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Contents

A Solomon River Phase Habitation Site (14ML417): Results of the 1980 KATP Field School
Mark Latham

Ceramic Artifacts from the Hallman Site (14HP524), A Bluff Creek Complex Site in Harper County, Kansas
Shelly Berger

Waterway Discoveries at the Malone Site (14RC5)
Randall M. Thies

Fossil Finds and Archeological Sites Reported in Manhattan's Newspapers
Patricia J. O'Brien

The Kansas Anthropologist

Journal of the Kansas Anthropological Association

Kansas Anthropological Association

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Contents

A Solomon River Phase Habitation Site (14ML417):
Results of the 1980 KATP Field School ..... Mark Latham 1

Ceramic Artifacts from the Hallman Site (14HP524),
A Bluff Creek Complex Site in Harper County, Kansas ..... Shelly Berger 75

Waterway Discoveries at the Malone Site (14RC5) ..... Randall M. Thies 125

Fossil Finds and Archeological Sites Reported in Manhattan's Newspapers .... Patricia J. O'Brien 145

Book Reviews 149

About the Authors 167

2004 Kansas Anthropological Association Members 169

NOTES

A Solomon River Phase Habitation Site (14ML417): Results of the 1980 KATP Field School

Mark Latham
Burns & McDonnell, Inc.

The Kansas Anthropologist 25:1-73

This report describes the results of an archeological investigation of a Solomon River phase house site in north-central Kansas. Site 14ML417 is situated on a terrace in a cultivated field overlooking Limestone Creek, a major tributary of the Solomon River in Mitchell County. In June 1980 an archeological investigation of the site was undertaken by the Kansas State Historical Society (KSHS) and the Kansas Anthropological Association (KAA). A series of magnetometer tests indicated that there was a strong possibility of buried features. The site was divided into three arbitrary areas, and 358 m^2 were excavated to a depth of 30 cm. The excavation revealed a floor of an earthlodge with a radiocarbon date of 850±50 B.P. (Beta 3334), with a calibrated age of 1160-1260 B.P. Evidence of a second lodge floor was found, but years of cultivation and pipeline and road construction appear to have destroyed it.

This report describes the results of an archeological investigation of a Solomon River phase house site in north-central Kansas. Site 14ML417 is situated on a terrace of a cultivated field overlooking Limestone Creek, a major tributary of the Solomon River in Mitchell County (Figure 1). It is at the eastern fringes of the Glen Elder locality in north-central Kansas. The locality is defined as the sum of the tributary basins feeding Waconda Lake (Latham 1996:3). This unit of the landscape includes all of the landforms and resources available to the prehistoric inhabitants in this portion of the Solomon River valley, including the Limestone Creek drainage. In June 1980 the Kansas State Historical Society (KSHS) and the Kansas Anthropological Association (KAA) undertook an archeological investigation, or excavation, of the site. To date this work has not been completely reported. This author had conducted extensive research in the locality and, therefore, volunteered to write the site report. During the initial work on this task, the author worked closely with the late John Reynolds, state archeologist of Kansas from 1993 to 1997, and promised to finish the report and publish it through the KAA/KSHS.

The fieldwork was undertaken from May 8 through June 6, 1980. KSHS staff who led the investigation and conducted a series proton magnetometer tests included John Reynolds, Tom Witty, Bill Brogan, Bruce Jones, and Don Rowlison. No fewer than 43 KAA members or registered participants were involved as field and laboratory crews, averaging about 20 on site each day during the excavation (Table 1). Others participated on a limited basis, and some of their names were not recorded. Laboratory work included cleaning and labeling of artifacts, which was begun during a portion of the field school and finished at the KSHS laboratory.

Environmental Setting

Site 14ML417 is situated on a terrace of the right bank of Limestone Creek, a major tributary of the Solomon River. Limestone Creek is on the eastern fringe of the Glen Elder locality in north-central Kansas. Although Gayle Carlson named the Glen Elder locality in 1971, he described it only in general terms. The locality commonly was thought of as the area around Waconda Lake, but such a definition

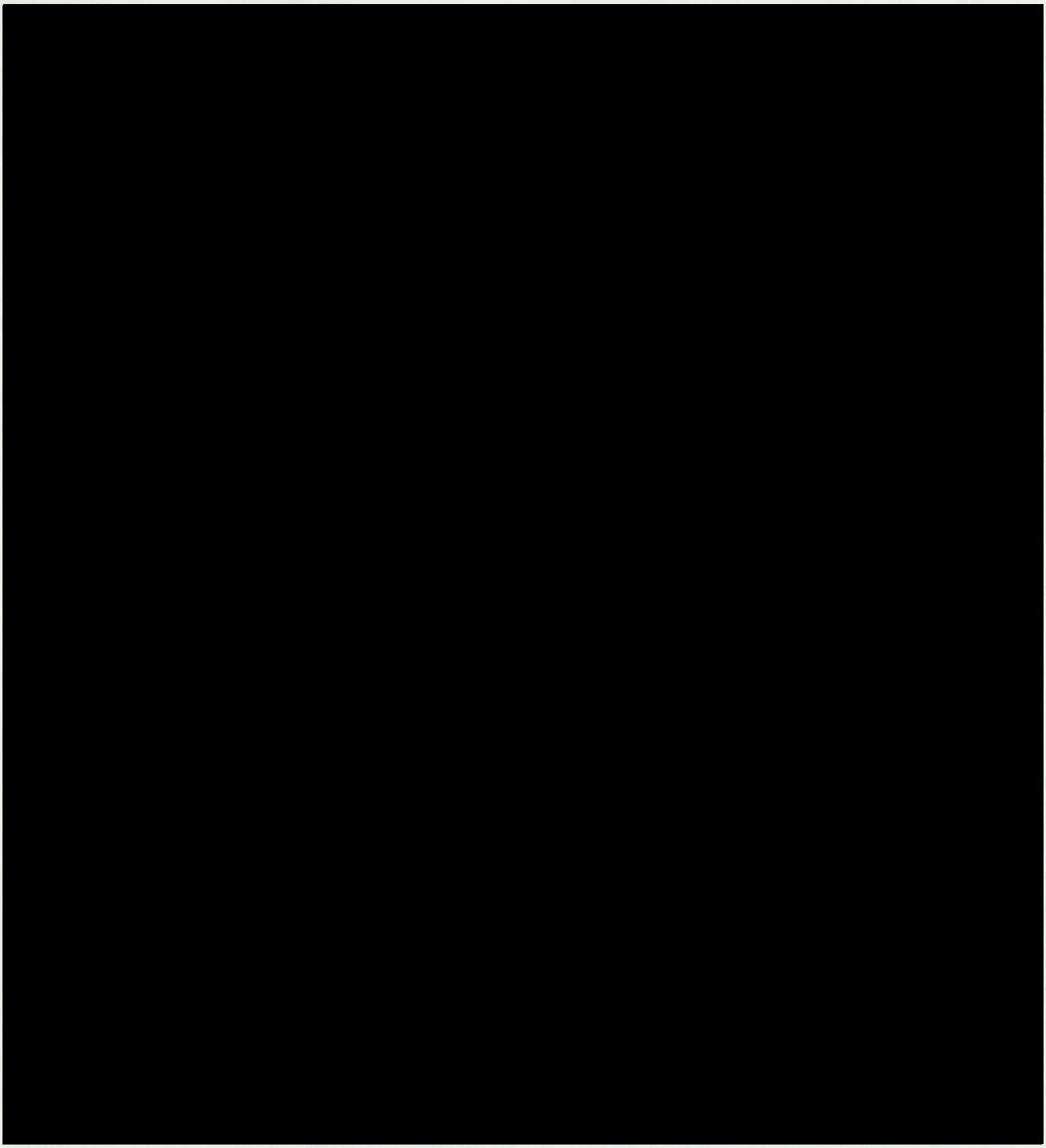


Figure 1. Area map showing general site location.

restricted it to arbitrary boundaries. To clarify this, it has been defined "as the sum of the tributary basins feeding Waconda Lake" (Latham 1996:3). The lone exception to this definition is Limestone Creek, which flows into the Solomon River just downstream from the Glen Elder Dam.

Physiography

The Glen Elder locality is on the heavily dissected eastern edge of the High Plains (Schoewe 1949:280, 311-330). The Smoky Hills, a section of the Cretaceous system, were named for their smoky appearance, caused by atmospheric refraction and haze. The

Table 1. Recorded KAA Participants in the 1980 Excavation at 14ML417.

Diane L. G. Bahm	Betty Fitzgerald	Wilfred T. Miller	Roscoe Peay
Mike Bahm	Marylie Foust	Judy Muck	John M. Peterson
Susan Barnes	Robin Flippo	Cleta Mulder	Harold Reed
Joyce Bell	Patricia Haegelin-Hiatt	Cleve Mulder	Margie Reed
Judy Bell	Linne Knight	Belinda Neal	Milton Reichart
R.D. Brent	Thomas A. Licht	Evelyn Nickelson	Aneita Remus
Nadine Cheney	Lester Maresch	Bonita Oliva	Harvey Rogers
Virginia Crowley	Merry Mathews	Maurice Pattengill	Neil Rogers
Verna Detrich	Milton Mathews	Dorothy Pearman	Ernest L. Spencer
LaVerna Ernst	Terri Mathews	Clarence Peay	Kenny Watkins
Walter Ernst	Betty Melton	Judy Peay	

underlying limestone was an important asset for the first European settlers in much of the region; lack of timber on the grassy plains forced settlers to exploit other sources of construction material, and limestone was and still is a plentiful resource (Wilson 1989:23-33).

Geology

Several outcrops of Blue Hill Shale, Smoky Hill Chalk, Fort Hays Limestone, and Greenhorn Limestone exist within the locality. The bluish hue of the shale gives the hills along the Solomon River their name: the Blue Hills (O'Connor 1968:54-57). Smoky Hill Chalk and Fort Hays Limestone are members of the Niobrara Chalk. Outcrops of this chalk and limestone are found primarily on the steep slopes of the major streams and upland drainages. Fort Hays Limestone is the typical limestone outcropping of the Blue Hills. The formations of soft chalk and limestone produce sediments that form moderately deep to shallow soils in the uplands of the region (U.S. Department of Agriculture 1978:64).

Chert Resources

The most common raw material used by the prehistoric inhabitants of the Glen Elder locality was the locally available Smoky Hill jasper or silicified Niabrara chalk (Loetterle 1937). The second most common raw material present at 14ML417 is from the Permian-age chert deposits in the Flint Hills, generally from sources north of Interstate 70. In addition, secondary sources are present throughout the locality in the form of Ogallala quartzite on the uplands and quartzites and poorly defined cherts in the stream cobbles. Other materials are considered exotic: Flattop chalcedony, Alibates agatized dolomite, and Mississippian cherts (Blakeslee 1999; Latham 1994).

Soils

Site 14ML417 is found within the Roxbury-Hord-New Cambria soil association. These soils are described as well drained loamy and clayey soils found on terraces and flood plains. Two soils have been mapped on the site, with Roxbury-Armo complex soils on the higher terrace of A801 and Hord silt loam in A802 and A803 (Hamilton 1980).

Drainage System

The Solomon River is a major tributary of the Kansas River and drains much of northwestern Kansas. Its forks come together near the town of Downs and supply water for Lake Waconda. Limestone Creek enters the Solomon just downstream from Glen Elder dam, which retains the water that creates Lake Waconda, and adjacent to the town of Glen Elder. Limestone Creek drains a broad, well-watered, and well-timbered area north of the Solomon River. The oral history of this stream is very colorful and shows that it has offered a variety of resources to human populations through time. General Land Office (GLO) survey notes and oral history suggest that the networks of tributaries of this stream had oak tree groves from the headwaters to the Solomon River confluence. The rocky outcrops of Limestone Creek were important features for the early European settlers (Ross 1937).

Flora

The Glen Elder locality falls within the potential native vegetation zone of short grass prairie. Early accounts indicate that the blue grama and buffalo grasses dominated the native vegetation. Forbs such as sunflowers were common in areas of poor or shallow soils. Before the introduction of foreign plant life and

farming techniques, native timber found along the ravines and stream edges consisted of cottonwood, elm, box elder, black walnut, hackberry, willow, ash, burr oak, elderberry, plum, and choke cherry (General Land Office 1866; Wedel 1959).

Fauna

Researchers have identified the native fauna of the area through historical accounts, biological studies, and the archeological record. Before the European invasion, the American bison (*Bison bison*) was the dominant herbivore in the locality. The archeological record shows that the bison was an important food resource.

Bison was not the only artiodactyl (hoofed mammal with equal number of functional toes on each foot) in the area that was important to the people on whom this study focuses. Also native to the area were two species of deer: white-tailed deer (*Odocoileus virginianus*) and mule deer (*Odocoileus hemionus*). The white-tailed deer is most commonly found along the forest edge (Jones et al. 1985:313), although preference for this ecological niche does not restrict the white-tail range as they are found throughout the plains. The range of the mule deer is restricted primarily to open prairies, and 14ML417 is found near the eastern edge of this range (Jones et al. 1985:312).

Other artiodactyls native to the area include pronghorn (*Antilocapra americana*) and American elk or wapiti (*Cervus elaphus*). Today pronghorn can be found just southwest of the locality. While not currently found in the area (Jones et al. 1985:311), elk are well represented in the historical and archeological records of the area.

Many carnivores are native to the locality, and most can be found in the area today. They include the coyote (*Canis latrans*), a variety of foxes (*Vulpes velox*, *Vulpes vulpes*, *and Urocyon cinereoargenteus*), raccoons (*Procyon lotor*), skunks (*Mephitis mephitis* and *Spilogale putorius*), badgers (*Taxidea taxus*), and a variety of weasels (*Mustela frenata* and *Mustela nivalis*). Less frequently reported carnivores include the river otter (*Lutra canadensis*), bobcat (*Lynx rufus*), and mink (*Mustela vision*). The European settlers exterminated the wolf (*Canis lupus*), grizzly bear (*Ursus arctos*), and the mountain lion (*Felis concolor*) from the area (Jones et al. 1985; Wilson and Ruff 1999).

Biologists report several other species of mammals in the area, including rodents, insectivores, marsupials, lagomorphs, and chiropterans (bats). Rodents are the most abundant, numbering at least 21 species. Three species of insectivores are well documented in the locality: one mole and two shrews. Native to the area are only one marsupial, the Virginia opossum (*Didelphia virgiana*), and two lagomorphs, the eastern cottontail (*Sylvilagus floridanus*) and black-tailed jackrabbits (*Lepus californicus*). Nine species of chiropterans inhabit the locality.

Many reptiles and amphibians are native to this portion of the Solomon River drainage basin. Although amphibians are very good indicators of the local environment, most of the eight species present here also are found throughout the state of Kansas. These species occupy specific niches and thus are indicators of the variety of environments present in the locality.

The large number of reptiles also is indicative of the variability within the locality. Two native turtles are the common snapping turtle (*Chelydra serpentina*) and ornate box turtle (*Terrapene ornata*), which are reported throughout the plains. Other reptiles include 7 species of lizards and 15 species of snakes (Collins 1982).

Climate

The climate of the Glen Elder locality is typical of the High Plains. The summers are hot, and the winters are cold with sudden temperature variations throughout the year. Brisk winds mark the spring and fall. Annual rainfall varies drastically. For example, in 1936 a total of 12.38 inches of rain fell, while in 1951 the total was 44.70 inches (Fishel 1955:27). The average rainfall from 1901 to 1955 was 24.56 inches.

Cultural Overview of the Glen Elder Locality

An understanding of cultural development of 14ML417 can be attempted only by viewing the local sequence within a regional context. The following discussion is based primarily on a cultural framework previously established in the Central Plains of the United States and most notably in the Glen Elder locality of north-central Kansas (Adair 1996; Blakeslee 1999; Gunnerson 1987; Hofman 1996; Hofman and Graham 1998; Johnson and Johnson 1998; Kay 1998; Latham 1994, 1996; Logan 1996; O'Brien 1984; Steinacher and Carlson 1998; Wedel 1986). The following discussion sets the stage for the Solomon River phase occupation of the locality, but it does not extend beyond the site occupation time period.

The Glen Elder locality is found along the eastern edge of the High Plains. This area is a transitional zone

between the cultures of the eastern Plains and those of the High Plains. Previous investigations in the locality by the author suggest that such a conclusion is well supported, as changes in phases and variants can be readily observed in the prehistoric occupations from east to west across the locality.

Archeologists generally divide the prehistoric cultural sequence of the Great Plains into two pre-ceramic and three ceramic stages. The earliest pre-ceramic stage has been variously designated the Paleoindian, Paleo-American, or Lithic stage and is dated from about 10,000 to 4500 B.C. Following the first pre-ceramic stage is the Archaic or Mesoindian stage, which dates from 4500 B.C. to A.D. 1. The first ceramic stage is known as the Early Ceramic, Plains Woodland, or Formative stage and dates from A.D. 1 to 950. The next ceramic stage is termed the Middle Ceramic or Plains Village, which is the occupation period of 14ML417, dating from A.D. 950 to 1500. The final prehistoric stage in the Great Plains is known as the Late Ceramic, Late Prehistoric, Protohistoric, or Post-Classic stage and dates from A.D. 1500 to 1800, but no discussion of this period is presented here.

Paleoindian

The Paleoindian stage is best defined by the presence of extinct megafauna remains in ecofact assemblages of archeological sites in North America. This stage is generally thought of as a period dominated by highly mobile hunting and gathering bands, living a nomadic lifestyle and exploiting, by choice, a limited number of resources. Within the Glen Elder locality the evidence of Paleoindian people is scant and was identified by the presence of projectile points only.

Two Folsom projectile points, which date to around 9000 B.C., were recovered from upland landform surfaces in Mitchell County (Hofman 1996; Latham 1996). One of these projectile points were made from Alibates/Day Creek dolomite from the Texas Panhandle (Latham 1994, 1996). Local collectors along Limestone Creek also have reported the presence of Folsom projectile points.

A distinct increase in lanceolate projectile point styles occurred across the Great Plains during late Paleoindian times. An approximate date range of 9000 to 8000 B.C. has been established for the late Paleoindian Plainview complex. Two Plainview projectile points have been recovered in the Glen Elder locality, but both were within a Solomon River phase house at Waconda Lake (Blakeslee 1999). These projectile points were made from Smoky Hill jasper, the most common locally available lithic source.

Several other Paleoindian complexes are found throughout the Central Plains, but no evidence of these is recorded in or near the Glen Elder locality. For discussions on these complexes in the Central Plains, see Brown and Logan (1987), Hofman (1996), and Hofman and Graham (1998).

Archaic

Occurring during the Middle Holocene, the Plains Archaic period was marked by the warmer and drier climate of the Hypisthermal episode (Kay 1998). By about 4500 B.C. most of the megafauna that had populated the continent had become extinct. The possible explanations for these mass extinctions range from climatic change to overkill by Paleoindian hunters. Regardless of the mechanisms that led to the extinctions, the facts are that climatic conditions changed and the megafauna became extinct. These factors in turn forced modifications in varying degrees to be made in the cultural traditions across the Great Plains. Some complexes exhibit these changes or modifications as increased diversity in the stone tool assemblage, including ground and polished tools, an increased reliance on smaller and more varied game species, and the exploitation of a wider array of plant foods. These groups increased in numbers and became more sedentary. In contrast, other complexes appear to have continued much the same as their Paleoindian ancestors. Finally, at the end of the Archaic stage, experimentation with plant domestication and ceramics manufacturing became evident (Kay 1998; Willey and Phillips 1958).

There are few Archaic sites officially recorded in or near the Glen Elder locality, although local informants and landowners report numerous sites and isolated finds of Archaic projectile points. No Early or Middle Archaic sites have been documented in the Glen Elder locality. At least one Late Archaic site was exposed in the profile of a trench silo along Oak Creek in Smith County (Latham 1996).

Plains Woodland (Early Ceramic)

The common label for this time period between the Archaic and Central Plains tradition is Woodland, a carryover from studies conducted in the woodlands of the eastern United States. Fundamental changes in technology are similar in both regions, but the adaptations are considerably different. The diagnostic artifacts that differentiate this stage are pottery and the bow and arrow. In certain areas of the Plains, pottery is actually introduced first during the late Archaic. Subsistence patterns developed such that horticulture

was becoming prevalent and, as the bow and arrow suggest, hunting techniques also varied from those of the Archaic. In certain portions of the Central Plains, these developments began around 500 B.C. (Adair 1996).

Six Plains Woodland sites have been documented in the Glen Elder locality. Only two actually contained ceramic artifacts, placing one in the early and the other in the late portion of the cultural period. The other four sites were identified on the basis of the projectile point styles in their artifact assemblages. Two appear to be early to middle Plains Woodland, while the other two are likely late Plains Woodland.

A cluster of Plains Woodland sites has been identified in the Osborne locality, just upstream on the Solomon River drainage (Latham 1996). The ceramic artifacts recovered at these sites are very crude, thick-walled, and vertically cordmarked conical vessels, which are similar to those within the Keith variant assemblage. The projectile points are small, corner-notched (Scallorn-like) arrow points, another key diagnostic of the Keith variant (Adair 1996).

Another aspect that separates this cultural manifestation from the Plains Woodland sites identified within the Glen Elder locality are the raw lithic materials. The Plains Woodland sites of the Osborne locality have a mixture of raw lithic sources, including the local Smoky Hill jasper and Ogalala quartzite, plus Flattop chalcedony, Permian cherts from the Flint Hills, and Alibates/Day Creek dolomite from the Texas and Oklahoma panhandles. The variety of raw materials may suggest that these people were still highly nomadic, whereas the few late Plains Woodland sites recorded in the Glen Elder locality had a raw lithic assemblage of local materials. Little evidence of the Keith focus has been found within the Glen Elder locality (Latham 1994, 1996). A few mounds along the bluffs overlooking the Solomon River have been recorded, but looters have heavily disturbed all of these and little cultural evidence remains.

Central Plains Tradition

Site 14ML417 has been classified as a Solomon River phase house site. The Solomon River phase is one of several phases of the Central Plains tradition (CPt) or Central Plains mosaic (Cpm) (Blakeslee 1999). In this study the Solomon River phase is classified under CPm. Below is a discussion of the Solomon River phase, but more detailed reviews of the specific attributes can be found throughout the following sections.

The Middle Ceramic Solomon River phase sites represent the best-documented prehistoric occupation of the locality. Most attributes of the Solomon River phase have been gleaned from the 15 sites that the University of Nebraska excavated between 1964 and 1966 (Blakeslee 1994, 1999; Carlson 1971; Krause 1969, 1970, 1982, 1995; Latham 1994, 1996; Lippincott 1976, 1978).

The people of the Middle Ceramic stage of the Central Plains were semi-sedentary horticulturists. They lived in semi-rectangular to circular earthlodges throughout most of the Central Plains. Their subsistence included raising crops of corn, beans, and squash, gathering many native vegetal foods, and hunting nearly every type of animal native to their area.

The Solomon phase people built their earthlodges on the ground surface or just below the sod. A hearth was usually near the center of the floor. Additional features within the house were various scattered post molds and storage pits. These cache pits varied in number "from one to ten and in form from bell-shaped, straight-sided, and contracting to basin-shaped" (Lippincott 1978:63).

The work-storage areas found at these sites typically include several post molds of no definable pattern, storage or trash pits, and heavy concentrations of chipped stone and faunal debris. Features/concentrations were called work-storage areas when no central hearth was present or post patterns and placement of pits were irregular (Blakeslee 1999; Lippincott 1978:63).

The sites of the Solomon River phase are of various sizes. The largest are multi-house sites, described as farming hamlets of 6 to 10 earthlodges on the first terrace of the North and South Solomon rivers. Unfortunately, at the largest of these sites (14ML15), only three lodge floors could be distinguished (Blakeslee 1999). Smaller sites include single houses along the well-watered Oak Creek tributary and campsites found throughout the area (Krause 1969, 1970, 1982, 1995).

The author identified many of the Solomon River phase sites in the locality by artifact clusters (Latham 1996). Many of these lodges have been destroyed by cultivation, and remaining evidence is scant. The house sites were situated on terraces (T2) near hardwood tree groves and springs, separated by 200 meters or less. The artifact clusters were found on extensions of the terraces overlooking the stream or on the highest portion of the terrace. This pattern may represent a rural community setting, much like what was defined in some studies of Caddo settlement pattern (Latham 1996) and the earlier Keith variant sites in the region (Adair 1996). Site 14ML417 may have had at least two house loci that could have been contemporaneous. The limits of the site were not accurately defined, thus

the presence of additional houses is unknown. Due to the proximity of a large spring, it is entirely likely that additional houses were present. The continued cultivation of the fields may have destroyed much of this evidence.

Previous Archeological Investigations

The purpose of this section is to give a brief overview of the previous archeological work conducted within the Glen Elder locality and site 14ML417. Most archeological investigations were the result of federally mandated cultural resource management, which focused on the federal property surrounding Lake Waconda. The institutions associated with early archeological investigations of the locality include the Nebraska State Historical Society, University of Kansas, and Missouri River Basin Survey of the Smithsonian Institution. The University of Nebraska, Kansas State Historical Society, Bureau of Reclamation, and Wichita State University (WSU) conducted later investigations.

Archeological Investigations Prior to the Construction of Lake Waconda

In 1937 a crew of archeologists from the Nebraska State Historical Society, led by George Lamb, conducted the first recorded reconnaissance survey within the Glen Elder locality. From the descriptions of the investigation, it is apparent that the survey was not conducted in a systematic manner, as they only visited sites that local informants disclosed to them. Small surface collections were taken from a few sites that were visited, some of which are temporally diagnostic of the Solomon River phase of the CPt. The survey results were never published.

Prior to 1952 a crew of archeologists from the University of Kansas, under the direction of Dr. Carlyle Smith, visited the locality and recorded several sites, most of which have been assigned to the Solomon River phase. Many of these sites later became instrumental in establishing the cultural sequence of the locality. Even though samples were collected, none of the sites was mapped or accurately recorded. The field crew depended on local informants to disclose site locations, and this proved to be a fast and productive means for finding many of the significant sites in the locality.

In 1952 Ralph S. Solecki and J. Mett Shipee conducted a preliminary archeological reconnaissance in the vicinity of the proposed Lake Waconda for the Missouri River Basin Survey of the Smithsonian Institution. The crew spent a total of four days in the field recording archeological sites that the construction of the Glen Elder Dam would adversely affect. The methods used by the survey crew included local inquiries at all farmsteads within the proposed project area. Crew members supplemented sample collections with a few small test excavations. One of the 17 sites investigated was designated 14ML4, which was later recorded as 14ML417. Records and maps were such that the actual placement of the site on the landscape was unknown. Later investigations discussed below will clarify the archeological history of 14ML417.

The Anthropology Department of the University of Nebraska conducted the largest salvage archeological investigations within the locality. A series of archeological field schools from 1964 to 1967 supplied most of the work force for this project. The fieldwork focused on the habitation sites of what was termed the Upper Republican phase, now classified as the Solomon River phase (Blakeslee 1999; Latham 1996).

A comprehensive report outlining the results of these field schools was never published. Nevertheless, much has been written about the settlement patterns of the Middle Ceramic sites that were investigated (Krause 1969, 1970, 1982; Lippincott 1976). For references on the individual sites, one must turn to student papers written for a seminar class at the university.

The actual field investigations usually were restricted to previously recorded sites in and around the proposed lake. However, local inhabitants continually informed the crews of archeological sites around the area. Most of these sites were investigated by selected crew chiefs. On other occasions the entire crew left the site they were working on and conducted site surveys (James O. Marshall [archeological crew member for the University of Nebraska during 1960s excavations at Waconda Lake], personal communication 1996). Unfortunately not all the sites investigated were recorded, and incomplete reporting of some that were assigned site numbers created confusion when the site numbers were duplicated in later projects.

The area of investigation was usually restricted to the project domain and short distances up Oak Creek and the South Solomon River. Very little time was spent investigating the tributary streams beyond the proposed impact area of the lake. Time constraints did not allow for systematic surveys (James O. Marshall, personal communication 1996). During the field schools two individuals conducted separate local inquiry surveys in attempts to identify additional sites.

Most of these inquiries took place just west of the Glen Elder locality. However, a few Solomon River phase sites were found within the Glen Elder locality.

Louis Ritz of Downs, Kansas, conducted the first of these local inquiry surveys. In July 1967 Krause had Ritz investigate along the South Solomon River, just upstream from the proposed lake. At several farmhouses in the area, Ritz (n.d.) asked about prehistoric sites. Although he recorded many Middle Ceramic sites, none was within the boundaries of the Glen Elder locality, and none was assigned a site number.

Student Dean Bergman conducted the second local inquiry survey. This survey was done in July 1967 and used the same methods as Ritz. This investigation also was concentrated just west of the locality. However, he did record a single Solomon River phase site within the locality (Bergman 1967). This site, 14SM502, is found on the east side of Oak Creek.

Archeological Investigations After Glen Elder Dam Construction

Kansas State Historical Society

After the Glen Elder Dam was completed, few archeological investigations took place in the locality until 1989. The KSHS conducted most of these small projects. These were usually small highway and secondary road projects, spread throughout the locality, where proposed construction was taking place in high probability areas for archeological sites.

Six of these projects were undertaken in areas outside Waconda Lake. These were the first recorded systematic surveys within the locality and the first samples upstream on several of the tributaries. Surveys totaling 140 acres along the mid-section of Carr Creek supplied the farthest upstream sample of this tributary (Reynolds 1980). Additional surveys along the mid-section of Limestone Creek netted 135 acres (Reynolds 1983). Oak Creek was the only other tributary to have any of these small surveys, for a total of 120 acres (Williams 1985). No new sites were recorded during these surveys.

Wichita State University

WSU archeologists conducted the largest systematic survey of the locality, covering the federal property around Waconda Lake. The crew for the four archeological field school sessions consisted primarily of students from the university. They recorded eight Solomon River phase sites and revisited several of the previously recorded sites, conducting limited text excavations on some. Much of the previous work and the WSU investigations on Solomon River phase sites in the Waconda Lake project domain was synthesized and data used to develop an updated interpretation by Blakeslee (1999).

The final archeological project to date within the locality was a sampling survey conducted by the author to test the adequacy of the sample size used to describe the settlement patterns of the Solomon River phase. A total of 48 Solomon River phase sites were recorded in the Glen Elder locality prior to this investigation; after the study 75 such sites were known, a number that continues to grow with help from local informants. The investigation also included recording several Solomon River phase sites to the west of the Glen Elder locality, in what the author has named the Osborne locality (Latham 1996).

Site 14ML417 was one of the sites used in the study to develop a site distribution model for the Glen Elder locality. It proved significant to this study because it contains the only house floor excavated outside the Waconda Lake project domain. Time spent reviewing the artifacts curated at the KSHS and conversations with the late John Reynolds led to this study.

Research Methods

This section describes many of the technical aspects of the 1980 fieldwork and recent artifact assemblage analysis of 14ML417. The archeological investigation of this site included a variety of methods, which are briefly described below.

Field Methods

The main objective for excavating the site was to gain knowledge of the Central Plains occupation of the locality. This objective was directly related to the opportunistic character of the Kansas Archeology Training Program (KATP) field school or dig, which allows researchers to pick a site in Kansas that could contribute at some level to the knowledge of a particular area, locality, or culture. In this case three areas were defined and designated with three-digit codes, the first two digits being the year of the investigation: 801, 802, and 803 (A801, A802, and A803).

Hand Excavation

The main goal of the investigations was to find and excavate the remains of a Cpt house. To undertake this search at 14ML417, excavations were placed in areas where magnetometer tests indicated possible subsurface features or deposits. Hand excavation was limited to shovel skimming and troweling. The

excavations were in 1 x 2-m and 2 x 2-m units in A801, irregularly shaped units in A802, and 2 x 2-m units in A803, for a total of 358 m2 of excavation.

The units in A801 and A803 were uniform to obtain more detailed artifact distribution information and to determine the density of materials across the site. Excavation was conducted in arbitrary 15-cm levels. It was determined that the plow zone (AP soil horizon) extended to a depth of approximately15 cm; therefore, level 1 (surface to 15 cm below surface) was not screened. Units were excavated to 30 cm below the surface in two 15-cm levels, with at least one unit extending to 32 cm below the surface.

The block excavation in A802 revealed a house floor and numerous features, leading to numerous adjustments in the placement and irregular shape of the units. Excavations in A802 also included several narrow exploratory trenches that were quickly excavated in the search for external features or middens around the house. The plow zone was quickly skimmed away and not screened. After the features were revealed, excavation procedures switched to troweling, and all features, tools, pottery rims, and clusters of artifacts and ecofacts were plotted with a transit. Each of the tools and artifact clusters was given a feature number. However, for the purposes of this report, the features are defined as nonportable artifacts, such as storage pits, post molds, and hearths.

Feature Excavation

Identified features were assigned numbers and then troweled clean for plan view photographs and drawings. Each feature was bisected to reveal its profile, and the profile was photographed and sketched. Then the other half of the feature was removed. The entire feature fill was bagged for flotation processing. Bioturbation had disturbed most of the features, several to the point that soil or other analyses of the feature fill would not be reliable. In those cases the fill was passed through the flotation process, but no other studies were conducted.

Flotation Samples

The field notes on file at the KSHS indicate that soil samples from features were processed through flotation. Unfortunately, the size of these samples was not documented. It may be that the entire feature fill was processed, but it is known that the tools and other large artifacts and ecofacts were collected and plotted as separate specimens. In any event the flotation process recovered many botanical and faunal specimens and very small flakes of chipped stone from late stage tool production or maintenance.

Site Mapping

The site grid was established off of the magnetometer study and mapped with a transit by John Reynolds. The site map included selected corners of certain excavation units, the outline of the block excavation in A802, and a few modern features of the landscape, such as the county road. Mapping also included the house features and the tools, artifact clusters, and ecofacts within the house.

Laboratory Methods

KAA members and KSHS staff processed many of the artifacts recovered during the 1980 excavation during the KATP field school and concluded the task back in the KSHS laboratory in Topeka shortly after the project concluded. The catalogue established for the site had general artifact types, such as chert flake or chip, modified flake, projectile point, knife, end scraper, and biface.

Prehistoric Artifact Collection and Analysis

Artifacts and ecofacts were collected from the excavations, and a series of surface collections were also made. The collection was identified, sorted, and tabulated according to functional categories, material, and provenience and is presented in the following sections. Raw material identification was based on the macroscopic inspection of the artifacts.

Chipped-Stone Technological and Functional Analysis

Observations of morphology were used to sort stone tools and debris into general categories and eventually place them into more specific divisions based on form, function, or debitage type. The classification of these artifacts was based on visual observations–many times supplemented by use of a 10-power hand lens–of the edges and surfaces of the artifacts. Granted, this approach is not as precise as high magnification, but the goals of this analysis were simple: separate tools from debitage and place tools into general categories based on technology and function.

The chipped stone artifacts were size graded to assist in the material analysis. A scale was developed to aid in rapid recording of debris sizes, recording the largest measurement: 1 = 4 inches (101.6 mm), 2 = 3 inches (76.2 mm), 3 = 2 inches (50.8 mm), 4 = 1 inch (25.4 mm), 5 = >.5 inch (12.7 mm), 6 = >.25 inch (6.35 mm), 7 = >.125 inch (3.175 mm), and 8 = >.0625 inch (1.5875 mm). The debris from A801 was separated, while materials from A802 and A803 were lumped together.

Table 2. Summary of the Functional Categories Established by Blakeslee (1999).

Functional Categories	Chipped Stone	Ground Stone/ Stone	Bone	Antler	Shell	Ceramics
Large Game Hunting & Hide Processing	Points Preform Points End Scrapers Choppers Beveled Knives Perforators		Hide Grainers Metapoidal Hide Fleshers Scapula Fleshers Tibia Fleshers			
General Hunting/ Fishing	Points Preform Points Knives Retouched Flakes Flake Scrapers		Fishhooks Fish Gorges Fishhook Blanks			
General Hide Working	Perforators Flake Scrapers		Bone Awls Eye Needles Split Deer Metapoidals Bison Scapula & Bison Vertebral Spine Beamers Rectangular Scapula Tools			
Swiddening	Axes Celts Adzes Hoes	Axes Celts	Bison Scapula Hoes Bison Frontal Hoes Bison Tibia Digging Tips Bison Ulna Picks Antler Rakes Squash Knives Scapula Cleavers Deer Mandible Sickles			
Gathering		Nutting Stones	Digging Stick Tips			
Food Preparation & Storage	Knives Retouched Flakes	Milling Stones Manos Mortars	Deer Crania Spoons		Mussel Valve Scrapers Mussel Shells w/ Serrated Edges Tanged Mussel Valve Spoons	Jars Bowls Ladles
General Manufacturing	Gravers Drills Wedges	Grooved & Un-grooved Abraders Clinker Abraders Sandstone Shaft Smoothers Discoidal & Unshaped Cobble Hammer Stones Anvils Lithic Debitage	Edge-Slotted Knife Handles Shaft Wrenches Cancellous Bone Paintbrushes Gouges Worked Bone Fragments	Tine Flaking Tools Shaft Wrenches Wedges or Chisels Beam Handles Hammers Rubbing Tools Grooved Antler Sections Antler Fragments w/ Tines Removed		
Clothing & Adornment		Beads	Bodkins Cylindrical Mammal & Bird Bone Beads Larger Mammal Bones Tubes Deer Phalanx "Tinklers" Mammal Tooth Pendants Bison Scapula Gorgets	Bracelets Bodkins	Mussel Shell Disk Beads Mussel Shell Tapered Narrow Triangular Pendants Mussle Shell Gorgets	

Functional Categories	Chipped Stone	Ground Stone/ Stone	Bone	Antler	Shell	Ceramics
Ceremonial		Pebble or Biscuit Form Pipes Elbow Pipes Effigy Pipes Cylindrical Pipe Human Effigy & Faces Pigments Pendants of Quartz Crystal & Kansas Pipestone Lunate Pendant Earspool Fragment Galena Selenite Crystals	Human Calvarium Bowl & Other Worked Human Cranial Bones Eagle Bone Whistle Turtle Carapace Rattle Ground & Polished Turtle Costal Bone Effigies	Decorated Bow Guards	Effigies Disks	
Unknown			Oblong Bone Objects Laterally Punched Bison Phalanges	Spatulate Objects Dressed Cylindrical Sections		

Sorting of artifacts by raw material type was undertaken, and the results were synthesized to show lithic source distribution for the prehistoric occupants of 14ML417. The materials were subdivided macroscopically into categories based on color, texture, crystal size, inclusions, form, and other diagnostic attributes. They were quantified according to count, weight, material type, and provenience.

Ceramic Technological and Functional Analysis

The ceramic sherds were initially classified according to temper, thickness, and sherd type (body or rim). Only rim sherds were measured, and the morphological traits of each specimen were described in detail. Zone decoration, rim type, vessel size, and other morphological characteristics of the rims were used to identify individual vessels. Based on these observations, the number of jars and bowls could be ascertained for each area of the site. A summary of the ceramic analysis and results is presented in a subsequent section.

Faunal Analysis

The 14ML417 faunal assemblage was analyzed using the comparative osteological collections at WSU in Wichita, Kansas, and those of the private collection of John T. Penman. Mr. Penman also assisted in the identification of several of the birds and small mammals, amphibians, fish, and reptiles represented in the faunal collection. Numerous literature sources were also used for skeletal and habitat information (e.g., Balkwill and Cumbaa 1992; Brown and Gustafso 1989; Casteel 1974, 1976; Ford 1990; Gehr 1995; Gilbert 1990; Gilbert et al. 1985; Hargrave 1972; Hillson 1986; Jones and Manning 1992; Lawrence 1951; Lyman 1994; Lyman and Fox 1998; Olsen 1960, 1968; Shaffer 1992; Sisson 1921; Thomas 1969, 1971; Whyte 1991).

Faunal elements were identified to the most refined taxonomic category possible, and the summary is presented in a later section. In addition to the taxonomic identification, taphonomic evidence was gathered, including presence of rodent gnawing, presence and location of butchering or skinning cuts, evidence of intentional cultural modification, and minimum number of individuals represented.

Dating Materials

A single radiocarbon date was obtained from the hearth (F435) at 14ML417. The material (assigned laboratory number Beta-9583) was sent to Beta Analytic Inc., Coral Gables, Florida, on May 31, 1984, by Don D. Rowlison, Kansas State Historical Society.

Functional Classifications

Blakeslee (1999:132-135) developed a list of functional classifications, based on a review of the literature, for non-ceramic artifacts for the period variously termed the Middle Ceramic, Central Plains mosaic, or Central Plains tradition in the Central Plains (see Table 2). Obviously, there is no consistency in

the artifact categories used by archeologists. To help remedy this in regard to the Solomon River phase and the Glen Elder locality, this report follows Blakeslee's functional categories with some additions. Definitions of the categories and artifact types are discussed below.

Artifacts associated with the various functional categories include ceramics, chipped stone, ground stone, and bone (Table 2). Definitions and descriptions of these types are presented in the related sections below. During the investigations at 14ML417, 10 functional categories were identified among the various artifact types recovered.

Results of Investigation

The archeological investigation at 14ML417 involved the block excavation of Solomon River phase habitations (A801 and A802) and surrounding work area (A803). A total of 358 m^2 were excavated to a depth of 30 cm at the site during the investigation. The following discussion is a summary of the 1980 investigation results; detailed discussions of the artifacts and features are presented in the following sections.

A801 Investigations

On visits to the site prior to the 1980 excavations, KSHS representatives defined A801. During the initial phases of the project, this area was subjected to extensive investigations, including magnetometer tests and test excavations. The test excavations were placed on a grid system in an attempt to locate any subsurface features that would assist in defining the house that was presumed to be present.

Magnetometer Tests

On May 8, 1980, John Reynolds, Bill Brogan, Bruce Jones, and Don Rowlison left Topeka for the Glen Elder area. The purpose was to conduct a proton magnetometer test on 14ML417. In order to systematically conduct the test, a 1-m grid, 20 x 20 m, was established along the eastern edge of the north-south county road between Sections 9 and 10, R9W, T6S. This gridded portion of the site, labeled A801, is found on the western edge of the site (Figure 2).

The magnetometer test indicated that there was a strong possibility of buried features (John D. Reynolds, personal communication 1996). With these findings it was decided that the KAA excavation crew would begin work in A801 during the 1980 field season.

Surface Collection

A series of surface collections were made throughout the project, but only one was undertaken for A801. On May 8, 1980, John Reynolds, Bill Brogan, Bruce Jones, and Don Rowlison collected surface artifacts in A801. This surface collection contained most of the formal lithic tools recovered from A801 and showed an artifact concentration on the highest portion of the site, adjacent to the county road.

Excavations Units

From May 31 to June 4, 1980, a crew of 43 (Table 1) excavated 22 units measuring 2 x 2 m and 14 units measuring 1 x 2 m in A801 (Figure 2). The initial units were 2 x 2-m, but as the project proceeded and no indications of a house or other cultural features were identified, the crew began a more exploratory phase of the investigation. To explore A801 more fully, the units were reduced in size to 1 x 2-m. A total of 36 excavation units were dug during the first few days of the investigation at the site, covering 116 m^2 or 29 percent of A801. The fill was screened through ¼-inch hardware mesh on the first couple of days, but it was decided that the plow zone would no longer be screened, as it was in disturbed context. The only feature encountered was that of a waterline trench that was laid a few years prior to these investigations.

The arbitrary levels excavated were 15-cm intervals, with a maximum depth of 30 cm. Throughout the excavations the plow zone was defined as being relatively shallow, ranging from 12 to 17 cm below the ground surface.

Archeological materials were recovered from most of the excavation units (Table 3), but several had very light artifact density. The highest artifact concentration was along the edge of the county road, generally within the west-central and northwest portions of A801.

1 x 2-m Units

The 14, 1 x 2-m units were excavated at the northern and southern ends of the A801 grid. All of these units were on a 2-m grid, but only half of each unit was excavated. The south half of 10 units placed at the south end of the grid were excavated, while the east half of the 4 units placed at the northern end of A801 were excavated. Two of the northern units, X1160 and X1162, were placed north of the original grid and, therefore, were assigned distinct numbers. It is not clear where these units are on the grid, as there is no site map or notes that refer to their locations, other than that they are north of the original grid. All of

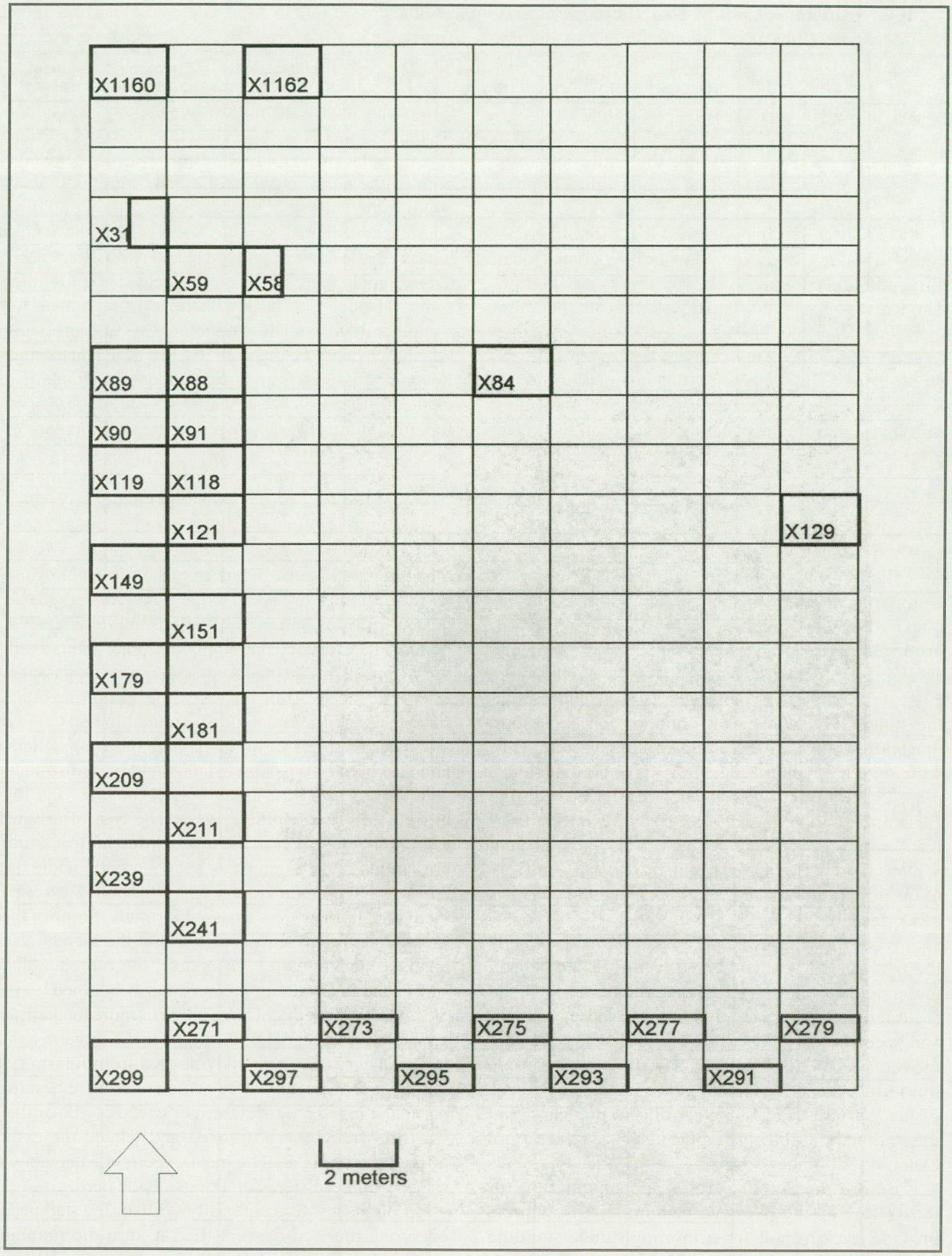


Figure 2. Distribution of Excavation Units in A801.

Table 3. Excavation Units by Size and Material Present in A801.

Test Unit	Size	Level	Lithic Debris	Tools	Ceramic Rims	Body	Architectural Daub	Faunal Mammal/etc.	Mussel Shell
X31	1 X 2	1	X	X				X	X
		2	X		X		X	X	X
X58	1 X 2	1	X						
		2	X						
X59	2 X 2	1	X	X				X	X
		2	X		X		X	X	X
X61	2 X 2	1	Abandoned--on pipeline						
X62	2 X 2	1	No Artifacts						
		2						X	X
X81	2 X 2	1							X
		2	X			X			X
X88	2 X 2	1	X	X	X				X
		2	X	X	X	X	X	X	X
X89	2 X 2	1	X	X	X			X	X
		2	X				X	X	X
X90	2 X 2	1	X		X			X	X
		2	X	X	X	X	X	X	X
X91	2 X 2	1	X	X	X			X	X
		2	X	X	X			X	X
X117	2 X 2	1	No Artifacts						
		2	No Artifacts						
		3	X					X	X
X118	2 X 2	1	X		X	X		X	X
		2	X			X	X	X	X
X119	2 X 2	1				X		X	X
		2	X	X	X		X	X	X
X121	2 X 2	1		X	X	X		X	X
		2	X					X	X
X129	2 X 2	1	No Artifacts						
		2	No Artifacts						
X149	2 X 2	1	X	X		X		X	
		2	X	X	X	X			
X151	2 X 2	1	X	X		X		X	X
		2	X		X		X	X	X
X179	2 X 2	1	X	X	X			X	X
		2	X	X	X		X	X	X
X181	2 X 2	1	X	X	X	X		X	X
		2	X					X	
X209	2 X 2	1	X		X			X	X
		2	X	X				X	X
X211	2 X 2	1	X	X				X	X
		2	X	X	X	X	X	X	

Test Unit	Size	Level	Lithic Debris	Tools	Ceramic Rims	Body	Architectural Daub	Faunal Mammal/etc.	Mussel Shell
X234	2 X 2	1	X						
		2	No Artifacts						
X239	2 X 2	1	X		X				
		2	X	X				X	
X241	2 X 2	1	X	X	X				X
		2	X	X	X		X	X	X
X271	2 X 1	1	X		X	X			
		2	X	X		X			
X273	2 X 1	1	No Artifacts						
		2							X
X275	2 X 1	1	X			X			X
X277	2 X 1	1							X
X279	2 X 1	1	X						
		2						X	
X291	2 X 1	1	No Artifacts						
		2	No Artifacts						
X293	2 X 1	1	X						
X295	2 X 1	1	X						
X297	2 X 1	1	X						X
		2	X			X			
X299	2 X 1	1			X				
		2	No Artifacts						
X1160	2 X 1	1	X						
		2	No Artifacts						
X1162	2 X 1	1	X	X	X	X			X
		2	X	X		X		X	X

these units contained artifacts, but the density varied extensively. The units at the south end of A801 had very few, if any, artifacts per level.

2 x 2-m Units

Seventeen of the 22, 2 x 2-m units were placed along the western edge of A801. The highest artifact density was found on the highest elevation of the northwest edge of A801. It is in this higher area that the most evidence of a structure, in the form of daub, was recovered.

Artifact Descriptions

The artifacts recovered from A801 were of 5 of the 10 categories defined by Blakeslee (1999) and presented in Table 2. These categories include large game hunting and hide processing, general hunting/fishing, food preparation and storage, general manufacturing, and clothing and adornment. The most common items were chipped stone tool production and maintenance debris (n=749) (general manufacturing), of which 114 artifacts (15 percent) were recovered from the surface. A801 produced 77 chipped stone tools, of which nearly half were retouched flakes. These tools represent the categories of large game hunting and hide processing, general hunting/fishing, and food preparation. A single bone bead represented the final category, clothing and adornment.

A801 may have been an activity area adjacent to a house site. Such areas are common for similar habitation sites in the Glen Elder locality (Blakeslee 1999; Krause 1969, 1970, 1982; Latham 1996a; Lippincott 1976, 1978). However, in contrast to A801, many activity areas in other sites have associated features, ranging from a combination of storage pits and post molds to a series of storage pits. The lack of features in

the work area of 14ML417 clearly separates inter-site behaviors within the locality.

The likelihood that A801 was an activity area is further in question, as the scattering of artifacts may not tell the entire story or function of the human occupation. With a county road essentially defining the west boundary of the area, the possibility of features and structural remains under or west of the road must not be overlooked. The construction of the ditches and road also has adversely impacted the area. No radiocarbon dates were obtained from A801, and ceramic analysis indicates that A802 (see page 46) and A801 may not be directly related.

A802 Investigations

During the magnetometer testing of 14ML417, a second portion of the site was investigated on a lower terrace along the eastern edge of A801. This area, labeled 802, included the house floor, features, and artifacts that supply most of the data discussed in the following chapters of this document. A brief overview of the results of the investigation in A802 follows.

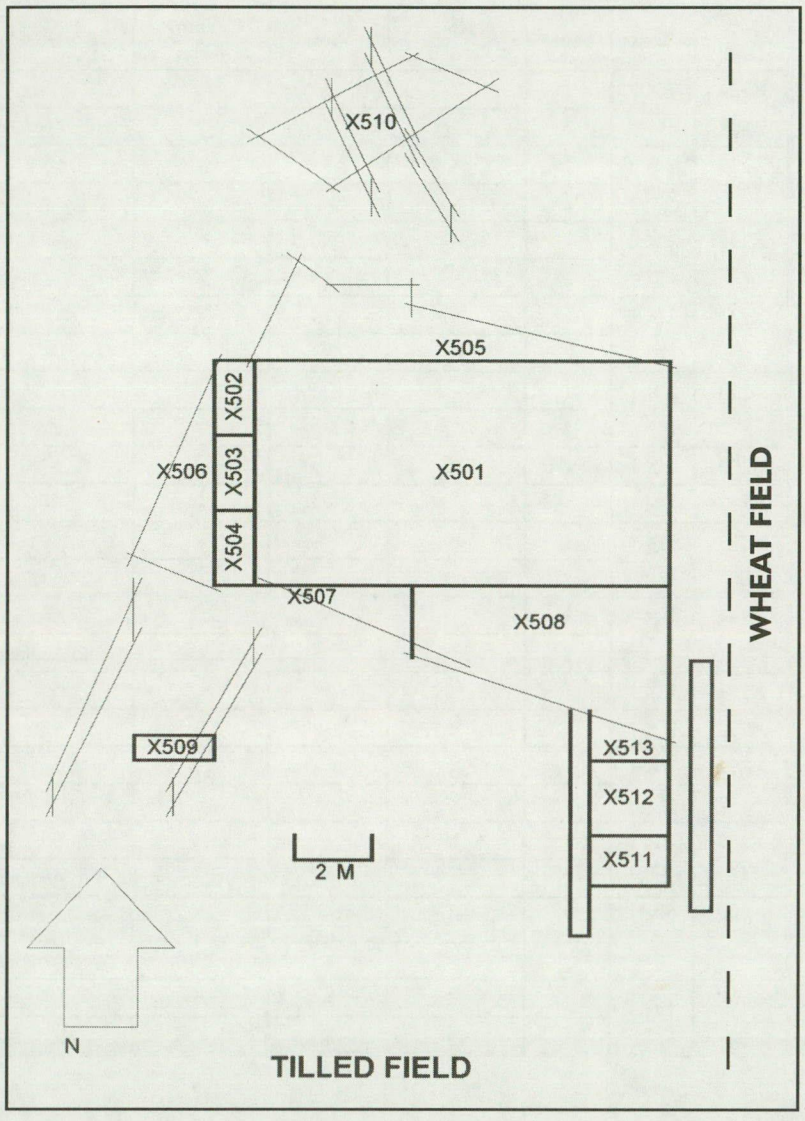


Figure 3. Excavation Units in A802.

Magnetometer Test

On May 31, 1980, a second magnetometer test was conducted at 14ML417, this time in A802. A 20-m grid was established over the area with a reference point in the northeast corner of the grid. The results of this magnetometer test were not conclusive, and the area was not expected to contain any intact features.

Additional Investigations

When State Archeologist Thomas A. Witty, Jr. visited the excavation of A801, he found that the crew was recovering few artifacts and no features or intact cultural deposits. After hearing the frustrations of the excavators, Witty went down the terrace slope to another artifact concentration and conducted some soil core tests, which indicated subsurface deposits. In fact, he pushed the Oakfield coring tool through a pit feature within what would prove to be a house floor. With this new insight on the composition of the site, the investigation of A801 was abandoned, and attention turned to the area where Witty had found the subsurface deposits.

Surface Collections

The first of a series of surface collections was undertaken at A802 during the May 9, 1980, visit to the site by John Reynolds, Bill Brogan, Bruce Jones, and Don Rowlison. After it was determined that A801 was not productive enough, A802 was selected for excavation. On June 4, 1980, Don Rowlison and the KAA crew collected two bags of artifacts from the A802 surface.

Excavations

Excavation procedures for A802 were irregular and less controlled than those for A801. Initially, instead of defining excavation units, the overburden was shovel-skimmed from the vicinity of the cored feature. This procedure allowed for more rapid exposure of house features, which was critical as the allotted time for the investigation was rapidly coming to an end. Excavation unit numbers were assigned to the A802 excavation block after the initial shovel skimming for more control of the provenience of artifacts and features. These units were numbered from X501 to X513, with X501 being the largest of the units, measuring 9 x 10 m (Figure 3). Along with these irregularly shaped units, several exploratory trenches about 30 to 50 cm wide were excavated. In all, approximately 210 m^2 were excavated in A802.

A802 Artifacts

The highest artifact density and diversity at the site was recorded in A802. The artifacts were placed in 8 of the 10 categories defined by Blakeslee (1999) and presented in Table 2. The majority of chipped stone, ground stone, and bone tools were found in the house locus of A802. A total of 85 ceramic jars were identified, including all of the complete and partially complete ceramic vessels. Chipped stone tool production and maintenance debris was the most common artifact category represented, as 1,016 flakes and other debris were recovered from the surface, excavation of the house floor and surrounding area, and features. About 14 percent of the debris was recovered from the surface, while 46 percent came from seven house features, including four storage pits, a mortar, a post mold, and the hearth. Three of the features (two storage pits and the post mold) contained only three pieces of chipped stone debris and few other artifacts. The hearth yielded about 44 percent of all feature debris: more than 70 percent were tiny flakes resulting from the retouching of tool edges. These were too small to be recovered in the standard screening process and were collected in the flotation.

A803 Investigations

A803, northeast of A801 and immediately north of A802, was part of the magnetometer grid area around A802. A802 and A803 yielded similar, inconclusive readings. After the house floor was identified in A802, a small block excavation was undertaken in A803 to determine if subsurface features and intact deposits were present there. This 4 x 8-m or 32 m^2 excavation block was excavated in 2-m^2 units.

As with the other excavations, A803 units were excavated by shovel skimming in two 15-cm levels. No features were identified. Artifact density was very light, with most of the material recovered from the plow zone.

The very few artifacts recovered in A803 were limited to 3 of the 10 categories defined by Blakeslee (1999) and presented in Table 2. In fact, only two tools, an end scraper and the tip of a projectile point, were recovered in the block excavation. Numerous pieces (n=198) of chipped stone debris, a preform fragment, and a single bone bead also were found. The faunal remains included mostly mussel shell fragments, of which only four were identifiable by species, and a few bone fragments, none identifiable except a rodent incisor fragment.

Architecture of 14ML417

Summary of Solomon River Phase Architecture

The permanent habitation structures associated with CPt sites had nearly square to sub-rectangular floors with rounded corners (Steinacher and Carlson 1998). A clear pattern of post molds is usually the distinction between a house and a work-storage area. Houses usually have an extended entrance, but the pattern and number of posts in them are inconsistent and thus they can be difficult to identify. Entryways are lined with small diameter post molds in two semi-parallel jagged lines (Lippincott 1976:61).

The Solomon River phase people built their earth lodges on the ground surface or just below the sod. A hearth was usually near the center of these floors with additional features within the house such as scattered post molds and storage pits. Cache pits vary in number "from one to ten and in form from bell-shaped, straight-sided, and contracting to basin-shaped" (Blakeslee 1999; Lippincott 1978:63; Steinacher and Carlson 1998).

When no central hearth was present or post patterns and placement of pits were irregular, feature concentrations were called work-storage areas (Blakeslee 1999; Lippincott 1978:63). The work-storage areas found at many of these sites were a scattering of post molds in no definable pattern, storage or trash pits, and heavy concentrations of chipped stone and faunal debris.

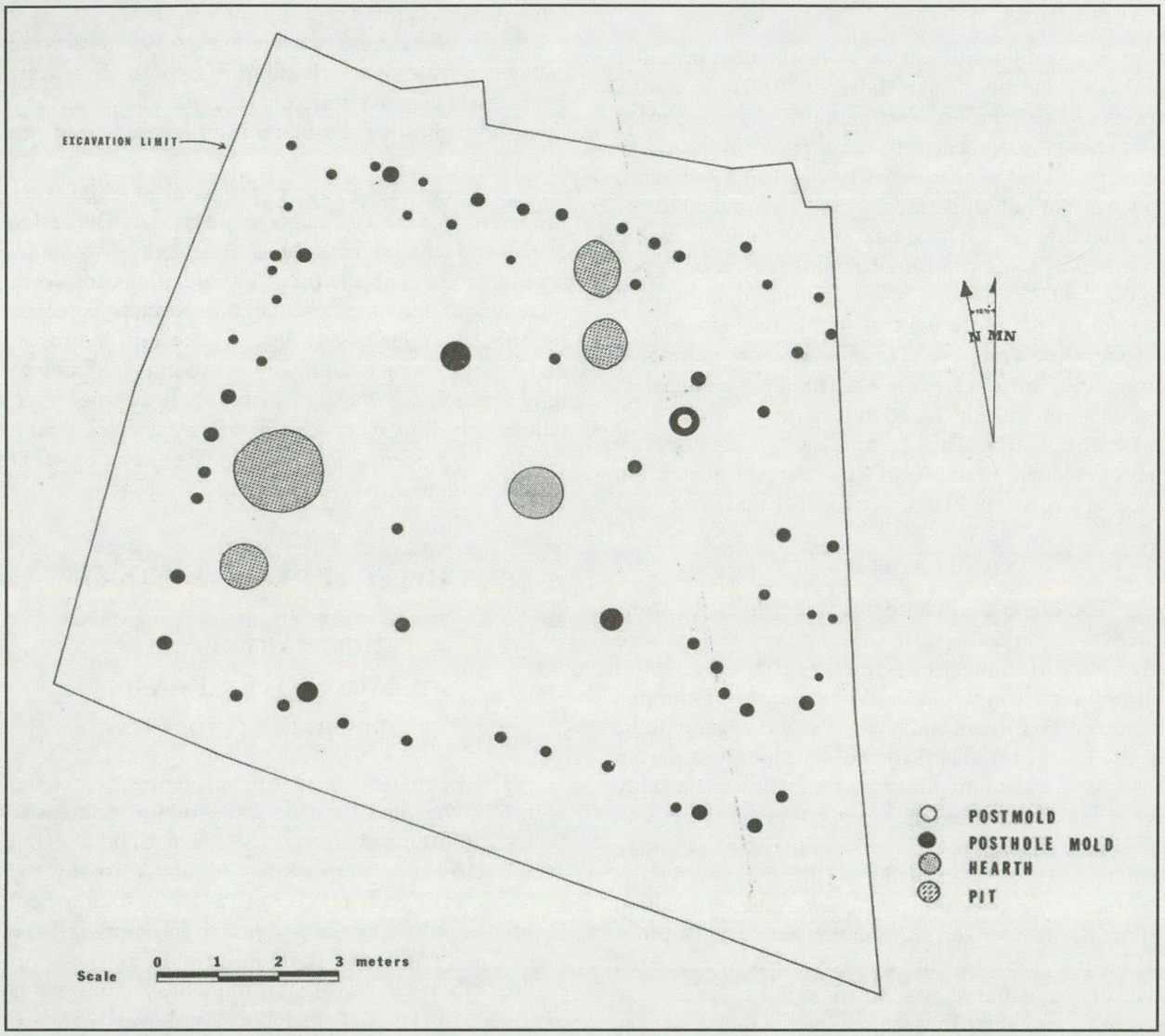


Figure 4. Map of House I in A802.

Architectural Remains in A802

The exposed house floor was defined by the wall posts and interior features (Figure 4). The house was adjacent to a wheat field, and the landowner would not let the crew disturb it. Therefore, the extended entryway was never excavated (Figure 5) (Rowlison 1980; John D. Reynolds, personal communication 1996). Four interior storage pits were identified, along with a central hearth and 15 internal support posts. A total of 49 exterior wall posts were excavated, which were on the average 12-20 cm in diameter. The 14ML417 house measured approximately 10 x 11 m and varied in several characteristics from those identified around Waconda Lake, but it is "less extreme in its architecture" than those at the Sumpter site (14OB27), which is just upstream from the lake (Blakeslee 1999:70). A single radiocarbon date for the 14ML417 house was obtained from material recovered from the hearth. The ^{14}C age was 850 ± 50 B.P. (Beta 3334) or A.D. 1160-1260 (Blakeslee 1999:41).

It was documented several times in the field notes that the house floor and features were disappointedly "clean," or lacked significant cultural debris. A review of the pit features and contents attest to the field observations. Very few artifacts were found.

F424 Shallow Basin

This shallow basin was found along the north wall of the house (Figure 4) and measured 75 cm east-west by 94 cm north-south and 27 cm deep (Figure 6). A



Figure 5. House excavation truncated by wheat field in A802.

section of a ceramic vessel (F456) was recovered adjacent to the pit opening. The matrix included burned earth, charcoal, fresh water mussel shell fragments, one flake of jasper (Table 4), and a few small pottery sherds, mixed with very dark humic silt loam soil. At the base a small rodent skeleton was found, lying on its back, feet up, and head facing south. The small quantities of cultural material in the feature suggest that this pit was in use when the house was abandoned. Any useful material was removed, and it was not used for refuse after it no longer functioned as a storage pit.

F435 Cylindrical Pit

This feature, along the west wall of the house (Figure 4), was the largest pit identified. It was 81 cm deep and was 1.44 m north-south by1.58 m east-west at the widest points (Figure 7). Mr. Witty first discovered this feature when he was exploring A802 with an Oakfield corer, and it was the initial evidence of the presence of the house.

The feature was first identified by darker or stained soils approximately 30 cm below the original ground surface. The feature mix included burned earth, charcoal, and fragmented mussel shell in stained silty loam soil. A concentration of charcoal, possibly a remnant of a post or log, was recovered from 50 cm below the lip of the pit.

F443 Basin Pit

This storage pit was just north of the hearth (F552) and south of another storage pit (F424) (Figure 4). It had an oval shape, measuring 87 cm north-south and 43 cm east-west, with a maximum depth of 28 cm in the center (Figure 8). Much of the pit fill was likely associated with hearth cleaning, as it included burned limestone, ash, burned earth, and charcoal. In addition, numerous stone chips (Table 4), small pottery sherds, and faunal remains were found in the pit. The high number of artifacts was primarily due to the very small flakes and potsherds recovered in the flotation sample taken from the pit. This combination of materials suggested that this feature was abandoned as a storage pit and used as a trash receptacle before the house was vacated.

F552 Hearth

The central hearth (F552) was the only feature identified at the site that functioned as a cooking place or heating source (Figure 4). This shallow basin was

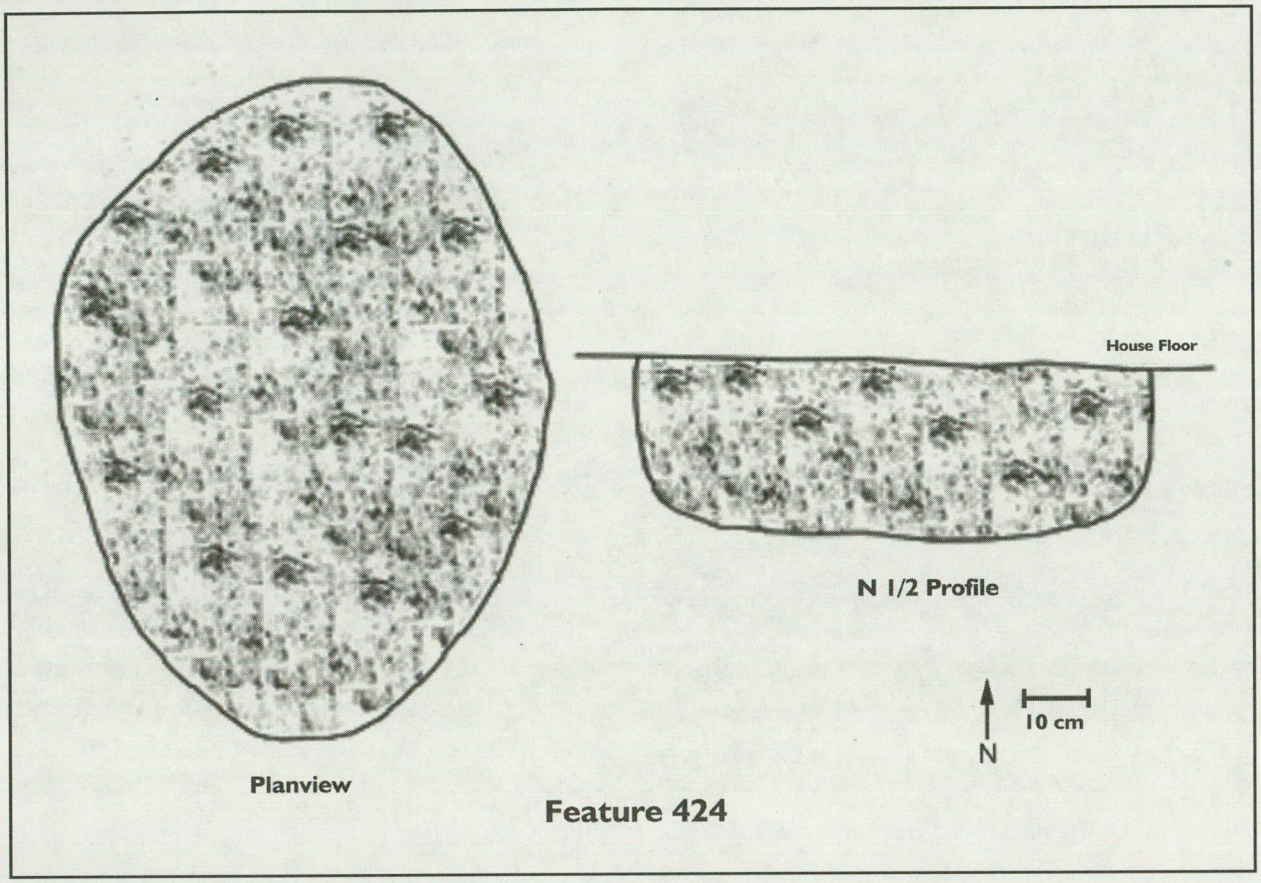


Figure 6. Plan view and profile of F424.

Table 4. Chipped Stone Tool Production and Maintenance Debris in the House Features in A802.

Artifact Type	F424 Pit	F435 Pit	F439 Post	F443 Pit	F480 Pocket Cache	F552 Hearth	F553 Pit	TOTAL
Raw Material		3						3
Secondary Flakes		2		2				4
Tertiary Flakes		11	1	4	2	3	1	22
Thinning Flakes		7	1	18		11	3	40
Retouching Flakes				129		145	37	311
Broken Flakes	1	10	1	14		44	12	82
Thermal Shatter				1		1		2
TOTAL	1	33	3	168	2	204	53	464

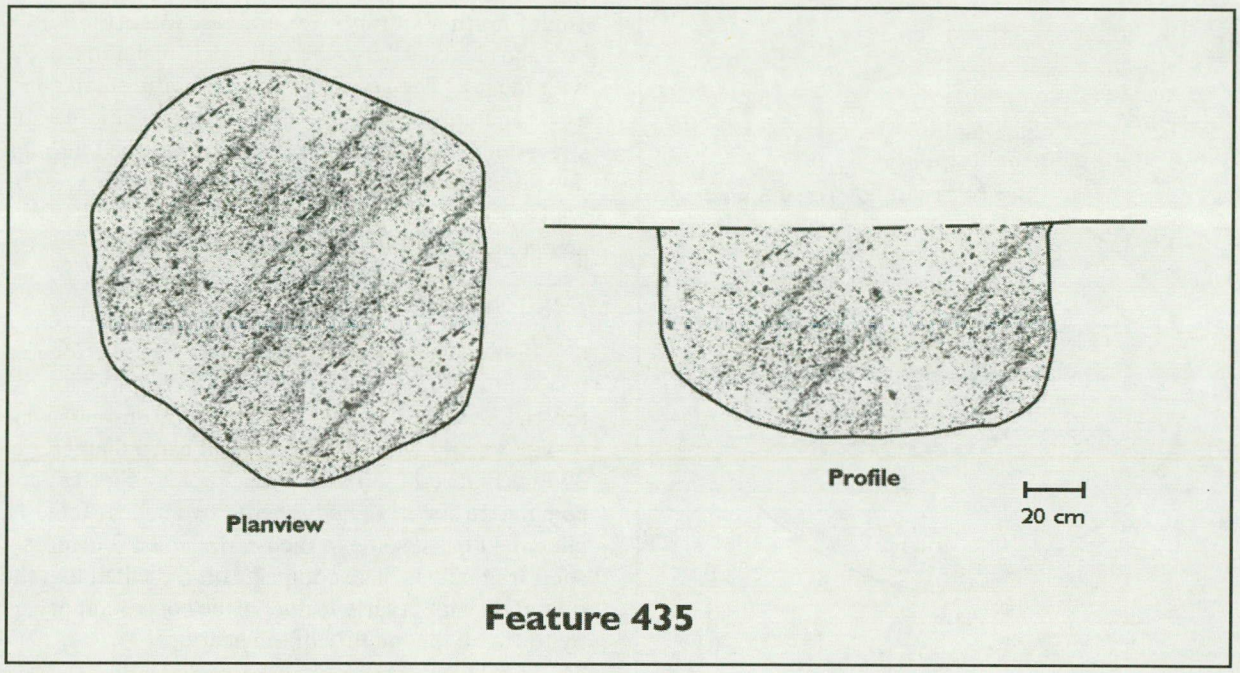


Figure 7. Plan view and profile of F435.

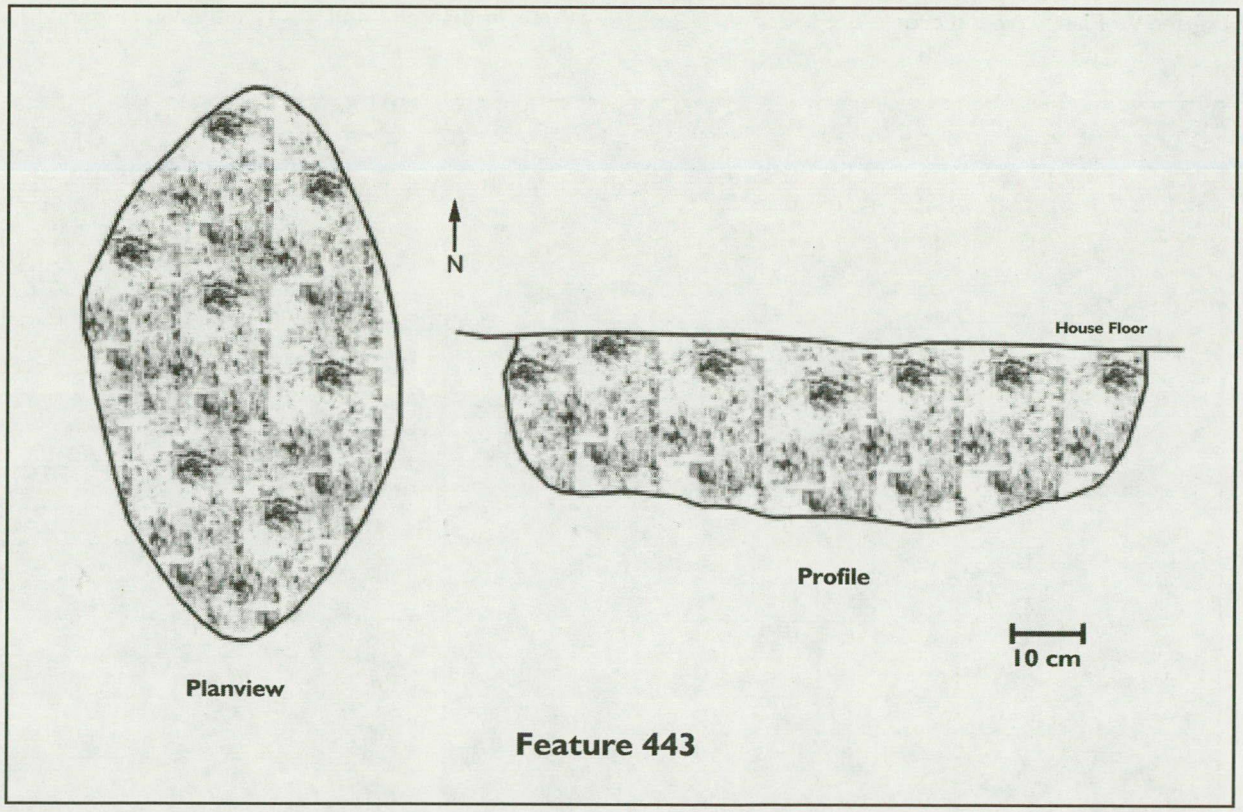


Figure 8. Plan view and profile of F443.

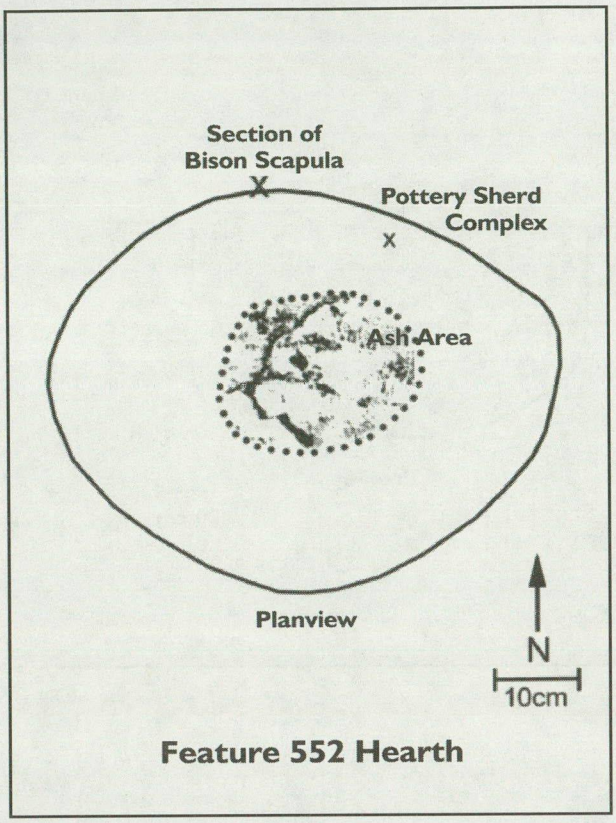


Figure 9. Plan view and profile of F552.

48 cm north-south by 61.5 cm east-west (Figure 9). Ash and charcoal flecks were the main materials mixed with the fill. The artifacts were generally small, such as retouching or resharpening flakes (Table 4) and slivers of potsherds, and were only retrieved through the flotation processing of the hearth matrix. The walls of the basin were heavily oxidized, suggesting an extended period of use (Figure 10).

F480 Mortar Pit

F480 was a straight-sided mortar pit, located just south of the hearth (Figure 4) and removed from the two storage pit areas along the north and west walls. The pit was 19 cm deep and had a diameter of 33 cm (Figure 11). The fill was very compacted, and contained a couple of body sherds, two flakes (Table 4), charcoal flecks, some burned earth, and a few mussel shell fragments. The compact soil indicated that the mortar pit was an early feature in the house, compacted by traffic in the vicinity of the hearth.

F553 Cylindrical Pit

This feature was along the west house wall, adjacent to the large pit F435 (Figure 4). It was cylindrical in shape, essentially a steep-sided basin that measured 80 cm in diameter and 45-49 cm deep (Figure 12).



Figure 10. Excavated hearth (F552) in A802.

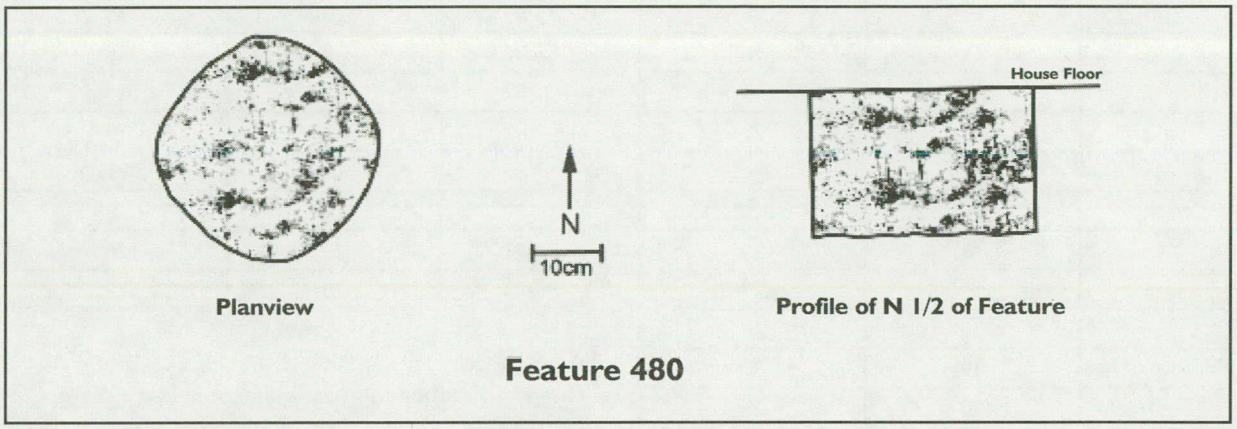


Figure 11. Plan view and profile of F480.

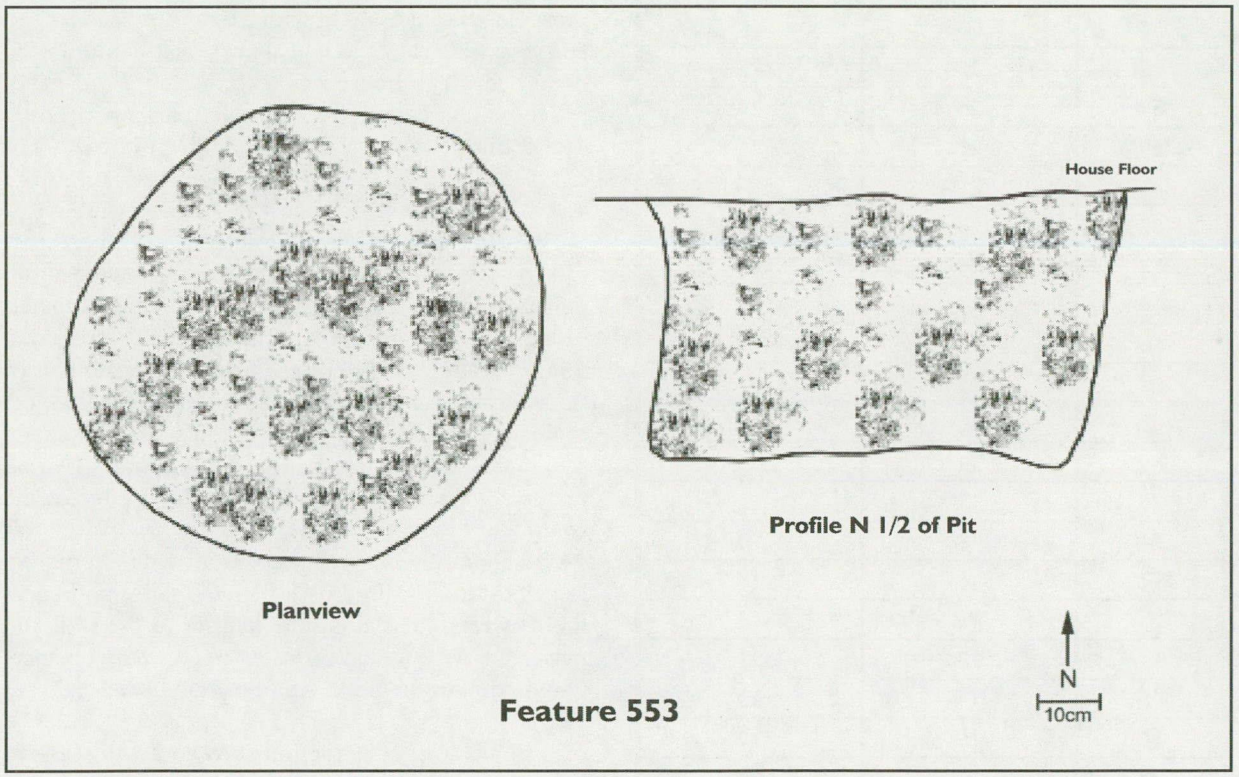


Figure 12. Plan view and profile of F553.

Table 5. Wall Posts of House in A802.

Post #	Post Diameter (cm)	Depth of Post (cm)
33	21	23
34	15	18
35	14	16
37	13	19
42	20	22
43	25	34.5
44	22	20.5
45	16	19
46	16	19
48	20	19
49	19	30
50	20	25
51	18	25
52	17	23
53	34	55
54	20	32
57	20	15
58	25	26
59	24	24
60	20	26
61	21	19
62	25	26
63	14	26
64	17	21
66	15	15
67	15	23
68	18	12
69	24	23
70	13	15
71	16	20
72	16	18
73	16	18
74	28	23
75	14	23
76	15	18
77	16	25
78	23	28
79	15	23
80	20	20
81	19	18
83	17	20
84	20	15
86	20	15
87	17	28
88	16	19
89	16	21
90	18	16
91	20	26
94	20	28

The pit contained mussel shell, some body sherds, 53 flakes (Table 4), and three scapula hoe fragments.

Post Molds

The house in A802 was defined by 64 post molds (Figure 4). Several additional posts likely were present to the east, along with the presumed extended entryway, beneath the wheat crop that could not be disturbed. The house walls were comprised of 49 posts, while another 15 were interior support posts. The diameter of the wall posts ranged from 13 to 34 cm (5-14 inches) (Table 5). Interior posts were from 17 to 42 cm (6.5-16.5 inches) in diameter (Table 6).

A line of post molds oriented north-northeast (300°) by south-southwest (200°), based on true north, defined the west wall. Post molds along the south half of the wall were generally large and evenly spaced in a fairly straight, well-defined line. The north half of the wall was represented by a cluster of smaller post molds. Only one of the post molds was similar in size to the posts on the south end of the wall. Two pit features were situated along the interior edge of the south half of the wall.

The north wall was substantial with alternating large post molds (Figure 4). Three small support post molds were found along the interior of the wall and may have been added for roof support maintenance. Orientation of the north wall post molds was 295° to 117°.

South wall construction showed a well-defined line of post molds (Figure 4). Larger diameter posts were at the corners and about every third post along the wall. A rather large post, inset from the southwest portion of the wall, could be evidence of structural repair.

The entryway on the east wall posts was

Table 6. Interior Support Posts of House in A802.

Post #	Post Diameter (cm)	Depth of post (cm)
32	23	20
36	18	26
38	20	22
39	22	24
40	20	25
41	23	26
47	40	60
55	24	20
56	18	22
65	42	56
82	17	15
85	17	28
92	25	29
93	28	61
95	23	28

constructed by a seemingly random series of posts (Figure 4). As discussed above, the entryway was not excavated due to the presence of a prize wheat crop. The wide array of post molds around the project entryway could be additional evidence of structural support repairs.

The interior posts varied in size and likely in function; some were repair props, and others served as internal furniture or racks. Three central support posts were identified to the northwest, northeast, and southeast of the hearth. As is the case with other CPt lodge patterns, the posts form three corners of the common square pattern. The projected area of the fourth post, southwest of the hearth, contained two small-diameter post molds slightly over a meter apart. Evidence of repairs to the central support post was evident in the northeastern post mold. Field notes of the coring of this post show that a slightly smaller diameter post replaced the original post. The evidence was drawn from two post molds, essentially a post mold within a larger post mold.

Roper's (2002) review of Middle Ceramic house patterns across the Central Plains showed a decrease in house size from central Kansas to the High Plains of western Kansas. She also demonstrated that post sizes varied. However, using her data for comparison, it appears that post molds of the house in A802 of 14ML417 were similar in size to the post molds at Ottawa County sites 14OT306 (House 1) and 14OT304 (House 1) (Roper 2002:33).

Architectural Remains in A801

The high density of daub on the highest elevation of A801 (Figures 13 and 14) suggested that A801 was another house locale. Cultivation and road and ditch construction had destroyed the floor and features of the lodge. It was originally thought that the artifact concentration marked an activity area, which were common for similar habitation sites in the Glen Elder locality (Blakeslee 1999; Krause 1969, 1970, 1982; Latham 1996; Lippincott 1976, 1978), as many of the Solomon River phase sites excavated in the locality have activity areas associated with houses.

Lithic Analysis

A total of 2,283 lithic artifacts recovered during the 1980 excavations at site 14ML417 include chipped stone (n=2,260), ground stone, and other raw materials (n=23), such as hematite. The following discussions report details and interpretations of the artifacts and how they relate to the activities and lifeways of the site occupants.

Chipped Stone Tools

Previous work in the Glen Elder locality has resulted in the analysis of artifact assemblages from 15 Solomon River phase sites (see Previous Archeological Investigations), providing a general understanding of the types and frequencies of tools at local house sites. Lippincott (1978) and Blakeslee (1999) have presented previous work on lithic assemblages of the Glen Elder locality. Lippincott (1978) listed several categories of bifacial chipped stone tools, with the primary criteria for these categories being thickness, overall shape, and the angle of the working edge. Blakeslee (1999) modified some of Lippincott's artifact categories and included additional artifact types and class categories from several other CPt or CPm studies.

There are other studies of Middle Ceramic sites in the region that list artifact classifications in order to determine site functions. For example, Roper (1990) reviewed the literature on what were thought to be hunting camps associated with west Upper Republican peoples. It had been postulated that the Middle Ceramic peoples had left their lodges for hunting excursions on the High Plains, but this theory has been brought into question recently.

Categories of chipped stone artifacts recovered from 14ML417 include six types of formally made tools and three of informally made tools, representing five functional categories (see Table 2). The projectile points, preforms, end scrapers, and beveled knives are classified under big game hunting and processing and

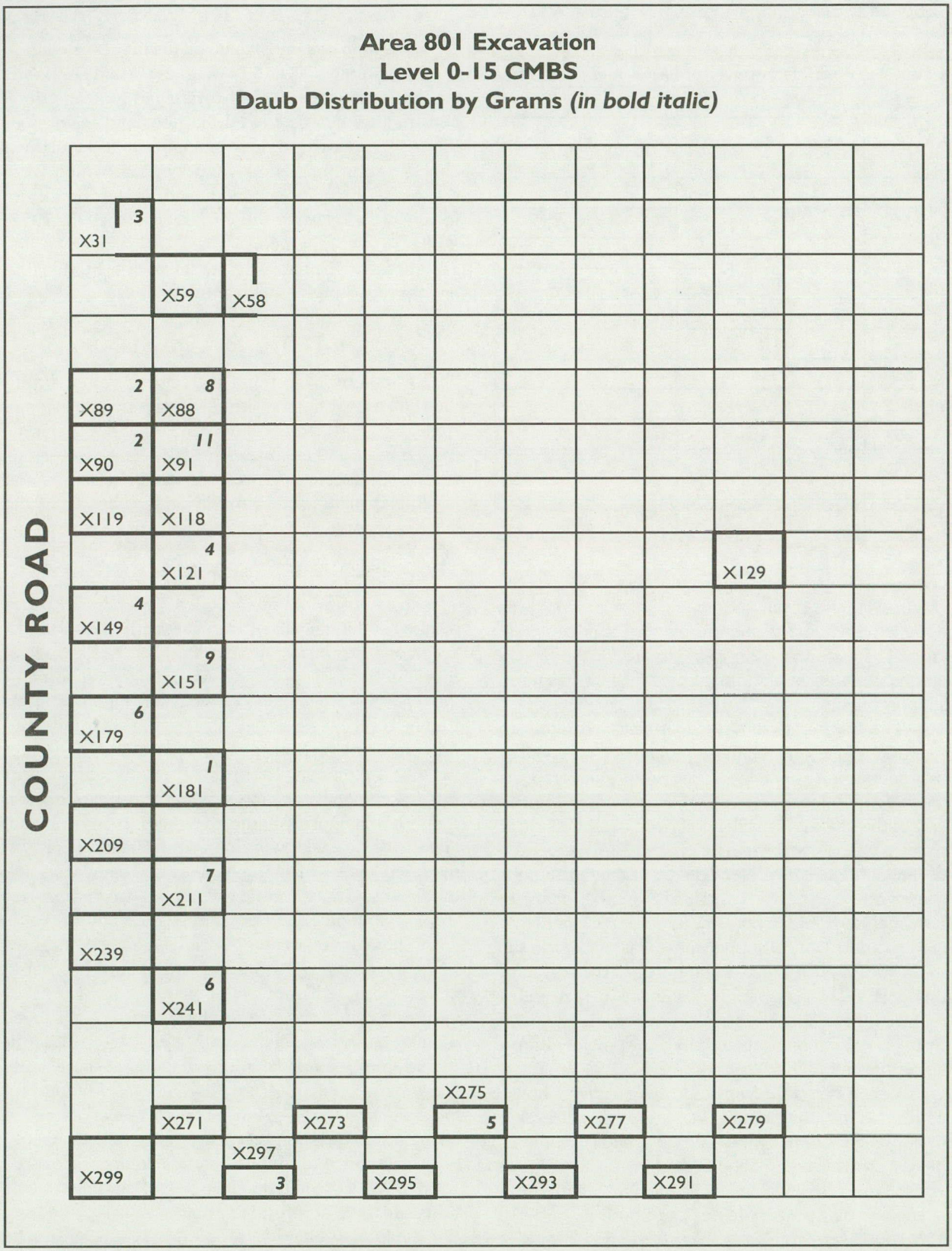


Figure 13. Distribution of daub in grams from 0 to15 cm bgs in A801.

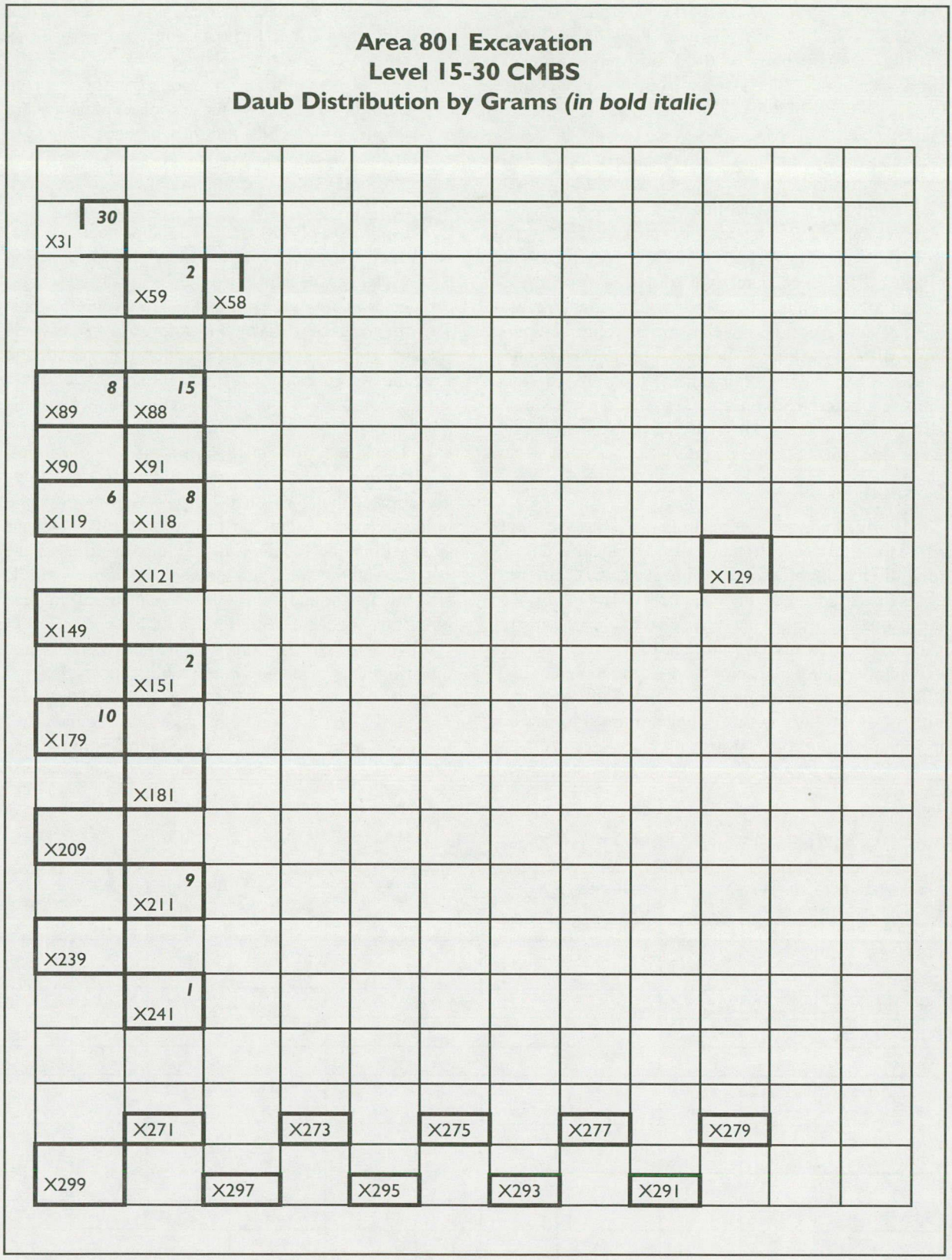


Figure 14. Distribution of daub in grams from 15 to 30 cm bgs in A801.

general hunting/fishing categories. Retouched flakes are also classified as general hunting/fishing and, along with knives, are parts of the food preparation and storage category. The last two functional categories include general hide working (scrapers) and general manufacturing (graver and spokeshaves). The debris from the production and maintenance of these tools has been divided into four categories including cores, blanks, preforms, and debitage.

A total of 219 chipped stone tools were recovered from the site, with 77 from A801 and 140 from A802 (Tables 7-9). The other two tools are from A803. Essentially seven tool types were represented, including projectile points, beveled knives, end scrapers, large bifaces, gravers, spokeshaves, and retouched flakes. Over half (59 percent) of the chipped stone tools recovered from the site were made from Smoky Hill jasper (Table 7). This pattern is consistent in both A801 and A802 (Tables 8 and 9).

Formal Tools

Formal chipped stone tools are those artifacts made through a reduction process to an idealized form, including both bifaces and unifaces. Six different types of artifacts were identified at 14ML417: bifaces are projectile points, beveled knives, large bifaces, and unspecified bifaces; uniface tools are limited to end scrapers and unspecified unifaces. Several small biface and uniface fragments are listed as unspecified bifaces or unifaces because they are too fragmentary to identify tool type or function.

Projectile Points. Projectile points are formal tools designed for hafting on shafts to be used as projectiles. The thin, bifacial point of the projectile could easily penetrate the skin/hide of prey. During the Solomon River phase these tools typically were arrow points with side notches or occasionally a combination of side and basal notches. These artifacts are representative of two functional categories listed in Table 2.

Lippincott (1978) analyzed the projectile points in the University of Nebraska collections. Considering hafting style as the main attribute, he identified several categories of projectile points from 15 site collections. The categories of points included three simple triangle shapes: regular unnotched, irregular unnotched, and irregularly triangular. Of the point styles identified, side-notched and side- and basal-notched were the most common.

The most projectile points at any Solomon River phase house is 53 at 14ML15, the largest site investigated thus far (Blakeslee 1999). Four projectile point styles were defined for Solomon River phase sites within the locality, all having variation in the notching on the sides and bases of the points. Single side-notched points and single side- and basal-notched points are the most common (Table 10).

The inter-notch width, which indicates the size of the arrow shaft used, has been established as the only measurement that varies with site location (Blakeslee 1999). Among the Waconda Lake sites the measurement was lower for sites on the South Solomon than

Table 7. All Chipped Stone Tools by Material Type.

Raw Material/ Chipped Stone Tools	Smoky Hill Jasper	Permian Chert	Alibates/ Day Creek Dolomite	Tecovas Jasper	Agate	Unknown Chert	Quartzite	Flattop Chalcedony	Petrified Wood	TOTAL
Projectile Points	8	7	3	1	1					20
Beveled Knives	5	5								10
End Scrapers	14	20			1	1	2	1		39
Graver			1							1
Unspecified Bifaces	12	4	4				1			21
Unispecified Unifaces	3									3
Large Bifaces	3					1	1			5
Spokeshaves	1	2	1					1		5
Retouched Flakes	85	17	5		2	2	2	1	1	115
TOTAL	131	55	14	1	4	4	6	3	1	219

Table 8. Chipped Stone Tools by Material Type in A801.

Raw Material/ Chipped Stone Tools	Smoky Hill Jasper	Permian Chert	Alibates/Day Creek Dolomite	Unknown Chert	Flattop Chalcedony	Petrified Wood	TOTAL
Projectile Points	4	5					9
Beveled Knives	1	1					2
End Scrapers	1	10			1		12
Unspecified Bifaces	4	1					5
Unispecified Uniface	1						1
Spokeshave	1		1		1		3
Retouched Flakes	32	8	3	1		1	45
TOTAL	44	25	4	1	2	1	77

Table 9. Chipped Stone Tools by Material Type in A802.

Raw Material/ Chipped Stone Tools	Smoky Hill Jasper	Permian Chert	Alibates/ Day Creek Dolomite	Tecovas Jasper	Agate	Unknown Chert	Quartzite	Flattop Chalcedony	TOTAL
Projectile Points	4	2	3	1	1				11
Beveled Knives	4	4							8
End Scrapers	13	10				1	2		26
Graver			1						1
Unspecified Bifaces	8	3	4				1		16
Unispecified Unifaces	2								2
Large Bifaces	3					1	1		5
Spokeshaves		2							2
Retouched Flakes	53	8	2		2	1	2	1	69
TOTAL	87	29	10	1	3	3	6	1	140

Table 10. Projectile Point Styles in Excavated Solomon River Phase Sites in Glen Elder Locality.

Site	Single Side-Notched	Double Side-Notched	Single Side- & Base-Notched	Double Side- & Base-Notched
14ML5	5	2	3	3
14ML8	3	0	0	0
14ML11	1	1	1	0
14ML15	23	5	21	4
14ML16	5	0	1	1
14ML17	1	0	2	0
14ML307	1	0	0	0
14ML310	1	1	0	1
14ML376	0	1	2	0
14ML377	0	0	1	0
14OB27	14	0	10	8
14OB28	2	0	0	0
14ML417	**9**	**1**	**4**	**1**

Table 11. Projectile Points by Material Type for A801 and A802.

Material Type	Side-Notched	Side- & Base-Notched	Double Side-Notched Concave Base	Unknown (fragment)	TOTAL
A801					
Smoky Hill Jasper	2			1	3
Permian Cherts		1		4	5
A801 Total	2	1		5	8
A802					
Alibates	2	1			3
Smoky Hill Jasper	2	1	1	1	5
Permian Cherts	2				2
Tecovas Jasper	1				1
Agate	1				1
A802 Total	8	2	1	1	12
OVERALL TOTAL	**10**	**3**	**1**	**6**	**20**



Figure 15. Selected projectile points.

for sites in other parts of the locality. The similarity in width of the hafting area (width between the notches) is interpreted as a sign of a particular flintknapper. In sites with more than one house, there appears to be evidence of multiple flintknappers.

At 14ML417 only one house is known, but possibly another existed in A801. The points were distributed fairly equally between A801 and A802 (Table 11). Eight of the points came from A801, but five were small fragments and contributed little to the



Figure 16. Harahey or beveled knives.

Table 12. Beveled Knives by Area and Material Type.

	Smoky Hill Jasper	Permian Chert	TOTAL
A801	1	1	2
A802	4	4	8
TOTAL	5	5	10

study. Of the 12 points recovered from A802, all but one are complete enough to identify the style of hafting. On A801 points the width between the notches is markedly larger than on those of A802. Figure 15 shows a group of 14ML417 points around 30 mm in length and inter-notch width between 7 and 8 mm. All the points in this group were from the house, whereas two of the outlying examples were from A801.

General measurements of the 14ML417 projectile points were limited to base width, width at the side notch, overall length, blade length, and maximum thickness. Maximum thickness was measured on the bases of all complete specimens; thickness was not recorded for points missing bases. Fourteen complete points show a length range from 21.28 to 34.82 mm.

The 20 projectile points recovered from 14ML417 were made from 5 different materials (Table 11, Figure 15): 8 of the locally available Smoky Hill jasper, 7 of Permian cherts from the northern Flint Hills east of the site, 4 of raw material from the Texas Panhandle, and 1 of a brown agate from an unknown source. This latter material has been observed in the stream cobbles of the region and, therefore, is considered a local source.

Beveled Knives. Beveled or "Harahay" knives are common artifacts, found among several prehistoric and protohistoric phases across the North American plains. These tools were produced as large ovoid bifaces that, through use and retouching or sharpening, were reduced to diamond-shaped tools common at CPt sites. Alternate retouching of the lateral edges created the distinct beveling.

Ten beveled knives were recovered during the investigation, with most coming from the A802 house locus (Figure 4; Figure 16). Only two raw materials were used in making these tools, equally divided between Smoky Hill jasper and Permian chert (Table 12). The use life of all the knives had been exhausted, and most of the specimens were fragmentary. Only two specimens were complete; both of Permian chert and found on the house floor, they measure 93.04 mm and 73.96 mm in length. The maximum widths are 32.24 mm and 28.05 mm, and thicknesses are 7.08 mm

Table 13. End Scrapers by Area and Material Type.

	Smoky Hill Jasper	Permian Chert	Flat Top Chalcedony	Agate	Ogallala Quartzite	Other Chert	TOTAL
A801	1	10	1				12
A802	13	10			2	1	26
A803				1			1
TOTAL	14	20	1	1	2	1	39

and 7.31 mm. A nearly complete Smoky Hill jasper beveled knife from A801 has a maximum width of 27.15 mm and thickness of 6.54 mm.

Unspecified Bifaces. A number of small fragments of biface tools were recovered at 14ML417. These tool fragments are too small and nondescript to identify the function or tool type and, therefore, are classified as unspecified bifaces.

End Scrapers. End scrapers of the Solomon River phase constitute another formal tool type, which are flakes or blades with beveled distal ends (Crabtree 1972; Morrow 1997). Typically these tools are unifacial with retouching on the working end and along portions of the lateral edges. These tools were produced by many different prehistoric cultures of North America for the scraping and processing of animal hides. These tools have been classified as representative of two functional categories: large game hunting and hide processing and general hunting and fishing.

Thirty-nine end scrapers were recovered from the site. Six different raw materials were used in the production of these tools, with Smoky Hill jasper and Permian cherts being the most common (Table 13; Figure 17). This frequency pattern held true for the 26 end scrapers found in A802, but in A801 nearly all the end scrapers were of Permian chert, and the only scraper from A803 was brown agate.

Of the 12 end scrapers from A801, 8 were recovered from the surface and 2 from the plow zone, leaving only 2 from the intact cultural zone. Seven were complete and ranged in length from 26.05 to 55.19 mm. Considering the retooling life of end scrapers, these measurements can not be taken as characteristic of Solomon River phase end scrapers. The widths of the working edges appear to have some standardization. Two sizes of end scrapers were recovered from A801. Two have much narrower scraping or working edges, with a width range of 7.28-9.50 mm (Figure 17). These narrow end scrapers were made from Permian or Florence B chert blades. The larger end scrapers, which included 8 of the 10 remaining specimens, have working edges that range in width from 20.08 to 25.38 mm. The two remaining are incomplete and were not included in any of the ranges.

In A802, 26 end scrapers were recovered, but only 14 of the specimens are complete. Five were from the surface, and three others were from the plow zone. The remaining 15 end scrapers were scattered across the house floor. Ten are Permian chert, and another 13 are Smoky Hill jasper (Table 13). The range of measurements is similar to the larger group found in A801. The lengths of the complete end scrapers range from 27.68 to 71.64 mm, with both extremes being Smoky Hill jasper. The lengths of the Permian chert specimens range from 29.80 to 59.75 mm. None of the end scrapers is narrow like the two found in A801. The widths of the working or scraping edges for the Smoky Hill jasper scrapers range from 15.25 to 30.36 mm.

Unspecified Unifaces. Tools placed in this category are generally small fragments of formally formed unifaces that are too small to determine size, shape, or function.

Informal Tools

Informal tools are essentially expediency tools that are made quickly for a variety of purposes. These tools are generally tertiary flakes that were retouched along one or more edges. Often utilized flakes are lumped in this category. However, because of the inaccuracy involved in identifying these artifacts, the author decided not to include any possible utilized flakes in this study.

Informal flake or expediency tool was the most common chipped-stone tool type identified at 14ML417, totaling 121 (Table 7). Forty-eight were recovered from A801 (Table 8), 72 from the A802 house locus (Table 9), and 1 from A803. Three artifact styles are represented in the informal flake tool category: simple retouched flakes, spokeshaves, and gravers.

Retouched Flakes. Retouched flakes are expediency tools formed by pressure flaking at least one edge. In the 14ML417 assemblage retouched flakes are quite common and include one or more retouched edges. Typically retouching is found on one

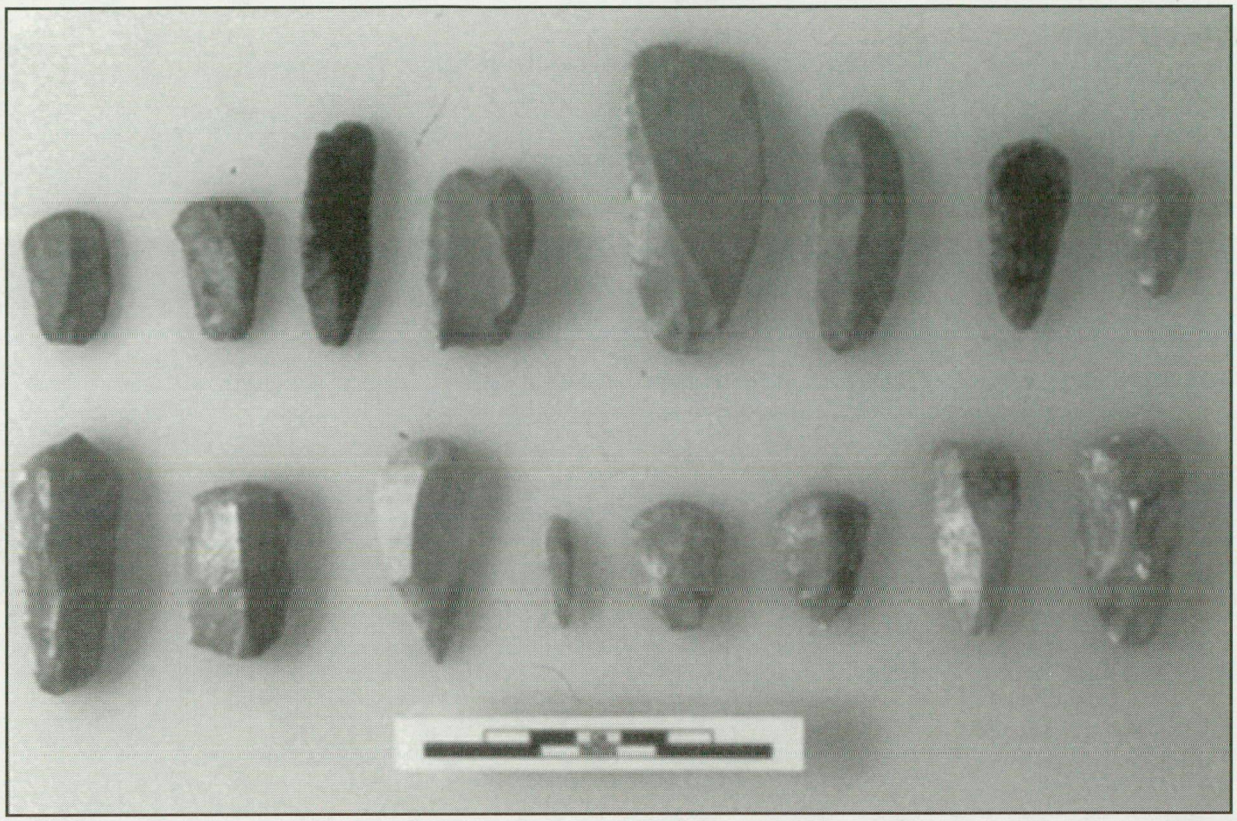


Figure 17. Selected end scrapers.

or both lateral edges, and oftentimes it occurs on the distal ends of the flakes. These expediency tools were generally produced from tertiary flakes, with most of the retouched edges evident on the dorsal sides. Some ventral retouching on alternate edges was observed on a few specimens (i.e., retouching on the dorsal side on one lateral edge and on the ventral side on the other lateral edge).

A total of 115 retouched flakes were recovered from the site, with 45 in A801 and 69 in A802 (Tables 7-9). One retouched flake was recovered from A803. The retouched edges range from one edge to both lateral edges and the distal end of the flake. Some of the retouched edges are only 6-7 mm in length, while others extend along the entire lengths of the flakes.

Specific surfaces and edges selected for retouching vary. Of the 45 retouched flakes from A801, retouching occurs on the dorsal surfaces of 35, on the ventral surfaces of 7, and on both surfaces of 3. The latter are considered expediency biface tools. In A802, 57 of the flakes were retouched on the dorsal surface; 3, on the ventral surface; and 9, on both surfaces. Seven of the A802 flakes or a mere 10 percent are blades, while none of the A801 retouched flakes bore blade characteristics.

Approximately 60 percent of the A801 and 49 percent of the A802 retouched flakes are divided equally between left and right lateral edges. Retouching of both lateral edges makes up 11 percent of the A801 and 19 percent of the A802 specimens. Those retouched on the distal ends total 11 percent in A801 and 14 percent in A802. Four other flakes were retouched on the distal ends in combination with a lateral edge, including one left edge and three right edges. A specimen from each area was retouched only on the proximal end.

All of the A802 specimens that were retouched on the ventral surface have retouching on the distal or left edge, while dorsal surface retouching typically includes the right lateral edge. This pattern is not present in the A801 assemblage.

Five different raw materials were identified among the A801 retouched flakes (Table 8). The most common is the locally available Smoky Hill jasper, which makes up 71 percent of the specimens, followed by Permian chert from the Flint Hills, which accounts for 18 percent of the sample. The remaining three raw materials identified were Alibates/Day Creek agatized dolomite, petrified wood, and an unidentified chert.

The same general pattern of raw material use was

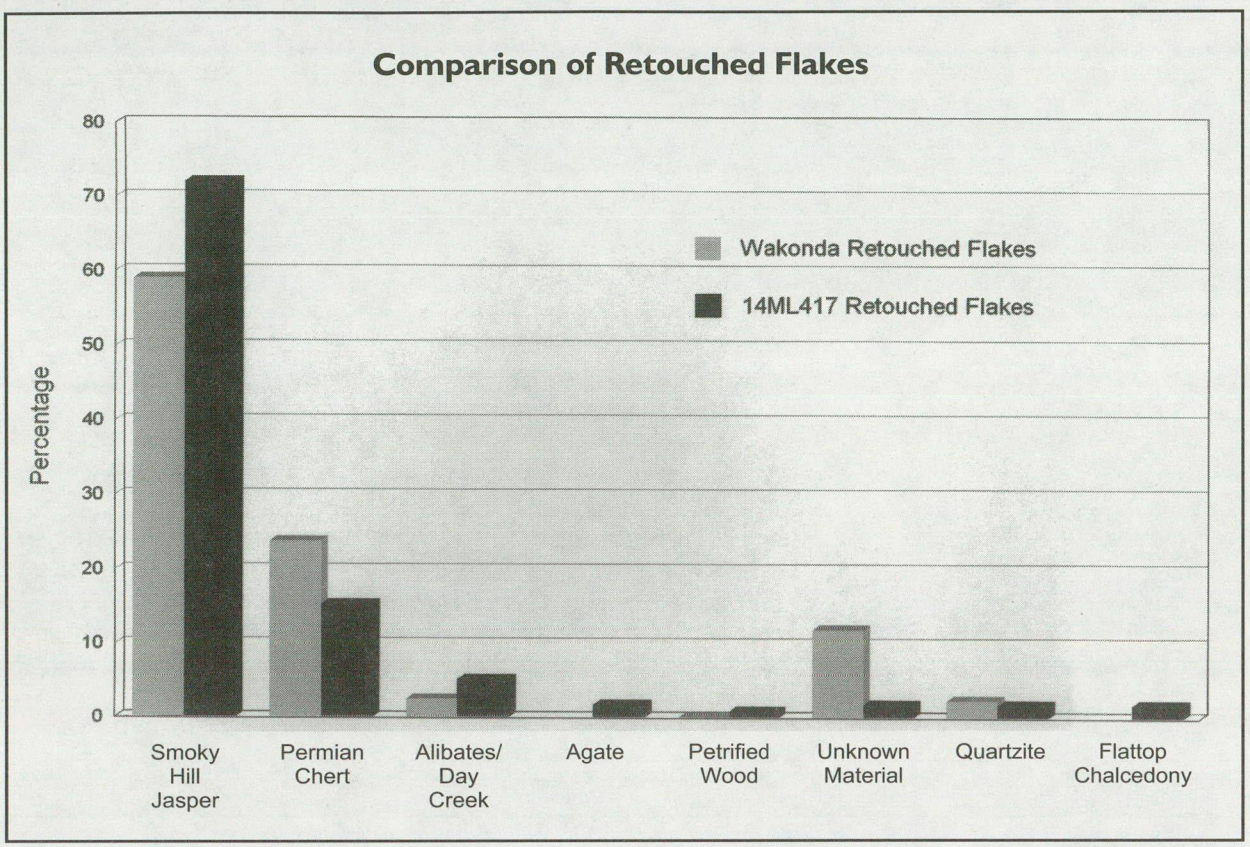


Figure 18. Comparison of percentages of expediency tools by stone types at Waconda Lake sites and 14ML417.

found in A802 retouched flakes, with a total of seven different raw materials identified. Smoky Hill jasper accounts for 72 percent, while 15 percent is Permian chert. Each of the remaining five materials accounts for less than 5 percent of the sample: Alibates/Day Creek agatized dolomite, agate, quartzite, Flattop chalcedony, and an unidentified chert. In addition to the Smoky Hill jasper, both the agate and quartzite were locally available, making nearly 83 percent the retouched flakes of local raw materials.

Retouched or modified flakes were common at the Waconda Lake sites. Figure 18 compares the percentages of raw materials used for expediency tools at Waconda Lake sites and 14ML417. A similar pattern clearly exists between them.

Spokeshaves. The spokeshaves identified are retouched flakes with formed notches on the lateral edges. Spokeshaves were used in the production of arrow shafts and possibly to shape other organic materials.

Five spokeshaves were included in the 14ML417 artifact assemblage, and all were unifacially retouched. Three were recovered from A801, and two were found in A802. Of the three A801 spokeshaves, one is Alibates agatized dolomite, the second is Flattop chalcedony, and the third is Smoky Hill jasper. Two were collected from the surface, while the third, the Smoky Hill jasper tool, was from the 15-30 cm level of X91. Two specimens were retouched on the ventral side, while the dorsal surface of the Flattop chalcedony specimen was retouched. All three spokeshaves were fashioned on the left lateral edges of flakes.

Both A802 spokeshaves were surface finds. These Florence chert specimens were retouched on the right lateral edges of the dorsal surfaces. The notches measure 8.57 and 9.79 mm across.

Graver. Gravers are chipped stone tools formed by pressure flaking to create sharp tips that presumably were used to incise or form soft stone or organic materials (Crabtree 1972). A graver was among the expediency tools recovered from A801 at 14ML417. This tool is essentially a retouched flake with a bifacially worked tip. The tip is small and sharp.

Stone Tool Production and Maintenance Debris

The most common artifacts recovered from 14ML417 fall into the lithic debris artifact type within the general manufacturing category, which is typical for prehistoric sites. Because of the large percentage of this material, a detailed analysis of the lithic debris is presented here. Definitions vary in lithic analyses, so the following definitions, gleaned from a number of sources and used by the author in numerous CRM reports (compare Latham 1996b, 2001a, 2001b, 2003a, 2003b), are supplied to clarify terminology.

Of the 2,033 chipped stone artifacts recovered from the site, 1,815 (89 percent) have been attributed to production and maintenance debris, essentially the byproducts of manufacturing and maintaining chipped stone tools. Most of the debris are flakes from late-stage biface production or maintenance, which is typical at other Solomon River phase sites in the locality (Blakeslee 1999; Latham 1994, 1996). The materials were subdivided into raw material categories, based on color, texture, inclusions, and form, and then were quantified according to count, weight, material type, and provenience. Prehistoric sites recorded in the locality contain large percentages of Smoky Hill jasper (Blakeslee 1999; Latham 1994, 1996), which is reflected in the 14ML417 assemblage. Presence of exotic cherts and other regional materials at 14ML417 and other Solomon River phase sites indicates trade or exchange throughout the Central Plains.

Cores. A core is a cobble or piece of chert or other knappable material from which one or more flakes have been purposely removed without evidence of shaping the piece into a tool. Many cores are chunks that have one or more flakes removed in a random fashion (amorphous cores). Others are more formally prepared to produce standardized conical or blade flakes. Only three cores were found at 14ML417.

Blanks. These unfinished bifaces are thick, bilaterally asymmetrical, have irregular sinuous edges, and lack lenticular cross sections. Most of the blanks identified in the Glen Elder locality are Smoky Hill jasper.

Preforms. A preform has a wide range of descriptions in the literature (Crabtree 1972; Geier 1973). A preform is defined here as a piece of lithic material that has been modified to an intended stage in the reduction sequence. Essentially the piece was roughed out of a selected cobble, flake, slab, or other material to the general shape–yet larger size–of the desired tool. Within this assemblage there are projectile point preforms, small biface preforms, and large biface preforms.

Debitage

Debitage is a general term used in reference to the lithic debris produced during chipped stone tool production and maintenance activities, such as flakes and shatter. Most of the material represents intentional breakage, but it also incorporates unaltered material and other unintentional breakage pieces. Artifacts in this category are useful for determining techniques and showing technological traits of the various stages of reduction (Crabtree 1972).

Of the 2,260 artifacts classified as chipped stone production and maintenance debris, the most common flake type is broken flakes. Small flake fragments in high traffic areas, such as habitations, are common at similar sites. These flake fragments are generally too small or incomplete to ascertain the stage of reduction they represent; therefore, they are listed as broken.

Primary Flakes. A primary flake is difficult to define when considering the different raw lithic materials used at the site, such as the tabular form of the Smoky Hill jasper. Many Smoky Hill jasper bifaces recovered from 14ML417 and other sites in the locality are thin slabs that were reduced to preform stage and finished with large portions of the cortex remaining on both sides. Therefore, the only primary flakes identified in this study came from stream cobbles or Permian cherts. These flakes have their entire dorsal surfaces covered with cortex and were produced by heavy percussion techniques (Geier 1973).

Secondary Flakes. Secondary flakes represent early stage reduction of blanks and preforms. These flakes include one or more dorsal ridges that indicate previous flake removals. Secondary flakes of many raw materials are generally smaller than primary flakes and nearly devoid of cortex (Bouldurian 1990). Some Smoky Hill jasper secondary flakes can have cortex, but secondary flakes are rare due to the thin tabular shape of the raw material.

Tertiary Flakes. Flakes of this category are produced by low intensity percussion, generally during late-stage reduction. The flaking normally overlies flake scar ridges from earlier stages of reduction, such as primary and secondary flake removals (Bouldurian 1990; Geier 1973). Some researchers define tertiary flakes as completely lacking cortex. This is not an appropriate definition in the case of Smoky Hill jasper that occurs geologically in thin sheets and often bears remnants of earlier stage platform preparation. Typically, flakes associated with the final stage of reduction or maintenance are identified as tertiary based on the presence of short, salient bulbs of force produced by pressure flaking techniques, but in

Table 14. Chipped Stone Debris, Excavation Units by Level and Artifact Type in A801.

Artifact Type	Surface	X31		X59		X81	X88		X89		X90		X91			X117	X118		X119	TOTAL
		L1	L2	L1	L2	L2	L1	L2	L1	L2	L1	L2	L1	L2	F493	L3	L1	L2	L2	
Cores	3																			3
Primary Flakes	9			2	1						1			1						14
Secondary Flakes			1				1						1	4			1			8
Tertiary Flakes	33	2	4	3		1	1	4	7	4		5	6	6	1		2	3		82
Thinning Flakes	6	2	6				4	5		2	1	8		9		1	2	1		47
Broken Flakes	44	6	15	3		1	8	6	6	7	6	44	1	21			1	7	4	180
Retouching Flakes												12								12
Shatter	19	4	2				4		1	4	1	14		4		1	1	2		57
TOTAL	114	14	28	8	1	2	18	15	14	17	9	83	8	45	1	2	7	13	4	403

Table 15. Chipped Stone Debris, Excavation Units by Level and Artifact Type in A801.

Artifact Type	X121	X149		X151		X179		X181		X209		X211		X234	TOTAL
	L2	L1	L2	L1	L2	L1	L2	L1	L2	L1	L2	L1	L2	L1	
Primary Flake												1			1
Secondary Flake														1	1
Tertiary Flakes						6	8	4	3	2	1	2	9	1	36
Thinning Flakes				3	1		4			4	2	7	10	1	32
Lamellar Bladelet								1							1
Broken Flakes	4	9	1	8		3	5	13	2	14	3	11	47	1	121
Thermal Shatter			2			2	6	3		1		7	16	1	38
TOTAL	4	9	3	11	1	11	23	21	5	21	6	28	82	5	230

this report those flakes have been assigned separate categories.

Next to broken flakes, tertiary flakes were the most common flake type at 14MP417. However, this number is likely not truly representative of the reduction processes undertaken at the site, as the final stages of retouching and retooling produce smaller debris than is caught in ¼-inch sifting screen. This discrepancy can be observed in the numerous retouching or pressure flakes recovered from matrix that was processed through flotation.

Thinning Flakes. Flakes removed by pressure or percussion to thin a preform, either a biface or a uniface, for tool manufacture are classified here as thinning flakes. These flakes commonly show specialized platform preparation (Crabtree 1972) and are generally smaller in size than earlier stage reduction tertiary flakes (Latham 2003b). Of the flakes

Table 16. Chipped Stone Debris, Excavation Units by Level and Artifact Type in A801.

Artifact Type	X239		X241		X271		X275	X279	X293	X295	X297		X299	X1160	X1162		TOTAL
	L1	L2	L1	L2	L1	L2	L1	L1	L1	L1	L1	L2	L1	L1	L1	L2	
Tertiary Flakes	1	1		2			1	1	1	2	1			1		4	15
Thinning Flakes	1	9		2						1					2	4	19
Broken Flakes	5	16	3	13	6	1	3		1			1	2		3	5	59
Thermal Shatter	3	4	1	4	1		1		1		1	1			3	3	23
TOTAL	10	30	4	21	7	1	5	1	3	3	2	2	2	1	8	16	116

Table 17. Chipped Stone Debris, X501 by Level and Artifact Type in A802.

Artifact Type	X501							TOTAL
	0-15	0-30	15-20	21	15-30	20-30	27-47	
Raw Material	1	4	2		4	4		15
Primary Flakes	1		1		2			4
Secondary Flakes	5	1			10			16
Tertiary Flakes	10	14	17	2	40	16	3	102
Thinning Flakes	7		15	1	24	6		53
Broken Flakes	31	7	20		44	9		111
Retouching Flakes					1			1
Thermal Shatter	8		2		10	6		26
TOTAL	63	26	57	3	135	41	3	328

recovered at 14ML417, the size range of thinning flakes is usually 1 inch (25.4 mm) or less.

Shatter. Shatter is irregular chunks of raw lithic material, lacking well-defined evidence of intentional reduction. Such chunks can be produced during the lithic reduction process or by a variety of other means, including heating, producing what is often referred to as thermal shatter.

Discussion of Chipped-Stone Tool Production and Maintenance Debris

The category of chipped-stone tool production and maintenance debris (primary flakes, secondary flakes, tertiary flakes, etc.) was added to this study. Chipped stone debris in A801 totaled 749 specimens, of which 360 or 48 percent were broken flakes (Tables 14-16). Tertiary flakes were the next most common type of debris, numbering 133 or 18 percent. The least common artifact type recovered were cores.

Two concentrations of debris were found during the excavation of A801. The concentrations were evident in both levels excavated and essentially outlined the highest portion of the terrace excavated (Figures 19 and 20). This terrace rise was also the location of daub concentration (see Architecture section).

A802 chipped stone debris includes 1,016 specimens. A total of 552, with nearly equal numbers of broken and tertiary flakes, were recovered from the surface and general excavation. A total of 175 broken flakes was recovered, which is about 32 percent of the assemblage. Tertiary flakes totaled 166 or 30 percent of the assemblage. Due to irregular unit sizes, the debris distribution density was not specifically obtained. However, it is clear that the majority of the debris in A802 was recovered from the house interior (Table 17).

Over 60 percent of the chunks of raw material from A802 was found within the house. All other raw material pieces were found adjacent to the house or on the surface. All three cores were found outside the

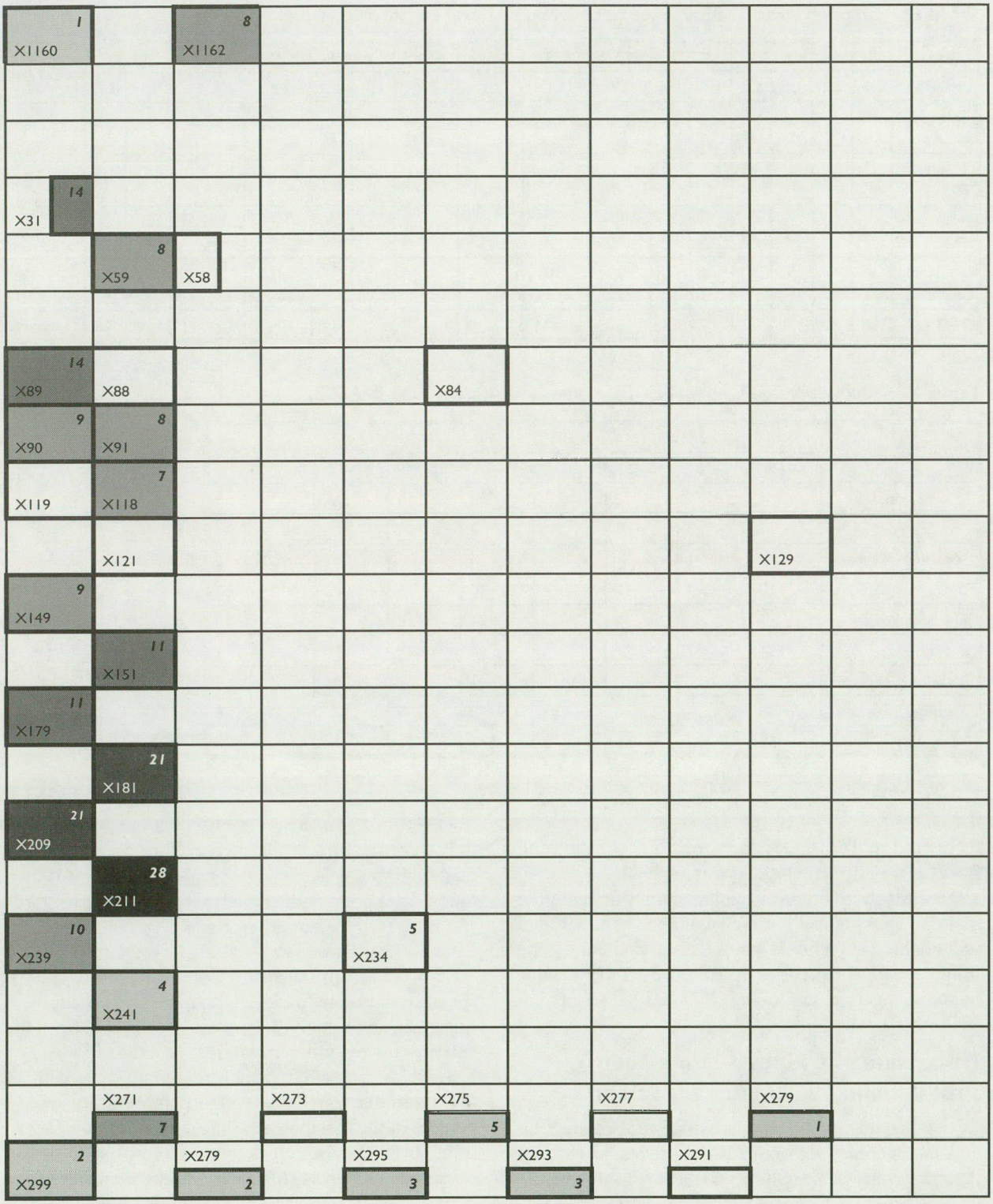


Figure 19. Distribution of lithic debris from 0-15 cm bgs in A801.

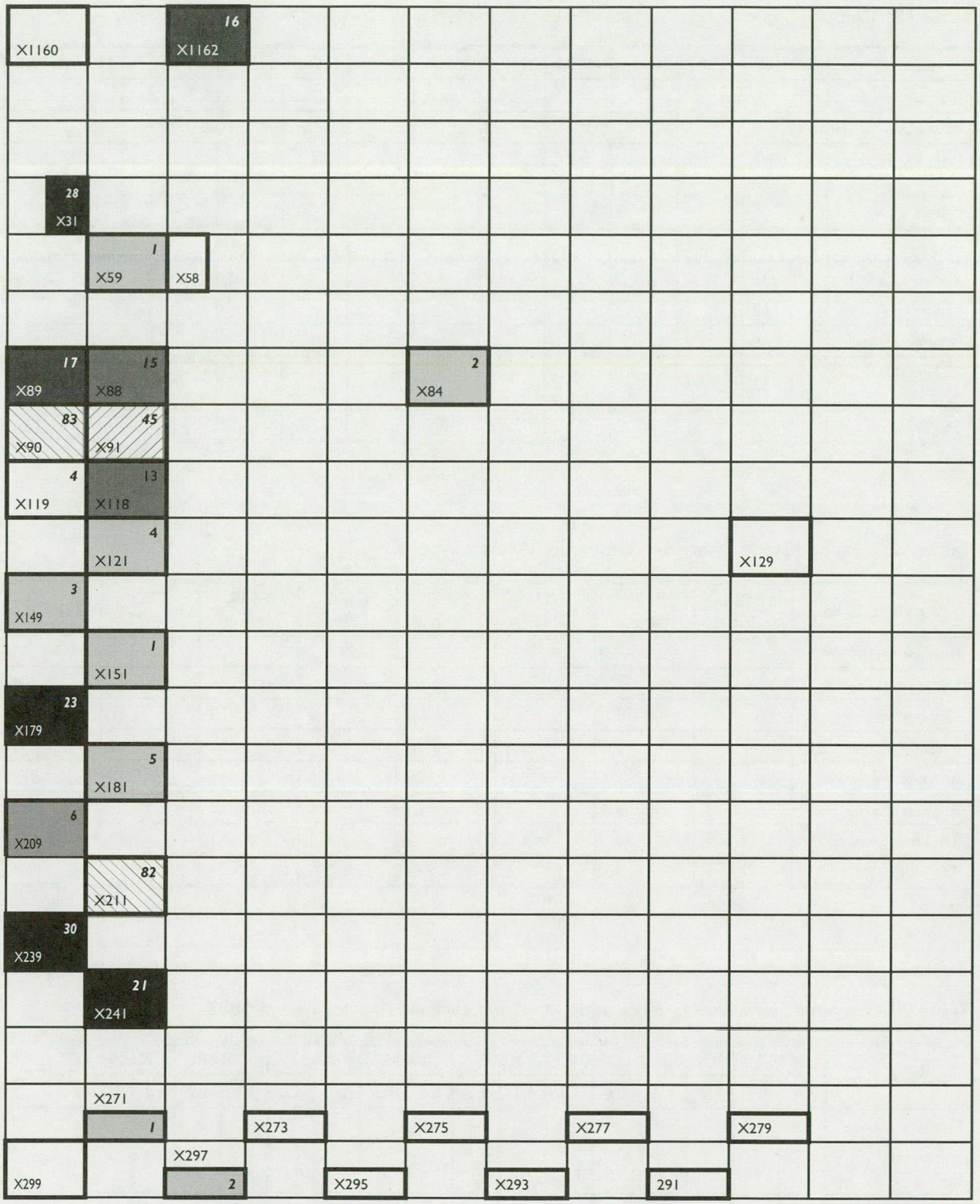


Figure 20. Distribution of lithic debris from 15-30 cm bgs in A801.

Table 18. Chipped Stone Debris, Surface and Excavation Units by Level and Artifact Type in A802.

Artifact Type	Surface	X502	X503	X504	X505	X506	X507	X508	X509	X510	X511	TOTAL
Cores	1					1		1				3
Raw Material	8								1			9
Primary Flakes	11	1			1							13
Secondary Flakes	8									1		9
Blade						1						1
Tertiary Flakes	38	5	3		5	5		4	1	2	1	64
Thinning Flakes	12			1		1						14
Broken Flakes	46	2	3	1	2	3	2	3		1	1	64
Thermal Shatter	23	3				2		4	7	7	1	47
TOTAL	147	11	6	2	8	13	2	12	9	11	3	224

Table 19. Chipped Stone Debris by Feature and Artifact Type in A802.

Artifact Type	F424 Pit	F435 Pit	F439 Post	F443 Pit	F480 Pit	F552 Hearth	F553 Pit	TOTAL
Raw Material		3						3
Secondary Flakes		2		2				4
Tertiary Flakes		11	1	4	2	3	1	22
Thinning Flakes		7	1	18		11	3	40
Retouching Flakes				129		145	37	311
Broken Flakes	1	10	1	14		44	12	82
Thermal Shatter				1		1		2
TOTAL	1	33	3	168	2	204	53	464

Table 20. Chipped Stone Debris, Excavation Units by Level and Artifact Type in A803.

Artifact Type	X602		X603		X604		X605		X606		X607		X608		X609		TOTAL
	L1	L2	L1	L2	L1	L2	L1	L2	L1	L2	L1	L2	L1	L2	L1	L2	
Primary Flakes					1	1											2
Secondary Flakes					1								1				2
Tertiary Flakes	3		6	4	5	1							5		6	1	31
Thinning Flakes		1	1		1												3
Broken Flakes	1	1											1			5	8
Shatter				1	1									1	1		4
TOTAL	4	2	7	5	9	2							7	1	7	6	50

Table 21. Chipped Stone Artifacts by Raw Material and Size Grade in A801.

Size Grade/ Material Source	1	2	3	4	5	6	7	TOTAL
Smoky Hill Jasper			50	207	142	7	2	408 (59%)
Smoky Hill Jasper (burned)			5	97	91	8		201 (25%)
Permian Chert			15	65	55	2	4	141 (17%)
Tecovas Jasper					2			2
Chalcedony				1				1
Brown Chalcedony			1	1	2			4
Gray Chalcedony				1				1
White w/Black Specks Chert			1	1			2	
Agate					1			1
Alibates Dolomite		1	2	2	2			7
Mississippian Chert			1	5	7			13
Flattop Chalcedony				2				2
Unknown Chert			5	4	3			12
Basalt				3				3
Quartzite			3	5	1	1		10
TOTAL		1	82 (10%)	394 (49%)	307 (38%)	18	6	808

house, with one recovered from the surface (Table 18).

Table 19 lists the chipped stone debris recovered from various house features. Of the 464 specimens, 311 or 67 percent were retouching flakes, the very small pressure flakes resulting from sharpening tool edges. These small flakes were recovered through the flotation process. Two of the pit features, F424 and F480, were nearly devoid of artifacts and were primarily filled with ash and mixed soil.

Chipped stone debris from A803 was sparsely scattered (Table 20).

The flake types and the presence of retouching flakes in the flotation samples indicate that lithic reduction processes within the site were generally limited to late-stage reduction and retooling. The high percentage of locally available Smoky Hill jasper within each size grade reflects the importance of this raw material to the site's inhabitants.

Lithic Material Sizes and Sources

The size grading showed that the most common size of debris was size 4, which had at least one measurement of an inch or 25.4 mm (Table 21).

Source locations of raw lithic materials represented in site assemblages offer many insights into the raw material richness, technology, and transportation techniques (Brantingham 2003). Raw materials in this study, summarized in Table 22, are typically of two kinds: local Smoky Hill jasper and Florence chert from the northern Flint Hills of eastern Kansas (Figure 21).

GROUND STONE

Ground stone artifacts recovered during the investigation were produced from local sandstones and limestones. Three different sandstones were locally available, with one source also used to produce the grit/sand temper found in the site pottery.

Ground Stone Tools

Middle Ceramic peoples of the Central Plains often ground sedimentary rock for a variety of tools and pipes. Sandstone abraders commonly have been recovered in sites of this stage throughout the region, including those of the Solomon River phase (Lippincott 1976:112).

A total of eight abraders, including five sandstone

Table 22. Chipped Stone Artifacts by Raw Material and Size Grade in A802 and A803.

Size Grade/ Material Source	1	2	3	4	5	6	7	8	TOTAL
Smoky Hill Jasper	2	8	100	287	110	34	66	9	616 (51%)
Smoky Hill Jasper (burned)		2	22	79	58	40	47	36	284 (23%)
Florence Chert		1	25	72	25	40	47	36	194 (16%)
Permian Chert									
Tecovas Jasper				1					1
Chalcedony				2					2
Brown Chalcedony			2	6	2	6	7		21
Gray Chalcedony			1	3		4	5		13
White w/Black Specks Chert			1	6	1				8
Unknown Chert			1	5	4	6	5	2	23
Agate				1	2	1	5		9
Alibates Dolomite				6	3	1	2		12
Agatized Dolomite									
Mississippian Chert					1	1	1		3
Flattop Chalcedony		1		4	1	3			10
Quartzite		1	5	4	3		2		15
Quartz									
Petrified Wood			1	2					3
TOTAL	2	13	158 (13%)	478 (40%)	210 (17%)	136 (11%)	163 (13%)	52	1214

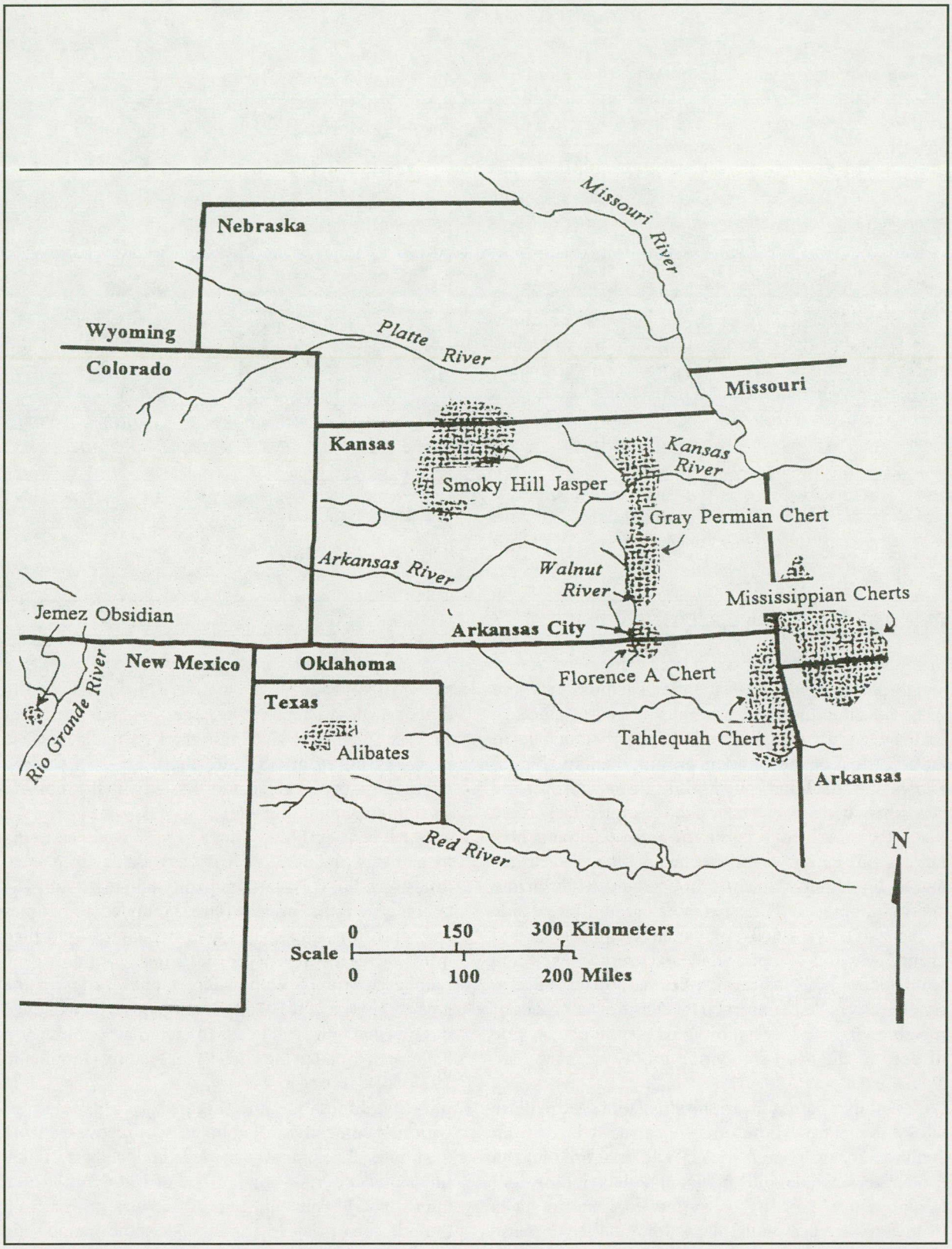


Figure 21. Map of regional lithic sources (from Hawley and Haury 1994:27).



Figure 22. Selected abraders.

and three scoria, have been identified at the site (Figure 22). Seven came from the house locus (Table 23), and the eighth was recovered from the surface of A801. Most of the abraders are fragmentary, but all except one specimen had multiple grooves. Seven are boat-shaped, each with a rounded base and flat surface that contains the largest groove on the specimen. This large groove runs lengthwise across the flat surface and is U-shaped, which is interpreted as an arrow shaft straightener. The specimens are only one side or piece of a two-sided tool, which would be clamped around a wood or bone shaft and worked back and forth to smooth or clean it (Adams 2002). Several other grooves were observed on the sides and bases of the abraders. These shallow grooves are not as wide or deep as the shaft-smoothing groove, and they are V-shaped.

Another common ground stone tool type in these sites is the mano. These tools were usually made from sedimentary or igneous rocks. The final product is a moderate sized, ovoid or rectangular grinding tool (Lippincott 1976:114). A variety of grinding slabs or metates are present in many Solomon River phase sites. The primary function of these tools is grinding seeds, such as maize.

One large fragment and four smaller grinding slabs, all sandstone, were recovered from the vicinity of the 14ML417 house. The larger fragment measures 11.31 x 16 cm and 47.82 mm thick. One flat surface was a grinding area, while there are two nutting depressions on the other side. Essentially the tool was a grinding and nutting stone.

Limestone Pipe. Stone pipes have been found in many of the sites. Most were made from local limestone, but they vary in quality and material. The pebble pipe is the simplest form, a rounded, sometimes smoothed limestone piece with two conically drilled holes. Such pipes were the most common type recovered from Solomon River phase sites in the locality (Lippincott 1976). Effigy pipes with engraved designs that represent heads of mammals or birds also have been found in the Glen Elder locality (Lippincott 1978:105-108).

One limestone pipe (Figure 23), a pebble pipe with two conically drilled holes, was recovered from the house. The pipe was made from locally available limestone and has a bowl orifice of 18.06 mm, which tapers to 7.11 mm. A stem orifice was drilled from the side, measuring 16.15 mm wide at the opening and tapering to 5.13 mm at the bowl. Some charring and heat discoloration is evident along the bowl interior and exterior.

Table 23. Abrader Characteristics.

Catalogue Number	Provenience	Groove Shape	Groove Width (mm)	Groove Depth (mm)	Total V-Shaped	Total U-Shaped	Abrader Style	Material
4283	A801	U	10.83	4.08		1	Fragment	Sandstone
		V	4.77	1.58	2			
606	A802	U	5.81	1.79		1	Fragment	Sandstone
		V	2.85	1.7	1			
645	A802	U	7.86	2.54		1	3-Sided	Clinker/ Pumice
		V	5.8	3.58	1			
		V	4.87	2.97	1			
691	A802	U	8.15	3.08		1	Boat-Shaped	Sandstone
		V	1.5	1.7	5			
811	A802	U	5.7	5.7		1	3-Sided	Pumice
		V	3.92	10.39	1			
		V	2.35	7.12	1			
1298	A802	V	1.5	1.2	2		Rounded	Sandstone
2790	A802	U	7.14	2.84		1	3-Sided	Sandstone
		U	8.27	0.93		1		
		V	3.54	2.1	1			
3132	A802	U	8.46	2.26		1	Boat-Shaped	Sandstone

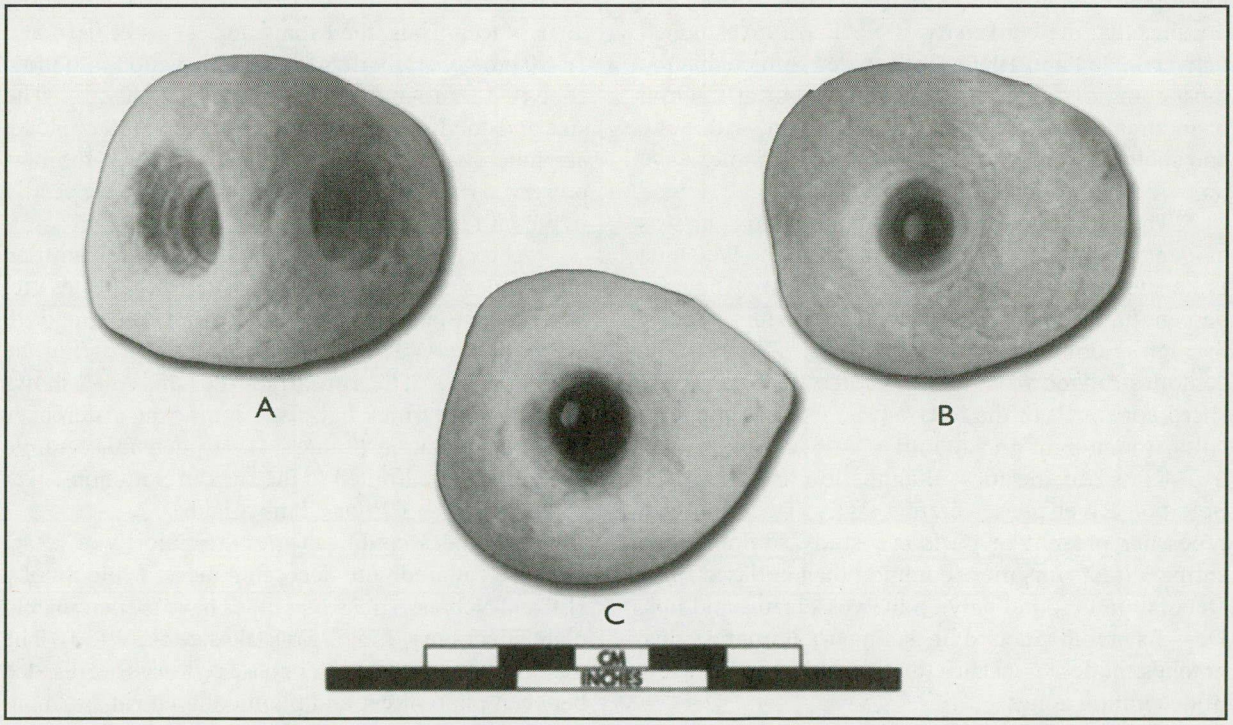


Figure 23. Views of limestone pipe from A802: a. both conically drilled holes, b. stem orifice, c. bowl orifice.

Ochre. Ochre is a general term for any of the clays or earth containing ferric oxide, silica, and alumina. Ranging in color from yellow through red to brown, ochre was widely used as a pigment for decorative and ceremonial purposes throughout much of prehistory and into the historic period. Many Native Americans, most notably Elders and Traditionalists, view ochre as sacred. Therefore, archeological sites with ochre are sacred to many and should be approached appropriately (Latham 2002).

Twenty-four fragments of hematite or ochre were recovered from the house locus. Most of the fragments (n=21) were from pit features within the house and are size grades 7 and 8. These small flecks of ochre normally would pass through a ¼-inch screen and were only recovered because of the flotation processing of pit feature fill. No ochre was found in A801 and A803.

Ceramic Analysis

Ceramic debris was another of the most common artifact types recovered during the excavation of 14ML417. These sherds have been classified under the domestic category and reflect activities critical to the livelihood of the site occupants.

The two most common ceramic vessel forms from the Middle Ceramic period are globular jars and hemispherical bowls. Gayle Carlson (1971) analyzed and classified the ceramic debris from the Solomon River phase using pottery sherd collections from 12 of the sites that the University of Nebraska investigated between 1964 and 1966. Carlson determined that the most common tempering agent is sand or grit. Grog or indurated clay temper is less common, with bone and shell being present but rare. A few samples have no evidence of temper in the paste.

The paddle and anvil method of manufacture was evident in 77 percent of the sherds from the Waconda Lake sites analyzed by Carlson (1971:51). About 22 percent of the sherds had smoothed exteriors, usually through smoothing of the cordmarking. Texture of the ceramics ranged from fine to coarse with dark gray sherd cores. Both the interior and exterior range in color from a light gray to buff.

Rims are the most diagnostic element of the Solomon River phase ceramic style. Two main rim types are present in Carlson's study sample, with simple direct rims more common than collared rims. Decoration is found only on the vessel rims and lips. Designs include incised lines, fingernail impressions, notches, nodes, punctates, and pinching in a variety of decoration zones.

The ceramic artifacts recorded from the excavation of 14ML417 are nearly all vessel sherds. Most of the sherds have cordmarked exteriors and grit or fine sand tempering. The rims reflect several aspects that logically could be ascertained about distribution of the ceramic artifacts. For example, the size of ceramic sherds in a field that has been cultivated for over 100 years would likely be tumbled, weathered, and broken into several small fragments within the plow zone. Rowlison (1980) described the plow zone as being from the surface to around 15-20 cm below the surface. Thus, the excavation levels of 0-15 and 15-30 cm generally divided the excavation into plow zone (0-15 cm) and sub-plow zone (15-30 cm). The size and condition of the sherds in the 15-30 cm level are much better for ceramic analysis. All the best preserved rims were within the house locus, especially in the pit features.

Table 24. Percentage of Ceramic Jar Rim Styles.

	A801	A802	A803	TOTAL
% Direct Plain	42.6	34.1	40	37.2
% Direct Decorated Lip	4	3.6	0	3.6
% Direct Modified Edge	8.5	25.9	20	19.7
% Direct Decorated Face	27.7	15.3	20	19.7
% Collared Plain	10.6	8.2	20	9.5
% Collared Modified Rim Base	6.4	1.2	0	2.9
% Collared Decorated Face	0	11.8	0	7.3
Number of Jars in Sample	47	85	5	137

A total of 137 ceramic jars have been identified by comparing rim morphology, temper, paste, etc. Forty-seven jars were identified from A801, and 90 are from the A802/803 house locus. Comparing the characteristics of the rims from A801 and A802 shows a lot of similarities but also significant differences in zone decoration (Table 24). In general, ceramic decorations are limited to the rims in Solomon River phase and other CPt or CPm variants.

In Upper Republican sites the majority of vessel rims are collared with decorated faces, while Smoky Hill and Nebraska phase ceramics have predominately plain direct rims (Table 25) (Blakeslee 1999:110). The majority of Solomon River phase ceramics are divided between plain direct and plain collared rims. About 80 percent of the identified vessels at 14ML417 had direct rims, with nearly equal percentages represented

Table 25. Comparison of Percentage of Ceramic Rim Styles.

Rim Styles	14ML417 A801	14ML417 A802	Solomon River*	Smoky Hill*	Nebraska*	Upper Republican*
% Direct Plain	42.6	38.6	39.6	56.3	52.6	23
% Direct Decorated Lip	4	4	6.7	8.4	18.4	6.9^
% Direct Modified Edge	8.5	14.8	5.9	8.9	14	^
% Direct Decorated Face	27.7	13.9	1.1	0	0.03	1.7
% Collared Plain	10.6	13.9	35.6	9.1	2.2	20.1^^
% Collared Modified Rim Base	6.4	0.9	2.2	16	7.6	^^
% Collared Decorated Face	0	13.9	8.9	1.3	5.3	48.3
Number of Jars in Sample	47	101	957	988	3,705	1,459
*From Blakeslee (1999:110).						
^ Direct rims with modified edges were not described by Kivett and Metcalf (1997), but a few may be included in the direct rim decorated lip category.						
^^ Collared modified bases were not counted separately in Kivett and Metcalf (1997), but a few specimens from a total of three sites are included with collared rims.						

Table 26. Ceramic Sequence by Rim Count.

Rim Style	A801	A802	A803	TOTAL
Direct Plain	20	39	2	61
Direct Decorated Lip	2	4		6
Direct Modified Edge	4	15	1	20
Direct Decorated Face	13	14	1	28
Collared Plain	5	14	1	20
Collared Modified Base	3	1		4
Collared Decorated Face		14		14
TOTAL	47	101	5	153

in A801 (83 percent) and A802 (79 percent). The differences between A801 and A802 are noted in decoration zones.

All of the complete and partial vessels from A802 have modified direct rims. In A802 the percentage of direct rims with modified edges is substantially higher than in A801. Examination of the rims yielded an interesting pattern of increasing use of the modified edge decoration. A pattern of rough, poorly designed rim modification was observed in many of the small rim fragments, thought to be from earlier pottery batches. The manufacturing techniques seem to be refined through time, as they appear increasingly more polished. The progression of refining the modified rim design may show the development of a single potter.

As A801 likely represents a second house on the site, ceramics from A801 and A802 were considered separately. Ceramics of the two areas are compared and then compared with other sites.

A801 Ceramic Artifacts

Jars

Based on the rim sherds recovered, 50 individual vessels were identified in A801. Forty-seven of these ceramic vessels are globular jars, typically found in Solomon River phase sites (Table 26). One is a miniature, while the other two are bowls. Ten other rims were recovered, but the poor condition of the specimens made it impossible to include these in the final count; therefore, they are not included in the following report. Fourteen of the 47 jar rims discussed

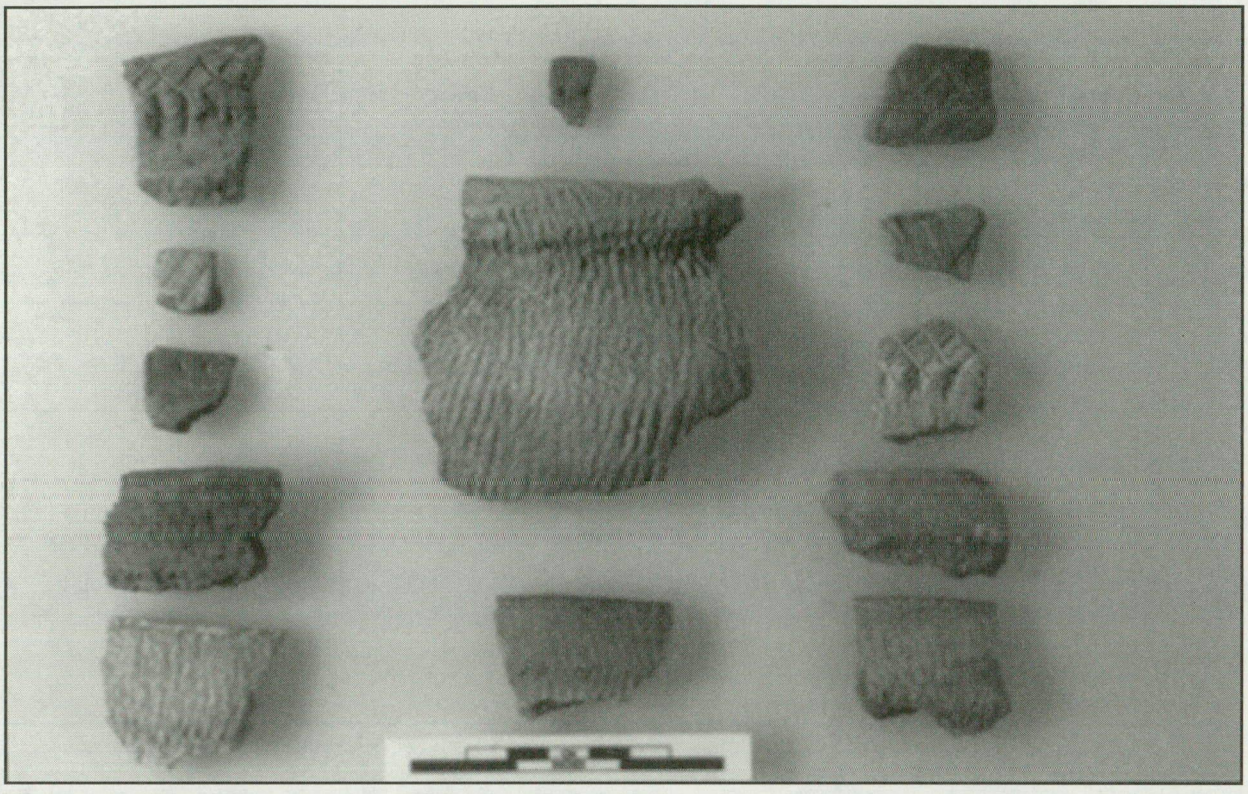


Figure 24. Selected rim sherds from A801.

were from the surface, while the remaining 33 rims were from excavation units.

Surface Rims Sherds. Twenty rim sherds were recovered from the surface of A801 during the first stages of the 1980 field investigations (Table 26). Many of these sherds are small fragments with weathered surfaces, evidence of being tumbled by farming activities and exposure to the elements. Orifice diameter could not be measured due to the small size. All of the rim sherds with intact surfaces appear to have cordmarked or smoothed-over cordmarked exteriors. Based on the paste, temper, rim style, and exterior and lip treatments, all 20 rim sherds represent individual vessels.

Four styles of rim form were identified in this sample, including direct plain (n=7), direct modified edge (n=1), direct decorated face (n=4), and collared modified base (n=1) (Table 26). A significant number of the rim sherds (n=6) fall under the unknown category, as they were too small and eroded to determine style and decoration.

Only seven of the rims have observable designs on the rim exterior. Four distinct designs are present and were created by two different application methods. The first method is a series of incised lines, created by dragging a thin, approximately 1-mm wide tool (e.g., reed or awl) through the surface of the pre-fired vessel in a desired pattern. The second method was placing a coil of clay along the upper rim and using a tool to cut or notch nodes; the roughed-out nodes were then pinched and smoothed, some very sloppily done. This form of decoration is more refined on later vessels in A802.

In considering the correlation between lip decoration and other characteristics of the rims, the unknown rim types were eliminated from consideration as was the collared rim because the lip was missing/eroded; thus, the lip decorated sample from the surface of A801 was reduced to 13 rims. Of these, seven have no exterior decoration, and all but one have smooth, rounded lips. In contrast, four of the five rims with some kind of decoration have smooth, flat rims. A single decorated rim with a rounded lip has a pair of incised lines in an undulating pattern.

Excavated Rim Sherds. Thirty-four individual vessels were identified among the 39 rim sherds excavated in A801. Sixty-eight percent or 23 of these sherds were recovered in excavation levels below 15 cm. Most of the rims (n=25) were recovered from the northwestern portion of A801, where the daub concentration indicated the presence of a house. The six rim types included direct plain (n=13), direct

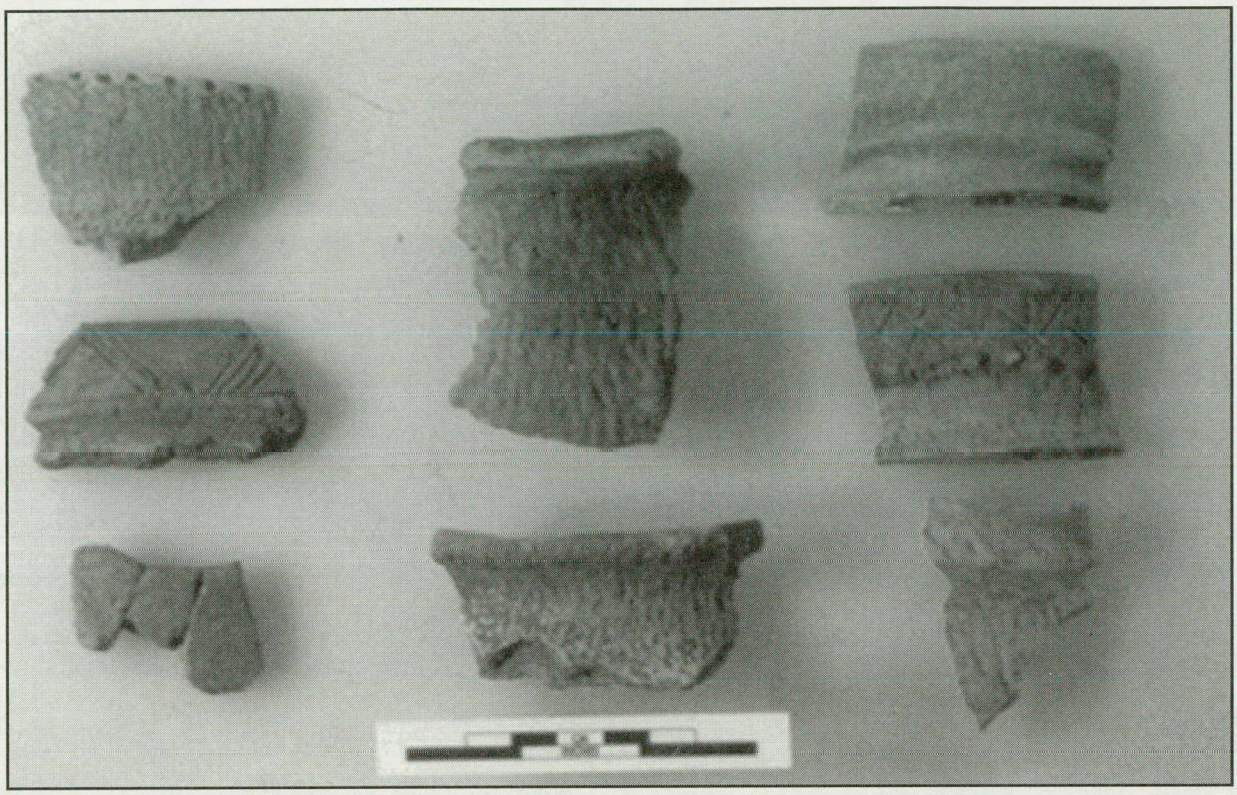


Figure 25. Selected rim sherds from A801.

decorated lip (n=2), direct modified edge (n=3), direct decorated face (n=9), collared plain (n=5), and collared modified base (n=2) (Table 26, Figures 24 and 25).

A review of rim sherd distribution showed that those found on the surface and in the plow zone were broadly scattered. On the other hand, a concentration of rim sherds below the plow zone matched the daub concentration in A801 (see Architecture section). This was further indication that a house, once present in A801, had been destroyed by cultivation and pipeline, road, and ditch construction.

Six of the decorated rims have a crosshatch design with pinched nodes. These rims were tapered significantly to the lip. A series of nodes were applied along the rim base, generally pinched by hand and ranging considerably in size, distribution, and morphology. Then the crosshatch design was incised with a thin tool, such as a reed, across the face of the pre-fired ceramic. One specimen has trailed lines and a series of slightly thickened lobes along the lower rim instead of nodes, but the same pattern of application was used.

Four specimens appear to represent four vessels made by a single potter. The potter initiated the incised design from the lower left, at the base of the rim face generally between the pinched nodes, and drew the tool through the paste to their upper right, terminating at the lip. To complete the crosshatch design, the potter then applied the same sized line, starting from the upper left and continuing to the rim base. On one specimen the potter applied an additional incised line, paralleling the lip, across the upper edge of the crosshatched design.

The maker of the sixth vessel appears to have copied the style of the first potter but varied the technique. This sherd has the same node pattern at the base of the rim, but the nodes were cut with a tool, not pinched. Also, during the application of the incised crosshatching the second potter began at the upper right and terminated the line at the crest of a node. The crossing line was initiated at the upper left and generally terminated in the groove between the nodes. An incised line, paralleling the lip, was applied across the upper edge of the crosshatched design. This second potter's design appears less refined than the one discussed previously.

Only one of the cordmarked collared rims had any design on the face. This specimen was found in a cluster of ceramic sherds recorded as F489 in X90. There were two other rim sherds found in this cluster, all from three different vessels, but only one had any design. The design was a series of cut nodes along the lower edge of the rim face.



Figure 26. Partial pot from A802.

Two of the collared rims with smoothed-over cordmarking also have designs on their exterior faces. Both came from the 15-30-cm level of X59. The first example (sherd #4591) not only has a series of tool-impressed punctates along the upper rim but also has a unique feature at the base of the rim. Generally, collared rims have an overhang or edge that extends over and grades into the neck of the vessel. In this specimen the angle of the overhang is abrupt, and the base of the collar is flattened. In addition, the rim of this vessel appears to have been applied to the top of the jar, not formed from the main body. A groove at the base of the rim sherd, where it separated from the neck, is clearly evident. The other sherd (#4592) has a series of incised diagonal lines running from the upper right to the lower left, essentially from the rounded lip to the base of the rim.

The lip morphology of the collared rims varies, with the most common style being a flat and smooth surface (n=8). Only one of these lips has any type of design, which consists of a series of diagonal incised lines across the smooth, flat surface. Other lip styles include tapered (n=3), rounded (n=2), smooth and beveled to the interior (n=3), and smoothed and rolled (n=1). Two are undetermined due absence of a lip.

The direct rims generally lack decoration other than cordmarking, but three of the excavated sherds have evidence of some lip or edge decoration. One of the specimens (#4793) has a series of incised diagonal lines across the lip surface. The second specimen (#4248) has a series of pinched nodes across the exterior edge of the lip. The final rim sherd with decoration has a series of large punctates along the exterior edge of the lip. These punctates were applied vertically, essentially from the top of the lip to about 1 cm down the rim face. Another design on this sherd is at least one diagonal incised line, which runs from the lip, down at about a 30° angle to the left.

Miniatures. One of the collared rims is from a miniature vessel, recovered from the 15-30 cm level of X179. The exterior of the rim sherd is cordmarked, and the only design element is a series of very small,

circular punctates at the base of the rim. The temper and the paste are similar to the other ceramic vessels at this site, so it appears that this miniature was made locally.

Bowls. Two bowls, represented by fragments of direct rims, were identified during the excavations in A801. One bowl rim sherd was recovered from 32 cm below the surface in X117. This specimen was made from the same paste and temper as most of the jars identified at the site; however, the bowl was not formed by the paddle and anvil technique used in the jar production. This interpretation is based on the fingertip impressions on the interior wall and the smooth, but undulating exterior surface, lacking cordmarking or shaping by tools.

The second bowl was recovered in X90, the likely edge of a house. This rim was in three fragments, with two in the top excavation level of 0-15 cm and the third in the 15-30 cm level. The exterior of this bowl is smooth with no evidence of cordmarking. However, a residue of hematite powder is scattered across the exterior and interior surfaces. The design motif on the exterior of the vessel is unclear, but a single incised line is evident. This line parallels the curvature of the vessel lip, which is tapered toward the exterior. The paste of this bowl appears denser than the other ceramics at this site, suggesting it was made in another locale, possibly a trade item.

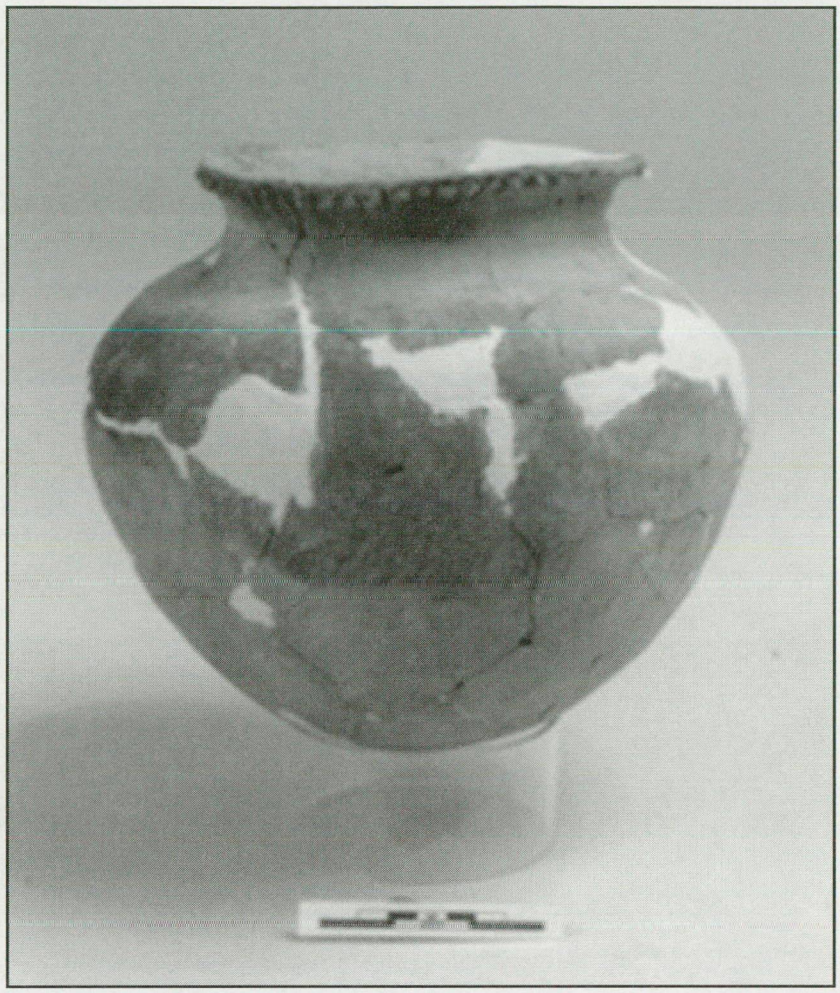


Figure 27. Second pot from A802.

Another bowl was uncovered prior to the 1980 excavations by the current landowner when the site was being plowed. This vessel was not saved.

A802 Ceramic Artifacts

Jars

Based on rim morphology, 101 jars were identified in the ceramic assemblage from A802 (Table 26). Three of these were nearly complete and were reconstructed by KSHS staff (Figures 26-28). The jar fragments were concentrated around the house, scattered across the floor. Rims were recovered from the surface, house floor, and hearth (F552).

Surface Rim Sherds. During the 1980 investigations 20 rims were collected from the surface of A802, but they represent only 17 different vessels (Table 26). Four styles of rims were identified: direct plain (n=7), direct modified edge (n=4), collared plain (n=4), and collared decorated face (n=2). Three sherds were classified as unknown, as they do not include enough of the rim to determine shape.

Decorated rims are limited to six specimens; however, one of the three rims classified as unknown style has evidence of decoration on the face. The types of decoration applied to the faces of these rims are limited to nodes, punctates, and incised or trailed lines. Nodes on four rims are immediately below the lips. Three of the rims have pinched nodes, while the fourth has tool-cut nodes. On three of the specimens,

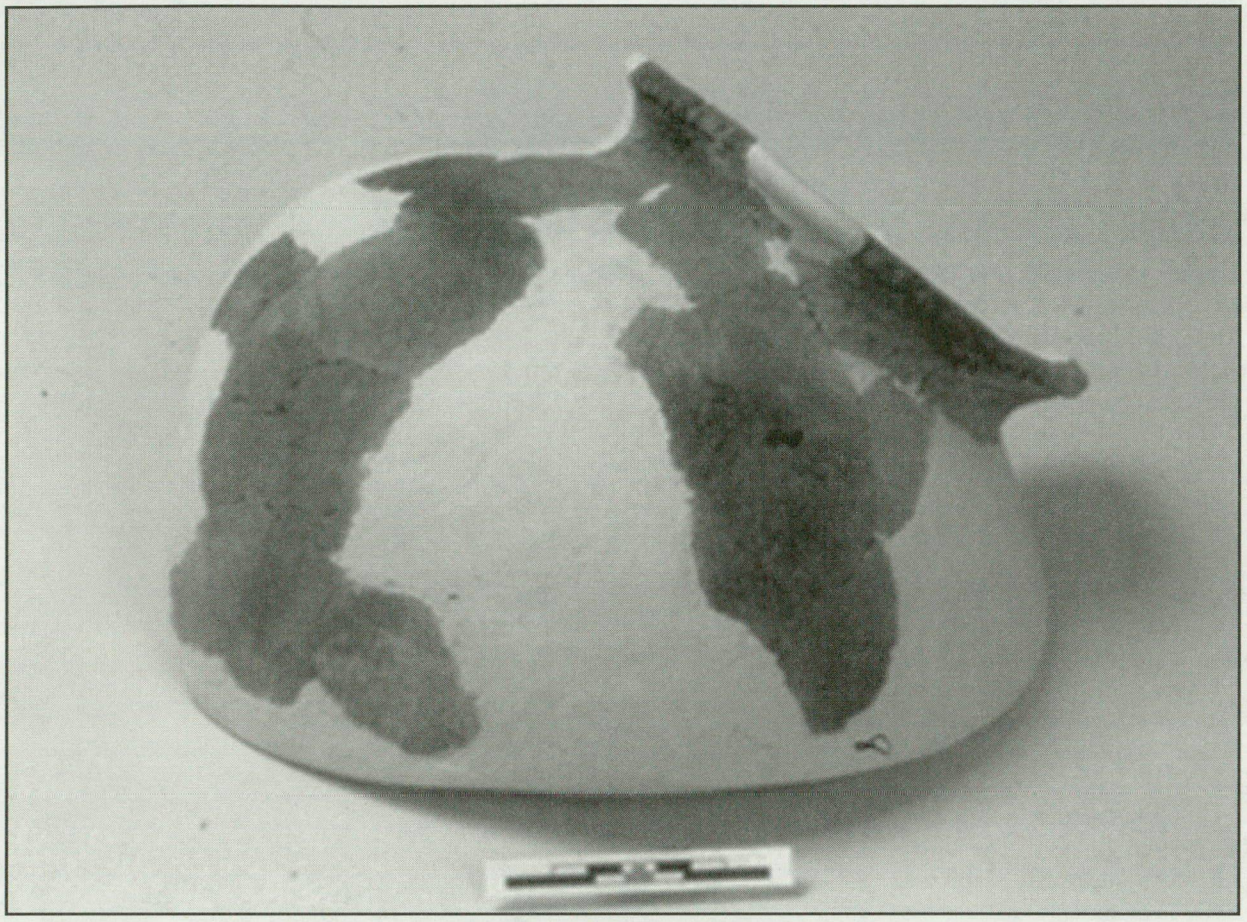


Figure 28. Third pot from A802.

the nodes are the only form of decoration, with the exception of cordmarking on the lip of a direct rim. The fourth node-bearing rim is collared (#3480) and has a trailed line between the nodes and the vessel lip, which is missing. The other forms of decoration are parallel rows of elongated punctates on a collared rim and horizontal incised lines on one of the unknown style rims.

The lip morphologies of the rims fall into four main types: beveled, rounded, tapered, and flat. Three rims cannot be categorized because the lips are absent. Of the 17 rims with identifiable lips, 3 are rounded, 3 are tapered, and 4 are beveled. These surfaces are generally smooth, with the exception of one beveled example, which has cordmarking on the lip of a direct rim. Most of the beveled lips slope to the exterior (n=3), including the cordmarked example. The interior-sloped lip is on a direct rim, as are all but one of the others. Flat-lipped vessels (n=7) from the A802 surface are typically smooth with no decoration. The lips generally do not extend beyond the width of the upper rims except in the case of #3632, which has a lip rolled to the exterior of the vessel.

Excavated Rim Sherds. Eighty-four individual ceramic jars were identified from the rim sherds and the three nearly complete vessels that were excavated in the house floor (Table 26). Seven rim styles are represented in the 58 jars that were recovered during the excavation of X501: direct plain (n=18), direct decorated lip (n=4), direct decorated face (n=11), direct modified edge (n=13), collared plain (n=5), collared decorated face (n=9), and collared modified rim base (n=1). A few sherds are too fragmentary or eroded for style identification.

The three reconstructed vessels have the direct modified edge rim style. The first vessel, a partially reconstructed globular jar (Figure 26), has a cord-marked exterior and pinched nodes along the lip edge as the only form of decoration. The spaces between nodes are 3-6 mm, and the nodes extend 3.2 mm out from the rim faces. The uniformity and characteristics of the nodes indicate that the construction included the placement of a coil around the lip edge, cutting by a tool to create the grooves or voids between the

nodes, and smoothing by hand. The orifice diameter is 153 mm, and the rim height ranges from 31 to 33 mm high.

The second nearly complete reconstructed vessel (Figure 27) is also cordmarked with a direct modified edge rim style. The design on this jar is a series of incised diagonal lines, which were applied by slicing through the lip edge with a tool, essentially pulling it at an angle from the upper left to lower right of the rim edge. The incised lines, placed 3.02-6.60 mm apart, are 2.25 mm wide. Incised line lengths range from 8.40 to 21.80 mm. Vessel dimensions are 23 cm tall, 173 cm orifice diameter, 26.82 mm rim height, and 262 mm maximum body width.

Vessel 3 is another nearly complete globular jar with a cordmarked exterior and direct modified edge rim style (Figure 28). The decoration is a series of pinched nodes nearly identical to those on Vessel 1. Orifice diameter of this 198-mm-tall vessel is 114.69 mm; the rim is 23.19 mm high; and at the widest point of the body, the jar is 231 mm across.

Twenty-six vessels were identified among the rims recovered from other units in A802 (X504, X505, X506, X507, X508, X509, and X511). The rim styles represented are direct plain (n=14), direct modified edge (n=1), direct decorated face (n=3), collared plain (n=5), and collared decorated face (n=3).

Exterior treatments are primarily cordmarked on the vessel bodies and many rims. Decoration or modification was noted on 54 of the 101 vessels in A802 (Table 26). Five different decoration techniques were identified: incised lines on the rim face, pinched nodes, punctates, notches, and fingernail impressions. Three of the techniques–pinched nodes, punctates, and notches–were found in on the direct modified edge rims. Pinched nodes were the most common technique, accounting for nearly 90 percent of the direct modified edge rim sample.

Eleven of the 26 vessels identified among the rims recovered from the house floor outside X501 were decorated. Three of these have multiple zones of decoration. One is collared with an incised chevron design on the rim face and punctates on the lip. Another is a direct rim that has incised diagonal crosshatching on the rim face and tool-cut nodes along the base of the rim. The third multi-zone decorated rim is of an unknown style due to its fragmentary condition; it has incised diagonal lines on the rim face and incised horizontal lines along the base of the rim.

The rim nodes were tool-cut and finger-formed prior to the cordmarking and incising. The small sample shows that the nodes are not uniform in structure or placement. For example, the nodes on sherd #2112 are horizontal ovals placed below the collar crest, whereas the nodes on sherd #669 are more circular in shape and placed on the collar crest.

The tools used to apply the incised lines are also inconsistent. The cruder samples have an incised line width of 2.5 mm, while the more refined specimen has a 1.5-mm line width. This variation may be related to the variation in pressure applied during the incising.

Lip treatments on the A802 rims include decorated, beveled, tapered, flat and smooth, and rounded. Seven rims from the house excavation have lip decoration. The forms of decoration are diagonal incised lines and punctates. Four of the lips—three plain direct rims and one decorated collared rim—are flat and decorated with incised diagonal lines. Another example of incised line decoration was noted on the lip of a decorated direct rim. On this specimen the lip is tapered, and the incised lines are cut through the peak of the lip. The remaining rim specimens with lip decoration are two decorated collared rims with elongated punctates placed at angles across the lip surface.

Of the remaining four types of lip treatments identified in the A802 excavated rims, flat and smooth (36 percent) and round (29 percent) dominate. All but two of the round lips are smooth, as they are smoothed-over cordmarked. Tapered lips, including the three reconstructed vessels, make up 17 percent of the sample, while beveled lips are 11 percent. The styles of the remaining 7 percent are unknown due to the fragmentary condition of the artifacts.

The final direct rim with lip design is too fragmentary to ascertain many details, and the design is limited to an ovoid punctate on the lip exterior. Punctates are not common in the collection, and this one leaves much to speculation. The lip of the specimen is smooth and somewhat rounded. Exterior treatment along the rim face is intensive cordmarking at varying angles but predominately vertical in orientation.

A803 Ceramic Artifacts

The 15 rim sherds recovered from A803 are generally small, showing evidence of extended exposure to the elements and cultivation. Due to this fragmentation, only two rim types could be identified from five different vessels. Four are direct styles: direct plain (n=2), direct modified edge (n=1), and direct decorated face (n=1). The only other identifiable rim style in A803 is collared plain.

Distribution of A803 rim sherds was confined to the upper 30 cm of the excavation, with 11 found within the top 15 cm, the plow zone. Three rims were

recovered from the surface, but two of these are from the same vessel. Most of the rims from the 15-30-cm level are large or intact enough to determine rim style, clearly reflecting that the amount of fragmentation is directly related to exposure of the sherds to modern cultivation.

Decoration on the rim sherds is present in half of the vessels identified (Table 24). The types of decoration are quite varied, with only two patterns or techniques of application being repeated, and these repeating decorative motifs appear in combination. The first style is a series of pinched nodes along the lip edge of vessel #3780. The node application is different than on some examples from across the site on which the nodes were formed by cutting and molding with a tool along the rim lip. On #3780 there is no evidence of coil application. Finger pinching formed the nodes, leaving only slight evidence of tool cutting. The entire rim exterior is cordmarked, but neither the upper nodes nor the lip are cordmarked.

Two rim sherds (#3629 and 3716) have the pinched-node motif and the incised line along the lip edge. As with the other pinched-node example in A803, these sherds show no evidence of coil application. It appears that the two sherds are from the same vessel, based on the node size, frequency, and placement; the incised line placement, width, and method of application; and the temper, thickness, and paste. Little else can be ascertained about the sherds, as they are small fragments of upper rims only.

One rim sherd (#3810) has a single incised line along the lip edge. The exterior rim surface is smoothed, and there is no evidence of other types of design, although admittedly the sherd is small.

A portion of a rim sherd (#3735), recovered from the top 15 cm of an excavation unit, has a trailed crosshatched design on the rim face. These lines were applied using a 2-mm-wide, rounded tool. The crosshatching was applied by dragging the tool across the rim surface from the lower right to the upper left and then from the lower left to the upper right. The upper rim is missing, so the exact design motif could not be determined.

Discussion

Table 26 clearly shows that there are some similarities in the ceramic assemblages from both areas, yet there are also glaring differences. Most notable is that collared rims make up 29 percent of the ceramic assemblage in A802 but only 17 percent in A801. Also significant is that decorated faces on collared rims are numerous in A802 (n=14) but absent in A801.

Another contrast is seen in the direct modified edge vessels from each area (Table 26). Close examination revealed that the four A801 rims were well finished, while many of those found in A802 were crudely fashioned. All of the A802 crude samples are small fragments, suggesting that they are older than the complete pots recovered from the site. If it is accepted that the smaller, more fragmentary rims were from earlier batches, it appears that the potter associated with the A802 ceramics was developing or learning the technique.

Based on the ceramic differences, it is concluded that each area represents a separate household. It remains unclear if these houses were occupied at the same time or sequentially. Tempering agents, exterior treatments, and many other characteristics suggest that they were closely related. The modified edge decoration of the three partial vessels, thought to be from the last batch of pottery made by the A802 potter, is similar to the A801 specimens. Most of the nodes were formed by placing a coil of clay around the portion of the rim where the decoration was desired, either upper or lower. Then the coil was either pinched by hand to form the nodes or was cut and notched to create nodes. On some of the specimens, the area of the notching was smoothed over, but cut marks are still evident. Perhaps the potter for the A802 household learned techniques from the A801 potter. Yet another possibility is that the A801 house was occupied later by the family from the A802 house.

Bone Tools and Ornaments

Bone tools are quite common in most CPt sites, including those of the Solomon River phase. The bison scapula hoe, the most characteristic bone implement of the Plains Village tradition, is very common in Solomon River phase habitation sites. The bone was fashioned into a blade and attached to a wood handle in a right or acute angle for use in cultivation. Other bison scapula tools were produced and used for a variety of functions.

These people used a variety of other animal bones to produce tools, including different hide-working tools. Among these are awls, eyed needles, split metapoidal gouges or fleshers, bison spine beamers, and "split metapoidal beamers for dehairing deer and other small mammals' hide" (Wedel 1986:108). They also made bone tools for fishing, such as bi-pointed fish gorges and curved fishhooks. Additional worked bones include ulna picks, shaft wrenches, slotted knife handles, perforated bison phalanges, and polished deer mandibles (Kivett 1949:280; Wedel 1986:108).

Fresh water mussel shells are common in Solomon

Table 27. Bison Scapula Hoe Fragments in A802.

Size of Element/ Provenience	Nearly Complete	Greater Than 1	1	2	3	4	TOTAL
F424				1			1
F435					1		1
F552			1				1
F553	1	3			2	1	7
X501 0-15					1	1	2
X501 15-30		3	5	12	9	5	34
X502 0-15						1	1
X502 15-30						2	2
X503 0-15					1		1
X506 0-30						1	1
X508 0-30				1	1	1	3
X510 15-30						1	1
X511 0-30					1		1
TOTAL	1	6	6	14	16	13	56

River phase sites near or along the Solomon River but appear to be evidence of subsistence, as shell tools are rare. Shell beads and gorgets are much more common than the tools and come in some variety. The styles of shell beads vary from the shaped disk made from local species of mussel shell to imported Olivella shell. Marine shell disk beads and at least one shell pendent are known to be associated with Solomon River phase sites in the Glen Elder locality (Donald J. Blakeslee, personal communication 1997). None of the shell or shell fragments recovered from 14ML417 exhibits any evidence of alteration for use as a tool or an ornament. A study by Dorsey (1998) demonstrated that much can be learned about the seasonality of an occupation from a detailed study of mollusk remains.

Bone Tools

A total of 13 bone tools were identified, but with the high number of small fragments of scapula hoes, additional tools may be represented. The identified tools include six bison scapula hoes, one squash knife, five awls, and a worked ulna.

Scapula Hoes

A number of bone tools made from bison scapulae were identified at the site. At least six bison scapula hoes came from the house locus (Table 27). Numerous small-to-medium-sized fragments also were recovered, many of which likely were from the six hoes but could represent additional tools.

The highest concentration of hoe fragments occurred in F553, the large basin pit along the west wall of the house. Three of the larger fragmented hoes were found in the pit, including the only nearly complete hoe from the site, as well many of smaller fragments.

One large hoe blade fragment was recovered from the hearth (F552). This fragment has significant gnawing along the edges, yet in one area six cut marks radiate medially from the notched edge. These cut marks are not likely evidence of butchering but an indication of use of the notch as a tool of some sort, perhaps a shaft straightener.

All of the hoes were prepared in the same manner. Both spines on the dorsal surface were scored and then removed by percussion (Figure 29), likely with a hammerstone. The glenoid process was not altered. Evidence of hafting includes a slight sheen around the proximal end just below the glenoid process and peck marks within the facet. Preparation of the distal end of the scapula to produce a working edge left a bevel on the dorsal surface and horizontal striations on the ventral surface.

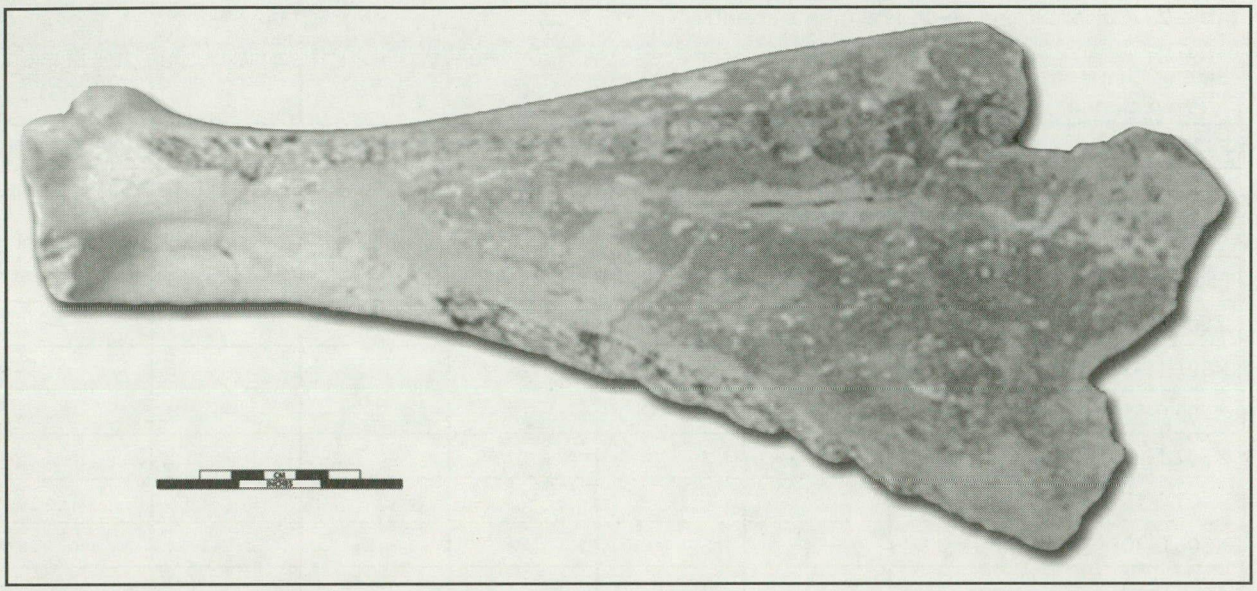


Figure 29. Bison scapula hoe from A802.

Worked Ulna

A worked bison ulna, recovered from the house floor in X501 (Figure 30), had three sections, including the body or handle, stem, and tip. Although severely gnawed by rodents, the striations resulting from shaping and use wear are still evident at the distal end of the element. The entire tool is 130.74 mm long, with a 54.32-mm-long stem and a 17.99-mm-long tip.

Bone Awls

One complete awl and portions of four awls were recovered from the house floor in X501 (Figure 30). A sixth small awl mid-section was found on the house floor. All of the specimens have a high sheen or polish on the tips, which taper from the tool bodies. One specimen was fashioned from a split deer rib, so it is curved. The body is 9.26 mm wide, and the diameter of the tip is 2.31 mm. The other three awls from split deer tibiae have three-sided bodies, resulting from the splintering of the bones. These tools are straight and measure about 5.6 mm wide across, with tips ranging from 27 to 16 mm in length and 2.21 to 2.68 mm in diameter. The complete awl from a deer tibia is 134.95 mm long. All of the specimens were ground into shape, effectively removing all sharp edges.

Miscellaneous Bone Tools

Several miscellaneous bone elements show evidence of cultural modification. Among these fragments are tips of unidentifiable tools. One such tip was found in the 15-30-cm level of X179 in A801. The tip has a blunt but slightly beveled end and a high sheen around the working end.

A mid portion of an awl or similar bone tool was recovered from the house floor in X501, 20-30 cm below the surface. This element is snapped at both ends, but the exterior surface has a high sheen similar to other bone tools.

The distal condyle of a rabbit humerus was cut from the shaft, probably to produce a bone tube. The end was recovered from the 15-30-cm level of X1163 in A801.

A deer tibia, right side, was recovered from the house floor. This tool was grooved/cut on the distal end, but its function was undetermined. It was severely gnawed along the shaft.

Bone Beads

Six small bone beads recovered from the site appear to have been manufactured from long bones of birds or rabbits (Figure 31). Rabbit and bird bones traditionally were used for bead production due to the hollow nature of these long bones. Five specimens recovered from the house floor are similar in length and diameter, whereas the one bead found in A801 is somewhat larger (Table 28).

Also recovered from the house locus were three larger bone beads or tubes (Figure 31), apparently cut portions of deer log bones with the interiors drilled out. All of the specimens have angled cuts on the ends and polished bodies. The tube diameters are 9.25-11.72

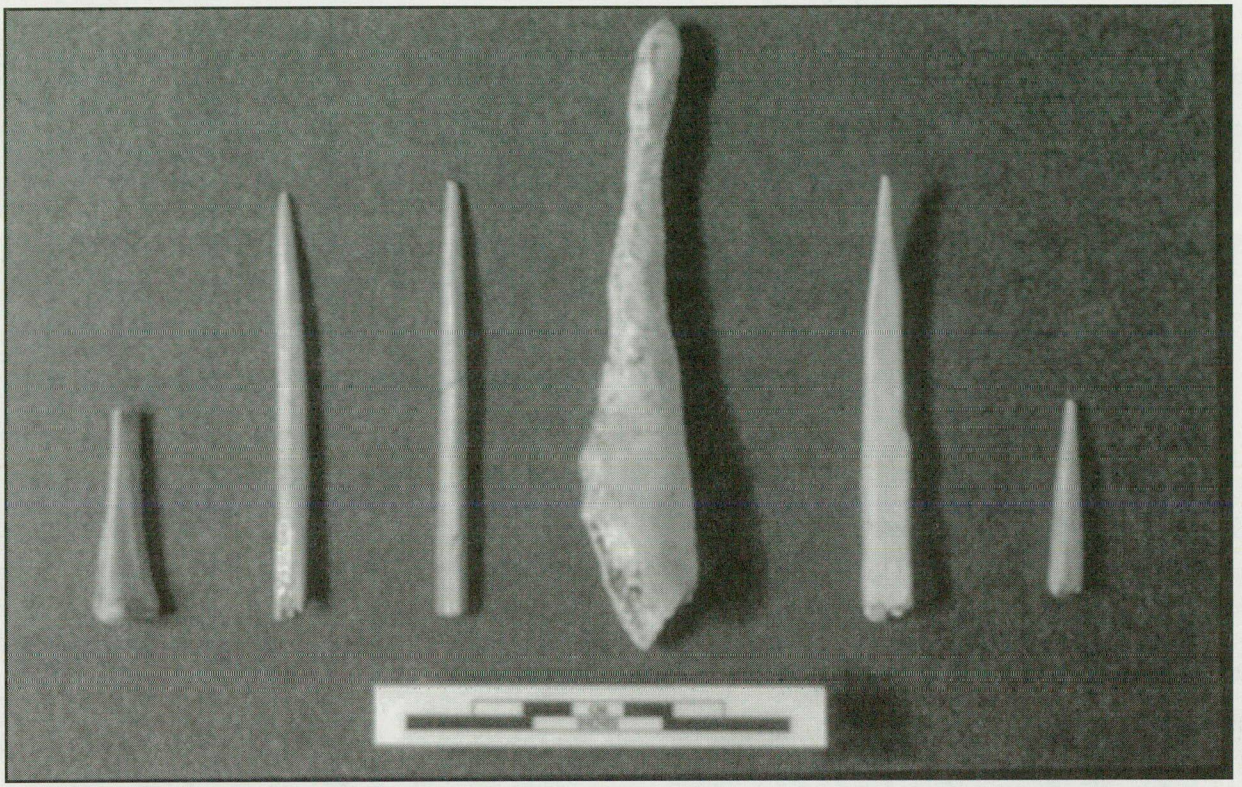


Figure 30. Selected bone tools: ulna and awls.

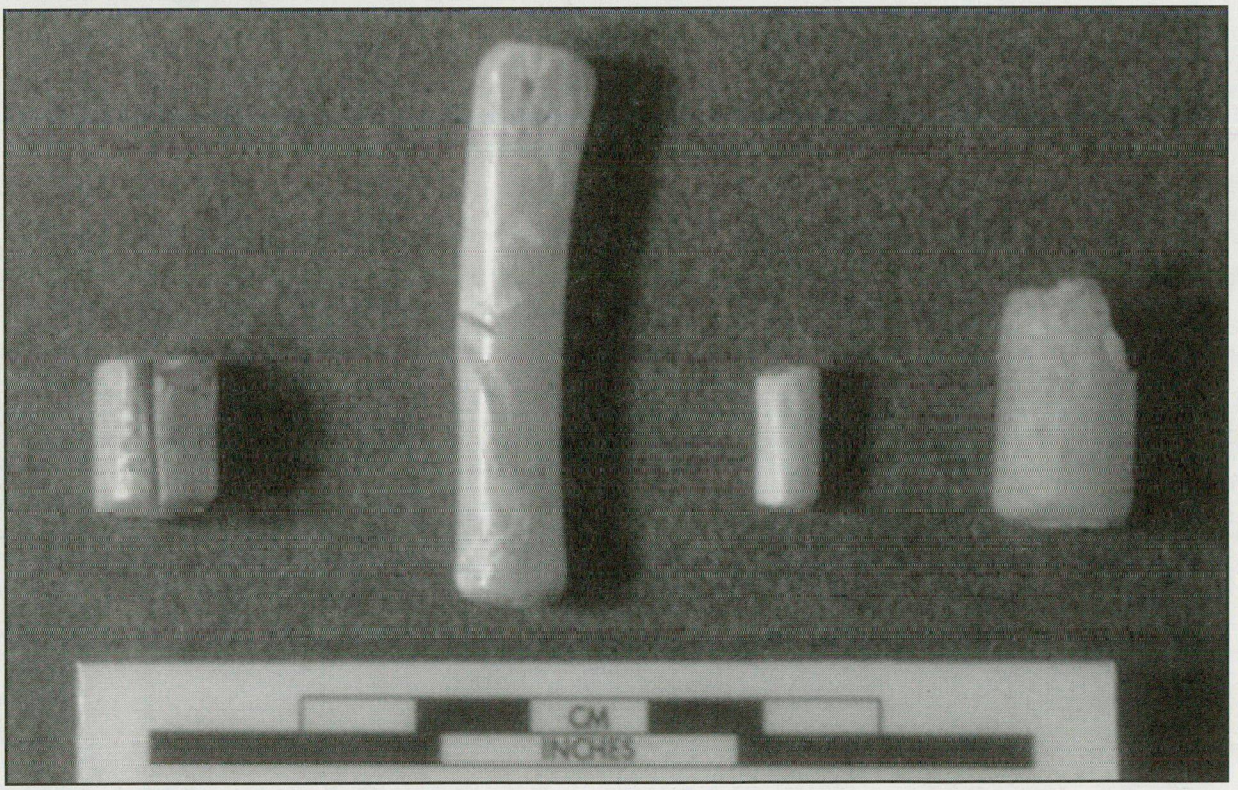


Figure 31. Selected bone beads and tubes.

Table 28. Bone Beads.

Specimen Number	Area	Shaft Length (mm)	Maximum Shaft Diameter (mm)	Maximum Interior Diameter (mm)
1281	802	10.88	2.66	1.47
1282	802	8.62	2.95	1.35
1283	802	11.42	2.55	1.85
1284	802	8.32	2.83	1.41
1980	802	11.36	N/A	N/A
4543	801	13.04	5.15	2.97

Table 29. Unidentified Bone Fragments from A801.

X-Unit	Level (cm)	Large Mammal Long Bone Fragments	Miscellaneous Bone Fragments	Small Mammal Bone Fragments	Burned Bone Fragments	Rodent Bone Fragments
Surface					1	
X1162	15-30		2			
X31	0-15			1	1	
X31	15-30				10	
X59	15-30		1			
X88	15-30	3	4			
X89	0-15				2	
X89	15-30		12 (2 w/ cutmarks)			
X90	0-15		8		1	
X90	15-30		3		14	
X91	0-15	6			2	
X91	15-30		3			1
X117	30-32					12
X118	0-15					1
X118	15-30	2		4	7	
X121	0-15		14 (2 w/ cutmarks)			
X121	15-30	1				
X151	0-15		1		1	
X151	15-30				2	
X179	0-15		1			
X179	15-30		5		1	
X181	15-30		1			
X209	0-15				2	
X209	15-30		1		2	
X211	0-15		1		1	
X211	15-30				3	
X239	15-30				1	
	TOTAL	12	57	5	51	14

mm, while the interior or drilled holes are 9.13-5.00 mm in diameter. Whereas the small beads are similar in length, the bone tubes range in length from 5.54 to 48.07 mm.

Subsistence Evidence at 14ML417

The purpose of this section is to give an overview of the subsistence-related materials and non-artifacts recovered from 14ML417. Macro-faunal analysis was the most productive technique used in this study. The following section gives a detailed account of the faunal elements and floral remains recovered from the site and an overview of the subsistence pattern indicated.

A subsistence model, developed for Upper Republican sites at Medicine Creek in south-central Nebraska, focused on the use of calories "as a quantifiable variable in assessing the subsistence strategy ... employed by late prehistoric inhabitants" (Nepstad-Thornberry et al. 2002:202). The following were the most common elements in this macro-botanical and faunal analysis: *Zea mays* (maize), *Helianthus* (sunflower), *Cucurbita* (squash), *Phaseolus* (bean), *Chenoams* (goosefoot, etc.), *Polygonum* (buckwheat family), *Celtis* (hackberry), *Juglans* (walnut), *Odocoileus* (deer), *Antilocapra americana* (pronghorn antelope), *Castor* (beaver), *Syvilagus* (eastern cottontail), *Lepus* (jackrabbit), *Ictalurus* (catfish), turtles, freshwater mussels, numerous fowl, and limited *Bison*.

Blakeslee (1999:75) reviewed the subsistence studies of the CPt, showing that "the people of the Central Plains subsisted through a combination of hunting, gathering, fishing, and horticulture." Lippincott (1976) identified nearly 100 species of fauna in the assemblages of the 14 Solomon River phase sites excavated by the University of Nebraska, including 25 mammals, 34 birds, 8 reptiles, 2 amphibians, 16 shellfish, and 8 fish. Botanical remains at CPt sites indicate diversity and development of several domesticated plants. Blakeslee (1999:93-96) listed 68 edible plants and the seasons in which they were present in the Central Plains.

The 14ML417 faunal assemblage was analyzed using the comparative osteological collections at Wichita State University and the private collection of John Penman. Mr. Penman also assisted in the identification of several of the birds, small mammals, amphibians, fish, and reptiles represented in the faunal collection. Numerous literature sources were used for skeletal and habitat information (e.g., Balkwill and Cumbaa 1992; Brown and Gustafso 1989; Casteel 1974, 1976; Ford 1990; Gehr 1995; Gilbert 1990; Gilbert et al. 1985; Hargrave 1972; Hillson 1986; Johnson 1972; Jones and Manning 1992; Jones et al. 1983; Jones et al. 1985; Lawrence 1951; Lyman 1994; Lyman and Fox 1998; Olsen 1960, 1968; Shaffer 1992; Sisson 1921; Thomas 1971; Whyte 1991; Zimmerman, Steele, and Meyer 1987). In addition to the taxonomic identifications, taphonomic evidence was gathered, including presence of rodent gnawing, presence and location of butchering or skinning cuts, evidence of intentional cultural modification, and the minimum number of individuals (MNI) represented.

Faunal Evidence

During the excavations of A801, A802, and A803, 1,686 faunal remains were recovered. Of these 1,448 (139 from A801 and 1,309 from A802) were unidentifiable as to element or species (Tables 29 and 30). Most of the 238 identifiable bones came from the A802 house locus.

The very few identifiable elements from A801 consisted of 24 mammal bones of 6 different species (Table 31). In A802 a total of 211 identifiable bones were recovered, including 157 mammal bones of 9 species (Table 32). Seven bird species were identified among the 16 identifiable bones from A802, but no identifiable bird elements were recovered from A801. Eight carapace fragments represent three species of turtle from A802, and one species was identified from carapace (shell) fragments from A801. Two other reptile species were also identified in A802, based on six elements recovered. Only two elements, including one canine individual, were recovered from A803.

The minimum individuals identified in A801 was one for each species identified, including deer, prairie dog, rabbit, gopher, plains yellow mud turtle, muskrat, and canine. The gopher elements were found below the 30-cm level that typically contained the artifact assemblage in A801, indicating that the gopher might not be related to the human occupation.

The maximum measurement of the 139 unidentified fragments from A801 is less than 38.1 mm (1.5 inch), but most pieces are smaller than 25.4 mm (1 inch). About 38 percent of the unidentified bone was burned in A801, where it was generally concentrated on the highest elevations in the vicinity of the destroyed house (see Architecture section). These unidentified fragments, including the burned bone, are generally 1.8-2.7 cm (.5-1 inch) in length, with two of the long fragments measuring about 4 cm (1.5 inches).

Rodents

Several rodents were identified in the faunal collection, but some are post-depositional ecofacts.

Table 30. Unidentified Bone Fragments from A802.

X-Unit	Level (cm)	Large Mammal Long Bone Fragments	Medium Mammal Bone Fragments	Miscel-laneous Bone Fragments	Small Mammal Bone Fragments	Burned Bone Fragments	Bird Bone Fragments	Rodent Bone Fragments
Surface		1				2		
501	0-15	8		22		3		
501	15-30	12				10	2	34
501	15-20			3		1		
501	27-47			1				
501	30	6		1		9		1
501	0-30	454	20	5	1	7	1	11
501	20-30	11	1	3	2			
501	F435	2	6	1		1	1	
501	F443				161	15		3
501	F552	2				97		17
501	F553	9		39		239		
502	0-15	4						1
502	15-30	4	3	4	1	2		1
503	0-15	2						
503	15-30	2		4				
504	0-15			1				
505	0-30	18						
506	0-30	4				1		
507	15-30	4					1	
508	0-15	1		1	1	1		
508	15-30	2		1				
508	0-30	1	1	1				
509	15-30					1	4	
510	15-30			1		10		
511	15-30			1				
TOTAL		547	31	89	166	399	9	68

Prehistoric people of the Plains (Blakeslee 1999), Southwest (Shaffer 1992), Inter-Mountain region (Latham 2002), and Great Basin (Thompson and Pastor 1995) commonly harvested rodents. However, burrowing rodents may not be part of the faunal assemblage of a site. Several studies have tried to determine if rodent remains recovered from sites were intrusive or a result of human predation. Two of the criteria proposed for human use of rodent populations included proximity to habitat and skeletal completeness (Driver 1985; Shotwell 1955; Szuter 1991; Thomas 1971). The closer a site was to rodent habitats, the more likely that the site occupants would exploit the rodent population. Furthermore, consumption of the animals would result in the scattered distribution of the elements rather than complete skeletons. Several extraneous forces, including burrowing of other animals (Erlandson 1984) or the excavator (Driver 1985), also can impact

Table 31. Identified Mammal Elements from A801.

	Deer	Prairie Dog	Rabbit	Gopher	Muskrat	Canine
Maxilla				1		
Back		1				
Scapula			1r; 1L			
Humerous			1L			
Femur		1r			1L	
Tibia			1r			
Clavicle		1r				
Metapodial	2					
Tarsal				1		
Calcaneous		1r				
Radial Carpal	1					
Phalanges	1	2		1		1
Metatarsal	1L					1 (cut)
Lunate	1					
Sesamoid	2					
Number of Indentified Specimens (NISP)	8	6	4	3	1	2
Minimum Number of Individuals (MNI)	1	1	1	1	1	1
r= right side element						
L=left side element						

completeness of skeletons. Another indicator of the source of rodent skeletal material is its state of preservation. In most cases the intrusive rodents arrived at the sites much more recently than the site assemblages were deposited. However, this criterion is not always applicable because many rodents and other burrowing animals were present during the site occupations (e.g., Latham 2003b; Shaffer 1992). On occasion studies can confirm human predation on rodents. At the Rainbow site in Iowa, researchers used patterning of the gopher elements, combined with geology and gopher biology, to determine that the rodents contributed to the subsistence of the site occupants (Falk and Semken 1990).

Four deer mice were identified in the faunal assemblage of 14ML417. The deer mouse is distributed throughout Kansas, with three subspecies defined. *Peromyscus maniculatus* was first found in the fossil record during the late Pleistocene (Wilson and Ruff 1999) and is still a common resident of the locality. Habitat of *Peromyscus maniculatus* is typically arid grasslands and flood plains, but it also is found in structures (Jones et al. 1983). Seeds and grain are important elements of the deer mouse diet, which may explain the presence of complete skeletons at the bottom of two abandoned storage pits. Otherwise, distribution of the rodent skeletal elements was evenly scattered across the site, both vertically and horizontally. Compared to the bones of other animals in the faunal assemblage, the bone preservation of the deer mice was better than that of other species. It appears that the mice recovered from the site were not consumed but are modern intrusions and, therefore, were not considered part of the 14ML417 faunal assemblage.

The MNI for black-tailed prairie dogs (*Cynimys ludovicianus*) at 14ML417 is three, with one from

Table 32. Mammal Elements Recovered from A802.

	Bison	Deer	Pronghorn	Prairie Dog	Rabbit	Muskrat	Mole	Deer Mouse	Canine
Cranium				1	3			3	
Antler		1							
Mandible		1r; 1L		2r	1r; 2L			6	
Incisors	2				3				
Premolars									1
Molars		1				1			
Vertebra	1			13	2			14	
Thoracic Vertebra		1		2	5				
Rib					1				
Scapula	6* (4r; 3L)	1			1L				
Sternum		1							
Clavicle					1L			3	
Humerous				1r	3r; 1L			2r; 3L	
Radius					1r; 1L				
Ulna	1*			2r; 1L	1r; 1L				
Pelvis					2r; 2L				
Femur		1r			4r; 1L				
Tibia	1r	2* (4r; 4L)	1r		4r; 1L			2r; 3L	
Fibula		1r w/ 2 cutmarks							
Sesamoid		2	1		1L				
Tarsal		2		1r; 1L					
Metatarsal		2r; 2L		5	1r				
Third carpal		4							
Radial carpal		2							
Metacarpal		1r			3				
Phalange	1 w/ several cutmarks on lateral sides	4	1	1	3		1		
Calcaneous				1r					
Number of Identified Specimens (NISP)	12 (7*)	35	3	29	49	1	1	26	1
Minimum Number of Individuals (MNI)	4	4	1	2	4	1	1	4	1
L= left side element									
r= right side element									
* in the form of hoes/bone tools									

A801 (Table 31) and two from A802 (Table 32). Six prairie dog bones were recovered from A801 and 29 bones from A802. Black-tailed prairie dogs have been reported in the faunal assemblages of CPt sites, including some in Kansas, but they are not abundant (Blakeslee 1999).

A femur from A801 and single molar from A802 were identified as muskrat (Table 32). Muskrats have been reported in Iowa and Nebraska CPt site assemblages (Blakeslee 1999).

Other rodent elements recovered from the site were scattered and many were charred, indicating that these were likely remains of peoples' subsistence. Among these charred remains were moles and mice. The flotation processing of the hearth (F552) recovered seven burned bones, indicating that at least one mouse and one mole were cooked or burned in the fire.

Deer

The MNI for deer (*Odocoileus* sp.) is five, with one from A801 (Table 31) and four from A802 (Table 32). In both areas the most common elements were from the head area and lower legs. Many bones were fragmented due to trampling and deterioration. Evidence of butchering was limited to one fibula, which had two cut marks at the distal end. Two of the bone awls discussed in the bone section are split tibia. Another awl was made from a split rib that may be deer. Deer skeletal remains were one of the most frequently identified among faunal assemblages of the CPt (Blakeslee 1999).

Pronghorn

Three leg bones from A802 were identified as pronghorn (*Antilocapra americana*), representing one individual (Table 32). Pronghorn is not common in CPt assemblages in Kansas (Blakeslee 1999).

Canine

Five bones identified as dog/coyote (*Canis* sp.) were recovered, two from A801 (Table 31), one from A802 (Table 32), and two from A803. With the likelihood that A801 and A802/803 represent two distinct houses or occupations, the MNI of canine is two. Canine skeletal remains have been reported in other CPt assemblages but not at a high frequency (Blakeslee 1999).

Bison

Bison was a primary food source for many Plains groups, but the skeletal elements at many CPt sites are not very frequent (Blakeslee 1999), as is the case for 14ML417. This lack of large numbers of skeletal remains does not mean that bison was a minor portion of the subsistence base of the occupants. It is clear that the bison bone tools, including at least six hoes, were an important part of the swidden (cutting and burning agriculture) tool category. Considering the bison bone tools and skeletal debris, the MNI of bison at the site is six.

No identifiable bison bone was recovered from A801, but 12 bison elements were identified in the A802 collection (Table 32). Seven of the A802 bones were modified into bone tools. Bozell (1991) and Manz and Blakeslee (1988) found similar results in CPt site assemblages. The unmodified elements recovered from A802 included two incisors, one upper and one lower, the spine of a thoracic vertebra, a fragment of a right tibia, and a phalanx. The phalange had several small cut marks on both lateral sides, clearly evidence of butchering.

It is likely that the bison were processed near the kill site, which could be some distance from the house site (Adams and Reher 1997, cited in Blakeslee 1999; Lehmer 1954; Wedel 1986). Bison processing sites have been identified throughout the Plains archeological record. Much information about processing comes from ethnographic and historic accounts (compare Brackenridge 1962; Weitzner 1979; Weltfish 1965; Wilson 1924). The small bone fragments, often found at such sites, generally are indicators of bone grease production activities (Fishel et al. 2003; Latham 2001a). Later sites, such as the large villages of the Arikara, have evidence that this processing took place at the habitation site (Latham 2001b).

Rabbit

The MNI of eastern cottontail rabbits at site 14ML417 is five, with one from A801 (Table 31) and four from A802 (Table 32). Fifty-three bones were recovered from the site, with four from A801 and 49 from A802. Two of the A802 rabbits were immature, while the other two individuals were mature animals. Eastern cottontail rabbits are among the most common species identified at CPt habitation sites (Blakeslee 1999).

Birds

Birds identified at 14ML417, all within A802, included waterfowl, upland game birds, perching birds, and a shore bird (Table 33). Seven species were identified: American Goldfinch (*Carduelis trists*), common grackle (*Quiscalus quiscula*), killdeer (*Charadrius vociferus*), lesser prairie chicken (*Tympanuchus pallidicinctus*), least tern (*Sterna albifrons*), mallard duck

Table 33. Identified Bird Elements Recovered from A802.

	Mallard	Prairie Chicken	Bob White Quail	Grackle	Killdeer	Goldfinch	Least Tern
Humerous	1r	1r; 1L	2r				
Radius							
Ulna		1r; 1L	1r; 1L	1	1	1	
Femur		1					
Quadrate			1r; 1L				
Metacarpal							1
NISP	1	5	6	1	1	1	1
MNI	1	1	2	1	1	1	1

Table 34. Reptiles, Amphibians, and Fish Recovered from House in A802.

	Reptile	Amphibian	Turtles			Fish
	Unknown	Bufo (Great America Toad)	Box Turtle	Softshell	Slider	Unidentified Teleolist
Opercural						1
Carapace Fragments		4	2	2		
Vertebra	5					23
Humerous		1				
Femur		2				
Metapodial	1					
NISP	6	3	4	2	2	24
MNI	2	1	1	1	1	2

Table 35. Identified Freshwater Mussel Shells.

	A801		A802		A803			
Subfamilies/Species	Left Valve	Right Valve	Left Valve	Right Valve	Left Valve	Right Valve	NISP	MNI
Ambleminae								
Fusconaia flava	10	5	5	7	0	0	27	15
Quadrula pustulosa	3	12	2	4	0	0	21	16
Quadrula quadrula	7	4	9	10	1	1	32	17
Tritogonia verruscosa	3	3	9	5	0	0	20	12
Lampsilinae								
Leptodea fragilis	2	3	4	1	0	0	10	6
TOTAL	25	27	29	27	1	1	110	66

(*Anas platyrynchos*), and bobwhite quail (*Colinus virginianus*). Most of these, including the common grackle, lesser prairie chicken, mallard, and bobwhite quail, were found in the assemblages of the Waconda Lake sites (Lippincott 1976:107).

Fish

A few fish bones were recovered from flotation samples at the site (Table 34). Human-imposed taphonomic factors on fish remains present at archeological sites include fishing and butchering techniques and cooking, consumption, and discard practices (Colley 1990; Wheeler and Jones 1989). The presence of vertebrae suggests bodies of fish, the main source of food, so these fish are part of the faunal assemblage.

Twenty-four fish vertebrae and two cranium fragments were recovered from the A802 house excavation. Eleven of the vertebrae and both skull elements were recovered from a storage pit (F553), while two vertebrae were recovered from the hearth (F552). Because the remains were in two different features and were of two different sizes, it is concluded that at least two different fish were represented at the site.

Fish remains are poorly documented in excavated sites in the Plains. This may be more a result of preservation and past excavation techniques than of the subsistence patterns of the region's prehistoric and protohistoric occupants.

Reptiles

Four species of turtles were identified at the site. A single carapace fragment from A801 represents a plains yellow mud turtle (*Kinosternon fluesears*). Carapace fragments from the A802 house produced three species of turtle: ornate box turtle (*Terrapene ornata ornata*), softshell (*Trionyx* sp.), and slider (*Chrysemys scripta*) (Table 34).

Six other reptile elements, five of which are vertebrae, were recovered from the house locus, but specific species could not be ascertained (Table 34).

Freshwater Mussels

Five species of freshwater mussels from two subfamilies were recovered at the site (Table 35). All five species are found in habitats like Limestone Creek (Cummings and Mayer 1992; Murray and Leonard 1962), and the host of the *glochidia* parasites are catfish (Murray and Leonard 1962), which are native to Limestone Creek. Nearly all of the shells examined were one to four years of age, similar to the results found at the Waconda Lake sites (Blakeslee 1999; Dorsey 1998).

In a study of the freshwater mussels at the Waconda Lake sites, Ron Dorsey (1998) determined that the mussels had been gathered to supplement the diet. He postulated that the shells were steamed or boiled, as there were few burned shells. Dorsey found that if the assemblage at a particular site is large enough (<100 MNI), the length of occupation and seasonality of the gathering episodes could be determined by the clustering of shell debris. Many of the Waconda Lake sites have features with large numbers of shells. However, this is not the case at 14ML417 where shells were scattered across the site, with no large clusters. In addition, only 1 percent of the hinges from the Waconda Lake sites was too eroded or fragmentary to identify, whereas this number approached 50 percent at 14ML417. This large number of broken and eroded shells can be attributed to the fact that they were not protected in a pit feature but were scattered across the site and subjected to modern cultivation.

Floral Evidence

The importance of plants in the subsistence of the site occupants is more difficult to determine. A few ground stone tools were found on the site, and a few carbonized corncobs fragments and kernels were recovered. Other plant materials that likely were associated with the prehistoric occupation were *Chenopodium* (lambsquarters) and beans. A walnut shell from the surface and was likely of modern origin. Dr. Ronald L. McGregor (1988) of the State Biological Survey of Kansas in Lawrence identified the botanical materials from flotation collections.

The storage pits found in CPt sites such as 14ML417 indicate at least limited storage of foodstuffs (Blakeslee 1999; Nepstad-Thornberry 2002). Subterranean storage pits identified at 14 sites at Lake Waconda were found within houses and in exterior work/storage areas. No exterior pits were found at 14ML417. Lippincott (1976:Appendix I) listed the feature diameters and depths of the interior pits, which ranged in orifice diameters from .245 to 2.44 m (.8-8 feet) and averaged between .915 and 1.22 m (3-4 feet). Storage pits were generally less than a meter deep, with none over 1.5 m in depth.

Some of the pits were filled with debris and rarely with cached artifacts or raw materials. Often the pits were nearly devoid of cultural debris, suggesting that they were empty when the house was abandoned (Blakeslee 1999:72). While none of the pits excavated within the house contained many artifacts, two did yield substantially more that the other three. The most common type of debris in the two trash-filled pits was ash from the hearth. One of the pits, not considered

Table 36. Storage Pit Details in A802 House.

Pit	Type	Opening Measurement (cm)	Depth (cm)	Function	Fill when Abandoned	Location
553	Cylindrical	80 cm diameter	45 to 49	Storage	Trash/Ash	West Wall
480	Cylindrical	33 cm diameter	19	Mortar	Empty	Near Hearth
443	Basin	87 X 43	23	Storage	Hearth Fill	North Wall
435	Cylindrical	1.44 X 1.58	81	Storage	Nearly Empty	West Wall
424	Basin	75 X 94	27	Storage	Nearly Empty	North Wall

significant by the excavators, was filled with heavily compacted soil and no artifacts, indicating that it was not used for trash disposal. The compaction of the soil suggested that the pit was backfilled while the house was still occupied and traffic around the hearth compacted the fill. The small size of this pit, 30 cm in diameter and 19 cm in depth, may indicate that this was the remains of a wooden mortar. Such features have been mentioned in reports of the Nebraska phase (Wettstaed 1988:37) and Itskari phase (Ludwickson 1978). It seems that two interior storage pits were in use at the time of house abandonment.

The storage pits occur in pairs by type: two cylindrical pits along the west wall and two basins along the north wall. It appears that one basin and one cylindrical pit were used at a time; when a pit was no longer useful, another of similar form was excavated next to it. The later pits were larger, perhaps an indication of more productive times. Characteristics of the storage pits are presented in Table 36. Of note is that the largest storage pits, those with the highest storage capacity, were the empty ones when the house was abandoned.

Adair (1988:62) undertook analysis of the botanical remains found at 14ML417, finding "...meager data on plant exploitation." Seeds included *Iva annua* variety *macrocarpa* Jackson (marshelder/sumpweed), *Helianthus annus* variety *macrocarpus* Ck11 (sunflower), *Zea mays* (maize/corn), and *Phaseolus vulgaris* (common bean). Five charred marshelder/sumpweed kernels were recovered, but since these kernels came from the same feature, Adair pointed out that they may represent a single plant. The small seeded sunflower, 10- to 14-row corn, and common beans were all recovered in small quantities.

Summary

The archeological deposits at 14ML417 revealed a broad based subsistence pattern for the inhabitants of both A801 and A802. Blakeslee (1999:85) discussed the wide range of variability in the faunal remains recovered from CPt houses, emphasizing many questions about the subsistence of the CPt people. Subsistence could vary due to temporal changes, but more data is required to be conclusive. As Blakeslee (1999:85) asserted, more information from the external pits and activity areas is needed, as most investigations have focused on the houses.

A total of 29 species were identified in the 14ML417 faunal assemblage. About 86 percent of the faunal remains could not be identified to species. The 238 identifiable mammal bones represent 10 different species: bison, deer, pronghorn, canine, muskrat, prairie dog, cottontail rabbit, gopher, mole, and deer mouse. The mole, gopher, and two of the deer mice appear to be intrusive or post-depositional. Seven bird species, five fresh water mussel species, four types of turtles, a toad, and two Teleolist fish were identified.

The botanical remains are very limited, but the presence of a few seeds, which are typically poorly preserved materials, indicates that much more was present (Nepstad-Thornberry et al. 2002). Additional support for this conclusion is the presence of the storage pits, which appear to have increased in volume through the history of the house occupation. The volume of the two storage pits that were in use when the house was abandoned was more than twice the volume of the two trash-filled or earlier used pits. The presence of complete deer mice skeletons in the bottom of two cleaned-out storage features may be another clue as to why the number of seeds recovered was so low. The house floor and empty pits were not sealed immediately by the roof fall, allowing easy access to faunal and botanical remains by a variety of wildlife.

According to the model put forth by Nepstad-Thornberry et al. (2002:210), small game, such as rabbits and prairie dogs, contributed about 5 percent of the individual human diet. At 14ML417 the MNI for small game animals is 14, not counting the post-depositional species. The MNI for large game animals is 10, with 5 of these (3 bison and 2 deer) represented by bone tools.

Still, the biomass represented by five large animals indicates that meat made up a substantial portion of the diet. In combination with the large capacities of the storage pits, it appears that the occupants of the defined house at 14ML417 had a diverse, yet balanced diet.

Discussion

Based on the comparisons of the artifacts, namely ceramics and lithic sources, and the radiocarbon date obtained at the site, it is concluded that the site is closely related to the 15 house sites excavated around Lake Waconda (see Blakeslee 1999). Yet, there are differences in the artifact assemblage and architecture that show some variability within the Solomon River phase.

Even though the excavation techniques employed at the site in 1980 are antiquated by today's standards, the investigators have supplied us with much more details on subsistence, artifact distribution, and lithic materials than were gained from the 1960s excavations in the same locality (Glen Elder) at Lake Waconda. With the lack of screening and systematic methods at the Waconda sites, much of the botanical and faunal remains were lost, as were several smaller artifacts.

Numerous CPm sites have been excavated using modern techniques that revealed a wide-based subsistence strategy (see Subsistence section). The information gained from the work done at 14ML417 adds more to the database and continues to develop understanding of what these people used to survive.

A review of the artifact distribution in the house shows a distinct clustering along the north and west interior portions. These areas were where the storage pits were located. The artifacts plotted by Reynolds in 1980 include half the projectile points (n=10), nearly all the bone tools, and 8 of the 39 end scrapers recovered from the site. Several rim sherds were also plotted, but these appeared to be evenly distributed across the house floor. Interestingly, all these artifacts are mainly associated with the tasks undertaken by women (Spector 1983, 1993).

The concentration of artifacts associated with outdoor tasks such as horticulture, hide scraping and preparation, and hunting indicates that the storage pit areas were used not only for storage of foodstuffs, but also the caching of tools. The presence of both male- (projectile points) and female- (grinding slab, bone awls, hoes, and end scrapers) associated tools around the storage pit areas suggest that these areas were places to store everyone's tools in the house.

The northwestern corner of the house did not contain a storage pit, yet several of the tools were found in this area. It is possible that this portion of the house was an indoor activity area associated with maintenance of the tools and possibly a cache area.

The rim sherds were scattered across the floor, but more concentrated around the center of the house or hearth. Faunal remains were found throughout the house area, but the highest density was from the hearth to both storage pit areas. Very few artifacts were identified along the southern wall, possibly suggesting that this area of the house held another purpose. It is projected that this area was primarily for the beds.

Based on the lithic raw materials identified at the site, the occupants had connections to the east (Flint Hills), southwest (Texas panhandle area), and north and northwest (High Plains).

Evidence of a second lodge was found in A801, but it appears to have been destroyed by cultivation. The presence of a large spring on Spring Branch of Limestone Creek, just northeast of the site, makes this a prime location for numerous lodges (Latham 1996). It is unknown if these lodges were contemporaneous or if the same family or families moved from lodge to lodge as the older lodges began to deteriorate. Many of the artifacts analyzed in this report suggest that the occupants of the two houses were closely related.

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Notes

Ceramic Artifacts from the Hallman Site (14HP524), A Bluff Creek Complex Site in Harper County, Kansas

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The Hallman site (14HP524) is located along a tributary of Bluff Creek, not far from the Oklahoma-Kansas border, and dates to around A.D. 1280. This Middle Ceramic site exhibits influences from both the Central and Southern Plains traditions; however, because only a few sites of the Bluff Creek complex have been systematically investigated, the significance of both the Hallman site and Bluff Creek complex is unclear.

This paper is a descriptive analysis of the ceramic assemblage from the Hallman site with the intent of understanding its temporal and spatial position in Central and Southern Plains archeology, as well as determining the site's relationship to contemporaneous archeological complexes. Seriations were created to clarify the temporal positions of the Hallman site and Bluff Creek complex relative to each other and to the surrounding cultural groups. Other issues examined herein include intra-site sherd distribution and site features to help establish how the site was used and sherd refit locations to estimate how much disturbance had occurred within the site itself. Recent archeological literature pertaining to the Hallman site also was examined.

The research presented here fulfills multiple purposes. When this research commenced, the Kansas State Historical Society was encouraging the use of its unanalyzed collections for research. Dr. Alfred E. Johnson, chair of the author's graduate committee, was aware of the Hallman site ceramic assemblage and the limited information available regarding the Bluff Creek complex (Brown and Simmons 1986:214; Drass 1997:439; Ranney 1994:75-79; Wedel 1983:229-234). Unanswered questions regarding cultural influences and affiliations, relevant dates, ancestry, and connections to historic tribes influenced the decision to use the Hallman site ceramic assemblage to shed some light on the Bluff Creek people (Berger 2003).

There has been, and continues to be, debate on taxonomic issues as applied to the Great Plains archeological record (McKern 1939). Because most of the research presented here for comparison has been published, the taxonomic labels already in the literature are retained, including those applied to the Hallman site and Bluff Creek complex by the original site investigators, Randall M. Thies (1989a) and Thomas A.Witty, Jr.

The purpose of this article is to describe and discuss the ceramic assemblage from the Hallman site in order to understand its temporal and spatial position in Central and Southern Plains archeology and to determine its relationship with contemporaneous archeological complexes. Because the Hallman site was occupied for a limited amount of time, the ceramic artifacts provide a snapshot of ceramic variability during the Middle Ceramic period. The overview addresses Marie H. Huhnke's (2000) technical report regarding the bulk of cultural material from the site. A seriation clarifies the site's temporal position within the Bluff Creek complex and places the Bluff Creek

complex within the regional chronology. In addition, an examination of intra-site sherd distribution sheds light on how the site was used and organized, while sherd refit locations demonstrate how much disturbance has occurred at the site. A reexamination of site features provides a better understanding of their functions, has implications for how the site was used, and indicates specific activity areas.

Temporal Context

Archeologically and historically, the Great Plains has been a region of near-continuous use since the Ice Age. Paleoindians (10,000-6,000 B.C.) hunted large game such as *Bison antiquus* and mammoth (O'Brien 1984:27-36). During the Archaic period (6000 B.C.-A.D. 1) people lived in seasonal camps and took full advantage of local resources (O'Brien 1984:39-43). The Early Ceramic period (A.D. 1-900), also known as the Plains Woodland period, was characterized by the Hopewellian culture in eastern Kansas and the possible beginnings of horticulture in central and western Kansas (O'Brien 1984:45-55). During the Middle Ceramic period (A.D. 900-1500) inhabitants engaged in agriculture and some hunting and gathering to procure food, and dwellings became more permanent structures (O'Brien 1984:57-65). The Late Ceramic period (A.D. 1500-1825) marked the beginning of the Historic period in Kansas with the appearance of European explorers (O'Brien 1984:67-77).

The focus of this article is the Middle Ceramic period, as the dates and artifact types associated with the Hallman site fall within this period. Comparisons are made with sites that have assemblages similar to that of the Hallman site. Because Bluff Creek sites have yet to be assigned definitively as part of another cultural group or an individual cultural entity, the term "complex" has been applied and does not impose a temporal boundary. Indeed, Thies (1989a:175) points out, "... the Bluff Creek sites have never been completely defined taxonomically, and are therefore referred to as a complex rather than a fully defined phase or tradition." Consequently, it should be relatively easy to assign a different taxonomic label when research determines to which culture group these sites belong.

Middle Ceramic Traditions

The Middle Ceramic period for the Central Plains region is also known as the Early Plains Village period, dating approximately A.D. 1000-1400 (Fagan 1995:151). Hallmarks included an increased dependence upon cultigens, as indicated by increased numbers of storage units and changes in the morphology of seeds from certain plant species; semi-subterranean houses with post molds along the outer edges; indications of hunting activities in the form of stone points and bison bones; and increased amounts of pottery, as compared to the Early Ceramic or Late Woodland periods.

This time period in the Central Plains encompassed the Upper Republican aspect, Nebraska phase, Smoky Hill aspect, and Pomona phase. The first three cultures were characterized by circular, square, or rectangular semi-subterranean houses with rounded corners and four central support posts. The houses covered 36-68 m^2 and were made of earth-covered timbers (Fiedel 1992:263-264). Villages were on the small side, unfortified and less compactly built than in the Middle Missouri area. Pottery was typically either cordmarked or plain. Shell tempering and other exotic ceramic traits were introduced into the Nebraska and Smoky Hill cultures by the Mississippian complex. The Plains Village peoples moved frequently and practiced a semi-horticultural subsistence, supplemented by bison hunting (Wedel 1983:231-232).

The Southern Plains culture groups of the Plains Village period date to A.D. 800-1500 (Drass 1997:11): Antelope Creek aspect and Paoli, Washita River, and Turkey Creek phases. Shared cultural traits include square to rectangular houses with extended entryways and, occasionally, depressed central floor channels or trenches. Houses covered between 29 and 128 m^2 and usually were constructed with interior support posts and hearths. Villages tended to be small, covering .2-1.5 hectares (.5-3.7 acres), with several small settlements clustered together, primarily close to reliable water sources (Brooks 1989:75). Pottery shifted from cordmarked to smoothed surface treatments (Wedel 1983:232-233). Some seasonal mobility and an indication over time of increased dependence upon cultigens, such as maize and beans, are apparent; however, heavy dependence upon hunting, especially bison, continued (Brooks 1989:75, 90).

Overview of Bluff Creek Complex

Although Bluff Creek sites have been surface-collected by local farmers for years, only recently have systematic scientific investigations taken place. Ronald Gould (1975) initially identified the Bluff Creek sites in his Wichita State University master's thesis, which described an intensive survey along the Bluff Creek drainage. James Chism (1959) and Marvin Munsell (1960, 1961) did additional work, investigating the Anthony site (14HP1), also known as the Dow Mandeville site, in 1959. Witty (1969; Gould 1975)

studied the Armstrong site (14HP5) in 1965 and the Buresh/Nulik site (14SR303/14SR305) in 1969.

Researchers (Brooks 1989; Brown and Simmons 1986; Drass 1998; O'Brien 1984; Thies 1989a) typically have based their summaries of the Bluff Creek complex on Witty (1978), who designated the Buresh/Nulik site (14SR303/14SR305) in Sumner County as the type site. Witty (1978:62-63) described the Bluff Creek complex as follows.

> ... sites ... were excavated on Bluff Creek, a tributary of the Chikaskia River in the south central portion of the state. Geographically, this is within the Wellington lowlands in the southern bluestem prairie. A series of small village sites usually constructed on the upland edge overlooking the floodplain was noted in the area between Anthony and Caldwell. When discovered in an undisturbed state these sites have the lodge locations still visible as low circular mounds (Witty 1969). Excavation at the Buresh site resulted in the identification of four lodge floors that gave evidence of frame structures: two square, one oval, and one rectangular with an extended entryway from the center of a long side. Ample evidence was present in the form of fired clay with grass and pole impressions to indicate that these structures had at once been at least partially daub covered. All four structures lack signs of an interior hearth. Storage pits are present both in the floor of the lodge and more frequently outside the lodge. Pit form is cylindrical with a flat floor. Adjacent to each lodge are found one or more shallow basins filled with detritus. These appear to be borrow pits from which the soil was removed for the covering of the house, after which the resulting hole was filled with discarded materials. Refuse in the form of broken and butchered animal bone, primarily bison, and waste chert materials is abundant. Burned corn cobs are also present.
>
> The lithic and bone artifacts from these sites are typical of the Middle Ceramic Period. Stone tools consist of small triangular side notched points, alternately beveled diamond-shaped knives, and end scrapers. Heat treatment is readily apparent on almost all of the chert artifacts and waste materials. The bone tools include digging stick tips, modified bison scapula hoes, cleavers, and shaft wrenches manufactured from the tibia of deer.
>
> The ceramics are important both in ware and type. Present in small amounts and probably representing trade ware are examples of shell tempered vessels with smooth exteriors, strap handles, and applique decoration typical of the Washita Focus of central Oklahoma. The restored pots from the excavations at the Buresh site are amphora-like jars with flattened or slightly concave bases and some evidence of strap handles. Exterior surfaces are either plain or cord-roughened. Tempering material consists of sand and of crushed and burned bone. Vessel sections from unrestored pots appear to represent small to medium globular forms also. These latter are cord-roughened, often with direct or plain collared rims similar to general Central Plains types.
>
> The Buresh site thus contains elements of the Central Plains Tradition as well as of the Southern Plains Washita Focus. The primary determinants, such as settlement patterns, house form, and ceramic traits, would again cause this writer to class this complex separately from the Central Plains Tradition, with ceramic similarities reflecting its geographical association with the Central Plains peoples to the north and Southern Plains peoples to the south. Radiocarbon determinations for the Buresh site date circa A.D. 1050.

The prehistoric Bluff Creek complex was located close to the present Oklahoma-Kansas border near the town of Anthony, Kansas (Figure 1). Sites centered along Bluff Creek, a tributary of the Chikaskia River, which is a tributary to the Arkansas River. The Bluff Creek complex originally was dated to A.D. 1000-1500 (Thies 1989a:175) and has a Middle Ceramic/Early Plains Village artifact assemblage. Typical artifacts include small notched and unnotched triangular projectile points, scapula hoes, grinding stones, cordmarked pottery, and bone-tempered pottery. Identified features are storage pits and rectangular houses with rounded corners. Subsistence activities included bison and deer hunting; the cultivation of maize, squash, marshelder, and sunflowers; and the gathering of local plants.

The Hallman site is located on an alluvial terrace overlooking the floodplain of Bluff Creek, 5 miles southeast of Anthony (Figure 2). The land was originally used as pasture, but Thies (1989a:178) described its condition in 1988.

> [The site] occupied two adjacent but quite different landforms. Both have been cultivated for years, and have been affected



Figure 1. Overview map of Bluff Creek complex (courtesy of C. Tod Bevitt).



Figure 2. General location of the Hallman site.

by agricultural terracing. Part of the site is on a blufftop at the edge of the creek valley, on the tip of an upland ridge formed in the silty redbeds characteristic of the Red Hills region of the state. In terms of soil types, this part of the site was mapped (Ratcliff and Dowd 1971) as Grant silt loam, which is described as being a deep, well-drained upland soil formed in material weathered from silty redbeds. The other part of the site lies to the immediate north, at a lower elevation, on an alluvial terrace overlooking a lower lying floodplain. The terrace was mapped as Crisfield fine sandy loam, a deep, well-drained lowland soil formed in alluvium. In somewhat simpler terms, the ridgetop can be described as being an ancient, heavily weathered landform formed of fine-grained silts, while the lower lying terrace is a relatively modern (Holocene aged) landform made up of sandy alluvium deposited by the creek.

Investigations at 14HP524

Selection of 14HP524

Based on earlier work by Gould (1975) and Wichita State University students led by Loy C. Neff in 1986 (Thies 1988:5), the Hallman site was selected as the location for the 1988 Kansas Archeology Training Program (KATP), the cooperative field school of the Kansas Anthropological Association (KAA) and the Kansas State Historical Society (KSHS). The site would not have been investigated otherwise, and it was deemed desirable to obtain more information on the Bluff Creek complex as a whole. The project also gave volunteers an opportunity to participate in a supervised archeological excavation and gain training in archeological techniques, theories, and methods (Thies 1988:6; Figure 3). The program, directed by KSHS archeologists Tom Witty and Randy Thies, ran from June 4 through June 18, 1988 (Kansas State Historical Society 1988).

Other than a preliminary study completed shortly after the dig, no artifact analysis was conducted until 1999. With the exception of the ceramics described herein, the bulk of recovered materials from the Hallman site was sorted and catalogued during the 1999 KATP workshop. Participants sorted artifacts and flotation samples, completed preliminary analyses of faunal remains and lithic tool use-wear, determined stone sources, and recorded metric data of the projectile points (Huhnke 1999:12).

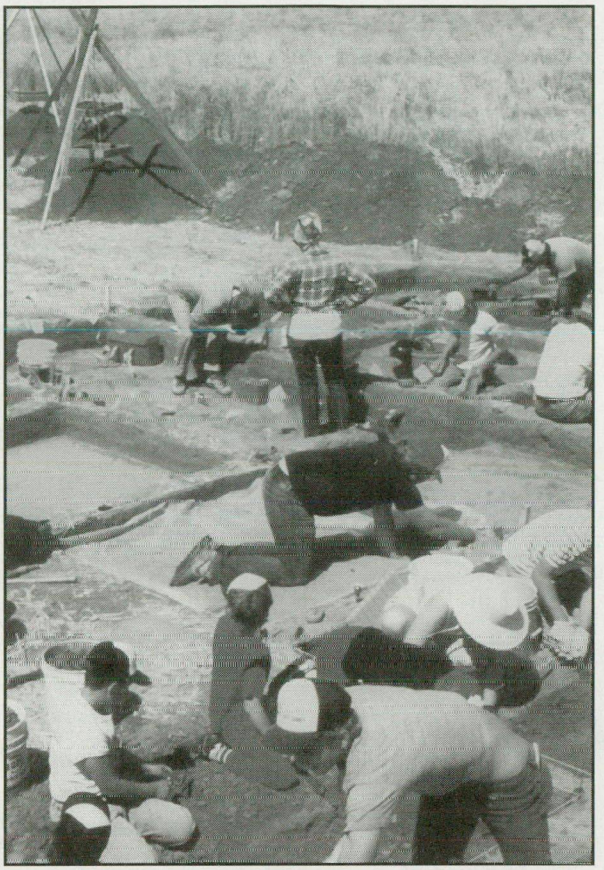


Figure 3. KAA crew at work at 14HP524 during 1988 Kansas Archeology Training Program field school.

Wichita State University graduate student Marie H. Huhnke (2000) published a technical report on that information. In it she concluded that the artifact assemblage represented a "Middle Ceramic-period, single-component, long-term" base site "from which some fairly intensive activities were carried out" (Huhnke 2000:30-31). She stated that the economy was based on agriculture, supplemented by bison primarily and dog and deer secondarily. She also asserted that "... bison processing was at least begun at the site, especially the stretching, defatting, and drying process for hides and the rough butchering, slicing, and drying of meat. The lithic tool kit was geared for the intensive bison processing." Huhnke (2000:31) went on to say that " ... a significant amount of effort must have been expended in acquiring the bedrock source Permian chert [over 50 miles away] that accounted for over 95 percent of the lithic raw material." In her estimation the site's trench features remained an enigma, and she closed with a call for more research on the Bluff Creek complex.

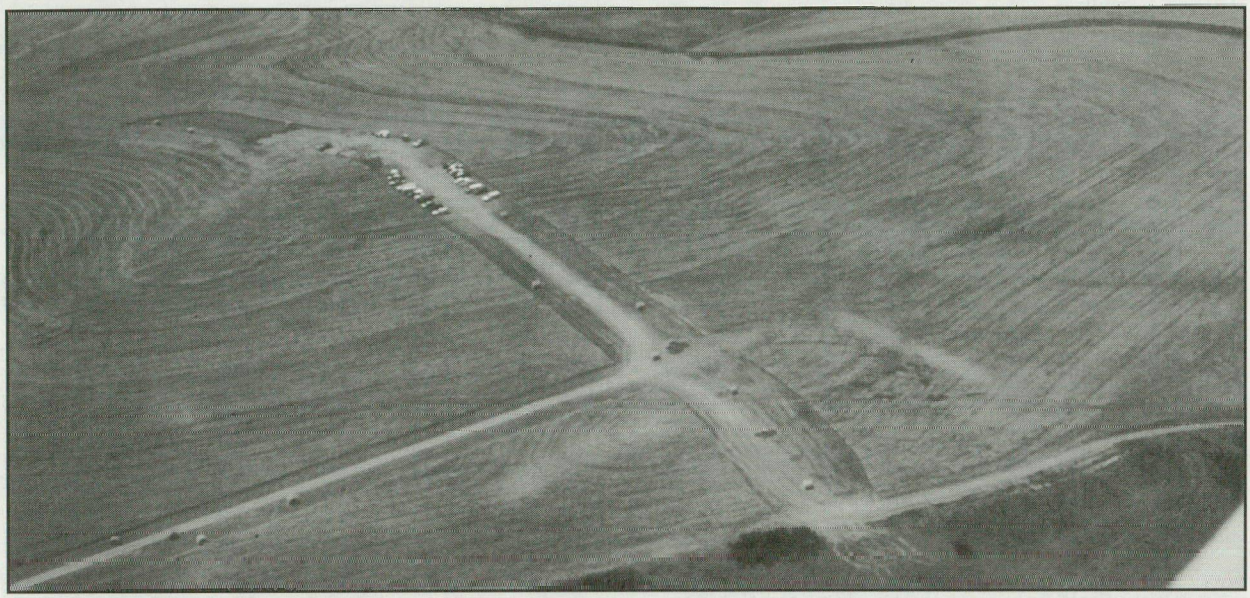


Figure 4. Aerial photograph of 1988 excavation at 14HP524.

1988 Excavations

Prior to excavation, the site was surface collected and probed to determine presence or absence of subsurface remains. The ridge top appeared to have been used as a settlement site, based on artifact concentrations and probes that identified several probable pits and borrow areas (Thies 1989a:179).

Three areas—A881, A882, and A883—were designated. A881 and A883, located on the ridge top, were initially thought to be separate and distinct; however, excavation demonstrated a single continuous distribution of cultural debris. A882 encompassed the terrace between the ridge and the creek.

Four block units were laid out on the ridge top to open as much of the site as possible and determine the overall size of the site and the number of dwellings. The blocks measured 133 m^2, 195 m^2, 16 m^2, and 12 m^2. In total, the blocks exposed an area of 356 m^2 on the ridge top, revealing features and their spatial relationships. Ten test pits on the lower terrace were designed to assess if full-scale excavation was warranted in that area. The test pits consisted of eight 1 m^2 units and two 2 m^2 units (Figure 4).

A881 and A883 had suffered deflation from wind erosion during the 1930s "dust bowl" (Thies 1989a:186) and from plowing. Two forms of plowing had been used: disc plowing, which extended to 20 cm below ground surface, and chisel-plowing, which extended to 23 cm. Erosion was evident in that only the lower sections of post molds and storage pits were still visible. Burrowing animals had disturbed the soil below the plow zone to the extent that it was difficult to separate the krotivina and the post molds.

Because churning from plowing would have destroyed any meaningful context, the top 15 cm were stripped off by shovel skimming. Every third bucket of soil was screened as a control to determine the size range of the artifacts and how much cultural material was missed by shovel skimming. This method proved to be an adequate technique for plow zone removal, as few artifacts were recovered in the screen.

As noted before, the ridge top (A881 and A883) was excavated in four blocks, opened as 2 m^2 units (Figures 5 and 6). Balk walls between units were left in place and excavated separately. Excavation levels were a combination of arbitrary and natural levels. Once the plow zone was stripped away, the blocks were taken down in 15-cm levels until sterile soil was reached. Level fill was screened through ¼-inch mesh. One corner of each unit was collected for flotation, and flotation samples also were taken from every feature.

A882, the terrace, was excavated in eight 1 m^2 test pits and two 2 m^2 test pits. As with A881 and A883, the plow zone was stripped away, and every third bucket was screened. Below the plow zone, all material was screened and flotation samples were taken from each level, as well as from each feature. All units were excavated to sterile soil.

Samples for radiocarbon dates were obtained from an ash complex, F588 in A882, from F42 in A881, and from F192 in A883.

The excavation methods described above were

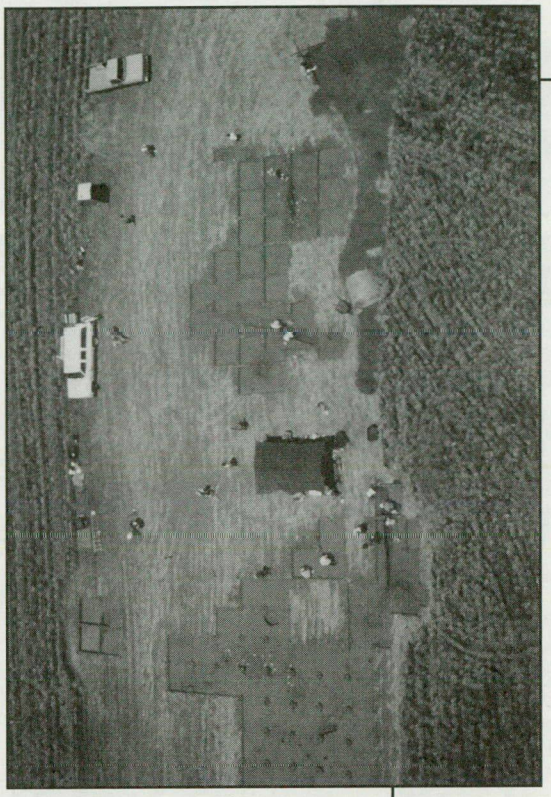


Figure 5. Aerial photograph of 1988 ridge-top excavation, oriented to correspond to the excavation map.

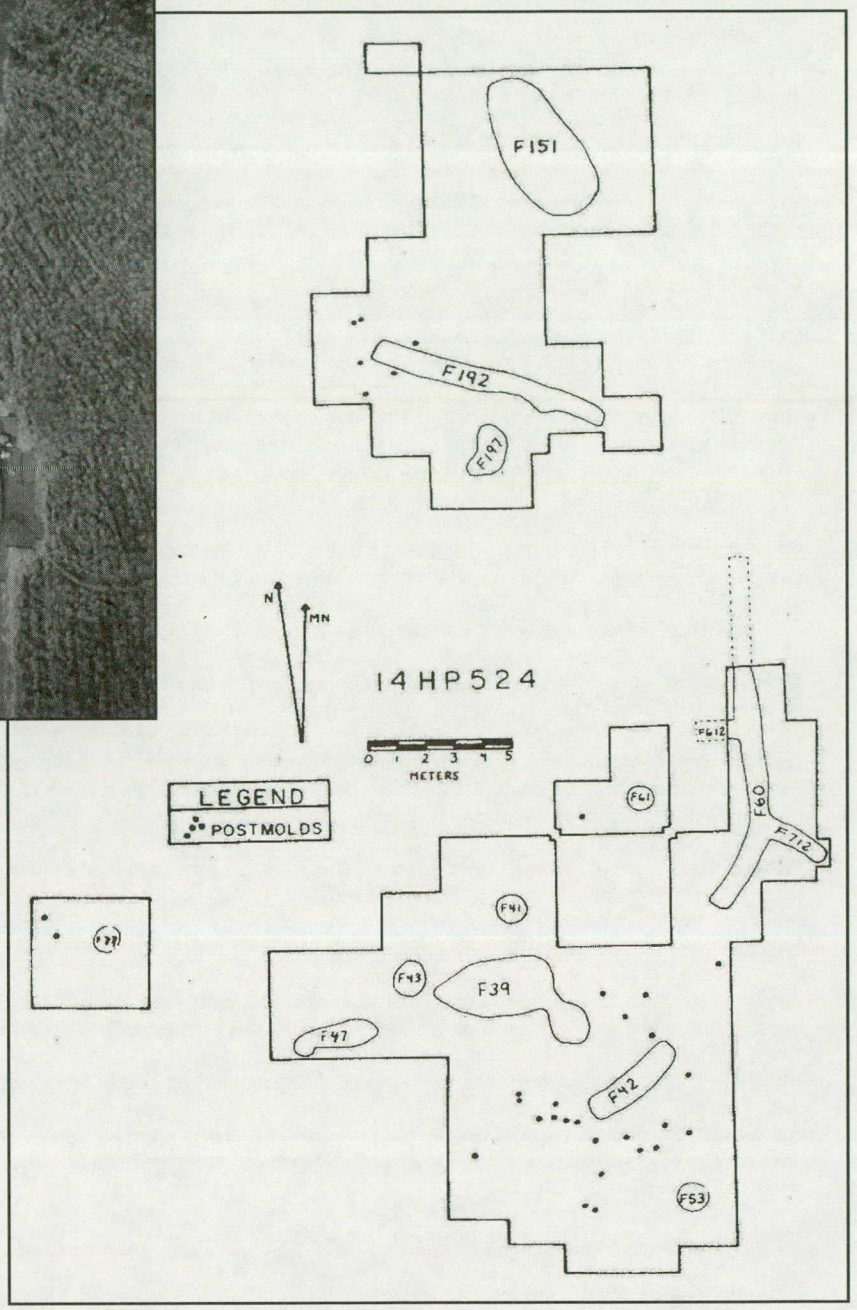


Figure 6. Excavation map (Thies 1989:187).

typical for possible village sites that probably have been disturbed. Screening of the plow zone ensured that shovel skimming was an effective way to clear the highly disturbed level. Flotation allowed for the recovery and identification of plant remains. By using block excavations, Witty and Thies were able to see the spatial patterns of dwellings in association with the richer sections of cultural debris as identified using the soil probe. Employing test pits was a quick and simple way to determine if and how the Hallman inhabitants used the terrace and to establish the site's spatial limits.

Artifacts other than ceramics found at the site appear to be typical of Early Plains Village complexes.

Glossary of Ceramic Terms

The following definitions are adapted from Greatorex (1997), Rice (1987), Shepard (1965), Sinopoli (1991), and Wedel (1949).

Appliqué: Application of small, shaped pieces of clay to the surface of the vessel.

Burnishing: A method of producing a luster on an unfired clay surface by rubbing it while leather-hard (dried but not fired) with a hard, smooth object, compacting and aligning the surface particles.

Chamfer: A beveled edge.

Coil method: The method of hand building an object of clay by successive additions of ropes or coils of clay; variations include ring building, spiral coiling, and segmental coiling.

Collar: A raised and extended orifice that begins at or above the point of maximum diameter of the vessel but does not significantly reduce the opening relative to the body diameter. This definition is used herein. However, in the Great Plains a collar is a rim type synonymous with a braced rim; it has additional thickening, or fillet, beginning directly at the lip or slightly lower. Also, see "Neck."

Cordmarking: A finishing process in which the outer surface of a vessel is given texture, usually accomplished by beating the surface of the vessel while it is still wet with a paddle wrapped in cordage.

Crenellated: Having a wavy or piecrust-like rim.

Denticulate: A regular patterned decoration in which a series of notches have been cut or impressed into the vessel, usually on the lip.

Dimensions: In this analysis measurements were taken according to the following conventions:
length is the greatest dimension of a sherd; rim height is the distance from the throat to the lip; thickness is the maximum thickness of the sherd.

Fabric: The composition of a fired ceramic, including clay, inclusion, and pores but excluding surface treatment; often used synonymously with body, paste, and ware.

Fillet: Narrow strip of clay, applied as an appliqué.

Fire cloud: A darkened area on a vessel's surface, resulting from uneven firing and the deposit of carbon in the pores, characteristic of firings in which fuel and vessels are in immediate proximity.

Incising: The cutting of lines into the surface of a vessel with a pointed implement before firing.

Inclusion: Particulate matter, usually mineral in nature, present in a clay or fabric, either naturally occurring or added by the potter; often used synonymously with temper. Herein, inclusions refer to non-clay materials of large particle size in the clay fabric.

Lip: The edge or margin of the orifice of a vessel.

Mouth: The orifice or opening of a vessel.

Munsell charts: A series of charts published by the Munsell Color Company for the standardized identification and description of colors. Individual shades, tints, and tones are represented by rows of color chips. Color is divided into three components: hue, value, and chroma.
Hue: first quality of color, corresponding to its perception of visible light as red, yellow, blue, green, and purple.
Value: lightness.
Chroma: saturation, purity, or strength of color; presence or absence of gray.

Neck: The part of a vessel between the shoulder and the rim, typically characterized by a marked constriction of the maximum body diameter. Where there is little constriction and the neck appears to come almost directly out of the vessel body, the region is often called a collar.

Node: A thickened point or protuberance.

Oxidation: A firing atmosphere characterized by an abundance of free oxygen, which combines with elements, such as iron, in the paste and yields clear colors to the ceramic body.

Paddle and anvil: A finishing technique involving the repeated striking of the clay with opposing pressure. A flat or concave stick or beater is used on one surface as a convex stone or clay anvil is held on the other surface. The method improves the bonding of segments, obliterates coil marks or irregularities, thins the walls, compacts the paste, smoothes or roughens the surface, and changes the shape of the vessel.

Paint: The action of applying a pigment.

Paste: A clay or mixture of clay and added materials; often used synonymously with fabric, body, or ware. Technically, paste differs from fabric because it does not include pores and differs from ware because it excludes surface treatments.

Pigment: Organic or inorganic coloring material, usually a mixture of colorants, clay, water, and a binder.

Punctate: Depression punched into wet clay, usually with a pointed instrument, such as a stick, hollow reed, awl, finger, or fingernail.

Rim: The area between the lip or margin and the side wall or neck of a vessel.

Seriation: The ordering of types of a particular artifact class according to their formal development. The method assumes gradual changes in cultural tastes and continuity of artifact attributes. Graphing of attribute occurrences can show the incipience, the period of the artifact's greatest popularity, and the tapering off in frequency. A further principle of seriation is that, if the same types are found at two different sites, the sites are presumed to be relatively contemporaneous.

Shoulder: The upper part of a body of a constricted vessel; that portion between the maximum diameter and the orifice or neck.

Slip: A fluid suspension of fine clay and water used to coat a body before firing or poured into a mold to cast a piece; a non-vitreous coating on a pottery vessel.

Smoothing: A finishing process in which the interior or exterior of a vessel is given a finer, more regular surface than results from forming. It is usually done with a soft, yielding tool, such as cloth, leather, a bunch of grass, or the potter's hand. A hard tool may be rolled over the vessel to eliminate imperfections and even out the surface. It does not produce a luster on the vessel's surface.

Stamping: A decorating technique in which the design is impressed into the wet clay, sometimes confined to zones or covering the entire body of the vessel. The term also can refer to the use of a tool to impress a repeated pattern of identical motifs.

Taphonomy: The study of what happens to an organism after its death and until its discovery as a fossil. This includes decomposition, post-mortem transport, burial, compaction, and other chemical, biologic, or physical activity that affects the remains of the organism.

Temper: To mix or modify to a proper consistency; a material—mineral or organic but usually nonplastic—added to a clay to improve its working, drying, or firing properties.

Throat: The base of a neck or collar on a vessel; the point of maximum diameter restriction of a neck or collar.

Vitrification: The action or process of becoming glass; the high-temperature process whereby the particles within a mass fuse, closing the surface pores and forming a homogeneous, impervious mass without deformation.

Waster: Vessels or sherds from vessels damaged in manufacturing, particularly in firing as by overfiring, underfiring, warping, or bloating.

The lithic assemblage included projectile points, a drill, end scrapers, side scrapers, beveled knives, and bifaces. Ground stone was present in the form of a metate, sandstone pipe, and abraders. Bone tools were relatively abundant and consisted of scapula hoes, digging stick tips, a fishhook, a shaft wrench, awls, an antler baton, a bead, cleavers, and a toy. The toy was a "cup" from a cup and pin game (Thies 1989a:193). Plant remains identified were corn, marshelder, and sunflower (Mary J. Adair personal communication, 1999), all plants typical of the Early Plains Village period.

Description of 14HP524 Ceramic Assemblage

Researchers must look at artifact assemblages to gain a better understanding of many aspects of a culture. Assemblages hold the keys to understanding lifeways, trade patterns, and cultural "survivals," which are traits that serve a purpose within a society and, therefore, are retained by that society.

Analytical Methods

The Hallman site artifact collection was only partially processed during the 1988 KATP field school. To obtain the ceramic artifacts for this analysis, the author went through the collection boxes to pull the bags containing ceramic materials, sorted the ceramic pieces, and counted and weighed the sherds. Unique sherds and rims were given individual numbers. Fragments that fit together were glued and counted as a single sherd. The ceramic artifacts from each unit and level were analyzed separately for color, temper, surface treatment, and sherd type. Sherds were sorted into four groups: rim, body, base, and appendage, based on presence or absence of obvious traits.

The objectives of these procedures were to recognize enough differences to allow for separation of the sherds into individual vessels and to recover enough of the vessels to determine usage. Sherd distribution was examined to identify activity loci, and refit distribution was studied to determine how disturbed the site actually was. A petrographic analysis was not completed; the development of such a database was judged to go beyond the scope of this project.

The sample from the Hallman site contains 610 sherds, of which 45 are rims, and one restored vessel that was counted as a single entity for this study.

General Traits

The intent of looking at the general traits of color, temper, and surface treatment was to determine the characteristics of the ceramic assemblage from the Hallman site. It was hoped that there would be enough variation to identify individual vessels or exotic/trade items. However, the sherds proved to be very homogenous in color, texture, and decoration with no distinguishing traits among them. For instance, color values are within three hue ranges. In addition, 100 percent of the assemblage has quartz sand as a temper component, and more than 96 percent of the ceramics have either smoothed or cordmarked surface treatments. Ninety-eight percent of the rims are either smoothed or flattened, and all the rims were tempered with quartz sand, with 22 percent also tempered with bone. The high instance of bone temper is the only unique aspect of the assemblage and may help determine the spatial limitations of the Bluff Creek culture for future research. Necks tend to be either straight (50 percent) or outflaring (39 percent). Also, refits cluster either within the plow zone or within features. These commonalties are typical for pottery from the surrounding region during the Middle Ceramic period.

Color

Color values were obtained using a Munsell Soil Color Chart, 1954 edition. The values were obtained during sunny to partly sunny days.

Sherd color ranges from white (7.5YR7/1) to black (7.5YR2/0-10YR2/1) at the extreme ends; however, a majority of the sherds remain within the 7.5YR, 10YR, and 5YR hue ranges. Darker values predominate inside the hue ranges, most falling within the gray, brown, and black variations. The chroma values tend to correlate with the numeric value. Those sherds with higher value numbers typically had higher chroma numbers, while those with lower value numbers also had lower chroma numbers. According to Rice (1987:342), this means that those sherds with higher numbers tend to have a more brilliant color, while those with the lower numbers have more dark and dusky colors. The green hue, present for a relatively small number of sherds, is indicative of firing at a high temperature (above 900° C) or repeated heating (Rice 1987:90-91).

A majority of core colors are within the black range of value and chroma, regardless of hue, thus supporting the notion that the vessels were originally fired in a non-oxidizing atmosphere. There are also variations in color assignments for the surfaces of the sherds, most noticeably on the surface of the restored vessel. The color ranges correspond to what would be expected from pottery fired with variable temperature and oxygen in a pit (Rice 1987:343-345; Shepard 1965:103-106).

Temper

Temper was identified visually by examining the sherds using the naked eye, a hand lens, and a 10-power binocular microscope. Both sides of the sherds and the break edges were examined after cleaning adhering soil matrix. Prior to examining the sherds under the microscope, the author examined comparative samples of burned and unburned bone, burned and unburned shell, gypsum, limestone, and sand to ensure accurate identification (Figures 7-14). Testing with hydrochloric acid was deemed unnecessary, as the test would only indicate the presence of calcium carbonate.

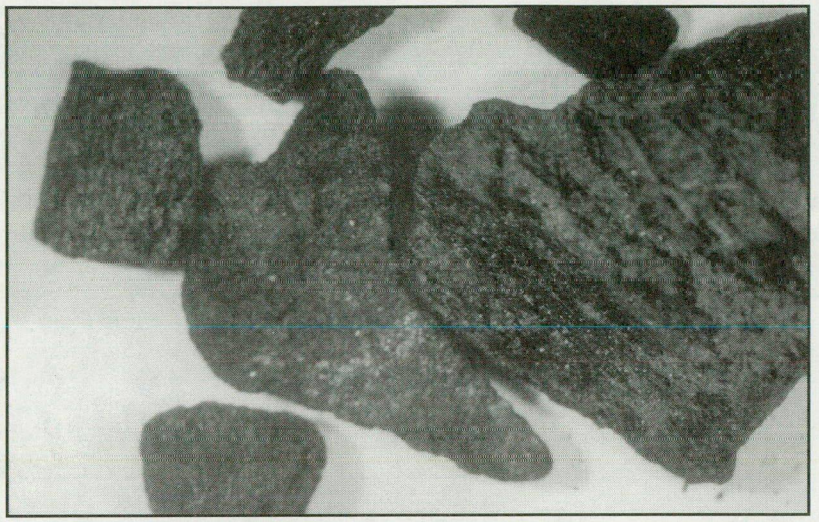


Figure 7. Burned bone sample.

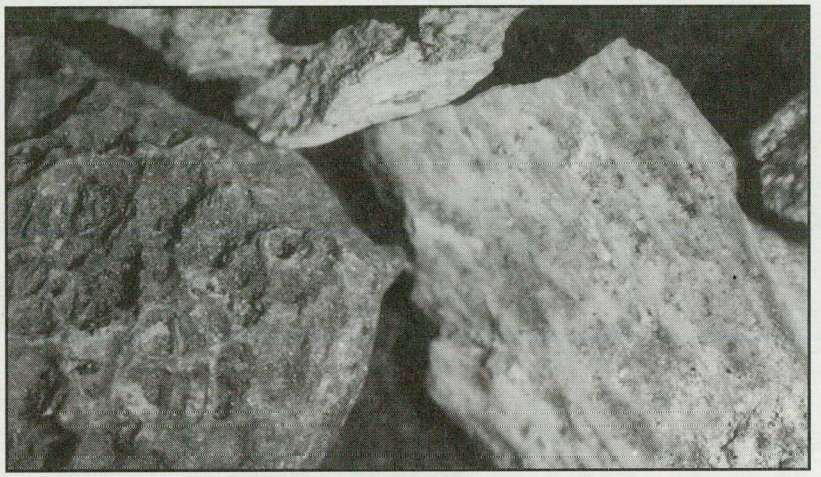


Figure 8. Unburned bone sample.

The temper categories are quartz sand (S); quartz sand and bone (S/B); quartz sand and limestone (S/LM); and quartz sand, bone, and limestone (S/B/LM). The sand has rounded edges, which can indicate that it is a natural component of the clay (Rice 1987:410-411). On the other hand, very high sand concentrations argue for deliberate addition to the clay matrix. Limestone is present, but only as inclusions that appear to be a component of the sand and not purposely added as a tempering agent. In order to determine if the limestone contributed significantly to the temper types, it initially was given its own category. This proved to be unjustified, as illustrated by its limited presence (Table 1). Bone was identified using diagnostic characteristics, such as fossa, foramen, cancellous structure, shape, and size. Some of the pieces are complete and so diminutive that they probably came from very small animals, such as voles. No shell or gypsum was identified.

Table 1. Breakdown of Sherd Temper Types.

Temper	No. of sherds	Percentages
Quartz Sand	474	77.58
Quartz Sand/Bone	104	17.02
Quartz Sand/Limestone	15	2.45
Quartz Sand/Bone/ Limestone	18	2.95
Totals	611	100.00

At the Hallman site quartz sand is the most common tempering material, while the quartz sand and bone mix is second. Bone is not an everyday tempering material, but it appears to be a common agent within the Bluff Creek complex and the Southern Plains tradition. For the Anthony site the most com-



Figure 9. Burned shell sample.

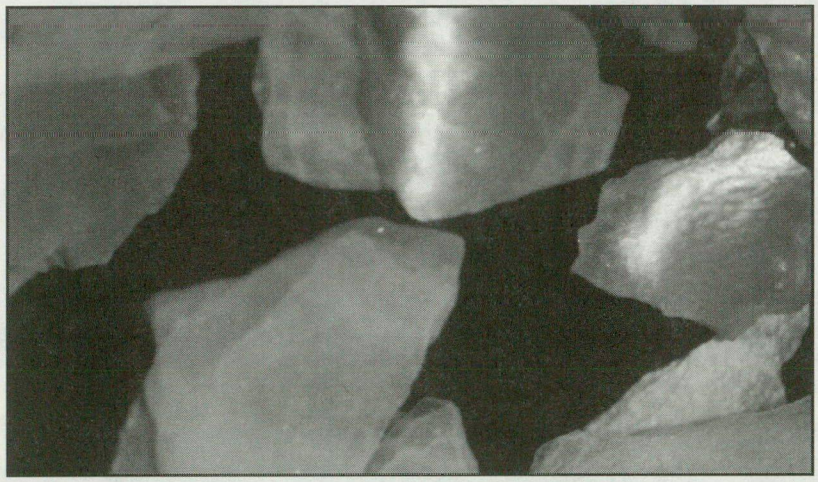


Figure 10. Unburned shell sample.

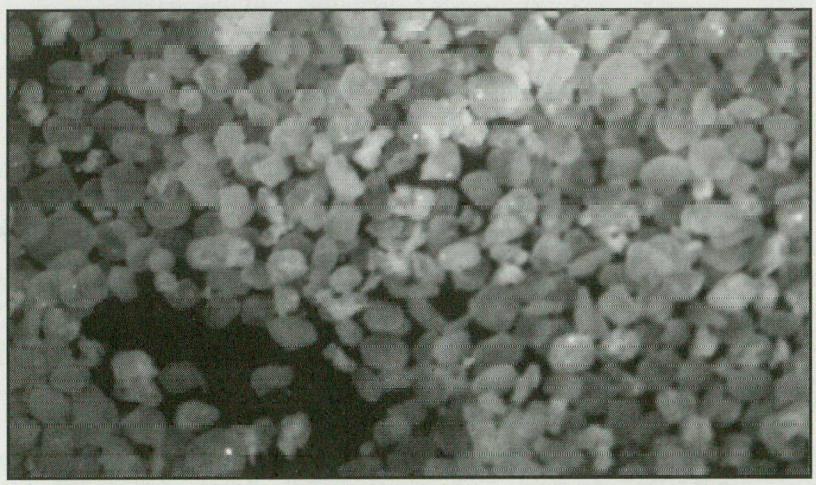


Figure 11. Gypsum sample.



Figure 12. Limestone inclusions in sherd.



Figure 13. Sand inclusions in sherd.



Figure 14. Sand and bone mix inclusions in sherd.

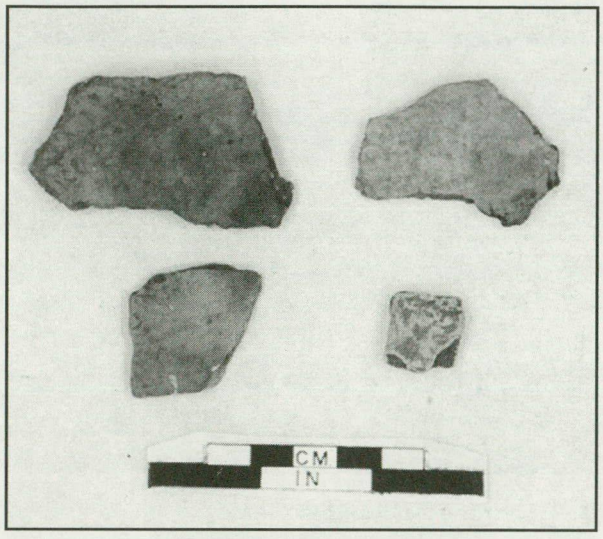


Figure 15. Sherds with smoothed surface treatment.

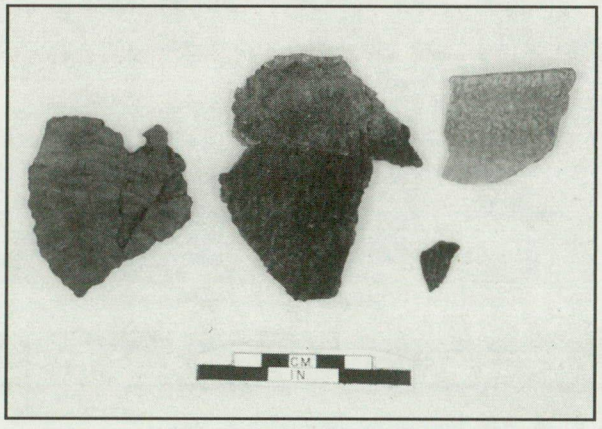


Figure 16. Sherds with cordmarked surface treatment.

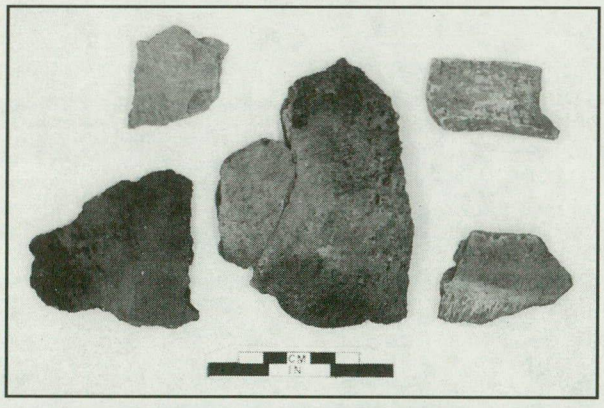


Figure 17. Sherds with smoothed-cordmarked surface treatment.

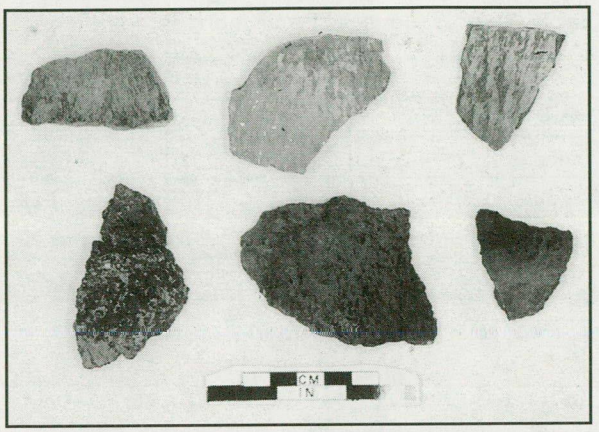


Figure 18. Sherds with smoothed and cordmarked surface treatment.

mon tempering agent is a quartz sand and gravel mix; similar to the Hallman site, the quartz sand and bone mix is the second most common tempering material. Indeed Munsell (1961:113) notes "small amounts of bone and shell temper are also present in some sherds; shell is the more frequent of the two." Witty (1969:3) described the ceramics from the Buresh/Nulik site as manifesting "variety in the ceramic paste ... with tempering material being crushed bone, sand or rarely shell." For the Armstrong site Gould (1975:52) did not identify any sherds with bone temper. Thus, it appears that three of the four systematically investigated Bluff Creek sites have bone as a fairly common tempering agent.

Surface Treatment

Surface treatment was decided by touch, sight, and, when necessary, with the aid of a raking light. Surface treatments fell into five categories: smoothed (SM) (Figure 15), cordmarked (CM) (Figure 16), smoothed-cordmarked (SCM) (Figure 17), smoothed and cordmarked (SM/CM) (Figure 18), and indeterminate (ID). SCM refers to the sherds with cordmarks partially obliterated by smoothing. SM/CM sherds have areas of smoothed surface and areas of cordmarks, commonly formed as bands. Due to the fragmentary nature of the assemblage, there is no way to determine whether these bands are the result of differential wear or a form of decoration. If the former is case, SCM and SM/CM categories could be combined. Table 2 offers a breakdown of the number of sherds in each category and their percentages.

It was initially thought that the sherds could be sorted into cordmarked and smoothed-over-cordmarked, and thus a vessel count could be obtained. Upon closer inspection of sherds and the restored vessel, it was determined this was not the case. Because vessels and sherds from this time period exhibit cordmarks and smoothed-over-cordmarks in adjacent areas, two sherds—one with cordmarks and the other with smoothed-over-cordmarks—could come from the same vessel. Therefore, no method based on surface treatment could determine the number of vessels represented in the collection.

Table 2. Breakdown of Sherd Surface Treatments.

Surface Treatments	No. of sherds	Percentage
Smoothed	128	20.95
Cordmarked	292	47.79
Smoothed-Cordmarked	168	27.50
Smoothed and Cordmarked	11	1.80
Indeterminate	12	1.96
Totals	611	100.00

A potentially important research question is why ceramic vessels from this time period manifest both types of surface treatment. While the SCM treatment may be an expression of the aesthetics of the potter (Gould 1975:55), it could also be a function of manufacturing technique. While the potter pressed cord into the pot, he/she rotated the pot to impress other sides of the vessel. If the vessel were held in the lap and rotated, the vessel would lie in such a way that some of the cordmarks would be smoothed away. Differences in pressure supporting the pot, either the potter's lap or the ground, could account for adjacent areas of cordmarks and smoothed-over-cordmarks, as well as variations in obliteration of the cordmarks.

Gould (1975:55) suggested that cordmarking was an attempt by the potter to decrease drying time by increasing surface area and that pots were remoistened and cordmarks smoothed over prior to firing. However, not all cordmarks were completely obliterated, and thus appear as SCM and not CM or SM. While this practice is feasible, it negates the advantages that cordmarking offered during cooking and handling. By increasing the surface area that transfers heat to the contents, cordmarks also might decrease the amount of cooking time required. Furthermore, a rough surface would allow for a better grip when wet (Rice 1987:232). In theory, repeated handling of the vessel over time could wear off cordmarks in certain areas. Some researchers (Griffiths 1978; Rice 1987:138, 232-233; Sinopoli 1991: 83-89) note that wear can create identifiable patterns and, therefore, indicate how vessels were used. However, the majority of use-wear

studies have focused on interior vessel surfaces. The hypothesis that variations in smoothed cordmarks might be accounted for by different uses of the vessel has not been systematically analyzed.

Another explanation for the SCM surfaces is that this treatment is a cultural trait. This implies that potters from the same culture group and/or family made all the vessels exhibiting a certain type of surface treatment. This does not seem to be the case as vessels with SCM are found in the Southern and Central Plains traditions, as well as throughout the Ceramic periods. Furthermore, because SCM treatment does not appear to have been produced in a systematic way and/or show systematic variation over time, it is unlikely a culturally distinct trait.

An alternative question is why a potter would want a smoothed vessel? The most obvious answer is that smoothness would show off the potter's skill. In addition, the smoothing action would help meld the coils together, and the technique would reduce manufacturing time by eliminating a production step. On the other hand, the smoothness might result from the production method. For example, if a pot were formed inside a gourd, the exterior of the vessel would reflect the smoothness of the gourd. In any case a thinner wall could be produced, which would increase the heat transfer to the contents and thus decrease cooking time.

Body Sherds

The majority of the Hallman ceramic assemblage comprises 563 body sherds. Sherds analyzed are larger than 2 cm along the longest axis or slightly larger than a nickel. The main difficulty with the body sherds is the lack of placement characteristics; there was no way to determine where in the body of the vessel the sherds came from. Thus vessel size, volume, and minimum number could not be determined.

Tables 3 and 4 show the breakdowns of temper types and surface treatments for body sherds. The body sherds themselves are relatively unremarkable. Quartz sand is the most common tempering agent, and cordmarking is the most common surface treatment.

Rims

A total of 45 rim sherds were recovered, accounting for 7 percent of the assemblage by number. A profile was drawn of each rim (Figures 19-22). With the exception of five unique rims, discussed below, rims will be described for each area of recovery. Due to the homogeneity of the assemblage, the rims are considered a representative sample of the range of variability (Figures 23 and 24). See Table 5 for a specific breakdown of rim sherd colors and attributes.

Table 3. Breakdown of Body Sherd Temper Types.

Temper	No. of sherds	Percentages
Sand	438	77.80
Sand/Bone	92	16.34
Sand/Limestone	15	2.66
Sand/Bone/Limestone	18	3.20
Totals	563	100.00

Table 4. Breakdown of Body Sherd Surface Treatments.

Surface Treatments	No. of sherds	Percentage
Smoothed	124	22.02
Cordmarked	258	45.83
Smoothed cordmarked	160	28.42
Smoothed and cordmarked	9	1.60
Indeterminate	12	2.13
Total	563	100.00

A881

Sixteen small rim sherds were recovered from A881. The average length, or longest dimension, of the sherds is 2.01 cm. Twelve of the rims (75 percent) are broken at or above the throat, and it is not possible to determine if the necks are vertical or flared. Of the remaining four sherds, two have vertical necks, one shows a slight in-flaring collar, and one has a concave or S-shaped neck. The rim heights range from 2.15 to 2.4 cm with an average of 2.25 cm.

All but two (87 percent) of the sherds have cordmarks to the lip. One of the two is obviously smoothed, and the other either has been smoothed or the cordmarks have eroded away. Two of the rims have very thin lips with slight chamfers or bevels on the interiors; two have rounded, thickened lips; two have flat lips; three have rounded lips with clay drawn into slight ridges on the exteriors; six have plain rounded lips; and one has a rounded lip with cordmarks that carry onto the lip and flatten it slightly. All sherds show smoothing of the interior surfaces except one, probably due to post-depositional erosional processes. Only one sherd has additional decoration—an apparent incised line on the interior surface. This sherd is also unique in that the exterior surface is painted black.

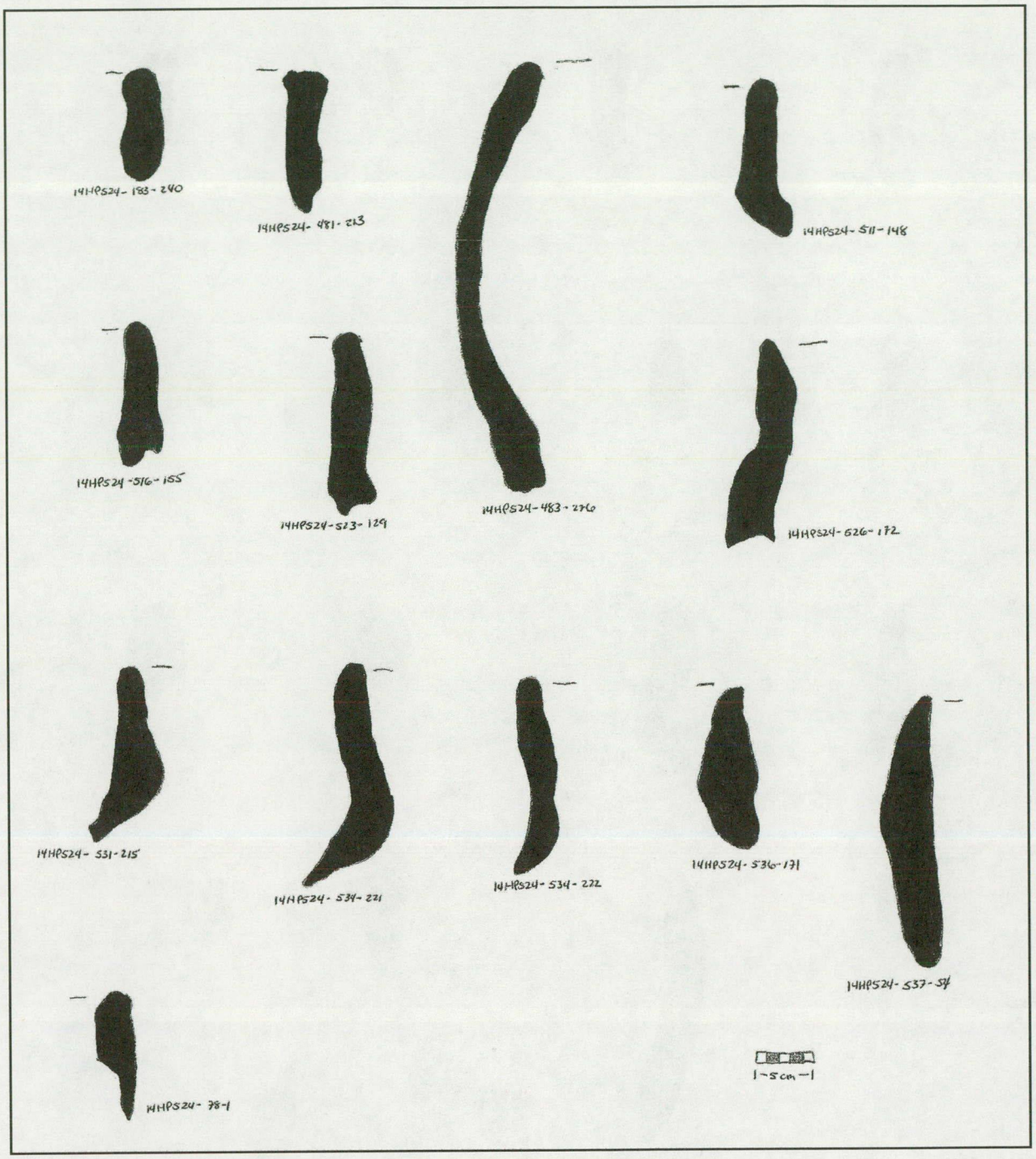


Figure 19. Rim profiles.

A883

A883 yielded 15 rim sherds. The average length is 3.62 cm, omitting sherd #176-1, a nearly complete rim measuring 13 cm long; its inclusion would increase the average length to 4.25 cm. Approximately 33 percent (5 of 15) are broken at or above the neck of the vessel. Of the remaining rims, 30 percent (3 of 10) are outflaring rims, while the remaining 70 percent (7 of 10) are straight rims. Neck heights range from 1.6 to 3.0 cm and average 2.63 cm.

In terms of surface decoration, 67 percent have cordmarks extending to the lip. Of the remaining five sherds, two were cordmarked initially, but the marks

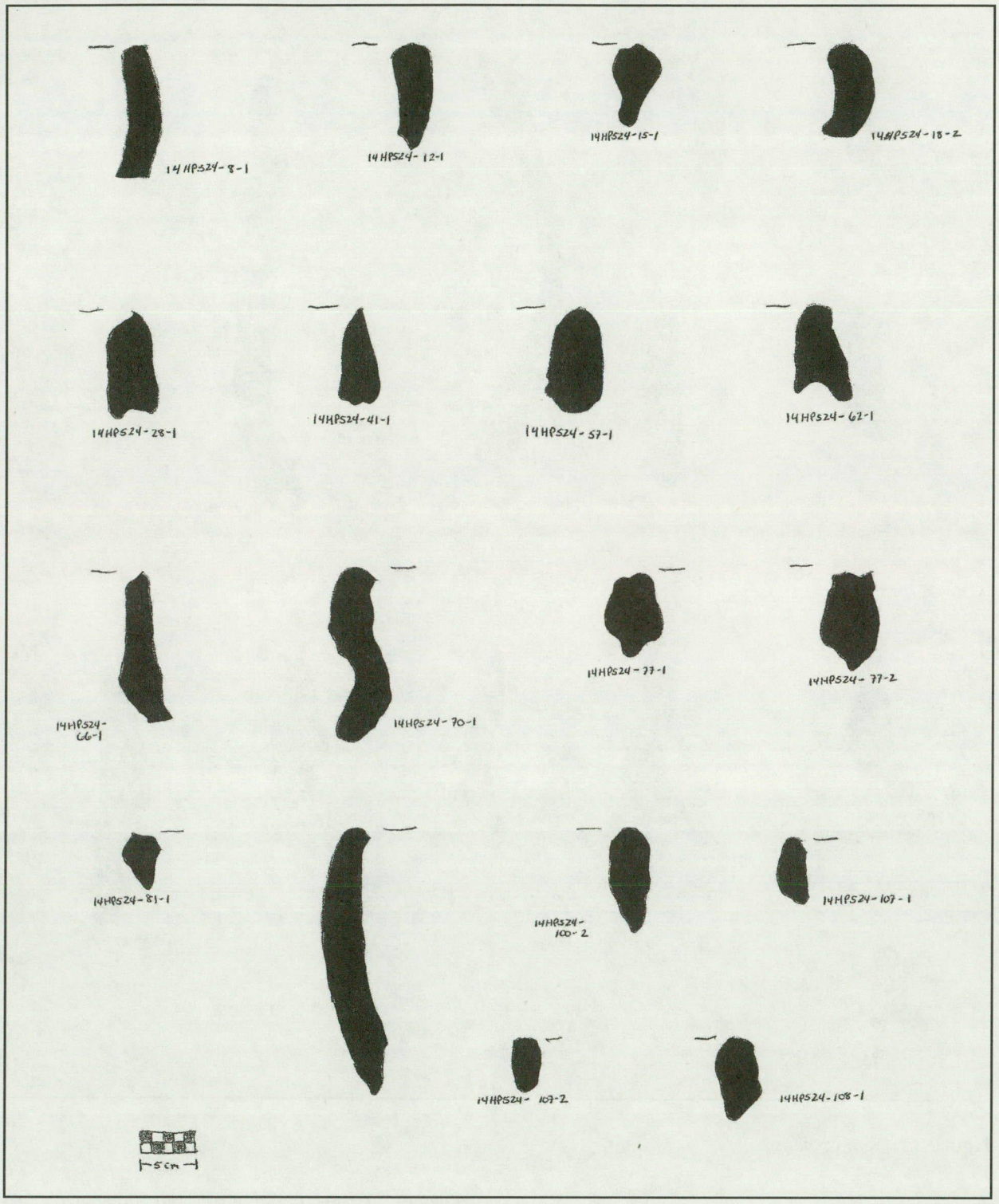


Figure 20. Rim profiles.

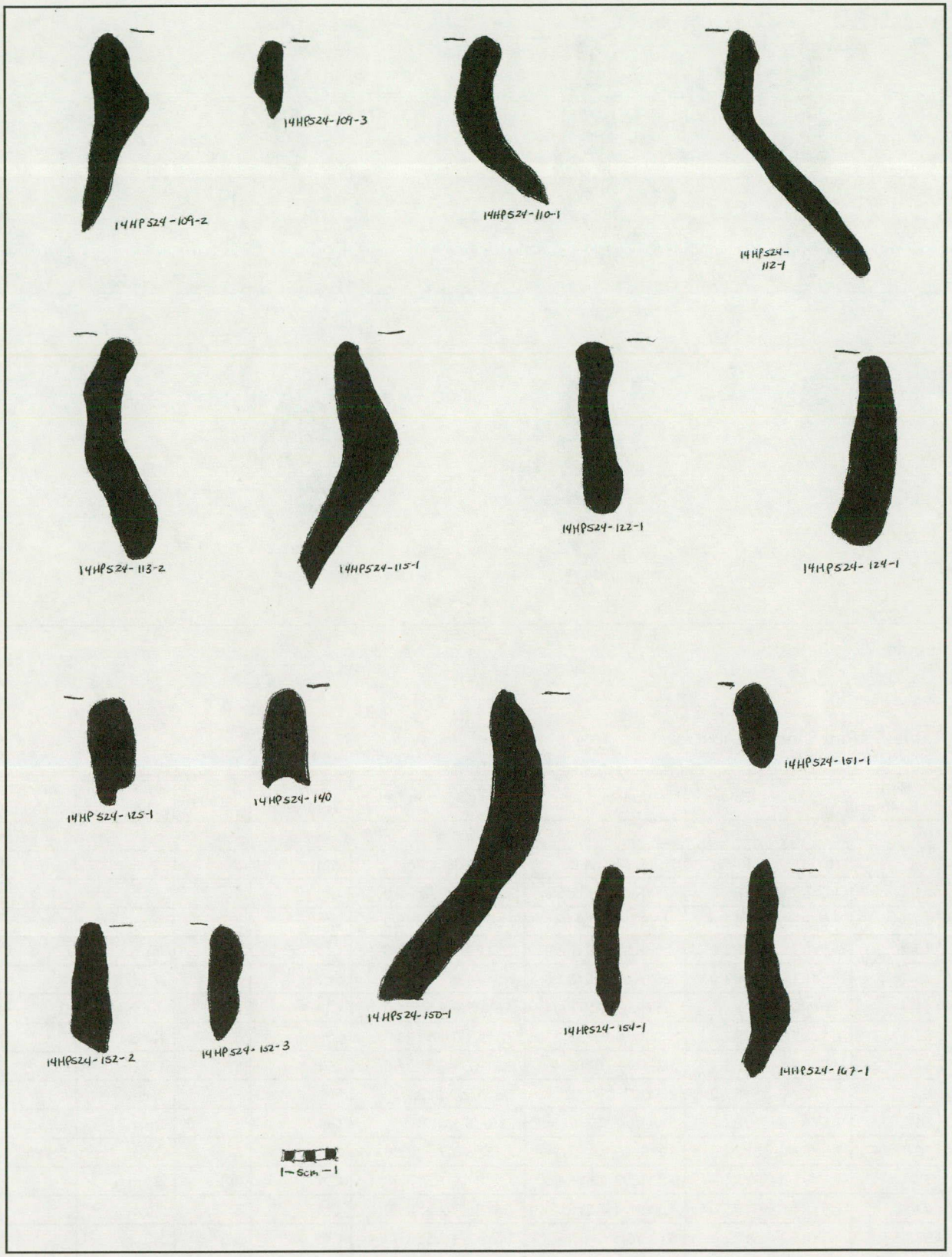


Figure 21. Rim profiles.

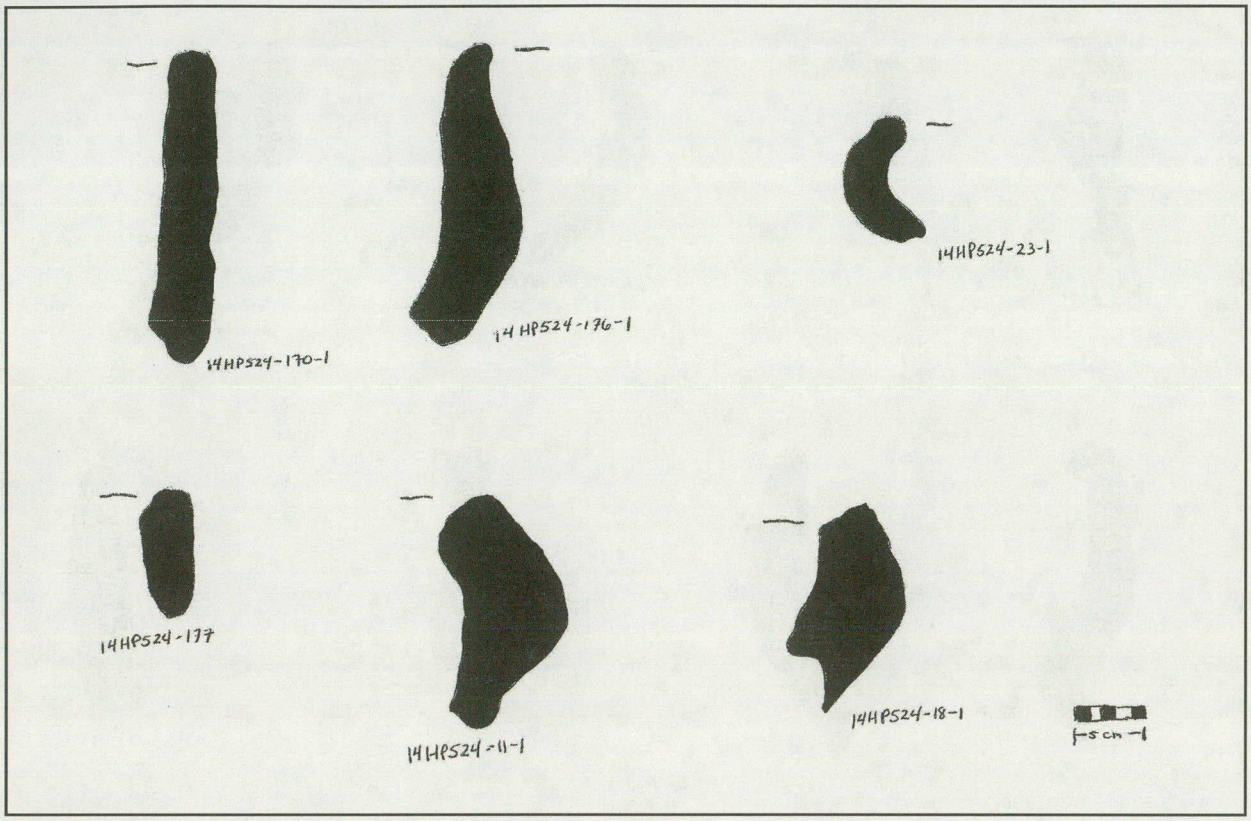


Figure 22. Rim profiles.

Table 5. Rim Sherd Attributes.

Rim Number	Exterior Color	Interior Color	Cross Section Color	Surface Treatment	Temper	Maximum Thickness	Neck Height
Area 881							
8-1	10YR6/1-10YR4/1	5YR6/6-5YR4/8		CM	S	.7 cm	
12-1	7.5YR8/6-7.5YR6/8	7.5YR8/6-7.5YR6/8	7.5YR4/0-7.5YR3/0	CM	S	.6 cm	
15-1	7.5YR3/0-7.5YR2/0	10YR7/4-10YR4/4	7.5YR3/0-7.5YR2/0	CM	S	.8 cm	
18-2	7.5YR3/0-7.5YR2/0	7.5YR3/0-7.5YR2/0	7.5YR3/0-7.5YR2/0	CM	S	.75 cm	
28-1	7.5YR3/0-7.5YR2/0	7.5YR3/0-7.5YR2/0	7.5YR3/0-7.5YR2/0	SCM	S	.7 cm	
41-1	5YR4/0-5YR3/2	7.5YR6/4-7.5YR4/4	7.5YR5/0-7.5YR4/0	CM	S	.6 cm	
57-1	7.5YR3/0-7.5YR2/0	10YR7/4-10YR6/6	7.5YR4/0-7.5YR3/0	SM	S	1.0 cm	
62-1	7.5YR6/4-7.5YR4/4	10YR6/4-10YR5/4	7.5YR7/4-7.5YR4/0	SCM	S	1.0 cm	
65	7.5YR4/0-7.5YR3/0	2.5Y5/2-2.5Y3/2	2.5Y4/2-2.5Y3/2	SM	S	.8 cm	
66-1	7.5YR6/6-7.5YR3/0	5YR7/6-5YR4/6	5YR4/6-5YR2/1	CM	S	.7 cm	2.15 cm
70-1	7.5YR3/0-7.5YR2/0	10YR4/2-10YR2/1	7.5YR3/0-7.5YR2/0	CM	S	.7 cm	2.4 cm
78-1	7.5YR5/2-7.5YR4/2	7.5YR5/2-7.5YR4/0	7.5YR7/4-7.5YR5/0	CM	S/B	.7 cm	
220	7.5YR4/0-7.5YR3/0	7.5YR6/4-7.5YR5/4	7.5YR5/0-7.5YR3/0	CM	S	.5 cm	
537-54	7.5YR5/4-7.5YR2/0	5YR6/8-5YR4/3	7.5YR7/4-7.5YR3/0	CM	S/B	1.0 cm	
536-171	10YR7/4-10YR5/3	10YR8/6-10YR6/6	7.5YR8/2-7.5YR3/0	CM	S/B	.9 cm	2.2 cm
183-240	7.5YR3/0-7.5YR2/0	7.5YR3/0-7.5YR2/0	7.5YR3/0-7.5YR2/0	CM		.65 cm	

Rim Number	Exterior Color	Interior Color	Cross Section Color	Surface Treatment	Temper	Maximum Thickness	Neck Height
Area 882							
100-2	10YR6/4-10YR5/2	7.5YR6/2-7.5YR4/4	10YR4/1-10YR3/1	CM	S	.9 cm	1.8 cm
107-1	10YR7/4-10YR6/3	7.5YR5/2-7.5YR4/2	7.5YR6/2-7.5YR4/0	CM	S	.6 cm	
107-2	10YR7/3-10YR4/1	7.5YR7/6-7.5YR6/6	5YR6/1-5YR5/1	CM	S	.5 cm	
108-1	10YR4/1-10YR3/1	10YR7/4-10YR4/1	10YR5/1-10YR4/1	SCM	S	.7 cm	
109-2	7.5YR4/2-7.5YR2/0	7.5YR6/4-7.5YR4/2	7.5YR5/2-7.5YR2/0	SM/CM	S	1.0 cm	1.0 cm
109-3	7.5YR7/4-7.5YR/0	10YR7/4-10YR4/2	10YR7/4-10YR5/2	SCM	S	.6 cm	
110-1	5YR6/8-5YR4/8	2.5YR6/8-5YR6/8	2.5YR6/8-2.5YR3/0	CM	S	.9 cm	2.2 cm
112-1	7.5YR3/0-7.5YR2/0	10YR3/1-10YR2/1	10YR5/3-10YR2/1	CM	S	.8 cm	1.75 cm
113-2	10YR4/2-10YR4/1	5YR6/6-5YR4/2	5YR7/6-5YR4/1	CM	S	.8 cm	2.1 cm
Area 883							
140	2.5Y6/2-5YR5/6	5YR6/6-5YR6/8	2.5YR6/2-5YR5/6	CM	S	.8 cm	
150-1	10YR5/3-10YR2/1	10YR5/3-10YR4/1	10YR6/3-10YR2/1	CM	S/B	1.1 cm	3.0 cm
151-1	10YR7/4-10YR6/4	10YR7/4-10YR6/4	10YR7/4-10YR6/4	CM	S/B	.6 cm	
152-3	10YR3/1-10YR2/1	10YR3/1-10YR2/1	10YR3/1-10YR2/1	SCM	S	.8 cm	
167-1	7.5YR4/1-7.5YR3/1	7.5YR4/2-7.5YR3/2	7.5YR3/1-10YR2/1	CM	S	.7 cm	2.9 cm
170-1	10YR5/3-10YR4/2	10YR3/1-10YR2/1	10YR6/3-10YR2/1	SCM	S	.8cm	
176-1	10YR7/3-10YR5/3	10YR7/6-10YR4/3	7.5YR3/0-7.5YR2/0	CM	S/B	1.2 cm	2.4 cm
534-221	7.5YR6/6-7.5YR4/2	7.5YR6/6-7.5YR3/2	7.5YR7/4-7.5YR6/6	CM	S	.8 cm	3.0 cm
534-222	10YR7/4-10YR4/1	7.5YR6/6-7.5YR5/4	7.5YR6/4-7.5YR2/0	CM	S	.7 cm	3.0 cm
531-215	7.5YR6/6-10YR5/4	7.5YR7/6-7.5YR5/6	5Y51-5Y4/1 and 7.5YR7/6	SCM	S/B	.95 cm	2.5 cm
526-172	2.5YR6/2-2.5Y4/0	10YR4/1-10YR3/1	7.5YR7/0-7.5YR3/0	SM/CM	S	1.0 cm	1.6 cm
523-129/130	7.5YR7/6-7.5YR4/2	7.5YR7/6-7.5YR5/0	7.5YR7/6-7.5YR6/4	SCM	S	.8 cm	2.8 cm
516-155	7.5YR4/2-7.5YR2/0	7.5YR5/4-7.5YR4/2	7.5YR7/4-7.5YR4/0	CM	S/B	1.0 cm	2.8 cm
511-148	7.5YR3/0-7.5YR2/0	7.5YR5/2-7.5YR3/0	7.5YR5/4-7.5YR3/0	CM	S	.7 cm	2.3 cm
481-213	10YR8/4-10YR6/4	10YR7/4-10YR6/4	10YR6/4-10YR5/1	CM	S/B	.7 cm	
Unusual Rims							
483-275/276	7.5YR4/2-7.5YR3/0	7.5YR5/4-7.5YR3/2	7.5YR6/4-7.5YR3/0	CM	S/B	.85 cm	
124-1	10YR6/3-10YR2/1	5YR6/4-5YR3/1	7.5YR6/4-7.5YR4/1	CM	S/B	.8 cm	
122-1	2.5YR6/6-2.5YR5/4 and 10YR6/4-10YR5/3	5YR7/6-5YR5/6	7.5YR7/4-2.5YR6/2	CM	S/B	.85 cm	
115-1	10YR6/3-10YR4/2	7.5YR6/6-7.5YR5/2	7.5YR7/4-5Y4/1	CM	S	1.2 cm	
86-1	5YR5/1-5YR4/2 and10R5/6-10R4/6	2.5YR6/8-2.5YR4/6 and 5YR7/8-5YR5/8	2.5Y6/2-2.5Y5/2	CM/Paint	S	.85 cm	

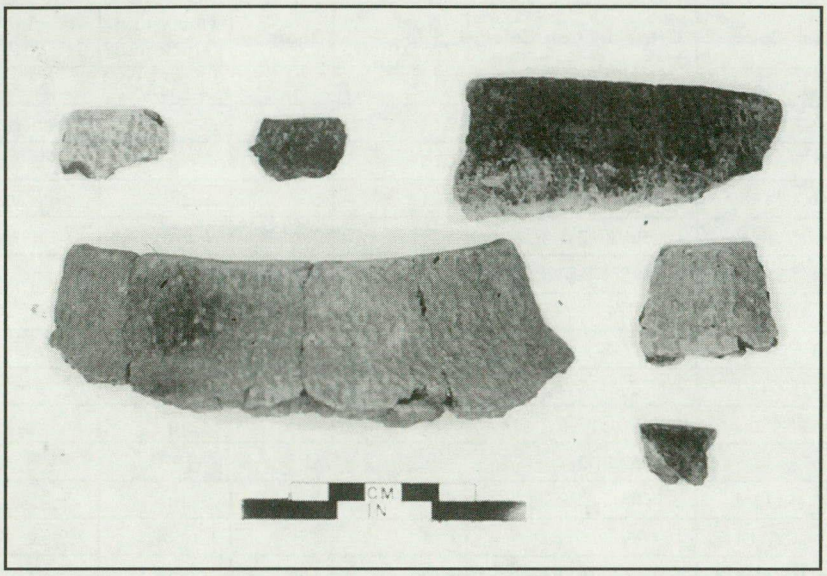


Figure 23. Rim exteriors.

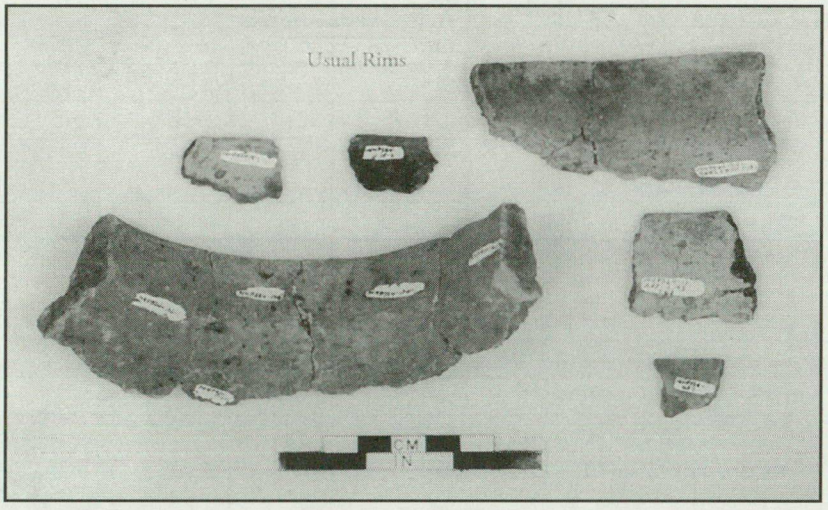


Figure 24. Rim interiors.

now appear smoothed over; it is not clear if they were smoothed intentionally or by use or erosion. Another specimen also initially had cordmarkings to the rim, but the area from just above the neck to below the lip was smoothed prior to firing. Yet another sherd shows smoothing over the cordmarks; in this case it appears that additional clay was smoothed into the joint between the shoulder and neck. As the edges of the paste were not smoothed, this may represent a repair. Another sherd appears to have been decorated with cordmarks on top of the rim.

The most common lip treatment is a simple rounding, which occurs on 47 percent of the rims. Thirteen percent of the rims show a rounded rim chamfer on the interior side. One of the rim sherds with a rounded lip exhibits a slight flattening due to the application of cordmarks on the lip. Other variations include a rounded, thickened lip; a rounded lip with a slight ridge of paste on the exterior; a flattened lip; and a flattened lip with overhangs of paste on both the exterior and interior sherd surfaces.

The interior surfaces exhibit mostly smoothing. One can be classified as burnished. Two of the remaining three sherds are smoothed with rough spots. The last sherd has some spots that might have been smoothed, but the sherd is highly eroded so a determination cannot be made.

A882

Only nine rim sherds were recovered from A882, accounting for 29 percent of the rims from the site. The average length of these sherds is 3.48 cm, and the average thickness is .66 cm. Five out of nine (55 percent) are broken at or above the throat joint; therefore, neck orientation could not be established. The four remaining rim sherds have outflaring necks. Neck heights range from 1.0 to 2.2 cm with an average of 1.77 cm. All rim sherds have quartz sand temper.

Six (67 percent) are cordmarked, and two (22 percent) are smoothed cordmarked. One sherd has a combination of surface treatments with a cordmarked shoulder portion and a smoothed neck. Its lip shows signs of possible indentations.

In terms of lip treatments, four sherds (44 percent) have rounded lips that were slightly flattened; two (22 percent) have rounded lips with chamfers angling down from the lips toward the vessel interiors, one with a slight angle and the other a bit more pronounced. One sherd (11 percent) has a rounded lip and a slight chamfer, but it is on the exterior surface and angles away from the lip. The remaining sherd has a flattened

lip with undulations; these may be cordmarks or denticulation created by either an impressing tool, such as a sharpened stick, or a fingernail. Unfortunately, the middle portion of the rim sherd is slightly eroded, and it is not clear if this is a regular pattern. In notched rims, the notches occur at closer intervals than the denticulated sherd discussed below.

In terms of interior surface treatment, five (55 percent) are smoothed, two (22 percent) are burnished, and one (11 percent) is smoothed with rough spots. The remaining sherd was too highly eroded for a determination to be made.

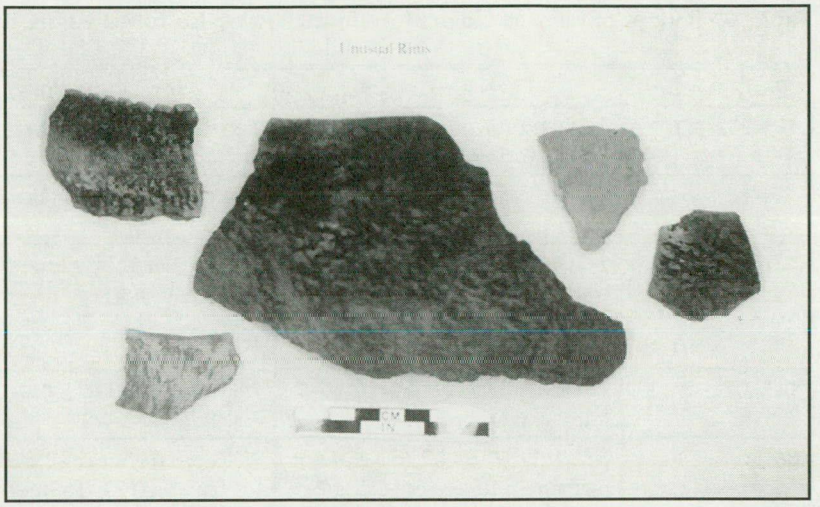


Figure 25. Unusual rim exteriors.

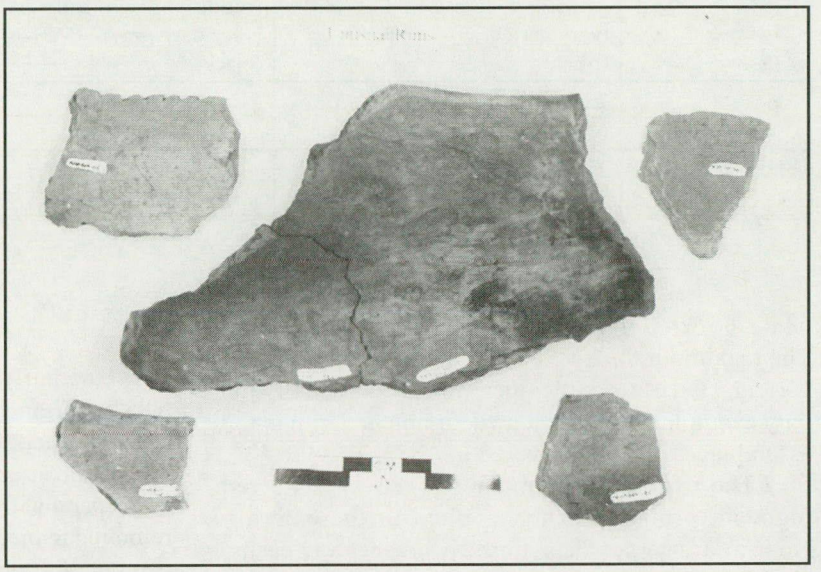


Figure 26. Unusual rim interiors.

Unusual Rims

Five rims were unusual when compared to the rest of the collection (Figures 25 and 26). Three have no neck or collar; they appear to have an opening similar to "seed" pots. The fourth specimen is the only sherd in the collection with a definite denticulated lip. The fifth is the only rim that has "fugitive" decoration. Ranges of Munsell colors for the exteriors, interiors, and cross sections are recorded in Table 6. These five rims may indicate trade items, temporal extension of the site, or specific activities.

Rims #483-275/276 and #124-1 are two cordmarked sections that likely belong to the same globular vessel—probably a bowl or seed bowl—with a restricted orifice. They were found in A882, Test Pit 10. The interior of #483-275/276 indicates that the vessel was smoothed, although some rough spots remain, especially near the top where it would have been difficult to access the interior surface due to the small diameter of the opening. It has a maximum thickness of .85 cm, and its temper is sand and bone in nearly equal proportions. Sherd #124-1 also has cordmarks extending to the lip, although smoothed over at the lip. The interior also shows smoothing with rough spots. The sherd has a maximum thickness of .8 cm, with sand/bone temper in which the sand comprises the majority.

A third rim sherd (#122-1), also from Test Pit 10 in A882, has cordmarks that extend to the lip, with smoothing on the edge of the lip. The interior of the sherd is smooth. The maximum thickness is .85 cm, and the temper is composed of a sand/bone mix, with sand comprising the majority. Due to the similarity in location, temper, surface treatment, and form, it is possible these three sherds belong to the same vessel, despite the fact that its color does not match the other two (Table 6).

Another unique sherd (#115-1) has a straight, slightly outflaring neck. The lip is incised with v-shaped cut marks at a 45-degree angle to the horizontal surface of the rim. The interior of the vessel is smooth,

Table 6. Ranges of Munsell Colors for Unusual Rims, Restored Vessel, and Other Ceramic Artifacts.

Rim Number	Exterior Colors	Interior Colors	Cross Section Colors
483-275/276	7.5YR4/2 (brown/dark brown)-7.5YR3/0 (very dark gray)	7.5YR5/4 (brown)- 7.5YR3/2 (dark brown)	7.5YR6/4 (light brown)-7.5YR3/0 (very dark brown)
124-1	10YR6/3 (pale brown)-10YR2/1 (black)	5YR6/4 (light reddish brown)-5YR3/1 (very dark gray)	7.5YR6/4 (light brown)-7.5YR4/1 (dark gray)
122-1	2.5YR6/6 (light red)-2.5YR5/4 (reddish brown) and 10YR6/4 (light yellowish brown)-10YR5/3 (brown)	5YR7/6 (reddish yellow)-5YR5/6 (yellowish red)	7.5YR7/4 (pink)- 2.5Y6/2 (light brownish gray)
115-1	10YR6/3 (pale brown)-10YR4/2 (dark grayish brown)	7.5YR6/6 (reddish yellow)-7.5YR5/2 (brown)	7.5YR7/4 (pink)-5Y4/1 (dark gray)
86-1	5Y5/1 (gray)-5Y4/2 (olive gray); pigment 10R5/6 (red)-10R4/6 (red)	2.5YR6/8 (light red)-2.5YR4/6 (red) and 5YR7/8 (reddish yellow)-5YR5/8 (yellowish red)	2.5Y6/2 (light brownish gray)-2.5Y5/2 (grayish brown)
Restored Vessel	5YR7/6 (reddish yellow)-5YR4/3 (reddish brown) and 7.5YR3/0 (very dark gray)-7.5YR2/0 (black)	5YR5/3(reddish brown)-5YR4/4 (reddish brown) and 7.5YR3/0 (very dark gray)-7.5YR2/0 (black)	7.5YR3/0 (very dark gray)-7.5YR2/0 (black) and 5YR7/6 (reddish yellow)-5YR4/1 (dark gray
Pipe	2.5Y4/0 (dark gray)-2.5Y3/0 (very dark gray)		5Y6/1 (light gray/gray)-5Y4/1 (dark gray)
Misc. Object	7.5YR5/2 (brown)-7.5YR3/2 (dark brown)		7.5YR5/4 (brown)-7.5YR4/1 (dark gray)

while the exterior has cordmarks extending to the rim. The maximum thickness at the throat of the vessel is 1.2 cm. Quartz sand temper was used. This is the only example of a denticulated, or notched, rim in the assemblage. It was recovered in A882, Test Pit 4.

The fifth unique rim sherd (#86-1) has a red pigment, probably ocher, applied to the exterior. Now in a dry, powdery form, it brushes off easily. Red coloration on the interior of the sherd has better adhesion and probably was applied as a slip prior to firing. Another surface treatment is cordmarking that extends to the lip, although smoothed over almost to the point of obliteration. The interior of the vessel was smoothed but is still somewhat rough. Maximum thickness is .85 cm, and the temper is quartz sand. This sherd was recovered from A881, X128, one of the units that contained trench F60.

The possible seed pot may be a trade item and thus imply trade routes with the Southwest. It also could indicate a higher reliance on horticulture because the inhabitants created specialty vessels for storing seeds, especially as it appears this vessel type is unique to Hallman within the Bluff Creek complex. The denticulated rim and fugitive red rim also may be indicative of trade.

Restored Vessel

One fairly complete vessel was recovered from the site (Figure 27). The pot was discovered in X113 at the northern end of trench F60. It was found in an upright position and was intact while in situ, but the rim separated from the body during recovery, so it was removed in pieces. After refitting the vessel, about 40 percent of the rim was determined to be missing. The fill from inside and dirt from under the vessel were collected as a flotation sample; analysis of this sample was never completed.

The quartz sand-tempered vessel has a globular body with a vertical neck and constricted throat. Overall dimensions are 27.5 cm in diameter and 25 cm in height. Maximum measurable thickness of the rim is approximately .9 cm. Cordmarks extend to the rim, and the lip has been slightly smoothed, but no other decoration or modifications are present. The shape and cordmarkings may indicate that this was a cooking vessel. In addition, the dark gray to black exterior coloring is mostly due to soot adhering to the vessel and patina from the soil matrix. See Table 6 for color ranges.

This vessel appears very similar in shape to pots from the Tobias site (14RC8) (Wedel 1959:236, Figure



Figure 27. Restored vessel.

39g), the Salina Burial Pit (14SA1) (Wedel 1959:plate 91a), and a Wilmore complex site (14CM407) (Bevitt 1999a:7). However, there are notable differences among these vessels. The Tobias vessel is Geneseo Simple Stamped (Wedel 1959:plate 28a) with less rounded shoulders than the Hallman site vessel. The Salina Burial Pit vessel has a straight neck and globular body but has less rounded shoulders and very different decorations. The Wilmore vessel is perhaps the closest in shape, but it has a braced rim and finger-pinched lip decoration. As these are minor differences compared to the overall shape of the pots, the Hallman site vessel should not be considered unique.

Other Ceramic Artifacts

Pipe

One pipe was recovered 30-45 cm below ground surface in A883 (Figure 28). This crudely made specimen has an elbow shape with an extension beyond the bowl, part of which is missing. The bowl has a diameter of 1.0-1.1 cm at the rim. The temper is fine quartz sand, which may or may not have been added intentionally. The exterior is smooth and has no decoration. See Table 6 for color ranges.

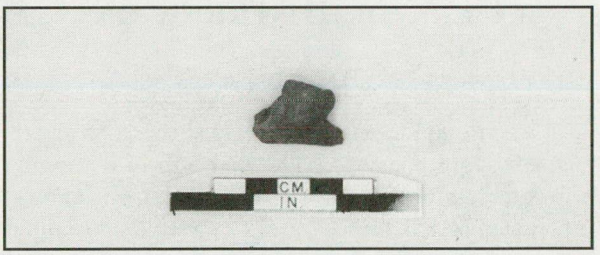


Figure 28. Side view of pipe fragment.

This object is comparable in appearance to an elbow pipe from the Tobias site (Wedel 1959:287, plate 45d). However, the Tobias pipe is made of catlinite and has an engraved groove circling the stem just in front of the bowl, while the Hallman site pipe is made of clay and has no discernable decoration. The presence or absence of decoration may be due to the intended usage of the pipe; that is, a ceremonial pipe may be more highly decorated than a utilitarian one. Possibly this pipe was so crudely made that it did not survive long enough to be decorated. Other ceramic elbow pipes have been recovered from the Washita, Paoli, and Smoky Hill sites.

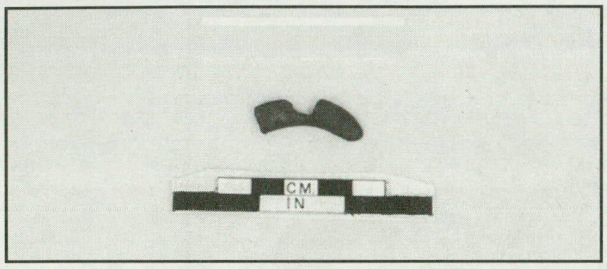


Figure 29. Baked clay object.

Baked Clay Object

From F152 at a depth below surface of 20-45 cm, an object of smoothed fired clay curved into an arc shape was recovered (Figure 29). It has a roughly oval cross section with a maximum diameter of .9 cm along the X-axis and .8 cm along the Y-axis. The blunt tip at one end has a diameter of 5 mm along the X-axis and 4.5 mm along the Y-axis. The object has fine quartz sand temper, which may or may not be intentionally added. See Table 6 for color ranges. Possible identifications for this object include a pipe fragment, pendant, or figurine/effigy. At present no comparable objects have been identified.

Analysis of Ceramic Distribution

Refits

An attempt to refit the pottery sherds was undertaken for three reasons. The first was to determine how much bioturbation (disturbance from natural processes) had disrupted the site. Krotovinas (animal burrows) were noted in almost every excavation square, and the site was deflated by erosion. Thus, an important question is how much the artifacts were affected by these taphonomic processes. If extensive mixing has occurred, the site might yield only a limited amount of data on numbers of occupations and variations in spatial utilization. The second reason for the refit attempt was to determine if there was any cluster patterning that might help to identify activity areas. The third reason was to estimate the minimum number of pots and obtain volume estimates for the vessels.

A total of 255 sherds were refitted. The refits demonstrated that the artifacts had not been significantly disturbed. The vast majority of the refits (90 percent) occurred among sherds from the same excavation unit, while 73 percent came from the same excavation level and 89 percent were from the same feature. Table 7 presents the information used in these calculations. Each area showed similar findings (Figure 30).

To determine how much vertical migration resulted from various disturbances, a single level was chosen and the percentages compared. Level 2 (15-30 cm) was chosen because this level was excavated throughout the site and was below the plow zone, which had significant artifact churning. In A881 the Level 2 refits account for 26 out of 100 (26 percent) of the refitted sherds. In A882, 18 of 62 (29 percent) of the refits occurred in this level. A883 had a few units that were dug in different increments: 15-23 cm and 23-30 cm. Because these fall within the 15-30-cm range that defined Level 2, they were averaged with units dug with a 15-30 cm level. Thirty-one sherds out of 93 (33 percent) were refitted.

Refits occurred at the frequency of 68 percent within the same excavation unit and level (Figure 31). Some refits occurred with adjacent units or levels (5 percent) or between diagonal units and levels (4 percent), but there were relatively few, 5 percent, between adjacent features. No refits occurred between levels or units that were not somehow next to each other. Thus, the refits demonstrate that while there had been mixing of the soil matrix, the pottery sherds did not migrate much overall.

In terms of indicating activity foci, the sherd refits only confirm previous conclusions—they concentrated in and around the features, as shown by the sherd counts and distribution maps (Figures 32-39). The refits themselves did not allow any additional conclusions to be drawn. As anticipated, the refits all occurred either within the top 23 cm or plow zone or within features. The only exception might be the test pits. If the alluvial terrace were used as a dump, this also would be expected.

The minimum number of vessels cannot be determined, nor can vessel volumes be estimated due to the nature of the sherds. Almost all of the refits are between body sherds that could not be recognized as any particular portion of the vessels they represent; therefore, volume cannot be determined, as that requires knowledge of the vessel's size and shape.

Sherd Distribution

Examining the distribution of sherds across the site could potentially reveal specialized activity areas such as cooking, storage, or trash disposal. Only A881 and A883 were excavated as blocks, thus exposing large horizontal expanses; therefore, only these two areas are examined. Problems affecting the study of sherd distributions include the inconsistent recording of feature and balk wall excavation depths. In addition,

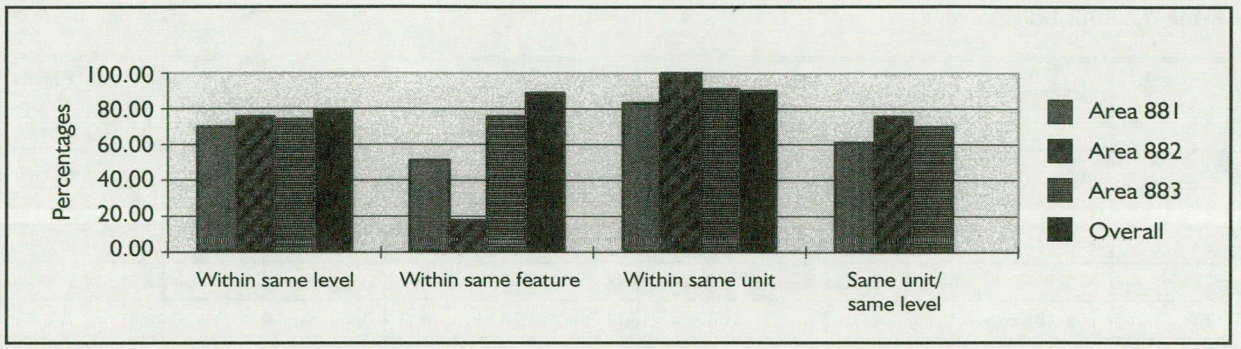


Figure 30. Refit percentages.

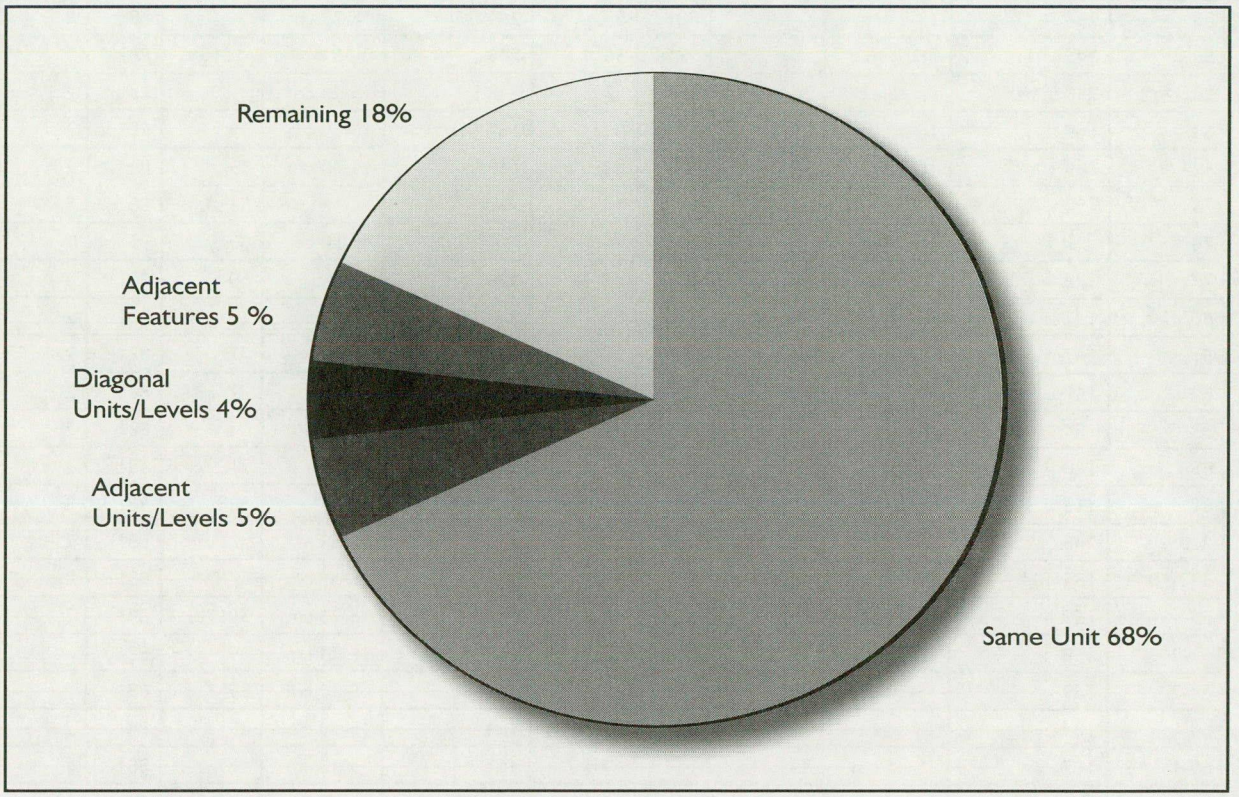


Figure 31. Location of refits in Level 2.

dig locations were selected on the basis of core samples that indicated concentrations of cultural debris, thereby potentially biasing the sample.

Features were excavated as single entities, with half of the fill collected for flotation and the other half screened. Depths were to be recorded as beginning and ending elevations, but the measurements were not always recorded on provenience sheets. Balk walls also were excavated as single entities and to the same levels as the surrounding units; however, depths were not recorded in a majority of cases, so that data is not used here. One example of this is F53, a storage pit, which had a sherd count of 14 and weight of 119.3 g. This is a sherd "hot spot" as no sherds were found in the surrounding excavation unit below 23 cm. The "hot spot" itself cannot be included on the map because there is no way to determine depth density, which is the purpose of this diagram. In an effort to be systematic,

Table 7. Refit Locations.

Provenience Code	Excavation Unit	Level	Feature	Area	Provenience Code	Excavation Unit	Level	Feature	Area	Pieces Refitted
2	113	0-23 cm		881	2	113	0-23 cm		881	2
3	114	0-23 cm		881	3	114	0-23 cm		881	4
22	170	0-15 cm		881	23	170-169 balk			881	2
22	170	0-15 cm		881	38-1	172-187 balk	0-23 cm		881	2
30	166-181 balk			881	31	182	0-15 cm		881	2
34	185	0-15 cm		881	34	185	0-15 cm		881	2
38	172-187 balk	0-23 cm		881	38	172-187 balk	0-23 cm		881	2
42	186-201 balk	15-23 cm		881	42	186-201 balk	15-23 cm		881	2
46	201-216 balk	0-23 cm		881	46	201-216 balk	0-23 cm		881	2
55	244	15-23 cm		881	55	244	15-23 cm		881	8
56	245	0-15 cm		881	56	245	0-15 cm		881	5
57	245 S. half	15-23 cm		881	57	245 S. half	15-23 cm		881	2
62	169	15-30 cm	39	881	62	169	15-30 cm	39	881	2
62	169	15-30 cm	39	881	62	169	15-30 cm	39	881	2
73	232		53	881	73	232		53	881	2
76		40-50 cm		881	76		40-50 cm	60	881	2
77	128	40-	60	881	77	128	40-	60	881	2
80	147	15-20 cm	60	881	80	147	15-20 cm	77	881	2
81	147		77	881	81	147		77	881	2
82	147	40-	77	881	82	147	40-	77	881	2
83	184		77	881	370-93	185-184	15-subsoil		881	2
85	128		145	881	85	128		712	881	2
87	113		712	881	87	113		888	881	8
270	245 S. half	0-15 cm	888	881	56	245	0-15 cm		881	2
370-90	185-184	15-subsoil		881	35	185	15-30 cm		881	2
59-1	168	15-23 cm	39	881	59-1	168	15-23 cm	39	881	2
59-2	168	15-23 cm	39	881	59-2	168	15-23 cm	39	881	
62-2	169	15-30 cm	39	881	62-2	169	15-30 cm	39	881	2
63-1	184	15-30 cm	39	881	63-1	184	15-30 cm	39	881	2
69-1	167	15-45 cm	43	881	69-1	167	15-45 cm	43	881	2
69-2	167	15-45 cm	43	881	69-2	167	15-45 cm	43	881	2
69-3	167	15-45 cm	43	881	69-3	167	15-45 cm	43	881	2
76 (B2)		40-50 cm	60 fill	881	76 (B2)		40-50 cm	60 fill	881	3
76 (B)		40-50 cm	60 fill	881	76 (B2)		40-50 cm	60 fill	881	2
77-1	128	40-	60 fill	881	86 (B2)	128		714 fill	881	2
86-2	128		714	881	86-2	128		714	881	2
2 (B2)	113	0-23 cm		881	2 (B2)	113	0-23 cm		881	2
227 (B2)	202	0-15 cm		881	227 (B2)	202	0-15 cm		881	3
28 (B2)	180	0-15 cm		881	28 (B2)	180	0-15 cm		881	2
7 (B2)	142	0-15 cm		881	7 (B2)	142	0-15 cm		881	3

Provenience Code	Excavation Unit	Level	Feature	Area	Provenience Code	Excavation Unit	Level	Feature	Area	Pieces Refitted
86 (B2)	128		714	881	86 (B2)	128		714	881	2
100	Surface			882	100	Surface			882	2
108	Test Pit 4	15-30 cm		882	108	Test Pit 4	15-30 cm		882	7
108	Test Pit 4	15-30 cm		882	108	Test Pit 4	15-30 cm		882	3
108	Test Pit 4	15-30 cm		882	108	Test Pit 4	15-30 cm		882	5
110	Test Pit 4	45-60 cm		882	110	Test Pit 4	45-60 cm		882	2
110	Test Pit 4	45-60 cm		882	111	Test Pit 4	60-75 cm		882	2
110	Test Pit 4	45-60 cm		882	111	Test Pit 4	60-75 cm		882	2
111	Test Pit 4	60-75 cm		882	111	Test Pit 4	60-75 cm		882	2
113	Test Pit 4		588 fill	882	117	Test Pit 4	back dirt pile		882	2
113	Test Pit 4		588 fill	882	117	Test Pit 4	back dirt pile		882	2
116	Test Pit 4	75-90 cm	588 fill	882	116	Test Pit 4	75-90 cm	588 fill	882	2
121	Test Pit 10	15-30 cm		882	121	Test Pit 10	15-30 cm		882	2
124	Test Pit 10	90-105 cm		882	124	Test Pit 10	90-105 cm		882	2
100-1	Surface			882	100-1	Surface			882	8
100-2	Surface			882	100-2	Surface			882	3
109-1	Test Pit 4	30-45 cm		882	109-1	Test Pit 4	30-45 cm		882	2
112-1	Test Pit 4	75-90 cm		882	112-1	Test Pit 4	75-90 cm		882	2
113-1	Test Pit 4		588 fill	882	256	Test Pit 4		588 fill	882	
113-2	Test Pit 4		588 fill	882	113-2	Test Pit 4		588 fill	882	7
114 S.ext.	Test Pit 4		588 fill	882	114	Test Pit 4 S. ext.		588 fill	882	2
122-2	Test Pit 10	30-45 cm		882	122-2	Test Pit 10	30-45 cm		882	2
152-1	570	15-30 cm	151 fill	882	529/523-134/204	570	30-45 cm	151-168	882	2
483-276	Test Pit 10		595	882	483-275	Test Pit 10		595	882	2
132	571	0-15 cm		883	132	571	0-15 cm		883	2
138	626	0-15 cm		883	138	626	0-15 cm		883	2
143	659	0-15 cm		883	143	659	0-15 cm		883	5
151	569	15-30 cm	151	883	151	569	15-30 cm	151	883	2
151	569	15-30 cm	151	883	156-1	569	30-45 cm	151	883	2
160	584-585 balk		151	883	160	584-585 balk		151	883	3
161	569-570 balk	20-45 cm	152	883	161	569-570 balk	20-45 cm	152	883	4
161	569-570 balk	20-45 cm	152	883	161	569-570 balk	20-45 cm	152	883	2
163	628-629 balk	30-45 cm	192 fill	883	165	629	30-45 cm	192 fill	883	2
170	658	10-15 cm	197	883	170	658	10-15 cm	197	883	2
150-1	554	15-30 cm	151	883	150-1	554	15-30 cm	151	883	5
152-1	570	15-30 cm	151	883	152-1	570	15-30 cm	151	883	2
154-1	585	15-30 cm	151	883	154-1	585	15-30 cm	151	883	2
154-2	585	15-30 cm	151	883	154-2	585	15-30 cm	151	883	2
156-1	569	30-45 cm	151	883	156-1	569	30-45 cm	151	883	2
167-2	630	in/over SW corner	192	883	167-2	630	in/over SW corner	192	883	2

Table 7. (Continued)

Provenience Code	Excavation Unit	Level	Feature	Feature	Provenience Code	Excavation Unit	Level	Feature	Area	Pieces Refitted
170-1	658	10-15 cm	197	883	170-1	658	10-15 cm	197	883	7
171 (B2)	644		197	883	171 (B)	644		197 fill	883	2
523-131	570		168	883	529/523-134/204	570	30-45 cm	151-168	883	2
529-198	570	30-45 cm	151	883	529-199/200	570	30-45 cm	151	883	2
529-199	570		183	883	529-200	570	30-45 cm	151	883	2
533-220	628	23-30 cm	192 fill	883	533-217/219	628	23-30 cm	192	883	2
534-223	570		183	883	160	584-585 balk		151 fill	883	2
534-224	570		183	883	160	584-585 balk		151 fill	883	2
330 (B2)	113/723		60 fill	883	330 (B2)	113/723		60 fill	883	2
126-1(B2)	554	30-45 cm		883	126-1 (B2)	554	30-45 cm		883	2
161-2(B2)	569-570 balk	20-45 cm	152	883	161-2 (B2)	569-570 balk	20-45 cm	152	883	3
163	628-629 balk	30-45 cm	192 fill	883	163	628-626 balk	30-45 cm	192 fill	883	3
175-1		15-23 cm	706/197	883	175-1		15-23 cm	706/197	883	2
176-1	128		711/714	883	176-1	128		711/714	883	5
340-1	585	0-15 cm		883	340-1	585	0-15 cm		883	2
523-129	570		168	883	523-130	570		168	883	2
527-186	570	15-30 cm	151	883	527-185	570	15-30 cm	151	883	2
186/185	570	15-30 cm	151	883	527-184	570	15-30 cm	151	883	2
529-134	570	30-45 cm	151	883	523-204	570		168	883	2
533-217	628	23-30 cm	192	883	533-218	628	23-30 cm	192	883	2
217/218	628	23-30 cm	192	883	533-219	628	23-30 cm	192	883	2

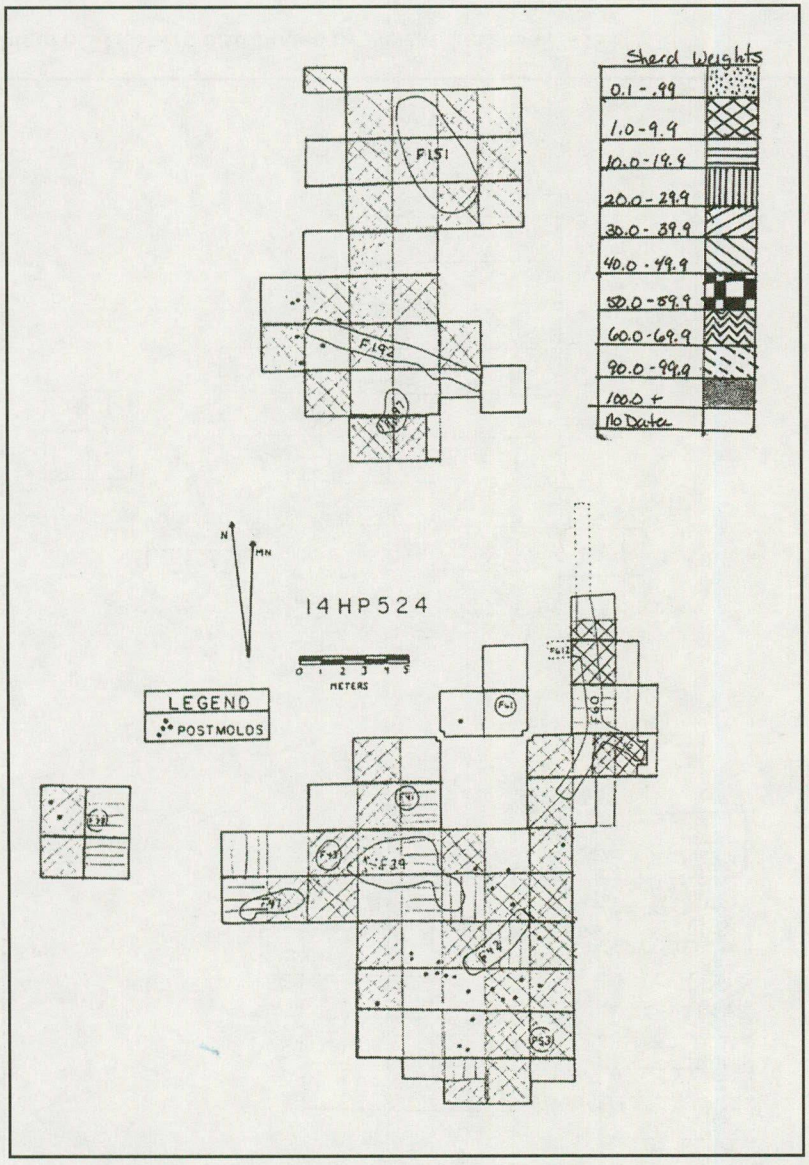


Figure 32. Sherd distribution by weight, Level 1 (0-15 cm).

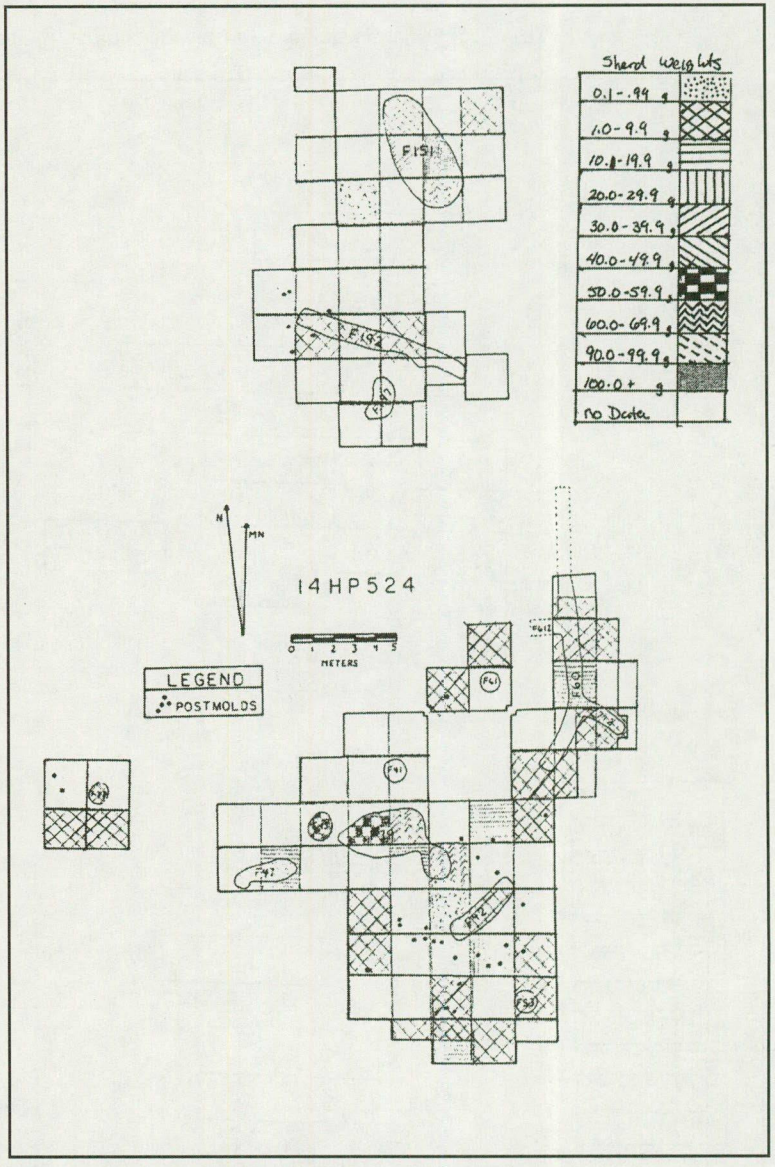


Figure 33. Sherd distribution by weight, Level 2 (15-23 cm).

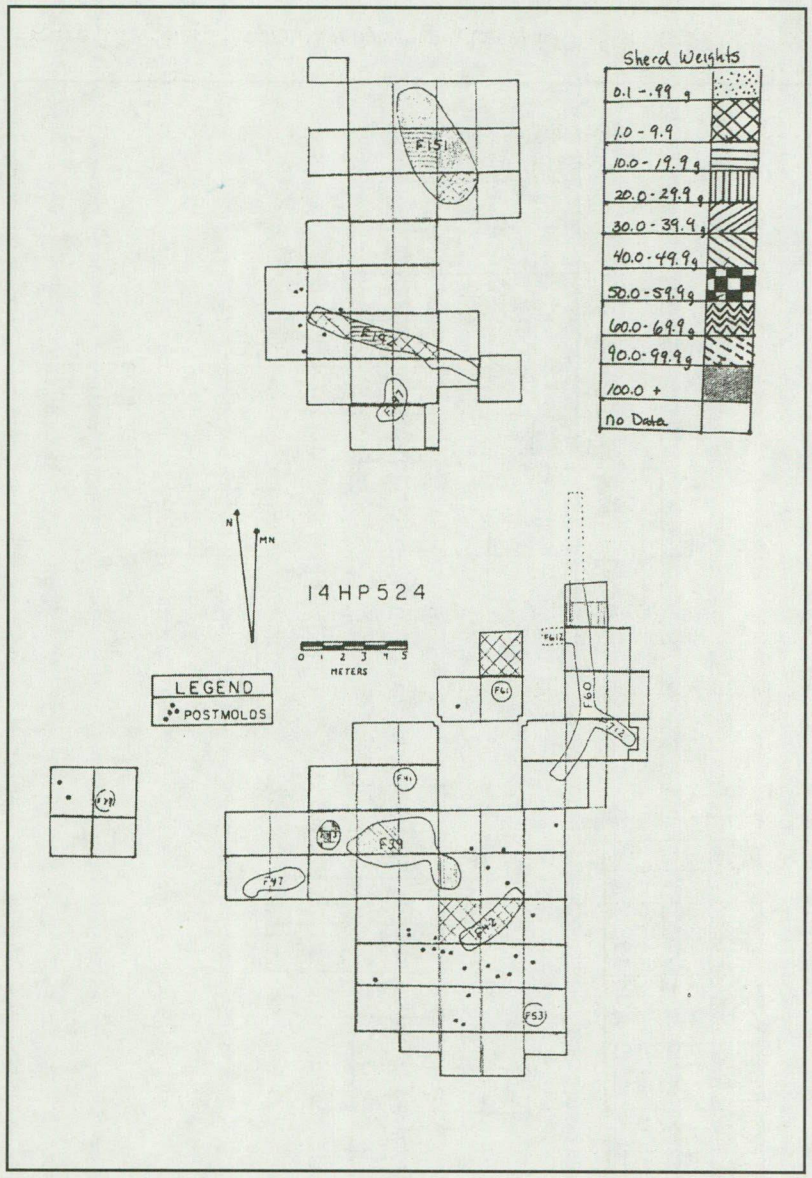


Figure 34. Sherd distribution by weight, Level 3 (23-35 cm).

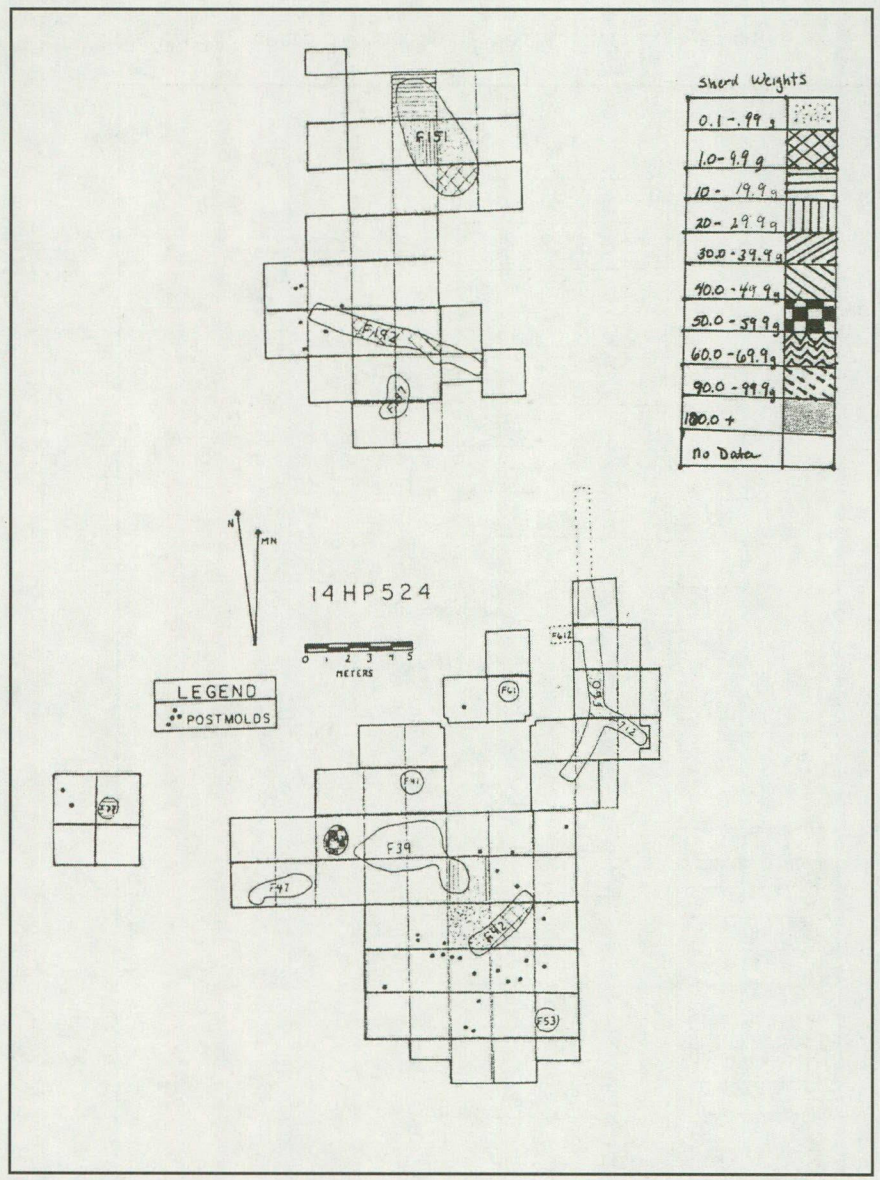


Figure 35. Sherd distribution by weight, Level 4 (35+ cm).

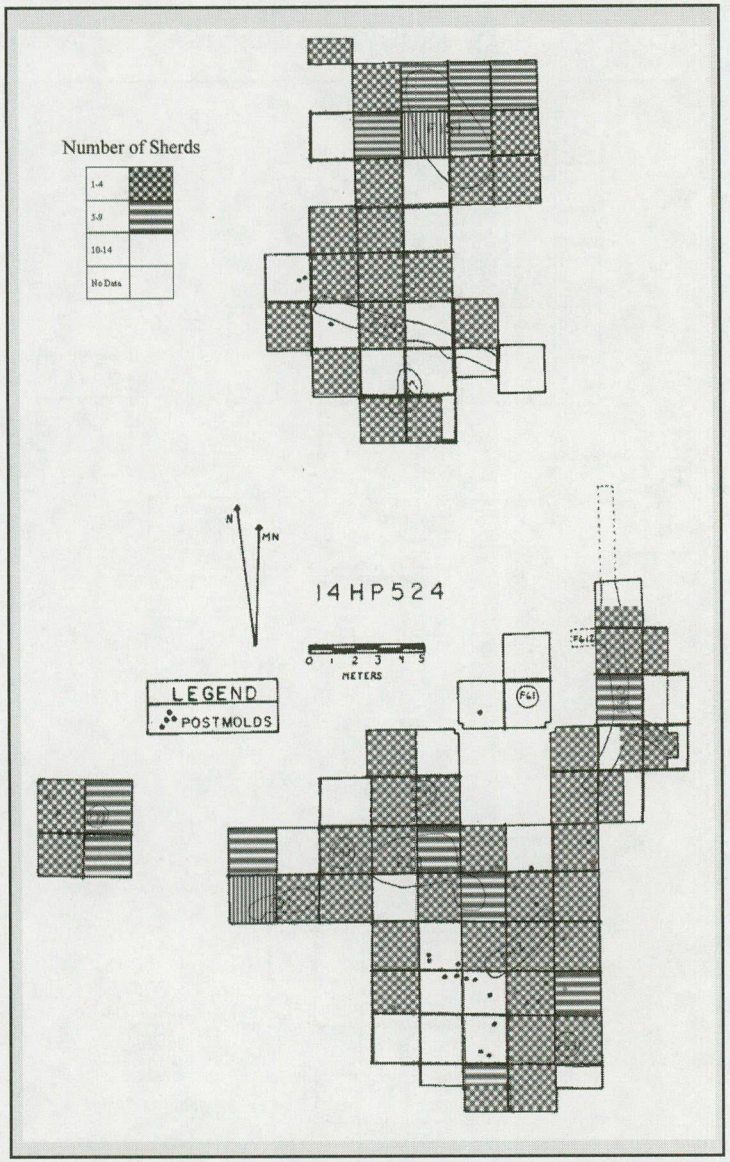


Figure 36. Sherd distribution by number, Level 1 (0-15 cm).

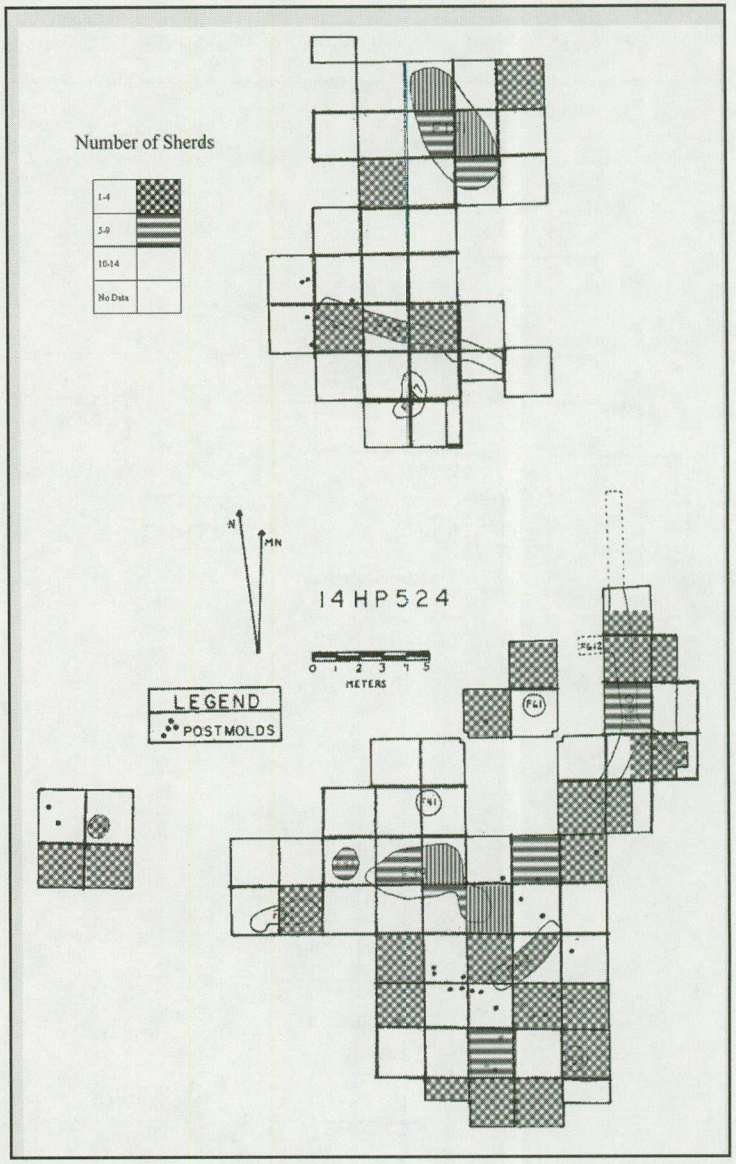


Figure 37. Sherd distribution by number, Level 2 (15-23 cm).

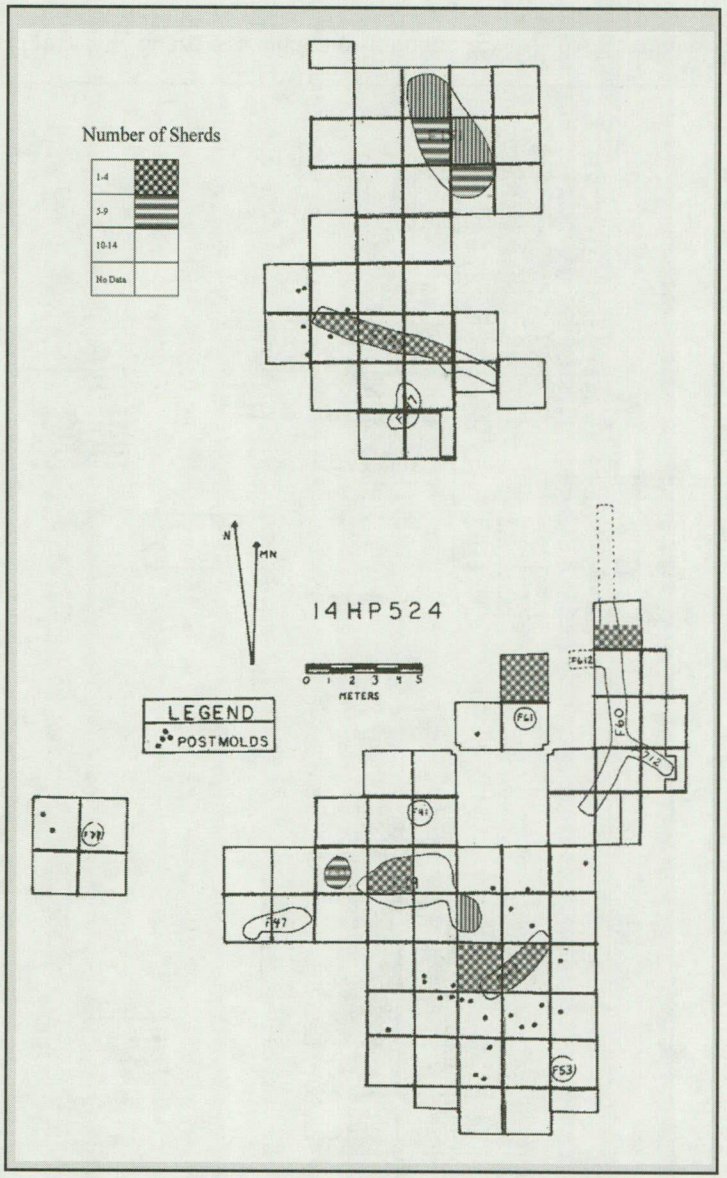


Figure 38. Sherd distribution by number, Level 3 (23-35 cm).

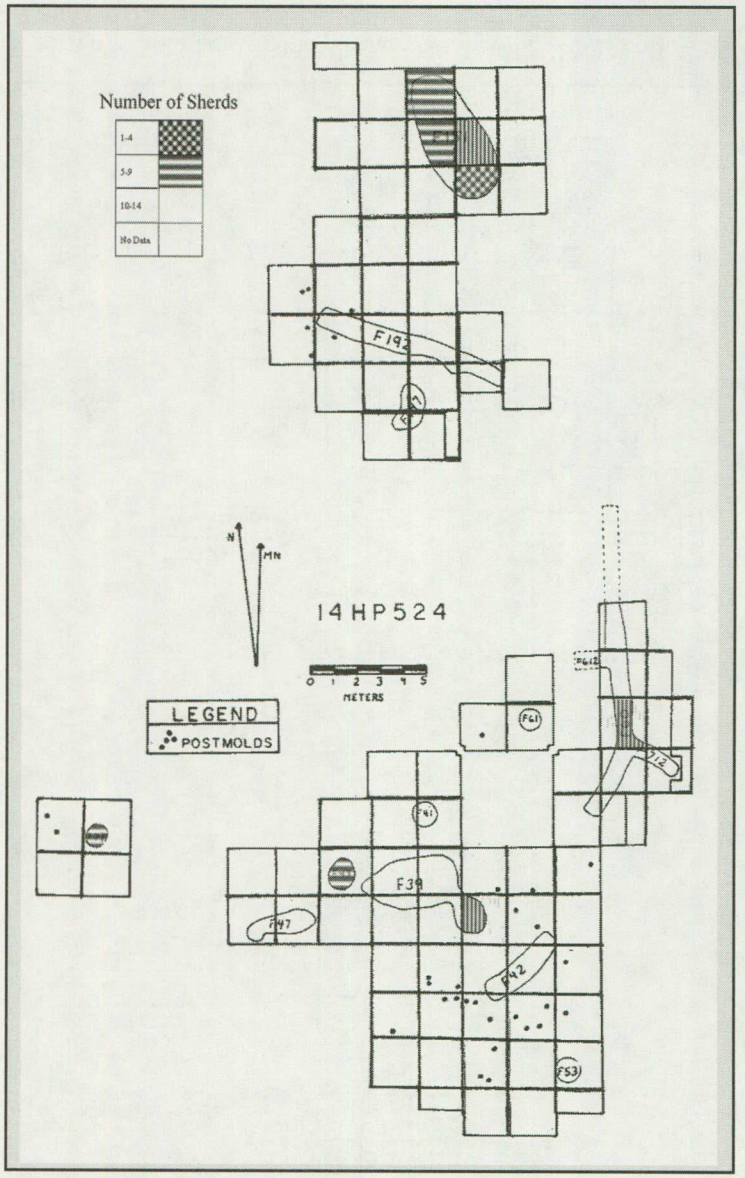


Figure 39. Sherd distribution by number, Level 4 (35+ cm).

only those sherd counts and weights with excavation depth data were recorded on the distribution maps.

Because A822 was investigated using non-randomly placed test pits, this alluvial terrace was not examined for spatial patterns. While this analytical method identifies vertical sections of cultural material, it is not amenable for distribution studies. Marie Huhnke (personal communication, 1999) believed that A882 was used for the single purpose of dumping trash. Aerial photos of the site (Figure 4) show an undulating terrace edge, possibly created by a combination of trash dumping onto the terrace and ongoing erosion of the ridge top. Huhnke pointed to the lack of defined features as supportive of her trash-dump hypothesis. She cited F588, a complex mixture of ash, charcoal, flakes, pottery, bone fragments, charred corn fragments, and burned rock, as an example. This feature, from which a radiocarbon sample was forthcoming, measured 114 cm east-west and 123 cm north-south, had an amorphously circular shape, and was situated on top of a thin line of trash. Thies (1989a:184) identified this feature as a trash deposit. While possible, the very nature of test pits—which could easily have missed features—hinders such a broad categorization. Without the ability to compare sherd distributions along a horizontal axis, there is no way to judge if the trash middens were localized occurrences or if the entire area was used as a trash dump.

To determine localization of sherds within the site, sherds in each level and unit were weighed and counted. It was thought those areas with the highest sherd weights or counts might indicate features, such as storage pits, or identify possible ceramic usage areas. Refitted sherds were counted as single sherds to eliminate skewing by reducing discrepancies between vessels that are more friable and therefore have more refits. Included in the sherd weights are sherds so small as to lack many measurable attributes and distinctive characteristics. Because a number of extremely small sherds were recovered during flotation, these sherds were weighed but not counted.

The distribution of sherd counts and weights are presented in Figures 32-39 according to four different levels below ground surface (bgs): Level 1 = 0-15 cm bgs, Level 2 = 15-23 cm bgs, Level 3 = 23-35 cm bgs, and Level 4 = 35 cm bgs and deeper. The sherd numbers were broken down into ranges of 1-4, 5-9, and 10-14. Weights were broken down into 10-g increments. The distribution maps were created so that patterns within the squares represent the number or weight range of sherds per excavation unit. No data is presented for those units that have no pattern.

Based on the distribution maps, the top 15 cm of the site had an almost uniform distribution of sherds, with the most common count between 1 and 4 sherds per 2 m^2. A dozen squares had 5-9 sherds, with the majority of those squares having weights within the 10-19.9-g range. In subsequent levels these squares contained most of the sherd concentrations. There were a few instances of concentrations as high as 10-14 sherds, but sherd counts did not exceed 14 per excavation unit. One concentration of 1-4 sherds, weighing between 40 and 49.9 g, was located within F197, a trash midden. Another unit had a concentration of 10-14 sherds, with a total sherd weight between 30 and 39.9 g. Neither of these units had sherds below the 15-cm level, although they both contained at least part of a trash midden.

Within the 15-23-cm level the number of units containing sherds was greatly reduced. A881 had the greater number of units with sherds; in most of these units, sherd concentrations were limited to features. F151, a trash-filled borrow pit, had sherd counts between 5 and 14, while weights ranged between 30.0 and 99.9 g. The feature lay within six excavation units, and each square lacked sherds outside of the feature. F39, also a trash-filled borrow pit, exhibited a similar pattern. While this feature had similar sherd counts, the weights were lower, ranging from 30.0 to 69.9 g.

In Level 3 the number of units with sherds continued to fall. With the exception of three units, sherds were limited to features: F151, F192, F43, F39, and F42. F51 had the highest concentration of sherds, which ranged in counts between 5 and 14 and in weights from 30.0 g to more than 100 g. F43, a trash midden, had the second highest weight range at 50-59.9 g with no sherds in the surrounding excavation unit. F192 and F42 were both trench features, and each contained 1-4 sherds throughout their lengths. F60, another trench, had a localized sherd concentration of 1-4 sherds that weighed between 20 and 29.9 g. The two excavation units that had sherds but no features contained between 1 and 4 sherds; these sherds weighed between 1.0 and 9.9 g.

Level 4 showed the same trends as Level 3. The three excavation units that yielded sherds also contained features, specifically F151, F39, and F42. Two of these excavation units had high sherd weights (10.0 to 19.9 g in one and 20.0 to 29.9 g in the other), with sherd counts between 5 and 9 and 10 and 14, respectively. According to the map, the sherds were spread across the entire excavation unit. This could demonstrate either a spreading out of the debris from the features or the failure of excavators to indicate that sherds were actually from the features. In all

likelihood the trash-filled borrow pits, F151 and F39, did not have good definition and thus appeared to the excavators to extend throughout the unit. F151 had the highest concentrations of sherds, ranging in number from 1 to 14 and in weight from 1.0 g to more than 100 g. Both F192 and F42, two of the trenches, continued to have sherd counts of between 1 and 4 and corresponding weights between 1.0 and 9.9 g. Feature 43 had the same sherd count and weight as the previous level. F77, a storage pit, had sherds, although none were present in the previous level. F60 had a localized concentration of 10 to 14 sherds that weighed between 90 and 99.0 g.

The distribution maps clearly show a correlation between high sherd counts, high sherd weights, and features. Because the features were not excavated in levels, but rather had the fill removed as a unit, depth was not always recorded. Consequently, the author could not be sure which level to put the data into. The relatively few features that did have excavation depths recorded are included in the maps.

The relative scarcity of sherds below 23 cm bgs may be due to deflation of the ridge top. In addition, the relatively recent agricultural practice of plowing the field in which the site lies may have pulled artifacts toward the surface and concentrated them within the upper 23 cm (Waters 1992:292). Sherd hot spots denote features with trash disposal as their final use. Other pottery-related activity areas were not identified.

Although pottery distribution and house plans can indicate how a site was used, they tell very little about the people who lived there. Still unclear are answers to a number of questions: Did the Hallman site folk have neighbors? What connection did the people have with any surrounding groups? Were the people newcomers, or had the group been in the area for a while? Where did they live before and after?

Comparison of 14HP524 to Other Bluff Creek Sites

A basic question needs to be answered: Are all the sites along Bluff Creek part of the same culture group and time period, or do they represent different culture groups and/or time periods? Corollary questions include: Are these sites actually part of another already identified culture group? If not, how do the Bluff Creek sites differ from the surrounding sites and complexes? This section of the article addresses these questions and presents some conclusions, thereby adding to the understanding of general traits in the region and similarities and differences between the Central Plains and Southern Plains traditions during this time.

In addition to the Hallman site, three other Bluff Creek complex sites have been systematically studied: the Anthony site (14HP1), also occasionally referred to as the Mandeville site; the Armstrong site (14HP5); and the Buresh/Nulik site (14SR303/14SR305). A number of other sites in the Bluff Creek drainage (see Gould 1975) have yet to be systematically investigated. To determine if the studied sites are from the same time period and culture group, descriptions of pottery, features, house floor plans, ascribed dates, and other significant cultural elements, such as "artistic demonstrations," will be compared. It is assumed that these sites are all related because they line the Bluff Creek drainage. The sites tend to be located on the terrace above the creek, and surface collections include pottery, bone, and lithic debris.

Anthony Site (14HP1)

Gould (1975:17-18) described this site as "located on the erosional remnant of a hill about 50 meters in diameter ... in the fork of a tributary of Bluff Creek and a wet weather creek. ... Evidence of fire pits can be seen on the surface when conditions are right. A stream channel has cut deeply into the northeast side of the site exposing one to two meters of cultural deposit." A variety of cultural material was recovered.

James V. Chism and Marvin R. Munsell excavated the site, located 4.5 miles northwest of Anthony, Kansas, in 1959. They referred to the site as the Dow Mandeville site after the landowner at the time of excavation. Their work recovered animal bones from bison, deer, tortoise, birds, fish, and dog, as well as freshwater mussel shells, charred corn, and charred seeds. The authors believed that the inhabitants practiced a hunting/gathering subsistence with at least the beginnings of agriculture, as indicated by the presence of corn, grinding stones in the form of manos and metates, and scapula hoe fragments (Munsell 1960:10-11). "A temporary campsite is indicated since no postmolds, fire hearths, floors or other indications of a permanent settlement were found" (Munsell 1960:12). Campfire evidence was found in the form of an ash lens and fire-cracked rocks (Munsell 1960:20). Additional cultural material included scrapers, abraders, drills, notched and unnotched projectile points, bone awls, and a shaft wrench.

The single largest category of identifiable cultural material at this site was pottery. The authors designated three types of pottery (see Seriation): Dow Utility (cordmarked with quartz sand and gravel temper with occasional inclusions of limestone and shell), Patrician (cordmarked with quartz sand temper or a mixed quartz sand, bone, and shell temper) and

Dow Shell Tempered (cordmarked and smoothed with shell temper). One exotic sherd was also found.

The Anthony site is similar to the Hallman site: both are located in the Bluff Creek drainage and yielded horticultural implements and cordmarked, bone-tempered ceramic sherds. On the other hand, 14HP524 did not have shell-tempered ceramics, and 14HP1 did. The sites are also close in comparative ages.

Armstrong Site (14HP5)

Gould's (1975:20-21) description indicated that this site is "located on the crest and west flank of a north-south ridge. ... The primary concentration of cultural materials occurs on and near the ridge crest. When conditions are right a large number of features, in the form of pit outlines, can be seen on the surface. The surface debris is extremely abundant. The site is ...150 meters north-south and 100 meters east-west."

This site was excavated as a salvage operation by KSHS archeologists in 1966 after storage pits were exposed during a county road-widening project. Permission to excavate outside the construction corridor was denied by the landowner.

As part of his 1975 master's thesis, Gould analyzed the recovered material, including pottery, projectile points, scrapers, stone knives, bone awls, bone hoes, bone knives, bone spatulas, shaft straighteners, a flesher or digging tool, a punch, polishing tools, a rawhide softener, and pipes. The ceramic assemblage contained mostly cordmarked pottery with temper of either quartz sand or a quartz sand and gypsum mixture. Occasionally the sand and gypsum were mixed with crushed limestone. In addition to the globular vessels, a ceramic pipe was also found (see Seriation).

The Armstrong and Hallman sites are similar in that they are located along the Bluff Creek drainage, have implements and storage pits suggesting a horticultural economy, and are of comparative ages. Pottery from both sites is cordmarked with quartz sand as the primary tempering agent. The sites differ in that 14HP5 pottery has gypsum and/or limestone as tempering agents, while 14HP524 ceramics did not have gypsum, although limestone appears as an accidental additive.

Buresh (14SR303)/Nulik (14SR305) Sites

Gould (1975:39-40) described the Buresh site as "located on a large north-south ridge that forms part of the first terrace south of the creek. ... on the ridge crest and on the east flank. Part of the site is grassland and part is cultivated. It was all formerly grassland. There are some low house mounds visible in the pasture of the site. ... The site appears to cover from 20 to 30 acres." Materials collected or observed included "stone chips and flakes, potsherds, two restorable vessels, hammerstones, stone tools, stone tool fragments, burned daub, one pipe and grinding stone fragments. ...This site has been surface collected for many years."

Gould's (1975:40-41) initial description of the Nulik site states that it is "located on a large north-south ridge that forms part of the first terrace south of Bluff Creek. This is the same ridge on which 14SR303 is located. This site is on the ridge crest and the west flank of the ridge. This land is now cultivated but it was formerly grassland." A house mound was visible and a surface scatter of cultural debris covered 3-4 acres. Even though the site was surface collected for many years, materials recovered included stone chips and flakes, potsherds, animal bone fragments, shell fragments, stone tools, stone tool fragments, and bone tools.

Although Gould assigned separate site numbers to these two areas, they are now treated as one. Excavations, led by Tom Witty in 1969, demonstrated that the village site spanned two owners' properties. Both portions contained house mounds, a unique characteristic of the site. The first house excavated at the Buresh site was represented by a circular posthole pattern, measuring 6.10 m across. Fired clay with grass and pole impressions indicated that the house was probably constructed using a wattle-and-daub method. Few artifacts were recovered from within the house, although three cylindrical pits with flat floors were present (Witty 1969:2). Another house had an oval floor plan, measuring 3.05 by 4.27 m, with an extended entryway in the middle of the north side of the structure. A small hearth was uncovered in the corner of the entry. Most of the artifacts came from extra-mural storage pits, intersecting with large basin-shaped borrow pits. The Buresh component was radiocarbon dated to A.D. 1050 (Witty 1978:63). O'Brien (1984:63) listed the uncalibrated dates as A.D. 900 ± 110 (GaK-2797) for House 1 and A.D. 1080 ± 90 (GaK-2796) for House 2.

Extensive cultivation had damaged the Nulik site, but two restorable vessels, chipped stone tools, and worked bone artifacts, including bone arrow shaft wrenches, were recovered (Witty 1969:2). Four structures were found: two square, one oval, and one rectangular. Only one had a small hearth in the corner of its entryway, but storage pits were found

both inside and outside the structures. Soil used to cover the structures was taken from borrow pits—later used as refuse pits—close to the structures. These pits contained quantities of broken and butchered animal bones, lithic debitage, and burned corncobs (Witty 1978:62). O'Brien (1984:63) reported an uncalibrated date of A.D. 1190 ± 110 (GaK-2798) for House 1 at the Nulik site.

Buresh/Nulik site ceramics included globular vessels with constricted mouths and unthickened rims, attached vertically or slightly flaring. Also present were wide-mouthed bowls or jars with conical, conoidal with flattened base, or globular bodies. Tempering materials were crushed bone, quartz sand, or rarely shell. Decoration was confined to the lip area in the form of scallops or tool impressions, although three vessels have appliqué around the shoulders. Surface treatments were either cord roughened or smooth (Witty 1969:3). The ceramics have not been fully and systematically analyzed.

Unfortunately, all the Buresh/Nulik site radiocarbon dates are from the unreliable Gakushuin Laboratory in Japan and, therefore, may be suspect (Blakeslee 1994; Drass 1998:439). (See Radiocarbon Dates.)

Summary

The Hallman site appears to fit within the Bluff Creek complex's basic parameters in terms of time period, location, economy, house type, and especially in regard to the ceramic assemblage. Pottery differences are mostly in the proportion of cordmarked versus plain and relative frequencies of temper materials. (Pottery from the Buresh/Nulik site was not considered, as it has yet to be fully analyzed.) As in the case of the other sites, 14HP524 contains large amounts of cordmarked pottery, with the most common temper being quartz sand and a quartz sand and bone mix. Sites along the Bluff Creek drainage have some bone-tempered pottery, as is the case for several Southern Plains complexes. Brooks (1989) and Drass (1998) reported that ceramic artifacts from the Antelope Creek, Buried City, Washita, and Wilmore complexes, as well as the sites of Pratt (14PT1) and Lewis (14PA307), have bone as a tempering agent. That bone was a common tempering material for cultural groups to the south and west of the Bluff Creek complex suggests a Southern Plains connection.

Another common feature in the Bluff Creek ceramic assemblage is globular body shape. Again, Brooks (1989) and Drass (1998) reported that the Pratt, Zimms, Great Bend, Antelope Creek, Upper Republican, Wilmore, Washita, Nebraska, Smoky Hill, and Buried City complexes have globular jars, with bases varying from flat to rounded. Thus, the globular shape was common across the region during the Middle Ceramic time period and into the protohistoric era. In addition, ceramic decoration lacks embellishments such as lugs, handles, and appliqués (Witty 1969:3).

Bluff Creek structures (perhaps houses) are indicated by post molds and building materials, such as daub. The structure in conjunction with F42 at the Hallman site is rectilinear. The rectangular floor plan can be found in the Paoli, Washita, Turkey Creek, Zimms, Buried City, Antelope Creek, Wilmore, and Smoky Hill complexes (Lintz 1984). However, the floor plan differs in that no other site has house trenches. While apparently associated with post molds, trenches are so few in number that the walls and floor plan cannot be delineated; thus, they are not useful for comparison. In general, the Hallman site structures seem typical for the surrounding complexes.

The charred corn and animal bone recovered at all the sites—as well as the presence of manos, metates, and storage pits—indicate that Bluff Creek complex peoples employed a mixed economy of hunting, gathering, and horticulture. Every site or complex within the region, both temporally and geographically, used the same economic system. The only variation appears to be which large herbivore was the primary source of meat. Deer was more common in the south, while bison was more common to the north, probably reflecting availability rather than cultural constraints.

The settlement pattern for the Bluff Creek shows some variation, which is not uncommon for a cultural complex. Munsell and Chism felt that 14HP1 was a campsite. The presence of storage pits indicated the probable presence of houses at 14HP5. Witty believed the Buresh/Nulik site was a village inhabited for an extended period of time because it had a number of mounds that held three structures. 14HP524 was either a small settlement or homestead with two structures.

The dates associated with the Bluff Creek complex have proved troublesome in the past. Original dates of A.D.1050 for the Hallman site and A.D. 900-1190 for the Buresh/Nulik site put the Bluff Creek complex surprisingly early in the regional chronology. Once additional dates were figured in with the original date, the Hallman site fell in line with the chronology of surrounding sites. Also, recognition that the Buresh/Nulik dates from the Gakushuin Laboratory were unreliable due to laboratory errors has helped place Bluff Creek in accord with the surrounding cultures.

In sum, the Hallman site appears to not only support the definition of the Bluff Creek complex but also to modify the description.

Regional Ceramic Comparisons

Middle Ceramic period pottery from the Great Plains includes a variety of shapes, surface treatments, tempers, and decorations. Some researchers (Drass 1998, 1999; Wedel 1959, 1983; Witty 1978) have used ceramic traits to determine trade partners, contemporaneity, and culture history. This section examines the ceramic traits of the Bluff Creek complex in comparison to Central Plains and Southern Plains pottery.

Physical Attributes

Shape

The Oklahoma Southern Plains pottery shape changed to more constricted throats, rounded shoulders, and globular bodies. Antelope Creek phase pottery consists of thin, globular, heart-shaped vessels with wide mouths and vertical or slightly flaring rims. Paoli phase pottery is divided into two wares: Lindsay Cordmarked, which consists of unshouldered conical jars, and Lee Plain, which has slightly more constricted necks, everted rims, and rounded or flat bases. Washita River phase ceramics continue the apparent trend of constricted neck and globular shape with rounded or flat base; this also describes vessel shapes for Turkey Creek phase pottery.

In southern Kansas the Wilmore complex ceramic vessels are globular in shape, whereas the Great Bend aspect has both globular and amphora-like vessels with constricted throats and straight or flaring rims. The Pratt complex also has flaring and straight rims on conical- and globular-shaped vessels. Stratigraphy at the Lewis site appears to show a change in vessel shape from conical to globular and an increasing constriction of the throat. Pottery vessels from the Bluff Creek complex are globular, conical, or conoidal with flattened bases; rims tend to be straight or outflaring.

Central Plains pottery tends toward a globular shape and straight or collared rims. Pottery from the Smoky Hill phase comes in globular form, some with subconical bottoms and high, flattened shoulders. Rims are commonly straight, although flaring, and collared rims also are found. Nebraska phase is similar except for fewer collared rims, and pottery form appears to increase in elaboration over time (Steinacher and Carlson 1998:249). The Upper Republican phase pottery also has a strong tendency for globular forms with a lot of collared, decorated rims. The Solomon River phase has vessel shapes that range from nearly globular jars to subconcoidal-based pots (Steinacher and Carlson 1998:245). Shoulders range from well developed and angular to gradually rounded forms.

Surface Treatment

In northern Oklahoma the Antelope Creek phase, Buried City complex, Turkey Creek phase, and the early parts of the Paoli and Washita River phases all have cordmarking as their surface treatment. Smoothed vessel exteriors also are found at sites from the Buried City and Zimms complexes and the later parts of Paoli and Washita River phases. Smoothed-over-cordmarked vessel surfaces were noted within the Buried City complex. Therefore, it appears that the surface treatment changed from cordmarked to smoothed.

Surface treatments in the Wilmore complex consist of cordmarking, smoothed-over-cordmarking, and smoothing. Great Bend aspect surface treatments include smoothing, cordmarking, and stamping. Whereas the Pratt complex vessels exhibit cordmarking, smoothing, and simple stamping, Bluff Creek complex pottery surface treatments range from cordmarking to smoothed-over-cordmarking to smoothing. In other words, surface treatments seem to shift from cordmarking to smoothing in southern Kansas.

In the Central Plains cordmarked vessels are found in sites of the Smoky Hill, Nebraska, and Upper Republican phases. Although a small percentage of the cordmarks are partially to heavily obliterated from some of the Upper Republican sites (Steinacher and Carlson 1998:245), knotted cordage—as opposed to twisted—was used at most of the Pomona sites (Brown 1985:461).

Decoration

Decorative motifs for the Southern Plains appear to be additive in form. In northern Oklahoma decoration for the Antelope Creek phase consists of the occasional incised line or row of fingernail punctations encircling the rim/body junction (Drass 1998:421). Buried City complex pottery decorations include chevron-incised, crenellated, filleted, fingernail gouged, and/or punctated rims and incised or punctated lips (Drass 1998: 426). Zimms complex decorations include nodes, rim tabs, and fillet strips (Brooks 1989:85). Lip tabs, handles, appliquéd nodes and strips, punctates, and incised decorative forms have been identified for the Washita River and Turkey Creek phases. No extraneous decorative forms were identified for Paoli phase pottery.

Wilmore complex pottery decorations consist of finger-pinching, stick impressions, and punctates on the lips and appliquéd nodes and incised designs on the necks. Strap and lug handles are also present (Bevitt

1999a, 2000). In the Great Bend aspect decoration takes the form of fugitive red filming, while short diagonal incising, puntates, appliqué strips, strap handles, and trailed stick impressions are decorative elements found on the Pratt complex pottery. Bluff Creek pottery exhibits lip decorations in the form of tool impressions, scallops, notching, and cordmarkings. Shoulder appliqué and red fugitive coloration is also noted.

In the Central Plains the decoration found in Smoky Hill phase pottery consists of rectilinear opposed-line motifs. Tabs and strap and loop handles also have been identified. Nebraska phase pottery appears to elaborate in form and decoration over time and has more appendages—strap and loop handles, lugs, tabs, and effigies—than Smoky Hill pottery (Steinacher and Carlson 1998:254). Decorations on Upper Republican pottery occur primarily on the outer rim and/or lip and appear as incised or excised geometric motifs. Pinched, applied, or excised nodes are also present (Steinacher and Carlson 1998:241). Pomona pottery exhibits crenellated and/or denticulated rims, although primarily in Coffey and Miami counties in Kansas and in western Missouri (Brown 1985:145). Cordmarked rims were also found at Pomona sites (Brown 1985:143).

It appears that the pottery from the Bluff Creek complex is common Middle Ceramic period pottery. Cordmarked pottery is present in both Central and Southern Plains complexes, although its frequency decreases over time. Globular shaped vessels are found in almost every complex. Appendages typically come in the form of handles, which are easily broken off and therefore harder to recover, possibly accounting for the lack of reported. Decoration in the Southern Plains appears to be of an additive nature (i.e., appliqués, nodes, etc.), while in the Central Plains the use of incised patterns is more common. The presence of crenellated and/or denticulated rims at both the Hallman and some Pomona sites may indicate a cultural connection between the two groups. The presence of a fugitive red sherd at Hallman may also indicate a closer association with the Central Plains, as such sherds have not been noted in the Southern Plains. Consequently, the external pottery treatment may either reflect regional norms or a connection to the Central Plains. The temper, however, tells a different story.

Temper

Bone is not commonly considered a primary tempering material, but it appears to be a common agent within the Bluff Creek complex and Southern Plains tradition. For the Anthony site the most common tempering agent is a quartz sand and gravel mix, but, similar to the Hallman site, the quartz sand and bone mix came in second. Indeed, within his Patrician type, the most common ware found at the Anthony site, Munsell (1961:113) noted, "small amounts of bone and shell temper are also present in some sherds . . . shell is the more frequent of the two." The ceramics for the Buresh/Nulik site are described as manifesting "variety in the ceramic paste ... with tempering material being crushed bone, sand or rarely shell" (Witty 1969:3). For the Armstrong site Gould (1975:52) did not find any sherds with bone temper. Thus, three of the four systematically investigated Bluff Creek sites have bone as a fairly common tempering agent.

The majority of sites and complexes in the Southern Plains tradition also used bone as a tempering agent. C. Tod Bevitt (1999:51) noted of the Wilmore complex Bell site (14CM407) that 36 percent of the pottery had bone as either the single tempering agent or as part of a temper mix. The Lundeen site (14MD306) had 65 percent of its ceramic assemblage with bone as the only tempering agent or as an ingredient in the temper mix. At the Booth site (14CM406) bone was not identified as a tempering agent; this is significant because the Wilmore complex is geographically close to the Bluff Creek complex, and both are on the border between the Central Plains and the Southern Plains traditions. The variability in tempering agents at the Wilmore complex sites indicates that the presence or absence of bone temper alone cannot be used to identify cultural affiliation or ancestry.

Some interesting similarities appear between ceramics of the Hallman site and the Two Deer site (14BU55), a transitional Plains Woodland-Plains Village site in Butler County (Adair and Brown 1981). Both sites have pottery that contains bone as a tempering agent and display cordmarked exterior surfaces. Examples of cordmarks on rim lips occur at the Hallman site and Pomona variant sites of the Middle Ceramic period (Brown 1985). Because of the proximity, both geographically and temporally, the cordmarked lips could indicate a relationship with the Pomona variant; however, as other cultural traits are not similar, connections of a different nature, such as trade, cannot be ruled out. Further research would help clarify this association.

Cordmarked pottery comprises nearly 100 percent of the Bluff Creek complex pottery assemblage, but the tempering agent changed over time. In general, it appears that plain shell-tempered pottery decreased in usage. At 14HP1, 87 percent of the cordmarked sherds have mixed temper, as compared to 49 percent at 14HP5 and 30 percent at14HP524. This seems to

be part of a switch from calcium tempering material to quartz sand temper. By the time 14HP524 was occupied, a shift from cordmarked to plain surface treatment had also begun.

The change in tempering material could be a simple case of temper availability. As climate fluctuates, so do resources. At this time it is not possible to pinpoint the quantity or quality of temper resources that were available to the inhabitants of the Bluff Creek drainage. Suppose that there was a cultural preference for shell temper but shell was less available at 14HP5, then potters might have considered bone to be the next best thing.

A number of researchers (Braun 1983; Bronitsky and Hamer 1986; Skibo et al. 1989) have investigated the advantages that different temper types impart to vessels. The studies typically compared the performance of clay temper with different materials via a series of tests. No studies of bone as a tempering agent could be found, although shell has been examined; however, these calcium-based materials are considered together in clay discussions (Rice 1987:97). This author has assumed that bone and shell share the same properties and that they should be comparable in functional temper studies.

Gordon Bronitsky and R. Hamer (1986:95-97) found that burned shell temper provided more impact resistance than quartz sand and unburned shell, as well as untempered clay samples, regardless of temper grade and firing temperature. Burned shell temper had greater loss of strength than unburned shell or quartz sand, but crack values were similar for all three temper types, and coarse burned shell-tempered clay survived thermal shock best. The quantity of temper did not affect weight loss in firing, cracking, or shatter resistance. They concluded that vessels with burned shell temper had more resistance to the stresses that cause initial cracking and that the vessels retained their structural integrity much longer under sustained impacts.

James M. Skibo et al. (1989:139) focused on various types of organic temper in their study. They concluded that organic temper allowed for conduction of heat but was not as efficient as mineral temper. Organic temper, however, did provide more strength to wet clay during the manufacturing and drying processes, as well as increased workability of the clay. Organic-tempered pottery weighed less and was more resistant to breakage if dropped, but the pottery had less resistance to abrasion. Therefore, fiber temper would be best suited for vessels that were frequently transported. Those vessels also were replaced frequently.

According to Bronitsky and Hamer, (1986:97-98), burned shell was the best temper material except that it lost strength, which could be rectified by adding fine quartz sand. Therefore, one might expect that the pottery would be tempered with quartz sand and shell, but that was not the case at the Hallman site. Perhaps Middle Ceramic potters had not experimented with shell to know how it would work, or maybe shell was not available in certain areas. The fact that shell was not recovered from trash pits or as artifacts except as isolated and highly fragmented finds in the heavy flotation fraction (Huhnke 2000:13-14) reinforces the theory that shell was not available to the Hallman site inhabitants. Shell is a resource dependent upon waterways and precipitation. On the other hand, bone is a more reliable and ubiquitous resource that could be used instead of the shell.

Hallman site ceramics included examples of both burned and unburned bone temper. This could result from not all the bone being burned during the burning process or from the deliberate mixing of burned and unburned bone. If bone were used in lieu of shell, a burned and unburned bone mixture would provide the best qualities: decreased weight, increased resistance to initial cracking, increased structural integrity, and increased resistance to thermal shock. Unburned bone also would provide some of the strength lost in the burning process. Although there is no way to determine the exact process, it is likely that bone, following the shell analogy, was burned and then ground into the fine medium necessary for use as a tempering agent.

Temper apparently depended more upon what materials were naturally available than on cultural constraints. Grog- and grit-tempered pottery wares tend to cluster in the Central Plains, where quartz sand was not quite as abundant as elsewhere, while bone-tempered pottery occurs along the Kansas/Oklahoma border. Shell has been found in those cultures located in regions with more abundant rainfall. Conversely, three complexes—Zimms, Antelope Creek, and Buried City—located in the Texas and Oklahoma panhandles, a region of variable precipitation, did not employ shell as a tempering agent. The wide array of tempering agents found at the Lundeen site (Bevitt 2000:162-153) reflected the abundance of materials available in the local environment during late prehistoric times.

Seriation

A relative frequency seriation of ceramic attributes was deemed an appropriate method to place the Hallman site within the Bluff Creek complex chronology, as well as to place the Bluff Creek complex into the regional chronology. As the Hallman site

represents a short-term occupation with little variation in its ceramic assemblage, this "time capsule" of mid-thirteenth-century Bluff Creek ceramics is especially suitable for seriation. Furthermore, because the Hallman site has reliable radiocarbon dates, it aids in the temporal placement of other Bluff Creek sites, like Anthony, Armstrong, and Buresh/Nulik, which do not have reliable absolute dates, by establishing a benchmark in the relative chronology. The unanalyzed ceramics from the Buresh/Nulik site could not be included in this discussion.

Chism (1959) and Munsell (1960) originally divided the sherds from 14HP1 into a series of types that is not adopted here. While their descriptions are useful, there were not enough unique traits to allow the consistent separation of these sherds from other similar sherds of the time period. Their first ceramic type, Dow Utility, has medium to coarse temper, consisting of quartz sand and gravel with occasional inclusions of limestone and shell. The pottery has cordmarked or smoothed-over-cordmarked surface treatments and crudely finished interiors. Decoration occurs around rims in the form of appliqués, lip notches, and diagonal incisions on lips. The rims are straight to flaring with a marked neck constriction. Fire clouds are not unusual. Sherd thickness ranges from 6 to 18 mm, with some base sherds being much thicker. Manufacture is thought to consist of pinching, with finishing touches made by a paddle and anvil technique (Munsell 1960:14-16).

Patrician, the second type, is characterized by medium to fine tempers of bone, shell, and, most commonly, quartz sand. Surface treatments are cordmarking and smoothed-over-cordmarking. Lip decoration consists of diagonal or perpendicular lines below the rim. Charcoal traces are found on interior surfaces. As no coil breaks are found, manufacture is thought to be pinching, with finishing by paddle and anvil. Munsell (1960:16-17) ranked this pottery type as a hard, dense ware, with sherd thickness between 4 and 10 mm.

The third type of pottery is Dow Shell Tempered, but no rim sherds of this type were recovered. The major distinguishing characteristic is the almost exclusive use of crushed shell as the tempering agent. Surface treatment consists of cordmarks and smoothing. Manufacturing techniques are thought to be pinching, followed by a paddle and anvil finish. Sherd thickness ranges from 5 to 9 mm, with a hardness ranking of 2.5 on the Mohs' scale (Munsell 1960:17-18). As Munsell (1960:113) points out, this type is similar to Southern Plains shell-tempered wares, such as Nocona or Woodward.

Table 8. Surface Treatment Seriation of Bluff Creek Complex Sites.

	Plain	Cordmarked
14HP524	n=110 19.0%	n=469 81.0%
14HP1 [2]	n=13 2.9%	n=436 97.1%
14HP5 [1]	n=4 .6%	n=639 99.4%
[1] (Gould 1975:52, 54)		
[2] (Munsell 1960:113)		

Gould (1975:51-59) described the 14HP5 ceramics for which the two most common temper types are quartz sand and quartz sand mixed with gypsum. Less common is a temper mixture of gypsum, quartz sand, and crushed limestone. Gypsum mixed with shell is observed in a few sherds. The general vessel shape is globular, and some pots are miniatures. Rims range from constricted (a diameter less than the throat) to vertical (diameter equal to the throat) to flaring (diameter greater than the throat) (Rice 1987:212). Lips vary from rounded to flattened, while the bases are rounded or flat. Handles are attached in a vertical position. Sherd interiors range from smooth to rough. The paddle and anvil technique was used to thin the walls and apply cordmarks. All sherds exhibit cordmarks, including rim and basal sherds. There is also modification of the cord roughening, ranging from light smoothing to near obliteration of the cordmarks. Decorations occur in the form of appliqués of rounded lumps of clay, pinched elements, or incised diagonal lines on lip edges or down interior rim walls. The vessels were fired in an oxidizing atmosphere, but they were not well oxidized.

To understand the Hallman site's relationship to the Anthony and Armstrong sites, relative frequencies of plain versus cordmarked sherds were compared. Surface treatment was the only characteristic that could be compared because the Hallman site ceramic collection lacked data on decoration, appendages, and vessel shape. In addition, as noted above, several researchers have detected a general trend in which cordmarked pottery gave way to plain, smoothed pottery. It was hoped that tracking this development would suggest at least tentative relative dating among the Bluff Creek sites.

Table 8 shows the percentages of plain or smoothed pottery relative to the frequencies of cordmarked pottery. Based on this, the Armstrong site is older than the Anthony site, which is older than the Hallman site (14HP524).

As a supporting test, the occurrences of ceramic

Table 9. Presence of Ceramic Decorative Elements at Bluff Creek Complex Sites.

Site	Paint/slip/ wash	Incising	Protuber- ances	Strap Handles	Notches	Pinched/ raised	Cordmarks/ Undulated Rims	Overall Decoration	Cordmarked
14HP524	Yes	Yes	No	No	Yes	No	Yes	1.0%	81.0
14HP1	Yes	Yes	Yes	Yes	Yes	No	No	1.9%	97.1
14HP5	No	Yes	Yes	Yes	Yes	Yes	No	3.0%	99.4

Table 10. Seriation Using Surface Treatment Categories.

	Plain		Simple Stamped		Cordmarked		Other	Dates
14PA307a[4]	n=820	98.0%	n=15	1.8%	n=2	.2%	-	
14PA307b	n=399	100.0%	-		-		-	1500-1550*
14PA307c	n=47	78.3%	n=13	21.7%	-		-	
14RC306[1]	n=252	31.5%	n=512	64.0%	n=36	4.5%	-	1425-1490*
14CM406[7]	n=35	26.9%	n=95	73.1%	-		-	1334-1609*
14CM407[8]	n=35	23.0%	n=117	77.0%	-		-	1040-1387*
14HP524	n=130	21.8%	n=466	78.2%	-		-	1248-1294*
14PA307e	n=386	18.5%	n=1703	81.5%	-		-	1274-1392*
14PT1[5]	n=56	9.5%	n=525	89.4%	n=6	1.0%	-	1450-1475
14MD306[9]	n=33	7.0%	n=445	93.0%	-		-	1280-1413*
14HP1[2]	n=14	3.1%	n=435	96.9%	-		-	1100-1200
14HP5[3]	n=4	.6%	n=639	99.4%	-		-	1100-1200

* = absolute date

[1] Loosle 1991: 113

[2] Munsell 1960: 14-20

[3] Gould 1975: 52, 54

[4] Ranney 1994: 44

[5] Wilcox 1981: 123

[6] Rohn and Emerson 1984: 108-111

[7] Bevitt 2000: 94

[8] Bevitt 2000: 51

[9] Bevitt 2000: 160,162

decoration at the three Bluff Creek sites were charted in Table 9. Witty's (1978) comments regarding the Buresh/Nulik site ceramics also were reviewed. He ascribed the decorative elements of appliqué and strap handles to an exotic ware, so those artifacts were not included in this comparison. Due to inconsistencies in the quantitative reporting of the presence of specific traits at the sites, a simple yes/no comparison was made. All the traits present at 14HP1 were found at either 14HP5 or 14HP524, thus implying that Anthony is a transitional site. While there is no way to determine which site, Hallman or Armstrong, is older based on the presence of decorative elements, the Anthony site's position in Table 9 is the same as its position in Table 8, lending support to the previously suggested temporal sequence of the Bluff Creek sites.

To put the Bluff Creek complex into proper temporal context, it was compared with cultural manifestations in close geographic and temporal relation, resulting in a relative regional chronology, as summarized in Table 10. Most published reports included data on surface treatment and temper, but they were rarely correlated. Surface treatment was chosen here as the defining attribute, as it seems likely that variations in temper are due to local availability of materials. Also, there is much variability in the literature on how temper is reported. As Johnson (1984:282) points out, the comparability of samples is crucial for the relative temporal ordering of archeological sites. Furthermore, Johnson has demonstrated that surface treatment frequencies can be used to build a seriation.

In regard to Table 10, it should be noted that the Buresh/Nulik site has associated radiocarbon dates that were not included in this analysis because they have yet to be independently verified. Also, the Lewis site (14PA307) had five stratigraphic levels, only four of which are included in the table. Level D was omitted as it produced only six sherds (Loosle 1991:154; Ranney 1994:75).

Ranney demonstrated that 14PA307 shows a trend of increasing plain pottery frequencies, decreasing cordmarked pottery, and the beginnings of simple stamping as a surface treatment. Simple stamping was only found in Level A, the youngest component of the multi-level site. Ranney (1994:78) believed that the upper levels more closely resemble the Great Bend aspect, while Level E is comparable with the earlier Pratt complex, and especially the Pratt site itself.

It should be noted that the seriation placement of the Pratt site, based on relative frequencies of surface treatments, is slightly out of order with the dates. The date range is problematic, as it was derived from intrusive Southwestern sherds (Ranney 1994:85-86; Wilcox 1981:119) that may reflect a later occupational level or usage of the site. Furthermore, the Pratt site collection is a non-systematic surface collection (Wilcox 1981:99-100).

In his recent analysis of the Wilmore complex sites (14CM406, 14CM407, and 14MD306), Bevitt (2000:98, 230) concluded that the Wilmore complex is on the cultural border between the Central and Southern Plains traditions. The pottery is similar to the Zimms, Buried City, and Antelope Creek complexes of the Southern Plains (Bevitt 1999a:5, 2000:221), as well as having decorative elements similar to north-central Kansas pottery (Bevitt 2000:230). When surface treatment frequencies are compared among the Wilmore complex sites, over time there is a decrease of plain pottery and a corresponding increase in cordmarked pottery. This corresponds to the trend in the surrounding area. Site 14CM407 has a number of similarities to the Hallman site, including virtually the same surface decoration frequencies, house types, and radiocarbon dates of A.D. 1154-1314 (Bevitt 1999a:6, 1999b:4). The addition of the Wilmore complex to Table 10 shows a smoother change over time than otherwise would be the case.

Table 10 shows a general increase in the relative frequency of plain pottery within the geographic area over time and a corresponding decrease in the presence of cordmarked pottery, a trend noted by various researchers (Drass 1998:429; Johnson and Johnson (1998:216; Loosle 1991:154-155; Wedel 1983:233). In fact, between the earliest site, 14HP5, and the most recent component, 14PA307 Level A, there is an almost complete inversion. The Armstrong site has about 1 percent plain and 99 percent cordmarked pottery, and Level A of the Lewis site has 98 percent plain and 2 percent cordmarked. This same level of 14PA307 has Simple Stamped pottery, a surface treatment that becomes more common during the Protohistoric period, as for example Wedel's (1949:90) Simple Stamped Geneseo type.

The occasional appearance of "Red Fugitive" surface treatment is notable at early (before A.D. 1300) sites, i.e., Anthony and Hallman. These are rare, yet Hallman has three sherds, two of which exhibit a dry red powder that brushes off easily; the third has a red coating that adheres much better and in all likelihood came from a vessel bearing a slip. An exotic sherd from 14HP1, found during surface collection, bears a badly worn red slipped or painted surface. Munsell (1960:17-18) hesitantly classified it as Crockett Curvilinear Incised, to which it bears a superficial resemblance, and noted that it also resembles Geneseo Red Filmed. A much higher incidence of red-filmed pottery occurs in later Great Bend aspect sites, such as 14RC306 (Loosle 1991:113).

In sum, Table 10 depicts the change in surface treatment from cordmarked to plain with the introduction of simple stamping at the youngest site. The use of red pigment was not a new development but had been around since at least the thirteenth century, as indicated by the presence of red fugitive sherds at the Hallman and Anthony sites. In addition, the seriation offers a good interpretation of the temporal ordering of sites and complexes in the south-central Kansas area between A.D. 1000 and 1700, thus providing a basis for future work in this region.

Radiocarbon Dates

Three samples were submitted for radiocarbon dating (Table 11). In 1989 Thies (1989a:184) sent the first one to the University of Texas Radiocarbon Laboratory in Austin. A single date of 870 ± 60 B.P. (TX-6448) was reported. This date was obtained on wood charcoal collected from F588, an ash complex located in a test pit in A882. The ash complex was described as an unstratified mass of ashes, charcoal fragments, and cultural debris, measuring approximately 114 x 123 cm, in an amorphously circular shape. The lack of in situ firing evidence, as well as an abundance of assorted trash, led the excavators to believe the feature had been used as a trash dump.

Two additional samples were submitted for radiocarbon dating during the course of the project reported here. In an attempt to assess possible

Table 11. 14HP524 Radiocarbon Dates.

Lab Number	B.P. Date	Calendar Date	Calibrated Age Range
Beta-13126	710+/-80	A.D. 1287	A.D. 1165-1407
ISGS-4301	780+/-70	A.D. 1263	A.D. 1059-1382
TX-6448	870+/-60	A.D. 1165, 1166, 1188	A.D. 1022-1279

temporal variability across the site, the samples were selected from two prehistoric trenches, F42 in A881 and F192 in A883. The trenches—of unknown function—contained charcoal, burned earth, daub, ceramic sherds, and lithic debitage, and were in close proximity to clusters of post molds. In fact, the F42 trench was more or less surrounded by post molds and contained large amounts of charred wood, grass, burned earth, and daub, interpreted as house construction materials (Thies 1989a:189). Assuming that the post molds and trash-filled trenches were connected, dating the trench would date the structure.

The sample from F42, A881, was sent to Beta Analytic, Inc. in Miami, Florida, and a date of 710 ± 80 B.P. (Beta-131269) was returned. The sample was wood charcoal from the trench fill, which also included burned earth, bone, shell, and lithic debitage. The sample from F192, A883, was sent to the Illinois State Geological Survey in Champaign. This sample is from a linear concentration of charcoal, thought to be the result of in situ burning/smoldering of roof fall. It yielded a date of 780 ± 70 B.P. (ISGS-4301).

The three dates were entered into the Radiocarbon Calibration Program, Rev. 4.3 (Stuiver and Reimer 2003). This program was used to calibrate the dates and determine their statistical deviation. Calibrated 2-sigma, 95 percent confidence intervals were used.

Beta-131269 was calibrated to A.D. 1165-1407 with an intercept date of A.D. 1287. ISGS-4301 was calibrated to A.D. 1059-1382 with an intercept date of A.D. 1263. These dates are statistically the same and overlap completely between A.D. 1059 and 1382. In addition, their intercepts are almost identical at A.D. 1263 and 1287. Although these two dates are from different locations on the ridge top, contemporaneity of occupation is indicated.

TX-6448 was calibrated to A.D. 1022-1279 with intercepts of A.D. 1165, 1166, and 1188. When considered beside the other two dates, all overlap between A.D. 1022 and 1279. The intercepts range between A.D. 1165 and 1287. Again, these values are statistically the same, suggesting that there is little or no temporal difference between occupations of the ridge top and the alluvial terrace.

Dates for other sites of the Bluff Creek complex are less precise. The Armstrong site, dated by Gould (1975) by comparison with surrounding complexes, was categorized as Middle Ceramic, A.D. 900-1500 (O'Brien 1984:57). Chism (1959:26) dated the Anthony site to A.D. 1100-1200, based on artifact similarities with surrounding dated complexes and sites. Munsell (1960:38) suggested a date of A.D. 1200 for Anthony, based on comparisons with surrounding complexes and sites. The Buresh/Nulik site is the only site other than Hallman to have radiocarbon dates. Gould (1975:86) and O'Brien (1984:63) report them as 870 ± 90 B.P., which calibrates to A.D. 997-1294 and averages A.D. 1165, 1166, and 1188 (GaK-2796); 1050 ± 110 B.P., which calibrates to A.D. 694-1219 and averages A.D. 997 (GaK-2797); and 760 ± 110 B.P., which calibrates to A.D. 1024-1410 and averages to A.D. 1276 (GaK-2798), using the Radiocarbon Calibration Program, Rev. 4.3 (Stuiver and Reimer 2003). These dates were generated from the Gakushuin Laboratory in Japan, and Blakeslee (1994) and Drass (1998:439) argue that, because a number of the dates generated by this lab are inaccurate, all the dates must be thrown out unless they are proven to be correct. Calibrations of these dates produce no statistically significant difference from the three previously cited dates from the Hallman site. All three of the Buresh/Nulik dates overlap within a 95 percent confidence interval between A.D. 1024 and 1219. Still, the author chose to exclude the Buresh/Nulik site from the temporal discussions and confined the analysis to those sites and dates that are not so problematic. Regardless, there is little question that the Bluff Creek sites date to the Middle Ceramic/Early Plains Village period, roughly A.D. 1000-1500.

The Hallman site is no longer relegated to a relative chronology. Instead, future research can compare contemporary sites that are known to be contemporaneous based on absolute dates. Material cultures of the various sites can be compared and cultural trait dispersal trends can be examined.

Conclusion

The purpose of this article was to describe and discuss the ceramic assemblage from the Hallman site with the ultimate goals of determining its relationship with contemporaneous archeological complexes and understanding its temporal and spatial position in the archeology of the Central and Southern Plains. To assist in this endeavor, a seriation was created to clarify the Hallman site's temporal position within the Bluff Creek complex and to place the Bluff Creek complex within the regional chronology. Intra-site sherd distributions were examined to shed light on how the site was used and organized, while sherd refit locations were analyzed to indicate how much disturbance had occurred at the site. The results from these tests should help future researchers determine cultural and/or ancestral connections. In addition, it is hoped that the information in this paper will help to modify the definition of the Bluff Creek complex and, ultimately, to determine which taxonomic label best applies.

There were four major problems or shortcomings that affected this analysis: 1) data collection was inconsistent because the site was excavated primarily by nonprofessionals with varying degrees of experience; 2) the site was assumed to be and, therefore, was excavated as a single occupation, and concentrations of cultural debris were targeted for excavation; 3) the ceramic assemblage itself is very homogenous and does not exhibit easily identifiable or distinctive traits for comparisons; and 4) relatively little research has been done in this location and general time period. These factors made interpreting the site and its cultural affiliations difficult. Inconsistencies in data collection influenced what data could be used and thus may have biased some of the conclusions. The author hopes that those biases are minimal and believes that with further research the Hallman site's and Bluff Creek complex's specific temporal and spatial relationships can be clarified.

The descriptive analysis demonstrated that pottery from the Hallman site is relatively homogenous. The majority of the vessels are cordmarked. Quartz sand is the most common tempering agent, while quartz sand and bone mix is the next most common. The assemblage is comprised primarily of body sherds. Rims made up less than 10 percent of the assemblage, and they are typical of the time period. No volume measurements or minimum number of vessels could be determined. While deflated and plowed, the site experienced little disturbance below the plow zone.

Seriation demonstrated an overall pattern for ceramic surface treatments during the Middle Ceramic period: decrease in cordmarking and increase in production of plain pottery. The Hallman site fits neatly within this seriation toward the bottom, thus supporting the radiocarbon dates of mid-thirteenth-century occupation. Higher percentages of cordmarked and decorated pottery allow the relative placement of the Armstrong and Anthony sites as older than the Hallman site. The presence of cordmarked rim lips may indicate a relationship between Hallman site/Bluff Creek complex and the Pomona variant, but additional research will be necessary to determine if this connection is valid.

Because cordmarked pottery is found in both Southern and Central Plains traditions, there can be no definitive cultural assignment of a ceramic assemblage to either tradition based solely on this trait. However, the use of bone as a tempering agent in Hallman site pottery indicates a closer affiliation to the Southern Plains. Even though the selection of particular tempering agents may result from availability within an environment, it is significant that a number of Southern Plains traditions complexes used bone temper, whereas only two Central Plains complexes did.

The general artifact assemblage from the Hallman site demonstrates that the inhabitants practiced a mixed economy of hunting, gathering, and horticulture. Scapula hoes, manos and metates, charred corn and corncobs, and large quantities of bison bone were recovered. These artifacts are typical of both the Central Plains and Southern Plains traditions during the Middle Ceramic period, so the economy cannot be used to distinguish between the two traditions. The only difference is the tendency toward a higher percentage of bison bones in Central Plains sites, while Southern Plains sites have higher percentages of deer bones. Hallman is unique in the presence of canine bones; although this is not reflected in either the Central or the Southern Plains traditions, it may provide some insight into cultural traits (see Hunke 2000).

The house structure found at Hallman has characteristics of both Southern and Central Plains traditions. The centrally depressed floor channel is a purely Southern Plains tradition trait; Central Plains houses have extended entryways, but they do not extend into the living area of the house. The presence of interior storage pits may prove to be a distinguishing trait between the Central and Southern Plains traditions, but more research is necessary.

Some conclusions can be drawn with regard to the Hallman site's position within the big picture of settlements in the Plains region. Obviously, 14HP524

demonstrates that people lived along the Bluff Creek drainage during the Middle Ceramic period. Questions of where the ancestors of the Bluff Creek complex people came from and who their descendants were cannot be answered by this study. However, this author believes that the Bluff Creek complex was either influenced by or was a northern projection of the Southern Plains tradition.

At this time there is no proof that the Bluff Creek complex was unique in southern Kansas; in fact, it appears to be a characteristically Middle Ceramic. It would be unreasonable to assume there was no contact between the Bluff Creek complex and inhabitants of the Central Plains. Therefore, the Bluff Creek complex could be viewed as a group of sites that mark a boundary between the Central and Southern Plains traditions.

The author submits the following modification of Witty's (1978:62-63) original definition of the Bluff Creek complex. Additions to Witty's original wording are in italics.

> Excavations . . . resulted in the identification of . . . lodge floors that gave evidence of frame structures: . . . square, . . . oval, . . . rectangular with an extended entryway from the center of the long side, *and rectangular with trenched floor plans*. Ample evidence was present in the form of fired clay with grass and pole impressions to indicate that these structures had once been at least partially daub covered. All . . . structures lack signs of an interior hearth. Storage pits are present both in the floor of the lodge and more frequently outside the lodge. Pit form is cylindrical with a flat floor. Adjacent to each lodge are found one or more shallow basins filled with detritus. These appear to be borrow pits from which the soil was removed for the covering of the house, after which the resulting hole was filled with discarded materials. Refuse in the form of broken and butchered animal bone, primarily bison, and waste chert materials is abundant. Burned corn cobs are also present.
>
> The ceramics are important both in ware and type. *Present at the Buresh/Nulik site* in small amounts and probably representing trade ware are examples of shell tempered vessels with smooth exteriors, strap handles, and applique decoration typical of the Washita Focus of central Oklahoma. The restored pots from the excavations at the Buresh site are amphora-like jars with flattened or slightly concave bases and some evidence of strap handles. *Small- to medium- sized globular shaped vessels with direct or plain collared rims have been recovered and restored from other Bluff Creek sites. Exterior surfaces tend to be either plain or cord-roughened. Tempering material consists primarily of quartz sand or quartz sand and crushed and burned bone mix.*
>
> The primary determinants, such as settlement patterns, house form, and ceramic traits, would again cause this writer to class this complex separately from the Central Plains Tradition, with ceramic similarities reflecting its geographical association with the Central Plains peoples to the north and Southern Plains peoples to the south. *Calibrated radiocarbon determinations for the Hallman site date with 95 percent confidence between A.D. 1022 and 1279 and the Buresh/Nulik site to between A.D. 1024 and 1219. Thus, the Bluff Creek complex is dated between the calendar years A.D. 1000 and 1300, which corresponds to the length of the Middle Ceramic period in south-central Kansas.*

This author does not believe the Bluff Creek complex can be exclusively tied to either the Central or Southern Plains traditions but is a mix of the two. Nor does the author believe that ancestry of the protohistoric tribes of south-central Kansas can be attributed directly to the Bluff Creek complex. The exact origins of the traditions are uncertain; the protohistoric tribes claim a connection to the south and east, whereas the connections indicated by this study tend to be to the south and west. It is the author's hope that the proposed modifications to Witty's definition of the Bluff Creek complex will provide a starting point for future research that continues to refine the Hallman site's and the Bluff Creek complex's proper places both temporally and culturally.

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Waterway Discoveries at the Malone Site (14RC5)

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In 1996 earthmoving associated with waterway construction at a protohistoric Great Bend aspect habitation site, known as the Malone Site (14RC5), resulted in the discovery of several subterranean features, primarily trash-filled storage pits. Kansas State Historical Society archeologists investigated those features, documented their locations for future researchers, and gained a significant body of data pertaining to the occupation of the site, most notably a radiocarbon date indicating that occupation occurred sometime between A.D. 1432 and 1657.

In 1996 the Kansas State Historical Society (KSHS) was given a rare opportunity to investigate a set of archeological features at the Malone Site (14RC5), a National Register of Historic Places site in Rice County, Kansas. Discovery of the features occurred as part of an investigation designed to monitor earthmoving associated with waterway enhancement, carried out by the Natural Resources Conservation Service (NRCS), and to document any archeological remains that might be exposed. The investigation was conducted to ensure compliance with various laws governing the treatment of cultural resources, in accordance with a cooperative agreement between KSHS and NRCS.

The investigation was considered a rare opportunity because scientific study of this site has been hindered for decades by uncooperative landowners who had a hostile attitude toward archeology. If not for the fact that the current landowner wanted NRCS funding, the 1996 investigation would never have been permitted. The current landowner does not welcome visitors. Archeological researchers—whether avocational or professional—are cautioned to remember that the Malone site is posted to prohibit trespassing, and even a casual walk across the field may result in unfortunate legal consequences.

Purpose and Scope of the NRCS Undertaking

The undertaking that brought about the 1996 investigation was a waterway enhancement project involving the use of a road grader and bulldozers to remove vegetation, deepen, and reshape an existing waterway in a cultivated field on the slopes of an upland ridge overlooking Cow Creek in Rice County, Kansas (Figure 1). The ends of the agricultural terraces that bordered the waterway were also reshaped, and an eroded area at the head of the waterway was filled with dirt.

Originally created in 1978, the waterway was excavated to a depth of probably 30-45 cm below the ground surface, then plowed and planted with grass to prevent erosion. This waterway is somewhat unusual in that it does not appear to have been created by enhancing a natural drainageway, at least on the upper ridge slopes in the area of the 1996 archeological finds that are the subject of this report. Instead, the waterway in this locale appears to be an artificial creation, a manmade drainageway that runs down the center of a long, broad, gently sloping upland ridge before meandering down and into a shallow natural drainageway on the lower slope of the ridge. The



Figure 1. Section of USGS topographic map showing the location and general extent of the waterway, the Malone site (14RC5), and the Boys Town site (14RC413).

waterway appears to be primarily designed to drain rainwater from manmade agricultural terraces that were constructed along the upper slopes of the ridge, although it allows water to drain into the waterway from the adjacent cropland as well. Once the rainwater enters the waterway, it is slowed by vegetation and either soaks into the ground or drains down to the lower-lying floodplain.

In the years since the waterway was first constructed, various things occurred that diminished and then ended its effectiveness. The adjacent cropland lost soil due to erosion, lowering the elevation of the field. Plowing pushed soil over to the edge of the field, creating a berm along the edge in many places and making it impossible for water from the adjacent cropland to drain into the waterway. More important, the uppermost terrace became badly eroded and essentially collapsed near the edge of the waterway, causing a large amount of dirt to settle in the waterway. Within the waterway itself, weeds and tall grasses were allowed to grow, and this overly dense vegetation trapped the eroding dirt, resulting in the accumulation of at least 30 cm of silt across the waterway floor. These conditions combined to create a situation in which the waterway was as much as 30 cm higher than the adjacent cropland in many places.

The goal of the enhancement was to reshape and deepen the existing waterway so that efficient drainage could occur. This was to be done by removing the artificial berms along the edges to enable drainage from the adjacent fields and by removing vegetation and silt from the sides and floor so that water could flow more freely. The waterway was to be deepened 1 or 2 feet (30-60 cm). The floor was then to be lightly scarified so that grass seed could be planted. The undertaking was to stay more or less within the limits of the existing waterway, extending outside only so far as was needed to reshape the edges to ensure that drainage from the adjacent cropland could occur.

Earlier Waterway Investigations

The waterway had received earlier professional archeological attention on two occasions: in 1978 when the waterway was constructed and again in 1995. The 1978 investigation was carried out with the approval and assistance of the Soil Conservation Service (SCS, predecessor of the NRCS), but it was a more or less ad hoc investigation that was hindered by the uncooperative landowner. The investigation was a one-day effort, carried out by State Archeologist Tom Witty and three other KSHS archeologists. Their focus included the proposed locations of the waterway that

is the subject of this report, one other waterway that was located to the west, and two associated agricultural terraces. The investigation included an intensive pedestrian survey of the areas and subsurface testing with Oakfield soil sampling tools.

No formal report ensued from this 1978 investigation, although written progress reports were produced for the site file. Progress reports indicated that much of the project area on the upper portion of the ridge was in pasture; however, the nature of the vegetation suggested that the pasture had been plowed in the past. Soil core probes confirmed this interpretation, indicating that the plow zone extended to a depth of 15 cm below surface. In much of the pasture area, however, "cultural mix" was found to be present below the plow zone, extending in some places to a depth of 30 cm below surface. Probing revealed the presence of three subterranean features that were interpreted as trash-filled storage pits, but none of these were in the locations that would be affected by terrace or waterway construction. With regard to the waterways, the archeologists concluded that construction "would apparently have no adverse effect" on any significant archeological remains, as both waterways were "lower on the hill and seem to be at the bottom of existing drainage[s]." Judging from these statements, it seems likely that construction plans varied from actual implementation; i.e., when finally built, the eastern waterway was not wholly in an existing drainage, and its construction extended much higher up the side of the ridge than originally planned.

By 1995 both waterways had silted in and were being considered for enhancement projects. Under the terms of the recently enacted cooperative agreement, NRCS contacted KSHS, and it was agreed that a new survey should be conducted. A field survey (technically known as a Phase II investigation) was carried out by the author, assisted by another KSHS archeologist and two NRCS employees who had received archeological training. The survey focused on the two waterways and included a pedestrian survey of the entire site area, accompanied by soil-core probing in the eastern waterway, which is the subject of this report.

The survey resulted in a report by the author (Thies 1995). No further work was recommended for the western waterway, which was believed to be lacking in potential for the finding of significant archeological remains. The eastern waterway, however, was deemed to have such potential. As noted in the report and the accompanying cover letter, investigation of the eastern waterway was hampered greatly by the dense vegetation and accumulation of at least a foot of flood silts, and neither the survey nor the testing produced any archeological evidence from within the waterway. Archeological materials found in the field outside the waterway clearly indicated that the upland edge was the area used for prehistoric habitation. Because a portion of the eastern waterway was located there, it was interpreted as having potential for significant archeological resources to be present–specifically, buried habitation features such as trash-filled storage pits.

With regard to additional work, subsurface testing (technically, a Phase III investigation) was considered, but the area of potential effect was believed to be too large to allow for a thorough and cost-effective investigation. It was thought that such an investigation would be ineffective in finding storage pits; certainly it would be unlikely to find all of the storage pits that might be present within the waterway.

At the time archeologists working under similar conditions at Great Bend aspect village sites in the Arkansas City area were having great success in finding storage pits and other such features by using road graders and other heavy equipment to remove the plow zone. Through the use of heavy equipment, the investigators were able to examine much larger areas in less time than could reasonably be done by hand, enabling numerous Great Bend aspect pit features to be detected at sites on the valley floor and in the uplands to the east (Hawley and Haury 1994). According to the lead investigator, it became very clear that the surface expression of the site bore little relation to what lay beneath the surface and that, if hand excavation of the site's deposits had been attempted based on surface concentrations, a great deal would never have been recovered. Because of this, it was "strongly" recommended that machinery continue to be judiciously employed in subsequent Arkansas City site excavations (Hawley 1995:31). Based on the results of the Arkansas City experience, soil stripping clearly appeared to be the only dependable way by which all of the storage pits within a specified area could be located in an expeditious manner.

The shallow earthmoving involved in the waterway enhancement at the Malone site was seen as a fortuitous opportunity to detect and document the presence of storage pits within the waterway. It was realized that some slight damage to the site might take place (one would not know that a pit had been encountered until it had been slightly truncated by the earthmoving), but the only real alternative was cancellation of the project. Cancellation did not seem advisable, as the landowner made it quite clear that he would proceed with the project on his own, but would not allow archeologists onsite if the NRCS withdrew

its funding. The choice, therefore, was between doing nothing and almost certainly losing valuable archeological information about a National Register site or doing something that would acquire that information but could also result in minor damage to the site. With these considerations in mind, the Phase II survey report (Thies 1995) presented the following conclusions and recommendations.

> The Phase II investigation indicated that there is potential for significant archeological resources to be present within the undertaking's area of potential effect. Specifically, the easternmost waterway is believed to have potential for the finding of buried habitational features such as storage pits. Since standard archeological testing (i.e., a Phase III investigation) would not be effective in locating such features due to the waterway's size and vegetational cover, we recommend that Phase II monitoring take place when the proposed construction occurs. The purpose of the monitoring would be to locate and identify any notable archeological features, and to carry out any appropriate mitigative and/or investigative actions (i.e., Phase IV data recovery) if such features are found.

As part of the Section 106 process, consultations were carried out with the State Historic Preservation Office (SHPO) concerning these plans. In a letter dated September 26, 1995, the SHPO formally concurred with the conclusions and recommendations provided in the Phase II report. The letter did provide warning, however, that the monitoring approach might have liabilities, for if significant remains were discovered during the undertaking, the NRCS would be responsible for mitigating damage to the site, in accordance with provisions of section 36 CFR 800.11 of the National Historic Preservation Act of 1966, as amended.

Environmental Setting

In physiographic terms 14RC5 lies within the Dissected High Plains section of the Great Plains province of the Interior Plains division of North America (Schoewe 1949:280, 309-311). The Dissected High Plains section essentially constitutes the heavily dissected eastern front of the High Plains of western Kansas. As described by Wedel (1959:10), the area is characterized by "... a broken landscape of high plateau-like uplands, prominent and often sharply indented east-facing sandstone or limestone escarpments, conspicuous headlands, isolated buttes, hills, and rolling lowland plains." Located north of the Arkansas River and covering most of north-central Kansas, the Dissected High Plains is made up of three distinct subdivisions or ranges of uplands that parallel each other in a northeast-southwest irregularly trending fashion. Bedrock is of Cretaceous age. The easternmost range (and sometimes the entire Dissected High Plains area) is commonly referred to as the Smoky Hills; it is formed mainly in thick beds of Dakota sandstone. The middle and western ranges are collectively referred to as the Blue Hills; the bedrock there consists mainly of limestones and shales.

The topography of the region varies according to the hardness of the exposed bedrock. In locations where the surface is eroded into nonresistant shales, the topography is rolling. In locations where the surface is eroded into the more resistant limestone formations, flat plateau-like surfaces with steep, rocky escarpments are found. Isolated buttes are occasionally encountered. The major rivers and streams of the area flow in an easterly or southeasterly direction through flat-bottomed valleys, ranging up to 2 or 3 miles wide. Numerous spring-fed tributaries indent the valley margins; like the larger streams and rivers, their courses are commonly terrace lined. The bottomland soils are usually deep, well drained, and fertile.

Prior to modern encroachment and change the vegetation of the region apparently consisted of mixed prairie interpenetrated by narrow ribbons of riverine forest, with a few small patches of trees occupying sheltered locations on the prairie, mainly on steep escarpments and butte tops. According to Kuchler (1974), the potential natural vegetation of the area consisted of mixed prairie, dominated by bluestem and gramma grasses, along with floodplain forest or savanna vegetation of scattered tall, medium tall, and low broadleaf deciduous trees and shrubs. Moving from east to west, the forests become narrower and lower and often less dense. Dominant trees include hackberry, cottonwood, willow, and elm. A variety of fruit and berry-producing shrubs–chokecherry, wild currant, gooseberry, plum, and grape–were also present.

This vegetation supported a variety of animals and birds, many of which were exploited directly by humans. Bison, elk, deer, and antelope were present in abundance along with the Plains grizzly, black bear, wolf, coyote, cougar, wildcat, swift fox, black-footed ferret, badger, beaver, otter, porcupine, raccoon, prairie dog, tree squirrel, jackrabbit, cottontail, and numerous smaller rodents. Quail, wild turkey, prairie chicken,

and grouse were available throughout the year along with ducks and geese in appropriate seasons and locations. According to Wedel (1959:12), the region could furnish "an abundance of food" for peoples wholly or primarily dependent on a hunting and gathering economy. In comparing the area to the High Plains, Wedel (1959:13) points out,

> ... there is here [in the Dissected High Plains] an increased and surer yearly precipitation, averaging from 22 to 30 inches or more; and this, added to fertile valley bottoms, relatively plentiful wood for fuel and building, water, and convenient flood-free terraces well suited for village locations, made the region an attractive one for native, as for the later white, farming peoples.

The natural ecology of the region has been greatly altered by modern land-use practices. Today, most of the lands within the central part of the state are used for agricultural purposes, primarily the pasturing of cattle and the cultivation of crops such as wheat, corn, milo, and soybeans.

Within the 14RC5 site area, all of the land is currently cultivated except for the waterways. According to the landowner, even the waterways have been plowed in the past, and erosion has been a constant problem due to the "soft and sugary" nature of the soils. As noted earlier, the eastern waterway that is the subject of this report was choked with tall grasses and weeds. The terraces that fed into the waterway became seriously eroded, and some of them essentially "collapsed" in the mid 1990s; that erosion, along with the dense vegetation, resulted in nearly a foot of silt being deposited over the upper portion of the waterway.

In terms of its geomorphic setting (see Figure 1), 14RC5 is located on the edge of the upland overlooking Cow Creek valley. Soils on the crest and slopes of the upland are classified as part of the Geary series. These soils formed in reddish, moderately fine-textured loess (Horsch 1974). The crest of the upland is classified as Geary silt loam, 1-3 percent slopes, while the drainageways and steeper slopes of the upland are classified as Geary-Clark complex, 3-7 percent slopes, eroded. In a representative profile of Geary silt loam, the surface layer (A horizon) is about 10 inches (25 cm) thick and consists of dark brown heavy silt loam overlying dark brown light silt loam. The subsoil, or B horizon, extends from 10 to 44 inches (25-112 cm) below surface and includes 8 inches (20 cm) of dark brown firm silty clay loam overlying 14 inches (36 cm) of brown firm silty clay loam that in turn overlies 12 inches (31 cm) of brown light silty clay loam. The substratum (C horizon) is reddish-yellow light silty clay loam (Horsch 1974).

Cultural-Historical Setting

Archeologically, research in central Kansas has yielded evidence of prehistoric human occupation dating from around 11,000 years ago and extending up to the modern era and certainly has the potential for yielding more such evidence. Sites in the region usually represent habitation areas or small workshops and more rarely occur as villages or burials. While the full extent of the area's archeological resources has yet to be determined, it is clear that the central part of the state contains materials deriving from all of the major cultural periods thus far identified in Kansas:

Paleoindian	circa 9,000 to 7,000 B.C.
Archaic	circa 7,000 B.C. to A.D. 1
Early Ceramic	circa A.D. 1 to 1000
Middle Ceramic	circa A.D. 1000 to 1500
Late Ceramic	circa A.D. 1500 to 1800
Historic	A.D. 1541 to present

The list consists of broad and somewhat artificial categories, and there is some temporal overlap between periods. As might be expected, more is known about the most recent inhabitants than is known about the earliest (Brown and Simmons 1987; Lees 1989; Thies 1987; Wedel 1959).

The Malone site has long been recognized as a Late Ceramic (or Protohistoric) village site. More precisely, Wedel (1959:323-343; 571-589) identified it taxonomically as a manifestation of the Little River focus of the Great Bend aspect, which is considered to be the protohistoric equivalent of the historically documented Wichita Indian tribe. In fact, 14RC5 is one of the three type sites that Waldo R. Wedel of the Smithsonian Institution used to define the Little River Focus. From an archeological standpoint, the site is particularly notable in that it is one of only two major Great Bend aspect village sites located along Cow Creek in Rice County. (The other village site is the Saxman site [14RC301], located about 10 miles downstream, as shown in Figure 2.) The Malone site is also important from a historical standpoint, as Wedel considered that it likely was one of the "Quivira" villages visited by the Spanish explorer Francisco Vàzquez de Coronado in 1541 during his epic journey in search of the fabled Seven Cities of Gold. Coronado's *entrada* is believed to have been the first encounter between Europeans and any of the native Kansas Indian tribes.



Figure 2. Map of Rice County, showing the locations of selected Great Bend aspect village sites.

The Malone site was occupied during the Late Ceramic period, which is defined as the time of initial contact between Native American populations and European explorers and entrepreneurs, a time period usually considered to extend from roughly A.D. 1500 to 1800. Indigenous populations of this period were able to gather into large villages because of reliable agricultural production coupled with an abundance of bison. In central and south-central Kansas, archeological remains from this time period are primarily those of the Great Bend aspect. The Great Bend aspect is a relatively well-known archeological entity, largely through Wedel's pioneering investigations.

Taxonomically, the Great Bend aspect has been divided into two foci: Little River focus, centered in McPherson and Rice counties of central Kansas, and Lower Walnut focus in south-central Kansas, primarily Cowley County (Wedel 1959:377-379). The Little River focus has been the subject of considerable archeological investigation, usually considered to begin with Johan A. Udden's work at the Paint Creek site in the 1880s (Hawley 2002; Udden 1900). A comprehensive discussion of the Little River focus is beyond the scope of this paper; however, a variety of publications are available for researchers interested in this subject and the larger topic of the Great Bend aspect and Wichita ethnohistory (Hawley and Blakeslee 2003). Especially useful is an article by Dr. Susan Vehik (2002) of the University of Oklahoma, which presents a succinct summary of what is known about Little River focus, tracing its development as an archeological construct and as a protohistoric cultural entity.

Earlier Investigations of the Malone Site

The Malone site was described as early as 1873 in a paper presented at a meeting of the Kansas Academy of Science, so the presence of the site has long been a matter of factual knowledge for interested scientists (Wedel 1959:324). Likewise, local artifact collectors are sure to have known of the site, and it can be assumed that some of those collectors carried out excavations at the site. Their activities are essentially undocumented, with the exception of Wedel's statement that the site is known to have been one of several Little River focus sites subjected to "considerable digging" in the late 1920s, when local investigators attempted to find proof to verify their claim that the Malone site and other Rice County sites were the villages visited by Coronado (Jones 1929, 1937; Wedel 1959:325).

In 1940 the Malone site received its first substantive scientific investigation, with this work being directed by Wedel under the auspices of the Smithsonian Institution. Unfortunately, the investigation

amounted to little more than "exploratory activities," according to Wedel (1959:325), because the landowner imposed "rigid restrictions" that made it "impossible to make a thorough surface survey or to test freely for the most likely refuse areas." Despite those difficulties, Wedel was able to excavate five trash-filled storage pits and a portion of a trash mound, recovering a sizable amount of artifacts and other archeological materials. Examination of an unplowed pasture revealed the presence of several notable features, including two low mounds, several clusters of small depressions, and two large basins that suggested the possibility of shallow habitation structures. In the cultivated field just north of the pasture, plowing revealed the presence of "literally scores of trash-filled pits," causing Wedel (1959:329) to express his belief that these undoubtedly "occur by the hundreds" on the site.

The archeological materials recovered by Wedel from the 14RC5 were quite similar to those he found at two other Great Bend aspect village sites, the Tobias site (14RC8) and the C. F. Thompson site (14RC9), which were more intensively excavated in Rice County that same year. The Malone site produced food remains in the form of corn, one bean, and numerous animal bones, consisting of primarily bison but also dog, deer, and smaller animals, along with turtle. Mollusk shell fragments were also found—probably representing food remains—along with one ornament, a whole shell pendant. More than a thousand pottery sherds were discovered, including one Puebloan sherd. Worked bone and antler tools were present, including numerous fragments of broken bison scapula digging tools, along with awls and scored bone—one of them possibly a musical rasp, another possibly a paddle used for making simple-stamped pottery. Chipped stone projectile points, drills, beveled and unbeveled knives, end scrapers, and side scrapers were recovered, including some made of obsidian, a non-local volcanic stone probably procured from somewhere in the Rocky Mountains. Ground stone items included grooved mauls, grinding slabs, shaft smoothers, a discoidal "rubbing stone," and several lumps of hematite with striations suggesting that they were used to produce pigments used in making paint.

The Puebloan sherd found in Wedel's excavations was badly fire-blackened and was not submitted to Southwestern pottery experts for examination. Wedel (1959:332) based his identification of the sherd as Southwestern or Puebloan on a band of glaze paint and further stated, "In view of the cultural similarities and probable contemporaneity of the [Malone] site with [C. F.] Thompson (14RC9), where more glaze-paint sherds were covered, the sherd is probably of the same Rio Grande type there represented." The four glaze-paint sherds from the Thompson site were examined by Southwestern pottery experts and identified as Mera's Group E or Kidder's Glaze IV at Pecos Pueblo (Wedel 1959:308-309). Mera and Kidder agreed that a date of A.D. 1525 to 1650 would be most likely, although Kidder preferred to place them prior to 1550 (Wedel 1959:309).

Additional temporal information was gained by examination of seven Southwestern sherds reportedly recovered from the Malone site by collector William C. Bond of Hutchinson. The Bond collection was examined by Dr. A. E. Dittert, Jr. of the University of Arizona and described in an article by Marc D. Rucker (1971) of Mississippi State University. With the exception of one specimen, the sherds indicated a date range from A.D. 1425 to 1650. Dittert identified the exceptional sherd as Santa Fe Black-on-white, dating from A.D. 1225-1350, while another authority, Dr. Fred Wendorf of Southern Methodist University, identified it as Pindi Black-on-white, dating from ca. A.D. 1300-1350. Rucker postulated that the Santa Fe or Pindi Black-on-white resulted from "antique collecting" and thus did not truly reflect the Malone site occupation. He interpreted the remainder of the sherds as hinting at a partially pre-Coronado occupation. Pointing to the fact that Wedel found almost no Euroamerican artifacts at 14RC5 (only one piece of iron was found, and it appeared to be intrusive), Rucker (1971:5) concluded, " it is tempting to suggest that a major portion of the occupation of the Malone site predates slightly the appearance of the Coronado entrada on the scene."

In a later article Wedel (1982) presented information on some other Southwestern artifacts that were found at the Malone site; like the sherds discussed by Rucker, Dittert examined these artifacts. A pottery pipe, found by Virgil Pangborn of Wichita, was thought to date from the period A.D. 1475-1550. Seven Southwestern pottery sherds, found by Ralph Thode of Plevna, Kansas, were examined; most were identified as dating from A.D. 1450-1490, but two were identified as dating from A.D. 1525-1650, and one from A.D. 1650-1700. In discussing these results with those reported earlier by Rucker, Wedel (1982:148) concurred with Rucker in noting that "... these sherds suggest a somewhat earlier time period than do most of the puebloan pieces from the Rice County locality, and it may be that the Malone Site merits special attention from archaeologists as a likely pre-Coronado 'Quiviran' (Great Bend Aspect) community."

Quite different conclusions were reached by University of Kansas graduate student Byron Loosle

in his 1991 doctoral dissertation, which contained a detailed analysis of the artifacts from two Great Bend aspect habitation sites in Rice County: the Major site (14RC2) and Hayes site (14RC306). As part of his analysis of the pottery sherds that had been acquired at those two sites, Loosle (1991:146-150) compared his results with similar data presented by Wedel for the Malone, Tobias, and C. F. Thompson sites. Loosle's analysis of the Great Bend aspect ceramic assemblages from these five sites led him to conclude that the Malone site may have been occupied at a later time than the others.

More specifically, Loosle inferred that if the ceramic seriation for the other four sites was also valid for the Malone site, then the evidence recovered in Wedel's excavations at Malone is probably from a late seventeenth- or early eighteenth-century occupation. This conclusion is apparently based on three observations: simple-stamped pottery was "very common" at the Malone site (much more so than at the other sites); Geneseo Red-filmed pottery was not found there; and a relatively high percentage of Cowley Plain pottery was present at 14RC5. These observations drew upon three assumptions: the use of simple-stamped pottery "appears to increase" through time at sites of the Little River focus; the frequency of Geneseo Red-filmed pottery "may decrease toward the end of the Great Bend occupation"; and Cowley Plain pottery, which is identified with the Lower Walnut focus, has a "small, but increasing prevalence" at Little River sites, perhaps because the Lower Walnut focus lasted slightly later in time than the Little River focus. Loosle qualified his conclusions, however, noting that the characteristics of the Malone site ceramic assemblage might be a result of the comparatively limited excavations conducted by Wedel. He also remarked that the Malone site might be somewhat different from the other four sites simply because it is spatially removed from those sites, all of which are located several miles to the east on the Little Arkansas River, as shown in Figure 2.

Strangely, Loosle made no mention of the sherds discussed by Rucker. He did discuss the Southwestern sherds described in Wedel's 1982 article but dismissed their importance in dating the site. He pointed to the wide variation in dates, which he believed could indicate curation of pottery vessels by the inhabitants of the Malone site, multiple occupations, or even confusion on the part of the collector. Loosle (1991:150) concluded that the information provided for the Southwestern sherds "is not particularly helpful in dating Wedel's collections made in 1940, except to indicate there is a late occupation (post A.D. 1650)."

As is apparent from the discussion above, scientific studies of the Malone site have consisted primarily of Wedel's 1940 excavations, followed by a variety of ceramic analyses. In addition to these studies, 14RC5 received attention of a different sort in the early 1970s, when KSHS staff distilled the available information into a National Register nomination form that led to the site being listed on the National Register of Historic Places in 1972. As part of this research, it came to light that a site survey report form had never been filled out for the site; therefore, the State Archeologist submitted a form in 1971.

As detailed earlier in this report, in 1978 KSHS archeologists conducted limited survey and testing at 14RC5 in connection with a SCS-assisted project designed to prevent erosion through the construction of terraces and waterways. At that time a pasture was present as described by Wedel in 1940, but it appeared that the pasture had been plowed at some time in the past. The one-day investigation found no evidence of any significant archeological remains in the areas that were to be affected by the proposed construction.

As previously described, in 1995 the author conducted a Phase II survey of the Malone site, focusing on the waterway that is the subject of this report. By then the pasture was no longer in existence, and all of the site area, except for the waterways, was under cultivation. Conversation with the landowner indicated that the pasture had been plowed in 1978, almost immediately after construction of the terraces and waterways (Thies 1995).

Roughly a year later in 1996, the author again visited the site vicinity to conduct a Phase II survey of a small portion of land located in the Cow Creek valley a short distance north and west of the uplands on which the Malone site is located. This survey, carried out for the Farm Services Agency (Thies 1996), included an extensive on-the-ground interview with Jeff Monroe. This lifelong resident grew up barely a half mile from the site and spent many years collecting artifacts from the Malone site, especially in the 1950s and 1960s. Monroe was well acquainted with all of the "hot spots" on the 14RC5. As a youth, he made money by selling "arrowheads" to the museum in Lyons, and this naturally prompted him to learn all the best places for finding artifacts, as well as the locations where things were not found. The information provided by Monroe, coupled with the data gained from the 1995 Phase II survey (Thies 1995), clearly indicated that the Malone site had been mapped incorrectly by previous researchers. In the earlier maps the site was shown as extending much farther to the north and northwest than was actually the case.

Monroe was adamant in claiming that the southern

boundary of the Malone site was nothing more than an arbitrary interpretation based on property lines. The half-section line forms the southern boundary of the Malone site, but in actuality archeological materials continue to the south and southeast without a break. For various reasons the southern area received a separate site designation of 14RC413; in reality there is actually only one large village site, consisting of the Malone site on the north and 14RC413, also known as the Boys Town site, on the south, with the half-section line forming an arbitrary distinction between the two, as shown in Figure 1.

As an addendum, researchers with an interest in the Malone site should keep in mind that the KSHS has two relatively large collections of artifacts from the site, donated by local collectors Parker Parrish and Dave Polson. Parrish was active in the 1950s, 1960s, and 1970s, while Polson acquired his collection more recently. Neither of these collections has been analyzed, and both of them constitute an excellent opportunity for future research.

Research Methods

The 1996 investigation consisted of monitoring earthmoving activities and resulted in the identification of several subterranean features, primarily trash-filled storage pits. Artifacts and other archeological materials that were dislodged by earthmoving or in locations that would be disturbed by plowing were collected, and the features were marked so that future researchers could relocate them.

Initially local NRCS Area Cultural Resources Coordinator Baron Shively carried out the monitoring. Shively was well suited for the task, having received formal instruction in Kansas archeology during a three-day training session for NRCS employees conducted by KSHS archeologists. As a member of the Kansas Anthropological Association (KAA), Shively also had gained valuable practical experience participating in several major excavations, surveys, and laboratory processing projects directed by KSHS archeologists as part of the Kansas Archeology Training Program.

Shively's primary task during the Phase II monitoring investigation was to watch carefully for buried features as heavy equipment stripped away the soil within the waterway. A belly loader and a road grader were used to do the earthmoving. Prior to beginning the work, the machine operators were cautioned that there was potential for finding archeological features and that the features would need to be avoided if they were found.

Work commenced on Wednesday, October 9, 1996. As the machines stripped away the soil, Shively walked behind them, searching for archeological evidence. The process was soon found to be successful in locating buried features, especially as the plow zone was removed and the light tan- or orange-colored subsoil was exposed. Although most of the former living surface obviously had been destroyed by years of cultivation and by previous waterway and terrace construction, several discrete subterranean features were soon seen, with their darker soil and the presence of charcoal, burned earth, artifacts, and other archeological materials standing in sharp contrast to the lighter colored, culturally sterile subsoil.

Shively marked the feature locations with pin flags and made sure that the machine operators avoided them. Although the construction plans called for a deeper waterway, the excavation that had already occurred (i.e., removal of the plow zone and an inch or two of the underlying subsoil) was sufficient to achieve the minimum depth needed in the location of the archeological features, so no further excavation was carried out there. This fortuitous occurrence was matched somewhat later when it was realized that the ground had been sufficiently scarified by construction and contained enough loose dirt that it would not be necessary to plow or disk the ground afterward to permit seeding of grass. Unfortunately, it was later learned that the landowner probably would plow the ground on his own.

After ascertaining that several intact features were present and that they would be safe from any harm, Shively followed standard NRCS operating procedures and immediately notified Kenneth Sherraden, the NRCS state Cultural Resources Coordinator. Sherraden then contacted the State Archeologist to officially request that KSHS archeologists conduct appropriate investigative actions as soon as possible, as required by the goals and procedures of the Cooperative Agreement.

Assistant State Archeologist John D. Reynolds arrived the next morning. Assisted by Shively, two local NRCS employees, and a KAA volunteer from Topeka, Reynolds delineated the area in which intact cultural remains were present and designated it as Area 961 (A961). He then put the crew to work with shovels and trowels, lightly skimming the ground surface so that all of the exposed features could be detected and clearly defined. Soil core probes were used to determine the depths of the features. Feature forms were filled out, enabling numbers to be assigned to each of the features. Archeological materials dislodged by the earthmoving and archeological investigations were collected. Reynolds returned to Topeka that evening,

and the next day the author took over the continuing investigation, assisted by Shively.

Several features present below the plow zone and scattered across the site—many too small and amorphously configured to merit formal feature designations—were found to be thin, irregularly shaped lenses of material, probably the bottoms of shallow natural depressions or borrow areas that had been truncated by the plow and/or the waterway enhancement. Hereafter these simply are referred to as pockets. Most of these features were relatively small or only a few centimeters thick and had been disturbed to varying degrees. In talking with the landowner, it was learned that he had no regard for "that sort of stuff" and would someday plow this ground, thereby destroying these features. Consequently, most of these pockets and some of the designated features were excavated completely, and all of the associated archeological materials were collected. Feature 2009 (F2009), for example, although relatively large in horizontal extent at 2 m in diameter, was not particularly thick, extending to a maximum of 15 cm below the graded surface. Because it appeared to be rich in archeological materials and had potential for yielding significant data and due to the likelihood that the feature would be destroyed by plowing if left in place, F2009 was excavated in its entirety. On the other hand, one other similarly sized pocket (F2010) extended up to 28 cm below surface in some places; this feature was too large to remove easily, and it was left unexcavated.

Because of the presence of archeological materials and the danger of future plowing, combined with the fact that some materials had been dislodged by earthmoving, limited excavation was carried out on two trash-filled storage pits, F2006 and F2007. Both pits were excavated to a depth of 15 cm below the graded surface.

Even though deep features could not be quickly excavated in their entirety, it was realized that there was no need to excavate them, as they would not be subjected to any further disturbance other than plowing. However, their locations needed to be documented and marked in some way so that future researchers could find them. On Wednesday, October 16, 1996, the author and two other KSHS archeologists, accompanied by Sherraden, returned to the site to map and mark the features. To prevent these features being found by pothunters, the manner in which they were marked is considered confidential and available only to qualified researchers.

After the fieldwork concluded, all of the recovered archeological materials were taken to Topeka and processed (washed, catalogued, etc.) in the KSHS archeology laboratory, where they now are curated. Analysis was carried out by the author, with assistance from specialists in the fields of paleoethnobotany (Dr. Mary Adair, who examined a piece of corncob) and faunal analysis (Cherie Haury, who identified some of the animal bone). The author carried out most of the faunal analysis, using the KSHS osteological comparative collection. Radiocarbon dating was done by the Radiocarbon Dating Laboratory at the Illinois State Geological Survey.

Archeological Features in Area 961

The area in which features were found during the Phase II monitoring investigation was designated as A961. This area was confined to the waterway, which varied greatly in width, ranging from approximately 10 m wide in the north to nearly 50 m wide in the south. A961 was approximately 41 m long, oriented roughly north-south. It was located in the uplands at the extreme north end of the waterway, at which point several agricultural terraces come together to divert rain water into the waterway.

Ten features were designated during the investigation. These included six trash-filled storage pits, one large feature interpreted as a possible pithouse, and three pockets, two of which were excavated. The features are described in Table 1.

Recovered Archeological Materials

The 1996 investigation resulted in the recovery of a variety of archeological materials. The artifact assemblage includes pottery, worked bone, chipped stone, and ground stone. Non-artifactual archeological materials include charcoal fragments and food remains. The latter consists primarily of bison bone and turtle bone but also includes one bird bone and corn.

All the material recovered in the 1996 investigation was found in primary context in the sense that it was from below the plow zone. A small amount of material had been moved about or otherwise disturbed by earthmoving. Nevertheless, most of it was literally in situ within F2009 or one of the many other pockets or within the upper 15 cm of two trash-filled storage pits (F2006 and F2007) that underwent limited excavation.

The analysis was organized by standard material categories: pottery, chipped stone, ground stone, etc. However, it is also instructive to consider the amount

Table 1. A961 Features.

Feature	Type of Feature	Depth below Graded Surface	Horizontal Shape & Dimensions	Comments
F2002	Pocket	1-5 cm	Irregularly oval, 400 x 250 cm	Totally excavated; no artifacts
F2003	Possible pithouse	79-90 cm	Oval, 350 x 200 cm	
F2004	Pit	50+ cm	Circular, 100 cm diameter	
F2006	Pit	103+ cm	Circular, 125 cm diameter	Upper 15 cm excavated
F2007	Pit	53 cm	Circular, 150 cm diameter	Upper 15 cm excavated
F2009	Pocket	5-15 cm	Irregularly circular, 200 cm diameter	Totally excavated
F2010	Pocket	10-28 cm	Irregularly circular, 200 cm diameter	
F2011	Pit	94+ cm	Circular, 100 cm diameter	
F2012	Pit	66 cm	Circular, 100 cm diameter	
F2013	Pit	97+ cm	Circular, 125 cm diameter	

and range of materials by provenience within the three specific features that were wholly or partially excavated.

The upper portion of storage pit F2007 contained only a small amount of bison bone. Most of the bone consists of unidentifiable fragments, but a rib midsection and the distal end of a femur were identified.

The upper portion of storage pit F2006 had a comparative abundance of material, including pottery and chipped stone, along with a corncob section, a few fragments of bison bone, two bits of burned earth, and five unworked pieces of Dakota sandstone. The pottery sherds—1 rim sherd and 12 body sherds—are sand tempered and represent the remains of at least three different vessels. More notably, one of the sherds is cord roughened and is believed to have a Central Plains tradition cultural affiliation. The chipped stone consists of one crude biface, two retouched flakes, and six waste flakes, made of jasper, Alibates agatized dolomite (hereafter referred to as Alibates agate), Flint Hills chert, and other cherts of indeterminate sources. The bison bone includes a distal metapodial fragment and a carpal bone, along with 12 long bone fragments.

F2009, the relatively large and artifact-rich pocket that was excavated in its entirety, yielded an abundance of material. The artifact assemblage consists of pottery, chipped stone tools and debitage, a section of a Dakota sandstone arrowshaft abrader, and two pieces of worked bone. The pottery consists of 85 sherds, representing one shell-tempered vessel and at least three (possibly as many as five) sand-tempered vessels. Most of the sherds (72) belong to a single sand-tempered vessel. The chipped stone is jasper, Alibates agate, and cherts from indeterminate sources and includes two formal tools: a crude biface and an alternately beveled knife midsection.

F2009 also produced a few pieces of burned earth and one small mussel shell fragment, along with a variety of unworked bone, including one bird bone (apparently from a Green Heron) and several pieces of bison bone. Identifiable bison elements are a section of a left mandible, part of a scapula, the proximal end of a rib, a first phalanx, and some 42 long bone fragments. F2009 also yielded a relatively large amount of turtle bone, representing a rather astounding total of at least 20 different turtles. These remains consist of plastron, one nearly complete carapace and a few elements of at least one other carapace, and seven postcranial elements: three ulnae (one left, two right), one right tibia, two pelvic bones (probably representing one individual), and one right coracoid section.

As noted above, the remainder of the materials came from non-specific locations. All of the material gained in the 1996 investigation, including the material from the three features discussed above, is grouped together for the following descriptions.

Pottery

The investigation resulted in the recovery of 121 pottery sherds. It should be noted, however, that 72 (approximately 60 percent) of those sherds are attributable to one vessel, a sand-tempered, simple-stamped pot found in F2009. For analytical purposes this item was labeled Vessel 6.

Certainly the biggest surprise to emerge from the pottery analysis was the discovery of two cord-roughened sherds that clearly appear to have a Central

Plains tradition cultural affiliation. They definitely are not examples of the cord roughening that has been documented on a small proportion of Little River pottery (compare Wedel 1959:242-243, 575). The more distinctive of these two sherds was found in one of the thin pockets that were exposed during the earthmoving. Best identified as a neck sherd, the specimen includes a small portion of the lower edge of the rim and a larger section of the shoulder of the vessel. The angle between the rim and shoulder is relatively acute, indicating an upright rim, well-defined neck, and flaring shoulder. The sherd is thickest at the neck (7 mm) and becomes somewhat thinner on the rim and shoulder. Surface treatment consists of a heavily smoothed (almost burnished appearing) interior surface and a smoothed-over cord-roughened exterior surface, with the exterior smoothing located primarily at the neck and oriented in such a way as to encircle the vessel. Analysis of the cord used to produce the cord roughening revealed it to have an S-twist. The sherd has a brown coloration and is sand tempered, but the tempering is relatively coarse and sparse—not the abundant fine sand that is a common characteristic of Great Bend aspect vessels. Taken altogether, this constellation of characteristics, along with the paste and overall "feel" of the specimen, clearly differentiates it from the Great Bend aspect sherds that constitute the bulk of the A961 pottery assemblage and enables this specimen to be identified culturally as an artifact of the Central Plains tradition. Assuming that it was made locally, the sherd can be regarded more specifically as a manifestation of the Smoky Hill aspect due to the geographic location. With this in mind, the sherd can be defined as an example of Riley Cord-roughened ware (Wedel 1959:183-184).

The other sherd also appears to be definable as Riley Cord-roughened. It is a body sherd, 7 mm thick, with coarse sand temper and a lightly cord-roughened exterior surface. Although the cord marking is faint, it appears to be a Z-twist, thus indicating that the sherd was from a different vessel than the neck sherd described above. The specimen was found in the upper 10 cm of trash-filled storage pit F2006.

The remainder of the pottery assemblage clearly appears to have a Great Bend aspect cultural affiliation and represents two wares: Geneseo Plain and Geneseo Simple Stamped (Wedel 1959:233-239). As shown in Table 2, sand was the predominant choice for temper, being present in all but 2 of the 119 Great Bend aspect pottery sherds. The two exceptions with shell temper are both body sherds; one was found in F2009, and the other was found in one of the pockets.

The Great Bend aspect sherds exhibit two exterior surface treatments–simple stamping and smoothing–enabling them to be categorized as either Geneseo Simple Stamped or Geneseo Plain. One of the shell-tempered sherds lacks its exterior surface and thus could not be counted, but of the 118 other sherds, more than two-thirds are simple stamped, as shown in Table 3. As mentioned before, this is a skewed total, as 72 of the simple-stamped sherds belong to Vessel 6. On the other hand, the total may be skewed in one other way, in that many of the sherds in the smooth-surfaced category are relatively small, and in some cases they are simply too small to exhibit any clear evidence of simple stamping.

Table 2. Temper in the A961 Great Bend Aspect Sherds.

Sand Temper	Shell Temper
117 sherds	2 sherds
>98%	<2%

Table 3. Exterior Surface Treatment of A961 Great Bend Aspect Sherds.

Simple Stamped	Smooth Surfaced
80 sherds	38 sherds
>67.7%	>32.2%

The small size of many of the sherds also makes it difficult to determine the number of vessels that are represented. Obviously, the two shell-tempered sherds represent at least one vessel or possibly two, judging from the fact that the sherds came from two separate proveniences. F2009 contained sherds from at least three vessels and possibly five or more; the F2006 sherds appear to represent at least three other vessels; and the various pockets contained sherds from at least four or five vessels, possibly more. In total the Great Bend aspect potsherds represent the remains of at least 11 vessels and quite possibly as many as twice that number. The two Smoky Hill Aspect sherds appear to represent two other vessels.

Only one Great Bend aspect pot, Vessel 6 from F2009, was represented by enough sherds that could be refitted sufficiently to enable a reasonable assessment of the vessel's size and other stylistic characteristics. Most of the base and the lower body of the vessel could be reconstructed, and some sections of the rim and shoulders of the vessel are also present. Judging from the evidence afforded by those sherds, Vessel 6 appears to have been a medium-sized vessel. It had an upright rim with a rounded lip, moderately

Table 4. Lithic Materials in the A961 Chipped Stone Assemblage.

Artifact	Obsidian	Alibates	Talequah	Jasper	Permian	Indeterminate
Points		1		1		
Beveled knife				1		
End scraper					1	
Bifaces		1				1
Retouched flakes		2	1	1	1	
Core					1	
Debitage	1	5	1	10	9	6
TOTAL (N = 41)	1	9	2	13	9	7

flaring shoulders, and a flat to slightly indented base. Portions of a riveted handle are present, indicating that the vessel had at least one and presumably two opposed loop handles that stretched from the neck to the shoulder. The vessel is lacking in decoration, other than the simple-stamped exterior surface treatment that is present over the entire vessel. On the rim the parallel ridges produced by simple stamping are vertically oriented. On the body of the vessel, the simple stamping was more haphazardly applied, and the ridges are angled in different directions and often cross one another. The height, width, and capacity of the vessel could not be determined from the evidence at hand, but the size of the flat base was clearly discernable (75 mm in diameter), and two adjoining rim sherds made it possible to estimate the size of the orifice (160 mm in diameter). The thickness of the base ranges from 5 to 6 mm. Thicknesses of the other Vessel 6 sherds range from 2.5 mm on a body sherd to a maximum of 8 mm at the neck. The overall average for Vessel 6 sherd thicknesses is 4.56 mm. Taking these various characteristics into account, Vessel 6 is definable as an example of the Geneseo Simple Stamped ware defined by Wedel (1959:237-239).

Thicknesses of the other A961 pottery sherds range from 3 to 7 mm with an average of 5.72 mm. When Vessel 6 is added into the equation, the Great Bend aspect sherds can be characterized as ranging from 2.5 to 8 mm in thickness with an average of 5.02 mm.

Chipped Stone

The A961 chipped stone assemblage consists of 41 specimens. Formal tools include portions of two projectile points, an alternately beveled knife, an end scraper, two crude bifaces, and five retouched flakes. In addition, 1 core and 29 pieces of debitage were found.

The assemblage is derived from several identifiable lithic sources. "Exotic" materials include obsidian (from the Rocky Mountains, probably New Mexico), Alibates agate (from the Texas Panhandle), and a white chert believed to be Talequah (from northeastern Oklahoma). Specimens of jasper from western Kansas and Permian chert from the Flint Hills are also present, along with several cherts of indeterminate sources. Table 4 compares the abundance of these materials.

The two projectile points are small, thin, triangular specimens, typical of the kinds of points found at Great Bend aspect sites and other protohistoric sites in Kansas. Both were found in one of the thin pockets. One is a midsection, measuring 3 mm thick, made of jasper. Due to the small size, it is uncertain whether the point was notched or unnotched. The other point, made of Alibates agate, includes the base and part of the midsection. It has side notches and a basal notch and is 2.5 mm thick and 13.5 mm wide at the base.

The alternately beveled knife was recovered from F2009. Made of jasper, it is a portion of a long triangular blade, best characterized as a midsection. It is 8.5 mm thick and has a maximum width of 31 mm. Due to the incomplete nature of the specimen, key characteristics of the original artifact are not present; it is unclear whether it was a diamond-shaped knife or had the side notches and short base that are distinguishing elements of many Great Bend aspect alternately beveled knives.

A simple uniface was found in one of the pockets. It is a midsection consisting of most of the proximal end of the tool and lacking its distal working end, but its overall shape strongly suggests that it was part of an end scraper. It is made of heat-treated Permian chert.

Two crudely made bifaces were discovered in F2006 and F2009. The former is an indeterminate chert; the latter is Alibates agate.

Five retouched flakes were found, two of them in F2009 and the others in three of the pockets. One is jasper, two are Alibates agate, one is Permian chert, and one is Talequah chert.

The single core was recovered from one of the pockets. It is made of heat-treated Permian chert.

The chipped stone debitage includes one piece of Alibates agate shatter and 28 waste flakes, the latter consisting of biface thinning flakes as well as primary reduction flakes. The debitage includes specimens of obsidian (1), jasper (10), Alibates agate (5), Talequah chert (1), and Permian chert (6), with four of the latter being heat treated. Six cherts of indeterminate sources are also present in the collection.

Ground Stone

A section of an arrowshaft abrader from F2009 was the only ground stone item in A961. More specifically, the artifact is one end of a broken abrader. Made of locally available Dakota sandstone, the artifact is 23 mm wide and 24 mm thick. It has a U-shaped groove approximately 10 mm wide.

Bone Tools

The A961 bone tool assemblage includes 10 items. The most notable specimen is a scored bison (*Bison bison*) bone (Figure 3) from F2009. Although scored bison ribs are relatively common finds at Great Bend aspect sites, this artifact is unique in that it is a portion of a hyoid bone, which is part of the assemblage of bones and cartilage that supports the tongue. More specifically, the artifact is fashioned from a stylohyoid, the largest of the various parts of the hyoid bone. It is from the right side of the animal. Thirty-two V-shaped score marks were cut along one long edge (the superior edge that would have been uppermost in the animal). In addition, several small thin cut marks are present on that edge and various portions of the lateral face of the bone, but these appear to be incidental modifications, probably butchering marks. In contrast to these more or less randomly located cut marks, the score marks were placed squarely on the edge of the bone, perpendicular to the long edge, and clearly were carefully and purposely placed. Although a few of the score marks are quite minimal, many of them range up to 1.0 mm wide and 1.0 mm deep. They are spaced from 1 to 5 mm apart, with most of the marks being 2-3 mm apart. The function of the specimen is uncertain, although–as with all scored artifacts of this nature–its use as a counting device or as a musical rasp are possibilities. However, microscopic analysis revealed no pronounced use wear as one would expect if the artifact had been used as a rasp.

The other nine pieces of worked bone appear to be bison and are clearly utilitarian in nature. The most distinctive of these specimens is a scapula "cleaver" (Figure 4) that was found in one of the pockets. The tool is 210 mm long and 50 mm wide. Breakage resulted in the loss of portions of the blade and handle; nevertheless, a heavily worn lateral blade edge and the purposeful removal of the spine clearly identify the artifact as a "cleaver." (Readers should remember that "cleaver" is a historical term of dubious value; although some cleavers may have been used as knives, most probably were employed as hand-held hoes or digging tools, much like trowels.)

The remainder of the worked bone is fragmentary and relatively uninformative. F2009 produced a distal end portion of a scapula hoe. The other specimens were found in pockets scattered locations through A961. Two exhibit polish indicative of use as hoes or digging stick tips, but they are such small fragments that neither their osteological nor functional identity can be determined with any certainty. Two other specimens that also have polish are somewhat larger; these appear to be scapula sections and are probably hoe fragments. Three other examples are scapula fragments; two of them are more specifically identifiable as sections of right scapulae. Although there is no polish on these three specimens, the spines have been removed, suggesting that they were altered for use as hoes. Similarly, one other piece is apparently part of a scapula. Numerous cutmarks suggest that it was altered for use as a hoe.

Other Faunal Remains

In addition to the bone tools described above, the A961 excavations produced a variety of unworked bone. These remains are derived from three sources: bird, turtle, and bison.

One complete and unbroken bird bone from F2009 was identified as a right carpometacarpus. The specimen is 43 mm long and has a maximum width of 10 mm and a median breadth of 6 mm. Species identification was accomplished through use of the KSHS osteological comparative collections and by examination of a standard reference, *Avian Osteology* (Gilbert, Martin, and Savage 1996). The bone tentatively was determined to be from a green heron (*Butorides virescens*), although it is somewhat large for that species, which is described as having an average carpometacarpus length of 37 mm (Gilbert, Martin, and Savage 1993:145).

The turtle remains from A961 are much more numerous, amounting to a total of 251 pieces of bone, many of them being complete elements. Five of these

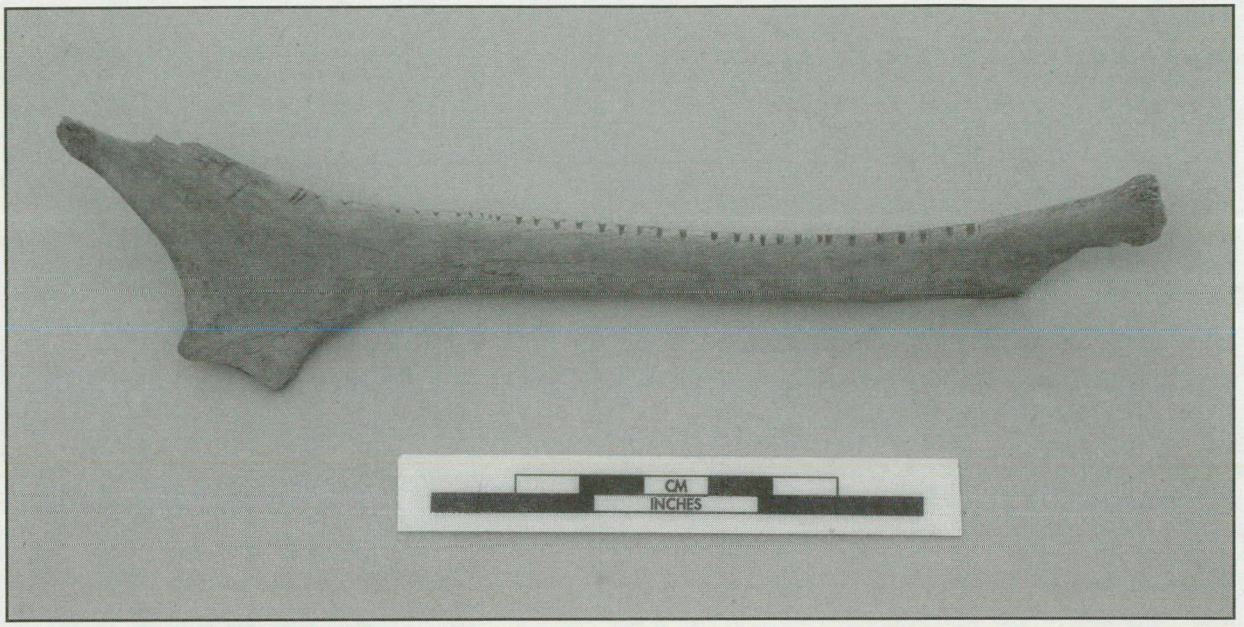


Figure 3. Scored bison hyoid bone.



Figure 4. Bison scapula cleaver.

bones—all carapace elements, including three pleural bones, one peripheral bone, and one vertebral bone—came from two pockets. The remainder came from F2009, with duplicated elements (20 xiphiplastron bones) indicating a minimum number of individuals (MNI) of 20 turtles within that feature. Because the five carapace elements came from two separate locations, it reasonably can be inferred that they represent at least two separate turtles. By combining that number with the F2009 data, the A961 faunal assemblage is determined to contain an MNI of 22 turtles. All of these appear to be identifiable as examples of the western box turtle (*Terrepene ornata*).

As indicated in Table 5, plastron elements account for most (163) of the 246 turtle remains in F2009. Carapace elements numbered 76, but fully half (38) of

Table 5. F2009 Turtle Elements.

Plastron Number	Element	Carapace Number	Element	Skeletal Number	Element
36	Unidentified fragments	38	One nearly whole shell	1	Ulna (left)
15	Entroplastron	1	Nuchal bone	2	Ulna (right)
6	Epiplastron (right)	5	Peripheral bones & fragments	1	Tibia (right)
8	Epiplastron (left)	33	Costal bones & fragments	2	Pelvic bones (one individal)
12	Hyoplastron (right)			1	Coracoid (right)
17	Hyoplastron (left)				
15	Hypoplastron (right)				
17	Hypoplastron (left)				
20	Xiphiplastron (right)				
17	Xiphiplastron (left)				
163		76		7	

those represented one individual, as they fit together to form one virtually complete carapace. Five of the other carapace elements (a nuchal bone, a right front peripheral, and three costal bones) also fit together, representing one other individual. The remainder of the F2009 turtle remains include seven skeletal bones: one coracoid, two pelvic bones of one individual, one right tibia, one left ulna, and two right ulnae. Evidence of burning was observed on several of the plastron bones, including one hyoplastron, one hypoplastron, and seven of the fragments that could not be more specifically identified. In addition, evidence of burning was observed on three carapace elements: a right front peripheral and the right and left front peripherals of the virtually complete carapace.

Bison remains also were relatively abundant, amounting to some 221 bones and fragments, most of them (163) being scattered about in the pockets. There were no notable concentrations, and virtually all of the material was fragmentary, making any estimation of MNI a meaningless exercise. Evidence of burning was confined to six small long bone fragments. Except for two unfused ephiphyses, which indicate young animals, all of the bone appeared to be from adult bison. Fragments of unidentifiable long bones accounted for nearly half (106) of the total remains, with rib fragments (70) accounting for another large portion. Most of the remaining elements were identifiable as leg or foot bones, along with nine scapula fragments and three vertebrae. Cranial elements included two skull fragments, one left mandible section, and two unassociated teeth.

Mollusk Shell

The mollusk shell recovered from A961 was minimal and uninformative, consisting of three small fragments that did not have the kinds of landmark features that would enable identification as to species. One fragment was found in F2009; the other two were found in two pockets.

Floral Remains

With the exception of charcoal, which is described separately, the A961 plant remains are limited to one small section of charred corncob (*Zea mays*) that was found in one of the several pockets. Dr. Mary J. Adair, a paleoethnobotanist at the University of Kansas, examined this fragment and determined that the specimen was from a 10- or 12-row ear of corn. She could make no further conclusions due to the small size of the fragment (Mary J. Adair, personal communication 29 December 2003).

Charcoal

Excavation of the upper 15 cm of trash-filled storage pit F2006 produced a small amount of wood charcoal. Numerous fragments weighed 5.9 grams. This material was submitted to the Radiocarbon Dating Laboratory at the Illinois State Geological Survey for assay. The resulting age determination was 360 ± 70 B.P. (ISGN-5546) and ^{13}C ratio of –24.5 per mil. The calibrated radiocarbon date, using the program CALIB REV4.4.2 (compare Stuiver and Reimer 1993) and

the calibration data set INTCAL98.14c (Stuiver et al. 1998), is between A.D. 1432 and 1657 at two-sigma variation. The median probability is A.D. 1546.

Summary Observations

Monitoring of the 1996 NRCS waterway enhancement at the Malone site succeeded in accomplishing its two-fold goal of locating and documenting subterranean features associated with the Great Bend aspect occupation of the site. Those features, truncated but still largely intact and undisturbed, included six trash-filled storage pits and one possible pit house. The features were marked to facilitate their relocation by future researchers.

The monitoring also located several shallow lenses of cultural material associated with the former living surface. These features were excavated because they would have been damaged by plowing or suffer from the depredations of local artifact collectors if left in place. With the same reasoning in mind, excavations were carried out on the upper 15 cm of two trash-filled storage pits that appeared to be particularly rich in artifacts and other archeological materials.

Although artifact recovery was not a primary goal of the monitoring, numerous artifacts and other archeological materials were collected. Chief among these finds was charcoal that produced a radiocarbon date, indicating occupation sometime between A.D. 1432 and 1657, with A.D. 1546 being the year of median probability. This is a significant piece of data for two reasons. First, this is the first, and so far the only, radiocarbon date to be obtained from the Malone site, which is one of only two major Great Bend aspect village sites on Cow Creek and one of the type sites used to define the Little River focus. Second, this radiocarbon date provides convincing evidence to support the belief that the Malone site was occupied at the time of Coronado's 1541 *entrada*, underscoring the likelihood that the Malone site was one of the villages visited by Coronado during his epic journey into the Land of Quivira.

Other notable finds included the scored bison hyoid bone, which marks a somewhat curious departure from the more common Great Bend aspect practice of scoring ribs. In contrast to this find, the various materials that make up the remainder of the A961 archeological assemblage are relatively ordinary, consisting of tools and food remains that are common to many other Great Bend aspect sites. The number of turtle bones is somewhat remarkable, however. Twenty turtles in one feature seem rather amazing and certainly emphasize the Great Bend aspect predilection for this food source. The single green heron bone is also an extraordinary discovery, as bird bones are not common on Great Bend aspect sites, and green herons were not a common source of food, unlike ducks and geese. It is possible that green herons, and hence this bone, had spiritual significance in the Great Bend aspect culture. The fact that the bone was found in a trash deposit makes this conclusion questionable, however; its meaning, therefore, must remain a matter of speculation.

What is perhaps more noteworthy about the materials found at A961 is the lack of "exotic" artifacts, such as Southwestern pottery sherds and items of European origin. One obvious explanation for the lack of these materials is the relatively small size and scale of the A961 investigation.

Archeologically, it is also important to note the discovery of Central Plains tradition pottery at the site. It is uncertain whether this material derives from an actual Central Plains tradition (assumedly Smoky Hill aspect) occupation or represents a curio brought to the site by its later Great Bend aspect inhabitants. Although most of the known Smoky Hill aspect sites in Kansas are located farther north (the Smoky Hill River, roughly 30 miles north of the Malone site, is commonly regarded as the southern edge of the Smoky Hill aspect occupation area), the Malone site location is certainly not wholly out of bounds for a Smoky Hill aspect habitation site, especially a short-term camp site.

In this regard, it is important to note that another Smoky Hill aspect pottery sherd was found only a little over half a mile southeast of the Malone site, at a site known as 14RC401. Originally described as having a "Middle Ceramic" cultural affiliation, 14RC401 is located in a terrace just above the valley floor at the base of the same upland ridge on which the Malone site is located. A local artifact collector found the sherd, which clearly appears to be an example of Riley Cord-roughened, in a "cache pit" that had been exposed by roadwork, and he later donated this artifact and some associated charred corn kernels to the KSHS. He also reported the finding of a "diamond shaped knife" by another collector. Presumably, this was one of the alternately beveled, diamond-shaped knives commonly found on Middle Ceramic sites, including those of the Smoky Hill aspect (O'Brien 1984:117-118). This combination of culturally diagnostic artifacts in a cache pit, along with the terrace setting (most Smoky Hill aspect sites are located on terraces, not uplands) provides a convincing basis for interpreting 14RC401 as a Smoky Hill aspect occupation site of some duration, thus demonstrating that Smoky Hill aspect people did live in the area.

With 14RC401 in mind, there is some basis for concluding that the Riley Cord-roughened sherds at the Malone site derive from a Smoky Hill aspect group that occupied the site prior to its later occupation by Great Bend aspect peoples. On the other hand, both sherds came from Great Bend aspect trash deposits. Although it is difficult to arrive at a definite conclusion on this matter, it does seems more likely that the Smoky Hill artifacts are curios brought to the site from elsewhere, possibly 14RC401.

Despite the intriguing questions raised by the Smoky Hill sherds, it is the information pertaining to the Great Bend aspect occupation that is of greatest importance. The 1996 investigation enabled KSHS archeologists to gain a significant body of data pertaining to the Great Bend aspect occupation of the Malone site, with the most notable piece of data being the radiocarbon date, indicating an occupation around A.D. 1546 or within a time span extending from A.D. 1432 to 1657. In addition, investigators were able to document the location of several intact subterranean features associated with that occupation, thereby preserving that data for future researchers.

The 1996 work at the Malone site was indeed a rare opportunity, one that may never come again. Fortunately, archeologists were able to exploit the opportunity when it presented itself. One can only hope that at some time in the future, systematic excavation of the waterway features can be carried out, so that more can be learned about this site.

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Notes

Fossil Finds and Archeological Sites Reported in Manhattan's Newspapers

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The Kansas Anthropologist 25:145-147

While engaged in research on other topics, references to late Pleistocene faunal remains and archeological sites were gleaned from Manhattan-area newspapers. The items were collected in this paper with the hope that they might be useful in contemporary archeological research.

While doing research on aspects of the early history of Manhattan, the author read many rolls of microfilm of the community's newspapers. In that process occasional references to elephant or buffalo remains were discovered, revealing the presence of late Pleistocene fauna in the region. Also noted were references to archeological sites or excavations at sites by local people. The following is a listing of these references, compiled to expedite the research of contemporary avocational and professional archeologists.

Most entries dealt with Riley County, but sometimes discoveries near, but outside, the county were mentioned; a reading of the nearest local paper might reveal additional data. In a few cases the farm and where the materials were recovered is mentioned; unfortunately, in a number of cases one gets only general location information.

- In 1867 a mastodon bone consisting of part of the skull and nostrils was removed from Wolf Creek in Dickinson County (KR 9/28/1867:3).
- A mastodon bone was found 12 miles above Solomon on the banks of the Solomon River (MI 11/2/1867:3). Later it was reported that a mastodon "for Professor Mudge's cabinet" came from 20 miles above Solomon on the Solomon River 20 feet below the ground (MI 11/2/1867:3). The Professor Mudge mentioned in this item was Benjamin Franklin Mudge, state geologist from 1864 to 1879 and teacher of geology at the Kansas State Agricultural College (later Kansas State University) from 1865

Key to References

DMN = *Daily Manhattan Nationalist*, a Manhattan newspaper

I = *Industrialist*, the Kansas State Agricultural College weekly newspaper

JCU = *Junction City Union*, a Junction City newspaper

KR = *Kansas Radical*, a Manhattan newspaper

KSC = *Kansas State Collegian*, a college newspaper

KSHS = Collections of the Kansas State Historical Society

MC = *Morning Chronicle*, a Manhattan newspaper

MI = *Manhattan Independent*, a Manhattan newspaper

MM = *Manhattan Mercury*, a Manhattan newspaper

MR = *Manhattan Republic*, a Manhattan newspaper

MS = *Manhattan Standard*, a Manhattan newspaper

N = *Nationalist*, a Manhattan newspaper

until 1873. He published the first book on the geology of Kansas in 1866 and was the first president of the Kansas Academy of Sciences.

• Henry Schepp discovered a 5¼-pound petrified tooth near the mouth of Wildcat Creek, two miles from Manhattan (MS 8/28/1869:3). This was either mammoth or mastodon.

• While digging Mrs. Shortridge's cellar for a new store on Poyntz Avenue, "bones of a large buffalo were found" (N 9/12/1879:3). This location is near the Kansas River and presently is under the concrete of the shopping mall at the intersection of Kansas Highway 18 and Fort Riley Boulevard.

• "Last Friday Silas Mason discovered north of Bluemont what on investigation proved to be the remains of an elephant. Two teeth, two portions of teeth, and two tusks were taken out of the bank. One tusk measured nine feet and six inches in length. More particulars next week" (N 10/7/1880:4).

No "particulars" appeared in the *Nationalist* city newspaper, but the college *Industrialist* did report. Generally its location was probably between the north end of Bluemont Hill northwest of the juncture of the Big Blue and Kansas Rivers. Modern topographic maps show two ravine areas. The first is approximately 500 feet south of the Highway 24-Kimball Avenue intersection on the west side of Highway 24. This locale is at the bottom of the main core of Bluemont. The second ravine is west of Highway 24 but north of Kimball Avenue in a Kansas State University pasture, where a farm pond exists just at the north centerline of Section 6, T10S, R8E. The fossil remains were identified as *Elephas Americanus* by Professor George H. Failyer (I 10/16/1880:2), a Manhattan farmer and teacher. Failyer taught chemistry at the Kansas State Agricultural College, 1879-1897, and was an assistant in soil research for the U.S. Department of Agriculture, 1902-1911.

• "A mastodon bone, a lower thigh bone, was found three weeks ago on William Rehfeld's place in Moehlman's Bottom. It was 4 feet long, 18 inches in diameter. The animal was probably 15 feet in height" (MR 9/4/1890:1). The 1881 Riley County atlas recorded a J. W. Rayfield owning the land east of the Kansas River in the northeast quarter of Section 1, T11S, R7E in the Moehlman Bottom area. "Rayfield" is the only name approaching "Rehfeld" in Anglicized form. His farm abutted the Kansas River.

• The *Manhattan Republic* reported the find of two mastodon bones in 1904. "Two huge pieces ... were discovered in a ravine near the Republican River and north of Junction City. The large piece is a thigh bone and the other a 'hind leg'" (MR 4/28/1904:1).

Occasional references to archeological explorations are found.

• In 1899 the following was reported in the Milford gossip section: "Three of our most scientific anthropologists made a partial examination of an Indian mound found on Ed. Hill's ranch north of the city. Nothing was found except some human bones and some Indian pottery" (JCU 2/24/1899:7).

• "Dr. Blanchly and Mr. Savage have excavated the Mound on Bluemont Hill. Two skeletons, beads, arrowheads were unearthed" (N 11/28/1879:4).

• "The old Indian village (the Kansa) near Mr. Wells' was visited and mapped by Judge Adams of the KSHS while the circles were still visible" (N 4/16/1880:3).

• "Parts of three Indian skulls and bones were found 4 feet below surface in the alley near Chas. Tegmeier's. One shows evidence of a student's saw" (MR 3/20/1890:2). This area would be under Manhattan's mall today.

• Indian graves were encountered at Fort Riley under the gun sheds (MR 5/7/1903:1). Indian relics were found (MR 6/25/1903:1).

• In southern Geary County, bridge abutment excavations in 1903 exposed remains. Materials were encountered 8 feet below the surface and consisted of an ancient fireplace, buffalo bones, arrowheads, and even a bronze coin (MR 1/29/1903:5).

• In 1912 workmen excavating for the Gillett Hotel basement discovered human bones—a "perfect specimen of the thigh bone, several ribs in good-condition and the jaw bone of a human person." They were found 6 feet below the ground for the new hotel annex. Local surgeons thought that the bones belonged to an Indian "who perished in the drain of the Kaw or Blue river ... and that sometime later his remains were washed down into the bottom land" (MN 6/27/1912:1). The modern location would have been between Houston Street and the alley to the north and about 100 to 200 feet west of the curb of 4th Street. Originally this was part of the Kansas River floodplain.

• In 1926 Professor J. V. Cortelyou discussed the presence of Indian ruins by the Rock Island Bridge and up the Wildcat Creek about a half mile in length (KSC 3/26/1926:3). He also mentioned the ancient Kaw village east of town. The materials discussed on Wildcat Creek must relate to Smoky Hill phase remains, like the Griffing site excavated by Waldo Wedel and similar materials recovered by Kansas State University's archeology program in the 1970s and 1980s.

• In 1927 mention was made of pottery, arrows, pipes, and petrified corn on a farm near Oakhill in

southern Clay County (MM and DMN 9/6/1927:7). These remains were dug by J. P. Locke and Frank Dieter on the Ware farm. They discovered a lodge 50 feet in diameter. These materials appear to belong to the Central Plains tradition. Further data on the site comes from the Kansas State Historical Society (KSHS 17:862).

> The discovery of ruins of an Indian lodge on a farm near Oak Hill, in southern Clay county, recently led the two who unearthed the pottery, arrows, pipes, and petrified corn to believe that other ruins in Clay county will reveal additional lodges of an early civilization.
>
> J. P. Locke and Frank Dieter, Oak Hill businessmen, who have been excavating for Indian ruins for many years, made the discovery. The turning up of buffalo bones on the Ware farm caused them to start digging at the site of the lodge ruins. They found charcoal walls of a lodge building that had been fifty feet square. They concluded that the lodge had been burned by an enemy tribe.
>
> ONLY WALLS REMAIN
>
> The charcoal walls were about a foot in thickness. Apparently the lodge roof was of straw, for only the charcoal walls were found.
>
> More than fifty arrowheads and spearheads were uncovered with in the borders of the structure. Parts of at least twenty pots, all scorched by fire, were found. The pottery was of many shapes and designs but all of the same clay. A rub rock which Indians used for grinding meal lay in the center of the lodge. Grains of petrified squaw corn remained in the hollow. Several bushels of corn, burned black as charcoal but easily recognizable, were piled near-by.
>
> CHIEF'S TOMB NOW SOUGHT
>
> An Indian pipe, made of fine pottery, indicated the Indian had the beginnings of an art. The bowl was thin and frescoed—the work of a careful workman. A flint scraper, apparently used for the cleaning skins of animals, and a piece of stone worn smooth as if it had been used for sharpening arrows and spears, was also found.
>
> "We have heard that the grave of an Indian chief is somewhere in the neighborhood," Locke said. "We will try to find it, for it probably will reveal still more concerning the lives of the early Indians in this section of Kansas."

As mentioned, this is probably a Smoky Hill phase lodge.

- In 1934 two short articles reported that K-State students "unearthed a portion of the skeleton of a buffalo estimated to be 15,000 to 25,000 years old, four and one-half miles southwest of Manhattan ... within a glacial deposit." "The bones of the leg have been mounted and are 60 inches high. An arrowhead found with the bones is believed to have been the cause of the animal's death. The specimen will be on display soon in the college museum (MC 4/7/1934:1).

The *Manhattan Mercury* reported the same data except that the bones were under 10 feet of glacial deposits. A search of the *Kansas State Collegian* revealed no report of this work. An examination of a modern topographic map points to the area being somewhere between Odgen and the western area of the Manhattan airport's long southwest-northeast runway, south of which Seven Mile Creek enters the Kansas River. In this period archeology was not taught at K-State, but Dr. Arthur Sperry, a geology professor, did examine such sites. In July 1934 he was reported to be involved in research on ground water in Seven Mile Township (KSC, Summer School News, 7/13/1934:1). Seven Mile Creek enters the Kansas River 4.5 miles southwest of Manhattan; therefore, it is believed that the bison was discovered in the Seven Mile Creek locality.

- In 1935 five articles reported that Dr. Sperry and Professor Frank Byrne, both of the geology department, examined Indian burial remains encountered during construction of a county lake on the land of C. E. Fairman. The Manhattan topographic map shows Fairman Lake in the center of the [redacted] quarter of the [redacted] on Wildcat Creek. The remains were discovered while excavating the dam face. Seven skeletons with pottery were found (MC 1/20/1935:1; MM 1/21/1938:1; KSC 1/29/1935:1). The remains were sent to Dr. Fay-Cooper Cole at the University of Chicago, who said that the materials were "pre-White." The pottery was of "a late phase of Woodland" and some of the beads were Mississippian (MM 4/12/1935:1). Based upon these observations and personal knowledge of the archeology of Riley County, the author would suggest that they belonged to the Smoky Hill phase of the Central Plains tradition, a common type of cultural material in this area of Wildcat Creek.

Notes

Book Reviews

The Western: The Greatest Texas Cattle Trail 1874-1886

The Western: The Greatest Texas Cattle Trail 1874-1886. GARY and MARGARET KRAISINGER; foreword by TOM B. SAUNDERS IV; illustrations by VICKIE COOPER. Mennonite Press, Newton, Kansas, 2004. xviii + 373 pp., 7 appendices, notes, bibliography, list of maps, index. $40.00 (hardcover). ISBN 0-9754828-0-7. *Reviewed by* Mary Conrad.

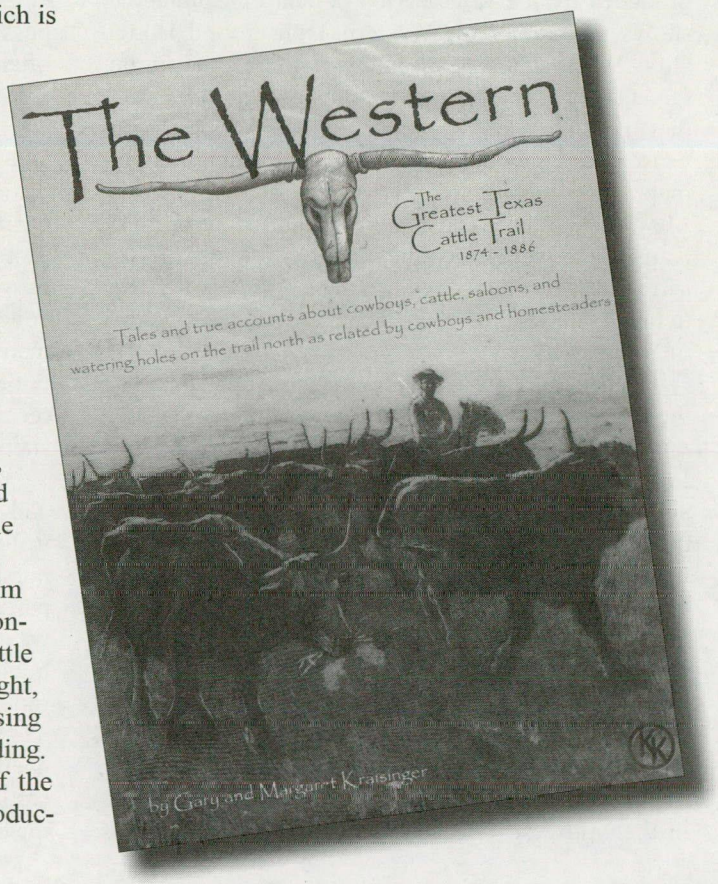
At first glance, Gary and Margaret Kraisinger's *The Western: The Great Texas Cattle Trail 1874-1886* appears to be a coffee table book. It is large—9 by 12 inches and about 1 inch thick. Sepia-colored sketches and historic photographs of longhorns, cowboys, and cow towns are scattered throughout. However, the dozens of maps, showing snippets of townships with indications of ranges within county after county, are clues to the serious nature of this book, which is the culmination of more than 30 years of detailed research.

In the late 1960s the Kraisingers set out to rectify an oversight they recognized in many history books and in popular culture. In the late 1800s, as the state of Kansas kept pushing the Texas cattle quarantine line farther west, drovers had to drive livestock farther and farther west for their northward treks. Thus, another trail called the Western developed. Somehow public knowledge of this trail largely fell between the cracks. Many do not know of this trail, and many consider this Western Trail to be the better-known Chisholm Trail. In fact, the authors tell of many historical markers and tourist promotions that label the Western as the Chisholm.

This basic confusion regarding the Chisholm and the Western trails is only the tip of the misconstrued history surrounding nineteenth-century cattle trailing. The Kraisingers try to set the story straight, delving into many misconceptions and discussing the controversy regarding names before proceeding. Thus, the reader becomes versed on history of the Eastern/Chisholm Trail while developing an introductory knowledge of the Western Trail.

The authors provide quotations from primary documentation to show that at least some nineteenth-century drovers used the term "Western Trail" for the routes farther west in the state. However, contemporaries used the names of Lone Star, Dodge City, and Dodge-Ogallala, just to name a few. A few of the names used for the Chisholm Trail during its active years include Longhorn Eastern, Caldwell, Abilene, and Ellsworth.

While many think of the Chisholm as a cattle trail from Texas to Abilene, Ellsworth, Caldwell, Wichita, and other towns, the Kraisingers use the term "Eastern/Chisholm." For purists the Chisholm Trail extends only from the Red River in Oklahoma to the mouth of the Little Arkansas River (now the Wichita area), as this was the route of an Indian trading trail established by trader Jesse Chisholm. When Joseph McCoy developed a cattle trail from Texas to Abilene, McCoy adopted the Chisholm as a portion of his new trail. The authors use primary sources to show that at least some, and perhaps many, drovers made this distinction, although other cowboys might have thought that they were on the Chisholm when they were on the Western and vice versa.



The Kraisingers admit that the controversy regarding appropriate appellation continues to this day. While they are in the purist camp—which applies the term "Chisholm" only to the section originally called the Chisholm Trail—they acknowledge that numerous professional historians, as well as others, think the term "Chisholm" should be used for the entire length of the Eastern Trail because of its long-standing popular usage.

Many of us certainly learned that the cattle trails ended in Kansas in Abilene, Ellsworth, Wichita, Dodge City, and other towns. Yet even this is a half-truth. The Kraisingers found statistics to indicate that more than half of the longhorns trailed north were taken beyond these nineteenth-century Kansas cow towns. Drovers went farther north due to traffic jams at Kansas shipping towns, intense rivalries with other rail towns, and buyers wishing delivery in the north. A trail boss might choose to go beyond Abilene to ship from another Kansas town, such as Waterville on the rival Central Branch Railroad, or go to Nebraska or beyond for shipping east, or deliver to ranchers and Indian reservations on the northern plains.

The Kraisingers describe a much more complex history of cattle trails than the public usually hears. A map in the *Official 2005 Getaway Guide* [to Kansas], produced by the Kansas Department of Commerce, shows the end of the Western Trail around Dodge City. While this is a commonly held misconception, the authors give statistics to support their contention that more than half the cattle on the Western Trail were driven beyond Dodge City. This book includes maps showing that the Shawnee, Eastern/Chisholm, Ellsworth Branch, and the Western all went north of Kansas into Nebraska or beyond. A trail boss driving a Texas herd to Canada or Montana was only halfway to his destination when his herd reached the outskirts of Dodge City.

When this Kansas couple embarked upon mapping the overlooked Western Trail, even they envisioned mapping only one route. As they diligently searched for references to cattle trails in a myriad of primary and secondary sources, they found that the Western moved west as the state declared new quarantine lines. In the end the Kraisingers mapped four routes of the Western Trail, some significant branches, and the National Cattle Trail (a route just inside the eastern Colorado state line).

Before the authors present documentation for the routes of the Western, a number of chapters provide background for a thorough understanding of nineteenth-century Texas longhorn cattle drives in the Midwest. Because so many misconceptions abound concerning this short but significant era of the American past, the Kraisingers explain the context of the nineteenth-century cattle-trailing era.

The authors wisely include a thorough explanation of the late nineteenth-century Indian wars on the southern plains. The last venue for Native Americans resisting placement on reservations was on the plains, both in the north and the south. As long as Indians could move at will across vast areas, they could be unpredictable impediments to Texas cattlemen wishing to drive cattle north. Fort Dodge and its auxiliary base, Camp Supply (later Fort Supply), located 90-plus miles south of Dodge City, dealt with the resisting Indians for a number of years. The last Indian wars in Kansas and Oklahoma occurred in the 1870s, just as the quarantine line and pressures from homesteaders demanded that cattle trailing move west. Thus, the end of these open Indian conflicts set the stage for the development of the Western Trail.

The relegation of some tribes to reservations in western Indian Territory (western Oklahoma) created known entities in specific places for the cattle herders. Native Americans could be upset by cattle crossing their assigned lands. Thus troops from Camp Supply/Fort Supply and Fort Dodge escorted many herds through various Indian reservations, but the numbers of herds far exceeded the supply of troops. Thus a trail boss himself might negotiate payment for passage, often one steer. Trail bosses who did not negotiate risked stampedes initiated by shunned Indians.

The overhead costs of paying Indians, settlers, and ranchers to cross their lands and/or to use their water were part of a much bigger picture: the big business of Texas cattle drives. The cost of driving a single longhorn north averaged around 50¢. A trail boss might make as much as $100 a month, while the cowboy often made around $30 a month. However, many longhorn owners amassed fortunes. Some of the middlemen (contractors) who found the buyers also received healthy cuts. Of course, the railroads that succeeded in attracting the most herds boomed.

A cattle herd might have 2,000 or more longhorns, and some exceeded 4,000. Eight to 12 drovers controlled a herd. Each cowboy needed from four to six horses, and he usually knew which ones were best for particular jobs. The most inexperienced cowboy often was the wrangler who moved and tended the extra horses, the remuda. The most experienced cowboys rode by the lead steers or alongside the herd.

Longhorns were especially skittish. If a stampede occurred, the lead drovers tried to turn the running cattle into a circle so they would stay together. When the livestock stopped from exhaustion, the men had to

look for any scattered longhorns with the appropriate brand. Once a lightning strike near Dodge set off a massive stampede of around 50 herds. The drovers worked for about a week sorting cattle into herds.

The drovers also tried to avert stampedes when very thirsty longhorns neared water. A trail boss preferred to water the animals about every 15 miles, but this was not always possible, especially the farther west the trail progressed. Sometimes the cowboys could not water a herd for 25 to 30 miles or even more, and then it was difficult to control the herd as it neared water. Sometimes cowboys deliberately created a stampede. If the water was "bad" or too salty, the drovers stampeded the herd through the water without drinking.

In the earliest days of cattle trailing, the herd owner did not provide supplies, so the drovers had to fend for themselves. However, chuck wagons soon became regular fixtures. The cook carried the food supplies and bedrolls. As the years passed and settlements pushed farther west, the cooks could find more settlers who sold foodstuffs and more stores and roadhouses along the way where supplies could be purchased. This also meant that the cowboys might find more places for refreshment. The Kraisingers point out that the roadhouses scattered all along the later trails are not part of the mythology of isolated trailing cowboys.

The total number of cowboys trailing north may have been around 35,000. I envisioned most cowboys going up and down the trails many times, but, according to *The Western*, only one in three went on more than one cattle drive. I frequently have heard that one-fourth to one-third of these drovers was African American. The Kraisingers give the statistic that about one-third of the cowboys was African American and Mexican, whereas I would have thought the combined numbers would have amounted to a higher percentage. Due to the many Hispanic cowboys, the Spanish term "vaquero" also was used to mean cowboy and drover.

Like the bison, longhorns naturally trailed in long narrow lines, so a moving herd might be only 200 yards or so wide. Because herds could be traveling parallel to each other about a quarter mile apart, a cattle trail could be a few miles wide, if the populace allowed. At times homesteaders plowed parallel furrows to indicate that the herds had to stay between those furrows. When the Kraisingers found documentation of such furrows, they included these on their maps.

With so many cattle traveling together, the animals kicked up tremendous amounts of dust, which often could be seen for 10 to 15 miles. Herds of horses also kicked up dust. The stereotype of a Texas cattle drive usually does not portray herds of horses; yet in reality, herds of horses also were driven north. Horses could be driven together or separately from the longhorn herds.

The Kraisingers mention the cattle trailed across Missouri or far eastern Kansas before the Civil War, but they focus on the 20 or so years of cattle trailing after the Civil War. Wrestling with the statistical inconsistencies they found, the authors deduce that more than half of the livestock trailed north in those years were on the Western Trail. After looking at a myriad of estimates, these researchers conclude that around 5 million longhorns and 1 million horses walked north on the Western from 1874 through 1886.

The authors incorporate a number of maps throughout the book. In their quest to identify trail routes, the Kraisingers searched many printed sources and archives. Of the many maps they found, they consider 12 to provide significant information for particular locales. Some of these maps had been published in local histories, and some were unpublished.

The Kraisingers also searched for clues in classic publications, as well as in many local histories. When reminiscences located cattle routes crossing or going near properties, they inspected land records to place the routes in particular locales. They also checked details within the memoirs to verify accuracy. One lady remembered a Crippen property 2 miles north of Buffalo Park, but land records showed that the property was only 1 mile north. Gary Kraisinger often looked for ruts to obtain corroborating evidence.

Using clues from maps, texts, and personal observations, Gary plotted routes onto maps, showing ranges within townships. The dozens of maps represent an extraordinary amount of detailed research that took years to accomplish. Within *The Western* the authors often present an overview map, drawn by Gary, and then provide many detailed township maps of particular routes or locales. The detailed maps not only show the routes, but also pinpoint particular ranches, homesteads, stores, watering areas, roadhouses, landmarks, and any other locations of note.

Maps included early in the book show the Cimarron Cut-Off connecting the Chisholm to the Western, as well as the relationship of the Western to Camp Supply and the military road. Various chapters cover routes from Dodge City north. The Hays City-Ellis Trail, 1873-1877, was a transitional trail during the time the Eastern/Chisholm had slowed down and the Western Trail was coming into use. An overview map of the Hays City-Ellis Trail is followed by detailed local maps of the route from Dodge north to Ellis with

a short fork to Hays City.

The Kraisingers provide a chapter on each of the four different routes of the Western, each route farther west than the last. The years delineated for these routes are as follows: Route 1 (1874-1877), Route 2 (1876-1882), Route 3 (1881-1884), and Route 4 (1883-1886). All four routes had the same basic approach into Ogallala, Nebraska.

The final route drawn in detail is the National Cattle Trail, a route just inside the Colorado border. This route, used in 1885 and 1886, was a final attempt to keep Texas cattle drives alive. However, the northern plains had reached a saturation point with cattle, other livestock breeds were gaining in popularity, and settlement continued to expand. The Western states sections of various cattle trails continued in use into the 1890s, but the Kraisingers' research indicates that all of this later usage consisted of shorter drives, not the long ones from Texas to the northern plains. While the National Cattle Trail was the final long distance cattle trail, the Western was the last significant one.

The authors synthesized an incredible amount of research to pinpoint the routes of the Western Trail as they evolved. To do this they had to look for pertinent details within many local histories, and they realized the value of local history! Without the data from the Red and Cimarron rivers in Oklahoma to Ogallala, Nebraska, the complexity of cattle trailing in nineteenth-century western Kansas and eastern Colorado would remain elusive. The details locate the places; reconstruct everyday life on the trail and in the towns; and recreate the communities of drovers who interacted with Indians, the military, homesteaders, ranchers, railroaders, other businessmen, and townspeople of many varieties. The many diary and newspaper excerpts help make nineteenth-century western Kansas come alive. The maps with specific locations help readers appreciate this heritage as part of today's complex region. While this period of cattle trailing from Texas to Kansas and beyond was relatively short, the Texas cattle business and the associated railroads significantly influenced the settling of more than a dozen states.

The Kraisingers themselves acknowledge that more research into nineteenth-century cattle trails is needed. They have filled in many details of the Western Trail, though they admit that there is still more to be found. Other aspects of the nineteenth-century cattle-trailing era that deserve in-depth research are the L. B. Harris Trail of 1873, mapping the trails north of Abilene on the Eastern/Chisholm Trail, buying of cattle by government agents for Indian reservations, loading and hauling cattle to slaughterhouses, and the cattle ranches north of Ogallala. We can hope that various researchers will pursue these topics with as much attention to detail as Gary and Margaret Kraisinger have done in *The Western: The Greatest Texas Cattle Trail 1874-1886*. As other people research various aspects of local history, *The Western* could serve as a model. Researchers who study trails, roads, and any other linear movements could use a progression of maps with accompanying detailed texts. Serious researchers should become acquainted with the bibliography in *The Western*, so they will know when they have found significant information not included in one of the sources cited by the Kraisingers. This volume undoubtedly will become a standard resource for those interested in nineteenth-century cattle trailing.

Pendejo Cave

Pendejo Cave. RICHARD S. MacNEISH and JANE G. LIBBY (editors). University of New Mexico Press, Albuquerque, 2004. xx + 526 pp., 76 halftones, 67 line drawings, 32 maps, 61 tables, references, index. $85.00 (hardcover). ISBN 0-8263-2405-3. *Reviewed by* Jim D. Feagins.

Pendejo Cave is a delightful tour-de-force that contains well over 500 pages of comprehensive information on a most extraordinary archeological site. The volume deals with a diversity of environmental and cultural topics, a few of which are quite controversial. Over the past decade at various conferences and informal settings, some members of the archeological community specializing in pre-Clovis research at times contentiously debated the earliest evidences of human occupation at Pendejo Cave.

This volume contains the results of most of the in-depth research produced by a diverse group of interdisciplinary researchers investigating the cave. Some of the environmental and cultural research is quite innovative. While the volume is a must-read for archeologists in the Clovis and pre-Clovis crowd, it contains much to interest students of the Archaic period and later cultures.

This reviewer is glad to see the term "Paleoamerican" used in the volume as well as seeing it appear more frequently elsewhere. MacNeish explains one of the reasons: "... Paleoamericans has been used in place of the more restrictive term Paleoindian. DNA

studies performed during the past few years strongly suggest that the earliest humans in the Americas belonged to mitochondrial DNA types other than the four major types represented by the Native Americans..." (p. 3).

Pendejo Cave is located in Rough Canyon in the basin-and-range province in south-central New Mexico, northeast of El Paso, Texas, and east of Las Cruces, New Mexico. The site is on the Fort Bliss Military Reservation at the northern edge of the Chihuahua Desert. Preservation in the very dry cave is excellent and within well stratified layers. These layers were dated with 75 radiocarbon dates, obtained from four different laboratories. Richard S. MacNeish was the site's principal investigator.

Most introductions to North American archeology contain several references to the work of MacNeish. Informally he went by the name of "Scotty." By the early 1950s he was pioneering studies in the origins of agriculture in the New World, especially working with early maize. He also helped in the development of interdisciplinary archeological research. In addition, his work at Pendejo Cave, along with other investigations in Alaska and elsewhere, placed him on the cutting edge of research concerning the earliest Americans. It is too bad that his *Pendejo Cave* volume was not published before his untimely death. He and Jane Libby had completed editing the manuscript just three weeks before his passing on January 16, 2001. He was almost 83. A tribute to Scotty, written by Barry V. Rolett, was then added to the volume. During his career MacNeish held many positions with various prominent institutions and conducted research in numerous foreign countries. He received much national and international acclaim.

At the age of 65, MacNeish "retired" as director of the Robert S. Peabody Museum of Archaeology. He promptly launched a nonprofit organization, the Andover Foundation for Archaeological Research (AFAR), and started projects in China and the American Southwest, including the research at Pendejo Cave. In 1990 MacNeish selected two caves to investigate on the Fort Bliss property. On this one, FB9366, he bestowed the salty name "Pendejo." From 1990 to 1992 this cave was excavated between the months of February and late April. A portion of the cave's strata remains for future researchers.

The volume, *Pendejo Cave*, is divided into three sections: "Paleoecology" (Chapters 1-7), "Evidence of Human Occupation" (Chapters 8-16), and "Conclusions" (Chapters 17-19). Often in a volume of this size and diversity of topics and fields of research, it is difficult to tie certain environmental chapters together and show their direct relevance to the cultural information presented. In *Pendejo Cave* the authors and editors have done a reasonably creditable job in this regard.

The 7 chapters in the first section are written by 10 authors: Russell E. Clemons, William Doering, Arthur H. Harris, Harold T. Hiles, Sa'eb Khresat, Michael McFaul, Richard S. MacNeish, Janet L. McVickar, B. Marino, and H. Curtis Monger. This 124-page "Paleoecology" section covers the regional setting, paleoclimate, soils and sediments, Pleistocene vertebrate fauna, modern vegetation, late Pleistocene and late Holocene macrobotanical remains, and isotopic studies of changing environments and climates, ranging from soil morphology to dating packrat middens to isotopic analysis of carbonates.

MacNeish had originally chosen Pendejo Cave for research because of its potential to contain Archaic-period corn. With his continuing interest in the domestication of maize, the dryness of the cave (for good plant preservation) and its thick undisturbed deposits made Pendejo Cave an excellent candidate for MacNeish's study; however, the cave proved to be even better than anticipated. In Zone G an excavator recovered the toe bone of a species of horse that had become extinct some 11,000 years ago. At that time MacNeish and company began to realize the greater antiquity of the site. Unanticipated discoveries sometimes have a way of greatly expanding original research designs. Thus, a major additional focus was added to the project. Ultimately the deepest deposits in the cave were thought to date as far back as possibly 75,000 years before present (B.P.). It should be noted that this is considerably older than the oldest radiocarbon date obtained from any of the site's strata.

The second section is the heart of the volume, presenting the evidence of human occupation in the cave. Geoffrey E. Cunnar is the author of Chapter 8, "Stratigraphy and Features of Pendejo Cave." The excavation methods are presented, and the various natural/cultural strata are described from Zone A to the bottom of the deposit, Zone O. Features within each zone are discussed. Seventy-five samples for radiocarbon dating were selected from 171 specimens collected for that purpose. The cave's sediments were dated from approximately 350 years B.P. to 55,000 radiocarbon years B.P. Twenty of the dates were directly associated with cultural features. Seven authors in Chapter 9 discuss the radiocarbon chronology in detail.

Early in the excavation MacNeish maintained that there were artifacts made from carbonate lithics (in this case all limestone related), while some

archeologists claimed that they were merely rock fall from the cave's walls and ceiling that happen to look culturally modified. Therefore, a petrographic analysis was conducted on the artifacts and compared with samples from other nearby natural sources, including the walls and ceiling of the cave. This study, described by Russell E. Clemons and H. Curtis Monger (Chapter 10), suggested that all the "artifacts" probably originated from the Yeso formation within which Pendejo Cave was formed. At least six of the carbonate artifacts, however, appear not to have originated from the cave's walls or ceiling.

The main body of lithic tools is described in Chapter 11, written by MacNeish and Peggy Wilner. The first portion of this chapter describes attempts by others to experimentally reproduce what appear to be manmade stone implements by natural processes. Also experimental usage of reproduced tools was conducted to provide baseline comparisons for the study of use-wear on the lithic assemblage from Pendejo Cave. These experiments proved interesting.

Most of this chapter describes the cave's lithic assemblage. These descriptions are accompanied by hundreds of fine quality line drawings of the artifacts, identified by their catalogue numbers and the zones from which they were obtained. Comparisons are made with artifacts from elsewhere. The lithic typology includes the following catagories: polyhedral point, pebble chopper, chopper scraper plane, convex uniface, concave uniface, large trianguloid uniface, pointed prismatic uniface, flake wedge, anvil stone, burin, wedge chopper, crude blade, strangled terminally worked uniface, keeled terminally worked uniface, thumbnail terminally worked uniface, serrated uniface, lenticular biface, graver, flat-top scraper plane, pointed keeled uniface, paint palette, domed scraper plane, Pendejo point, flake scraper plane, pebble scraper plane, Nogales point, Fresnal point, Armijo point, Tesuque point, and Perdiz point. The raw materials, form and chipping techniques, evidence of use-wear, temporal and spatial relationships, and very basic metric descriptions generally are given for the various lithic categories.

The remainder of this long chapter discusses "Defining the Paleoamerican Phases." The earliest assemblage in the cave, represented by Zones O and N, was named the Orogrande complex. The authors state, "Radiocarbon dates indicate that this complex began at least 58,000 and perhaps as much as 75,000 radiocarbon years ago and lasted until about 52,000 years ago..." (p. 248). They maintain that this complex is represented mainly by a pebble tool industry characterized by five lithic types: polyhedral points, pebble choppers, concave unifaces, convex unifaces, and chopper scraper plains.

The next component, the McGregor complex, is represented in Zones M to I and dates from 52,000 to 31,000 radiocarbon years B.P. This complex is said to contain some of the lithic types from the pebble tool industry but to also contain unifacial flake tools. Diagnostic tools from this complex include large trianguloid terminally worked unifaces (end scrapers), prismatic pointed flakes, flake wedges, anvil stones, burins, and wedge choppers.

The last of the pre-Clovis components has been named the North Mesa complex, which is said to date from about 31,000 to 12,240 radiocarbon years ago. This complex occupies Zones H to C2. The many tool types from this complex display much use-wear and their raw materials were obtained from a variety of lithic sources. The remaining upper zones in the cave contain Clovis-age materials (although no Clovis points were recovered) through historic items. The identification of the pre-Clovis complexes is quite controversial.

George H. Odell and Anne Louise van Gijn performed use-wear analysis on some of the lithic artifacts from the cave. In Chapter 12 they examine the effects of post-depositional surface modification on the interpretation of use-wear. Their studies used both high and moderate magnification, and the chapter is well documented with examples from microscopic photography.

"Worked Bone from Pendejo Cave" is the title of a chapter written by Donald Chrisman and Robson Bonnichsen. The excavated layers of the cave have produced 75,000 bones and bone fragments. Species identification has been obtained for approximately 41,000 bones; however, few of these bones exhibit evidence of being modified by humans. Selected bones thought to have the highest potential for human modification were carefully examined—visually with a microscope and in some cases with X-ray and CT scan technology. This study was coupled with experimental replication of several types of bone modification. Of special interest to the researchers was alleged modification to a giant bison (*Bison antiquus*) humerus, obtained from a zone dating to about 51,000 years ago.

A total of 39 pottery sherds were recovered from the upper part of the cave. An estimated eight or nine brownware vessels are represented by this small collection, as described by David V. Hill. All date from zones deposited during the last millennium.

"The Perishable Artifacts" is the title of an interesting and lengthy (120-page) chapter written by

D. C. Hyland, J. M. Adovasio, and J. S. Illingworth. A thorough analysis was conducted on the hundreds of fragments of cordage, basketry (including many sandals), and miscellaneous perishable items, all dating from within the last 13,000 years.

D. Chrisman, J. Mavalwala, H. Savage, and A. Tessarolo, the authors of Chapter 16, present unique direct information on the presence of humans in Pendejo Cave in the forms of friction-skin imprints and human hair. They are to be greatly commended for their innovative analysis of friction-skin imprints. From the excavation archeologists recovered 16 friction-skin imprints (probably all finger or palm prints) on fired clay. First they ruled out the possibility that these imprints were caused by the excavators, by plants, by natural ripple marks, etc. Then they were able to determine that primates, as opposed to other mammals, caused the prints. Of course, fossil remains and historical information confirm that humans are the only primates that ever lived in this region. A series of excellent photomicrographs accompanies the discussion of how this forensic/detective work was accomplished. The various ridge characteristics from the friction-skin imprints are explained, and amazingly at least one photomicrograph shows the imprint of the sweat pores on the print ridges. The authors state, "These regularly spaced sweat pores, creases, and recurved ridge patterns provide conclusive evidence that the Pendejo Cave imprints are those of a primate" (p. 422). Eight of the imprints are from cave layers that were radiocarbon dated to Paleoamerican times. Here is an example of the contexts in which these imprints were found: two imprints, recovered from Zone I, were associated with two fractured phalanges of an *Equus alaskae* (prehistoric horse), one of which had been impaled by a pointed limestone wedge. Charred oak from this zone was dated at 32,000 ± 1200 years B.P. (UCR-2645) and at 35,960 ± years B.P. (BETA-44296). Other examples of friction-skin imprints were found in close associations with a worked flake and with cordage.

Preservation in the cave was so good that hair provided another strong argument for the presence of humans dating to considerable antiquity at the site. Human, bear, sloth, ovid, caprid, bovid, equine, and camelid hairs were recovered collectively from four strata: C, C_1, C_2/C_2A, and E. Considerable discussion is presented on hair forensics, methods of extraction, the recovery zones, associations and dates, and comparisons of human hairs with those of other species. Highly magnified lateral views of hair medulla and cross sections and scanning electron microscope views of the cuticle pattern on the exterior hair surfaces were used in this analysis. Some samples were dated to the Clovis period. In addition, some of the human hair was directly used for accelerator dating and produced late Pleistocene (pre-Clovis) dates of 12,370 ± 80 years B.P. (UCR-3267A/CAMS-12366) and 12,240 ± 70 years B.P. (UCR-3267B/CAMS-12367). Human hair also was used for DNA analysis. An attempt was made to match Pendejo Cave hair mitochondrial DNA with the four primary clusters of Native American lineages. There was no match. The chapter authors state, "The DNA findings may indicate contamination of the samples by non-Native American mtDNA or it may point to lineages not included in the four primary mtDNA clusters; that is, lineages of people (sometimes called group X) who may have migrated to the Americas prior to the migrations of the ancestors of the major Native American groups. The significance of this finding cannot be lightly dismissed" (p. 429). These ancient dated samples of mtDNA, along with information from other old sites, have profound implications for our understanding of the peopling of the Americas.

The conclusions section of the volume contains three chapters. The first, written by G. Jessop and MacNeish, summarizes and expands on the way of life manifested in the various strata at Pendejo Cave. This is cultural reconstruction through time.

In the next chapter MacNeish discusses the history of Paleoamerican research and theories of Paleoamerian migrations and compares Pendejo Cave with a variety of possible pre-Clovis sites in North, Central, and South America. Then MacNeish presents his speculative models of Paleoamerican migrations and a theoretical perspective to carry Paleoamerican research beyond Pendejo Cave.

In Chapter 19 Geoffrey E. Cunnar and MacNeish summarize the volume and discuss its implications and future research problems. Almost undoubtedly, the period of earliest arrival(s) of people in the New World will be much more complex than once thought. Cunnar and MacNeish support the reexamination of many old sites that were excavated years ago, especially those that still retain portions of their stratigraphy where new technology can be used to reexcavate and reevaluate their nature. The tremendous advances in technology, especially with interdisciplinary studies, that can now be brought to bear on archeological problems, should be utilized to the fullest. These authors also produce a thoughtful, refreshing self-evaluation of the work done at Pendejo Cave, pointing out things that (with hindsight) could be improved, as well as additional studies that could still be conducted with the collected data.

The site's great antiquity, its wonderful preservation, the careful collection of information from the site, and the interdisciplinary approach to its research has made Pendejo Cave a major contributor to an increased understanding of Paleoamericans. Of course, controversy always accompanies New World archeological sites that claim such antiquity. Were people really present in the Americas before Clovis times? Particularly were they present at such great antiquity as suggested at Pendejo Cave? With an open mind, this reviewer is waiting to see how the dust settles on this site and on the pre-Clovis arguments in general.

The volume, while containing a few minor typographical errors, is well written and edited. MacNeish and Libby are to be commended. *Pendejo Cave* may be obtained from the University of New Mexico Press, MSC01 1200, 1 University of New Mexico, Albuquerque, NM 87131-0001 or ordered through your local book store. The volume is rather pricey; however, considering the volume's thickness and large format, coupled with the tremendous amount of research and reading it contains, the price is certainly not out of line. *Pendejo Cave* contains information that must be reckoned with. Clearly this volume is one that will be cited for years to come as the great debate over the Paleoamerican period continues.

Ishi's Brain: In Search of America's Last "Wild Indian"

Ishi's Brain: In Search of America's Last "Wild Indian." ORIN STARN. W. W. Norton & Company, New York, 2004. 320 pp., prologue, epilogue, notes, index. $25.95 (hardcover). ISBN 0-393-05133-1. *Reviewed by* Randall M. Thies.

Written by a cultural anthropologist, *Ishi's Brain* is a fascinating and thoroughly engaging story of the saga surrounding the life of Ishi, often called America's last stone-age Indian, and the efforts involved in the modern-day repatriation and reburial of his remains.

Ishi became a celebrated figure in American history when he emerged from his tribe's last hiding place on Deer Creek in the forested hills of northern California in 1911. Ishi had become the last living Yahi, one of the many tribes that once inhabited the region before being decimated by the onslaught of western civilization. At a time when all other American Indians had been placed on reservations or otherwise come under the control of the American government, Ishi was the last of the "wild" Indians of North America—the last Indian to live outside the bounds of western civilization and practice a way of life that began millennia before.

The term "stone-age Indian" is not quite apropos, however, nor is it true that Ishi was really outside the bounds of western civilization. One of the book's many surprises is that Ishi and his group obtained much of their material culture by stealing or salvaging articles that had been discarded by white settlers. Iron nails were used to tip Yahi fishing harpoons, glass (much preferred over obsidian) was used for flintknapping, and discarded clothes were eagerly retrieved from farmstead dumps. Their way of living was far from an existence of natural purity, and it was far from the idyllic lifestyle that is suggested by the well-known photographs of Ishi at Deer Creek in 1914.

Despite the title of the book, Ishi is not the only focus of the story. As might be expected from this author, a cultural anthropologist at Duke University who grew up in California as the son of a University of California at Berkeley professor, the actions and motives of the famous Berkeley anthropologist Alfred Kroeber are examined in detail. Known as "the dean of American anthropology," Kroeber was at Berkeley when Ishi came out of hiding. Kroeber immediately took charge of Ishi, became his friend and mentor, and provided him with a new home in a San Francisco museum, where Ishi often performed traditional Yahi activities for visitors. Were Kroeber's actions exploitive, as some critics claim? Starn's discussion clearly indicates that the matter was much more complicated than that. Both good and bad—actually, more good than bad—can be seen in the actions taken by Kroeber and the other scientists who became Ishi's friends and admirers, men like Thomas Waterman and Saxton Pope.

The crux of the story is, as the title suggests, Ishi's brain. Ishi did not last long in modern society, dying of tuberculosis in 1916. Although Kroeber—who was absent from the scene at the time—had directed that no autopsy be done, an autopsy was carried out, and the brain was removed for examination. Ishi's body was subsequently cremated, and his ashes were placed in an urn at a local cemetery. But the brain remained separate from the other remains and eventually was given to the Smithsonian Institution to become part of the brain collection amassed by Ales Hrdlicka, the most prominent physical anthropologist of his day. Interest waned in this collection, especially after

Hrdlicka's death, and over time Ishi's brain became just another nearly forgotten item in the Smithsonian's vast collections.

The book is written from an anthropologist's perspective. As an archeologist who has had some experience in repatriation, this reviewer found that perspective to be thoroughly familiar, reflecting an "insider's" understanding of the repatriation process. In addition to his professional interest, however, Starn had several personal reasons for becoming involved in tracking down Ishi's remains. For one thing, he grew up in northern California and could identify with Ishi in that sense. Furthermore, as a young boy, Starn had been enthralled with the romantic image of Ishi that Theodora Kroeber created in her vastly popular 1961 book, *Ishi in Two Worlds*.

By the time Starn became an established anthropologist, he felt a renewed interest in the topic and found himself wondering if there might be more that could be learned about Ishi. A trip to California in 1997 brought this interest to a head. Hearing that the Maidu Tribe was attempting to obtain Ishi's ashes for reburial, Starn made a phone call to find out more. That call evolved into a stirring saga of research and discovery, leading to the finding of Ishi's brain, its repatriation, and the burial of the brain along with Ishi's ashes in a secret location within the Yahi homeland. *Ishi's Brain* is Starn's account of his involvement in this saga. The book is made all the more interesting by its description of Ishi and the Yahi lifeways that he was forced to abandon; by its account of the near destruction and the modern resurrection of the California tribes and their salutary efforts to obtain and rebury Ishi's remains; and by its discussion of the motives and accomplishments of the many anthropologists and archeologists who engaged in early-day research and later the modern-day research and repatriation efforts that led to Ishi's burial. As part of this research, Starn was able to visit Ishi's last campsite; for an archeologist, this is a captivating story, certainly of academic interest but also emotionally evocative, given the circumstances.

An excellent and highly recommended companion piece for this book is a one-hour video documentary, *Ishi the Last Yahi*, made in 1992 by Jed Riffe of Rattlesnake Productions, Inc. (ISBN 1-56633-123-4). Unfortunately, the video was produced before the repatriation gained momentum, so nothing of that effort is found in the video. Nevertheless, after reading *Ishi's Brain* and acquiring such a detailed written description of his life, the film imagery was almost breathtaking in its depiction of the landscape in which Ishi lived. This reviewer was delighted to see all the photographs of the people and places that were described in the book.

Ishi's Brain may not have photographs and film footage, but, as is the case with almost all books, it provides a much more detailed story than can be shown in a video. Not only is it quite readable, but also it has as many twists and turns as a mystery novel. Best of all, it has a happy outcome.

Before Lewis and Clark: The Story of the Chouteaus, the French Dynasty that Ruled America's Frontier

Before Lewis and Clark: The Story of the Chouteaus, the French Dynasty that Ruled America's Frontier. SHIRLEY CHRISTIAN. Farrer, Straus and Giroux, New York, 2004. 509 pp., including notes, acknowledgments, index, map of Chouteau country, Laclède-Chouteau family tree, 21 illustrations. $27.00 (hardcover). *Reviewed by* James O. Marshall.

The archeologist and historian focus on different kinds of evidence, both with the goal of illuminating past human activity and events. The archeologist is concerned with the material residue of people, and the historian's concern is the written record. The two disciplines often join together in time and place, wishing that each had more to offer the other.

An example of just such an occurrence was Hard Chief village, which has been historically identified and reported as an archeological site (Marshall 2000). The village is one of the Kansa Indian settlements on Mission Creek, Shawnee County, Kansas, which flourished from 1830 to 1846. Although a record of primary references to the village has been collected, Kansa historian William E. Urau (1986:xxiii) lamented that an archeological guideline for the Kansa was lacking, causing some of his colleagues to wonder if a vibrant history could be written. The archeological report describes the material remains recovered from the site (14SH301) and includes a review of the Kansa experiences with Americans from 1806 to 1847.

Several personalities emerged as part of the Kansa experience during their time on Mission Creek. The Methodist mission and missionaries for whom the creek was named have their own history, as do the

Chouteau family and its trading post. The exact location of the post remains to be identified. The Chouteau brothers there were Cyprien (1802-1879), Louis Pharamond (1806-1831), Charles (1808-1884), and Frederick (1809-1891). Frederick gave the only account of post affairs, without mentioning any of his brothers (Adams 1904:423-424). Christian's volume clearly demonstrates that the historical setting for Hard Chief village is in need of revision and elaboration.

Researchers now have a major reference for the Chouteau family, complete with consanguine and affinal relationships, differing personalities of family members and associates, fur trade activities, and the family's role in the transition of the Louisiana Territory from French to American control. A historian may have a different opinion, but the only criticism that this reviewer can offer is that the title is misleading. This family saga, which reads as easily as a well-written novel, includes events before and after Lewis and Clark.

The first chapter, for example, is about the meeting of the Chouteaus and President Jefferson's men. The second chapter is devoted to family origins, and the third chapter introduces the Osage Indian tribe to which the Chouteau fur trade was anchored. Alliances with the tribes were sealed by the acceptable practice of having Indian wives. Young Chouteau men were sent to the tribes to become acculturated in Indian society; the same was done with the Americans. Upon the recommendation of Captain Meriwether Lewis, young Chouteau men were sent off at once to the United States Military Academy at West Point. Nothing was left to chance that might hinder the Chouteau's purpose: always to be in a position to do business, particularly the business of the fur trade.

The family also was involved in mining operations, real estate, and retailing. They were instrumental in introducing steamboats on the Missouri River. At the time Lewis and Clark were becoming acquainted with the Chouteaus, the family had been established in upper Louisiana for 40 years. President Jefferson likely would have found the Chouteau household at St. Louis more intellectually and socially stimulating than what he was experiencing at the President's house in Washington. The Chouteaus could be just as comfortable in an Osage lodge or at a far distant trading outpost as they were in Washington, D.C., Philadelphia, or New York City.

The rest of the volume, Chapters 4 thru 15 plus an epilogue, is a wonderfully literate history of a large portion of the American West, structured around the most prominent Chouteau of successive generations.

Because of a personal research interest in the Kansa Indians, this reviewer found particularly captivating the story of Frederick's eldest brother François Chouteau (1797-1838) and his wife Bérénice at Kawsmouth (the future site of Kansas City). Exemplifying the family modus operandi of teaching its own the fur trade business, a 15-year-old Frederick came to Kawsmouth to learn the fur trade business under the tutelage of François. His life was spent with the Kansa tribe and with the arriving immigrant tribes. Frederick married Shawnee women, and we have to assume that he was with Kansa women, too. The Methodist missionaries never commented on these "blanket" marriages—by their time the Kansa and the French had been enmeshed with one another for over a hundred years; after all, Auguste Chouteau (1750-1829) was trading among the Kansa in 1778. Christian also gave attention to François' wife Bérénice, as did this reviewer to Mary Jane Chick, the wife of the Methodist missionary to the Kansa, William Johnson. Now any account of local history concerned with the Kansa must include these two remarkable women.

One does not have to have the experience of a researcher to appreciate the contribution of a Pulitzer Prize-winning journalist. Christian was awarded the prize in 1981 in the category of International Journalism for her dispatches sent from Central America to the *Miami Herald* newspaper. Historians and archeologists certainly will appreciate that Christian devoted her attention and talent to unraveling a complex and confusing subject: the Chouteau family and its role in the upper Louisiana fur trade. All readers will enjoy a fascinating story and finish feeling that they have just read a good book.

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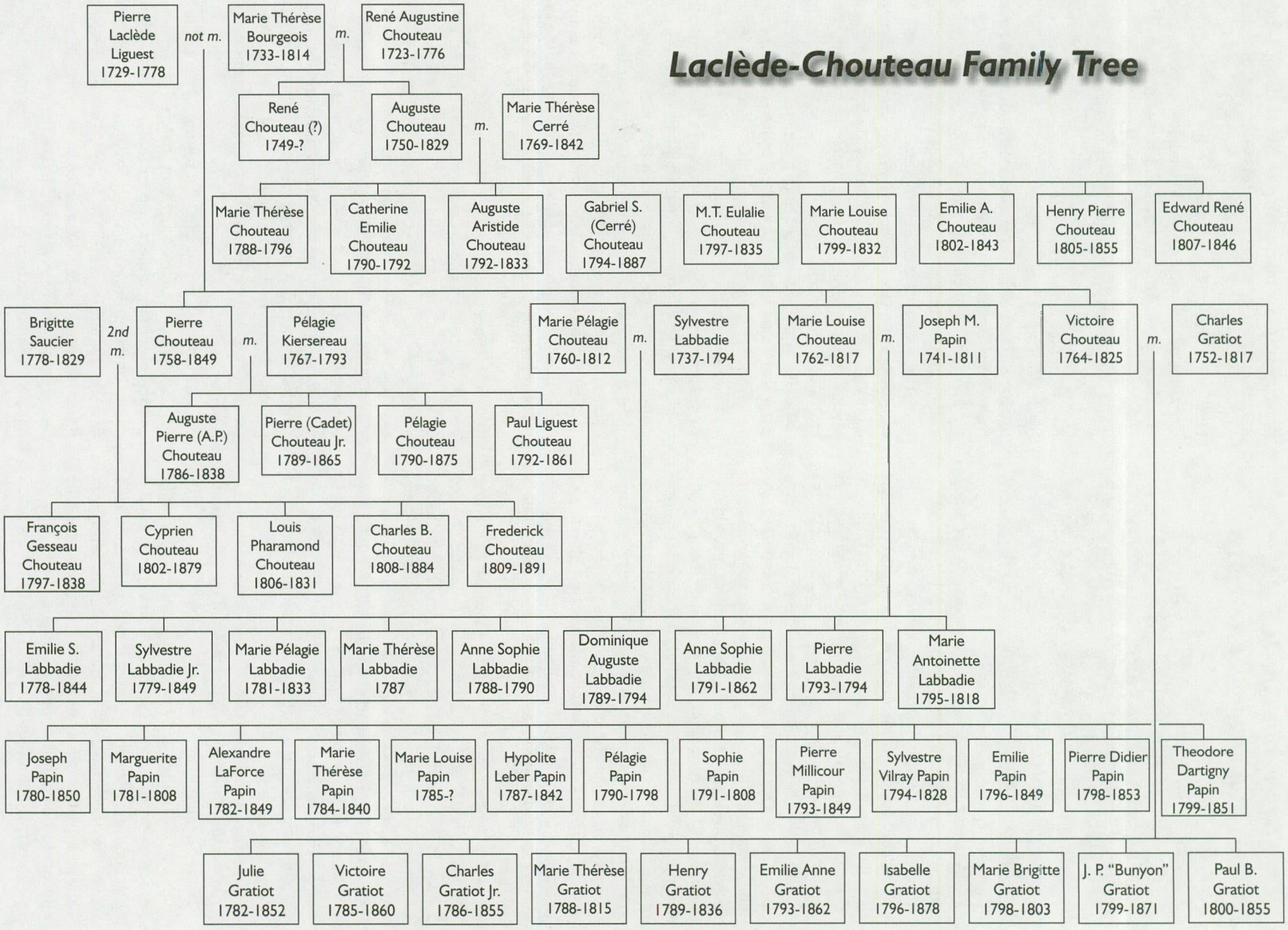
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Laclède-Chouteau Family Tree



Laser Ablation-ICP-MS in Archaeological Research

Laser Ablation-ICP-MS in Archaeological Research. Edited by ROBERT J. SPEAKMAN and HECTOR NEFF. University of New Mexico Press, Albuquerque, 2005. vii + 200 pp., 130 figures, 31 tables, contributors and affiliations, references, index. $75.00 (cloth). ISBN 0-8263-3254-4. *Reviewed by* Jim D. Feagins, St. Joseph Museum.

As research equipment and methods have improved in other fields, archeologists have increasingly turned to utilizing higher technology to help solve many cultural and environmental questions that they hardly dreamed of asking only a generation or so ago. *Laser Ablation-ICP-MS in Archaeological Research* describes one such approach. Laser Ablation-Inductively Coupled Plasma-Mass Spectrometry (LA-ICP-MS) is actually a series of methods that, when used jointly, have proven especially useful in archeological research. This volume presents a summary of the procedure and describes a number of examples of its usefulness in studying material culture to shed light on certain archeological problems.

To the nonspecialist in this highly technical area of research (as is the case with this reviewer), the volume appears rather intimidating at first glance and perhaps even second glance. However, early impressions can be deceiving, as one does not need to know all the nerdy aspects of the equipment and the details of its use in order to understand the general procedure of LA-ICP-MS and its application to archeological research. The latter, rather than the former, is the focus of this book. The former is what laboratory technicians are paid to know. However, it is mandatory that the archeologist know enough about the subject to be able to effectively communicate and to be sure that what is being measured is appropriate and handled in a manner that will address the particular archeological problem being investigated.

Laser Ablation-ICP-MS in Archaeological Research contains 15 chapters written by 28 authors. Robert Speakman and Hector Neff have done a credible job of editing, and only a few minor (probably nitpicking-type) errors were noted. However, speaking of the editors, it seems unusual that only Speakman's name is on the outside cover of the volume, while both editors are acknowledged on the inside cover. This appears to be an unfortunate oversight.

Most, if not all, of the LA-ICP-MS case studies presented in the volume were processed in laboratories at either the University of Missouri at Columbia (where Speakman is affiliated) or at California State University, Long Beach (where Neff is affiliated). A variation of at least one of the studies was presented at a Society for American Archaeology meeting.

The volume is jointly introduced by both editors. The short history of LA-ICP-MS is presented, and mention is made of its use in the fields of zoology, botany, ecology, and earth sciences, as well as archeology. With the recent development of commercially produced laser ablation (LA) systems, a LA system now easily can be joined with an inductively coupled plasma (ICP) system and a mass spectrometry (MS) system; so in reality LA-ICP-MS is three systems in one. This joint system is able to identify most elements of the periodic table. The LA simply uses a laser to ablate (vaporize) certain compounds being studied after placement within a closed system. After transportation of these vapors (gases) without contamination to the ICP, they are ionized and in general prepared to enter the vacuum chamber of the mass spectrometer. To simplify, there the ions are accelerated by high voltage prior to entering a magnetic field. The series of wavelengths recorded by the MS serve as fingerprints to identify the various charged elements present in the sample being tested. These elements can be used to identify the general composition of various artifacts or of even almost minuscule areas (such as a thin coating of pigment) on a portion of an artifact. Speakman and Neff state, "Ablation areas vary in size depending on the sample matrix, but the analyzed area is usually smaller than 1,000 x 1,000 microns and less than 30 microns deep" (p. 2). In other words, an almost visually imperceptible layer is removed from an area of less than a square millimeter. This three-in-one system can be used for spot studies rather than just bulk analysis of samples.

Following the introduction, each remaining chapter presents a case study that attempts to answer specific archeological questions utilizing the LA-ICP-MS system. A diverse range of applications is presented; however, Speakman and Neff emphasize that LA-ICP-MS can be used to help solve many other types of problems.

Chapters 2-6 concern identifying certain lithic sources or the sources of certain materials (ores and elements) within stone. Two of the six case studies are about sourcing obsidian artifacts in western Guatemala and in central Mexico. Another chapter presents the chemical characterizations of jade from a jade workshop in central Guatemala. The LA-ICP-MS has proven to be extremely useful in this research.

The authors of Chapter 5 (Roll, Neeley, Speakman, and Glascock) attempt the daunting task of characterizing chert samples from a limited set of prehistoric quarries in Montana. As is commonly known, the heterogeneous nature of individual chert types oftentimes makes them very complex to study. Thus, sourcing of multiple varieties of chert can be very difficult. Visual identification and various chemistry-based, high tech studies were compared generally. Based on their research, Roll, Neeley, Speakman and Glascock state,

> Examination of a sample of lithic specimens from a single quarry rarely provides an adequate basis for attributing the raw material used in stone tool manufacture to that quarry. Visual characteristics used to identify raw material to source of origin require some form of external validation. Instrumental techniques, such as LA-ICP-MS, may or may not prove successful in the quest for "source identification," but without them the archaeological folk taxonomies about stone types will remain folk taxonomy (p. 70).

However, they indicate that their studies are encouraging. Clearly the chert studies should continue.

Chapter 6 is a pilot study to distinguish the source differences in various copper minerals, especially within turquoise. Compared with past instrument-aided studies, the ability of LA-ICP-MS to conduct spot analysis makes it possible to control intra-source variation within samples. This allows for better comparison of copper-containing minerals (such as turquoise and malachite), finished artifacts, and unprocessed ores.

Chapter 7 attempts to identify the source of African glass trade beads, manufactured prior to European contact. The authors (Popelka, Glascock, Robertshaw, and Wood) state, "LA-ICP-MS is an effective method for analyzing glass beads because of its high sensitivity for multiple isotopes, high spatial resolution, and minimal sample preparation" (p. 91). Incidentally, the sources for the early African glass beads were from southeast and south Asia. At least some of them appear to have been manufactures in the city of Giribawa, Sri Lanka.

Seven chapters involve ceramic analyses of various types. Chapter 8 compares various methods used to study Virgin branch, Anasazi ceramic. The following chapter concerns sourcing studies of Hohokam schist-tempered pottery. Another ceramic case study used LA-ICP-MS for the analysis of tephra (volcanic glass) temper in pottery. Chapters 11-14 analyze pigments on pottery surfaces. These individual case studies investigate ceramic pigments in Turkey, Peru, and the American Southwest (redware from Point of Pines, Arizona, and Mesa Verde and Mancos Black-on-White pottery). LA-ICP-MS proved especially adept at analysis of ceramic glazes and slips.

The last chapter of the volume proved especially interesting to this reviewer. It is titled "Detecting Provenance of African-Origin Individuals in the Colonial Cemetery of Campeche, Yucatán: A New Approach Using Trace Elements and LA-ICP-MS." The various trace elements within individuals are obtained from what they eat and especially from what they drink. These elements are recorded in their teeth and other bones. The isotopic record ratio can identify the areas where they were raised as children, as well as where they lived later in life. Isotopic "fingerprints" in bones undergo continuous change throughout an individual's lifetime, mainly reflecting the later years just prior to death. However, the childhood formation of dental enamel does not undergo a turnover, and this tissue still retains an environmental record from the period of early tooth development. Burials from a historic colonial cemetery in Campeche were used in this case study. Campeche's population is predominately Mayan; however, migrations from Spain and the introduction of slaves from Africa contributed to the multiethnic nature of the community. Sixteen of the cemetery's infants and young children were closely examined. Presumably they were born in the area, and their teeth and bones contained the area's isotopic characteristics. Twelve adult individuals from the cemetery were determined to be of African ancestry. The first permanent molars from each of these two groups (28 total individuals) were subjected to LA-ICP-MS study, and the two dental subsets were compared. The results indicated that most of the Africans were born in the Campeche area and that all were from the Yucatán region. Clearly none had been born in Africa, so they all appeared to have been second (or later) generation slaves. Presumably in future studies, it would be possible—with much additional research in Africa—to identify the part of that continent in which a captured individual (a first-generation slave) was born.

Laser Ablation-ICP-MS in Archaeological Research presents types of studies for which LA-ICP-MS is useful. Undoubtedly, there are additional possibilities, including some that have not been thought of yet. Speakman and Neff state, "... LA-ICP-MS offers several advantages over other analytical methods. These include high accuracy and precision, low detection limits, rapid analytical time, low cost per sample,

high sample throughput, and minimal damage to the sample" (p. 10).

The University of New Mexico Press is to be commended for publishing this academic volume, which provides information about a cutting-edge research method. It was not written for a wide readership; the general public would not be interested in the volume's detail, and most avocational archeologists would find it more technical and a little pricier than their tastes. However, the press had the foresight to recognize that it could fulfill a need of professional archeologists, who now have a better way to obtain answers to certain questions that have been difficult to research. The technological detail is needed to support the results and conclusions presented and to enable other researchers to have the background and data sets for comparisons.

Laser Ablation-ICP-MS in Archaeological Research may be ordered through your local bookstore or directly online from the University of New Mexico Press (unmpress.com) or by calling (800) 249-7737.

No Bone Unturned: The Adventures of a Top Smithsonian Forensic Scientist and the Legal Battle for America's Oldest Skeletons

No Bone Unturned: The Adventures of a Top Smithsonian Forensic Scientist and the Legal Battle for America's Oldest Skeletons. JEFF BENEDICT. HarperCollins Publishers, New York, 2003. xii + 304 pp., source notes, acknowledgments, index, 18 photographs. $25.95 hardcover. ISBN 0-06-019923-7. *Reviewed by* Jim D. Feagins.

This delightful volume is written not by a scientist but by an investigative journalist. It is about the work of Doug Owsley a physical (forensic) anthropologist at the Smithsonian Institution in Washington, D.C. Owsley is an extremely interesting individual (I have twice met him personally), and he has an astounding professional life that takes him from one scientific "adventure" to another. An expert in reading the story that human bones and soft tissues have to tell, Owsley has studied and documented human remains from recent homicides to those many thousands of years old. He has probably analyzed more human remains than any other living person.

Some of his forensic work is described in this volume: excavation of the historic Indian burials at Pitchfork Rockshelter in Wyoming; heading up the team that studied the deaths, including that of David Koresh, at the Branch Davidian compound in Waco, Texas; his dangerous research in 1992, finding the charred fragments from two Americans murdered by Guatemalan guerrillas and disposed of in the jungles; training Croatians to record and inventory their thousands of civil war dead after the breakup of Yugoslavia; excavation of the oldest (late 1600s) lead coffin burials known to exist in America; study of a 10,000-year-old mummy from Spirit Cave, Nevada; discovery of African-Americans from the fort at the colony of Jamestown; and his key role in suing the U.S. government to obtain the right for scientists to examine the remains of Kennewick Man, a 9,800 year old skeleton from the state of Washington.

Reflecting back, Owsley remembered that the Spirit Cave mummy proved to have very distinctive characteristics. It was not like any modern Native Americans and did not appear to be one of their ancestors. The same was true of Kennewick Man. It displayed no wide cheekbones and no shovel-shaped incisor teeth. At first it was thought to be a Euro-American with (or in spite of) a stone projectile point found deeply embedded in the pelvis. Not until the very old radiocarbon date came back was there a realization of just how extremely important Kennewick Man could be to science and what a detailed examination with many specialized studies would be necessary. Actually, based on its morphology, it seemed to most closely resemble the Ainu people, an ancient race living on Hokkaido Island, Japan.

This realization led to reexamination of North America's other oldest skeletal remains. In a misguided attempt to follow the Native American Protection and Repatriation Act (NAGPRA), some of these remains already had been repatriated to various Indian tribes and reburied with only minimal study in spite of no proven tribal affiliation. Sometime after the fact, Owsley and Richard Jantz (a physical anthropologist from the University of Tennessee) studied the records from some of these cases, and several are discussed in the volume:

- Measurements to calculate the skull's true dimensions from the photographs of the remains of a 12,825-year-old teenage girl found in a rock quarry at Buhl, Idaho, proved that she shared no affinity to modern Native Americans. With almost no studies performed, she had been reburied by the Bannock tribes in 1991.
- An 8,775-year-old woman discovered during

highway construction in 1931 at Pelican Rapids, Minnesota, also bore no affinity to modern American Indians. The Sioux tribes reburied "Minnesota Woman" on October 2, 1999.

- Browns Valley Man, a 9,710-year-old male, again from Minnesota, also was turned over to the Sioux and reburied. A study of its skull features showed no affinity to modern Native Americans.
- A 9,140-year-old burial from Hour Glass Cave in the Colorado Rockies was reburied by the Southern Ute tribe. Almost no research had been conducted on the burial.
- The Wizards Beach Man has been claimed by the Paiute tribes. This is a 10,825-year-old male from the state of Nevada.
- A child under 10 years old was found at the Grimes Point Burial Shelter. Claimed by the Northern Paiute, the burial dates to 10,825 years ago.

Kennewick Man and the Spirit Cave mummy, while not the oldest, are the best preserved. The Kennewick Man story is a bittersweet one. It is a story of the U.S. Army Corps of Engineers' bungling and disregard of court orders, the maneuvers of government lawyers, and loss of archeological information. Apparently, while in the care of the government, two femurs from the burial were lost for a period of months. Because of the age and notoriety of Kennewick Man, the FBI estimated the value of these bones on the black market at $25 million. To add insult to injury, the Corps of Engineers buried the site under tons of rock to deny any future research at the Kennewick Man site. This occurred despite a bill that would have made it illegal for the Corps to carry out its proposal to cover the site that had passed both houses of Congress and was awaiting the president's signature. It is an alarming story of a government agency's blatant disregard for public opinion and the wishes of the court and Congress. It is a sad but exciting story, one that may yet have a relatively happy ending.

The legal action associated with the Kennewick Man case will greatly influence whether scientists have the right to study other remains of this type in the future. Without scientific study how can anyone know how old a skeleton is or its racial, cultural, or tribal affiliation? Owsley and other scientists in the lawsuit were willing to place their jobs on the line to defend what they feel is right.

Whether recounting the drama of the search for information on ancient burials or describing the forensic detective work that enables the more recent dead to speak, Benedict has produced an engaging book. This reviewer found it hard to put down and felt some reluctance when it ended. *No Bone Unturned* is written for the general public. If you need a gift for a friend who has even a little interest in archeology, enjoys reading stories about real-life detective work or scientific discoveries, or perhaps enjoys watching *CSI* on television, then this may be just the thing. The book may be obtained from your local bookstore or ordered on the Internet.

Ancient Burial Practices in the American Southwest: Archaeology, Physical Anthropology, and Native American Perspectives

Ancient Burial Practices in the American Southwest: Archaeology, Physical Anthropology, and Native American Perspectives. DOUGLAS R. MITCHELL and JUDY L. BRUNSON-HADLEY, editors. University of New Mexico Press, Albuquerque, 2001. xii + 264 pp., 42 figures, 63 tables, references cited, list of contributors, index. $32.95 (paper). ISBN 0-8263-3461-X. *Reviewed by* Jim D. Feagins.

An abundance of well-preserved archeological sites has long attracted many archeologists to the American Southwest. This has resulted in large data sets useful for archeological theory and method development that could be tested with synthetic case studies. Given the good preservation and the amount of archeological work done in the Southwest, the burial data sets tend to be larger than those from most other regions (such as the Great Plains), sometimes allowing broader approaches to the study of and manipulation of burial information. Archeologists, physical anthropologists, and Native Americans from the Southwest and beyond should find *Ancient Burial Practices in the American Southwest* of considerable interest.

As one would expect, the volume contains information from many lines of investigation presented by contributors from academia, government agencies (including tribal cultural resource personnel), and private contract archeologists. The editors are both from private firms. Fifteen authors wrote the book's 12 chapters, plus an epilogue. As stated by the volume's editors, its purposes are "to continue the exploration of past social complexity through several specific studies of ancient cemeteries" and "to place these studies into the current context of changes brought about by recent

laws and new dialogues between archaeologists and Native Americans" (p. 1).

Mitchell and Brunson-Hadley in the Introduction (Chapter 1) summarize the research contained in the various chapters and also set the stage concerning how federal burial law has changed the face of archeology. The most important of the laws that relate to the study of burial practices is the Native American Grave Protection and Repatriation Act (NAGPRA).

Mitchell and Brunson-Hadley point out that many archeologists, as well as most tribes, "supported the passage of NAGPRA as it was discussed and described during the hearings, and the national professional archaeological organization, the Society for American Archaeology, testified on behalf of the bill," but "the resultant implementation has not always reflected the discussions that had been put forth before Congress as to how NAGPRA was to be interpreted" (p. 2). Passage of the law has formally provided for respectful treatment of human remains and the repatriation of certain types of burial remains, such as the cases in which tribal affiliation can be established. However, the ways this law has been interpreted and implemented by some agencies and institutions have not always proven to be satisfactory to many of those involved in learning about the past or to some tribes. The bottom-line question becomes: Does the past belong to a specific group or groups of people or does it belong to everyone—all humankind?

Archeologists usually view human burials in light of their potential to understand the past. Of course, the profession then has an obligation to share the information gained with the public, including Native Americans. While sharing an appreciation of their history, many (but certainly not all) Native Americans may view the subject with a somewhat different perspective. Views on the care and study of human remains differ from tribe to tribe and often from individual to individual within a tribe. NAGPRA has provided for a greater dialog and sharing of information between tribes and archeologists; of course, this can and has provided many mutual benefits.

Chapter 2, "Hopi Perspectives on Southwestern Mortuary Studies," by T. J. Ferguson, Kurt Dongoske, and Leigh Kuwanwisiwma presents one tribe's perspective on how NAGPRA has changed its view of archeological research and involvement in archeological projects. Most Hopi view their ancestors as their spiritual guardians and "these ancestors continue to play an important role in Hopi rituals and ceremonies" (p. 9). The Hopi have a responsibility to care for their ancestors; therefore, it would be expected that they are more concerned with the proper treatment of the dead than they are with the knowledge that can be gained by studying the remains of their ancestors and the artifacts associated within a burial setting. Of course, many Hopi are interested in the scholarly knowledge that can be obtained from these studies about their past. However, Ferguson, Dongoske, and Kuwaniwisiwma go on to say, "Hopi interest in mortuary studies is secondary to making sure their ancestors are accorded the proper respect" (p. 10). This chapter presents considerable information on the Hopi beliefs and customs related to death and the afterworld. These beliefs can be at odds with the desires of those wanting to learn about the past. However, Hopi realize that the dead are going to be disturbed from time to time as they are discovered after events of nature expose these remains and especially during various construction projects. Therefore, an appreciation of the archeological survey prior to construction activities has developed. Also, "the Hopi Tribe recognized that the remains of Hopi ancestors are better treated by having archeologists do the exhumation than they would be by other potential groups that might do this work, e.g., professional morticians" (p. 16). The remaining sections in this chapter discuss the collaboration of the Hopi and archeologists, the ethics of research, and the differences between cultural and biological affiliation. This chapter is well written, interesting, and useful; however, it describes the viewpoint of only one tribe. There are many other tribal viewpoints that are not presented. Probably all readers would agree to the potential usefulness and certainly the ethical responsibility of consultation; however, the authors make no mention of its potential to interfere with academic freedom, e.g., the freedom of archeological interpretation. However, that concern does not negate ethical responsibilities, a respect for tribal beliefs, or the cooperative efforts needed by all parties to resolve these sometimes thorny issues concerned with the treatment and study of the dead.

Several chapters (3, 4, and 10) are concerned with Hohokam skeletal data or burial practices. Randall McGuire (Chapter 3) uses his Grave Lot Value (GLV) concept as he analyzes cremation burials. He assigns values to types of artifacts in order to score the worth of grave goods associated with individual burials. There is tremendous variation in the richness of the grave goods associated with individual burials, which suggests that there were also major inequalities in the lives of these individuals. McGuire, along with some of the other authors in this volume, draws analogies between the burial data and ethnographic accounts. This chapter presents an interesting effort to view complex prehistoric social relationships as expressed through burial practices.

Douglas Mitchell and Judy Brunson-Hadley (Chapter 4) use certain artifact assemblages associated with hundreds of Hohokam burials during the Classic period (A.D. 1100-1400) to determine social ranking. They studied the presence or absence of artifacts, combined with burial location data, to argue that certain burials represented some blend of religious and secular leadership.

Stephanie Whittlesey and Jefferson Reid (Chapter 5) use information derived from 674 Mogollon burials at the Grasshopper Pueblo (A.D. 1300-1400) to investigate two aspects of social organization: ethnic variation and the presence or absence of sodalities (ceremonial associations that crosscut kinship groups). Also based on the data obtained from trace element analysis and cranial deformation, this Mogollon village appears to have contained a small Anasazi population.

John Hohmann (Chapter 6) discusses the change in social organization between the late Pueblo II period (A.D. 1050-1200) and the Pueblo III period's Elden phase (A.D. 1125-1200) as reflected by the Sinagua burial practices. This cultural group is centered in the Flagstaff, Arizona, vicinity.

Chris Loendorf (Chapter 7) discusses the burial practices of the Salado culture located in southeastern Arizona. Almost 500 burials were examined to provide the data set for this interesting chapter.

Todd Howell (Chapter 8) examines both the skeletal data and the artifacts from Hawikku, an ancestral village of the Zuni (A.D. 1325-1680). Over 900 burials from this 800-room village were studied. The health of the population, as reflected by evidence from the skeletal remains and the funerary objects, is evaluated in an attempt to identify potential leaders in the village. Howell assumes that leaders controlled the economic processes in the community and would have the most diverse roles, which could then be quantified with a diversity measurement. Further, he believes that the more prominent leaders would have the highest diversity scores as reflected in their burial artifacts, body position, stature, general health (measured incidence of iron-deficiency anemia), etc.

Anasazi status is investigated through the analysis of 179 burials at Chaco Canyon (A.D. 900-1300) by Nancy Akins (Chapter 9). She uses demographic variables, skeletal health indicators, and the contents of the graves to study a complex system.

Susan Guise Sheridan (Chapter 10) also studied skeletal remains. She used trace element investigations, enamel hypoplasias, porotic hyperostosis, diploic thickening of the cranium, osteopenia (age-related bone loss), and demographic reconstruction to investigate the Hohokan community at Pueblo Grande, Arizona. From these multiple lines of evidence, she establishes that the population was under a lot of childhood stress from infectious disease and nutritional deficiencies and through time the populations were in a general state of declining health.

Chapter 11, written by Debra L. Martin and Nancy J. Akins, investigates the trauma and mortuary behavior in the La Plata River valley in northern New Mexico and southern Colorado from A.D. 1000 to 1300. The authors establish a clear linkage between trauma, health, and mortuary treatment. Grave furniture, burial location, and osteological evidence are most variable. Evidence of trauma is especially noted in the adult female population. This study also establishes that growing population pressures produced ever increasing social hardship and stress with the La Plata group of Anasazi people. Martin and Akins compare their findings with other studies of trauma in the Southwest. They point out that injurious actions sometimes occurred: "mass slayings, individual dismemberments, burning, possible cannibalism, scalping, intentional injury, and limited hand-to-hand combat do exist in the Southwest archaeological record..." (p. 243).

It is refreshing to have an overview (Chapter 12) of the aforementioned chapters written by an archeologist from outside the American Southwest. Michigan State University Professor Lynne Goldstein presents an interesting perspective. She points out that students in the Southwest benefit from a large and complex database, fostering the development of mortuary theory and innovative methods to investigate mortuary practices. Even then, as she notes, the data can have problems when attempting to study and synthesize burial information from older excavations compared with those investigated more recently.

Many of the investigations presented in this volume focus on status and ranking. According to Goldstein, there are perhaps "too many" when compared with other studies that could be explored. She feels that it is now time to use the extensive Southwestern data to spend more effort on the "...complex and complete analysis of mortuary ritual" (p. 250). Questions concerning symbols and ritual should receive greater consideration. Goldstein correctly states, "The mortuary site or grave generally represents the end of the mortuary ritual, and more research is needed on the stages of ritual" (p.151). She further believes that ethnographic and historical data, including oral history, should be used in more than a simply confirmatory manner. Also, the patterning of graves and their locations in the landscape are considered by Goldstein to be important avenues for future study.

Generally her comments have to do with suggestions for future research and are not criticisms of this volume or its researchers.

The short Epilogue by the volume's editors provides many good suggestions for future mortuary research, which could bring currently divergent groups closer together. They ask (p. 254), "What other studies should anthropologists provide that are of importance to related descendants of today?" And concerning the implementation of NAGPRA, they inquire (p. 255), "How far back can any one group be allowed to claim cultural affinity?" Overall, anthropologists and Native Americans clearly have much in common as they share an interest in and mutual respect for the people that lived in the past.

With new techniques continuously unfolding, the future ability to learn from human ancestors—regardless of their cultural affiliations—holds great promise. *Ancient Burial Practices in the American Southwest* addresses some of these techniques that provide opportunities for reconstructing and understanding ancient civilizations in the American Southwest and gives examples of methods that have merit for gleaning a greater understanding of cultural processes from burial practices in other regions. How people died and the manner in which they were buried furnish many clues that, with careful analysis, enable an increased understanding of how populations lived. This volume presents new lines of evidence and a broad perspective of some of the types of burial overviews being done after the enactment of NAGPRA.

Ancient Burial Practices in the American Southwest may be obtained online, through your local bookstore, or from the University of New Mexico Press, MSC01 1200, Albuquerque, New Mexico 87131-0001.

About the Authors

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[redacted]

Shelly Berger is a graduate of the University of Kansas, where she completed two masters degrees: one in historical administration and museum studies and the second in anthropology. Her thesis for the latter degree formed the basis of this article. Previously she served as the first Director of the El Quartelejo Museum in Scott City. She is currently the Registrar for the Museum of Mobile. When not running from hurricanes, she can be found exploring the various seafoods and Mardi Gras traditions of the Gulf Coast.

Mary Conrad
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Mary Conrad has been a school librarian in the Kansas City, Kansas school district for 30-plus years, most of which have been at the district magnet high school Sumner Academy. Collegiate degrees include a bachelor of arts in history from Creighton University in Omaha, Nebraska, and a master's degree in library science from Kansas State Teachers College, now Emporia State University. Conrad is active in numerous archeological and historical associations, including the Kansas Anthropological Association, Kansas City Archaeological Society, Friends of Grinter Place Museum, Oregon-California Trails Association, and Santa Fe Trail Association.

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Jim D. Feagins is a private archeological consultant who also serves as part of the adjunct archeological staff for the St. Joseph Museum. He received a B.S. degree from Pittsburg State University and a M.N.S. degree from the University of Oklahoma. After 30 years as a science instructor for Consolidated School District No. 4, Grandview, Missouri, he retired in 1995.

Active in promoting archeological education, he is president emeritus of the Missouri Archaeological Society. He also has served as president of the Kansas City Archaeological Society and as a vice-president of the Missouri Association of Professional Archaeologists and the Kansas Anthropological Association. He is a life member of the KAA.

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Mark is a native Kansan and a member of the KAA. He is a cultural resources principal investigator for Burns and McDonnell, Kansas City, Missouri. He has conducted cultural resource investigations in 25 different states since receiving his M.A. in anthropology from Wichita State University. Currently, he resides in Lindsborg with his wife Kiersten and daughter Callan.

James O. Marshall
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James Marshall has participated in archeological projects in New York, New Mexico, Nebraska, and Kansas, where he was employed by the Kansas State Historical Society. Almost all of the Kansas projects were a part of the Missouri River Basin Archeological and Paleontological Surveys. Major publications are concerned with the historic and prehistoric cultures that have been found in Kansas, including the Kansa Indians who were monopolized by Chouteau-owned or controlled fur trading companies throughout the late eighteenth and most of the first half of the nineteenth centuries.

Patricia O'Brien

[redacted]

Pat O'Brien is emeritus professor of sociology and anthropology at Kansas State University. She graduated from the University of Illinois and is interested in Plains and Midwest archeology.

Randall M. Thies

[redacted]

Randy is an aging hippie, astonished to find himself working as a highway archeologist with the Kansas State Historical Society. For many years he has had an interest in Kansas burials, both prehistoric sites and historic cemeteries. Currently blundering about in Iraq on a misguided quest for excitement, he hopes to return to Kansas to retire as soon as possible.

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The varied readership of the journal should be kept in mind when preparing papers. **Jargon should be avoided.** The style authority is *American Antiquity* (see Volume 57, Number 4, 1992). Professionals are expected to submit their manuscripts in this form; others who are not familiar with the *American Antiquity* style guide will receive editorial assistance.

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