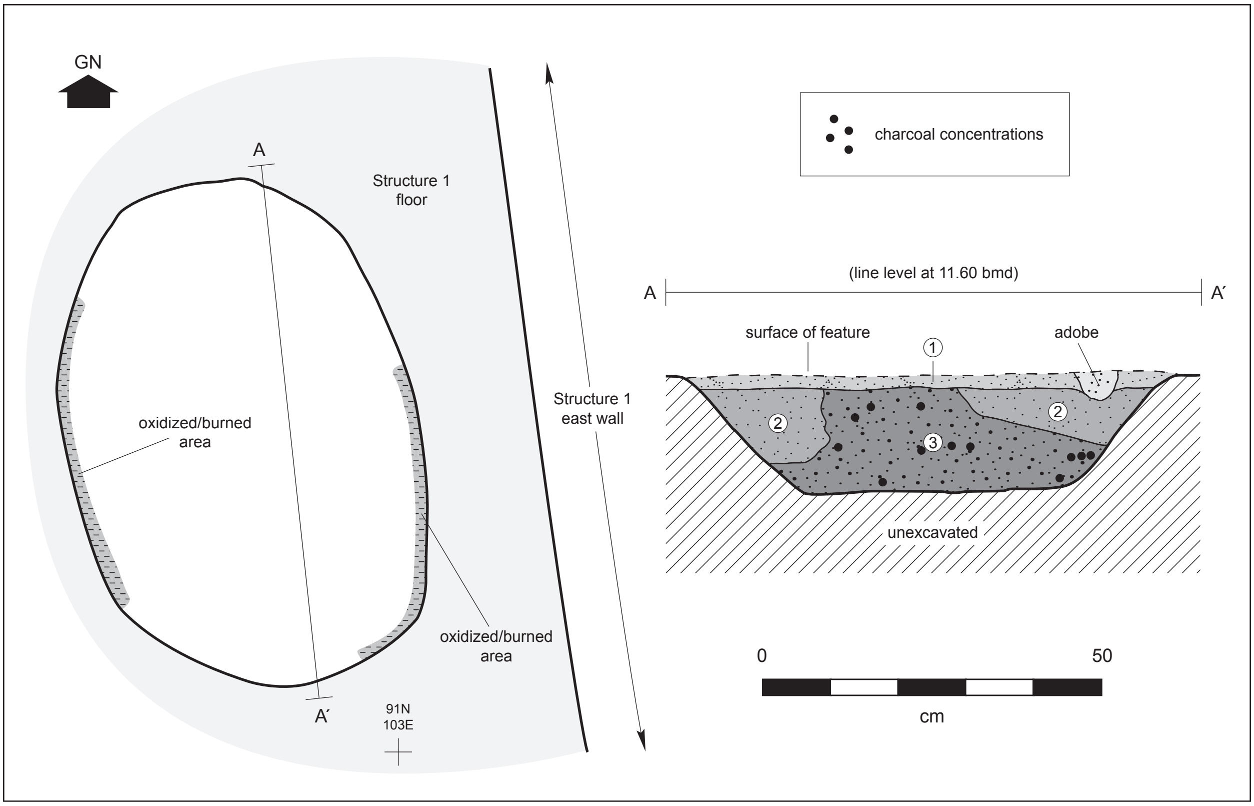
Feature 45, LA 104106.



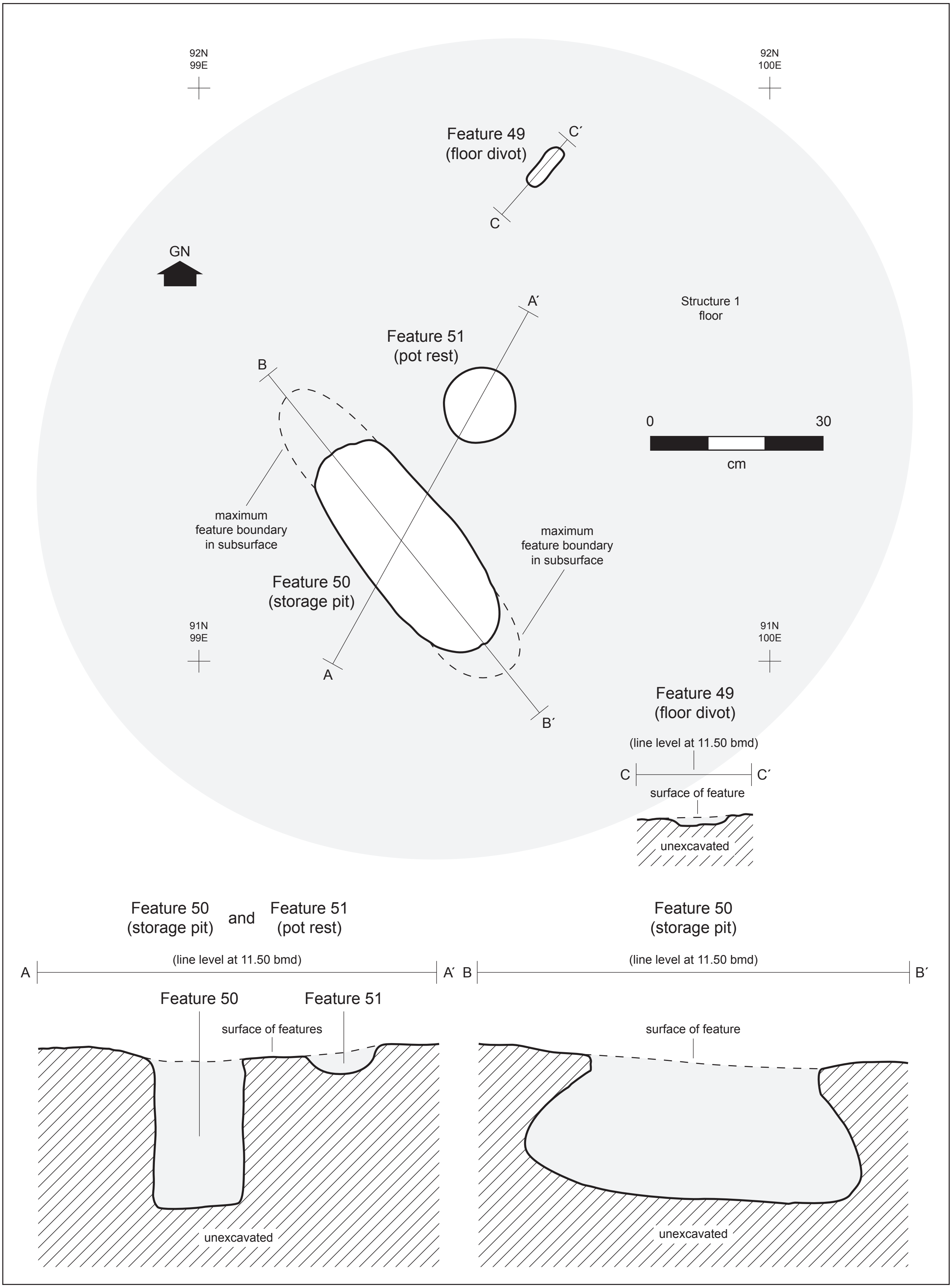
Feature 46, LA 104106.



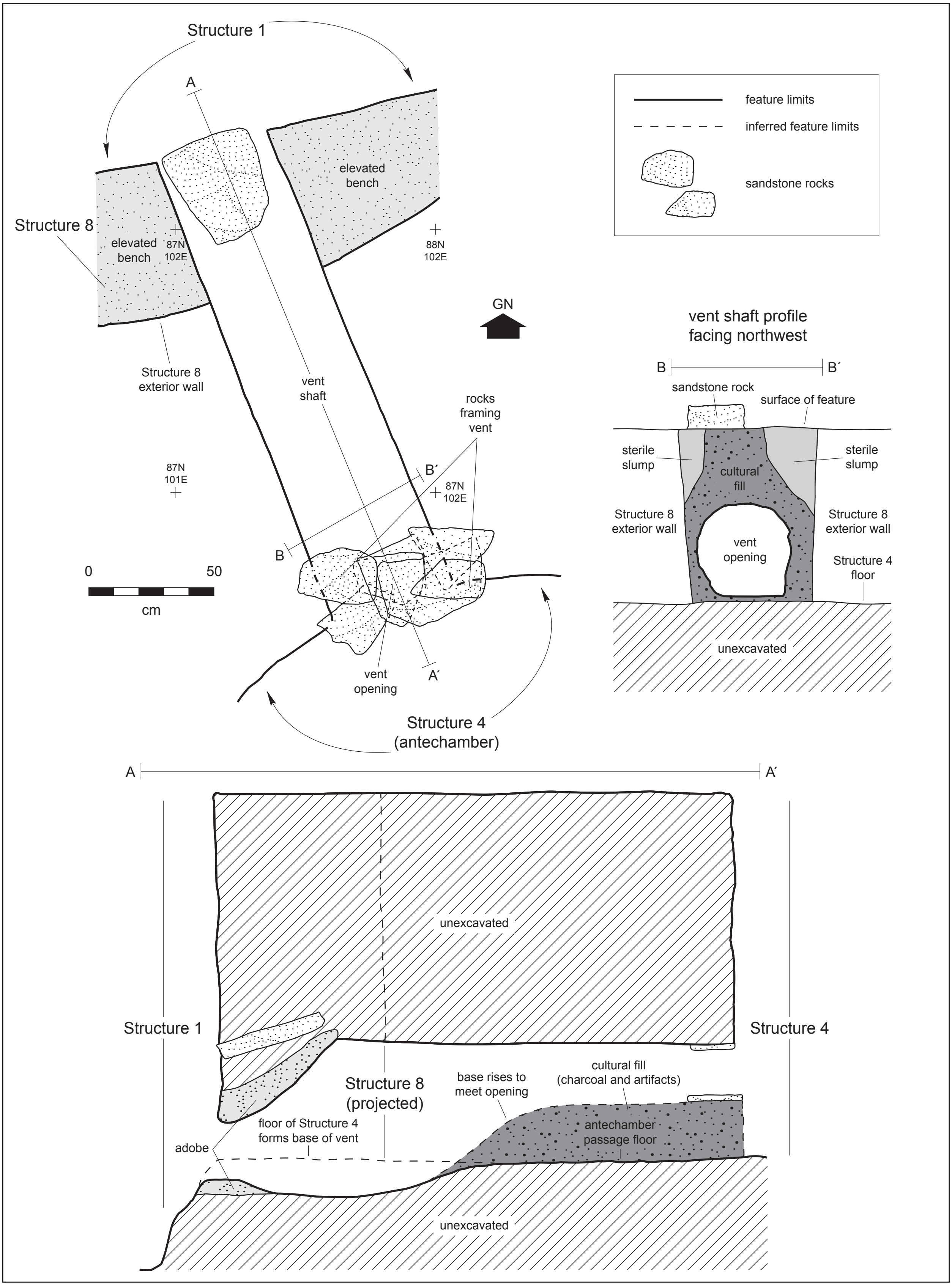
Features 47 and 42, LA 104106.



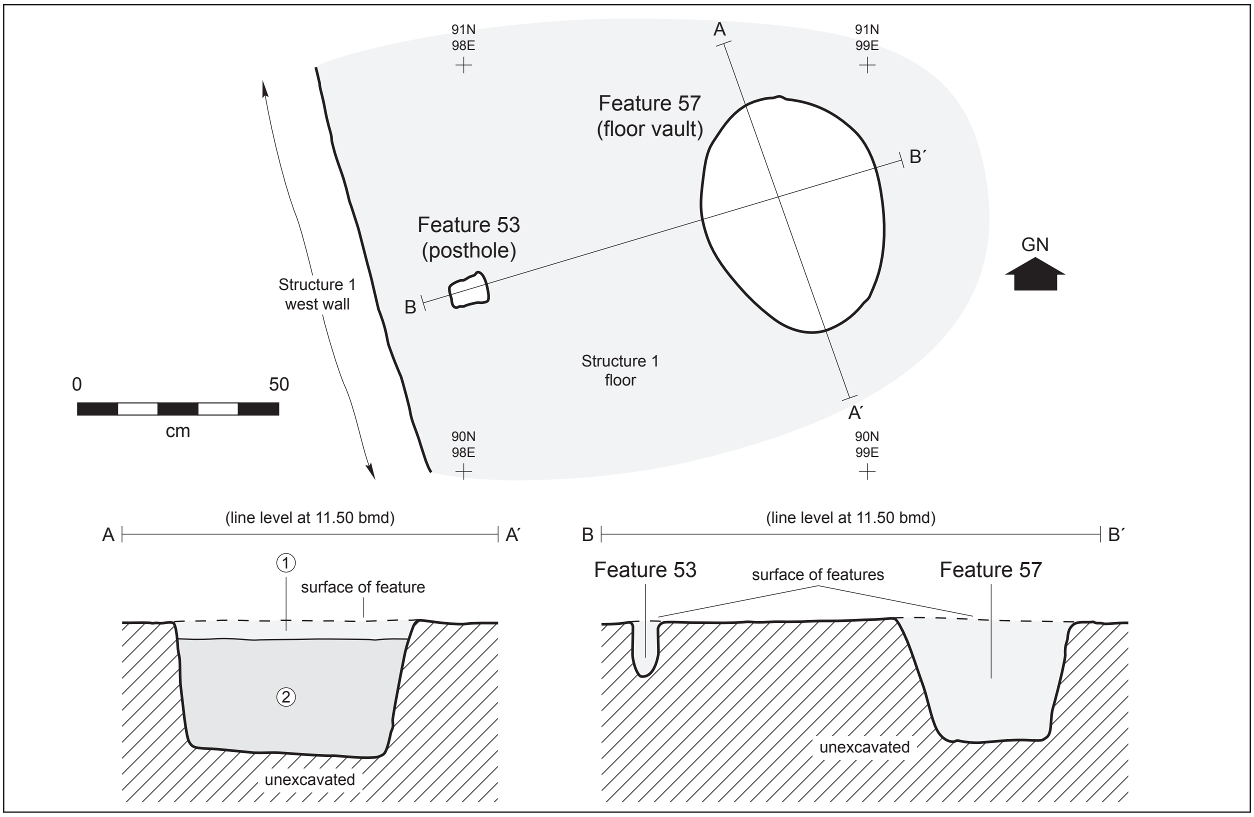
Feature 48, LA 104106.



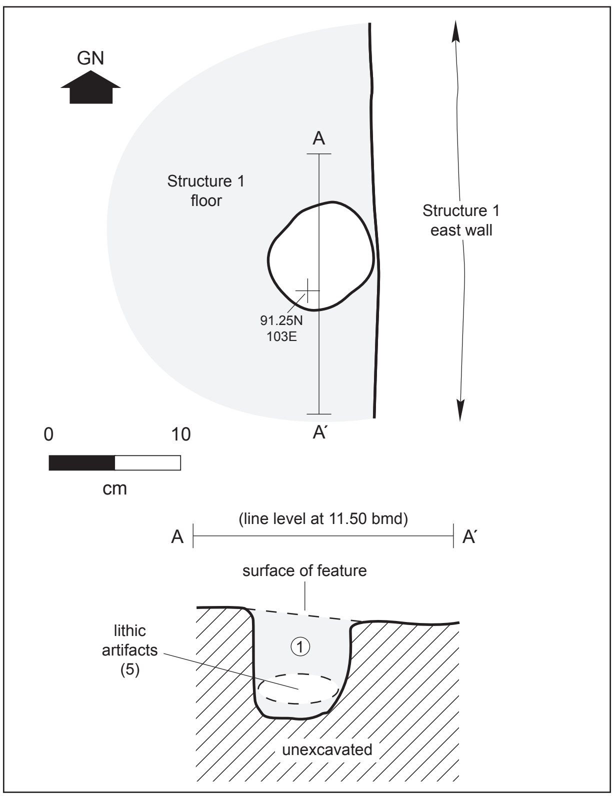
Features 49–51, LA 104106.



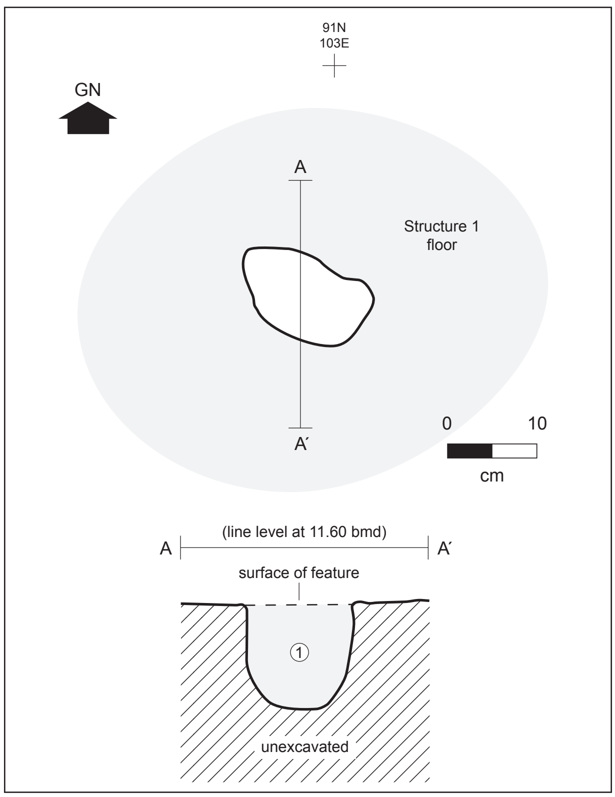
Feature 52, LA 104106.



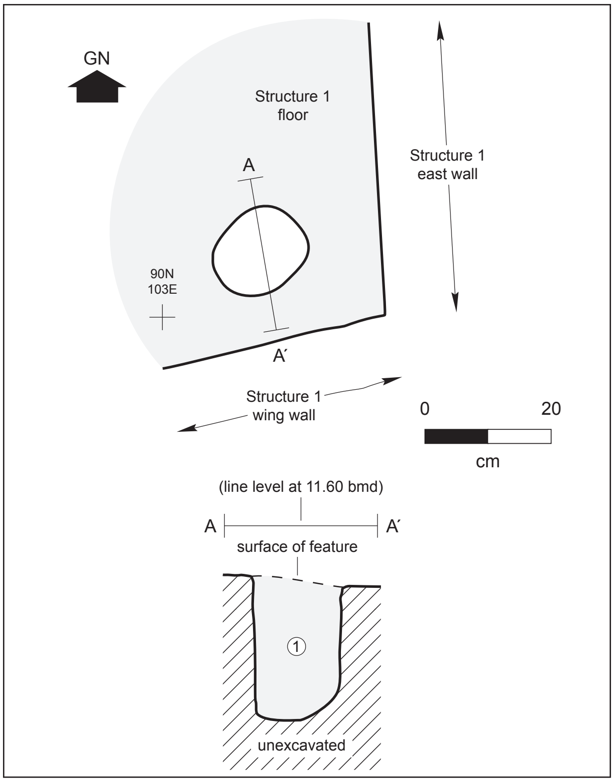
Features 53 and 57, LA 104106.



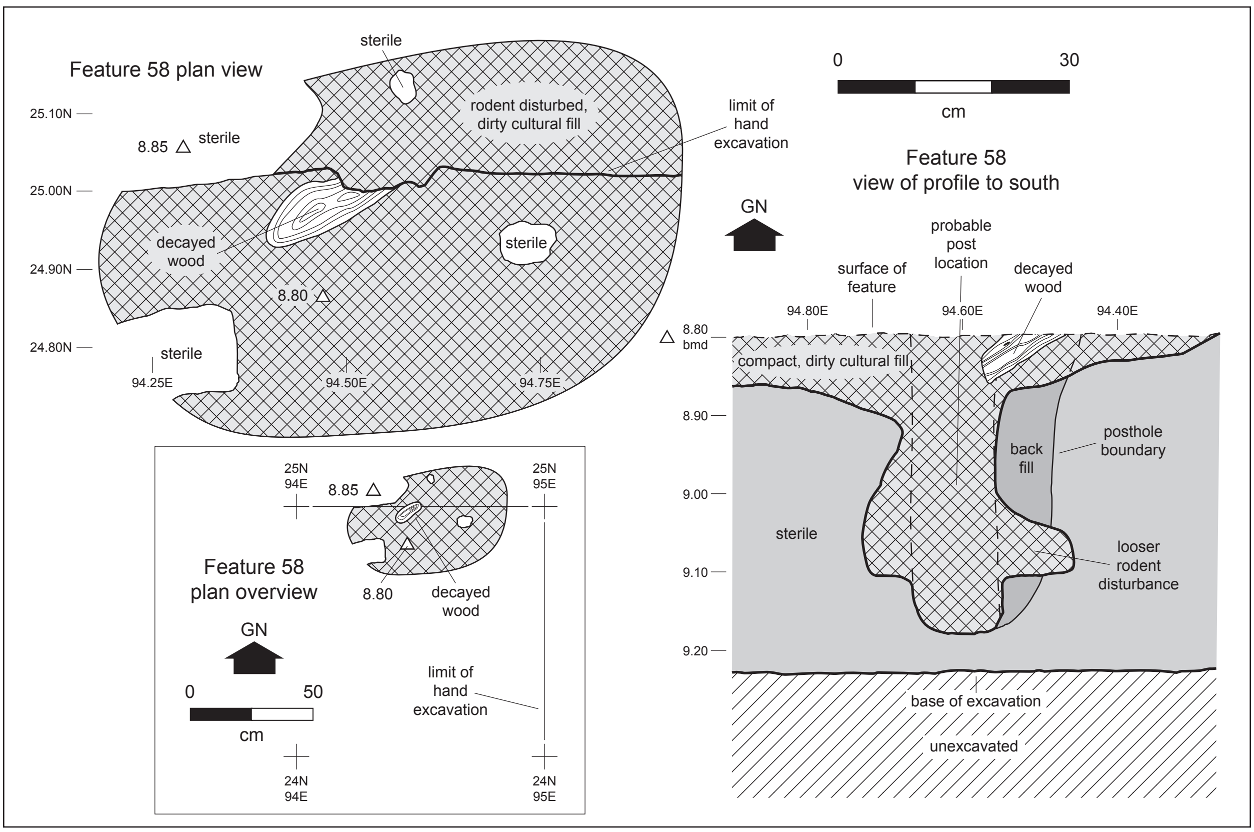
Feature 54, LA 104106.



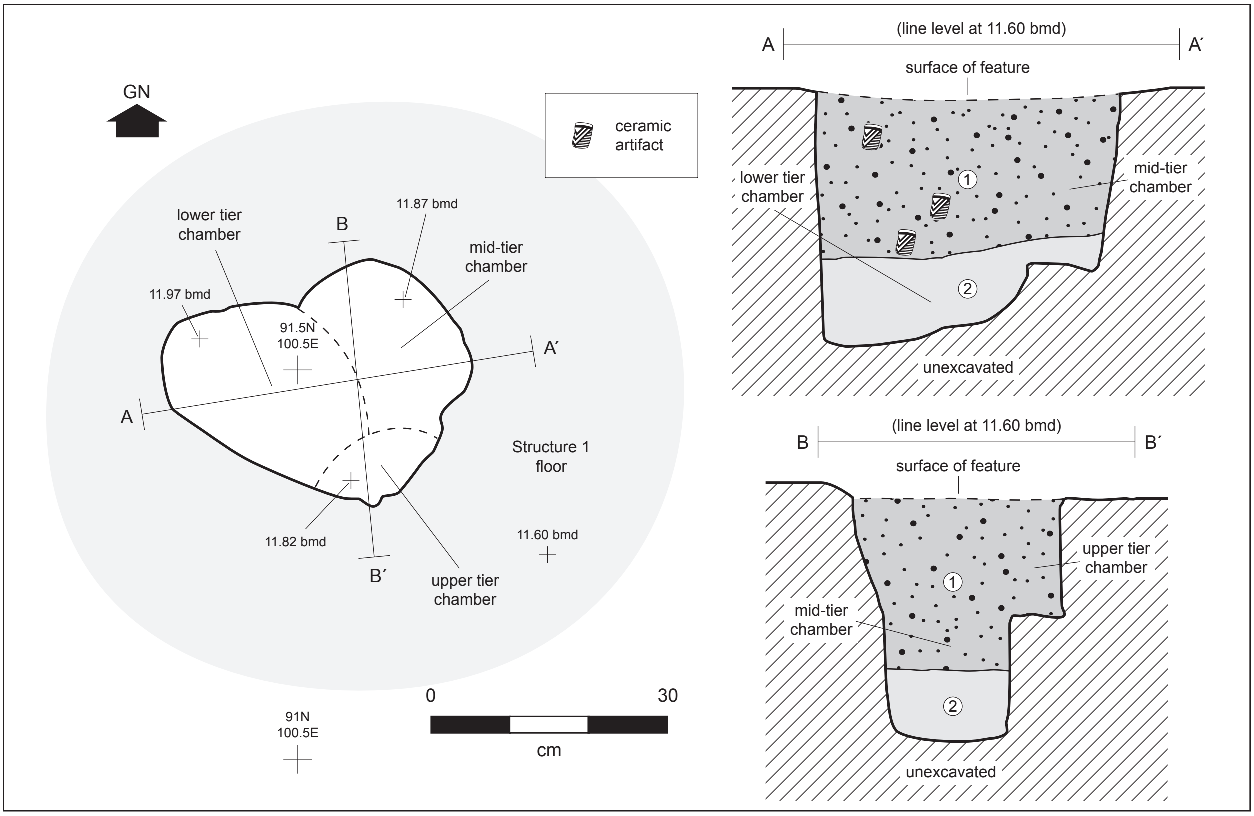
Feature 55, LA 104106.



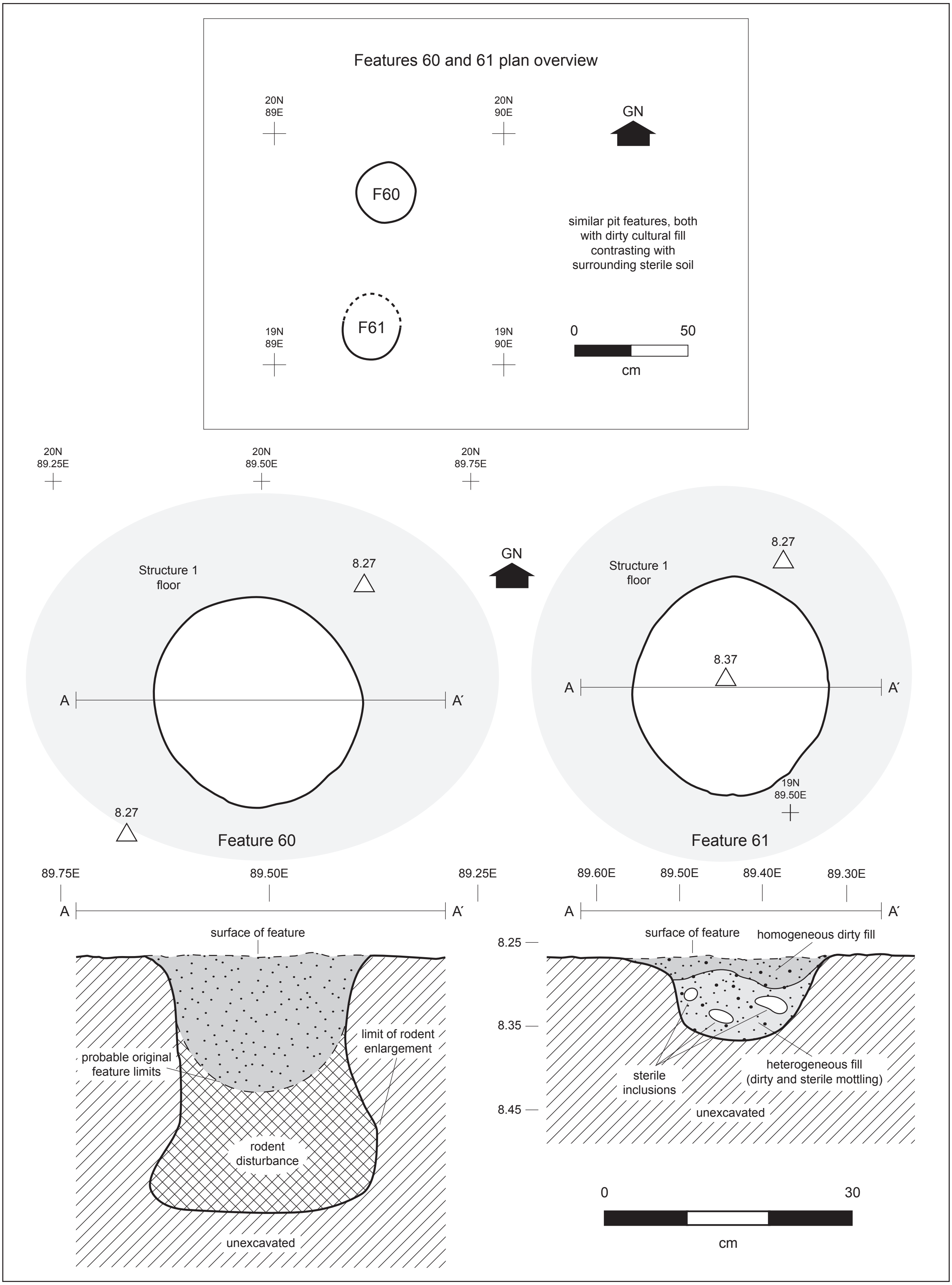
Feature 56, LA 104106.



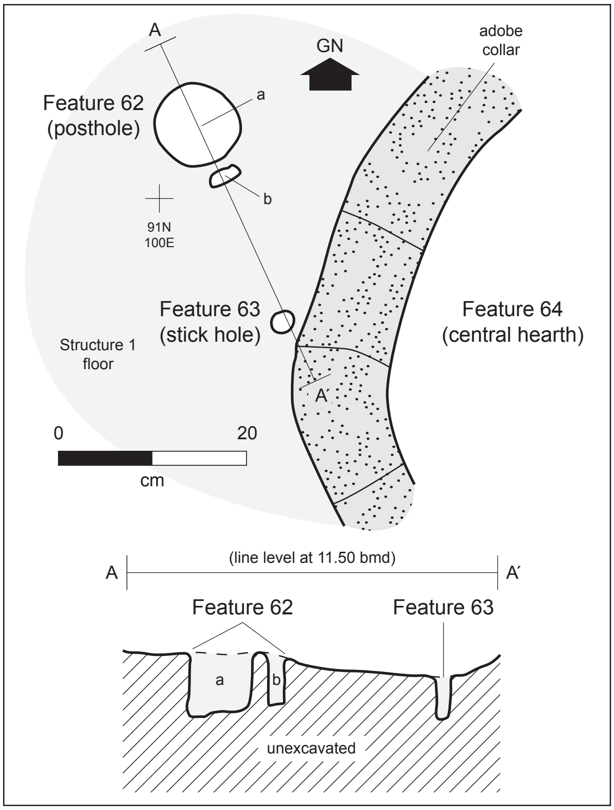
Feature 58, LA 104106.



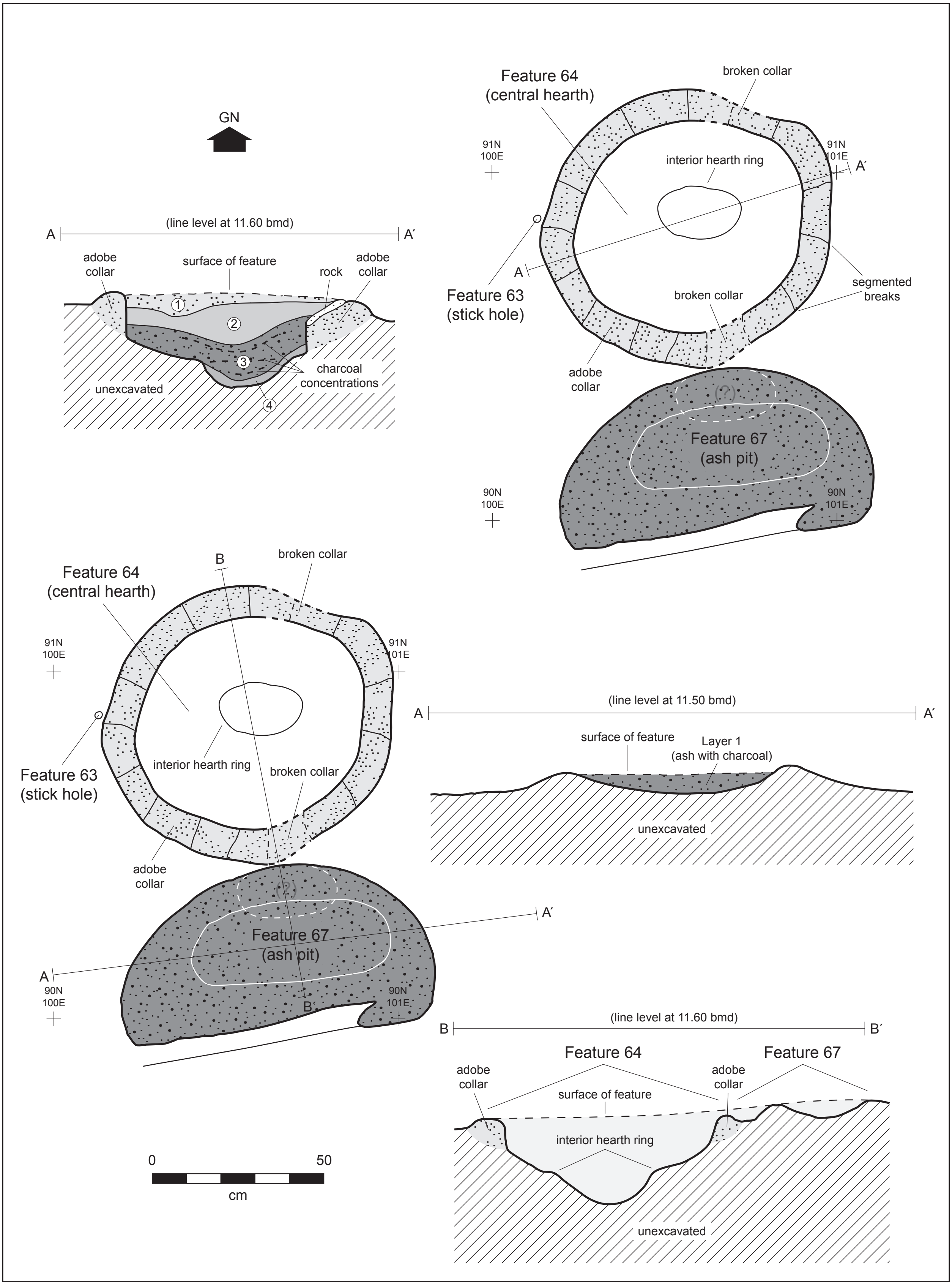
Feature 59, LA 104106.



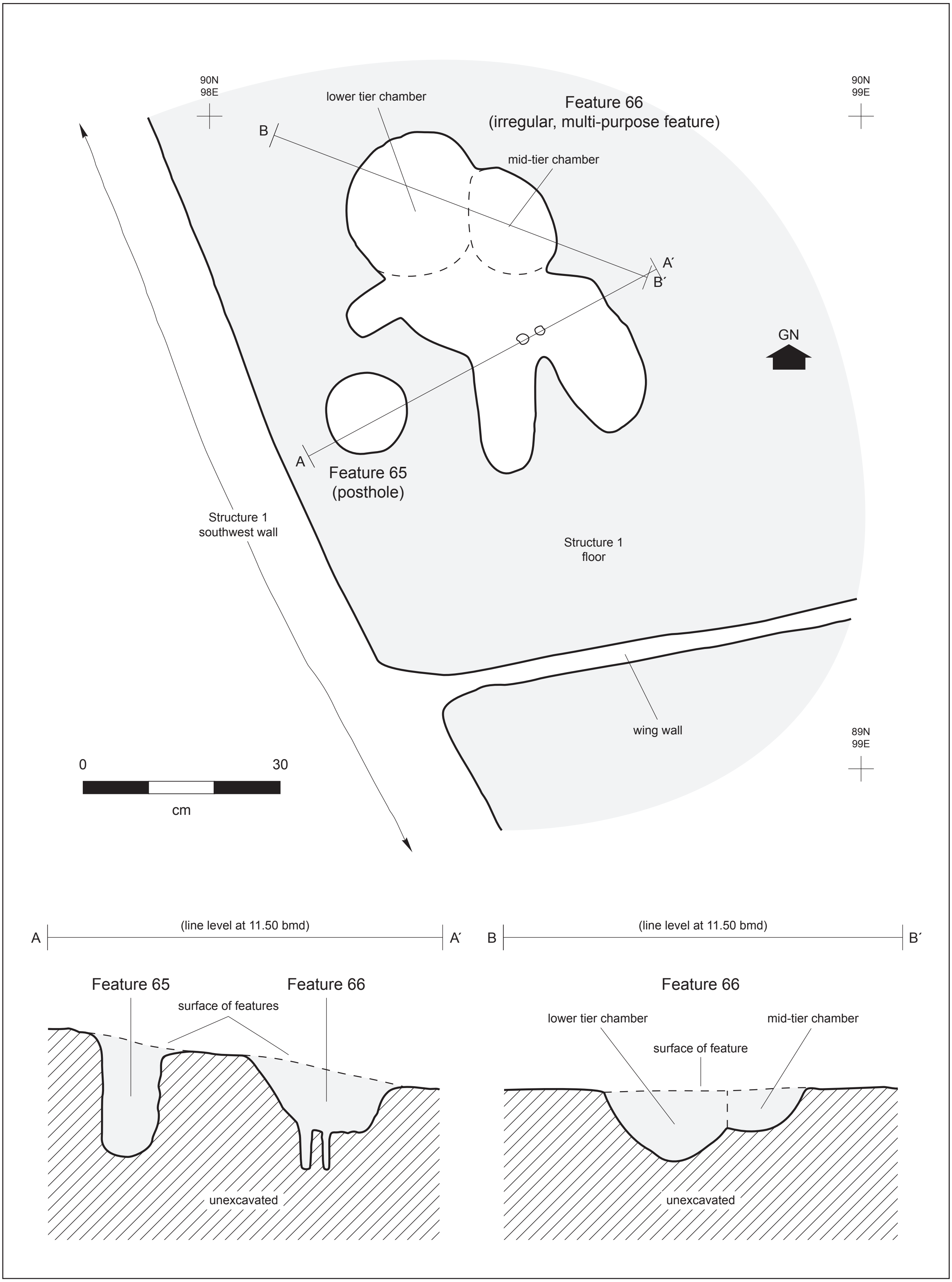
Features 60 and 61, LA 104106.



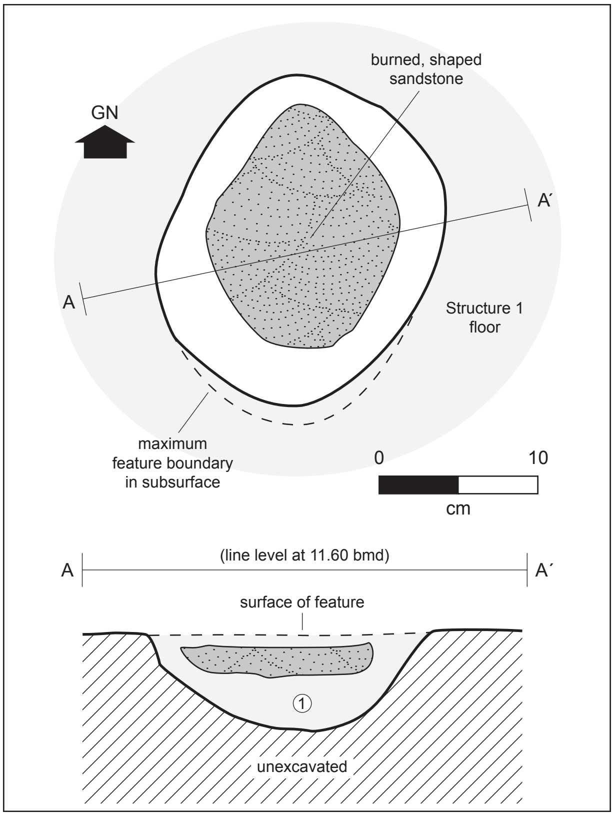
Features 62 and 63, LA 104106.



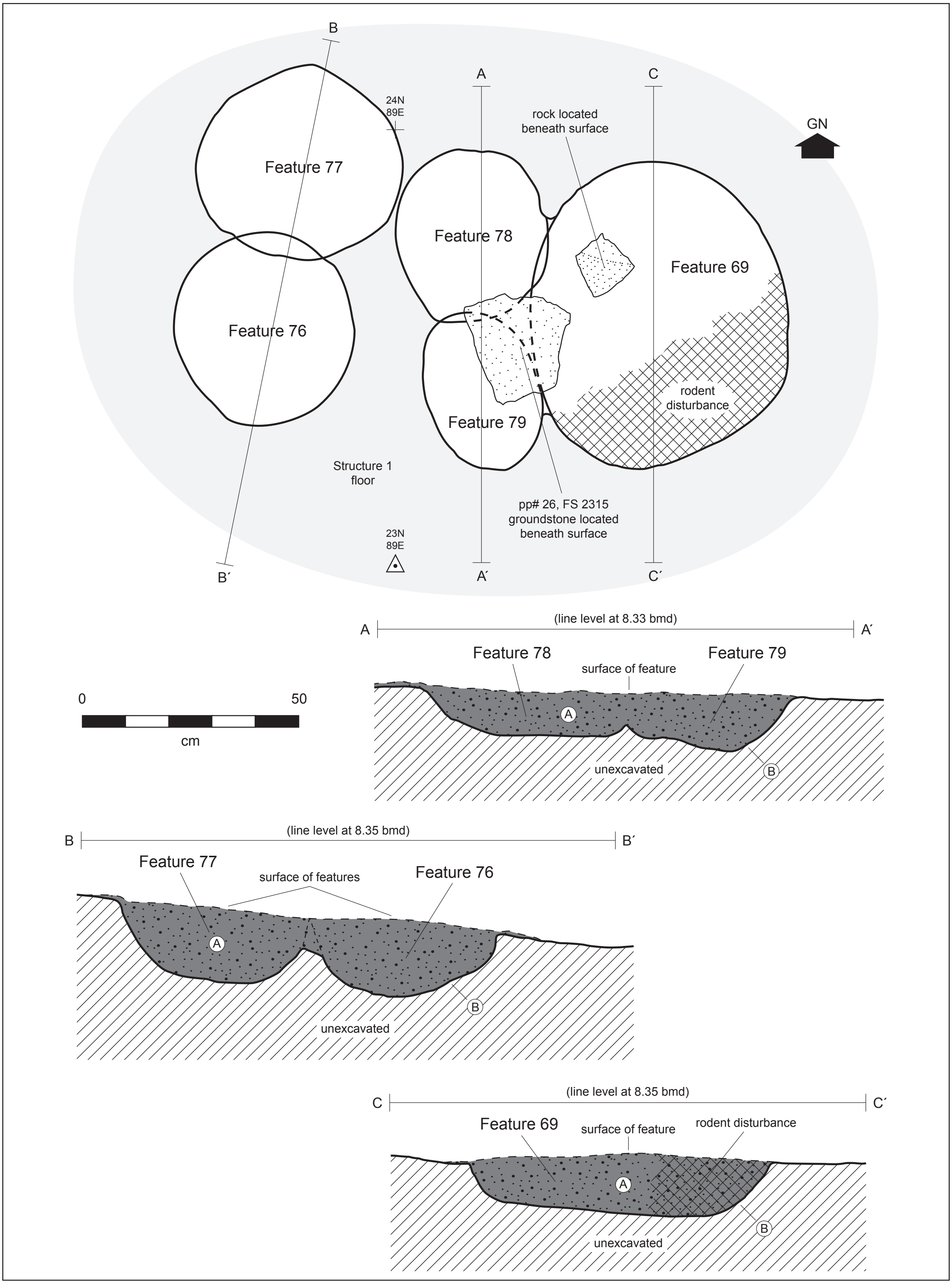
Features 64 and 67, LA 104106.



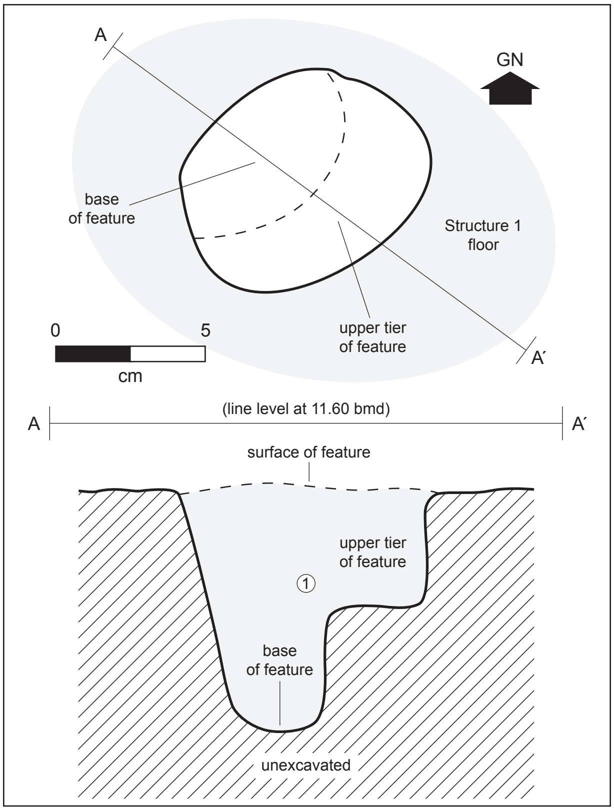
Features 65 and 66, LA 104106.



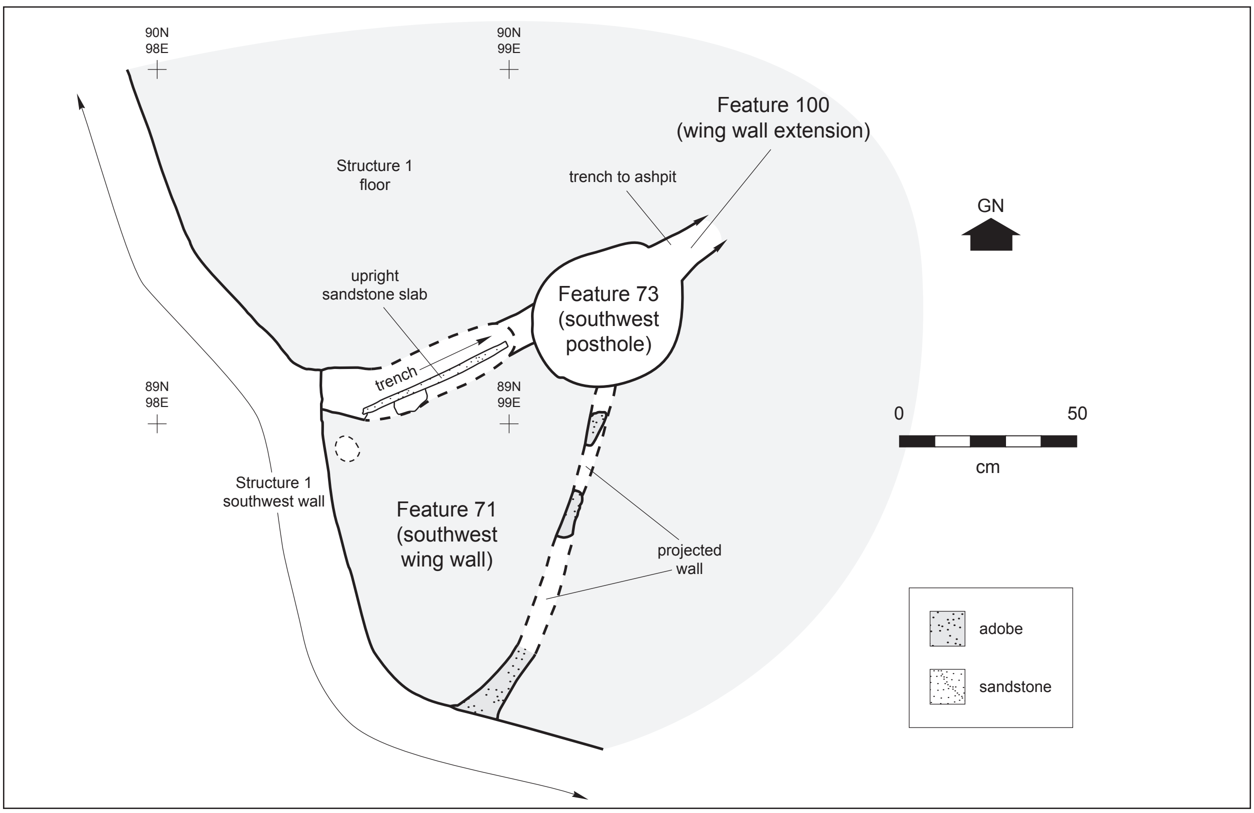
Feature 68, LA 104106.



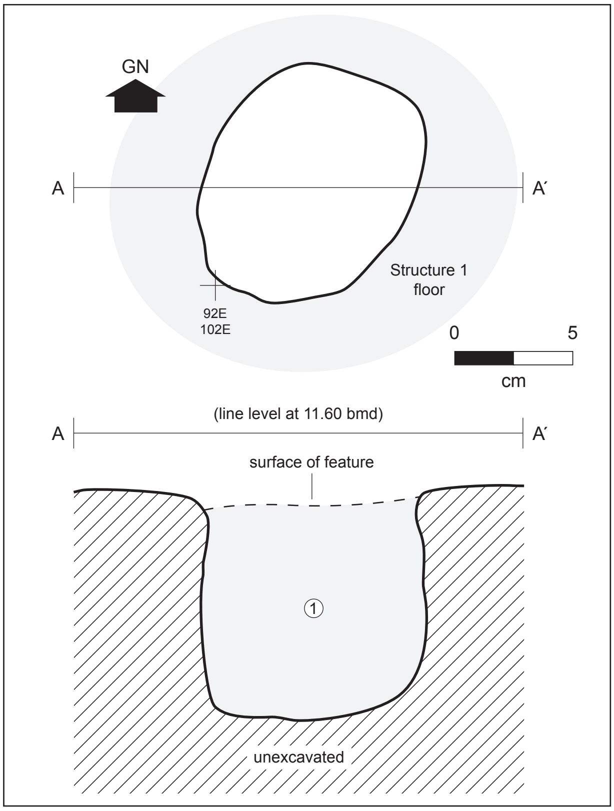
Features 69, 76, and 77–79, LA 104106.



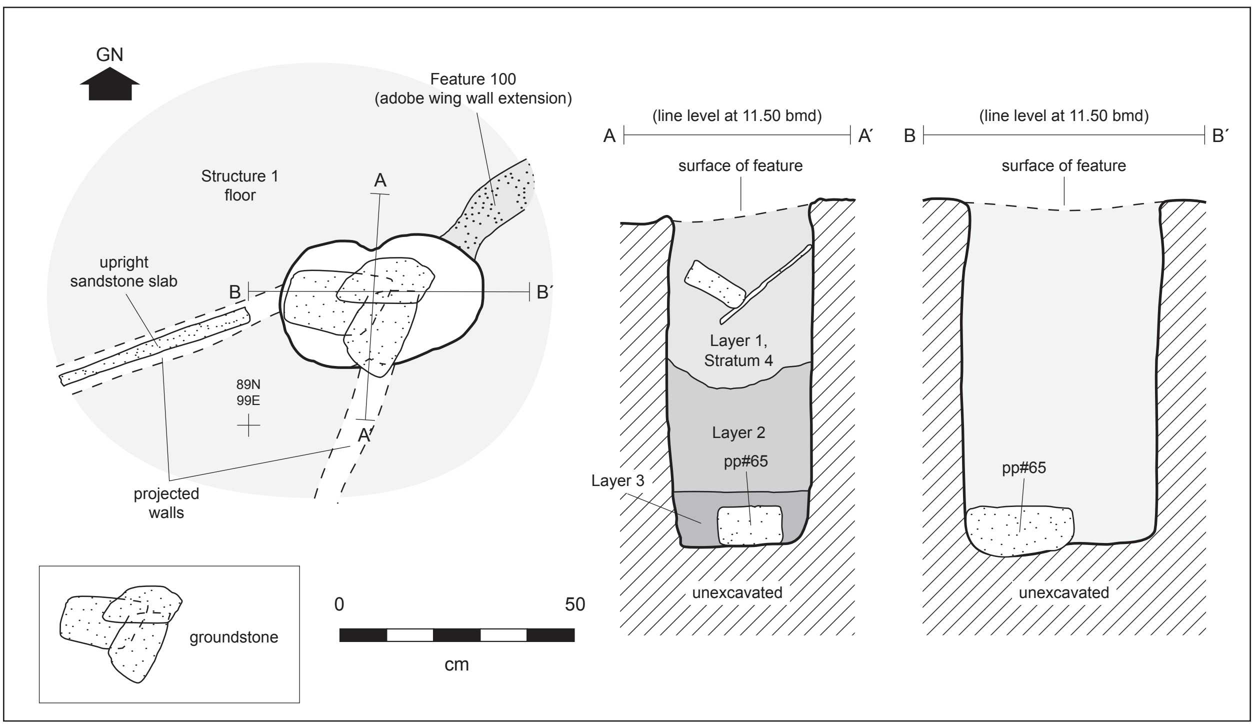
Feature 70, LA 104106.



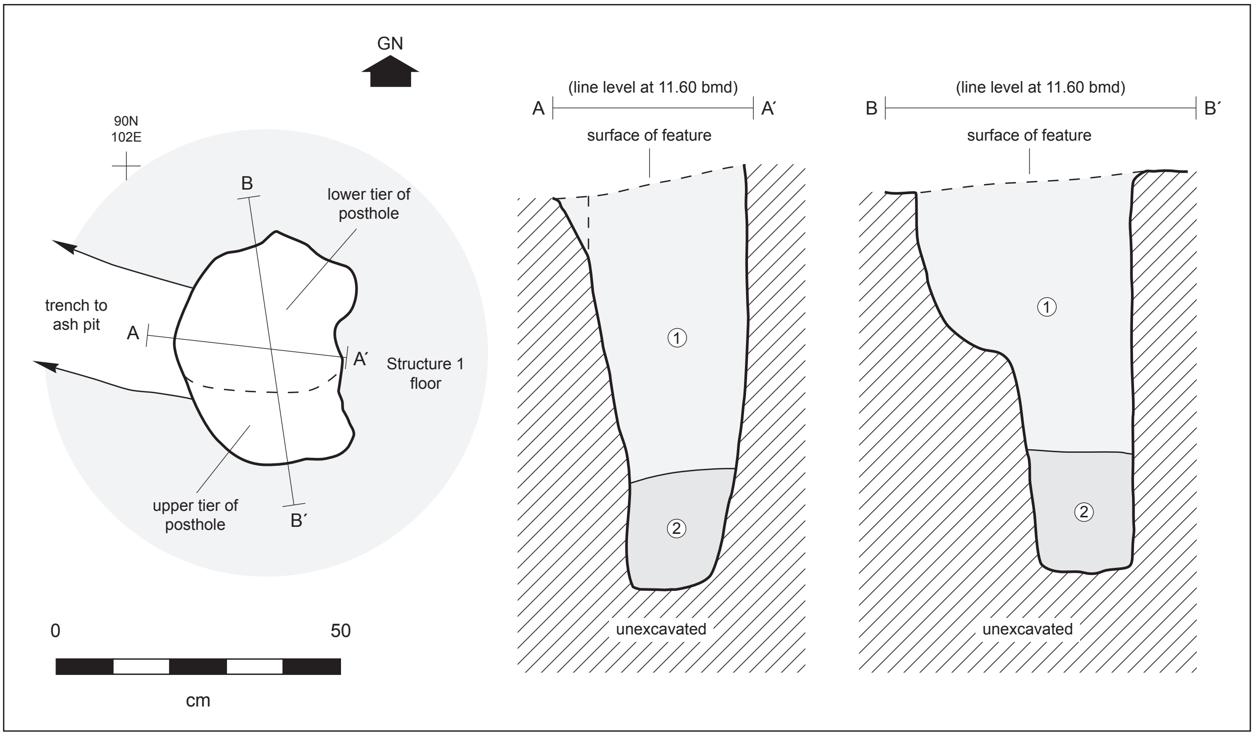
Feature 71, LA 104106.



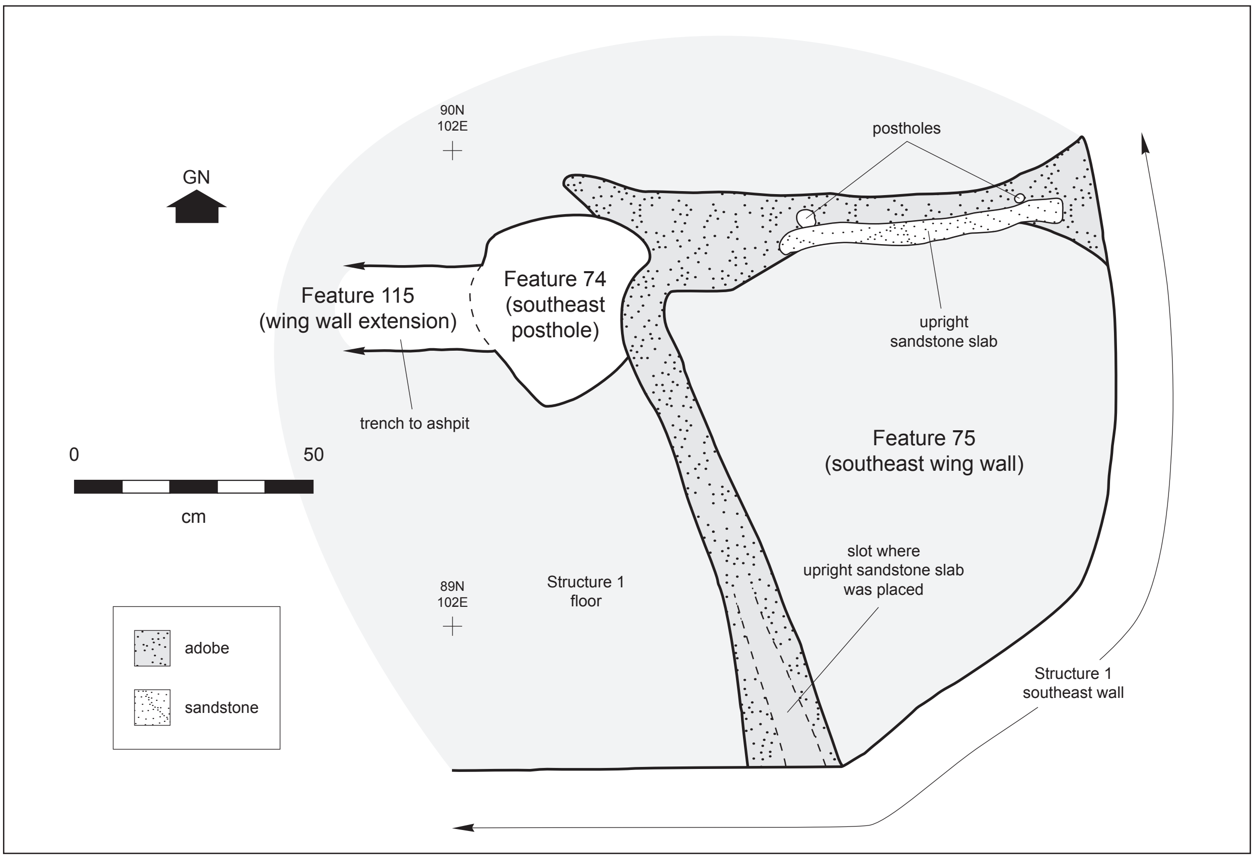
Feature 72, LA 104106.



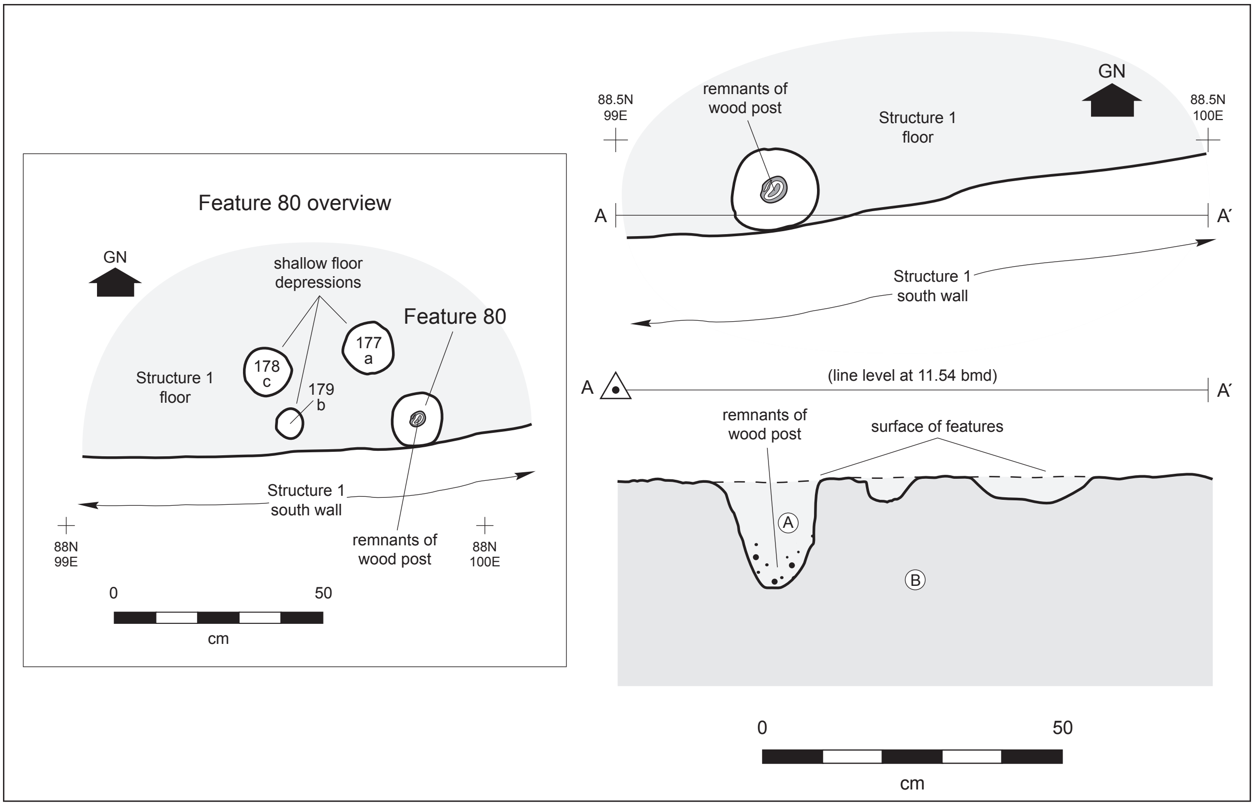
Feature 73, LA 104106.



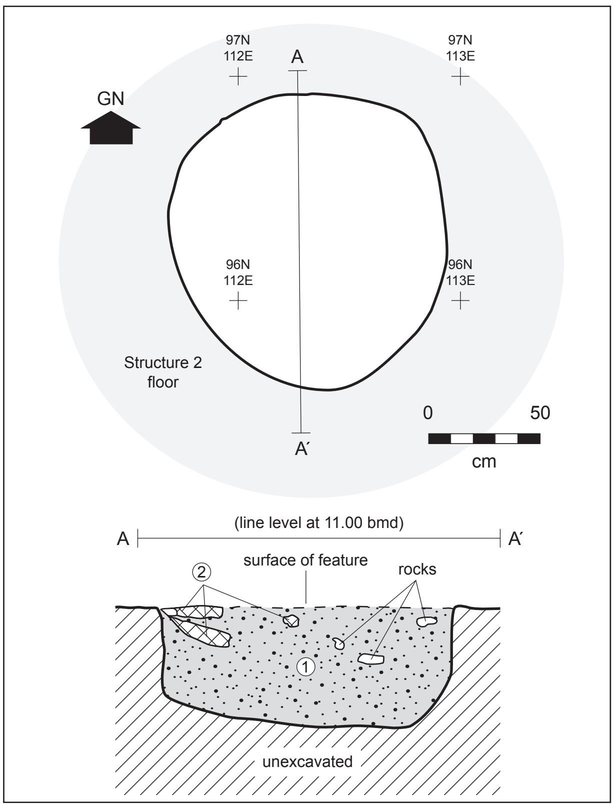
Feature 74, LA 104106.



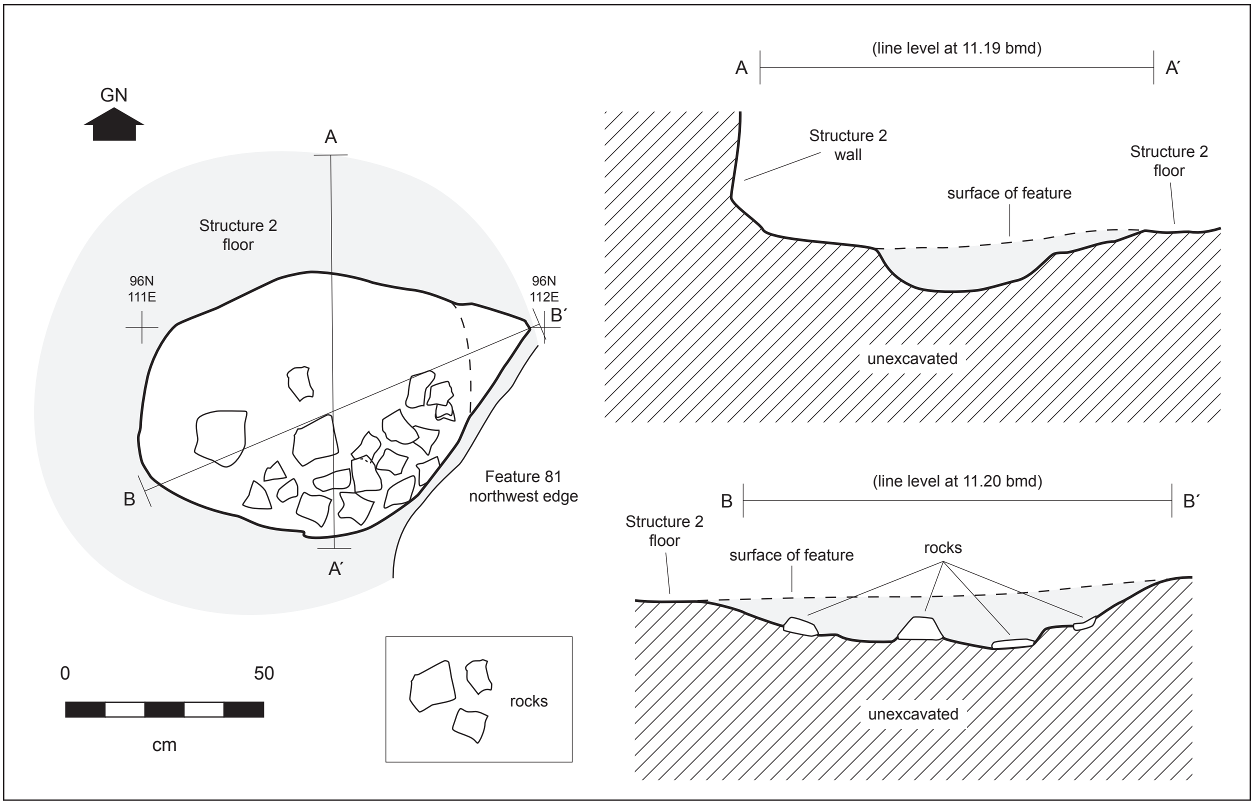
Feature 75, LA 104106.



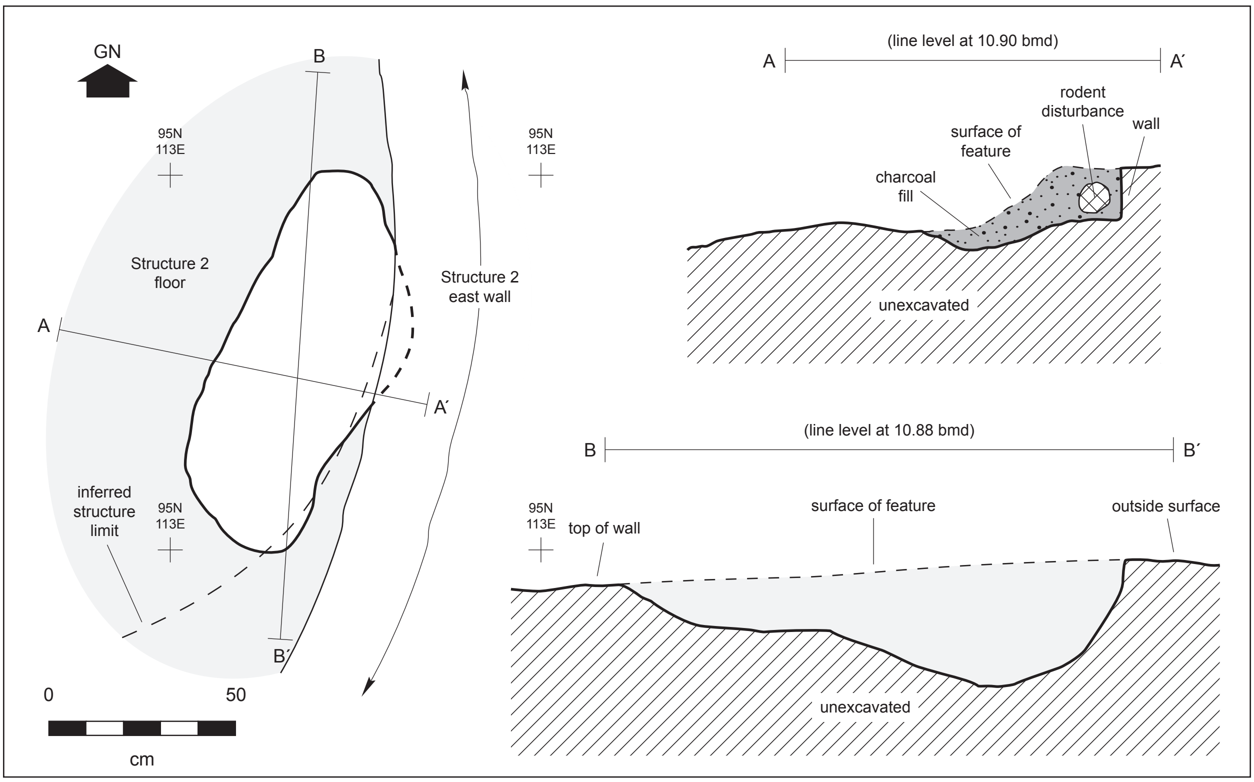
Feature 80, LA 104106.



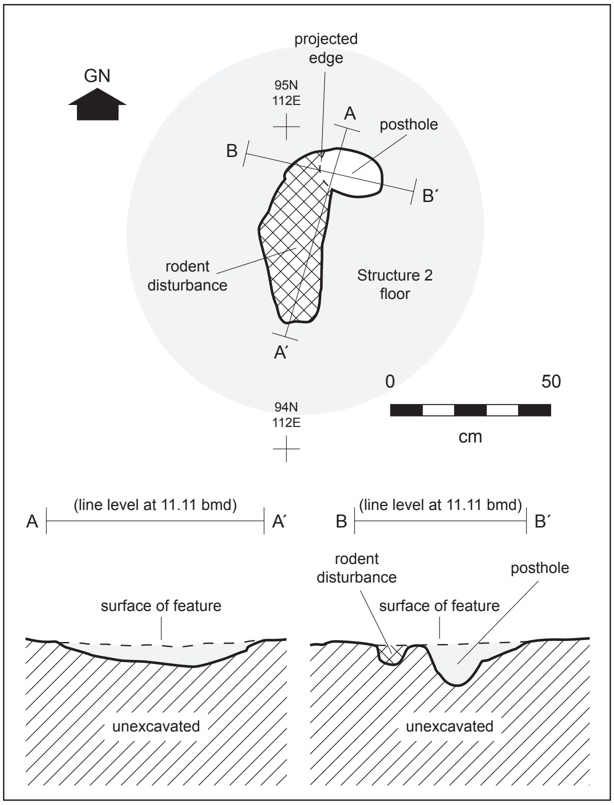
Feature 81, LA 104106.



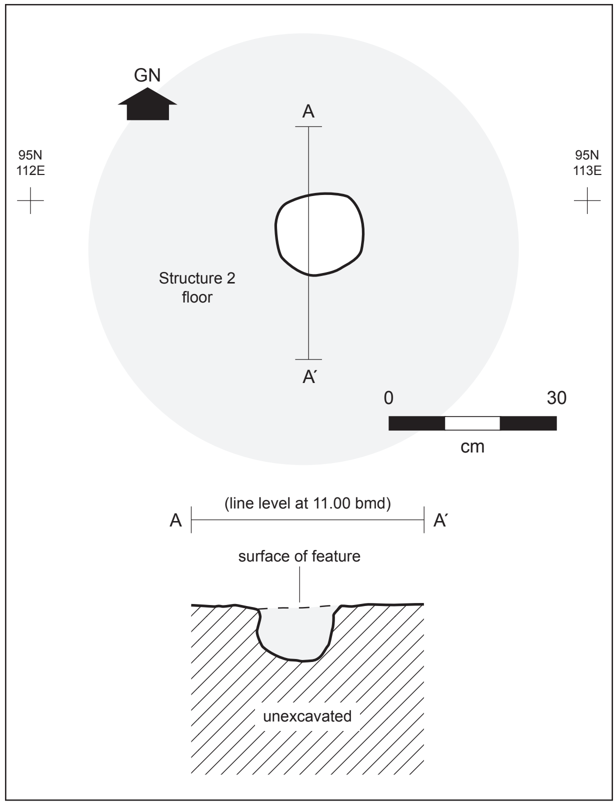
Feature 82, LA 104106.



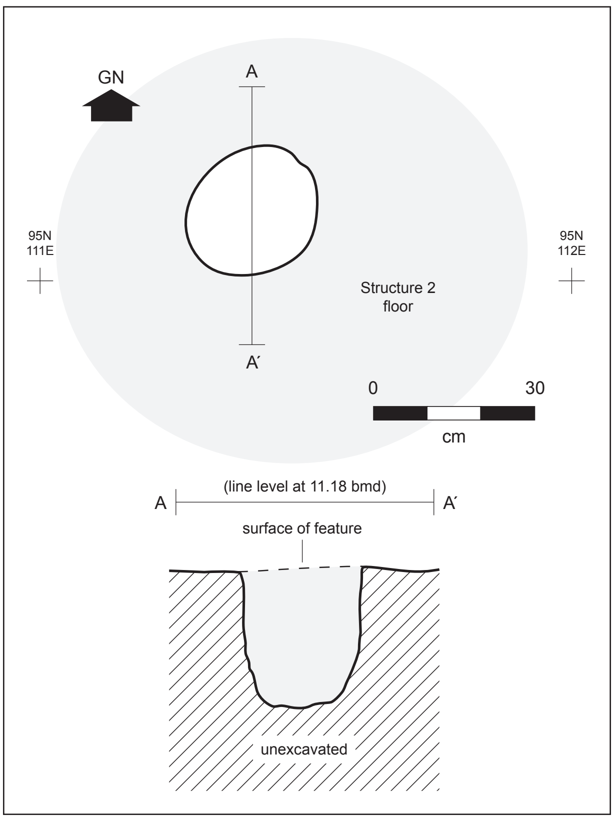
Feature 83, LA 104106.



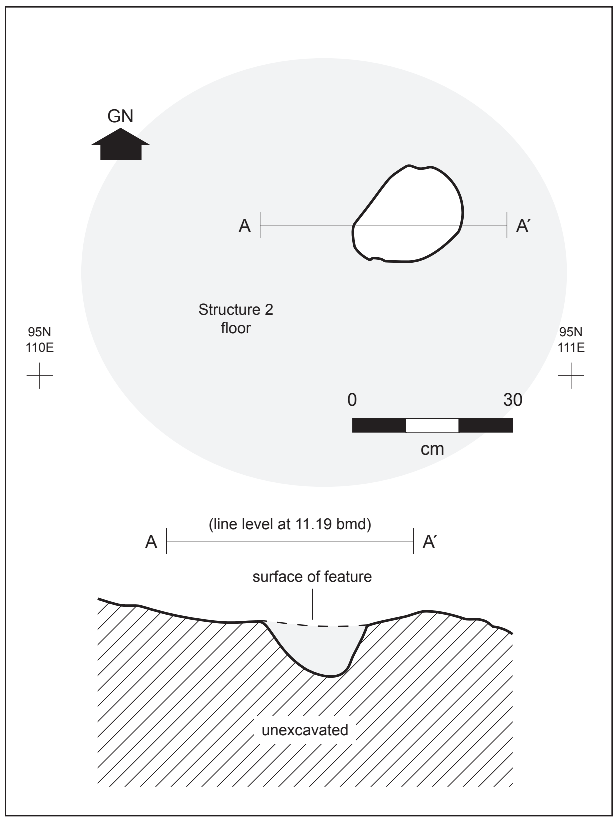
Feature 85, LA 104106.



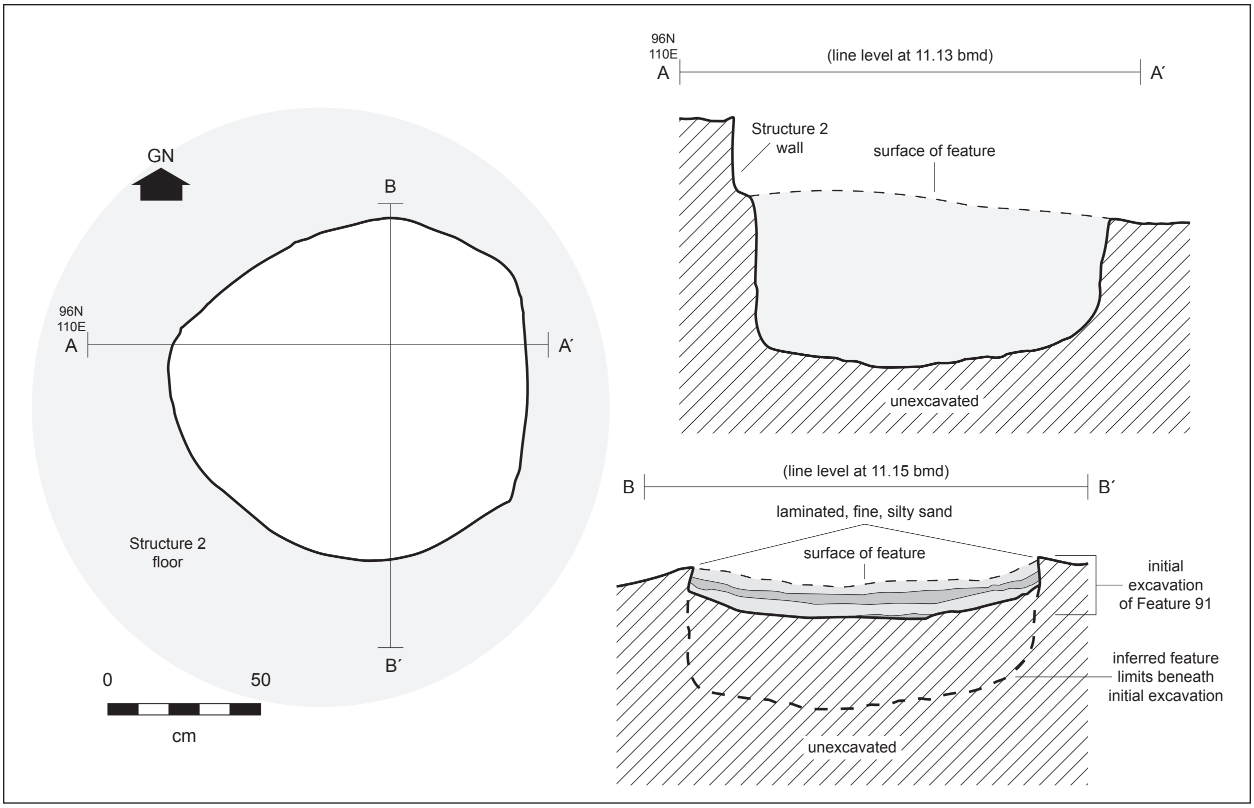
Feature 88, LA 104106.



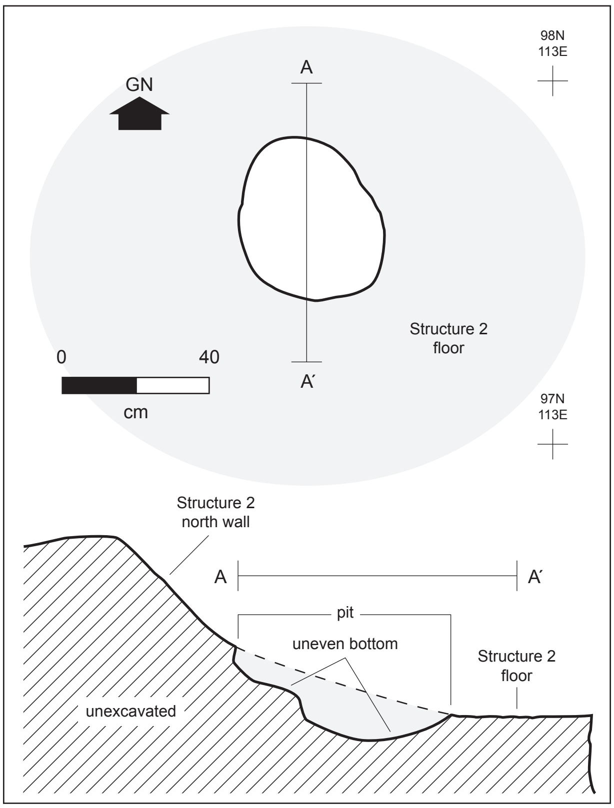
Feature 89, LA 104106.



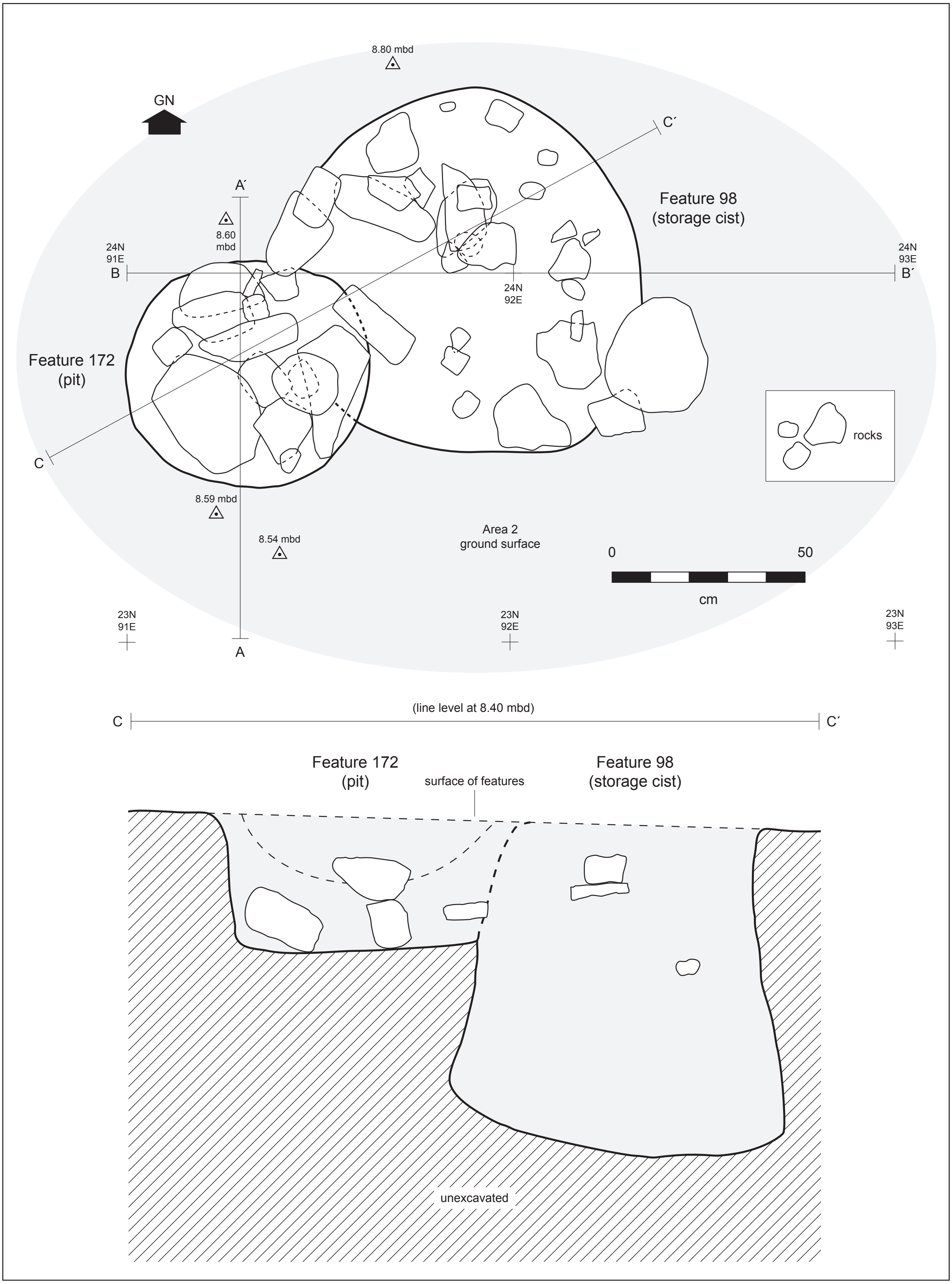
Feature 90, LA 104106.



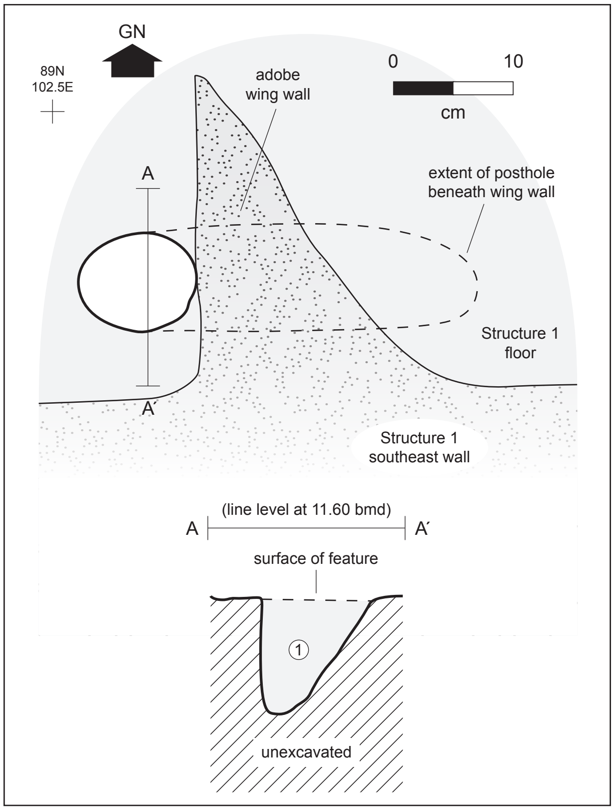
Feature 91, LA 104106.



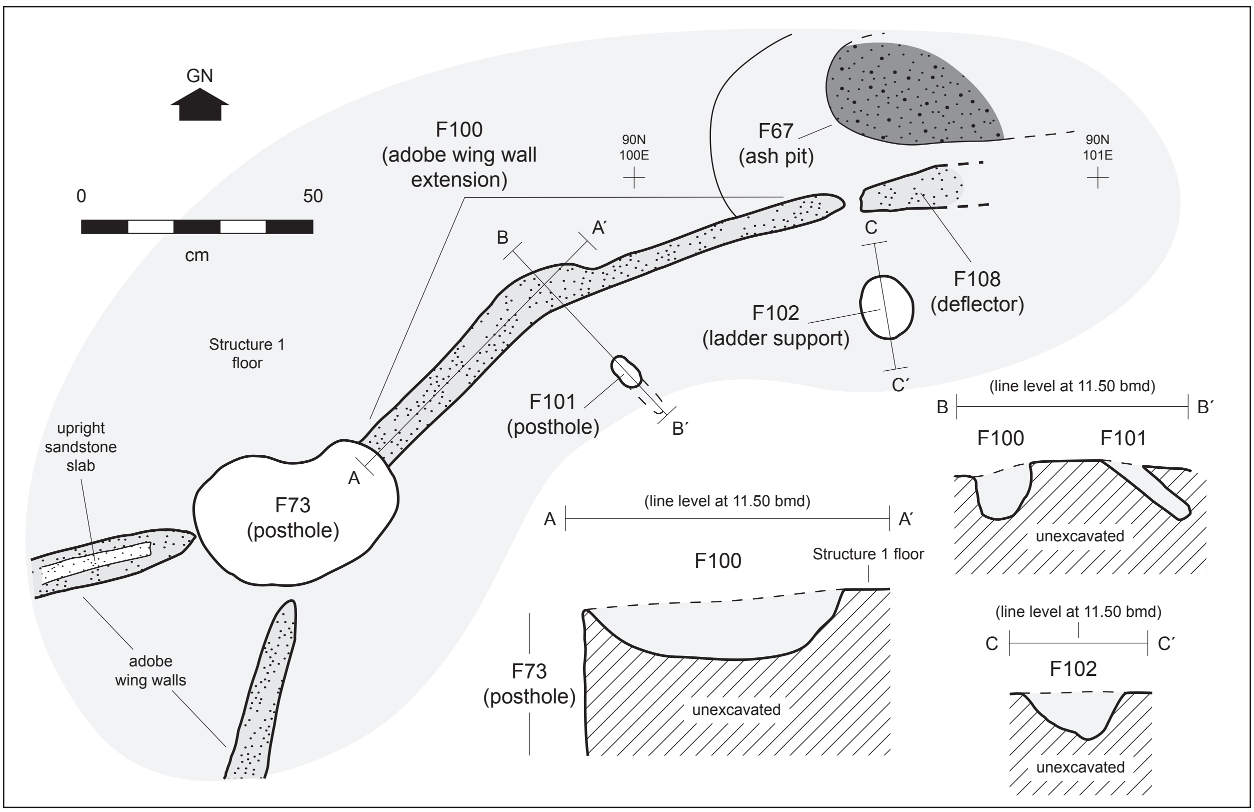
Feature 94, LA 104106.



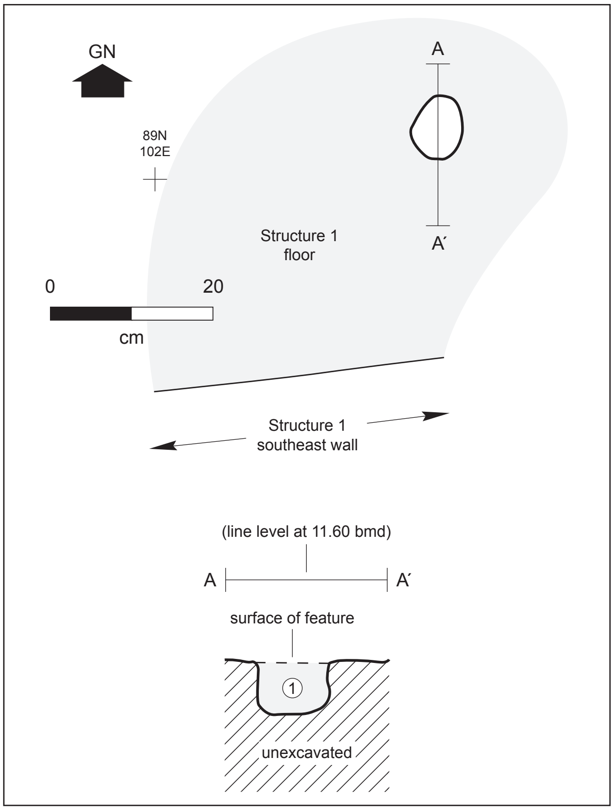
Features 98 and 172, LA 104106.



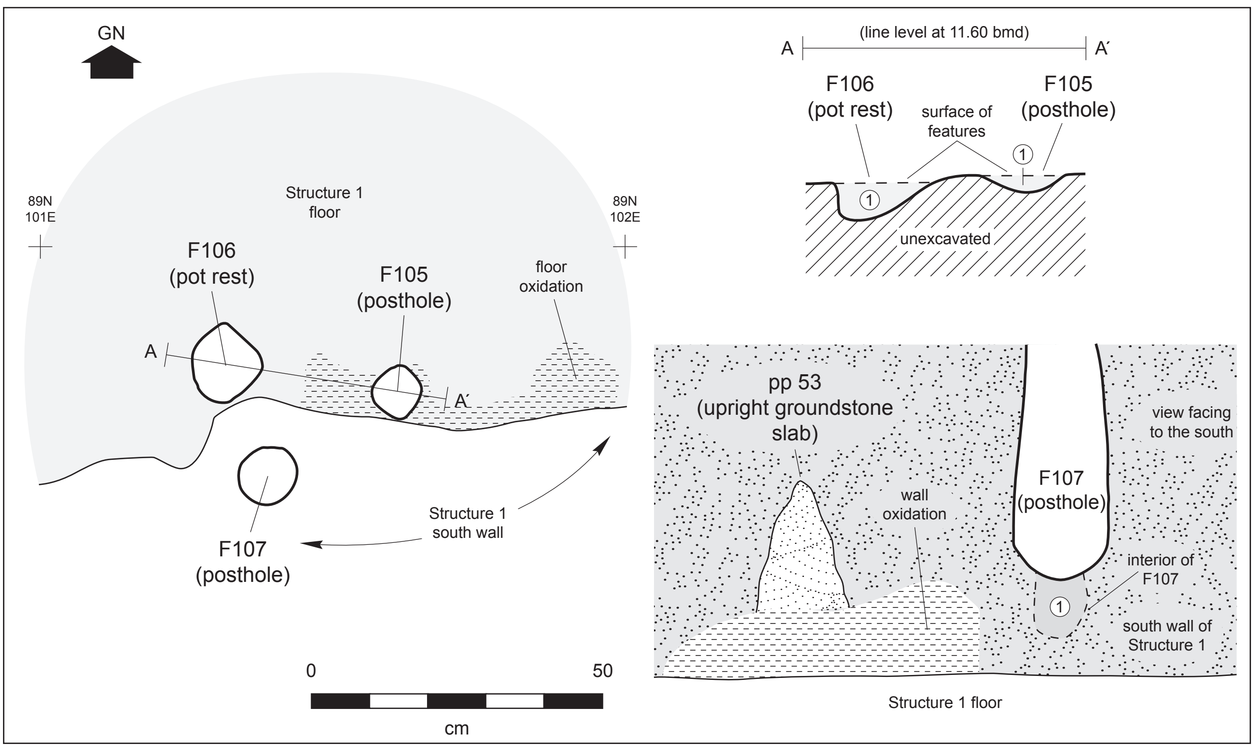
Feature 99, LA 104106.



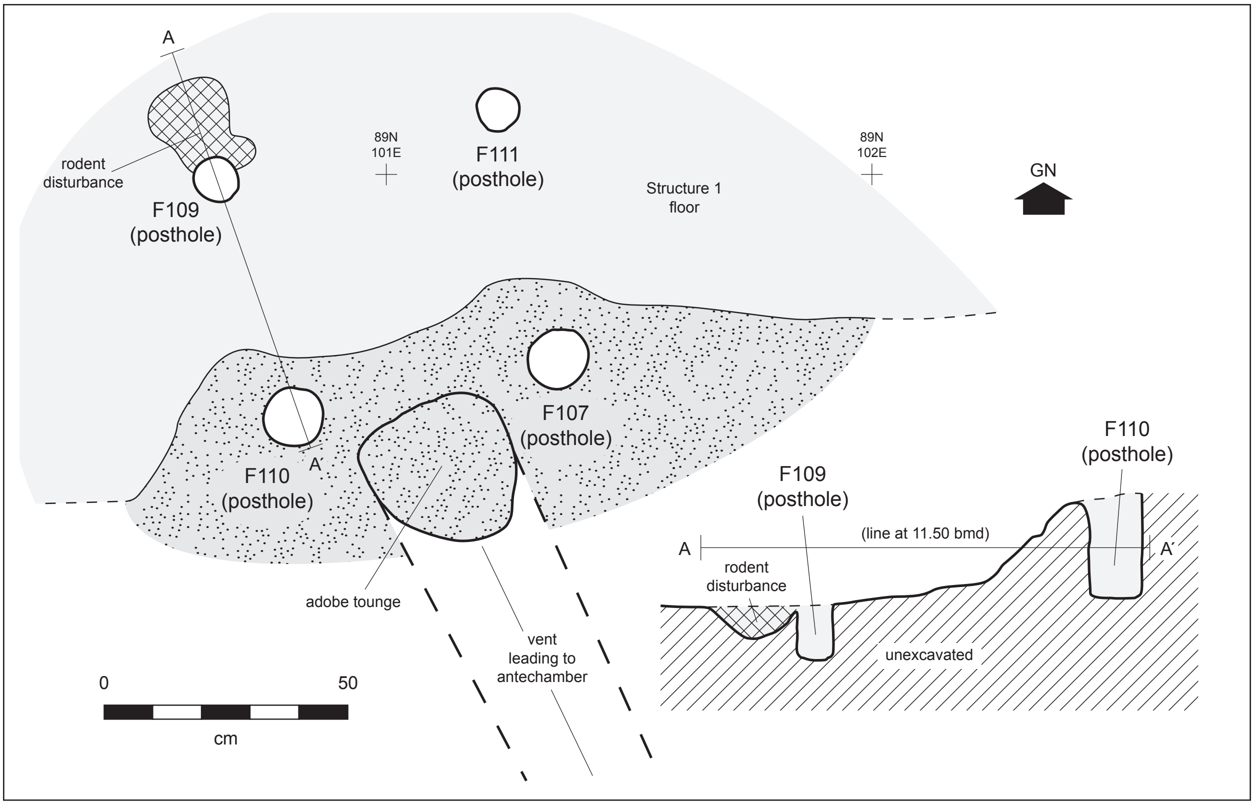
Features 100–102, LA 104106.



Feature 104, LA 104106.



Features 105–107, LA 104106.



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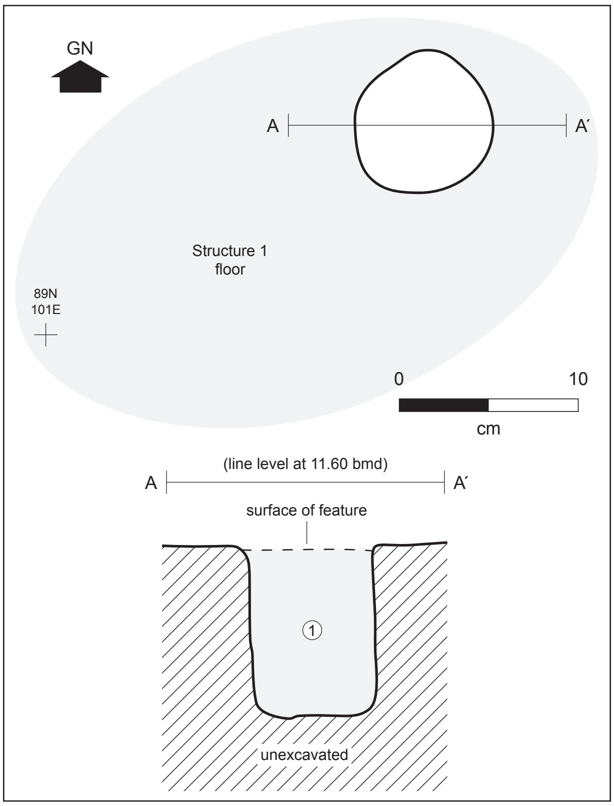

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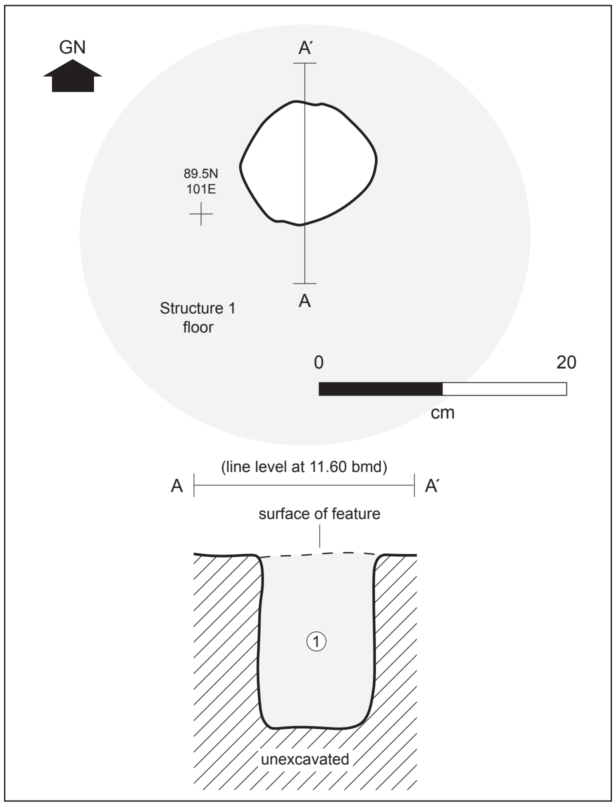

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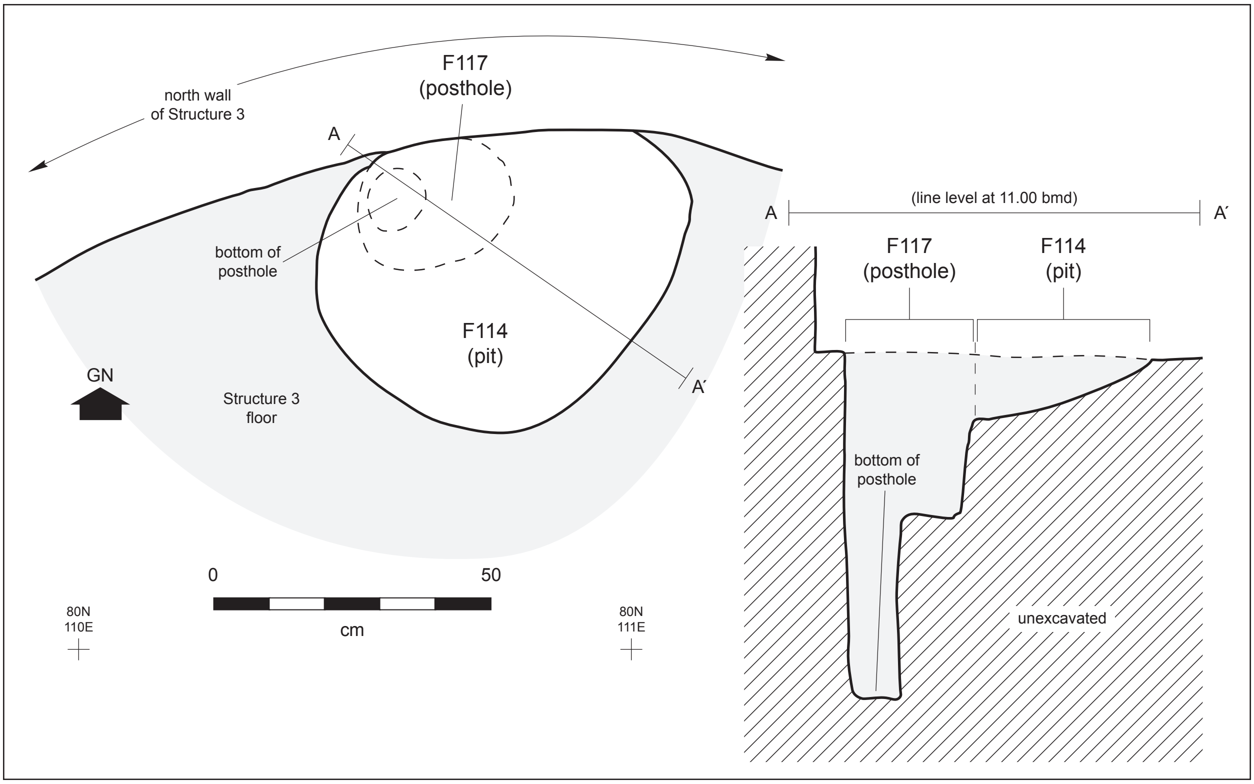

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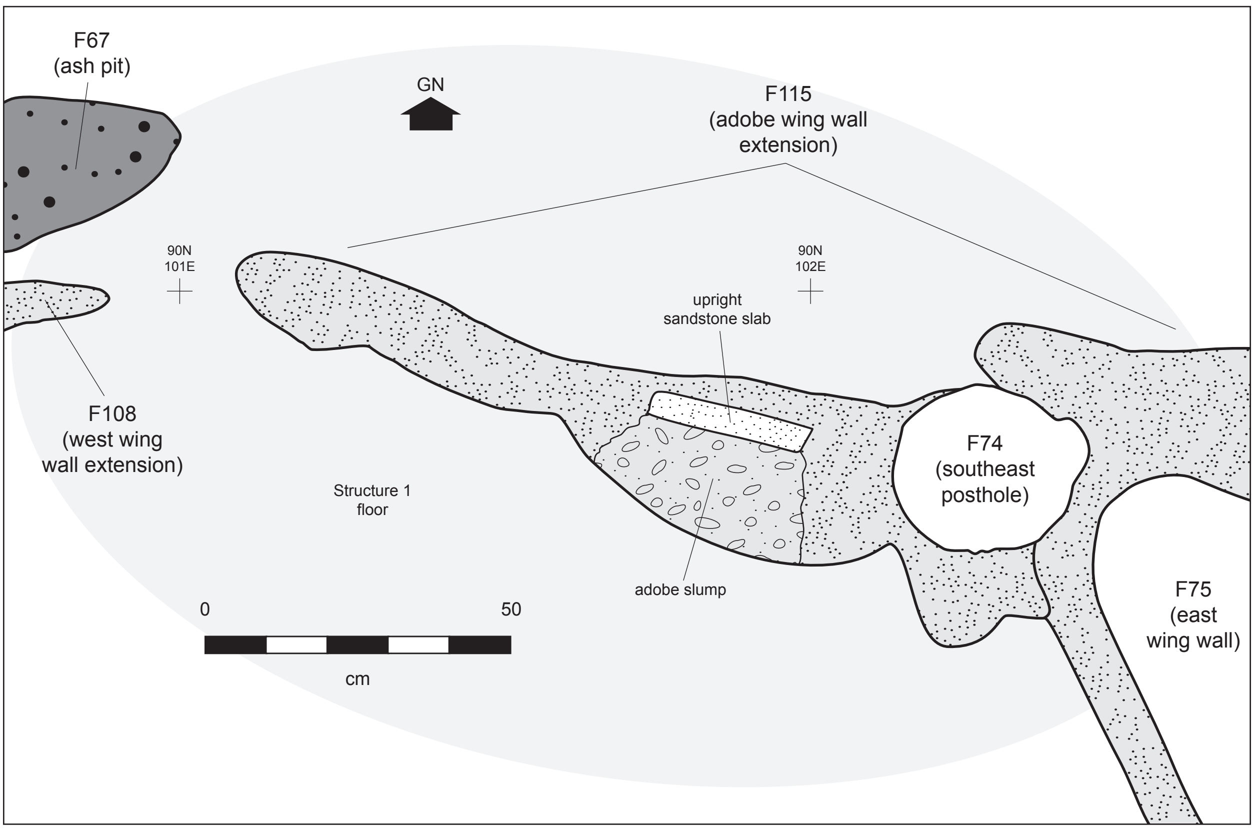

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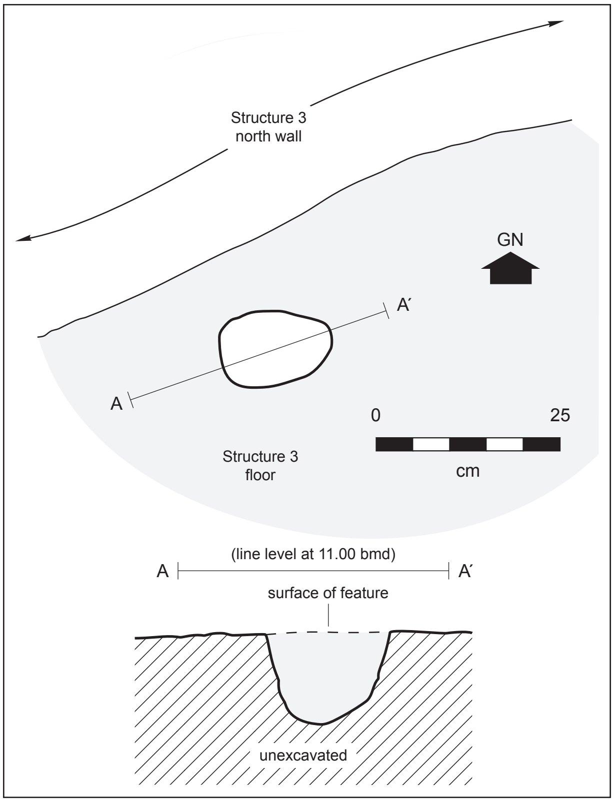

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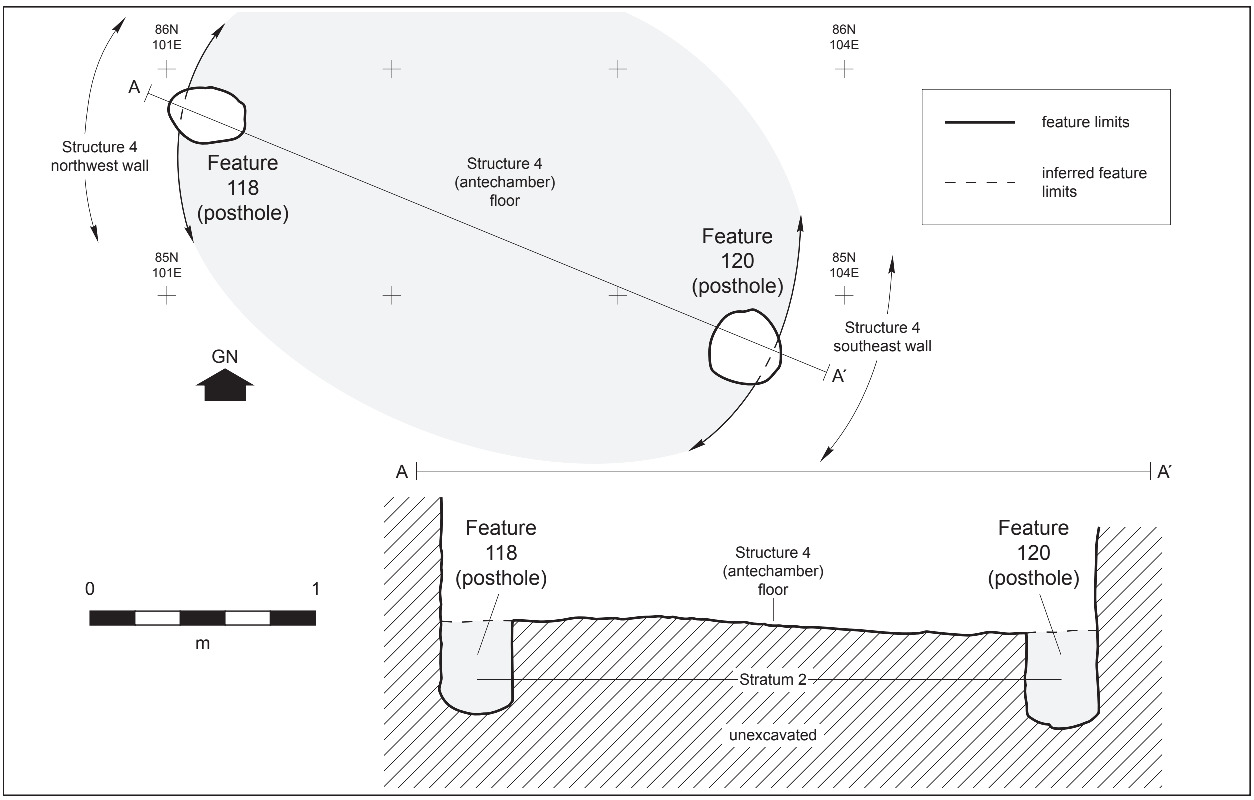

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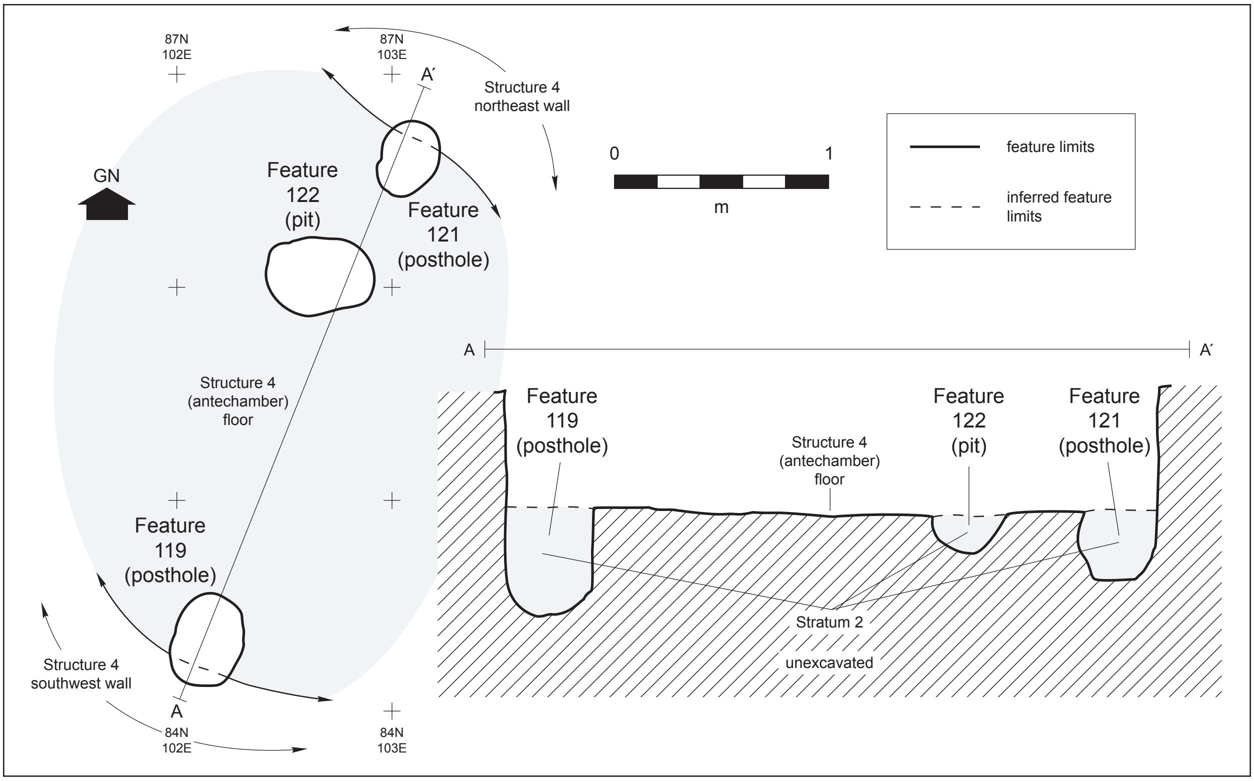

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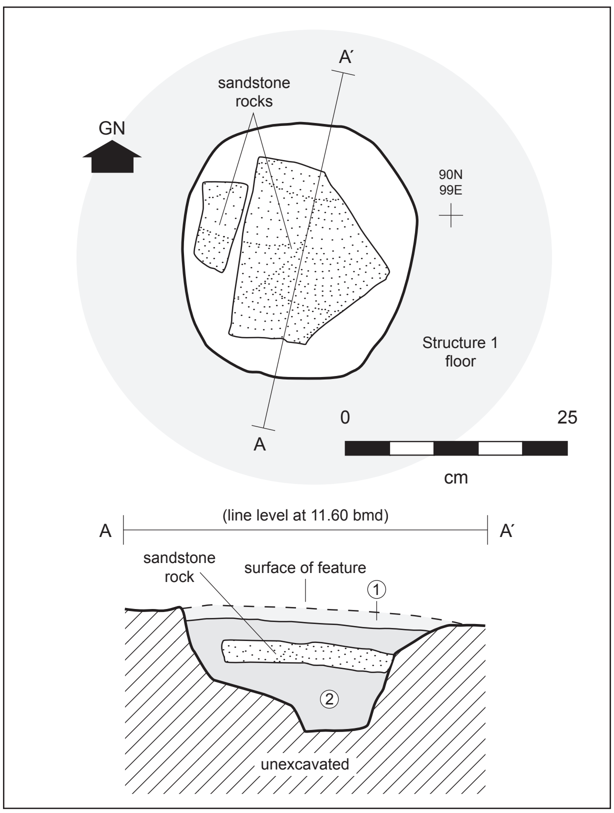

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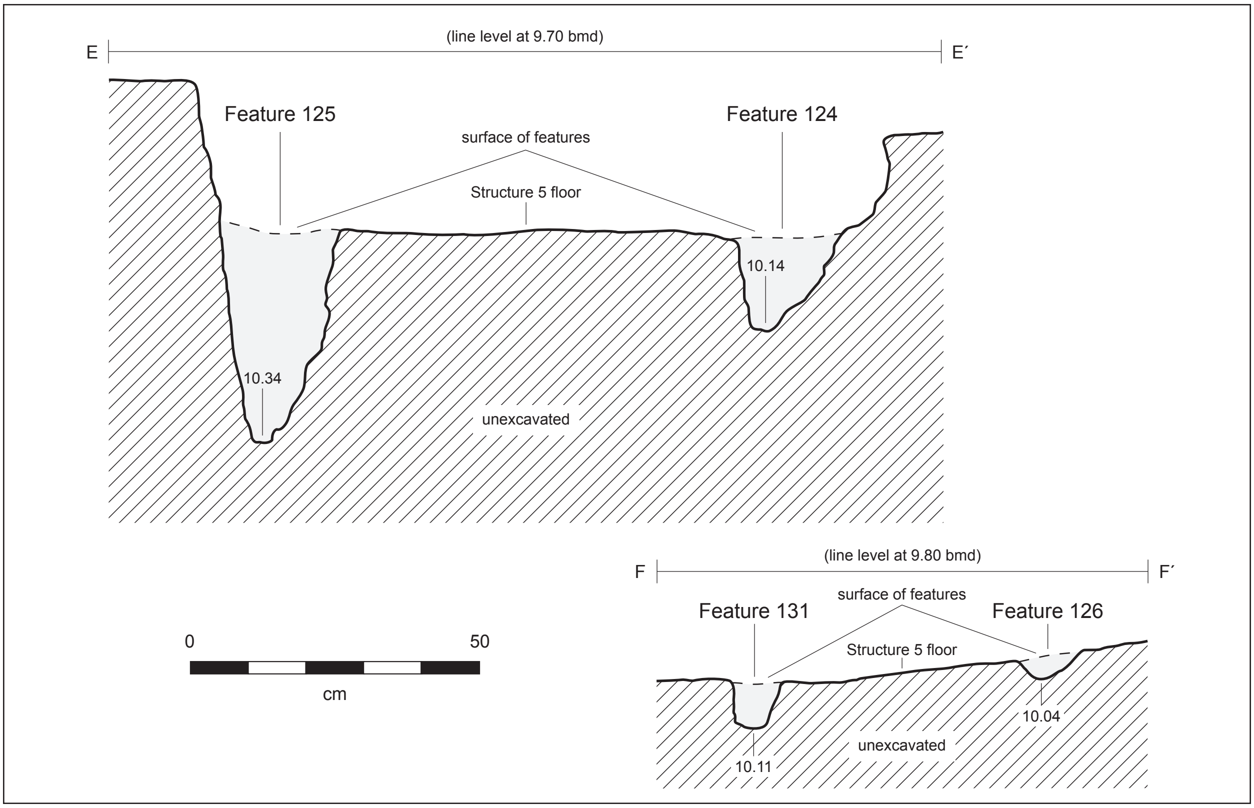

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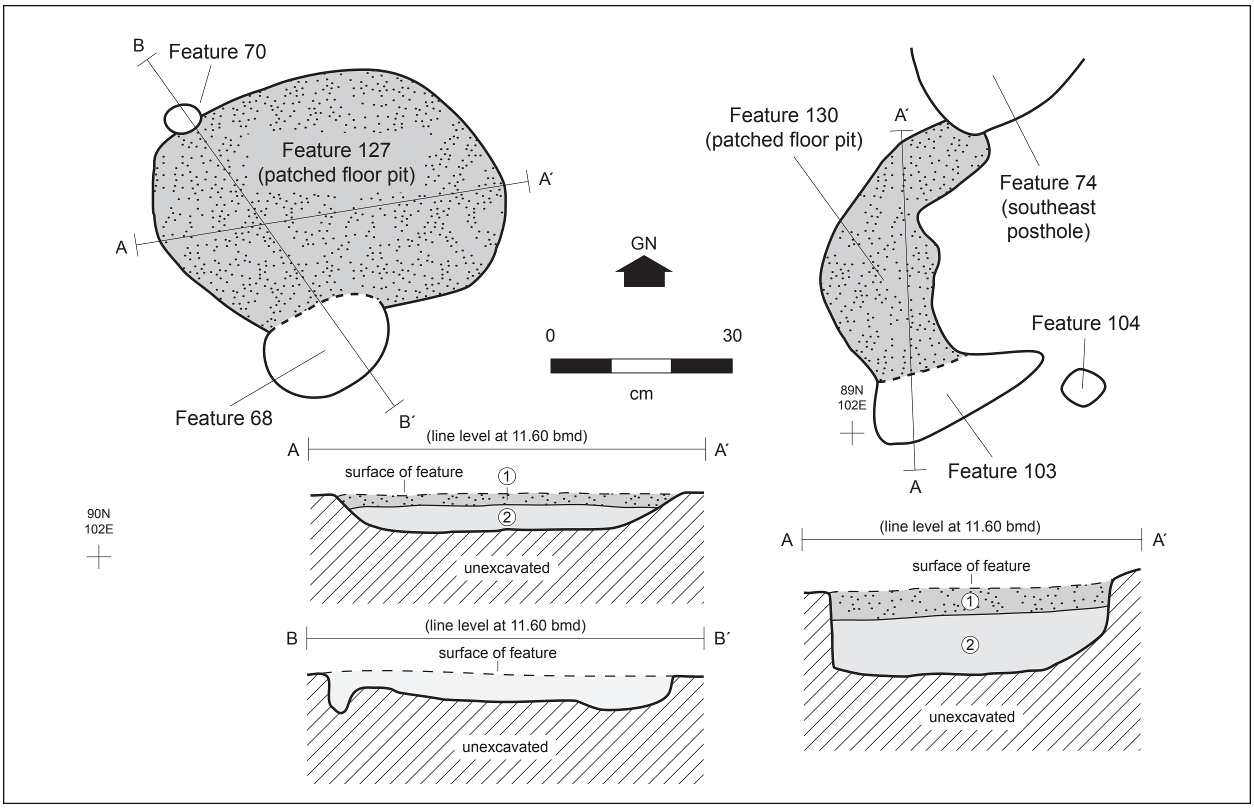

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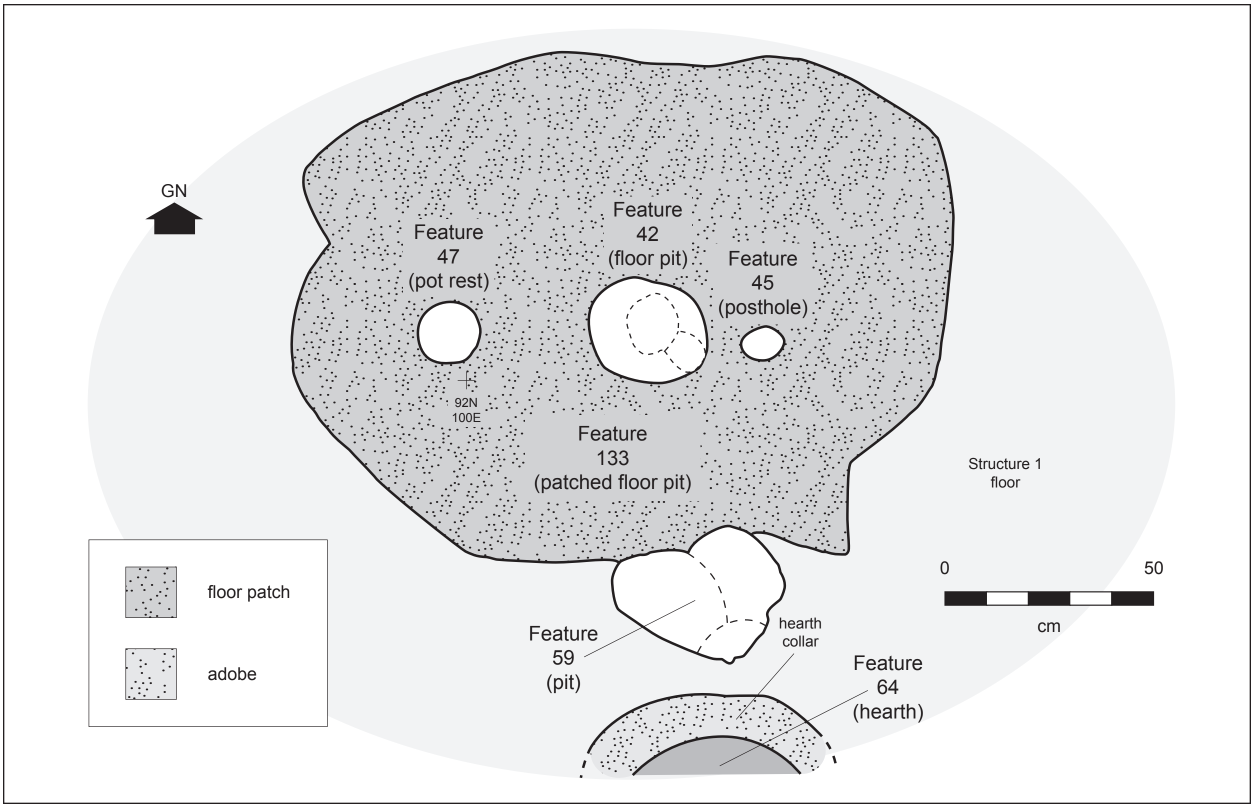

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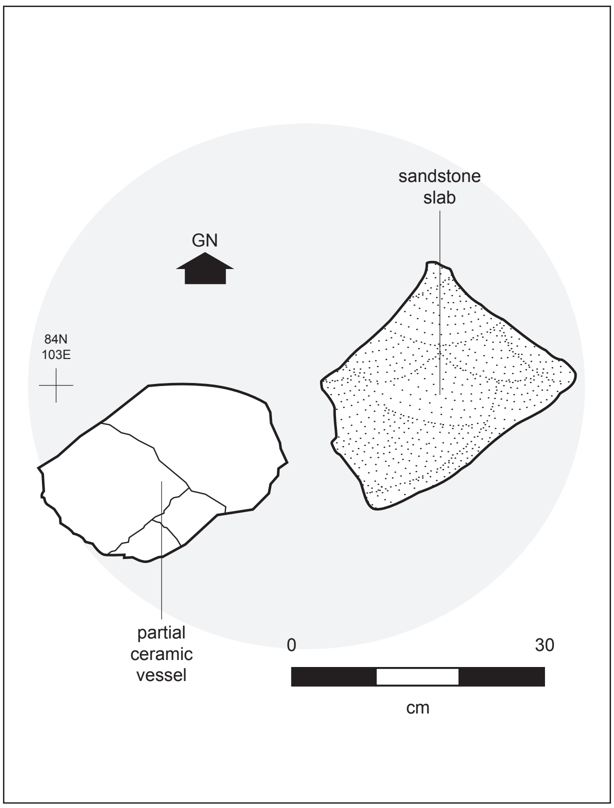

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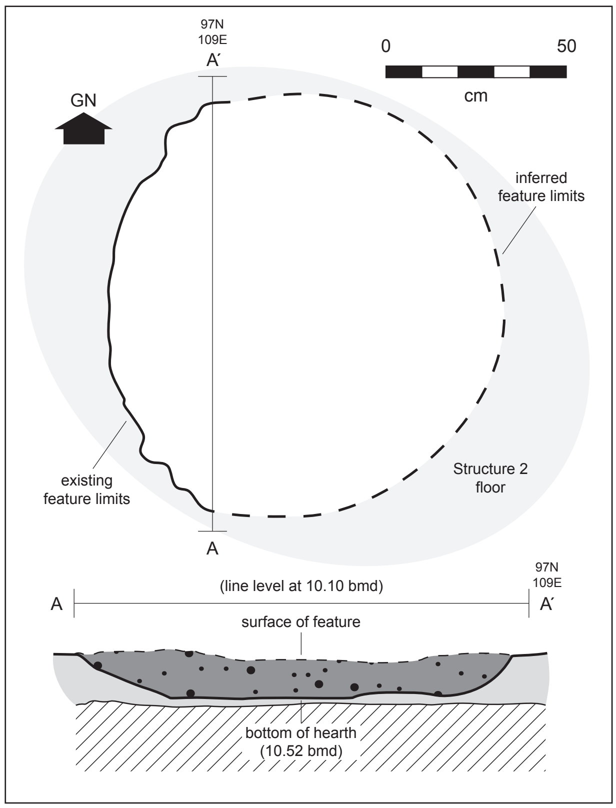

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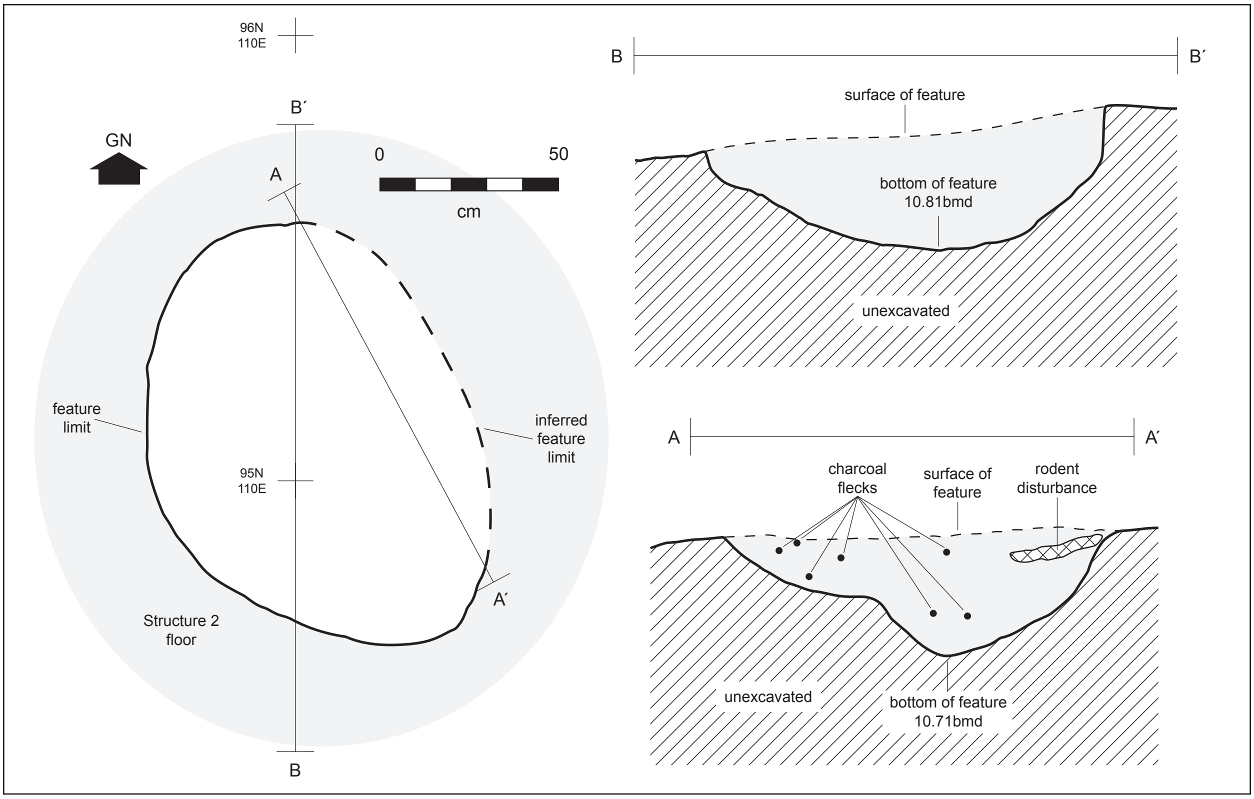

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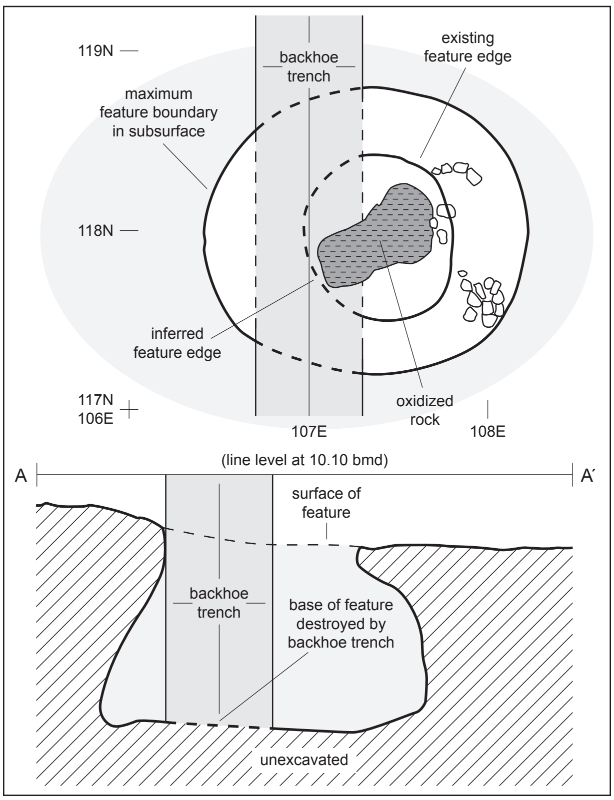

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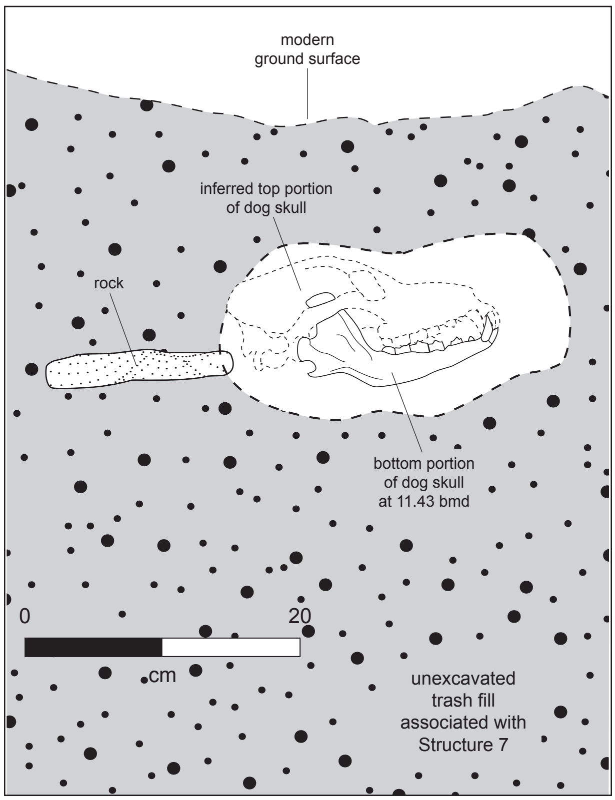

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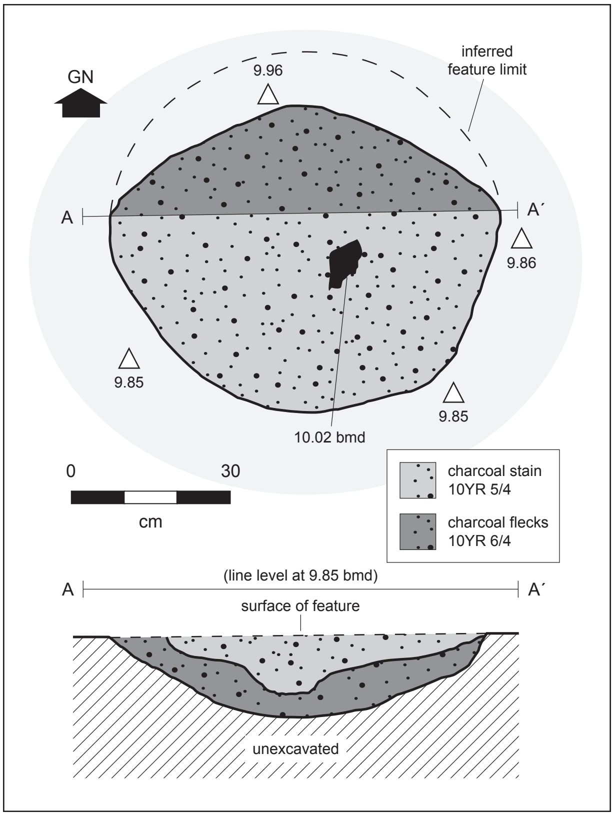

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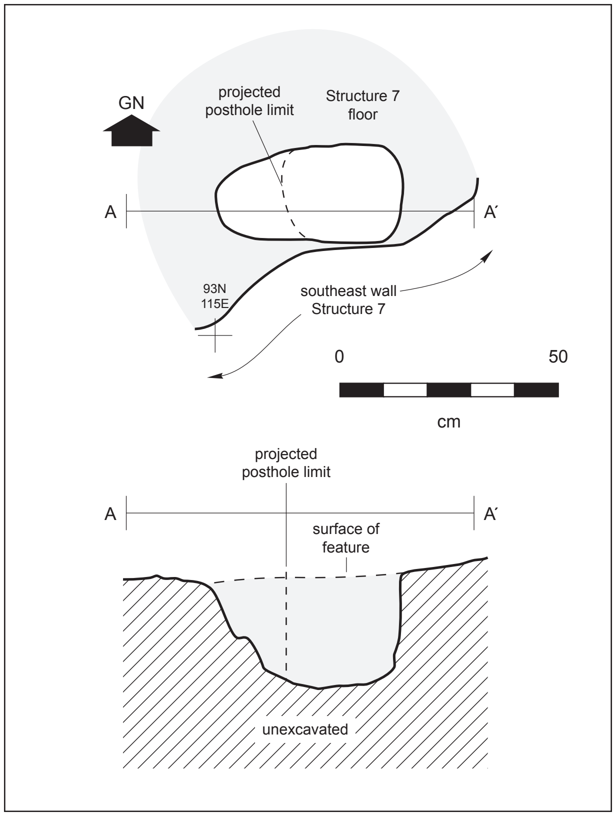

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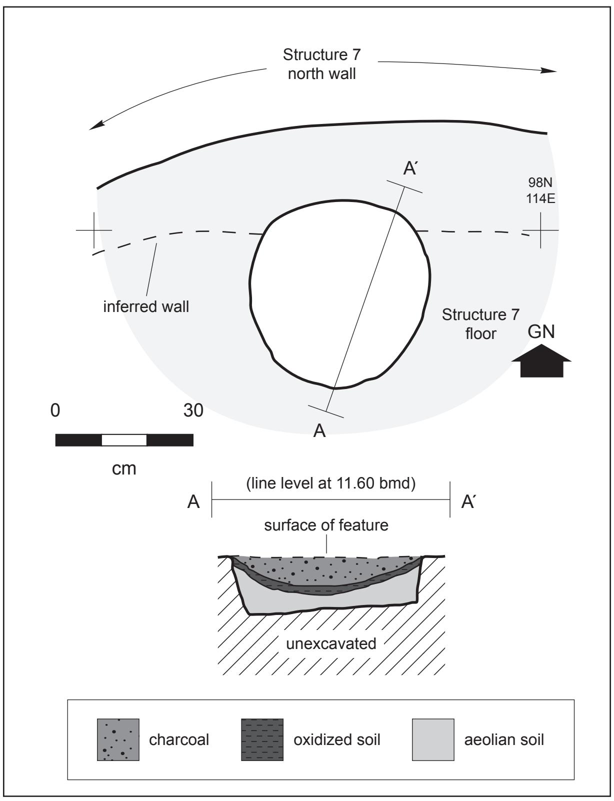

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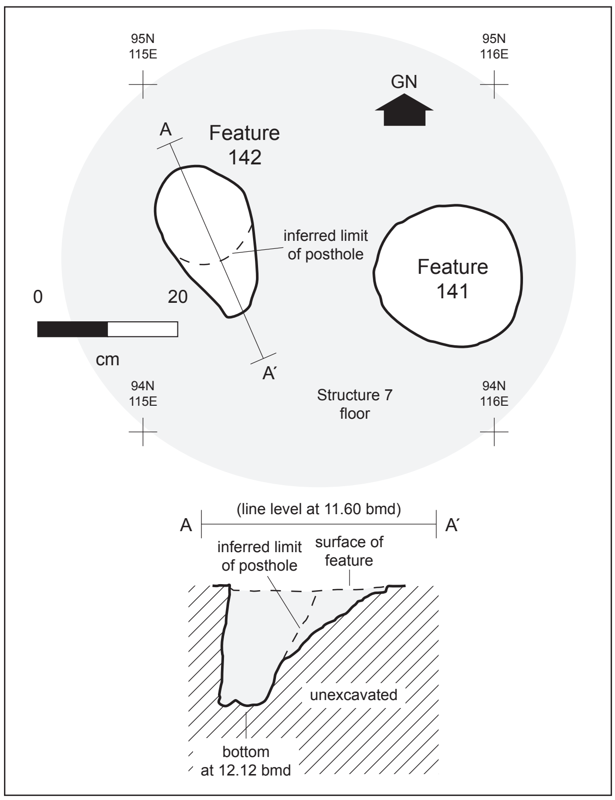

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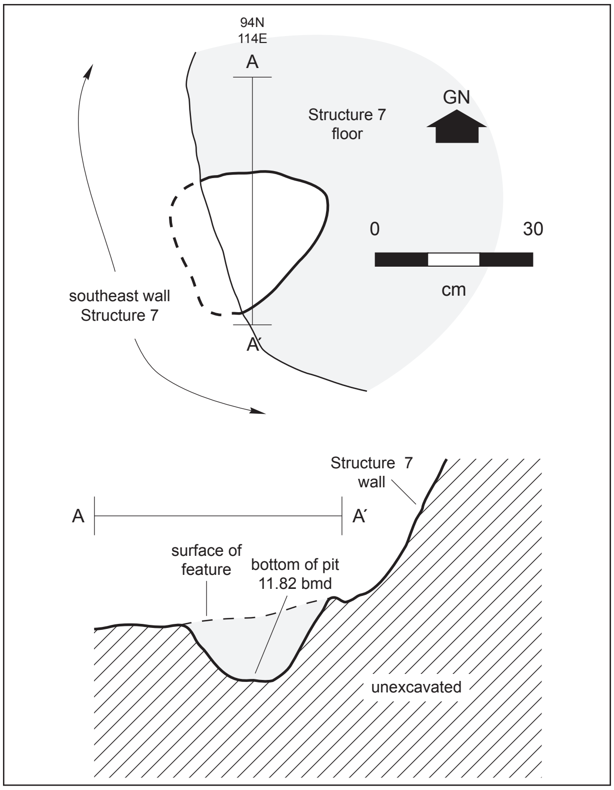

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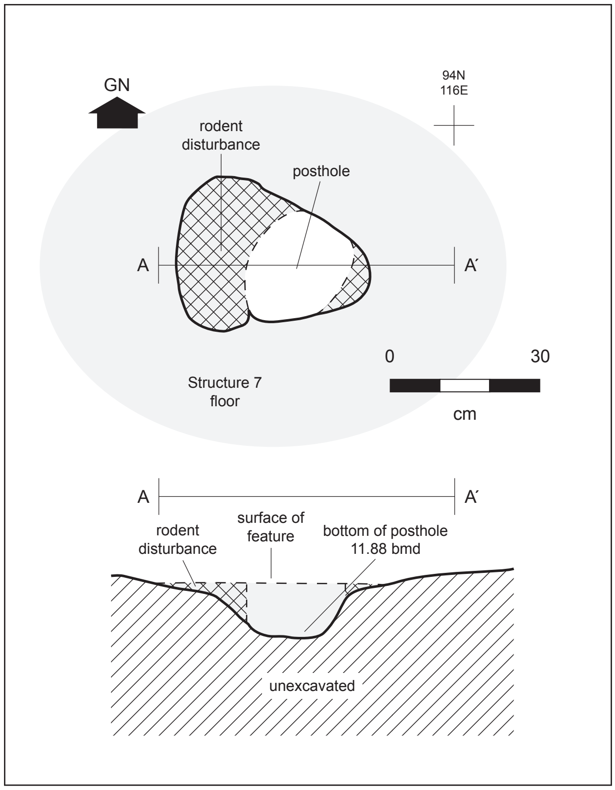

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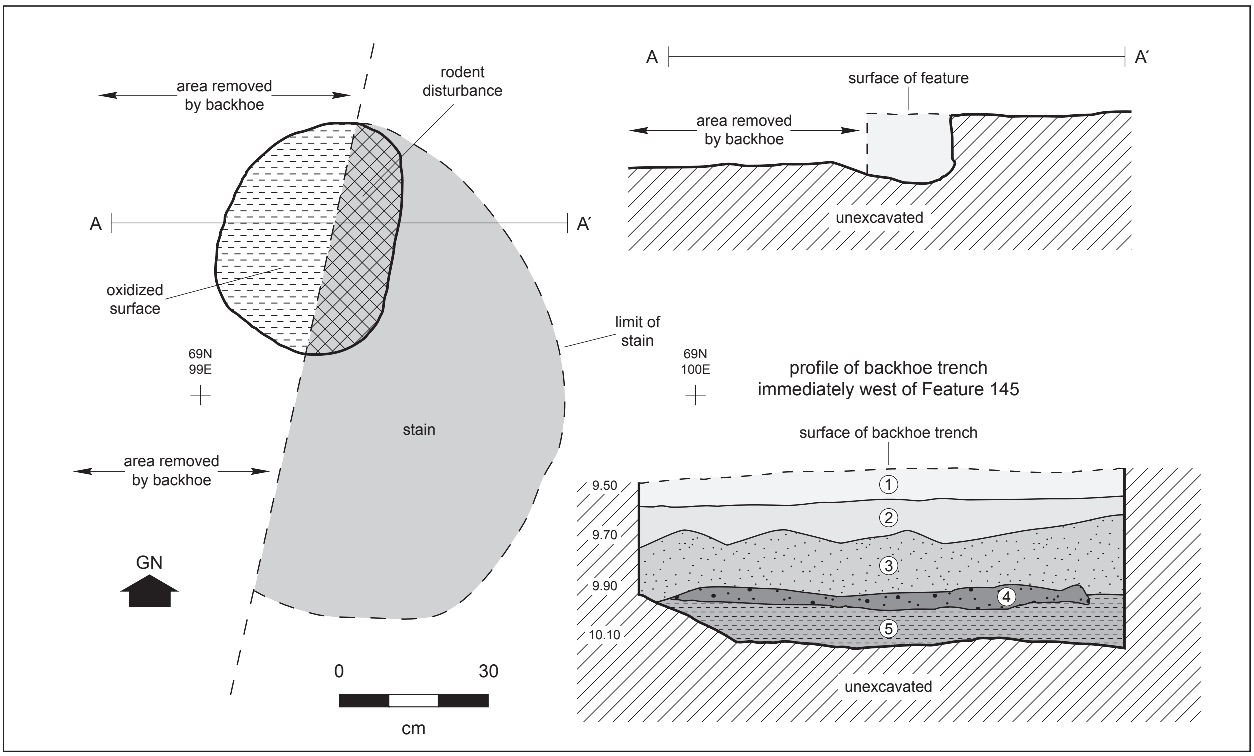

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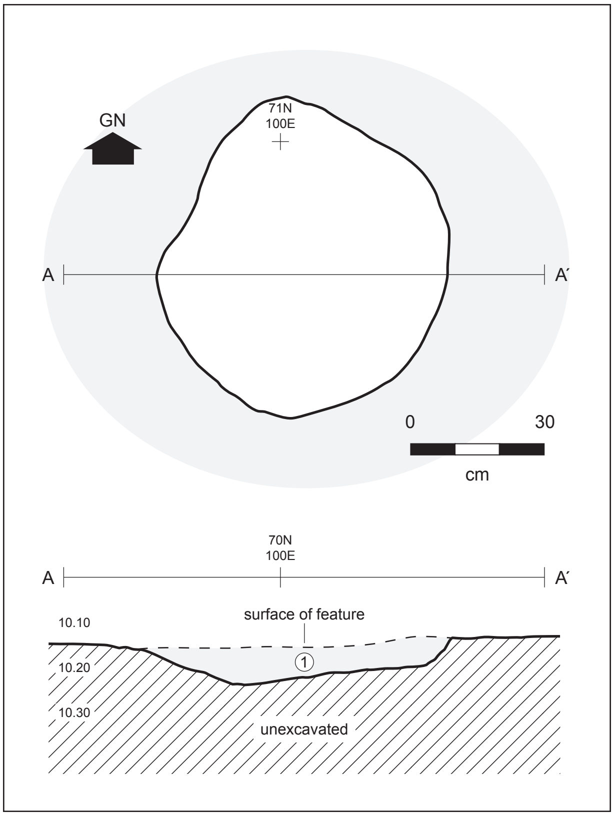

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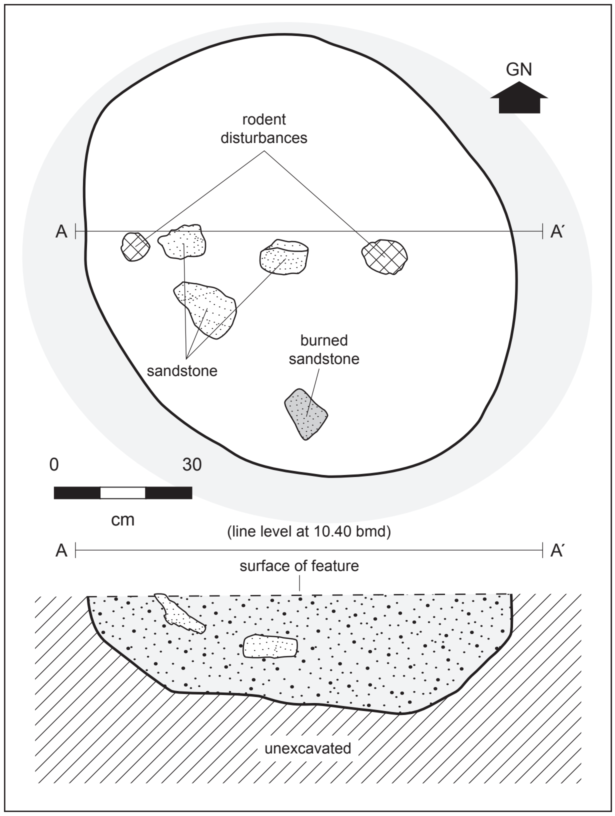

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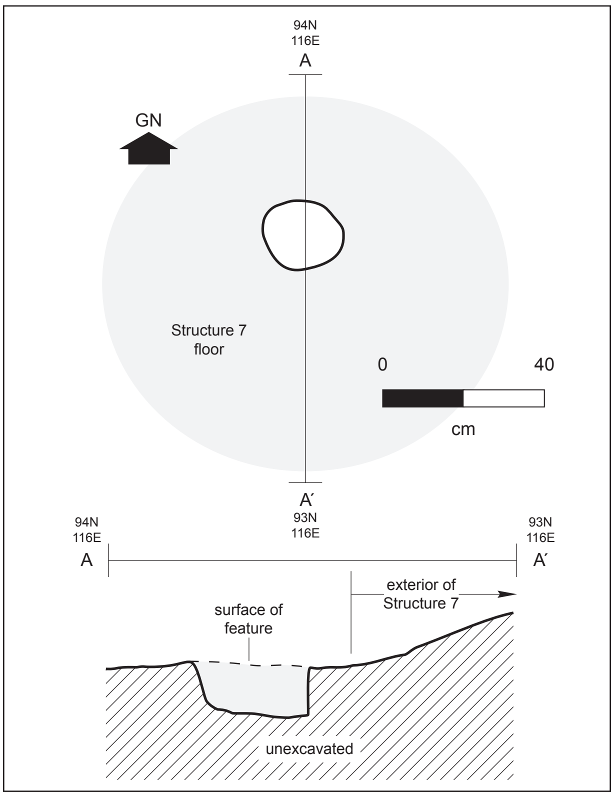

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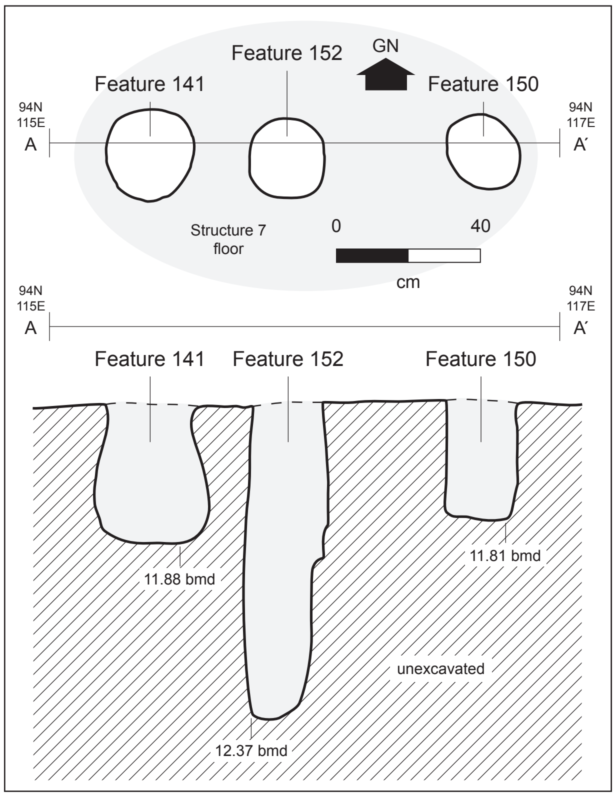

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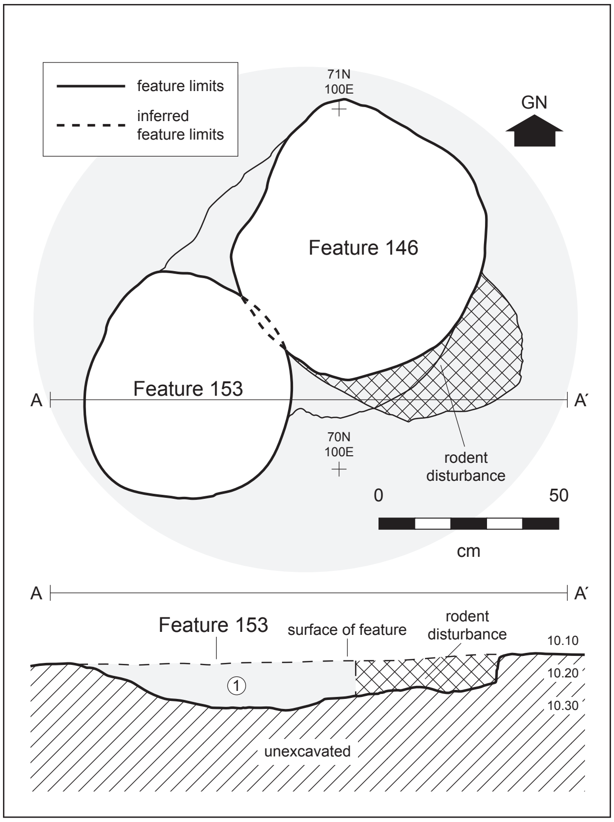

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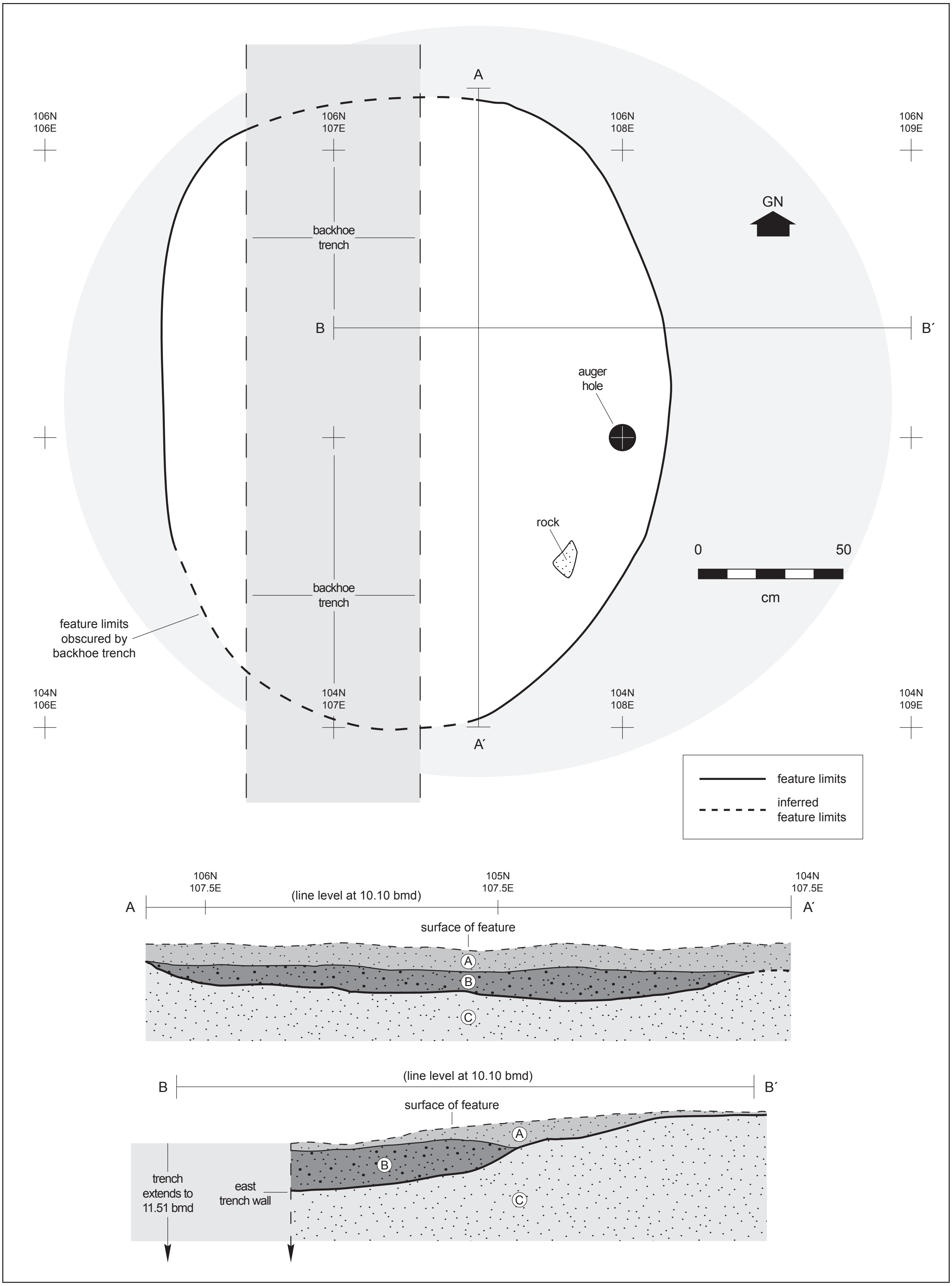

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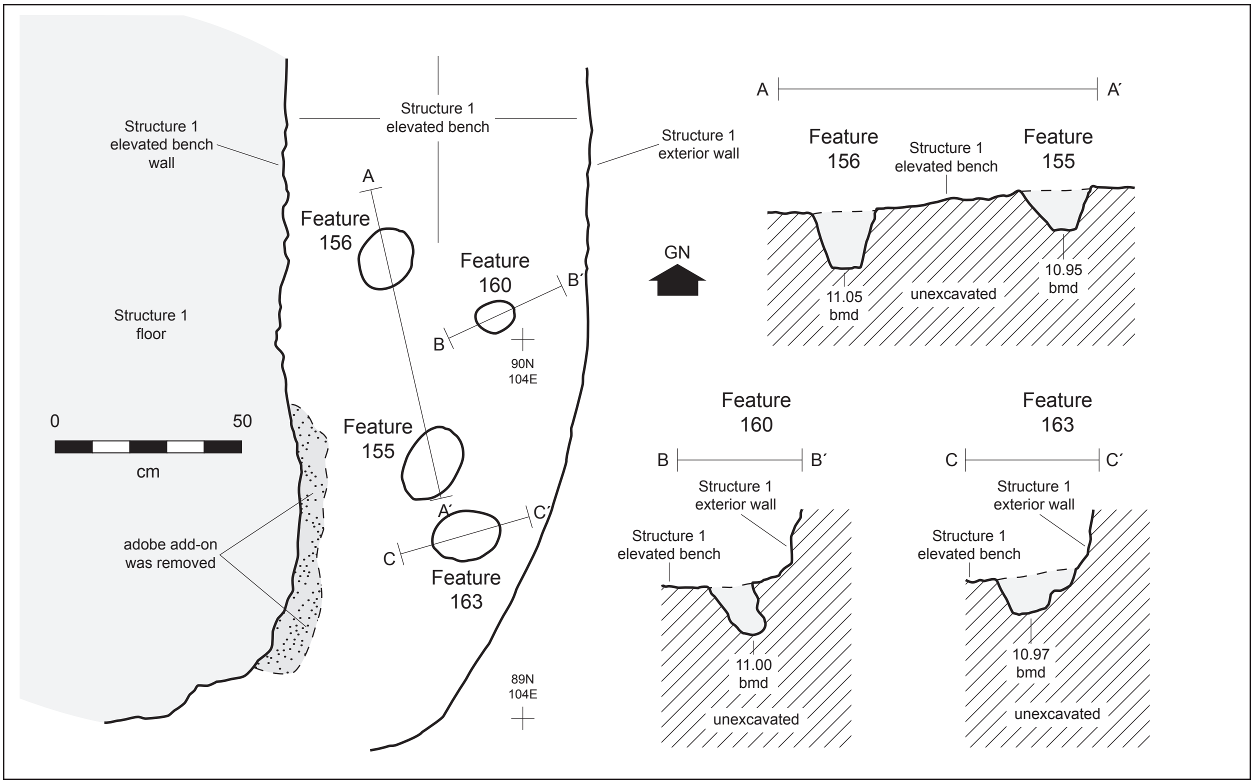

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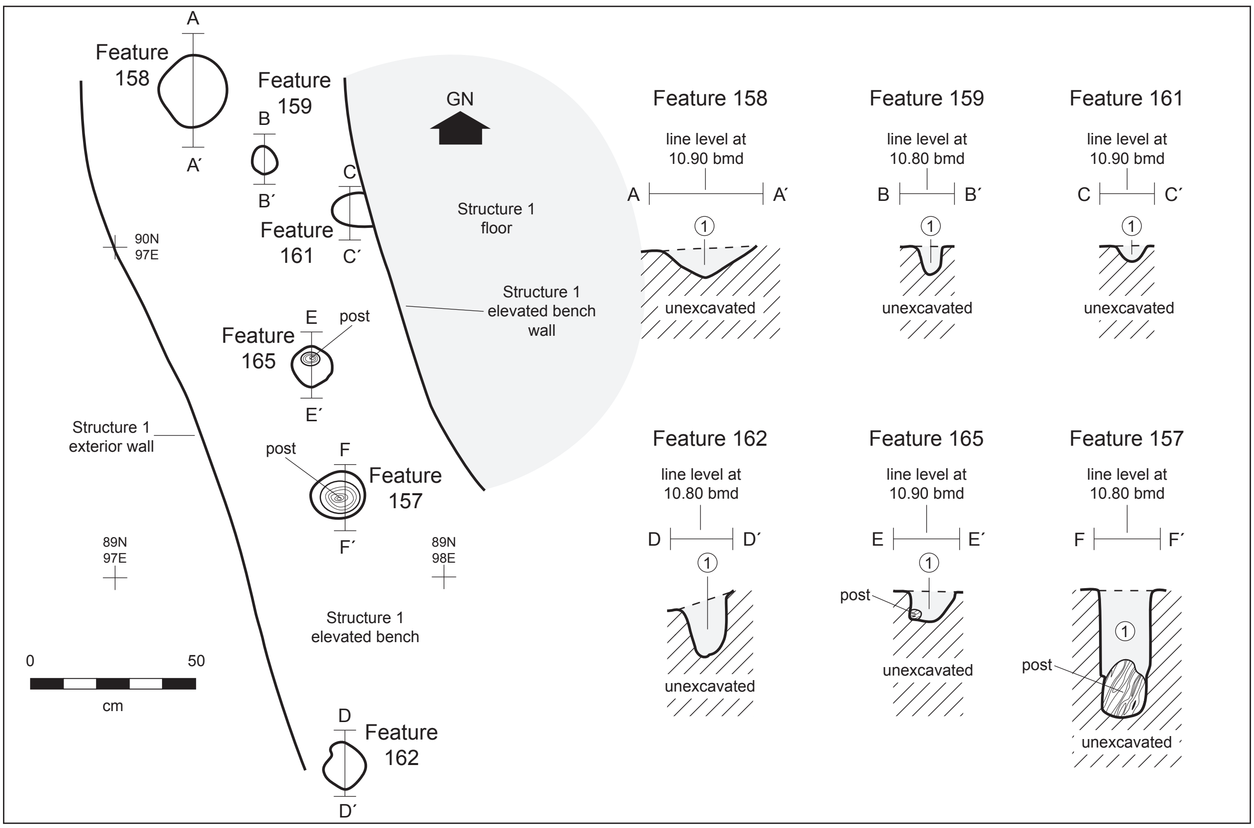

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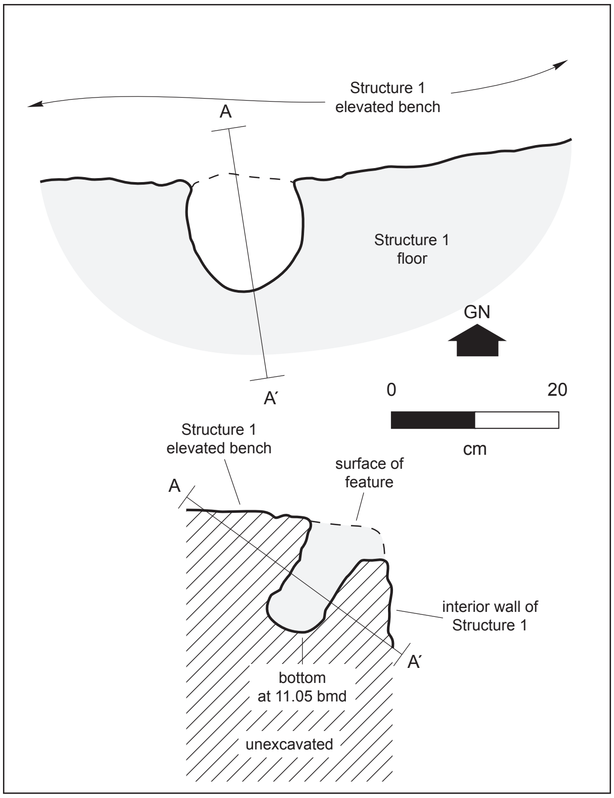

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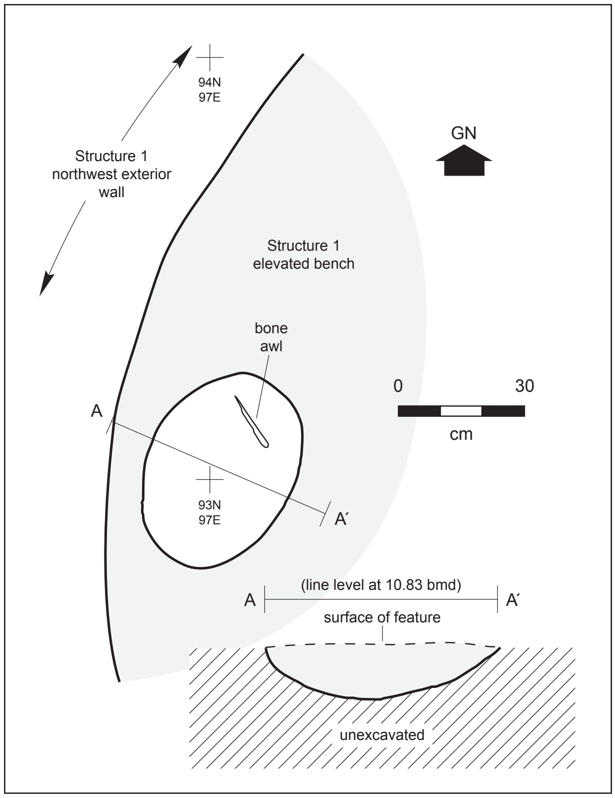

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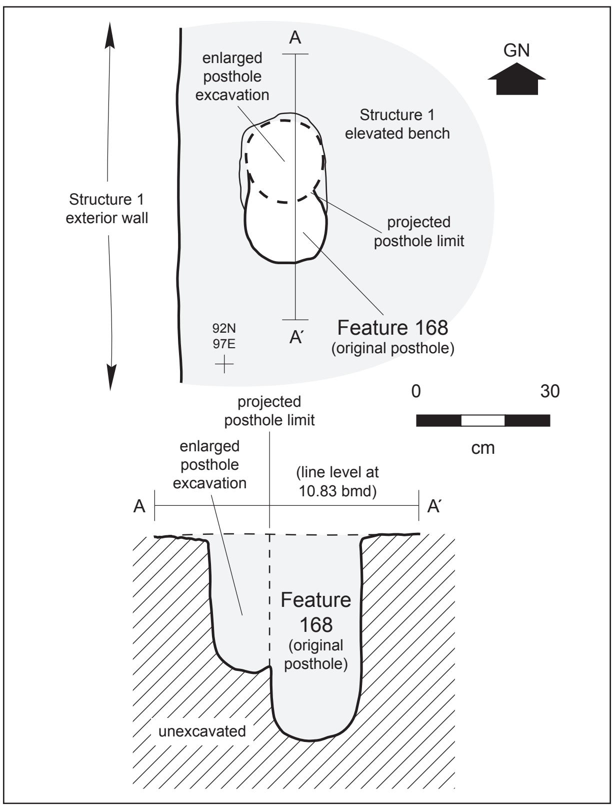

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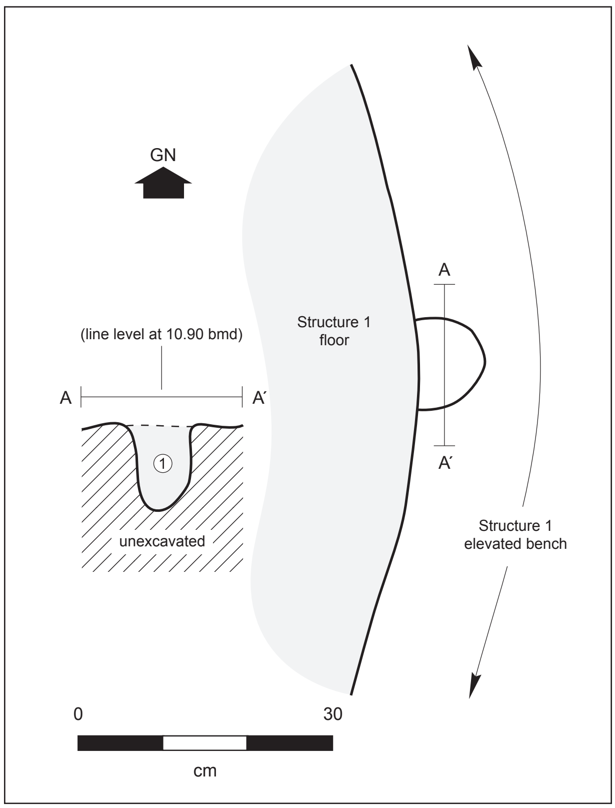

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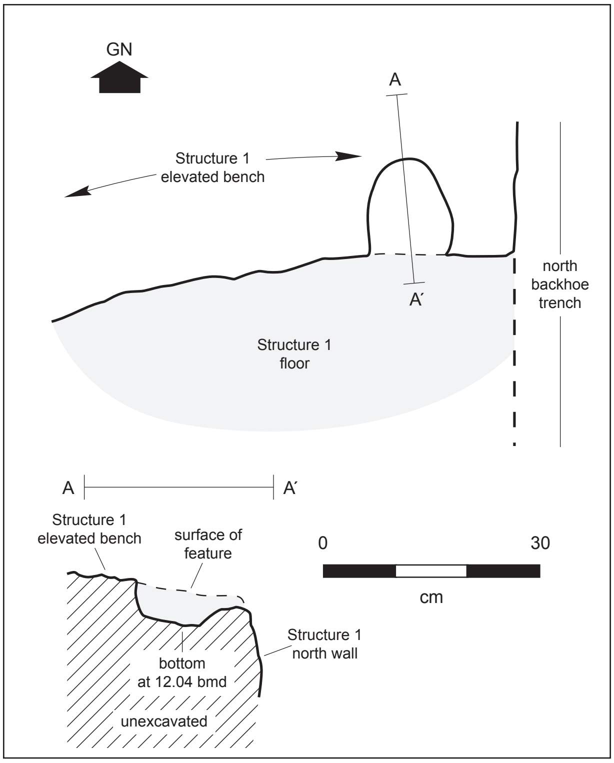

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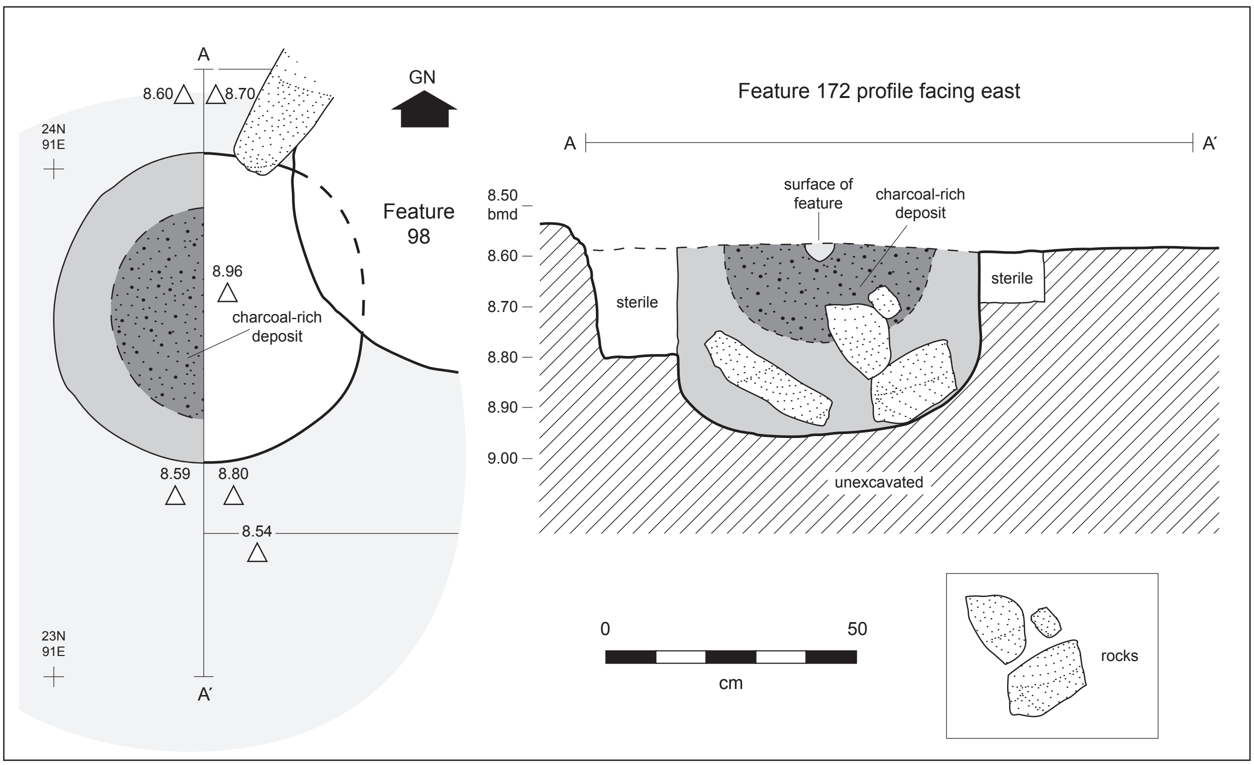

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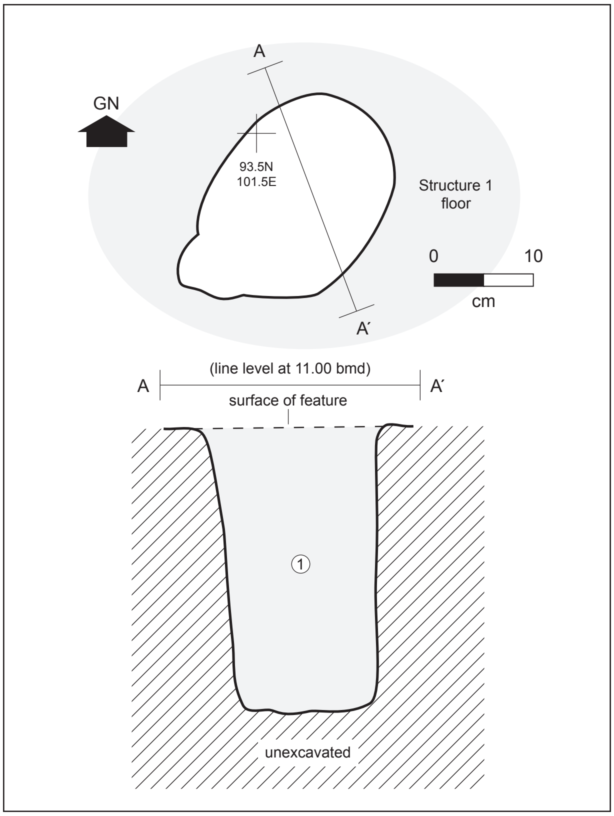

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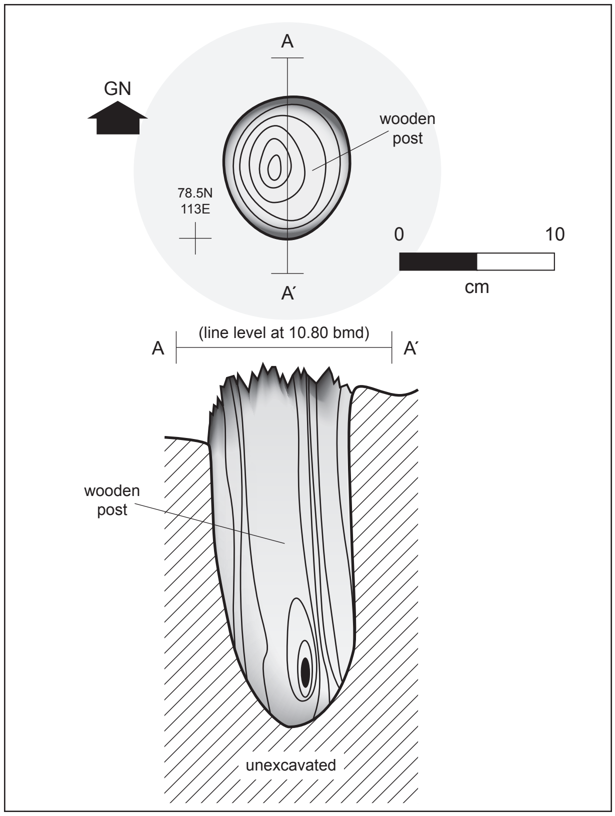

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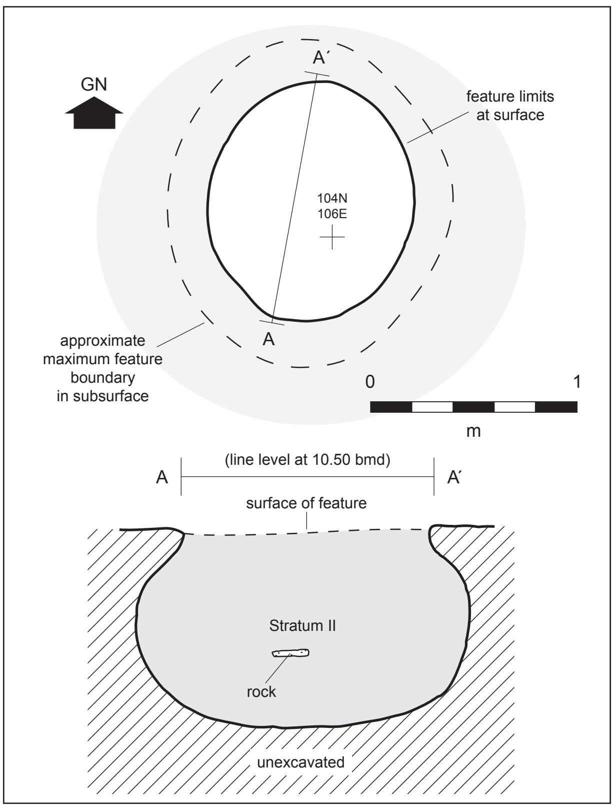

Feature 175, LA 104106.

Appendix 6 | Dendrochronological Sample Analysis from Twin Lakes Project Sites

Laboratory of
Tree-Ring Research

THE UNIVERSITY OF
ARIZONA®
TUCSON ARIZONA

P.O. Box 210058
Tucson, Arizona 85721-0058
Phone: (520) 621-6469
FAX: (520) 621-8229

04 July 17 2002

Dr. Steven A. Lakatos
Project Director
Office of Archaeological Studies
Museum of New Mexico
P. O. Box 2087
Santa Fe, New Mexico 87504-2087

Re: Accession A-1565

Dear Dr. Lakatos:

Here are the results of our analysis of 29 archaeological tree-ring samples from LA 104106. Included are a date list, a species identification form, and a key to the symbols that accompany the dates. Also enclosed is an invoice to cover the cost of the analysis.

The twenty-six samples that could not be dated are reported on the species identification form. Blank spaces in the FIELD NUMBER column denote samples with the field number listed directly above. These samples failed to date for one or various combinations of the following reasons: unsuitable species (unidentified nonconiferous), too few rings, erratic growth, complacent ring series, and serious false ring problems. Nonetheless, ten of these samples have enough dendrochronological potential to be incorporated into our permanent collection for future reference.

Although it is impossible to estimate the number of rings lost from the samples exteriors, the three noncutting dates represent trees that probably were cut in the early to middle seventh century.

In accordance with your instructions, the uncatalogued samples are being returned separately.

If you have any questions about these results, please let me know.

Sincerely,

Jeffrey S. Dean

Jeffrey S. Dean
Professor of Dendrochronology

LA 104,106 - Reported 30 June 2002 - Accession A-1565

-	PROVENIENCE	TRLNO	FIELD	SPEC	INNER	SYM	OUTER	SYM
1	Structure 1	NMGM-18	0866	PNN	0486	+/-	0616	+vv
						Count:	1	
2	Structure 3	NMGM-19	0844	PNN	0514		0621	vv
						Count:	1	
3	No provenience	NMGM-9	1260	PNN	0541	p	0592	vv
						Count:	1	
						Count:	3	

LA 104,106 - Species ID by RLW - Reported 30 June 2002 - Accession A-1565

-	FIELD NUMBER	TRLNO	DF	PP	PNN	JUN	S/F	POP	QUER	NONCON	COMMENT
1	0622	NMGM-20			1						Structure 3.
	0666	NMGM-10				1					Structure 1.
		NMGM-11				1					Structure 1. Erratic ring series.
		NMGM-12				1					Structure 1. Erratic.
		NMGM-13				1					Structure 1. Erratic.
		NMGM-14				1					Structure 1. Erratic.
						9					Short, erratic.
	0785	NMGM-15			1						Structure 1. Short.
		NMGM-16			1						Structure 1. Tight ring series.
					2					1	
	0866	NMGM-17			1						Structure 1. Tight, erratic.
										1	
	1256				1						Short, complacent ring series.
	1304					1					Erratic; false rings.
	2342	NMGM-21				1					Area 2.
						1					Short, erratic.
				Total:	7	17				2	

LABORATORY OF TREE-RING RESEARCH
ARCHAEOLOGICAL RESEARCH

EXPLANATION OF SYMBOLS

The symbols used with the inside date are:

- year - no pith ring present
- p - pith ring present
- fp - the curvature of the inside ring indicates that it is far from the pith
- ±p - pith ring present, but due to the difficult nature of the ring series near the center of the specimen, an exact date cannot be assigned to it. The date is obtained by counting back from the earliest dated ring.
- ± - the innermost ring is not the pith ring and an absolute date cannot be assigned to it. A ring count is involved.

The symbols used with the outside date are:

- B - bark present
- G - beetle galleries are present on the surface of the specimen
- L - a characteristic surface patination and smoothness, which develops on beams stripped of bark, is present
- c - the outermost ring is continuous around the full circumference of the specimen. This symbol is used only if a full section is present
- r - less than a full section is present, but the outermost ring is continuous around available circumference
- v - a subjective judgment that, although there is no direct evidence of the true outside on the specimen, the date is within a very few years of being a cutting date
- vv - there is no way of estimating how far the last ring is from the true outside
- \+ - one or more rings may be missing near the end of the ring series whose presence or absence cannot be determined because the specimen does not extend far enough to provide an adequate check
- ++ - a ring count is necessary due to the fact that beyond a certain point the specimen could not be dated

The symbols, B, G, L, c and r indicate cutting dates in order of decreasing confidence, unless a + or ++ is also present.

The symbols L, G, and B may be used in any combination with each other or with the other symbols except v and vv. The r and c symbols are mutually exclusive, but may be used with L, G, B, + and ++. The v and vv are also mutually exclusive and may be used with the + and ++. The + and ++ are mutually exclusive but may be used in combination with all the other symbols.

Appendix 7 | Archaeomagnetic Dating Results for LA 104106 (Samples ADL 1111–1124 and 1128)

Eric Blinman and J. Royce Cox

Archaeomagnetic dating sets (samples) were recovered only from site LA 104106 during data recovery excavations associated with US 666 (now US 491) highway improvements in the vicinity of Twin Lakes, New Mexico. Fifteen sets were collected, five from discrete burning episodes within Structure 1 and the remainder from features and structures across the site. Archaeomagnetic date ranges were initially interpreted based on the archaeomagnetic dating curves available in the early 2000s (Cox and Blinman 1999; DuBois 1989; Lengyel and Eighmy 2002), and those initial date ranges were used in the descriptive reporting in this volume. Recent archaeomagnetic calibration studies by Hagstrum and Blinman (2010) and Lengyel (2010) have provided additional perspectives on the dating of pre-AD 700 pole positions, but our assessment is that their implications are not yet relevant to the LA 104106 date range interpretations.

Background

Archaeomagnetic dating derives from the acquisition of a magnetic moment (direction and strength) by susceptible minerals when they are heated and cooled (see Blinman and Cox 2008). When heated to the Curie point (580º and 680º C for magnetite and hematite, respectively), magnetic materials go into a state of flux and lose any prior magnetic orientations. Upon cooling, the magnetic orientations of susceptible minerals are aligned with the earth's prevailing magnetic field, creating a thermoremanent magnetic moment (TRM). TRM alignments generally persist until the material is again heated to the original or a higher temperature. Although most archaeological heating events do not reach the Curie temperature, enough of the magnetic material is realigned (partial TRM or pTRM) to provide a detectable orientation. Since the Earth's magnetic field is constantly changing, heated earths retain a record of the past apparent or virtual geomagnetic pole (VGP) position at the time of cooling. Pole positions from heated archaeological earths can be compared with regional calibrations of VGP movement through time, and the position of the sample VGP along the calibration curve can be interpreted as a date range. Successful archaeomagnetic dating requires appropriate earthen materials, fires sufficiently hot to create an alignment, recovery of a carefully aligned set of specimens from the burned archaeological feature, laboratory measurement of the specimens to determine a mean pole position or VGP and its error term for the set, and interpretation of a date range from the juxtaposition of the error ellipse of the set result and a calibration curve.

Normal specimen collection techniques consist of isolating a column of in situ burned material by excavating around the column, placing a carefully leveled cubic mold over the column, and encasing the column with plaster of Paris poured within the mold. The mold orientation is precisely recorded, and the specimen cube and mold are separated from the feature, base-filled, trimmed, labeled and returned to the laboratory for measurement.

Archaeomagnetic measurement begins by letting the individually collected specimens "rest" within a zero magnetic field. This allows the dissipation of any contaminating weaker magnetic moments that have been created since the last firing, during transportation, or during sample storage prior to measurement. Each specimen is then measured to determine the natural remanent magnetism (NRM), which is the specimen's original magnetic direction plus any secondary magnetic moments that did not dissipate during the rest period. After the initial NRM measurement, the specimens are usually demagnetized in an alternating magnetic field (AF) at maximum field intensities of 50, 100, 150, 200, and 300 Oersteds (Oe). If warranted, specimens are taken up by further 100 Oe steps until a significant amount of additional secondary magnetism has been eliminated. Since demagnetization removes TRM as well as secondary orientations, the measurement technician must make a subjective judgment about when significant secondary moments have been eliminated and which demagnetization level results in the best approximation of the TRM of interest. Each selected specimen result consists of inclination and declination directions, which are then projected on a virtual model of the Earth to yield a virtual geomagnetic pole (VGP) position. This can be visualized as an approximation of the magnetic pole position when viewed from the sample collection location at the time of burning.

An archaeomagnetic dating result is expressed as a VGP centerpoint and a surrounding error ellipse. The centerpoint is the mean of the orientations of the individual specimens. An error ellipse is defined by the dispersion of the individual specimen orientations around the set mean. The area within which the mean centerpoint can be expected to fall 95 percent of the time (α_{95} value) is calculated using Fisher statistics, assuming that the individual specimen orientations are representative samples of the orientation of the feature as a whole. As error terms become larger, VGP locations are less precisely known and the date range interpretations become larger and less useful. Large α_{95} values also imply that the TRM contribution to a sample's magnetic orientation may be weakly expressed compared with other sources of magnetic orientations. Weak orientations can result from poorly suited susceptible minerals within the material (as encountered in other portions of the Chuska Valley [Cox and Blinman 1999]), pTRM components that were created by temperatures well below the Curie point, or small proportions of heat-affected material within specimen volumes (weak fields). Values of α_{95} less than 1° are excellent and imply a strong TRM that should be relevant for dating purposes. α_{95} values of more than 4° are imprecise and raise the possibility that the magnetic moment is less exclusively relevant to the archaeological heating event of interest.

In some instances, individual specimen orientations deviate markedly from the rest of the specimens of the archaeomagnetic set. These outliers can be defined either statistically as orientations that fall beyond two standard deviations of the sample mean (using Fisher statistics) or by anomalies identified during laboratory or field handling. Anomalies can include a significant change in specimen intensity, differences in material substrate that are noted during field sampling, potential exposure of a specimen to a different heating history, or physical instability of specimens noted during field collection that suggest that an individual specimen might not be congruent with the rest of the archaeomagnetic set (Cox and Blinman 1999; Sternberg and McGuire 1990). Set measurement programs using Fisher statistics define and eliminate outliers progressively from the specimen set until all remaining specimen orientations fall within two standard deviations of the new calculated sample mean. If specimens are subjectively defined as outliers they are manually removed from the set data and the set characteristics are recalculated from the remaining specimen measurements.

Three curves are currently in use for date estimation in the greater Southwest (Figure A7.1). The Wolfman Curve (Cox and Blinman 1999) is used for the AD 1000–1450 segment of the curve, the SWCV2000 curve (Lengyel and Eighmy 2002) is used primarily for the AD 650–1000 segment and also AD 1450–present, and occasionally the DuBois Curve (DuBois 1989) is used for AD 400–650 and also AD 1450–present. Dates interpreted for the AD 650–1000 period using the SWCV2000 curve are generally accurate, although precision can be improved (Cox and Blinman 1999). The Archaeomagnetic Dating Lab (ADL) believes that the Wolfman Curve is both a more accurate and more precise model of VGP movement for the AD 1000–1450 period in the Southwest (Blinman et al. 2008). These curves do not address VGP movement prior to AD 400, but a small segment of a prototype calibration curve has been proposed for Late Archaic or Basketmaker II periods (Cox and Blinman 1999:Fig. 19.5).

The interaction between an error ellipse and the VGP calibration curve determines the estimated date range(s) for a sample result. To the extent that curve paths are accurate and that VGPs express the TRM exclusively, error ellipses should overlap the curve path. However, neither assumption can be

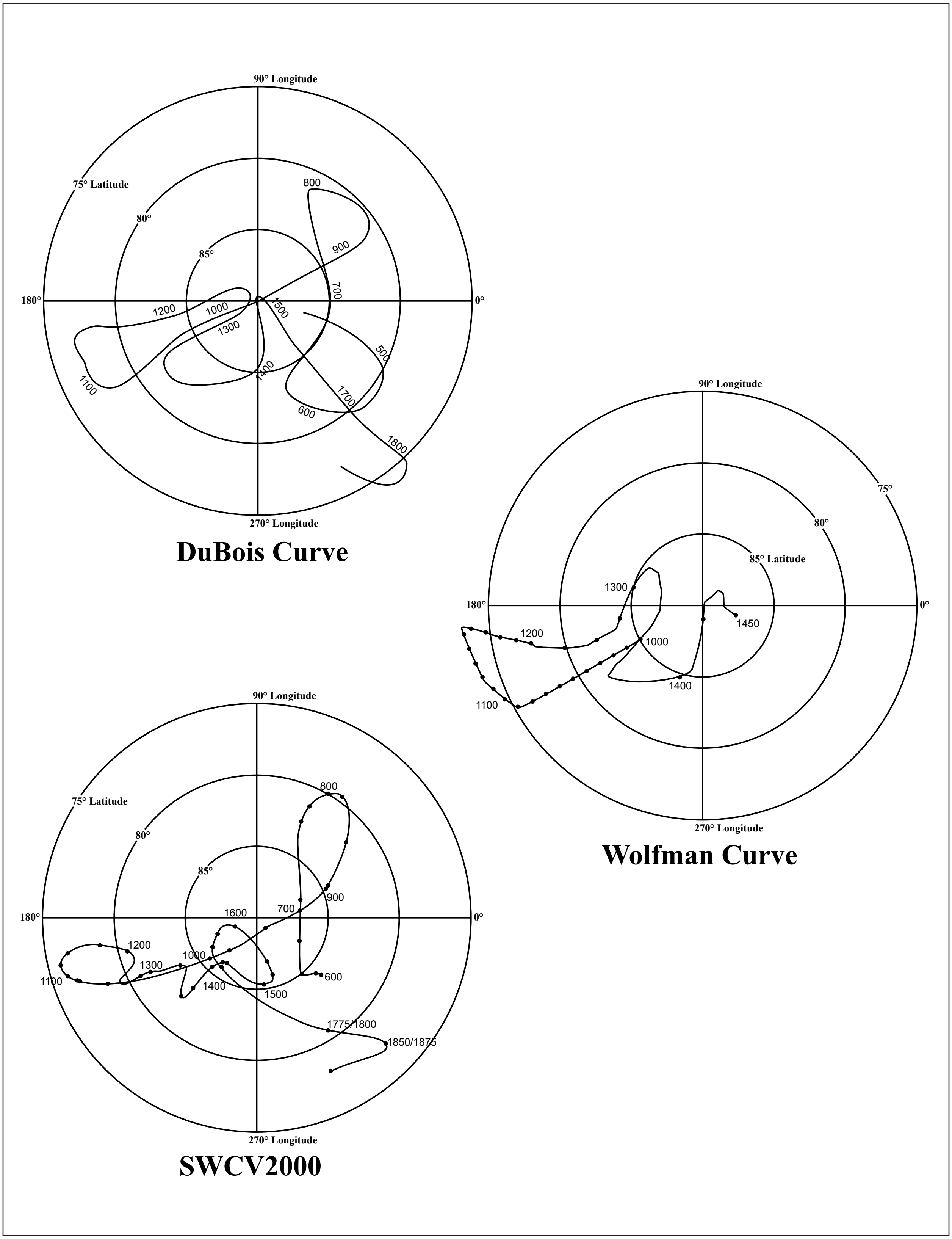

Figure A7.1. Archaeomagnetic dating curves for the Southwestern United States. The DuBois Curve is adapted from DuBois (1989), the SWCV2000 curve is adapted from Lengyel and Eighmy (2002), and the Wolfman Curve is from Cox and Blinman (1999).

made with absolute confidence. The most common dating convention is to assume that every curve segment that is intersected by, or that is immediately adjacent to, an error ellipse is potentially relevant to the date interpretation of that result. Depending on location and error size, an ellipse can intersect multiple curve segments, each of which could support a valid date interpretation (although only one is correct). To estimate a date range that reflects the precision or imprecision of the VGP estimate, the oval is moved as if the centerpoint were replotted to coincide with the nearest point on each curve segment in turn. The points of intersection between the ellipse and each curve segment determine the early and late end points of each date range interpretation (rounded to the nearest five-year point outside of the ellipse).

Since only one date range is actually relevant to the archaeological event that produced the TRM, independent information must be used by the archaeologist to determine which archaeomagnetic date range is appropriate. Archaeomagnetic date interpretations are thus most useful where there are multiple sources of chronology that can help focus attention on a particular date range as relevant. In the case of a multiple component site such as LA 104106, archaeomagnetic date interpretations are necessarily nuanced. The presence of eighteenth-century Navajo, Basketmaker III, and pre-Basketmaker III (Basketmaker II or late Archaic) components results in closely spaced VGP ellipses that could be ambiguous in terms of component affiliation. However, accumulating calibration data for the pre-AD 700 period also suggests that archaeomagnetic dating can be used to discriminate occupations within and preceding the early Basketmaker III period.

Archaeomagnetic Set Results

Of the 15 sets that were collected (Table A7.1), three produced VGP positions with unacceptably imprecise error terms ($\alpha_{95} > 10^o$), three error terms were too large for date range interpretation ($\alpha_{95} = 4.2–6.1^o$) but still can contribute to chronological interpretations, and the remaining nine results are sufficiently precise to support date range estimates (α_{95} = 1.6–3.0^o). Results are reported by set number and then are summarized by apparent component associations. Components generally coincide with the different areas of the site: two are from Study Unit 3, five are from Study Unit 2, and the last eight are from Study Unit 1.

Dating Results

ADL 1111 was collected from Feature 5, an extramural hearth in Study Unit 3. A portion of the hearth had been deformed by a road grader tire tread, probably decades prior to excavation during the original construction of US 666. An adjacent barbed wire fence created a local field anomaly that influenced the Brunton compass readings of specimen orientations by about 0.5^o, and the specimen orientations have been corrected. Eight specimens were collected and measured in the laboratory, and the best result was determined to be after demagnetization at 50 Oe. One specimen was eliminated as an outlier, and the remaining seven specimens yielded a VGP with a moderate error term (α_{95} = 2.1^o). The result is plotted against the SWCV2000 in Figure A7.2, and the oval overlaps the Protohistoric portion of the curve (AD 1600–1850) and is adjacent to the circa AD 1500 portion of the curve. A radiocarbon date on juniper charcoal from the feature fill (Beta-164334) yielded a 2-sigma date range of 1470–1690 cal AD (p = 0.95) using the OxCal v3.8 calibration program. The radiocarbon date and the archaeomagnetic result centerpoint location suggests that the Protohistoric portion is the most appropriate segment for date interpretation, and the resulting date range estimate is AD 1665–1775.

ADL 1112 was collected from Feature 8, another shallow extramural burned basin or hearth in Study Unit 3. A portion of this hearth also had been deformed by a road grader tire tread, probably during the original construction of US 666. Nine specimens were collected and the best eight (based on field assessments of integrity) were measured in the laboratory. The result at NRM was poor, yielding a VGP with a very large error term (α_{95} = 13.2^o). This error term is too large to use in date interpretation.

ADL 1113 was collected from Feature 7, a shallow extramural basin in Study Unit 2 that was strongly oxidized, reflecting its use as a thermal-processing feature. Eight specimens were collected and measured in the laboratory; the specimens were relatively weak, and the VGP at NRM has a large

Table A7.1. LA 104106, archaeomagnetic set results.

Set ADL	Feature	Inc.(°)	Dec.(°)	VGP Lat.(°)	VGP Long.(°)	α_{95} (°)	δ_p	δ_m	N	Demag (Oe)	Estimated Date	AM Date	Collector
1111	Study Unit 3; Feature 5, hearth	61.3	3.9	82.6	274.4	2.1	2.5	3.3	8/7	50	Proto-Historic/Navajo	AD 1665–1765[1]	E. B.
1112	Study Unit 3; Feature 8, burned basin	66.7	20.9	69.6	293.1	13.2	17.9	21.8	8/8	NRM [2]	Proto-Historic/Navajo	N/A	E. B.
1113	Study Unit 2; Feature 7, basin	53	356.4	86.3	126.3	6.1	5.8	8.4	8/8	NRM [2]	Archaic Proto-Historic/Navajo	N/A	E. B.
1114	Study Unit 2; Feature 11, cist	61.2	7.6	81.2	290.5	1.6	1.9	2.4	8/7	50	Proto-Historic/Navajo	AD 1710–1815[1]	E. B.
1115	Study Unit 2; Feature 12, cist	59.2	1.2	85.6	263	3	3.4	4.6	8/8	150	Proto-Historic/Navajo	AD 1615–1750[1]	E. B.
1116	Study Unit 2; Structure 9; Feature 23, hearth	56.9	19	74.7	329.1	4.2	4.4	6	8/7	150	Proto-Historic/Navajo	N/A	E. B.
1117	Study Unit 2; Feature 24, cist	54.9	5.9	85.2	343	2.3	2.3	3.2	8/7	50	Archaic Proto-Historic/Navajo	330–230 BC[3]	E. B.
1118	Study Unit 1; Structure 1; Feature 64, upper hearth	55.3	4.6	86.2	337.4	2.9	2.9	4.1	8/8	300	BMIII	AD 635–710[4]	E. B.
1119	Study Unit 1; Structure 1; Feature 64, middle hearth	57.9	1.3	87	271.2	2.7	2.9	4	8/8	300	BMIII	AD 585–670[4]	E. B.
1120	Study Unit 1; Structure 1; Feature 105, burned wall and floor	57	4.9	85.6	313.7	2.2	2.3	3.2	8/8	150	BMIII	AD 625–680[4]	E. B.
1121	Study Unit 1; Structure 1; Feature 48, vault	55.9	0	89.2	253	4.4	4.5	6.3	8/8	50	BMIII	N/A	E. B.
1122	Study Unit 1; Structure 1; Feature 64, lower hearth	57.6	7.1	83.8	315.3	1.9	2.1	2.8	8/7	50	BMIII	AD 625–675[4]	E. B.
1123	Study Unit 1; Feature 137, cist	56.1	10.4	81.5	331.9	2.4	2.4	3.4	8/8	50	BMIII	AD 435–550 AD 635–695[4]	E. B. E. B.
1124	Study Unit 1; Structure 8; Feature 176, burned vegetation	55.5	346.8	79.3	167.1	16.5	16.8	23.5	8/8	NRM [2]	BMIII	N/A	E. B.
1128	Study Unit 1; Feature 145, burned basin	66.2	9.5	75.3	276.8	11.2	15	18.3	8/7	NRM [2]	BMIII	N/A	E. B.

[1] Date range from SWCV2000 curve (Lengyel/Eighmy 2002).
[2] Archaeomagnetic set not demagnetized.
[3] Date range from 325–75 BC curve (Cox and Blinman 1999).
[4] Date range from DuBois curve (DuBois 1989).
Collector: E. B. = Eric Blinman

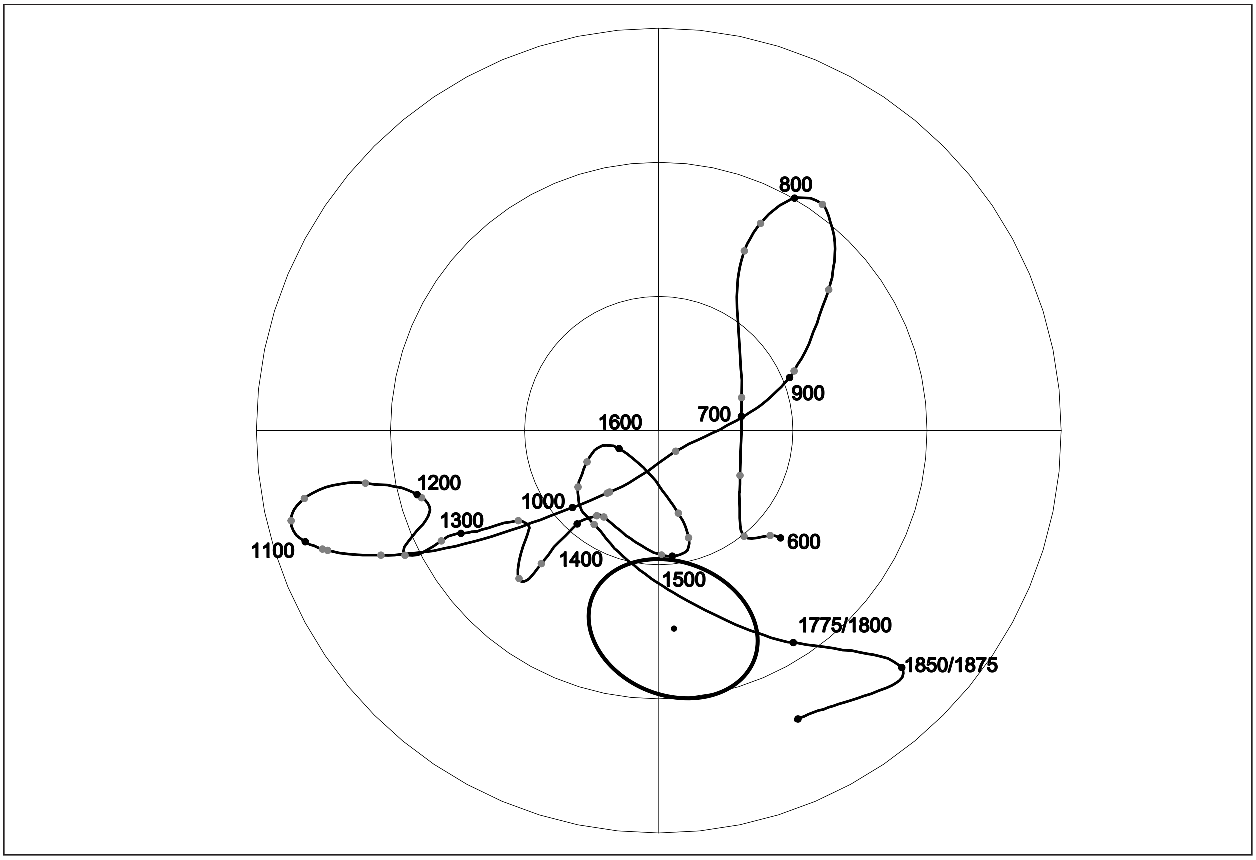

Figure A7.2. Archaeomagnetic result for ADL 1111, Study Unit 3, Feature 5, hearth, after demagnetization at 50 Oe. The result ellipse is plotted on the SWCV2000.

error term (α_{95} = 6.1º). Given the weakness of the specimens, improvement upon demagnetization was not expected, and the NRM result is reported. No other dating information is available for Feature 7, so the feature could be associated with any of the site components or even an undefined component. The ellipse is plotted in Figure A7.3 against the DuBois Curve and against a proposed Late Archaic or Basketmaker II curve segment (Cox and Blinman 1999:Fig. 19.5). The ellipse overlaps partially with archaeomagnetic results for the Protohistoric and Basketmaker III components at the site, but it also may fall between the late end of a possible prototype curve for 325–75 BC period and the early end of the DuBois Curve (before circa AD 400).

ADL 1114 was collected from Feature 11 in Study Unit 2, a small bell-shaped pit that was strongly oxidized. Eight specimens were collected and measured in the laboratory. The individual specimen orientations were coherent, and after removal of one statistical outlier, the best result had a small error term (α_{95} = 1.6º) after demagnetization at 50 Oe. A radiocarbon date on juniper charcoal from the feature fill (Beta-164335) yielded 2-sigma date ranges of 1430–1670 cal AD (p = 0.94) and 1780–1800 cal AD (p = 0.01) using the OxCal v3.8 calibration program. This implies a Protohistoric date for the feature, and the archaeomagnetic result is plotted against the SWCV2000 curve in Figure A7.4. The result only overlaps with the Protohistoric segment of the curve, and the associated date range is AD 1710–1815.

ADL 1115 was collected from Feature 12, another strongly oxidized small bell-shaped pit, adjacent to Feature 11 in Study Unit 2. Nine specimens were collected, and the best eight (based on field assessments of integrity) were measured in the laboratory. The individual specimen orientations were relatively dispersed, and the best result had a moderately large error term (α_{95} = 3.0º) after demagne-

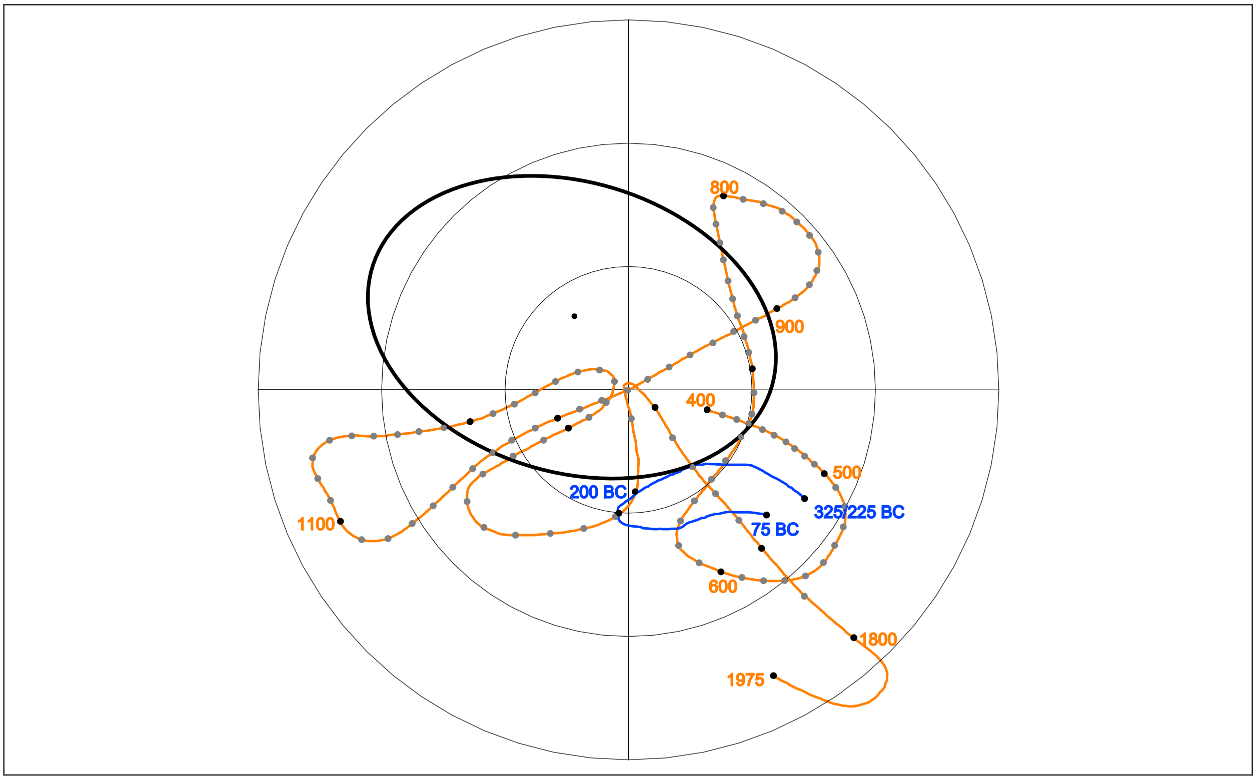

Figure A7.3. Archaeomagnetic result for ADL 1113, Study Unit 2, Feature 7, basin, at NRM. The result ellipse is plotted on the DuBois Curve and on a prototype segment of the Southwest curve for the 325–75 BC period.

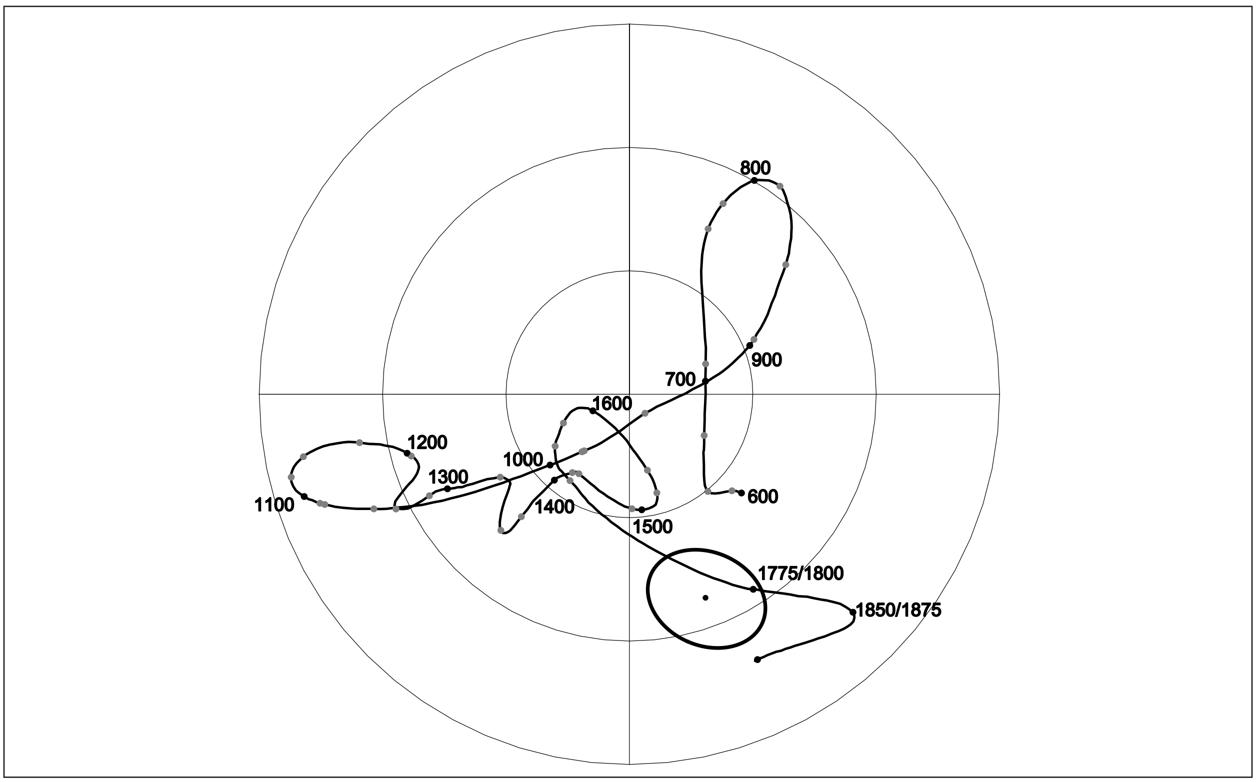

Figure A7.4. Archaeomagnetic result for ADL 1114, Study Unit 2, Feature 11, cist, after demagnetization at 50 Oe. The result ellipse is plotted on SWCV2000.

tization at 150 Oe. A radiocarbon date on juniper charcoal from the feature fill (Beta-164336) yielded 2-sigma date ranges of 1480–1700 cal AD (p = 0.56) and 1720–1820 cal AD (p = 0.31) using the OxCal v3.8 calibration program. This implies a Protohistoric date for the feature, and the archaeomagnetic result is plotted against the SWCV2000 curve in Figure A7.5. The result overlaps with multiple segments of the curve, but based on the radiocarbon dates the Protohistoric segment is the only relevant segment of curve. The date range associated with the error ellipse is AD 1615–1750.

ADL 1116 was collected from a shallow oxidized basin (Feature 23) on the floor surface of Structure 9 in Study Unit 2, and the feature is interpreted as the central hearth of a Protohistoric structure. Eight specimens were collected and were measured in the laboratory. The individual specimen orientations were dispersed, and after a single specimen was eliminated as a statistical outlier, the best result had a large error term ($\alpha_{95} = 4.2^{o}$) after demagnetization at 150 Oe. Since Structure 9 is well-defined as Protohistoric, the result ellipse is plotted on the SWCV2000 curve in Figure A7.6. The error term is too imprecise to support a date range estimate, but the centerpoint of the result falls near the mid-nineteenth century extension of the calibration curve, and if the ellipse were moved to calculate a date range, the ellipse would encompass a portion of the late-eighteenth century segment of the curve as well.

ADL 1117 was collected from Feature 24, a 2 m deep, large storage cist in Study Unit 2. Eight specimens were collected from burned sandstone bedrock that formed the bottom of the storage cist. The burned patch of bedrock was small, as if a warming fire had been lit on the floor of the large cist when it was empty and perhaps shortly after it was constructed. The individual specimen orientations were relatively coherent, and after removal of one statistical outlier, the best result had a moderate error term ($\alpha_{95} = 2.3^{o}$) after demagnetization at 50

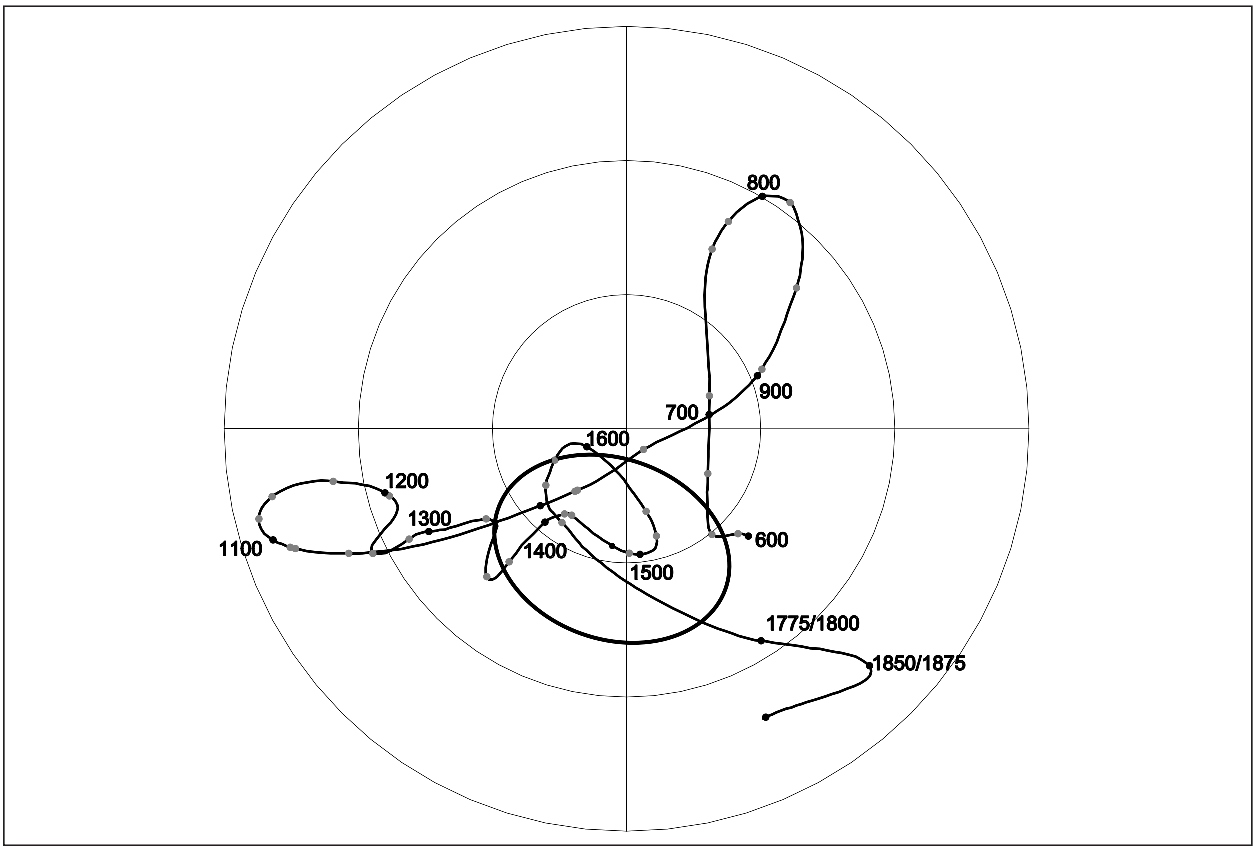

Figure A7.5. Archaeomagnetic result for ADL 1115, Study Unit 2, Feature 12, cist, after demagnetization at 150 Oe. The result ellipse is plotted on SWCV2000.

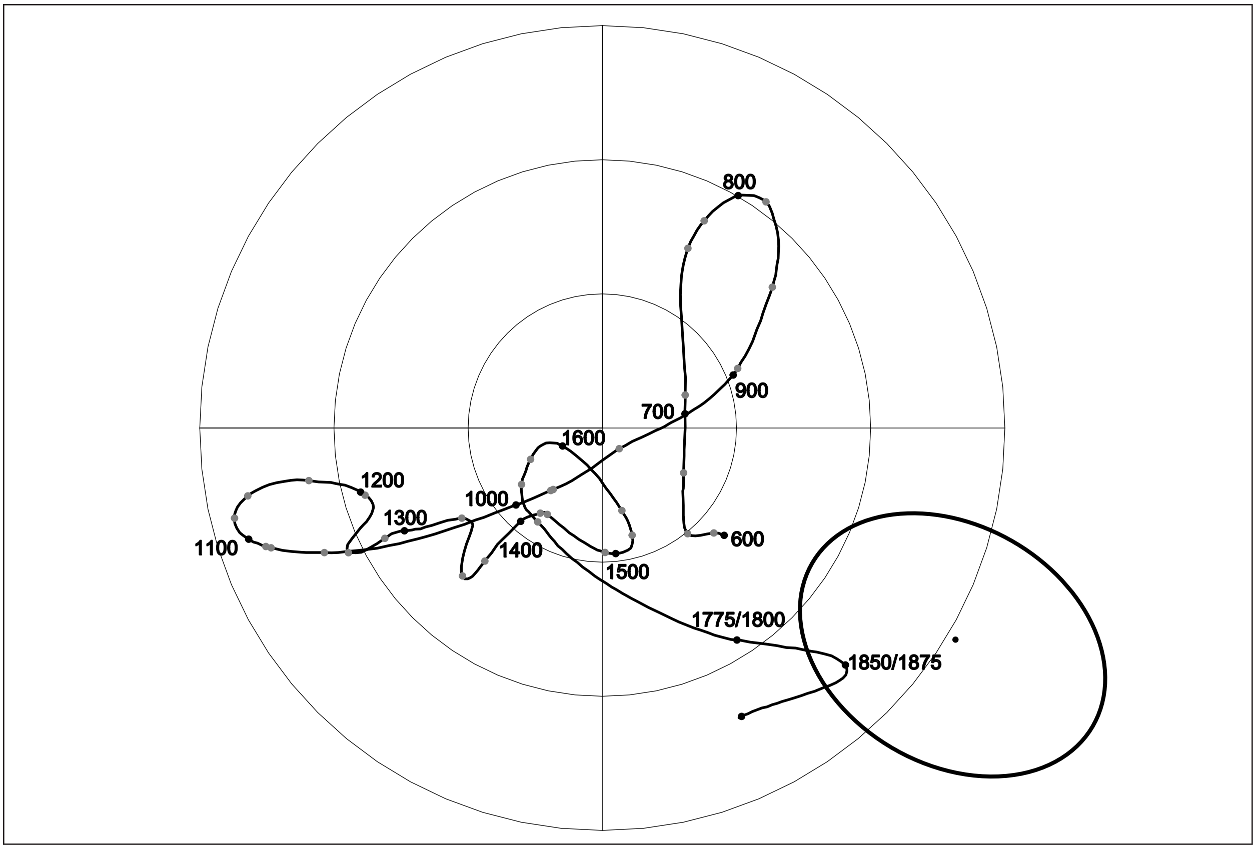

Figure A7.6. Archaeomagnetic result for ADL 1116, Study Unit 2, Structure 9, Feature 23, central hearth, after demagnetization at 150 Oe. The result ellipse is plotted on SWCV2000.

Oe. The complex stratigraphy of the cist, associated artifacts, and radiocarbon dates from the upper and lower fill strata document an initial construction of the cist during the Basketmaker II period, followed by re-excavation and reuse in the Protohistoric period. The radiocarbon date from the lower fill (Beta-164340) was on *Sarcobatus/Atriplex* wood charcoal and yielded a 2-sigma range of 360–150 cal BC (p = .93). Since the construction of Feature 24 is confidently within the Basketmaker II period, the result ellipse is plotted against the prototype of a Basketmaker II curve (Cox and Blinman 1999:Fig. 19.5) in Figure A7.7. The location of the ellipse relative to the prototype curve is within the third or perhaps early fourth century BC, and this archaeomagnetic date is consistent with the slightly later radiocarbon date from the lower cist fill.

ADL 1118 is the stratigraphically most recent of three remodeled versions of the central hearth (Feature 64) of Structure 1, a Basketmaker III pit structure in Study Unit 1 (see also ADL 1119 and ADL 1122). Eight specimens were collected from the uppermost hearth coping and were measured in the laboratory. The individual specimen orientations were only moderately coherent, and the best result had a moderate error term (α_{95} = 2.9°) after demagnetization at 300 Oe. The result ellipse is plotted against both the DuBois Curve and SWCV2000 in Figure A7.8. Both calibration curves yield Basketmaker III date ranges for the result, but we prefer to use the DuBois curve for date range calculation in this case because the DuBois curve provides greater resolution for the early seventh century. Based on the DuBois curve, the upper hearth coping yields a date range of AD 635–710.

ADL 1119 is the stratigraphically intermediate of the three remodeled versions of the central hearth (Feature 64) of Structure 1, the Basketmaker III pit structure in Study Unit 1 (see also ADL 1118 and ADL 1122). Nine specimens were collected from the intermediate hearth coping, which was exposed after removal of the upper coping. Eight of

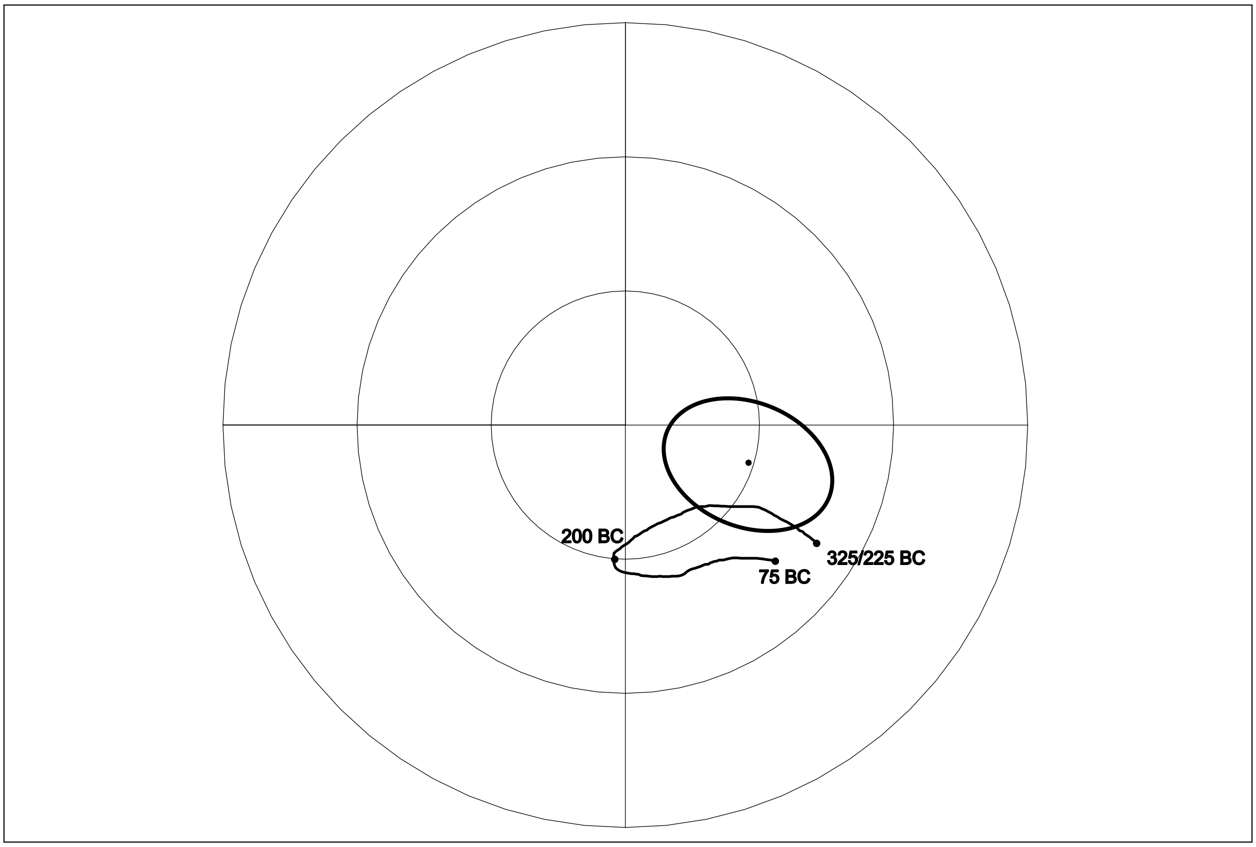

Figure A7.7. Archaeomagnetic result for ADL 1117, Study Unit 2, Feature 24, storage cist, after demagnetization at 50 Oe. The result is plotted on a prototype segment of the Southwest curve for the 325–75 BC period.

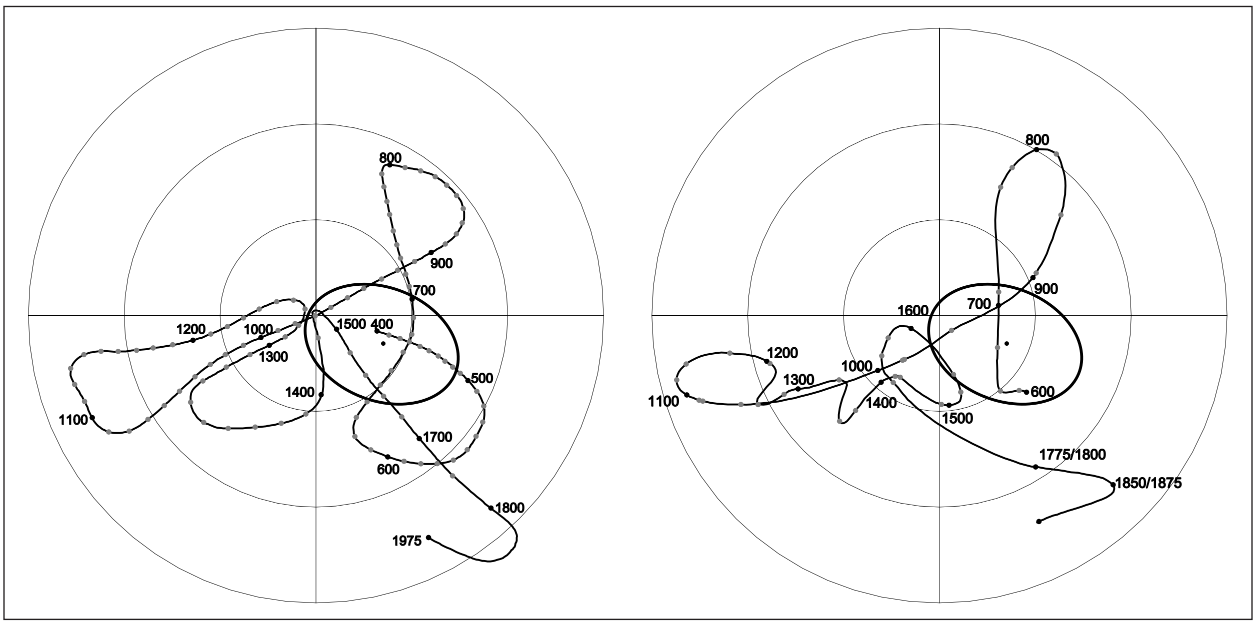

Figure A7.8. Archaeomagnetic result for ADL 1118, Study Unit 1, Structure 1, Feature 64, upper hearth, after demagnetization at 300 Oe. The result is plotted on the DuBois Curve (left) and SWCV2000 (right).

these (based on field assessments of greatest integrity) were measured in the laboratory. The individual specimen orientations were only moderately coherent, and the best result had a moderate error term (α_{95} = 2.7°) after demagnetization at 300 Oe. The result ellipse is plotted against both the DuBois Curve and SWCV2000 in Figure A7.9. Both calibration curves yield Basketmaker III date ranges for the result, but we prefer to use the DuBois curve for date range calculation in this case because the DuBois curve provides greater resolution for the early seventh century. Based on the DuBois curve, the upper hearth coping yields a date range of AD 585–670.

ADL 1120 was collected from a shallow, burned basin (Feature 105) within Structure 1, the Basketmaker III pit structure in Study Unit 1. Twelve specimens were collected from a contiguous area immediately to the east of the vent tunnel opening, and the best eight of these (based on field assessments of greatest integrity) were measured in the laboratory. The individual specimen orientations were only moderately coherent, and the best result had a moderate error term (α_{95} = 2.2°) after demagnetization at 150 Oe. The result ellipse is plotted against both the DuBois Curve and SWCV2000 in Figure A7.10. Both calibration curves yield Basketmaker III date ranges for the result, but we prefer to use the DuBois curve for date range calculation in this case because the DuBois curve provides greater resolution for the early seventh century. Based on the DuBois curve, the upper hearth coping yields a date range of AD 625–680.

ADL 1121 was collected from the lightly burned western margin of a floor vault (Feature 48) within Structure 1, the Basketmaker III pit structure in Study Unit 1. Eight specimens were collected and all were measured in the laboratory. The individual specimen orientations were poorly coherent, and the best result had a large error term (α_{95} = 4.4°) after demagnetization at 50 Oe. The result ellipse is plotted against both the DuBois Curve and SWCV2000 in Figure A7.11. The ellipse overlaps both calibration curves within the Basketmaker III period, but the result is too imprecise for date range interpretation.

ADL 1122 is the stratigraphically earliest of the three remodeled versions of the central hearth (Feature 64) of Structure 1, the Basketmaker III pit structure in Study Unit 1 (see also ADL 1118 and ADL 1119). Eight specimens were collected from the interior hearth lining after removal of the linings associated with the intermediate and upper remodeling alterations of the hearth. After laboratory measurement, the individual specimen orientations were

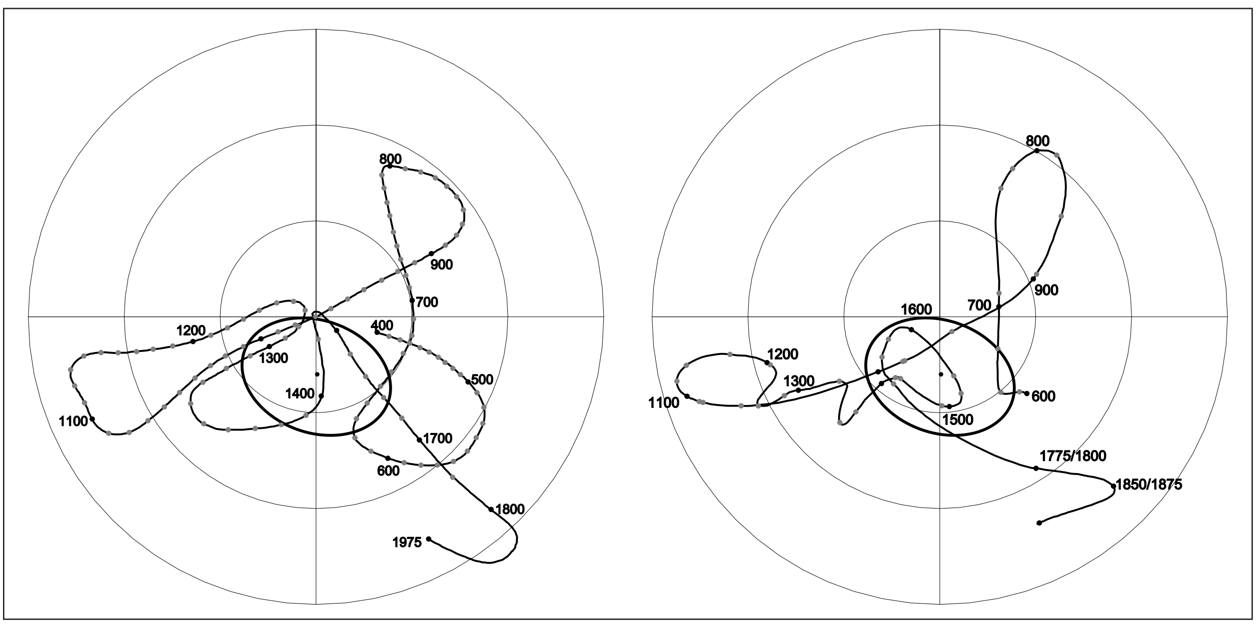

Figure A7.9. Archaeomagnetic result for ADL 1119, Study Unit 1, Structure 1, Feature 64, intermediate hearth, after demagnetization at 300 Oe. The result is plotted on the DuBois Curve (left) and SWCV2000 (right).

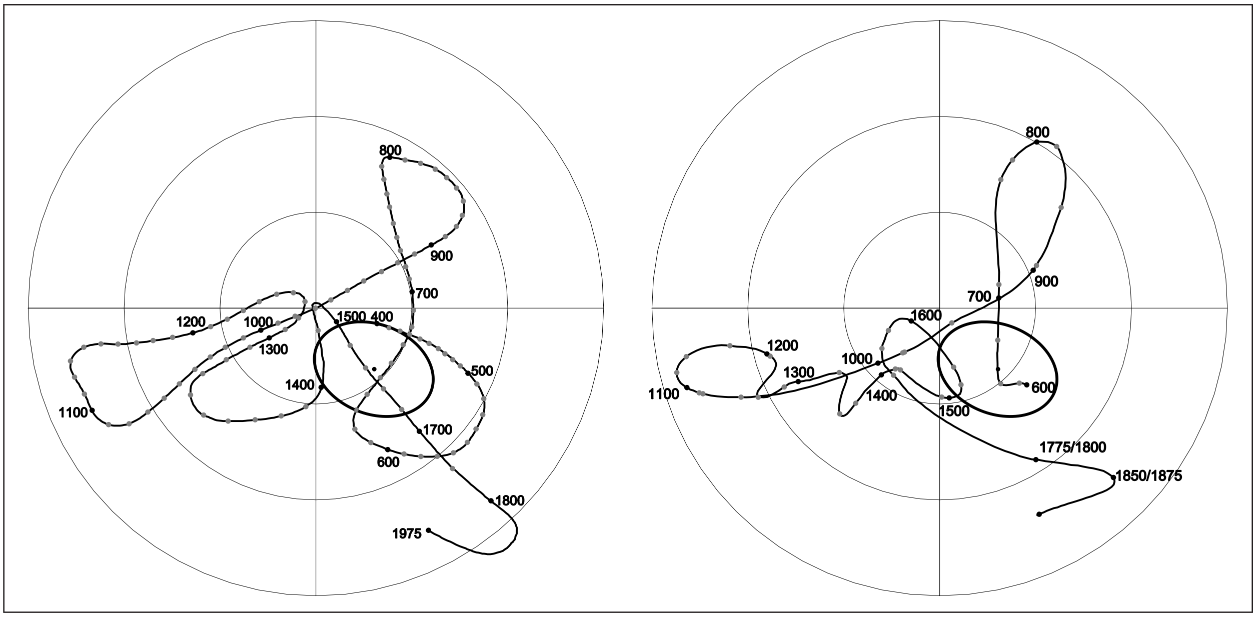

Figure A7.10. Archaeomagnetic result for ADL 1120, Study Unit 1, Structure 1, Feature 105, hearth (burned wall and floor), after demagnetization at 150 Oe. The result is plotted on the DuBois Curve (left) and SWCV2000 (right).

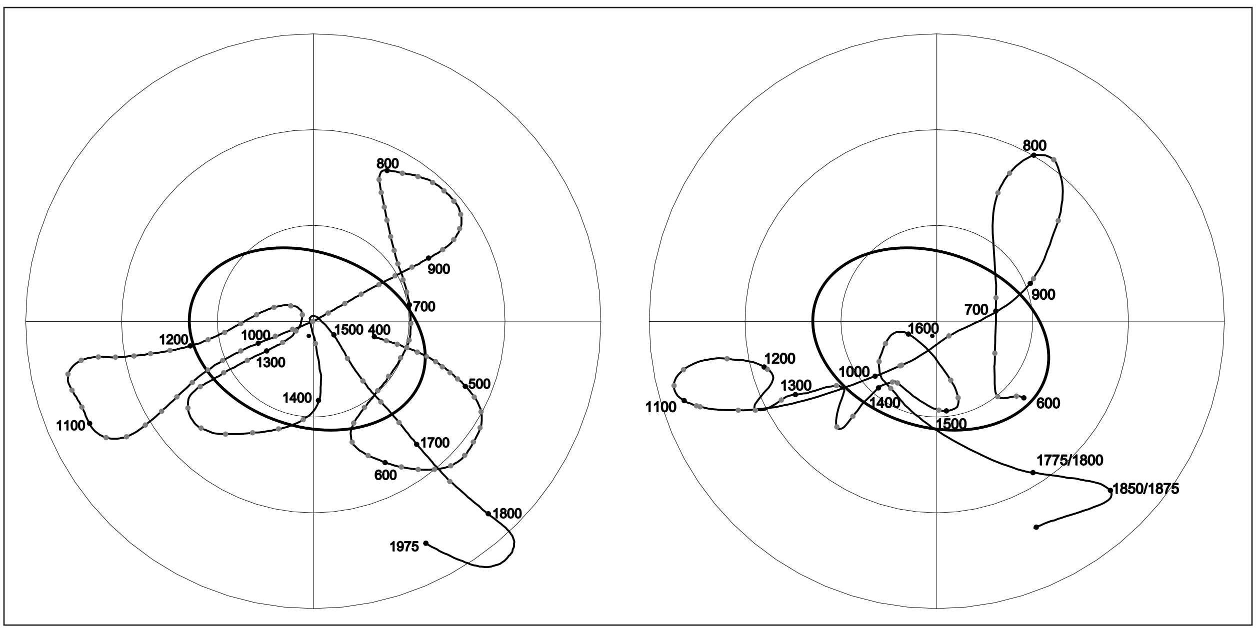

Figure A7.11. Archaeomagnetic result for ADL 1121, Study Unit 1, Structure 1, Feature 48, vault, after demagnetization at 50 Oe. The result is plotted on the DuBois Curve (left) and SWCV2000 (right).

relatively coherent, and the best result had a relatively precise error term (α_{95} = 1.9º) after demagnetization at 50 Oe. The result ellipse is plotted against both the DuBois Curve and SWCV2000 in Figure A7.12. Both calibration curves yield Basketmaker III date ranges for the result, but we prefer to use the DuBois curve for date range calculation in this case because the DuBois curve provides greater resolution for the early seventh century. Based on the DuBois curve, the upper hearth coping yields a date range of AD 625–675.

ADL 1123 is from an area of burned surface at the bottom of a deep (1.5 m) extramural bell-shaped pit (Feature 137) in Study Unit 1. The fill of the cist included no pottery (implying that it predates the Basketmaker III component), but there is no independent radiocarbon chronology for the feature. Twelve specimens were collected from the burned area, but only the best eight of these (based on field assessments of most intense burning) were measured in the laboratory. The measured specimen orientations were moderately coherent, and the best result had an error term (α_{95} = 2.4º) after demagnetization at 50 Oe. The result ellipse is plotted against both the DuBois Curve and SWCV2000 in Figure A7.13. The error ellipse touches the Basketmaker III segments of both curves, but its location is most consistent with a pre-AD 600 interpretation for both. The DuBois curve yields a pre-AD 600 date range of AD 435–550 for the result, but an AD 635–695 date interpretation is possible.

ADL 1124 was collected from an area of burned sediment (Features 176) within the fill of Structure 8 in Study Unit 1. The sediment was burned when vegetation within the structure fill caught fire, and the archaeomagnetic sample was collected in hopes of providing some independent chronology for the abandonment of the structure. Eight specimens were collected from the weakly burned sediment, and all eight were measured in the laboratory. Although the burning produced a magnetic moment within the material, the specimen measurements were too incoherent for interpretation. The measured specimen orientations had a large error term (α_{95} = 16.5º), and the specimens were not demagnetized. No chronological inferences are warranted.

ADL 1128 was collected from the burned sloping sides of a shallow extramural basin, Feature 145 in Study Unit 1. Eight specimens were collected, and all eight were measured in the laboratory. The specimen measurements were incoherent, yielding a large error term (α_{95} = 11.2º). The specimens were not demagnetized, and no chronological inferences are warranted.

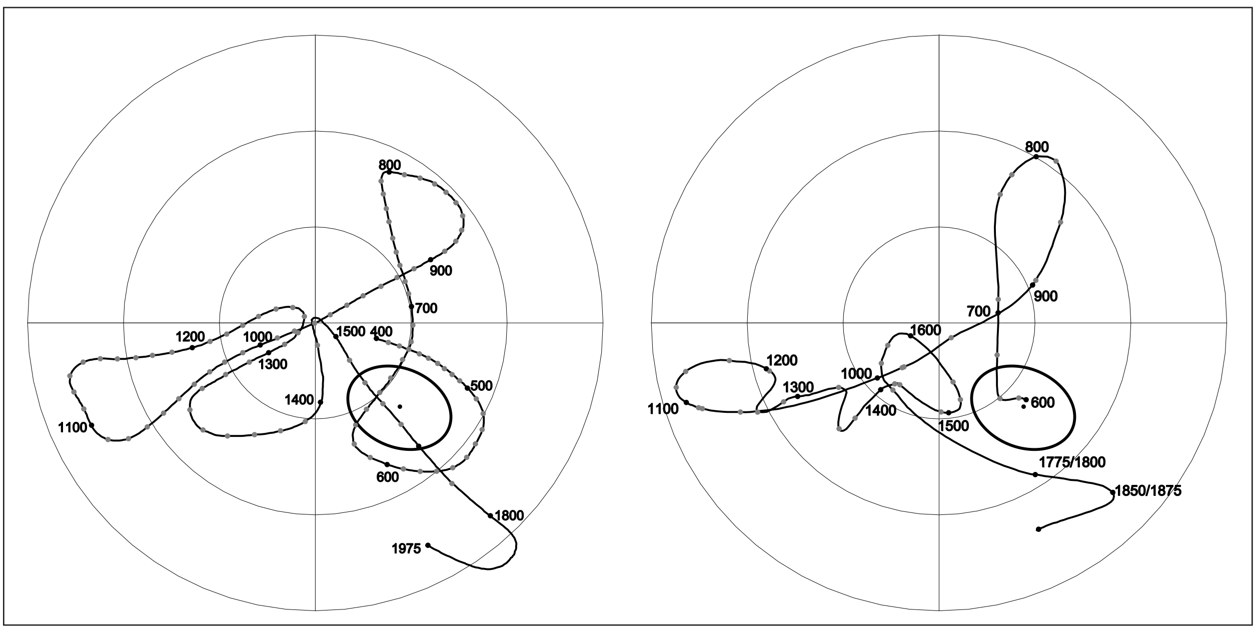

Figure A7.12. Archaeomagnetic results for ADL 1122, Study Unit 1, Structure 1, Feature 64, lower hearth, after demagnetization at 50 Oe. The result is plotted on the DuBois Curve (left) and SWCV2000 (right).

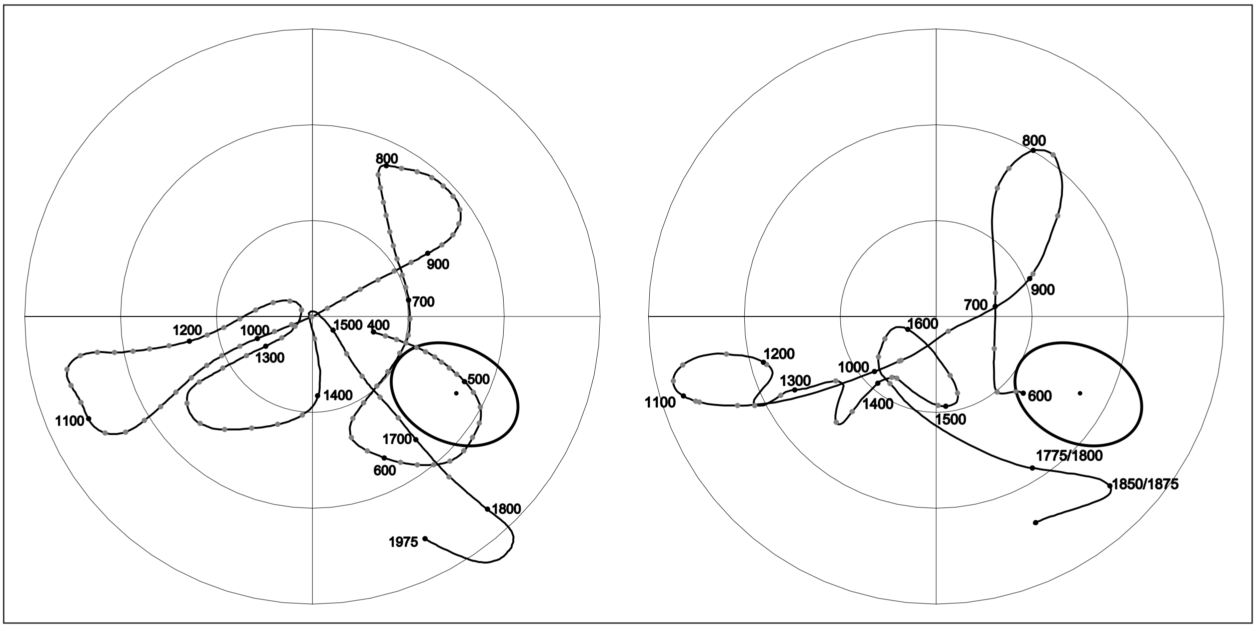

Figure A7.13. Archaeomagnetic result for ADL 1123, Study Unit 1, Feature 137, cist, after demagnetization at 50 Oe. The result is plotted on the DuBois Curve (left) and SWCV2000 (right).

Dating Interpretations

The multiple components of LA 104106 provide opportunities and challenges for archaeomagnetic dating. Two focal components are relatively well defined in spatial and stratigraphic terms, while a number of features with archaeomagnetic results are distinct in their associations and dating.

Pre-Basketmaker III

Two archaeomagnetic results appear to be related to aceramic components at LA 104106. ADL 1117 is from the base of a deep storage cist that is probably Basketmaker II in cultural affiliation. The result is remarkably precise given that it was collected from burned sandstone (see Fig. A7.7), but in the absence of a confidently defined archaeomagnetic calibration curve, a weak interpretation is that the result represents a pole position in the early centuries BC ADL 1113 is imprecise (see Fig. A7.3), and it overlaps slightly with the VGP for ADL 1117. Its pole position is again weakly interpreted, but it also could be in the Basketmaker II period, in the early centuries, either BC or AD.

Basketmaker III

The Basketmaker III component includes multiple samples from Structure 1 and one sample that is probably earlier. The earlier result (ADL 1123) is from extramural cist Feature 137 (see Fig. A7.13). Although this result overlaps with the error ellipses from Structure 1, its centerpoint is more consistent with a circa AD 500 age, and the feature could be associated with the pre-Basketmaker III structures at the site.

Structure 1 provided opportunities for multiple archaeomagnetic samples, including a stratigraphic remodeling sequence within the hearth (Feature 64). The three hearth samples are plotted together on the DuBois Curve in Figure A7.14. Although the results are not extremely precise, their pole position progression (ADL 1122, 1119, and 1118) matches the stratigraphic sequencing of the samples. The elapsed time implications of the positions is over several decades within the seventh century. Archaeomagnetic pole positions for two other features from the structure support this dating. The floor feature burn (Feature 105; ADL 1120; see Fig. A7.10) overlays the three hearth sample results, and although the floor vault sample (ADL 1121) is too

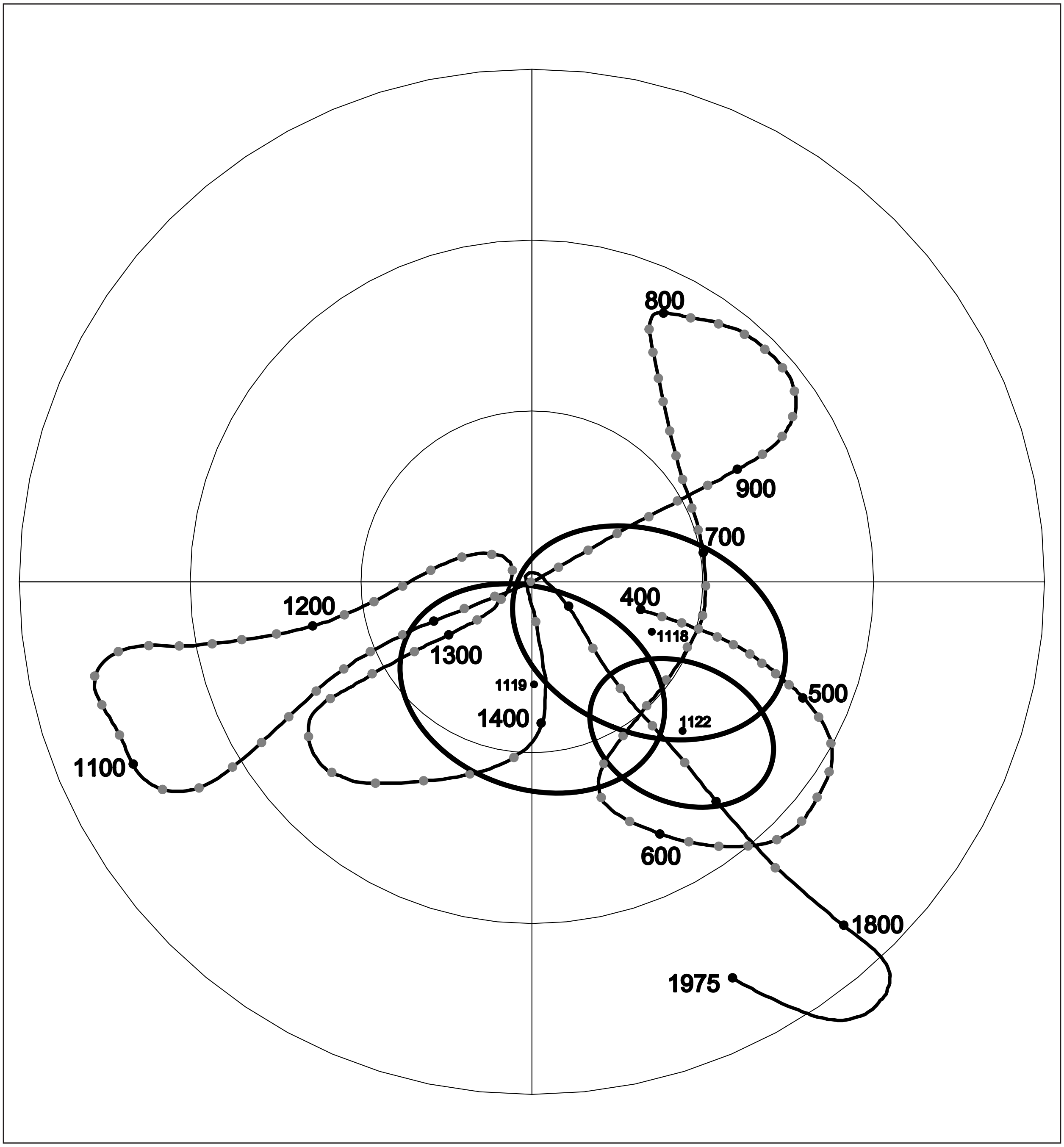

Figure A7.14. Archaeomagnetic results for samples from Study Unit 1, Structure 1, Feature 64, upper (ADL 1118), intermediate (ADL 1119), and lower (ADL 1122) hearths. Results are plotted on the DuBois Curve.

imprecise for interpretation (see Fig. A7.11), it also overlaps the seventh century segment of the archaeomagnetic dating curves.

Protohistoric

The Protohistoric segment of the archaeomagnetic calibration curve (SWCV2000) reflects considerable movement of the VGP between about AD 1600 and 1875, but the rate of movement of the VGP is either sporadic or poorly calibrated. Three features (Feature 12 [ADL 1115], Feature 5 [ADL 1111], and Feature 11 [ADL 1114]) have archaeomagnetic date ranges that reflect seventeenth through eighteenth century Navajo occupation at the site (Fig. A7.15). Despite the poor curve calibration, these Navajo features appear to span multiple generations. Another feature, the hearth from Structure 9 (ADL 1116), appears to be later within the nineteenth century (see Fig. A7.6).

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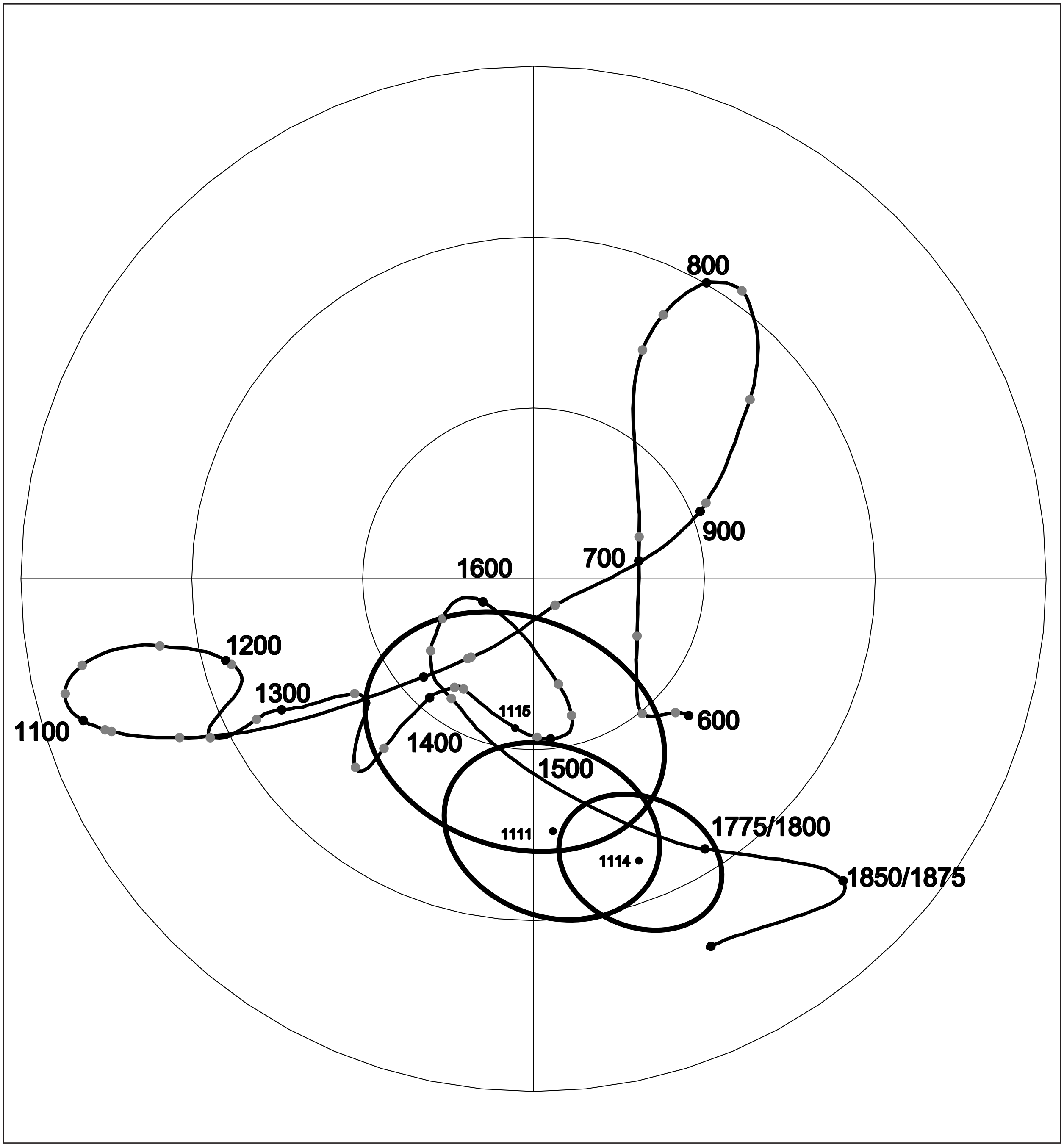

Figure A7.15. Archaeomagnetic results for confidently attributed Navajo component sets (ADL 1111, 1114, and 1115). Results are plotted on SWCV2000.

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