Archaeological Investigations at the Twin Knobs Locality Crittenden County, Kentucky

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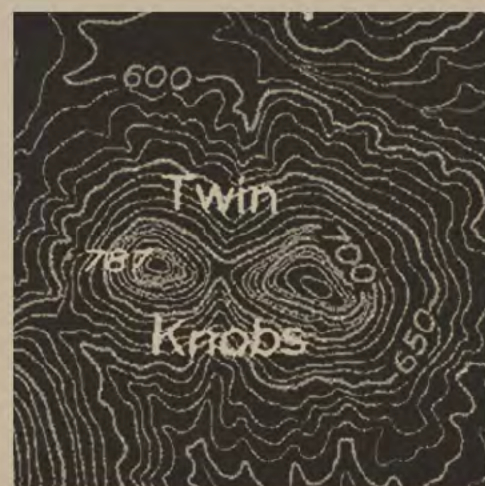

RESEARCH REPORT NO. 9
Kentucky Archaeological Survey

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Kentucky Archaeological Survey
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Report Prepared for:

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Kentucky Archaeological Survey

The Kentucky Archaeological Survey is jointly administered by the Kentucky Heritage Council (State Historic Preservation Office) and the University of Kentucky Department of Anthropology. Its mission is to provide a service to other state agencies, to work with private landowners to protect archaeological sites, and to educate the public about Kentucky's rich archaeological heritage.

Kentucky Heritage Council

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The University of Kentucky Department of Anthropology has a mission to educate students and promote scholarly research in the field of archaeology. The Department also is charged by state law with enforcing and administering the State Antiquities Act, which prohibits the destruction of archaeological sites on state and municipal lands. It maintains comprehensive inventory files and records on archaeological sites in the Commonwealth through the Office of State Archaeology, and supports the major state curation repository for archaeological collections (the William S. Webb Museum of Anthropology).

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CHAPTER ONE: INTRODUCTION

Between 7 May and 9 August 2005 and again from 8 May to 26 May of 2006, Kentucky Archaeological Survey (KAS) personnel conducted archaeological investigations of the Twin Knobs locality in central-southern Crittenden County, Kentucky (Figure 1.1). The Twin Knobs locality consists of two isolated sandstone knobs with relatively steep sides and flat tops (Figure 1.2). This state funded project was conducted at the behest of the Kentucky Transportation Cabinet (KYTC) in advance of the relocation of the U.S. 641 highway corridor between the towns of Marion, Crittenden County and Fredonia, Caldwell County, Kentucky. The investigation involved excavation at three sites: Twin Knobs Rockshelter (15Cn50), the Flat Top site (15Cn52), and an unnamed disturbed site (15Cn61).

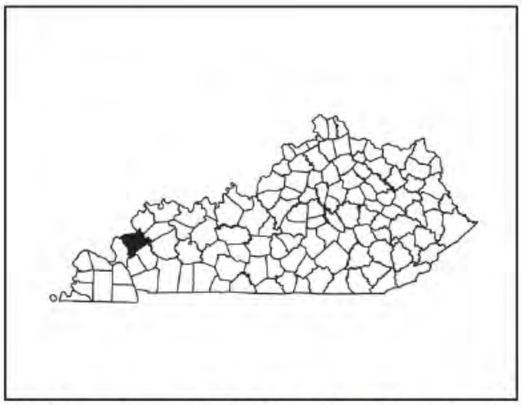

Figure 1.1. Location of Crittenden County, Kentucky.

Crittenden County is located in western Kentucky and is bounded by the Ohio River and Union County to the north, the Tradewater River to the east, and Caldwell, Lyon, and Livingston Counties to the south and west. Crittenden County encompasses the boundary of the Mississippian Plateaus and Western Coal Fields physiographic regions (Pollack 2008a). The county is located within the Green River management area (Ohio River II section) as defined in the Comprehensive State Plan of Kentucky (Pollack 2008a:13).

The Western Coalfield physiographic region is characterized by substrate sandstones, shales, and coal of Pennsylvanian age. The landscape includes extensive dissected and rolling uplands with sandstone bluffs and cliffs (Pollack 2008a). The Mississippian Plateaus physiographic region is characterized by an extensive and well-developed karst topography containing sinkholes, caves, and springs that can result in relatively limited surface water availability (Pollack 2008a). Streams are often deeply incised across the broad karst plain and have exposed abundant and high-quality chert bearing limestones in the river valleys (Jacobs 1988). The boundary between the Western Coalfield and Mississippian Plateau is dominated by the southern extension of the Shawnee Hills, which trend roughly north-south across eastern Crittenden and

Caldwell Counties. These uplifts resulted from extensive faulting in the region and are primarily composed of isolated knobs and broad ridges with sandstone cliff lines that often contain rockshelters (Jacobs 1988). Elevation in Crittenden County ranges from 94 to 25 meters amsl with the steepest reliefs located at cliff lines in the Shawnee Hills.

The Twin Knobs locality is a relatively distinct landform that consists of two directly adjacent peaks with small, flat tops and steep sides (Figure 1.2). Although the physical form of Twin Knobs is regionally-distinct, other small, free-standing sandstone knobs are relatively common in eastern Crittenden County. Elevation of Twin Knobs rises sharply from 182 meters amsl at the base to 238 meters amsl at the top of the western peak. Approximately 300 m to the southwest of Twin Knobs is another free-standing knob known as Crayne Knob, which was not investigated. The nearest water source to the knobs is the Cruce Branch of Livingston Creek—a fourth-order stream located approximately 700 m from the knobs. At the time of the KAS investigation of the Twin Knobs locality, both peaks were densely wooded on the slopes and tops—but had been logged in historic times (Figure 1.3).

The Twin Knobs Rockshelter (15Cn50) is a small sandstone overhang situated on the southeastern face of the western peak of Twin Knobs at approximately 224 meters amsl (Figure 1.4). The site measures 11 m east/west by 5 m north/south, although the flat, habitable space of the shelter measures only 5 m north/south by 5 m east/west. The site was originally identified in 2005 during an archaeological survey of the highway re-alignment corridor (Miller and Striker 2005).

[redacted]

Figure 1.2. Topography of the Twin Knobs locality.

Figure 1.3. View of the Twin Knobs locality.

[redacted]

Figure 1.4. Location of Sites 15Cn50, 15Cn52, and 15Cn61.

TWIN KNOBS ROCKSHELTER (15CN50)

The 2005 survey of the site noted the presence of a large looter trench near the back wall of the shelter (Miller and Striker 2005). At that time, a total of 92 artifacts were recovered from looter backdirt. In addition, examination of the looter pit profile suggested a complex sequence of intact stratigraphy within the shelter that extended at least to a depth of 60 cm below surface. Aside from the looter disturbance, extensive modern disturbance of the shelter's surface was also indicated by the presence of a low rock wall, fire pit, and modern trash. Graffiti also was noted on the rear wall of the shelter. Miller and Striker (2005) suggest that the low wall may be an indication that the shelter was once used for moonshining activity. In spite of the relatively extensive modern disturbance to the surface of the shelter, the indication of intact subsurface sediment and recovery of artifacts from the looter backdirt suggested that the site contained potentially significant prehistoric cultural deposits that would be impacted by the proposed construction. As a result, additional testing of the Twin Knobs Rockshelter was recommended (Miller and Striker 2005).

In order to mitigate the impact of the planned highway construction, KAS excavations at the Twin Knobs Rockshelter consisted of 13 1 x 1 m units and two 1 x 0.5 m units, for a total of 14 m^2. Each of the 15 units are contiguous and comprise an excavated block that measures 4 m north/south by 4.5 m east/west. Each unit was excavated by trowel in a combination of 10 cm and 5 cm arbitrary levels within natural sediment zones to sterile sediment or bedrock. All sediment from excavation—with the exception of flotation samples—was screened through 6.35 mm wire mesh. The maximum depth of the excavations at the Twin Knobs Rockshelter was 1.0 m below surface, although a majority of units terminated between 75-90 cm below surface.

Prior to the initiation of unit excavation, the low rock wall and historic fire pit were dismantled, and the loose fill and leaf litter was removed from the looter pit to determine the extent of disturbance and examine the exposed sediment profile. Examination of the western edge of the looter pit indicated that intact cultural deposits—including at least three sediment zones and a probable feature (Feature 1)—had been disturbed. Unfortunately, the deepest and most extensive portion of the looter pit digging was located near the center of what was later identified to be a large, Early Woodland pit feature (Zone D [Feature 1]).

In order to establish the limit of looter damage and excavate intact sediments, a series of test units were positioned along the margins of the looter pit and later in adjacent locations to expand the spatial coverage within the shelter. The net result was the excavation of a 4 m north/south by 4.5 m east/west block that provided information on the subsurface stratigraphy and intrasite spatial patterning, as well as resulting in the collection of a relatively large artifact assemblage.

Four distinct sediment zones (Zones A/B, C, E, and H) and two features (Zone D [Feature 1] and Zone F [Feature 2]) were identified at the site. The appearance and thickness of each stratigraphic zone varied (sometimes substantially) across the shelter area, resulting in a relatively complex stratigraphic sequence. Like many rockshelters, the complexity of the depositional history has been compounded by the persistent reuse of the shelter through time and bioturbative processes (e.g., rodent and root activity). In addition, modern recreational use of the shelter and looter activity has disturbed a substantial portion of the uppermost deposits at the site.

Each of the sediment zones contained relatively high densities of cultural materials. A total of 28,013 artifacts was recovered from the excavation of the Twin Knobs Rockshelter and included lithic tools, debitage, prehistoric ceramics, bone and shell, botanics, and charcoal. Diagnostic materials from the site, include a relatively large number of projectile points and projectile point fragments (n=140) that span the Late Paleoindian to Late Prehistoric period. The ceramics recovered from the shelter are primarily diagnostic of the Late Woodland, though a few date to the early Mississippian subperiod. Although some mixing of artifacts is clearly present within the shelter, most of the stratigraphic zones are internally consistent enough to be associated with specific prehistoric time periods.

Zones A/B represent the modern surface and Late Prehistoric occupation of the shelter. Although distinguishable in profile, these two zones have been combined because of the substantial modification and mixing of the site surface by looter activity and modern recreational uses of the site. Zone C appears to correlate with the Late Woodland and probably is directly associated with the similarly-aged occupation of the Flat Top site. Based on associated radiocarbon dates and diagnostic artifacts, Zone E was deposited during the Late Archaic period. Diagnostic artifacts from Zone H suggest that it encompasses a long period of time that spans the Late Paleoindian to Early and Middle Archaic periods.

In addition to the sediment zones, two features—Zone D (Feature 1) and Feature 2—also were identified at the site. Zone D (Feature 1) is a large Terminal Archaic/Early Woodland pit (perhaps a series of overlapping, small pits) that was characterized by a dense, organically-rich dark sandy silt that appeared unevenly between 20-90 cm below surface. Feature 1 measured 1.70 m north/south by 2.82 m east/west and had been heavily impacted by looter activity. A single radiocarbon date of 2910±70 B.P. (3316-2863 cal B.P.; 1367-914 cal B.C.) on nutshell was obtained from Feature 1.

Feature 2 (originally defined as Zone F) is a small area (81 cm north/south by 74 cm east/west) of burned and mottled sediment (probable hearth) associated with burned sandstone and four groundstone implements (one nutting stone, a hammerstone, and two sandstone grinding slabs). The sediment of Feature 2 was a mottled, dark reddish brown fine sandy silt mixed with ash and charcoal flecking. Feature 2 was identified at a depth of 38 cm below surface and continued to 47 cm below surface. Unfortunately, no charcoal large enough to date was recovered from within the burned area of Feature 2 (all of the burned and mottle sediment was collected as a flotation sample). However, a date of 3770±70 B.P. (4407-3932 cal B.P.; 2458-1983 cal B.C.) on nutshell fragment next to the groundstone tools suggests a Late Archaic age for the feature.

The results of the KAS excavations indicate that the Twin Knobs Rockshelter was a significant and important location throughout the long prehistory of western Kentucky. In spite of the presence of the large Terminal Archaic/Early Woodland feature, the distribution of artifacts by stratigraphic zone suggests that the most intensive use of the Twin Knobs shelter occurred during the Late Woodland/Late Prehistoric period and the Late Archaic period. In general, there appears to have been a general increase through time in the number of artifacts being deposited in the Twin Knobs Rockshelter. Given the sustained use of the Twin Knobs Rockshelter throughout prehistory, it is likely that the function of the site and size of occupying groups varied over time.

During the Late Paleoindian, Early Archaic, and Middle Archaic periods the site appears to have functioned as a hunting camp—given the number of projectile points recovered. The elevated setting of the shelter may have provided good visibility of the surrounding terrain and convenient access to both lowland and upland areas. It is likely that during this long span of time, the site was repeatedly occupied on a temporary basis for short periods by small hunting groups or perhaps individuals. The absence of features related to this period argue against any intensive use or sustained occupations.

It is also possible that in addition to its role as a hunting camp, the Twin Knobs Rockshelter may have served as a way station. Twin Knobs is located roughly equidistant between the Cumberland River (approximately 23 km to the south) and Ohio River (approximately 22 km to the north). The relatively distinctively shaped Twin Knobs, with its rockshelter, may have served as a known and convenient stopover or temporary camp for groups or individuals moving between these large drainages.

During the Late Archaic, site function and intensity of occupation changed. The extent of the Zone E sediment and associated Feature 2 (hearth and grinding/nutting area) suggest that the shelter likely was used by small task-oriented or special purpose groups—probably for the collection and processing of upland resources, particularly nuts. The duration of occupation was likely short-term and seasonal, but apparently was repeated over several centuries—given the radiocarbon dates associated with the Zone E and Zone F (Feature 2). These dates suggest an occupational range of 5463-3618 cal B.P. (3628-1669 cal B.C.).

Early Woodland use of the shelter mimics the Late Archaic pattern of small task-groups and short-term repeat occupations. Like the earlier occupations, the Early Woodland use was focused on upland resource collection and processing. Although a few early cultigens were consumed, an emphasis remained on exploitation of wild plant resources.

Late Woodland use of the shelter is related to the occupation of the Flat Top site. It is likely that the short-term seasonal occupation by small family or multi-family units posited for the Twin Knobs Rockshelter also characterizes the use of the Flat Top site. During this period—and only during this period—the Twin Knobs Rockshelter and the Flat Top site probably could be considered separate aspects of single interrelated site.

The presence of Lewis pottery and Lowe Cluster points at both sites reinforces the probable contemporaneity of both sites between A.D. 600 and 900.

Late Prehistoric (post A.D. 900-1700) use of the shelter is indicated by the presence of triangular arrow points and a few mixed tempered fired clay and shell tempered ceramics. The lack of features associated with this occupation, and the paucity of cultigens, such as maize, speaks to a more transient use of the shelter than in the earlier Late Archaic and Terminal Archaic/Early Woodland periods. It appears that during Mississippian times the shelter likely functioned once again as temporary way station and/or hunting camp. That the site was situated midway between the Cumberland and Tradewater Rivers may have led to it being a convenient stopping off point for hunters moving between these rivers and the nearby Ohio River. Use of the shelter may have occurred throughout the year, but likely only involved small task-groups or individuals.

FLAT TOP SITE (15CN52)

The Flat Top site (15Cn52) is located on the small, flat, upper surface of the western peak of Twin Knobs (Figure 1.4). The site measures 24 m north/south by 36 m east/west and encompasses the entirety of the flat surface of the knob. Access to the knob top is difficult as the side-slopes are cliff-like. In spite of an earlier archaeological survey of the project area (Miller and Striker 2005), the existence of the Flat Top site was unknown prior to the KAS investigations and was identified by the presence of cultural material eroding down the knob slope. Investigation of the surface of the knob top by KAS personnel resulted in the collection of cultural materials, including prehistoric pottery and lithic debris, and the identification of the site. The presence of prehistoric artifacts eroding out of intact sediments suggested that the site could possibly contain potentially significant deposits.

In order to mitigate the impact of planned highway construction, KAS conducted extensive excavation across the relatively small Flat Top site. A total of 30 1 x 1 m and two 50 x 50 cm units (totaling 30.5 m^2) was excavated at the site. Each unit was hand excavated with shovel and trowel in natural levels to sterile subsoil or bedrock. All sediment from excavation was screened through 6.35 mm wire mesh. Units were opportunistically spaced across the surface of the knob in order to maximize horizontal subsurface information and attempt to document any possible occupational changes or spatial differences in activities/use. In general, units excavated at the Flat Top site indicated a highly similar and shallow stratigraphic profile across the surface of the knob. No features were identified during the excavation of the Flat Top site and artifact densities were relatively low.

The overall stratigraphic pattern identified in the excavations indicates a thin (8-15 cm thick), relatively homogeneous, single component depositional episode that appears to date to the Late Woodland period (ca. A.D. 400-900). Diagnostic artifacts recovered included Lewis cordmarked pottery, Lowe Cluster projectile points, and a triangular projectile point. Other artifacts recovered the site, included lithic debris, informal stone tools, biface fragments, a Mill Creek chert hoe, and polished hoe flakes. A relatively wide range of domestic activities is represented by the Flat Top artifact assemblage. In spite of the range of domestic activities, the absence of features, relatively low artifact densities, and shallow, single component deposits suggest that the occupation of the site was short-term and seasonal, and likely involved only small groups, or perhaps individual family units.

The presence of Lewis pottery and Lowe Cluster points suggests that the Flat Top site is likely representative of the regionally-defined Lewis phase (A.D. 600-900) of the early Late Woodland period. The conspicuous location of the Flat Top site on top of a relatively inaccessible knob and presence of Lewis pottery suggest that this site probably represents an example of a Late Woodland 'stone fort' (Butler and Wagner 2000; Muller 1986) and is likely associated with the Stone Fort Complex of the lower Ohio Valley (see Chapter Two). The Stone Fort Complex is primarily known from southern Illinois, with only a few sites having been identified in Kentucky (Pollack and Henderson 2000).

Unlike many of the more well-known Stone Fort Complex sites, the Flat Top site lacks any evidence of stone walls or stone mounds. The presence of hoe flakes and a hoe suggests that gardening took place in the vicinity of the site, and is suggestive of a domestic component to the Flat Top site. On the other hand, the site's location on prominent knoll, makes one wonder if it was also selected for ceremonial and religious purposes. Clearly fires set on top of this knoll at night could be seen for many miles. The Flat Top site represents a significant addition to our understanding of the Late Woodland period in western Kentucky and the lower Ohio Valley region.

SITE 15CN61

Site 15Cn61 is located on the relatively flat, top of the eastern peak of Twin Knobs (Figure 1.4). The site measures 28 m north/south by 32 m east/west, and encompasses most of the upper surface of the knob. This previously unknown site was identified by the presence of several possible "stone mounds" and rock piles containing looter holes located on the top of the knob. Like the nearby Flat Top site, access to the top of the steep-sided knob was probably relatively difficult in the past, although a bulldozer track related to modern logging activity had been cut on the northeast face of the eastern peak. The track continued to the knob top, where extensive leveling and ground disturbance, along with a large bulldozer push pile, was documented. In order to establish if the possible "stone mounds" were of prehistoric origin and mitigate the planned impacts of the proposed highway construction, KAS conducted limited excavations across the surface of the eastern knob.

Fourteen units (totaling 20 m^2) were excavated at Site 15Cn61 Each unit was hand excavated with shovel and trowel in natural levels to bedrock. All sediment was screened through 6.35 mm wire mesh. Units were opportunistically spaced within the possible "stone mounds" and rock piles in order to document the stratigraphic profiles and determine if they were of prehistoric origin. In general, units excavated at Site

15Cn61 indicated a shallow stratigraphic profile of channery sediment and exfoliating bedrock across the surface of the knob. All of the possible "stone mounds" and piles were determined to be of natural origin, with the rocks discarded by looters giving them a mound-like appearance.

Only eight small flakes were recovered from this light lithic scatter and Site 15Cn61 does not appear to have been as intensively occupied as the nearby Flat Top site. This assessment should be treated with caution, however, as the site had been severely impacted by logging activities prior to KAS's investigation. The results of KAS's investigation of Site 15Cn61 is presented in Appendix III.

SUMMARY OF EXCAVATIONS

In sum, the KAS excavations at the Twin Knobs Rockshelter and Flat Top site have provided specific information regarding the nature and duration of occupation at each site, along with data related to subsistence and technological practices. In addition, the results of these investigations also generated significant insights into long-term patterns of regional landscape use and changing mobility within western Kentucky and the lower Ohio Valley region. Given the relatively small size of the Twin Knobs Rockshelter, the depth of deposits and the quantity of recovered material is impressive. Similarly, despite the small size of Flat Top, its conspicuous location and Lewis phase occupation allowed for the recognition of a Late Woodland 'stone fort' site—and its association with the Stone Fort Complex. Because knobs like the Twin Knobs locality are present across east Crittenden and Caldwell Counties, it is likely that similar small sites may be located throughout the region.

ORGANIZATION OF THE REPORT

In effect, this report details two separate—yet related—site investigations. As such, the Twin Knobs Rockshelter and Flat Top sites are presented separately in the following chapters. Chapter Two provides a brief cultural background within which to contextualize the research conducted at both sites. Particular detail is given to the Late Woodland period, in which the Lewis phase settlement of the lower Ohio Valley region is reviewed and the Stone Fort Complex is defined.

Chapters Three through Seven present the excavation data from the Twin Knobs Rockshelter, including Field Methods, Stratigraphy, Lithic Analysis, Ceramic Analysis, Faunal Analysis, and Archaeobotanical Analysis. Chapters Eight though Ten present the excavation data from the Flat Top site and include Field Methods, Stratigraphy, Lithic Analysis, and Ceramic Analysis. Chapter Eleven presents a summary of the information from each site, respectively, and offers conclusions. Appendices I and II present the materials recovered by context from the Twin Knobs Rockshelter and Flat Top site. Appendix III presents the results of investigations of Site 15Cn61 on the eastern knob of the Twin Knobs locality.

CHAPTER TWO:
CULTURAL AND CONCEPTUAL BACKGROUND

The excavated assemblage from the Twin Knobs Rockshelter indicates long-term use of the shelter that ranges from the Late Paleoindian period through the Late Prehistoric. In order to provide cultural context for the following analysis and discussions, a general cultural history of western Kentucky is presented. In contrast to the rockshelter, the Flat Top site is representative of a single early Late Woodland occupation and appears to be related to the relatively poorly understood Late Woodland 'stone fort' tradition. An overview of the Late Woodland period in Kentucky is presented below; however, an expanded discussion of the early Late Woodland 'stone fort' tradition is presented in the Summary chapter (Chapter Eleven) in order to better contextualize the Flat Top site within the regional archaeological understanding.

PALEOINDIAN PERIOD (9,500-8,000 B.C.)

The Paleoindian period (ca. 9,500 to 8,000 B.C.) represents the initial documented colonization of all the major physiographic regions within Kentucky (Maggard and Stackelbeck 2008:113). Until the late 1990s, the view of Late Pleistocene hunter-gatherers in the Americas was largely dominated by the "Clovis-first" paradigm (Maggard and Stackelbeck 2008:109). However, new discoveries have resulted in a rather surprising amount of data that cannot be explained under the Clovis-first hypothesis. The discovery of the well-dated occupation of the Monte Verde site, located in southern Chile has made it clear that humans were in the Americas by at least 11,000 B.C. (Dillehay 1997, Maggard and Stackelbeck 2008). In addition, as more sites are documented in North America that contain cultural assemblages in depositional contexts that are stratigraphically below Clovis layers it is becoming increasingly clear that there are sites in North America that predate Clovis (Maggard and Stackelbeck 2008). Several of these pre-Clovis sites are located in regions close to Kentucky, such as Cactus Hill in Virginia, Topper in South Carolina, Big Eddy in Missouri, and Meadwocroft Rockshelter in Pennsylvania (Adovasio et al. 1999; Goodyear 1999; Lopinot et al. 2000; McAvoy and McAvoy 1997). Although people may have lived in what is now Kentucky before 9,500 B.C., the archaeological evidence of such utilization and occupation of this region has yet to be found (Pollack 2008a:7). With the exception of a radiocarbon date (9,010 +/- 240 B.C.) and a retouched blade recovered below Late Paleoindian deposits from the Enoch Fork Shelter in Perry County, Archaeologists currently know very little about the timing of pre-Clovis occupations in Kentucky (Maggard and Stackelbeck 2008).

Based on projectile point styles, it is now relatively common across much of North America, including Kentucky, to refer to Paleoindian occupation in three distinct subperiods: Early, Middle, and Late Paleoindian. Kentucky's climate at 9,500 B.C. was much cooler and moister than today; however, a warming trend began around 8,500 B.C. This warming caused drastic changes in Kentucky's vegetation, and the composition of terrestrial resources (Tankersley 1996:21). The Early Paleoindian subperiod in Kentucky ranges from 9,500 to 9,000 B.C. and is associated with Clovis projectile points. These early inhabitants of Kentucky had a distinctive toolkit adapted to hunting and processing big game. The primary tools used by Paleoindian groups included fluted and finely worked lanceolate projectile points (Maggard and Stackelbeck 2008). However, large bifaces, prismatic blades, chipped stone knives, side and end scrapers, gravers and bone, ivory or antler implements, such as awls and sewing needles also are well-known (Haynes 2002; Tankersley 1996:24).

Research across North America is revealing that Clovis peoples living in small, highly mobile hunter-gatherer groups, relied on subsistence strategies more closely resembling the broad-spectrum Early and Middle Archaic subsistence practices than that of big game hunting specialization (Maggard and Stackelbeck 2008). Although mastodon, mammoth, bison, horse, tapir, camel, and peccary are just a few of the big game mammals that Paleoindian groups hunted, they did not depend solely on mega-fauna resources but instead employed a mixed foraging strategy, exploiting small game, marine, and plant food resources.

The Middle Paleoindian subperiod (9,000-8,500 B.C.) is similar in most respects to the preceding Early Paleoindian Clovis subdivision; however, it is marked by technological changes, greater stylistic diversity of projectile points, and increased economic regionalization (Maggard and Stackelbeck 2008; Ray 2003). During the Middle Paleoindian subperiod Gainey and Cumberland replace Clovis points and a core and blade technology is replaced by a technique called bipolar lithic reduction. These technological changes most likely occurred in response to the use of a wider range of raw material resources, including some poorer quality materials. Changes in lithic technology also accompanied the increased use of locally available chert resources. The Middle Paleoindian subperiod witnessed noticeable climatic changes, including the retreat of the Pleistocene glaciers and the replacement of spruce and pine forest with hardwoods. These changes resulted in environmental instability and the apparent extinction of most species of Pleistocene mega-fauna (Maggard and Stackelbeck 2008). Environmental changes also appear to have resulted in a subsistence shift toward an increased reliance on regionally available plants and smaller game resources within a mixed foraging economy (Walker 2007).

The Late Paleoindian subperiod (8,500-8,000 B.C.) is once again marked by changes in Paleoindian toolkits. Like Early and Middle Paleoindian points, Late Paleoindian points are bifacially-flaked, lanceolate forms; however, they lack the characteristic flutes that are diagnostic of earlier projectile point types (Ray 2003; Tankersley 1996). The earlier point styles were replaced by unfluted point types, such as Lanceolate Plano points and Dalton Cluster points (Tankersley 1996:33). The toolkit became more diverse and included unifacial and bifacial tools, such as beveled and backed bifaces, unifacial and flake scrapers, adzes, retouched flakes, and drill/perforators (Goodyear 1999; Morse 1997; Tankersley 1996). As in earlier periods, a changing environment was the driving force behind the addition of new tool types. Ray (2003:46-50) suggests that four major changes in lithic technology occurred between the Late

Paleoindian subperiod and their earlier predecessors: 1) a more intensive use of a wider range of locally available chert resources, as later points are often manufactured from lower quality materials; 2) channel fluting is replaced with basal thinning; 3) there is a marked reduction in the size of projectile points and; 4) more extensive resharpening of projectile point blade margins. Clovis, Cumberland and Gainey points are usually resharpened only along the distal end of the point blade. Late Paleoindian points; however, are frequently resharpened along the lateral edges of the blade indicating substantial reuse.

By Late Paleoindian time, large herbivores, such as mammoth, mastodon, horse, moose, and elk, had become or were going extinct and open areas were most likely limited to karst barrens and sandy terraces along major streams (Maggard and Stackelbeck 2008). Game such as white-tail deer, bear, and turkey became important sources of food, and an extremely wide range of plants, including various nut species were collected.

Sites 15Cn50 and 15Cn52 are located in the Green River Management Area, Ohio River II Section, which includes Breckinridge, Crittenden, Daviess, Hancock, Henderson, and Union counties, Kentucky (Pollack 2008b). Over one-third (n=133) of all known Paleoindian sites in Kentucky have been recorded in the Green River Management Area (Maggard and Stackelbeck 2008). However, relatively few of these sites (n=24) were recorded in the Ohio River II Section of the Green River Management Area (Maggard and Stackelbeck 2008).

Among the notable sites containing Paleoindian components in the region are the Clark site (15Da32) and the Abe Carter site (15Da33), in Daviess County (Creasman 1993). The Clark site is located on a “low relief ridge of a broad, flat outwash plain south of the Ohio River” (Creasman 1993:62). The Abe Carter site, which is located within close proximity of the Clark site is situated along the top and south slope of a knoll that is part of a broad flat terrace. The evidence for Paleoindian occupation of both sites was based on the recovery of fluted projectile point fragments from subsurface contexts. In addition, a unifacial spurred endscraper was recovered from the same excavation context as the fluted point fragment from the Clark site (Creasman 1993).

Other sites of note within the Ohio River II section that have yielded Paleoindian artifacts include the Brother Abraham site (15Bc282) and the George Branch Shelter A (15Bc283) in Breckinridge County (Mocas 1993a, 1993b). The Brother Abraham site is an open habitation located on a bench situated above the south side of the George Branch of the Rough River. Cumberland, Beaver Lake, Quad, and Dalton points (largely from a private collection) recovered from this site indicate Middle and late Paleoindian occupations of this locale. The George Branch Shelter A is located directly below the Brother Abraham site. According to (Mocas 1993b), the only diagnostic artifact recovered from the shelter was a Dalton point. At least one human burial was reportedly looted from the shelter; however, no intact burials were observed at the time of the survey (Mocas 1993b).

ARCHAIC PERIOD (8,000 – 1,000 B.C.)

Retreating Pleistocene glaciers and the onset of the Hypsithermal climatic interval marked a shift in the climate of Kentucky and also in the lifeways of its inhabitants. The climatic changes that forced the northern migration/extinction of mega-fauna also changed the nature of Kentucky's forests. The once circum-glacial coniferous forests were replaced by mixed deciduous forests, thus allowing modern species of flora and fauna to expand. The Archaic period began around 8,000 B.C. with a slow shift from the exploitation of mega-fauna to a more varied subsistence strategy. Archaic groups began to exploit forest game like the white-tail deer as well as plant foods, especially nuts. Marine resources, such as freshwater mussels, also became important sources of food.

The Early Archaic subperiod (8,000-6,000 B.C.) is marked by numerous technological, social, and economic changes as hunting and gathering societies adapted to the climate change that occurred toward end of the last Pleistocene glaciation (Jefferies 2008:202). The appearance of corner and basal notched projectile points, such as the Kirk and LeCroy types, the relatively high percentage of projectile points made from high quality nonlocal cherts, and the lack of evidence for long-term occupation, suggested that mobile hunting groups continued to exploit relatively large territories much like their Paleoindian predecessors (Jefferies 2008:203). Early Archaic assemblages contain few tools related to collecting or processing plant food, and the paucity of these tool types indicates that these subsistence activities were of relatively minor importance compared with hunting activities (Jefferies 2008). The limited amount of Early Archaic material found at most sites, combined with a general absence of middens, features, and burials, suggests that most Early Archaic occupations were of short duration (Jefferies 2008:203).

The Hypsithermal climatic interval, which began around 7,000 B.C., caused the midcontinent to gradually become warmer and dryer than today (Jefferies 1996:47). This shift in climate affected the plants, animals, and people of Kentucky. The Middle Archaic subperiod (6,000-3,000 B.C.) was a time of increasing regionalization of cultures reflected by a variety of technological, settlement, subsistence, and social traits (Jefferies 2008:203). One of the most distinctive characteristics was the development of regional projectile point styles, such as Morrow Mountain, Matanzas, and Big Sandy II in eastern and central Kentucky (Jefferies 2008:203). Point types, such as Eva, Cypress Creek, and Big Sandy are found in western Kentucky (Jefferies 1996:47).

During the Middle Archaic subperiod a variety of specialized tools appear in the archaeological record. Additions to the Archaic toolkit, include formal and informal groundstone tools, such as axes, pitted anvils, grinding stones, and pestles, which were used to process plant foods (Jefferies 2008). Another important tool that appears during this period is the atlatl, which extended the range to which a spear could be thrown (Jefferies 1996:48). In many parts of Kentucky, the ephemeral nature of most early Middle Archaic occupations suggests high group mobility, not unlike that found during the Early Archaic subperiod (Jefferies et al. 2005). In contrast with the early Middle Archaic, the presence of large late Middle Archaic sites containing deep middens, a high diversity of tool types, and burials indicates that some locations were intensively occupied on a long-term or year-round basis (Jefferies 2008:206).

The climate in the eastern United States began to become more moderate around 3,000 B.C. and Late Archaic (3,000-1,000 B.C.) groups remained largely mobile as represented by the numerous small sites dating to this subperiod. Differences in the size, number, and distribution of settlements are suggestive of changes in settlement systems and social organization from the Middle to Late Archaic (Jefferies 2008:209). In some parts of Kentucky, Late Archaic sites appear to be more dispersed and less intensively utilized than during the late Middle Archaic (Jefferies 2008:209).

Late Archaic subsistence focused on hunting white-tail deer and collecting hickory nuts. A wide variety of small animals, birds, and fish supplied dietary protein and fat and in certain areas, mussels obtained from streams were an important source of food. The presence of native and tropical cultigens at some Late Archaic sites suggests that groups were beginning to experiment with horticulture/gardening (Jefferies 1996:57). A wide range of flaked stone, groundstone, bone, and wood tools reflects this shift in subsistence (Jefferies 1996:55). Late Archaic projectile point types include an assortment of large straight, expanding, and contracting stem points, and smaller stemmed and side-notched types (Jefferies 2008:210). The presence of artifacts manufactured from nonlocal raw materials, such as copper and marine shell, at several sites along the Green River shows that some form of long distance exchange network existed during the Late Archaic (Jefferies 2008).

Roughly twenty-eight percent of the Archaic sites recorded in the Green River Management Area are located in the Ohio River II Section (n=314) (Jefferies 2008:228). An assortment of projectile points, including bifurcate base, Kirk Corner Notched, and Lost Lake are associated with the Early Archaic occupation of this part of Kentucky. During the 1970s, limited excavations conducted along the Ohio River in Breckinridge County, located three sites (15Bc16c, 15Bc17, and 15Bc18) containing Early Archaic artifacts (Allen and Cowan 1976; Cowan 1975). The presence of midden at some of the sites indicates that intact Early Archaic cultural deposits may be present at these locations (Allen and Cowan 1976).

Middle Archaic period sites are relatively poorly represented in the Ohio River II section (Jefferies 2008). Known sites and components primarily contain Big Sandy Side Notched and Matanzas projectile points. Middle Archaic sites also produce assorted groundstone tools, such as grooved axes, celts, and adzes. Excavations at the Clark site (15Da32) in Daviess County documented a large late Middle to Late Archaic French Lick phase midden deposit (Creasman 1993). Researchers proposed that the midden was associated with a small residential base camp occupied during the fall or winter.

A Late Archaic site of note in the area of interest is the Highland Creek site (15Un127), located on a low ridge overlooking the Ohio River floodplain in Henderson County. The Highland Creek site contains an extensive midden consisting of dense accumulation of plant and animal remains, as well as burned clay (Maggard and Pollack

2006:1-4). Diagnostic artifacts recovered from the site included Etley Cluster, Pickwick, and Saratoga Parallel Stemmed projectile points (Maggard and Pollack 2006:100). The site yielded abundant evidence for a localized late Middle-early Late Archaic adaptation to the nearby wetland environment. The exploitation of a wide variety of wetland plants and animals, combined with intensive utilization of nuts, suggests increasing economic intensification during the late Middle/early Late Archaic in this part of the lower Ohio Valley (Maggard and Pollack 2006).

WOODLAND PERIOD (1,000 B.C. – A.D. 900 or 1,000)

The appearance of pottery technology is one of the defining characteristics of the Woodland period; however, it was adopted at different times across Kentucky. While chronometric determinations place pottery in some parts of Kentucky at or before 1,000 B.C., there are few dates prior to 600 B.C. and many more after 400 B.C. (Applegate 2008). The oldest pottery is typically thick-walled cordmarked, plain, or fabric-impressed vessels tempered with coarse grit and rocks. This type of pottery is known as Fayette Thick and is considered Early Woodland (Applegate 2008; Griffin 1943). These vessels were barrel-shaped jars or large, deep, basin-shaped jars or cauldrons (Railey 1996:81).

Early Woodland projectile point types mostly notched and stemmed forms, such as Wade, Gary, Turkeytail, and Camp Creek were used as knives, spears, or atlatl dart tips. Adena stemmed points became common after about 500 B.C. (Railey 1996). Pestles and nutting stones were utilized in plant processing; hunting tools sometimes included groundstone atlatl weights. Hammerstones and abraders were commonly used in tool manufacturing (Applegate 2008:343).

Another archaeological characteristic of the Early Woodland is the appearance of social or ritual sites that are spatially segregated from domestic habitations (Applegate 2008:345). Among these, are burial mounds, "sacred circles," ditched earthworks, and other enclosures. By about 500-400 B.C., groups in some parts of Kentucky began to construct burial mounds and irregularly shaped enclosures; these sites were typically associated with Adena (Applegate 2008:345). An early Adena site in central Kentucky is Peter Village. Peter Village is a large oval structure that was originally surveyed and mapped by Constantine Rafinesque in 1820 (Schlarb 2005). The first large oval enclosure built at Peter Village was a wooden stockade; it was later replaced by a 2 m deep exterior ditch (Clay 1985a; 1985b). Artifacts collected from the surface of the site, include stemmed and other projectile points, drills, gravers, reamers, scrapers, knives, celts, hammerstones, sandstone tubular pipe fragments, worked pipestone, slate pendant fragments and gorgets, and hematite cones/hemispheres (Applegate 2008). Items produced from barite or galena, such as boatstones or atlatl weights, beads, and cones/hemispheres, as well as Fayette Thick and Adena Plain ceramics also were recovered from the surface at Peter Village (Griffin 1943; Webb 1941). Despite its name, Peter Village did not function as a habitation site (Applegate 2008:461). According to Clay (1985b), the stockade and ditch-embankment features could have served defensive functions and/or defined “an area for secular or sacred purposes.” Peter Village was a special activity site or “defensive resource exploitation center” where barite/galena was acquired from a nearby vein deposit and processed into rectangles and cones that commonly occur as grave goods at Adena mortuary sites (Clay 1985b:39). Food preparation and mortuary feasting, and pottery and chipped stone tool manufacture, also occurred at the site (Applegate 2008:461).

The Adena and Hopewell concepts emerged in the early part of the twentieth century from research focused on Woodland burial practices(Applegate 2008). These two concepts are the synthesis of the excavation of several small burial mounds in Kentucky and southern Ohio (Railey 1996). Most Kentucky archaeologists concur that Adena spans the late Early Woodland to early Middle Woodland (Clay 1985b; Henderson et al. 1988; Pollack et al. 2005; Railey 1996; Richmond and Kerr 2005; Schlarb 2005). The vast majority of Adena earthwork sites in Kentucky are thought to date from 500 B.C. to A.D. 250 (Anderson and Mainfort 2002; Clay 1980, 1983; Fenton and Jefferies 1991; Seeman 1986). Adena burial mounds seldom represent a single event but instead contain several individual tombs, each tomb being covered with earth at the conclusion of the mortuary event (Railey 1996). Adena mortuary items include projectile points, stone gorgets, pipes, celts, simple and engraved tablets, galena, bone and shell tools, and beads (Railey 1996). Hopewell mounds differ from Adena mounds in that they tend to cover a single tomb (Railey 1990:254). Additional interments are distributed horizontally in Hopewell contexts instead of vertically, as in Adena contexts (Railey 1990:254). Whole ceramic vessels, mica cut-outs, obsidian artifacts, platform pipes, terra-cotta figurines, and copper celts are items that appear in Hopewell contexts and are absent or rare in Adena (Railey 1990:254).

Hopewell sites date from A.D. 1 - 500 and tend to be concentrated in southern Ohio. However, a number of Woodland sites showing Hopewell influence have been documented in Kentucky (Applegate 2008). Clay (1991:35) has interpreted Hopewell “as an extension of the complexity that developed in Adena.” Railey (1996:100) concluded that “Adena should be viewed as an early regional expression of Hopewell rather than its predecessor.” Applegate (2006) suggested a similar interpretation, stating that Adena developed during the late Early Woodland in Ohio and Kentucky. By the early Middle Woodland times in Ohio, the Adena mortuary-ritual complex morphed into or was superseded by Hopewell (Applegate 2008). In Kentucky; however, the predominant mortuary-ritual complex continued to be Adena with limited and irregular influences from Ohio Hopewell, Appalachian Summit Hopewell, Copena Hopewell, and to a lesser extent, Illinois Hopewell (Applegate 2008). In essence, the distinction between Adena and Hopewell in Kentucky is much less clear-cut than it is in Ohio. This is not surprising, because Kentucky is located in an area that was a “hinterland” or “periphery” to classic Hopewell (Applegate 2008).

Early Woodland (1,000-200 B.C.) subsistence patterns in Kentucky witnessed a slight change from Late Archaic times. Hunting and gathering continued as the main subsistence activities, with garden crops supplementing more of the diet (Applegate 2008). Animal protein was obtained from a variety of sources, including white-tail deer, box turtles, small mammals, birds, and in some areas, fish and mussels (Applegate 2008:344). Much like the Archaic period, nuts continued to be an important food source and they were gathered and stored for year-round consumption. However, one important change in Early Woodland subsistence was the intensified use and cultivation of weedy plants and cucurbits (Applegate 2008). Indigenous plant cultigens of the Eastern Agricultural Complex (EAC) found at Early Woodland sites, include sunflower, sumpweed or marsh elder, chenopodium or goosefoot, erect knotweed, giant ragweed, and maygrass. Gourd and squash, some species of which were indigenous cultivars, also are found in Early Woodland plant assemblages (Applegate 2008:344; Watson 1985:101)

Subsistence practices are believed to have been seasonal. Planting, tending gardens, and fishing were spring and summer activities; while harvesting wild and domesticated plant species, as well as gathering and storing mast products, were autumn activities (Railey 1996). Hunting deer and other game was predominantly a late autumn and winter activity. There is less information regarding Middle Woodland subsistence compared to earlier and later subperiods; however, limited faunal and floral assemblages indicate a generalized hunting and gathering pattern supplemented by small-scale gardening—similar to the better documented Early Woodland pattern (Applegate 2008).

In Kentucky, intensive use of exotic raw materials and the development of long-distance exchange networks first appeared at end of the Early Woodland, but peaked during the Middle Woodland (200 B.C.-500 A.D.) (Applegate 2008). Items, such as copper bracelets, breastplates and gorgets, copper and mica ornaments, marine shell beads, and Vanport (Flint Ridge of Ohio) chert bladelets are among the types of artifacts that have been recorded. However, exotic materials such as these are associated almost exclusively with specialized, mortuary-ritual contexts (Applegate 2008:346).

During the Early and Middle Woodland, the exploration and use of caves also became relatively common (Crothers et al. 2002). Caves across Kentucky, Tennessee, Indiana, and Alabama have been identified, through radiocarbon dating, as having been explored by prehistoric humans during both subperiods. The specific uses of caves varied, but appear to have included: 1) the mining of minerals, such as gypsum and mirabilite; 2) chert quarrying; 3) burial of the dead; and 4) possible ritual or ceremonial activities within dark zones (Crothers 2012; Crothers et al. 2002). Bundles of river cane and/or small sticks were used for lighting and often dabbed on the wall to keep the torch burning at an even rate for longer light usage; woven fiber slippers provided added foot protection; small rocks were used for battering gypsum off cave walls; and river cane and/or larger wooden digging sticks were used to prospect for and retrieve selenite crystals from the floor and wall sediments within caves.

While it is not exactly clear why minerals, like gypsum (hydrous calcium sulfate) and mirabilite (hydrous sodium sulfate), were mined so intensively during this period of prehistory, modern archaeological experiments with these minerals have determined that, with the addition of water or grease, gypsum powder makes a crude white plaster base similar to plaster of paris. Gypsum crystals (satin spar and selenite) could have been used in ritual or ceremonial purposes, and mirabilite and epsomite are both laxatives and have the additional medicinal properties of Glauber's salts and Epsom salts (Crothers et al. 2002). Mirabilite also tastes somewhat salty, hinting at its possible use in cooking and meat preservation (Crothers et al. 2002:512).

The transition from the Middle to Late Woodland (A.D. 300-500) in Kentucky does not appear to have been abrupt. Instead it was a gradual process, linked to changes in plant subsistence practices and hunting technology, an apparent decline in long-distance trade networks, and changes in ritual expression (Pollack and Henderson 2000:615). In some parts of Kentucky, the Late Woodland was "a time of appreciable cultural change," including population increase, development of the bow-and-arrow technology, changes in the amount of mound construction, shifts in social organization, and subsistence change (Anderson and Mainfort 2002).

During the early Late Woodland wild plants and animals continued to be the foundation of the subsistence economy. Cultivation of native plants continued and may have begun to intensify in some areas (Applegate 2008:348). Though small amounts of maize are present in Middle and early late Woodland contexts, it was not until the terminal Late Woodland (ca. A.D. 800) that it became a significant component of regional diets (Applegate 2008:348). Early Late Woodland ceramic assemblages are marked by a decrease in vessel wall thickness and a general increase in jar size relative to the Middle Woodland subperiod (Pollack and Henderson 2000). These larger vessels were used to cook nutrient rich starchy-oily seed crops.

Perhaps the most striking characteristic of Late Woodland occupations in the lower Ohio Valley is the apparent highly dispersed settlement pattern and fine-grained use of the landscape (Applegate 2008; Butler and Wagner 2000; Muller 1986). Unlike Early and Middle Woodland sites, Late Woodland sites are found in virtually all available environmental and physical settings and display widespread use of both lowland and upland settings (including rockshelters and hilltops). The extensive and dispersed distribution of Late Woodland sites suggests that the seasonal use of upland resources (particularly nut masts) was equally important to seasonally-available lowland and wetland resources (Muller 1986; Railey 1996).

In contrast to the diversity of site locations is the relative homogeneity of Late Woodland cultural material across the region (Applegate 2008; Butler and Wagner 2000; Muller 1986). Early Late Woodland (A.D. 400-800) ceramics are characterized by thin-walled, cordmarked vessels (predominantly jars) that tend to be grog or grit tempered (Butler and Wagner 2000; Pollack and Henderson 2000). Along the Ohio River in southern Illinois and western Kentucky, Lewis phase ceramics (A.D. 600-900) are diagnostic of the early Late Woodland subperiod (Butler and Wagner 2000; Pollack and Henderson 2000). Lewis ceramics are grog or fired clay tempered vessels with exterior cordmarking. Surface decoration (other than cordmarking) is not common and mostly includes lip notching and broad-line incised patterns (only identified at a few sites) (Butler and Wagner 2000; Pollack and Henderson 2000).

Lowe Flared Base projectile points are commonly associated with early Late Woodland deposits in the lower Ohio Valley (Railey 1996). After about A.D. 800, however, the smaller Jack's Reef and triangular point forms become much more prevalent—and are believed to represent widespread adoption of bow-and-arrow technology (Butler and Wagner 2000; Muller 1986). The period from about A.D. 800-1000 (terminal Late Woodland) along the lower Ohio is characterized by increasing settlement aggregation, and changes in ceramic technology (appearance of bowls and pans), hunting technology (i.e., adoption of the bow), and subsistence practices related to the increasing importance of maize (see Applegate 2008; Butler and Wagner 2000; Muller 1986; Pollack and Henderson 2000; Railey 1996).

Roughly thirty-eight percent of the Woodland sites recorded in the Green River Management Area are located in the Ohio River II Section (n=288) (Applegate 2008:387). An assortment of projectile points, including Gary Contracting Stemmed, Wade, Turkey Tail, and Dickson are associated with the Early Woodland occupations in this part of Kentucky. Ceramics recovered from mortuary-related features at the Rockmaker site (15Bc138) include Arrowhead Farm (Zorn Punctate) and Chenaultt/Dexter series pottery. Both short-term camps and lithic workshops, such as Beech Fork site (15Bc168), Rockmaker (15Bc138), and Yellowbank (15Bc164), and base camps, such as Site 15Ha151 and Site 15Bc98 (Applegate 2008; Bader 1991 1996a, 1996b; Turnbow et al. 1980) characterize Early Woodland settlement patterns in the Ohio River II Section.

Middle Woodland sites in this section area are characterized by Crab Orchard tradition settlements that from short-term temporary camps to large base camps that may have been occupied year-round (Applegate 2008; deNeeve 2004). A variety of Crab Orchard ceramics, including Crab Orchard Cordmarked, Crab Orchard Fabric Impressed, Crab Orchard Plain, Crab Orchard Cord-Wrapped Stick Impressed, and Crab Orchard Decorated pottery have been recovered from these sites (deNeeve 2004). In addition, to Crab Orchard ceramics, Hopewellian and Mann phase ceramics have been recovered from several sites in this section, including Slack Farm, Site 15He13, and Site 15He315B (Applegate 2008; deNeeve 2004; Dowell 1979; Schock and Stone 1985). Crab Orchard assemblages also have been recovered from 30 other sites in this section, including Site 15Da39, Smith (15He16), and Site 15Ha113 (deNeeve 2004; Hoffman 1966; Marquardt 1971; Ottesen 1981; Turnbow et al. 1980).

The early Late Woodland in this section is poorly known, but is represented by thinned walled jars with notched lips at Slack Farm, and by the Lewis phase materials recovered from the Twin Knobs Rockshelter and Flat Top site presented in this report. In comparison, Terminal Late Woodland Yankeetown sites are well represented in the Ohio River II Section. Yankeetown ceramics are characterized by distinctive decorative elements that included incising executed within a decorative zone delineated by parallel horizontal lines that were often filled diagonal lines. Other decorative elements are complicated stamping, filigree, nodes, rim folds, lip notches, and punctations, which usually occur in zoned arrangements on individual vessels. Common vessel forms are jars, bowls, and sometimes pans. Large vessels have lugs or loop handles (Applegate

2008; Blasingham 1965; Clay 1963; Curry 1954; Dorwin and Kellar 1968; Redmond 1990; Sussenbach 1992; Vickery 1970). Diachronic changes in Yankeetown ceramics include an increase in bowls and pans, a decrease in cordmarking, a decrease in folded rims, and incorporation of shell tempering (Sussenbach 1992). Yankeetown settlements tend be small dispersed homesteads or hamlets and are usually less than 1 ha in size. Sites with Yankeetown components in the Ohio River II section, include Site 15Ha151 (Turnbow et al. 1980), Site 15He35 (Hoffman 1966), Site 15Un30 (Marquardt 1971), Y-in-the-Road (15Un31) (DiBlasi and Sudhoff 1978), Stull (15Un95) (Ottesen 1981), and Foster (Sussenbach 1992).

‘Stone forts’ and early Late Woodland settlement

Early Late Woodland settlement patterns in the lower Ohio Valley (which includes portions of southern Illinois, western Kentucky, and southwestern Indiana) is typically characterized as more dispersed than during the preceding Middle Woodland (Crab Orchard) subperiod, and emphasized widespread and fine-grained use of the landscape (Butler and Wagner 2000; Pollack and Henderson 2000). Butler and Wagner (2000:698) have suggested that Lewis phase settlement patterns involved long-term habitation of certain favored locales with extended seasonally-based task and family group dispersions. The vast majority of sites, however, tend to reflect relatively small, seasonal occupations. Muller (1986:146-147) has suggested that the new cooking (thin walled vessels) and hunting (introduction of the bow) technologies allowed for a reduced interdependence among groups, and fostered a more dispersed and mobile settlement pattern.

In addition to the more common dispersed, seasonal sites, several early Late Woodland period ‘stone forts’ also have been identified in the lower Ohio Valley. These sites, which are located on steep, ‘mesa-like’ promontories containing Lewis phase pottery and Lowe Flared Base points, have been known for some time in southern Illinois and have generally been seen as a local cultural expression (Brieschke and Rackerby 1973; Muller 1986). The ‘stone forts,’ located in the Shawnee Hills of southern Illinois (at least 10 have been documented), are typically small, and situated in remote, inaccessible locations (see Butler and Wagner 2000). Often these locations are demarcated by a low rock walls that may have further restricted access or served defensive functions (Butler 2001; Muller 1986). With the exception of Cypress Citadel (11Js76) in southern Illinois (Butler 2001; Butler and Wagner 2000, 2003, 2012), these sites typically lack evidence of intensive or long-term habitation.

Muller (1986) and Butler (2001) have both pointed out that the conspicuous location (and occasional associated walls) of the ‘stone forts’ has made it easy to characterize these sites as defensive locations. In spite of the presumed defensive function, both authors put forth different characterizations of the ‘stone forts’ as more related to seasonal, small group aggregation than defense. Muller (1986) suggests that they may have served as the location of seasonal trade fairs where autonomous family groups interacted and exchanged goods with regional neighbors. While acknowledging the location of these sites in peripheral/boundary areas to major Late Woodland regional centers (i.e., the lower Ohio Valley to the south and Saline and Wabash Valleys to the north), Butler (2001) argues that the ‘stone forts’ more likely represent locations of seasonal ceremonial or ritual aggregation.

One of the most well-known Kentucky 'stone fort' sites is McGilligan Creek Village (15Lv199), which is located in north-central Livingston County, Kentucky (Henderson and Pollack 1996; Pollack and Henderson 2000; Stackelbeck 2005), west of and adjacent to Crittenden County. McGilligan Creek Village is located the flat crest of a steep promontory with restricted or limited access on all sides. Unlike many stone fort sites, but like Cypress Citadel in Southern Illinois, it appears to have been intensively occupied as evidence by thick midden deposits and the presence of domestic structures that appear to form a ‘ring’ surrounding a central, open plaza where no domestic activities took place. Lewis phase ceramics—including a rare broad-line incised decorative style—and chipped (Lowe Flared Base points) and ground stone tools comprise the material assemblage (Pollack and Henderson 2000). Other lithics of note include polished Mill Creek hoe flakes. Faunal remains and the seeds of starchy plants in the Eastern Agricultural Complex, maygrass and cultivated chenopod, also were recovered. A charcoal sample produced a calibrated radiocarbon date at 2 sigma of A.D. 590-800, which is consistent with the associated Lewis phase artifact assemblage (Stackelbeck 2005).

McGilligan Creek Village is further distinguished from other Stone Fort sites, again with the exception of Cypress Citadel and the Fort Ridge Site Complex in nearby Caldwell County, by the presence of multiple burial mounds. A couple are located within the village area, but most are located below and adjacent to the McGilligan Creek Village) (Pollack and Henderson 2000; Stackelbeck 2005). The largest concentration of mounds is associated with the McGilligan Creek Mound site (15Lv203). Located east/southeast of the knob on which the village lies, this site consists of two groups of stone mounds of various sizes totaling 86 mounds, constructed using unmodified sandstone rocks of varying sizes. Mound diameter averages 5.4 m, and mound height ranges from 1-5 m. An additional eight mounds, were documented at four other nearby sites: Barry Dalton Mounds (15Lv228)**,** Sue Zivari Mounds (15Lv230), Raymond Athey Mound Group (15Lv229), and the Homesite Mound (15Lv231). These four sites form a rough arc around McGilligan Creek Village (Stackelbeck 2005).

In addition to McGilligan Creek village, Lewis phase ceramics were recovered from six nearby rockshelters: Mantle Rock Petroglyph Site (15Lv160), Southpaw Shelter (15Lv200), Hole in Rock Shelter (15Lv202), Dollar Bill Shelter (15Lv212), Kissing Rocks Shelter (15Lv213), and Y-Not Shelter (15Lv215). Decorated sherds, however, only appear to be present in significant quantities at McGilligan Creek Village (Stackelbeck 2005).

Although less well known, similar bluff and hilltop Lewis phase sites have been documented in the southern extension of the Shawnee Hills in western Kentucky (Pollack and Henderson 2000). In Caldwell County, Rafinesque (1824:33) listed a single site, described as a ‘stone fort’ on the Tradewater River, that likely was either Fort Ridge or

Fort Bluff: Fort Ridge (15Ca1) situated adjacent to Montgomery Creek, not far south of its confluence with the Tradewater River; and Fort Bluff (15Ca6) in northern Caldwell County not far from the Crittenden County line on the West Fork of Donaldson Creek, a tributary to the Tradewater River. These two locations—along with the Flat Top site presented in this volume—appear to represent additional examples of early Late Woodland ‘stone fort’ sites.

Fort Bluff has not been visited by professional archaeologists, but Young (1910:58-59), Webb and Funkhouser (1932:61) and Steger (1987) have described it. The site sits on a high ("practically impregnable") 18 m-high peninsular bluff. It consists of a 183 m-long wall made of large stones that extend across a neck of land, enclosing 4 ha of the blufftop and an adjacent spring. The wall has a single 2.4 m east-facing opening. Originally, the site also contained a 1.9 - 2.1 m-high stone "parapet."

Fort Ridge (aka Fort Ridge Site Complex [15Ca1/15Ca57-60]) was described by Webb and Funkhouser (1932:59) and Steger (1987) as an ancient fortification. Unlike Fort Bluff, however, professional archaeologists have visited and documented this site (Henderson 1993, 2012; Sharp and Clayton 2007). The site complex extends for 825 m along the top and toe slope of a long narrow, steep-sided, northeast-southwest-trending ridge. Steep sandstone cliffs form the edges of the ridge except at the ridge toe, although even here, the slope is steep. Broad, relatively flat knolls are connected by narrow saddles.

The site complex consists of sections of three stone walls, five low stone mounds, and diffuse artifact scatters of varying size (mainly of chipped stone debitage and tool fragments, but also occasionally small weathered pottery fragments). The stone walls at Site15Ca57 and Site 15Ca59 extend across the ridge at the two spots where the ridge pinches and narrows. These are saddles, and are much lower than the ridgetops. The walls at Site 15Ca1 are located partway down the toe slope. These walls are made of large to medium-sized moss-covered sandstone rocks piled up.

The highest spot along the wall at Site 15Ca57 is approximately .76-.91 m tall. The wall measures 3 m wide at the widest point and extends 30 m from cliff edge to cliff edge. There is an opening or a disturbance on the south side. The walls at Site 15Ca59 are not as sharply defined. They stand approximately .6 m tall and extend for 15 m from slope to slope. The walls on the toe slope at Site 15Ca1 extend for about 300 meters and stand only .46 m tall, but otherwise are similar to the others.

Low mounds made from the same local sandstone rocks are situated on the ridge east and adjacent to each wall section at sites 15Ca57 (one mound) and 15Ca60 (four mounds). Looter holes are present in these mounds. The former is one (for sure) or two low-lying stone mounds. One measures 3 m in diameter. A flake was collected in the edge of a looter hole. The latter consists of a group of three mounds and one separate mound located east of the group on the edge of the saddle. The largest mound measures 7 by 8 m and stands 1 m high; the others measure 5 m or 8 m in diameter, respectively. The separate mound, the largest, measures 11 m in diameter.

The ridgetop artifact scatters occur on a flat-topped knob in the smaller southwest section (15Ca58) and on a much larger, flatter northeastern section (15Ca60). Artifacts have been recovered from screened shovel probes and bare spots on the ground surface of the smaller section, and from a single screened shovel probe in the larger section. Theses scatters likely represent habitation areas associated with the stone walls and mounds.

The smaller southwest section, between cliff and stone walls, measures 218 by 88 m. The flatter top of the knob measures approximately 80 x 50 m. Within this site, a deflated dark grayish brown silt loam (2-6 cm thick) overlies a yellowish-brown silty clay loam. The densest concentration of artifacts was documented on the highest spot in this smaller section. In contrast, the dark grayish brown silt loam soils on the larger northeastern ridge section (320 by 100 m) are 12-20 cm thick and do not appear to have been plowed.

Only a limited sample of artifacts was collected and most consisted of late-stage flakes. Two bifaces also were recovered: a small thick blank likely broken in manufacture and another that is probably a point fragment (Sharp and Clayton 2007). Chert types represented include St. Louis mainly, but also Ste. Genevieve and Ft. Payne. The ceramics are badly weathered, relatively thin (average is 6.1 mm thick), fired clay tempered body sherds with cordmarked (n=3), plain matte/eroded plain (n=2) or check stamped (n=1) exteriors. These sherds are likely Lewis Series ceramics (Henderson and Gray 2011).

It is highly likely that additional ‘stone fort’ sites are located along the western edge of the southern Shawnee Hills extension in Kentucky. For example, several Caldwell County sites described by Webb and Funkhouser (1932:61) may be related to the ‘stone fort’ tradition. They include Site 15Ca2, a village and fortification, and Site 15Ca3, a rock wall. Neither have been visited by archaeological professionals. Site 15Ca37, in the Pennyrile State Forest, also might be affiliated with early Late Woodland ‘stone forts.’ This rockshelter produced very thin (3.5-4.0 mm) grog tempered cordmarked pottery. Although the authors assigned the specimens to Mulberry Creek Cordmarked (Sanders and Weinland 1979), they could be Lewis Series ceramics.

Thus, it seems that the ‘stone fort’ tradition is not a local cultural expression limited to southern Illinois. Rather, this tradition appears to encompass much of the lower Ohio Valley. It extends from the Shawnee Hills in southern Illinois southward into Crittenden, Livingston, and Caldwell Counties in western Kentucky and is roughly bisected by the lower Ohio River. Relatively small ‘stone forts’ and larger sites (like Cypress Citadel, McGilligan Creek, and Fort Ridge) have been documented in both the northern and southern areas, although the northern sites have received far greater attention and are better known. Given the expanded regional scale of the ‘stone fort’ cultural expression and recognition of additional sites, we refer to these sites collectively as the early Late Woodland Stone Fort Complex.

LATE PREHISTORIC PERIOD (A.D. 900/1000-1750)

The Late Prehistoric period in Kentucky is defined by two different cultural traditions: Mississippian and Fort Ancient. The Fort Ancient tradition flourished in central, northern, and eastern Kentucky, as well as southeastern Indiana, southwestern Ohio, and western West Virginia. Mississippian peoples occupied western Kentucky, as well as the extreme southern and southeastern portions of the state. The Ohio River II section of the Green River Management area contains nearly one-half of all the recorded Mississippian sites in Kentucky (n=282; 46.6 percent) (Pollack 2008b). Open habitations without mounds (n=253; 88.0 percent) account for most of the sites within the section, but sites containing earthen mounds (n=8) and cemeteries (n=10). Despite the large number of recorded Mississippian sites within the Ohio River II section, relatively few systematic excavations have taken place and our understanding of these sites is somewhat limited.

Mississippian Tradition

Mississippian society has been exemplified as that of a chiefdom in which leadership roles were ascribed, society was ranked, and the power of chiefs could be great but was usually not absolute (Lewis 1996; Pollack 2008b). In addition, Mississippian groups shared a fundamental iconography (Pollack 2008b). Mississippian groups throughout the Southeast, including those in Kentucky, shared an economy based on hunting; the cultivation of maize, squash and native plants; and the collection of wild plants (Pollack 2008b:605). Gathered plants included hickory nuts, persimmons, and the seeds of goosefoot, erect knotweed, and maygrass. Animals commonly hunted for consumption, include white-tail deer, wild turkeys, turtles, and fish.

The Mississippian settlement system was made up of a hierarchy of habitation sites, most notably, administrative centers, that featured plazas flanked by buildings positioned on platform mounds and sizable populations (Lewis et al. 1998; Pollack 2008b:605). The platform mounds constructed at these sites were home to elite members of society. Administrative centers were the social, political, and religious centers of Mississippian society. Other Mississippian site types consisted of large villages, small villages, hamlets, farmsteads, and cemeteries (Pollack 1998, 2008b). Hamlets were larger than a farmstead, but smaller than villages.

Large hoes, adzes, abraders, gravers, and picks joined the bow-and-arrow as the main components of the Mississippian toolkit. Non-local materials, such as marine shell and copper, also have been recovered from Mississippian sites. Muller (1986:251) notes that the appearance of these artifacts probably represents hand-to-hand exchange rather than the long-distance movements of traders. Ceramic assemblages consisted of jars, bowls, plates, and pans and the use of shell temper increased as the Mississippian period progressed. Most of the ceramics from lower Ohio Valley sites are plain wares, either fine or coarsely tempered (Muller 1986:238). Finely tempered ceramics were being used primarily for activities like eating, while coarsely tempered wares were being used for food storage and/or food preparation. Decorated ceramics, include incised or trailed designs often found on jars, and rarely negative painted and red slipped treatment found on bowls and bottles (Pollack and Munson 1998).

The centuries between A.D. 1300 and 1700 witnessed both the greatest development and the end of Mississippian culture in Kentucky and most Mississippian sites had been abandoned by A.D. 1400 (Lewis 1996). Changes in environmental conditions and the reduction of agricultural yields may have contributed to the downfall of a single chiefdom; however, disruption to Mississippian interaction spheres and access to prestige goods and esoteric knowledge may have undermined local elites' positions within their respective societies (Pollack 2008b). Without the goods they needed to validate their positions in society, local elites may have been unable to withstand the challenges to their authority, which ultimately led to their demise (Pollack 2008b:608). In western Kentucky, some Mississippian sites were occupied well into the 1600s, as evidenced by the recovery of European trade good (Pollack 2008b). Ultimately, the collapse of these societies and the subsequent abandonment of their respective settlements and regions are tied to Euro-American exploration and settlement of the Ohio and Mississippi river valleys, and the disruption of indigenous exchange networks (Pollack 2008b:608).

Roughly forty-six percent of the Mississippian sites recorded in the Green River Management Area are located in the Ohio River II Section (n=282) (Pollack 2008b:677). Many of these sites were occupied sometime between A.D. 1000 and A.D. 1400 and are contemporary with the Angel and Kincaid polities (Muller 1986). Among these sites is the Foster site, an Angel phase farmstead located in Davies County. Other important Mississippian sites in this section include, Papineau (15Cn11) (Railey 1984), a farmstead or hamlet, and Tolu (15Cn1) (Webb 1931), a small administrative mound center in Crittenden County. Neither has been assigned to a particular Mississippian phase.

Other Mississippian sites in this section have been assigned to the late Mississippian/ Protohistoric Caborn-Welborn (A.D. 1400-1700) phase. The 52 sites assigned to this phase in Kentucky range in size from small farmsteads to large villages, with the most well-known site being Slack Farm (15Un28). The latter encompasses about 30 ha and contains at least seven residential areas with associated storage facilities and cemeteries. The recovery of objects of European manufacture from Slack Farm, Blackburn (15Un57), Moore (15Un42), and Cummings (15He775) (Pollack 1998, 2004), indicates that some of these sites were occupied into the seventeenth century.

Fort Ancient Tradition

The Fort Ancient tradition is generally believed to be a response by local populations to increased reliance on agriculture, increased sedentism, and an accompanying rise in sociopolitical complexity (Sharp 1990:469). Fort Ancient subsistence practices and their environmental focus appear to have developed early and stabilized quickly, changing little over a time spanning 750 years (Henderson 2008). Maize, beans, squash, and sunflower were staples of the Fort Ancient diet, but gourds and tobacco, and to a lesser extent, sumac was grown (Henderson 2008). Relative to earlier

Late Woodland peoples and contemporary Mississippian groups, there was much less emphasis on starchy-oily seeded crops, such as maygrass and marshelder (Rossen 1992a). The agricultural practices of Fort Ancient groups were supplemented by a variety of small mammals, reptiles, fish, and freshwater mussels. Fort Ancient peoples also depended on deer, elk, and wild turkey for subsistence (Henderson 2008). There is evidence for domesticated dogs and possibly the keeping, but not domesticating, of wild turkey (Henderson 2008:744).

Kentucky Fort Ancient settlements consisted of autonomous villages and small camps. Throughout much of the Fort Ancient culture area, settlements were located along floodplains or terraces of the Ohio River and its major tributaries in central and eastern Kentucky; however, villages also were located on interior ridges within close proximity of a variety of drainage types and springs (Henderson 2008:745). These villages varied from circular/elliptical, to a linear arrangement of structures located along a ridge or terrace. Fort Ancient community size increased over time and early villages may have been occupied by no more than 40 or 50 people (Henderson 2008). During the Middle Fort Ancient (A.D. 1200-1400) subperiod, villages may have held 90 to 300 individuals and by the Late Fort Ancient (A.D. 1400-1750) subperiod villages are estimated at between 250 and 500 people (Henderson 2008). The development of circular villages and the construction of burial mounds during the Middle Fort Ancient subperiod provide evidence for long-term group planning and socio-political cooperation, and the formalized expression of social inequality (Henderson 2008:745). During the Late Fort Ancient, houses take on the shape of large rectangular structures and differ greatly from older Fort Ancient houses. Distinctive artifacts were small triangular projectile points, bifacial end scrapers, disk pipes, bone and shell beads, copper or brass tube beads or pendants, and shell gorgets. European trade goods also have been reported from Late Fort Ancient sites. Copper tinkling cones and catlinite artifacts have been found in association with extended burials covered with shingled rock slabs (Henderson 2008).

Ceramics are the most common and diagnostic Fort Ancient artifact class. Fort Ancient ceramic vessels were made from locally available clays and are grit, limestone, sandstone, and/or shell tempered. Stylistic differences among Fort Ancient Jars have been used to define regional divisions e.g., (Anderson, Jessamine, and Manion) within the tradition prior to A.D. 1400 (Henderson 2008:741). After A.D. 1400 ceramic vessel types such as bowls and saltpans become common. Vessel rims and necks can be decorated with incising, punctations, or notching.

Fort Ancient chipped stone tools were made from locally available high- to medium-quality cherts (Henderson 2008:742). The lithic toolkit of Fort Ancient peoples included small, generally isosceles triangular arrow points as well as a variety of cutting, scraping, and drilling tools manufactured not only from stone but also animal bone (Railey 1992). Groundstone tools include sandstone abraders, manos, or nutting stones (Henderson 2008). Smoking pipes were manufactured from clay, sandstone, Ohio pipestone, limestone, and catlinite. Chipped limestone disks are diagnostic of the Middle Fort Ancient subperiod (Henderson 2008). Fort Ancient tools also were manufactured from shell and bone. Fort Ancient peoples produced shell or bone spoons and hoes, bone awls, needles, drifts, and beamers. Ornaments in the form of beads, plain or engraved gorgets, earrings, and bracelets, were made of animal teeth and bone, shell (both freshwater and marine), and cannel coal (Henderson 2008:743).

CONTACT PERIOD (A.D. 1540-1795)

In Kentucky, the Contact period extends from when the first indirect effects of European presence were felt by Native American cultures in the area (ca. A.D. 1540), to the signing of the Greenville Treaty in 1795 (Henderson et al. 1986:1). During this period Europeans traded Old World goods (e. g. firearms, metal tools, trinkets, and cloth) first indirectly, and then, after about the 1730s, directly to the indigenous inhabitants. In return native peoples provided the Europeans with information relating to survival (e. g. aboriginal hunting methods, the uses of native materials for shelters and canoes, and the uses of native plants for nourishment and medicinal cures).

The knowledge provided by Native Americans could only be built upon by the Europeans and not lost. However, continued demand for European goods by indigenous groups ultimately led to material dependency on their European neighbors. This dependency succeeded in changing the economic, social and political character of indigenous cultures. These changes, along with conflicts and diseases engendered by the European presence, led to the extinction, amalgamation, and/or migration of the Ohio Valley Native American groups (Henderson et al. 1986:2).

European households that moved to the Ohio Valley and Kentucky invaded the territories of the Chickasaw and Shawnee (Scheinan and Mocas 1993). The Shawnee, who struggled with early Kentucky settlers more than any other tribe, probably numbered no more than three or four thousand by 1750 (Harrison and Klotter 1997). Many Shawnee and other indigenous groups left Kentucky by the end of the 1700s. Those who remained were absorbed into the culture of the new Commonwealth of Kentucky, although some kept alive the memories of their traditional ways of life.

CHAPTER THREE:
EXCAVATION AND STRATIGRAPHY OF THE TWIN KNOBS ROCKSHELTER

EXCAVATION METHODS

As discussed in Chapter One, the Twin Knobs Rockshelter has a relatively small surface area. Excavations of the rockshelter consisted of 13 1 x 1 m units and two 1 x 0.5 m units, for a total of 14 square meters (roughly 70 percent of the habitable surface of the shelter). Each of the 15 units are contiguous and comprise an excavated block that measures 4 m north/south by 4.5 m east/west (Figure 3.1). Each unit was excavated by trowel in a combination of 10 cm and 5 cm arbitrary levels within natural sediment zones to sterile sediment or bedrock. In general, the upper 40 cm of deposits were excavated in 10 cm levels (Levels 1-4). Levels 5-10 were excavated in 5 cm increments to bedrock. A few units (12, 13, 14, and 15) were excavated entirely by depositional zone (i.e., the entire zone was removed as a single level). The maximum depth of excavation was 100 cm below surface, although a majority of units terminated between 75-90 cm below surface. All sediment from excavation was screened through 6.35 mm wire mesh with the exception of flotation samples. Large amounts of sandstone rock was present throughout the excavation units.

Previous looter activity resulted in the excavation of a large, irregularly shaped pit near the rear wall of the shelter (Figure 3.2). The looter pit was discernible from the surface, but had largely filled back in with disturbed backdirt and leaf matter. In addition, displaced looter backdirt was spread across much of the surface of the shelter. Prior to starting excavation of the units, loose fill and leaf litter was removed from the looter pit to determine the extent of disturbance and examine the exposed sediment profile. Examination of the western edge of the looter pit indicated that intact cultural deposits—including at least three sediment zones and a probable feature (Feature 1)—had been disturbed (Figure 3.3). The looter digging extended to bedrock (approximately 90 cm below surface) in the deepest area (predominantly within Units 7 and 8) and ranged from approximately 20-65 cm below surface in portions of Units 1 and 4.

Unfortunately, the deepest and most extensive portion of the looter pit digging was located near the center of what was later identified to be a large, Early Woodland pit feature (Zone D [Feature 1]). Feature 1 was characterized by an organically-rich dark zone that appeared in the looter pit walls between 40-45 cm below surface. However, at the time of the initial cleaning of the looter pit, the horizontal and vertical extent of Feature 1 was unknown and the dark sediment was referred to as Zone D. No sediment zones were identifiable beneath the Zone D deposits within the looter pit—due to the depth of Feature 1 and looter disturbance of the area. As a result, initially it was only possible to observe the small portions of Zones A and B in the looter profile.

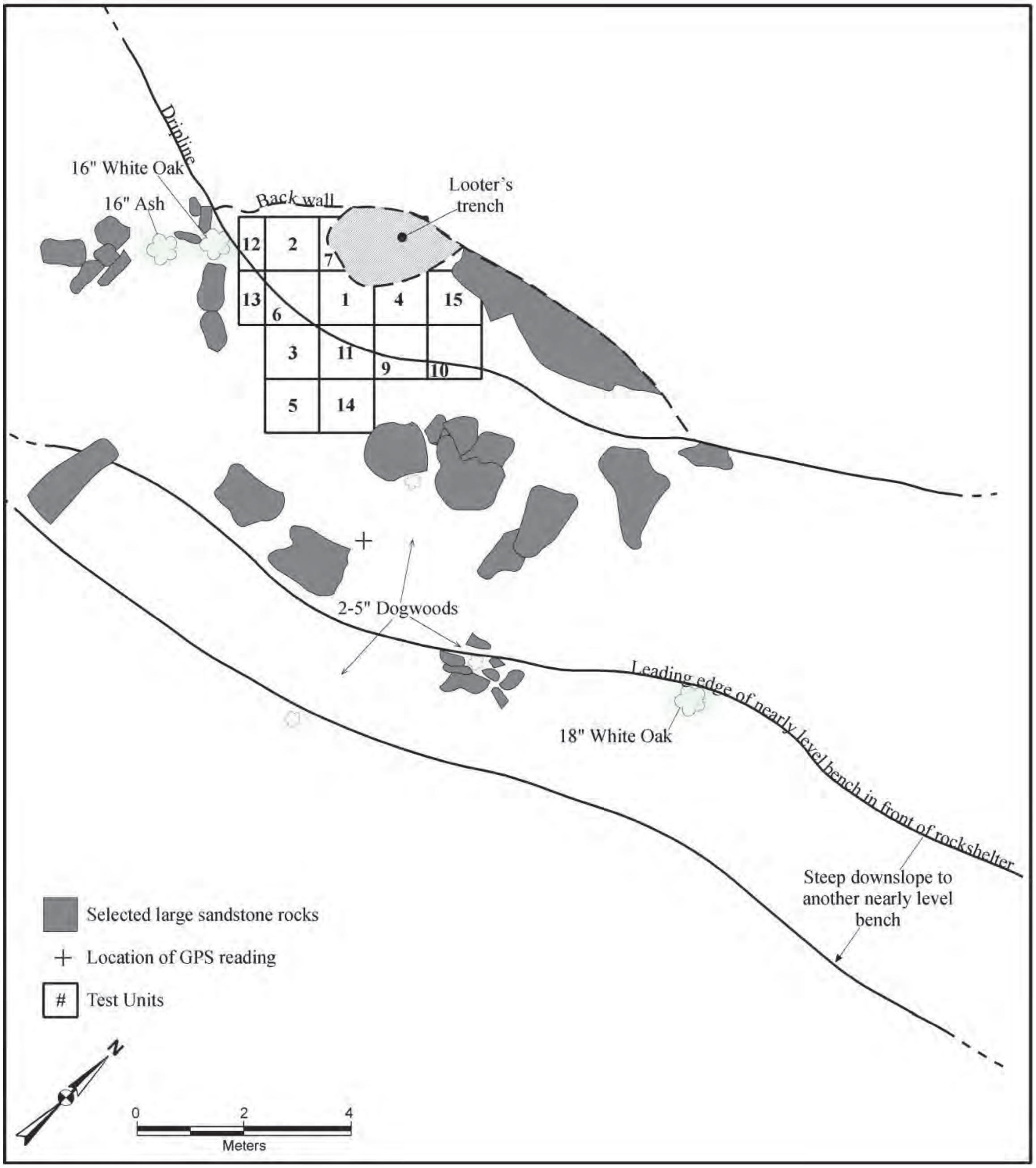

Figure 3.1. Planview of Twin Knobs Rockshelter and excavation units.

Figure 3.2. View of the Twin Knobs Rockshelter (note the deep looter pit in the right of the photo).

Figure 3.3. View of the west wall of the looter pit.

In order to establish the limit of looter damage and excavate intact sediments, two units (1 and 2) were positioned along the margins of the looter pit—Unit 1 along the central-southern edge and Unit 2 on the western edge. Three sediment zones had been identified in the walls of the looter pit (Zones A, B, and D [Feature 1]). In order to document these zones and expose the Zone D deposits, the upper sediment (0-40 cm below surface) of Units 1 and 2 was excavated in 10 cm levels. At the base of Level 4 (40 cm below surface) in Unit 1, the southern edge of Zone D (Feature 1) was discernible. In addition, near the base of Level 4 (36 cm below surface) in Unit 1, a reddish brown sediment zone containing artifacts (Zone E) was identified. Within the Zone E deposits, a small, roughly circular stain mottled with ash and charcoal (and associated with a nutting stone and burned sandstone) was documented in the southern portion of Unit 1 at 40 cm below surface. This stain was identified as Zone F (Feature 2). At this point, the excavation of Unit 1 was temporarily halted in order to open additional units and determine the spatial extent of both Zone D (Feature 1) and Zone F (Feature 2).

Figure 3.4. West wall profile of Unit 2 at the Twin Knobs Rockshelter.

Excavation of Unit 2 in 10 cm levels was continued in order to provide a window into any possible deeper sediments and determine the depth of the shelter deposits. As a result, Unit 2 was excavated to a maximum depth of 80 cm below surface, at which point bedrock was encountered. A total of six sediment zones (zones A, B, C, D [Feature 1], E, and H) were identified in Unit 2 (Figure 3.4). In addition to the previously identified zones A, B, and D, the excavation of Unit 2 indicated the presence of additional, deeper zones (zones C, E, and H) that contained prehistoric artifacts.

Following the excavation of units 1 and 2, nine additional units were excavated across the shelter to a depth of 40 cm below surface in order to define the horizontal extent of Features 1 (Zone D) and 2 (Zone F); provide information on any intrasite spatial patterning; document the horizontal and vertical extent of six sediment zones; and recover additional cultural materials. Units 3-11 were excavated adjacent to Units 1 and 2 in order to form a large block (Figure 3.5). Each of these units was individually excavated to a depth of 40 cm below surface in 10 cm levels (levels 1-4). At 40 cm below surface a plan map of the block was drawn (Figure 3.6).

Figure 3.5. View of Units 1-7 at 40 cm below surface (note the large amount of rock that was removed during unit excavations).

As a result of the block excavation, the shape and extent of both Zone D (Feature 1) and Zone F (Feature 2) were defined (Figure 3.7). Feature 1 measured 170 cm north-south (oriented to the site grid) and 282 cm east-west. The dark sediment that originally defined Zone D was consistent throughout the feature and was characterized by a 10YR 3/2 very dark grayish brown fine sandy loam with high organic content. Unfortunately, after establishing the boundaries of Zone D it was clear that the looter activity had destroyed most of the feature. In spite of the disturbance, it was possible to map its extent, and collect *in situ* artifacts and flotation samples.

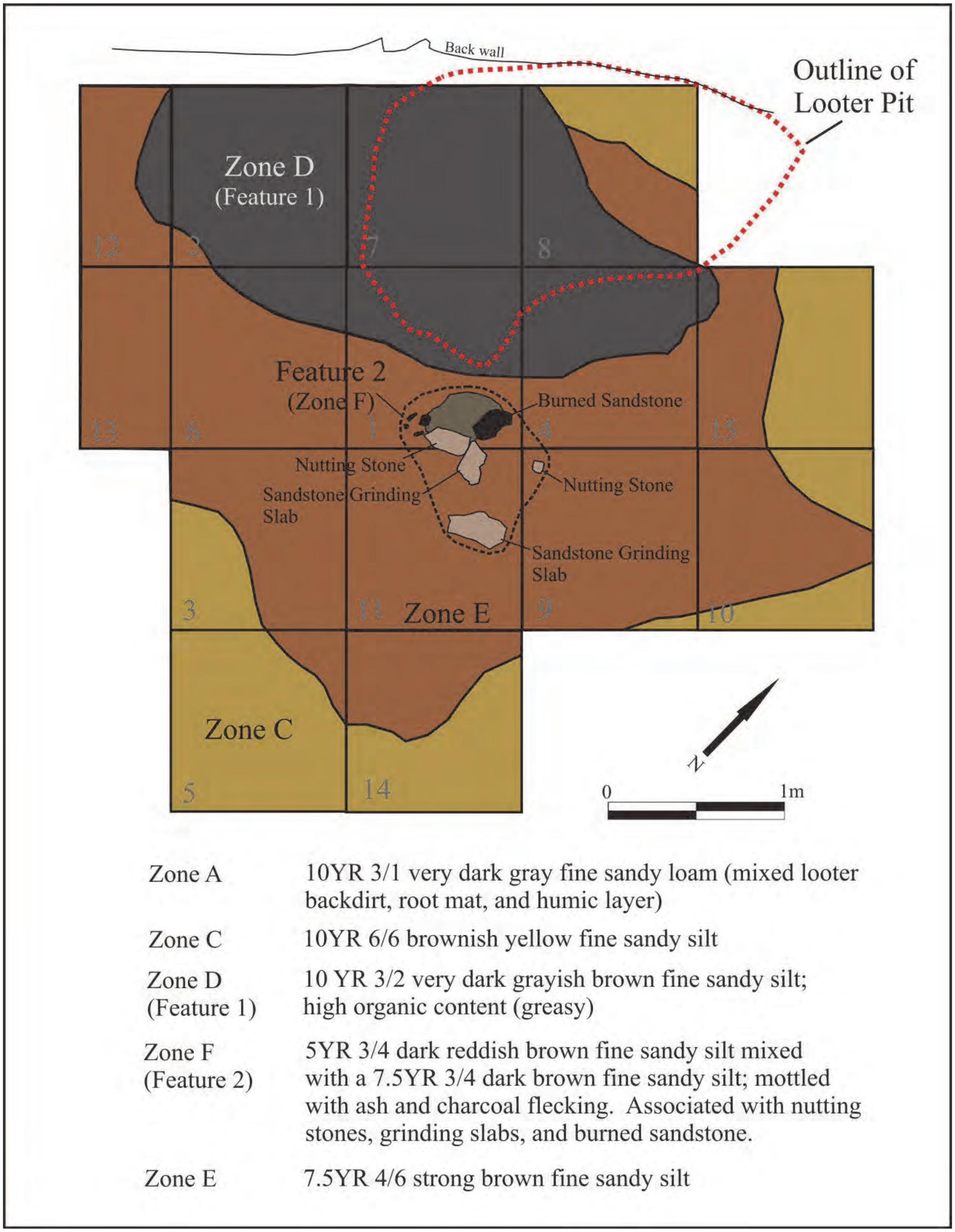

Figure 3.6. Planview of excavation block at 40 cm below surface.

In contrast, Zone F (Feature 2) was much smaller, measuring 81 cm north-south by 74 cm east-west. The sediment within Feature 2 was characterized by a 5YR 3/4 dark reddish brown fine sandy loam mixed with a 7.5YR 3/4 dark brown fine sandy loam and mottled with ash and charcoal flecking. Four groundstone artifacts, including two nutting stones and two sandstone grinding slabs, were associated with Feature 2. As noted previously, a large amount of sandstone rock was present throughout the excavation of all levels (see examples in figures 3.5 and 3.7).

Figure 3.7. Excavation block at 40 cm below surface (note the dark Zone D [Feature 1] sediment and reddish Zone F [Feature 2] near the center of the image).

In addition to documenting Features 1 and 2, the block excavation to 40 cm below surface indicated that the Zone E deposits were intruded on by the dark Zone D (Feature 1) sediment—indicating that Zone E likely related to an earlier depositional episode. The reddish brown Zone E deposits covered a much larger extent of the shelter than Zone D (appearing in portions of all units), but did not extend to the limit of the shelter area. Zone F (Feature 2) was located entirely within the Zone E deposits and appeared to be contemporaneous with Zone E. At the margins of the shelter area, Zone E was abruptly replaced by Zone C sediments—which overlay Zone E across most of the shelter. The spatial restriction of Zone E (not present across all the relatively small shelter area) and its association with Zone F (Feature 2) suggested that the Zone E/Feature 2 reddish sediment may relate to a specific activity area or occupational episode within the Twin Knobs shelter.

Following the mapping and documentation of the block excavation at 40 cm below surface, Units 1-11 were excavated in 5 cm levels within sediment zones to bedrock. The deeper (40-100 cm below surface) excavations indicated that the basal sediment across the shelter (Zone H) was a relatively homogeneous light yellowish-brown (2.5Y 6/3) fine sandy silt containing abundant large rocks and exfoliating sandstone bedrock. Zone H extended from the contact with zones C and E to bedrock and contained artifacts throughout. At the base of the block excavations, an additional planview map was drawn (Figure 3.8).

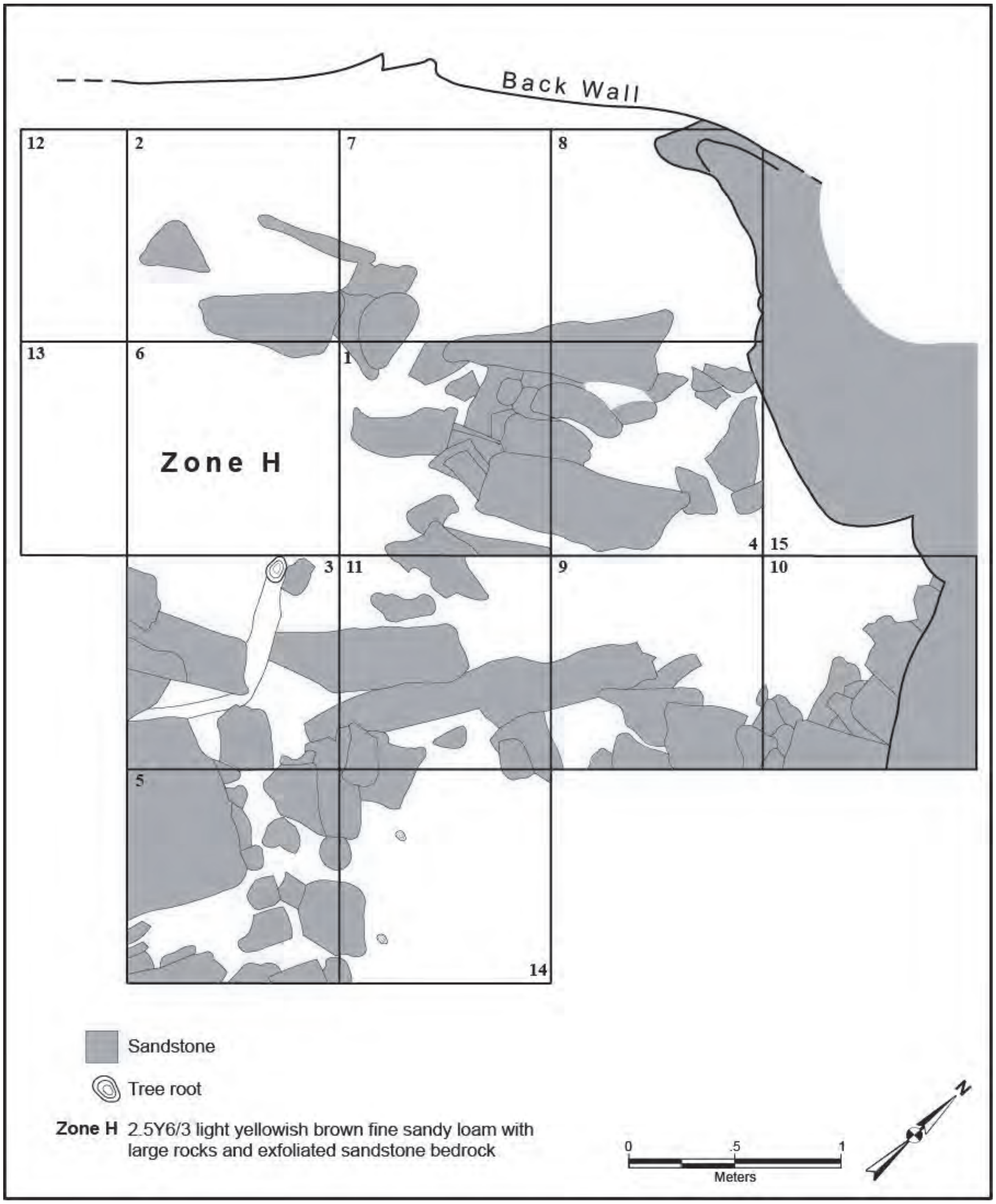

Figure 3.8. Planview of base of excavations at the Twin Knobs Rockshelter.

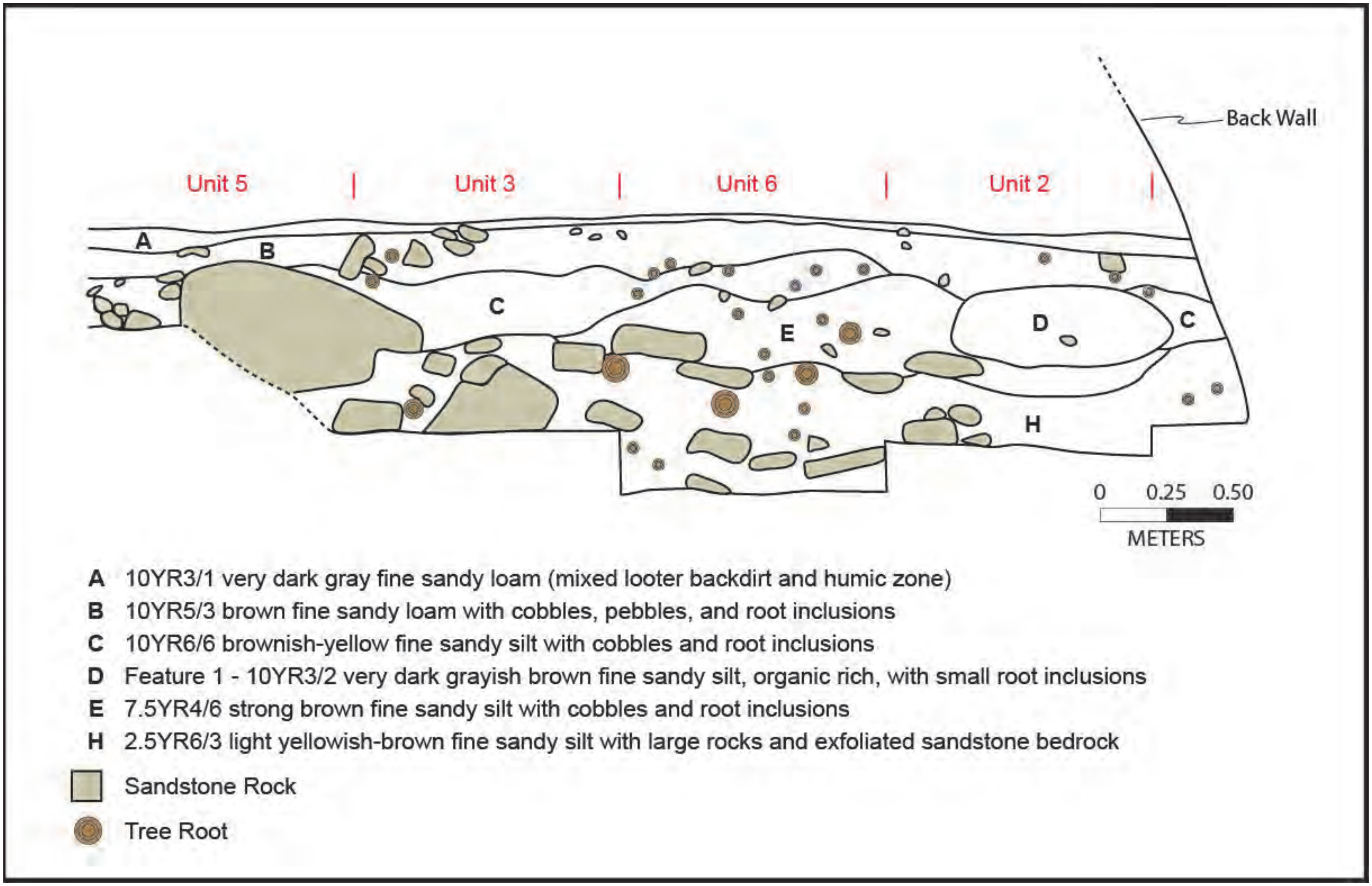

Figure 3.9. Twin Knobs Rockshelter West Wall Profile.

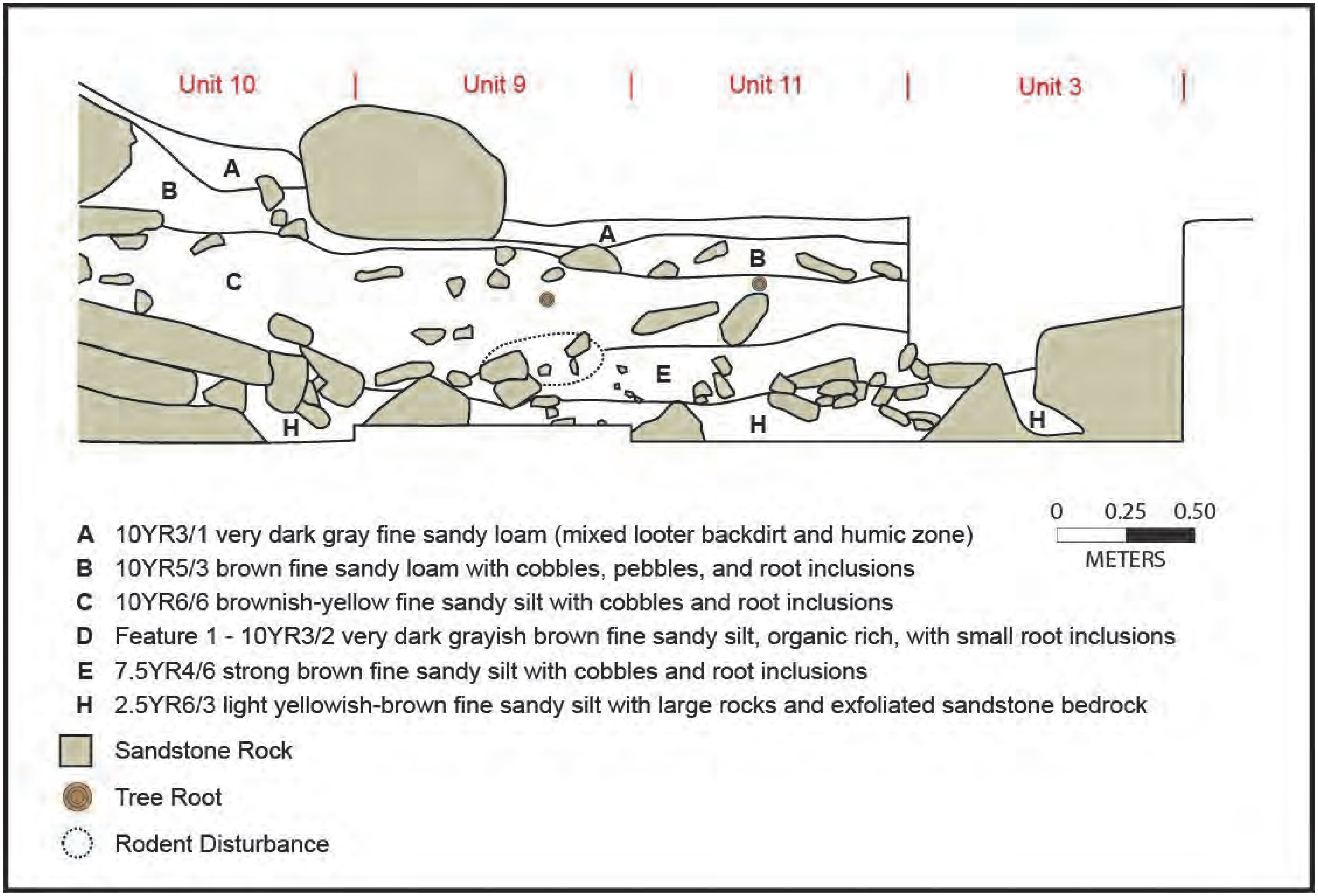

Figure 3.10. Twin Knobs Rockshelter South Wall Profile.

Upon completion of the large block, four additional units (12, 13, 14, and 15) were excavated by zone to bedrock (see Figure 3.1). Units 12 and 13 were 0.5 x 1 m adjacent units located on the westernmost edge of the shelter deposits. Unit 14 was located adjacent to units 5 and 11 at the extreme southern edge of the shelter area. Lastly, Unit 15 was located on the easternmost edge of the shelter adjacent to units 4 and 10. In each of these units, entire zones were excavated and screened as single levels to facilitate the recovery of additional cultural materials and increase the spatial definition of the edge of the cultural deposits.

STRATIGRAPHIC ZONE AND FEATURE DESCRIPTIONS

A total of six sediment zones (A, B, C, E, and H) and two features (zones D [Feature 1] and F [Feature 2]) were identified during the excavation of the Twin Knobs Rockshelter. Each of the zones contained cultural materials. The appearance and thickness of each zone varied (sometimes substantially) across the shelter area, resulting in a relatively complex stratigraphic sequence (figures 3.9 and 3.10). Like many rockshelters, the complexity of the depositional history has been compounded by the persistent reuse of the shelter through time and bioturbative processes (e.g., rodent and root activity). In addition, modern recreational use of the shelter and looter activity has disturbed a substantial portion of the site's uppermost deposits. Rather than discuss each unit individually, the stratigraphy of the Twin Knobs shelter is presented collectively and discussed by zone.

Zone A was a very dark gray (10YR 3/1) fine sandy silt loam that consisted of mixed looter backdirt and the natural humic layer. Zone A varied in thickness across the rockshelter, but was thickest within and directly adjacent to the looter pit. Across most of the rockshelter, Zone A extended to a depth of 5-8 cm below surface. However, in Unit 7 (which encompassed the deepest portions of the looter pit) Zone A sediment was encountered to depths of 66 cm below surface—but remained only 3-7 cm in thickness. The aberrant depth of Zone A in Unit 7 is a direct result of the disturbance and redeposition associated with the looter activities.

Zone B consisted of a brown (10YR 5/3) fine sandy silt loam that represents the uppermost intact deposits at the site. Zone B maintained a relatively uniform thickness across the shelter, appearing between 3-8 cm below surface and extends to a maximum depth of 15-30 cm below surface. Across most of the shelter area Zone B was encountered between 5-19 cm below surface. Although they are described separately here, Zones A and B were combined into a single zone (Zone A/B) for the artifact analysis and discussion sections. The reason for this is that the relatively thin Zone A is a recent redeposition across the site. The upper portions of Zone B also have been substantially impacted and mixed by modern recreational activities and bioturbation. As a result, the two zones cannot be meaningfully separated.

Zone C consisted of a brownish-yellow (10YR 6/6) fine sandy silt with sandstone cobbles and root inclusions that was present across most of the shelter area. Zone C probably covered the entire shelter surface at one point, but the upper stratigraphic sequence in the area of the looter pit had been obliterated and could not be identified. Zone C appears between 10-30 cm below surface and extends to a maximum depth of 30-72 cm below surface. Zone C is relatively thin near the back wall, but becomes thicker (and deeper) near the southern edge of the shelter. It overlies both Zone D and Zone E, and represents a depositional episode that post-dates both zones (and Features 1 and 2).

As noted previously, Zone D comprises Feature 1—a large Early Woodland pit feature (see chronological discussion below). Zone D (Feature 1) is characterized by a very dark grayish brown (10YR 3/2) sandy silt rich with organic matter (greasy). It measured 170 cm north-south by 282 cm east-west. Feature 1 is irregular in shape and thickness—appearing as high as 20-22 cm below surface along its western edge (in units 2 and 12) and 28-40 cm below surface along its central and southern margins (units 1, 4, and 7). The base of Feature 1 is similarly irregular, extending to a maximum depth of 40-45 cm below surface along parts of the western margin (units 6 and 12) and as deep as 62-90 cm below surface in other areas (units 2 and 7). The irregular shape and thickness of Zone D suggests that Feature 1 is comprised of several smaller, overlapping pits—rather than a single large pit. Although the shape of Feature 1 suggests this possibility, due to the extensive looter disturbance it was not possible to identify any internal stratigraphy during its excavation.

A single radiocarbon date of 2910±70 B.P. (3316-2863 cal B.P.; 1367-914 cal B.C.) on nutshell recovered from a flotation sample from Unit 6, Level 4, in the upper portion of Zone D (Table 3.1) suggests an Early Woodland age for Feature 1.

Table 3.1. Radiocarbon Dates from the Twin Knobs Rockshelter (all samples consisted of carbonized nutshell).

FS#	Unit/Level	Zone	Depth (cm)	^{14}C date	Cal BP*	Cal BC/AD	Sample ID
161	TU 4/Level 4	D	30-40	2910±70	3316-2863	1367-914 BC	ISGS-6072
185	TU 9/Level 5a	E	40-45	3520±70	3983-3618	2034-1669 BC	ISGS-6078
172	TU 11/Level 5a	F	40-45	3770±70	4407-3932	2458-1983 BC	ISGS-6075
165	TU 6/Level 5b	E	45-50	4100±80	4828-4431	2879-2482 BC	ISGS-6073
175	TU 11/Level 6b	E	55-60	4520±100	5463-4867	3514-2918 BC	ISGS-6077
169	TU 6/Level 6b	E	55-60	4570±90	5446-5051	3628-3013 BC	ISGS-6076

*Calibration data (Reimer et al. 2009)

Zone E was characterized by a strong brown (7.5YR 4/6) fine sandy silt with sandstone cobble inclusions that was present across much—but not all—of the shelter surface (Figure 3.6). It appeared relatively consistently between 20-38 cm below surface and extended to a maximum depth of 47-67 cm below surface. Zone E was thickest toward the back wall of the shelter (north end) and thinned to the south. The relatively high density of artifacts and presence of Feature 2 (Zone F) within Zone E, combined with the reddish (oxidized) appearance of the sediment, suggests that this zone may have had a different function from other zones at the Twin Knobs shelter.

It is possible that the oxidation of the Zone E sediment reflects nothing more than the location of an old dripline and previous extent of the shelter overhang. However, the presence of Feature 2 (probable hearth) and associated groundstone implements may indicate that Zone E is related to specialized plant (nuts) processing activities. Four radiocarbon dates from flotation samples collected within Zone E range from 3520±70 B.P. (3983-3618 cal B.P.; 2034-1669 cal B.C.) to 4570±90 B.P. (5446-5051 cal B.P.; 3628-3013 cal B.C.) (Table 3.1) and suggest a Late Archaic date for Zone E. If Zone E is related to specialized nut processing activities, then the Twin Knobs shelter likely witnessed multiple episodes of use.

Zone F (Feature 2) is a small area of burned and mottled sediment (probable hearth) associated with burned sandstone and four groundstone implements (two nutting stones and two sandstone grinding slabs). The sediment of Zone F is characterized by a dark reddish brown (5YR 3/4) fine sandy silt mixed with a dark brown (7.5YR 3/4) fine sandy silt mottled with ash and charcoal flecking. Feature 2 was identified in Unit 1 at a depth of 38 cm below surface and continued to 47 cm below surface. Although the burned area was restricted to Unit 1, the groundstone artifacts extended into units 9 and 11 and are associated with Feature 2.

Unfortunately, no charcoal large enough to date was recovered from within the burned area of Feature 2 (all of the burned and mottled sediment was collected as a flotation sample). However, a date of 3770±70 (4407-3932 cal B.P.; 2458-1983 cal B.C.) on nutshell fragment from a flotation sample collected next to the groundstone tools (Unit 11, Level 5a, 40-45 cm below surface) suggests a similar Late Archaic age to that of the surrounding Zone E sediments.

Zone H represents the basal sediments across the shelter. It consists of a homogeneous light yellowish-brown (2.5Y 6/3) fine sandy silt containing abundant large rocks and exfoliating sandstone bedrock. Zone H is overlain by Zone C or Zone E depending on the location within the shelter, appearing between 46-64 cm below surface and extending to a maximum depth of 100 cm below surface.

MATERIALS RECOVERED BY ZONE

A total of 28,013 artifacts was recovered from the excavation of the Twin Knobs Rockshelter (Table 3.2). Prehistoric artifact classes, (lithics, ceramics, faunal, and botanic materials) were recovered from all zones (including two features). Detailed discussion and analysis of the prehistoric materials recovered are presented in later chapters. In general, however, the materials recovered from Twin Knobs shelter are indicative of relatively intensive and repeated use of the shelter from the Late Paleoindian to Late Prehistoric period.

Table 3.2. Materials Recovered by Artifact Class at the Twin Knobs Rockshelter.

Artifact Class	Frequency	Percentage
Lithic Debitage	27,413	97.86
Lithic Tools	293	1.05
Ceramics	50	0.18
Bone/Shell	199	0.71
Charcoal	58	0.21
Total	**28,013**	**100.00**

Lithic artifacts (tools and debitage) dominate the assemblage (Table 3.2). Lithic debitage (n=27,413) comprises 97.86 percent of the assemblage, while lithic tools (n=293) represent 1.05 percent of the assemblage. Ceramics (n=50; 0.18 percent), faunal materials (n=199; 0.71 percent), and charcoal samples (n=58; 0.21 percent) were also recovered in small amounts.

The distribution of artifacts by stratigraphic zone suggests that the most intensive use of the Twin Knobs shelter is correlated with zones A/B, C, and E (Table 3.3 and Appendix I). Zone A/B contained 8,179 artifacts and represents 29.2 percent of the assemblage and based on the diagnostic artifacts is correlated with the Late Prehistoric period. Zone C (n=6,759; 24.13 percent) and Zone E (n=6,613; 23.61 percent) contained slightly less, but similar, numbers of artifacts. Based on associated diagnostic artifacts and radiocarbon dates Zone C is correlated with the Late Woodland/Late Prehistoric period, while Zone E is representative of the Late Archaic period. Zones D (Feature 1) (n=2,944; 10.51 percent) and H (n=2,061; 7.36 percent) yielded the fewest artifacts. Diagnostic artifacts and a single radiocarbon date from Zone D (Feature 1) suggest an Early Woodland age for the feature. Diagnostic artifacts from Zone H are suggestive of a relatively long period of time that spans from the Late Paleoindian to Middle Archaic periods.

Table 3.3. Artifact Counts by Stratigraphic Zone at the Twin Knobs Rockshelter.

	Materials Recovered	
Zone	**Frequency**	**Percentage**
A/B	8,179	29.20
C	6,759	24.13
D	2,944	10.51
E	6,613	23.61
F	155	0.55
H	2,061	7.36
Disturbed Contexts	1,302	4.65
Total	**28,013**	**100.00**

Zone F (Feature 2) yielded 155 artifacts (0.55 percent of the assemblage). Although no diagnostics were associated with Feature 2, the position of the hearth/nutting area within Zone E strongly suggests a Late Archaic age for the feature. Lastly, 1,302 artifacts (4.65 percent) were recovered from disturbed contexts, which primarily are associated with looter backdirt and cleaning of the looter pit. Overall, there appears to have been a general increase through time in the number of artifacts being deposited in the Twin Knobs shelter.

SUMMARY OF EXCAVATIONS

Excavations conducted by KAS at the Twin Knobs Rockshelter consisted of 13 1 x 1 m units and two 1 x 0.5 m units, for a total of 14 square meters. Each of the 15 units within the shelter are contiguous and comprise an excavated block that measures 4 m north/south by 4.5 m east/2est (approximately 70 percent of the habitable shelter area). The maximum depth of deposits at the site was 100 cm below surface, although a most units terminated between 75-90 cm below surface. The excavations documented a relatively complex subsurface stratigraphic sequence that included four zones and two features, and provided detailed information regarding intrasite spatial patterning and the occupational history of the shelter. In addition to the stratigraphic and spatial information, a relatively large assemblage of artifacts was also collected from the shelter. Detailed analysis and discussion of the artifacts are presented in the following chapters.

CHAPTER FOUR:
LITHIC ARTIFACTS FROM THE TWIN KNOBS ROCKSHELTER

The chipped stone assemblage (n=27,709) recovered from Twin Knobs Rockshelter consists of projectile points and point fragments (n=140), edge-modified/retouched flakes (n=30), utilized flakes (n=30), blade-like flakes (n=5), prismatic blade fragments (n=2), drills/perforators and fragments (n=13), bifaces and biface fragments (n=53), cores and core fragments (n=20), unifacial endscraper fragments (n=3), and flakes and flake fragments (n=27,413). The broad range of chipped stone tools recovered indicates that all stages of manufacture, use, and maintenance took place during the prehistoric occupation of this locale. In addition to the chipped stone artifacts, four groundstone implements were also recovered.

ANALYTICAL METHODS

Current approaches to the analysis of lithic artifacts include a study of the step-by-step procedures utilized by prehistoric knappers to make tools. Terms used to commonly describe this process are *chaine operatoire* or reduction strategy (Grace 1989, 1993, 1997; Tixier and Roche 1980). The analysis of stone tool assemblages provides insights into the processes by which prehistoric flintknappers produced their implements. It also enables archaeologists to characterize the technical traditions of specific prehistoric cultural groups (Grace 1997).

The production of any class of stone tools involves a process that begins with the selection of a suitable raw material. The basic requirements of any raw material to make flaked stone artifacts include the following: 1) it can be easily worked into a desirable shape; and 2) sharp, durable edges can be produced as a result of flaking (Grace 1997). Once an adequate source is located and a raw material is selected, the process of tool manufacture begins. Two different strategies can be utilized. One involves the reduction of a material block directly into a tool form, like a biface, or the production of a core. The second involves the preparation of a block of raw material so that flakes or blanks of a suitable shape and size can be detached. These blanks are then flaked by percussion or pressure flaking into a variety of tool types, including scrapers, bifacial knives, and projectile points.

Experimental work has shown that the former manufacturing strategy, involving a raw material block, begins with the detachment of flakes with cortical or natural surfaces. This is accomplished by direct percussion, usually involving a hard hammer (stone) that more effectively transmits the force of the blow through the outer surface. Having removed a series of flakes and thus created suitable striking platforms, the knapper begins the thinning and shaping stage. The majority of the knapping is conducted with a soft hammer (antler billet). The pieces detached tend to be invasive, extending into the mid-section of the biface. A later stage of thinning may follow, which consists of further platform preparation and the detachment of invasive flakes with progressively straighter profiles in order to obtain a flattened cross-section. By the end of this stage, the biface has achieved a lenticular or bi-convex cross-section. Finally, the tool's edge is prepared by a combination of fine pressure work and pressure flaking if desired. It should be noted that flakes derived from biface reduction are sometimes selected for bifacial, unifacial, and expedient tool manufacture.

The second type of manufacturing trajectory, utilizing a flake or blank, begins with core reduction and the manufacture of a suitable flake blank. The advantages of employing a flake blank for biface reduction include the following: 1) flakes are generally light-weight and can be more easily transported in large numbers than blocks of material; and 2) producing flakes to be used for later biface reduction allows the knapper to assess the quality of the material, avoiding transport of poorer-grade chert.

The initial series of flakes detached from the flake blank may or may not bear cortex. However, they will display portions of the original dorsal or ventral surfaces of the flake from which they were struck. It should be noted that primary reduction flakes from this manufacturing sequence could be entirely noncortical. Therefore, the presence of cortex alone to define initial reduction is of limited value. Biface reduction on a flake involves the preparation of the edges of the piece in order to create platforms for the thinning and shaping stages that follow. In most other respects, the reduction stages are similar to those described above, except that a flake blank often needs additional thinning at the proximal or bulbar end of the piece to reduce the pronounced swelling and achieve a thinned final product.

A small sample of both formal (n=4) and informal (n=6) tools was examined for possible usewear by Dr. Tom D. Dillehay of Vanderbilt University. All of the tools were examined at 50X magnification using a Leica DM5000B Microscope at low power magnification levels. Each artifact was scanned by systematically observing all edges and surfaces in order to interpret topographic features stereoscopically. Each tool was examined for edge fractures, rounding, surface polish, and striations. Based on experimental studies, researchers have shown that working of hides, bone, and plants can leave distinct signatures on tool surfaces. Identification of these signatures can be used to gain a better understanding of tool function (Keeley 1980; Odell and Odell-Vereecken 1980).

FORMAL CHIPPED STONE TOOLS

The identification of formal and informal chipped stone tools is useful in addressing questions involving the trajectory of reduction and the general activities undertaken by the prehistoric occupants of a site. Formal tools are defined as implements with a standard morphology. Some formal tools, such as projectile points, may be produced for specific anticipated functions. However, they may also have been used in a wide variety of other tasks. Identification of prehistoric formal chipped stone tools recovered from the Twin Knobs Rockshelter was based on comparisons with previously defined types (Justice 1987).

Projectile Points

A total of 140 projectile points (n=45) and point fragments (n=95) was recovered from the Twin Knobs Rockshelter. If complete, or nearly complete, projectile points (n=45) were examined for size and shape, resharpening methods, flaking characteristics, blade and haft morphology, presence of basal thinning or grinding, notch flake scars, type of fracture(s), and material type. Length, width, and thickness measurements (in millimeters) were taken for each projectile point. Length measurements were taken on points retaining a distal end or working edge. "Length" reflects the maximum length along the axis of the point. "Width" reflects the point of maximum width that is perpendicular to the long axis of the point. Two width measurements were taken for the fine triangular arrow points (basal and mid-point). "Thickness" reflects the point of maximum thickness on a plane that is perpendicular to the width.

Most of the recovered projectile points could be assigned to one of sixteen previously defined types. Seven specimens could not be confidently identified and have been combined into one group. All of the points are described in the following section. As the existing archaeological literature suggests (e.g., Andrefsky 1998; Kelly 1988; Odell 1981 1996a, 1996b), a majority of the established point types were utilized, in all likelihood, as both hafted knives and projectiles. Projectile points within this assemblage were assigned to a named type if the attributes for that type were observed. However, in cases of heavy resharpening or fragmentation, if the attributes for a given type could not be applied to a point being analyzed, they were classified as unidentifiable. The identifiable projectile points recovered from the Twin Knobs Rockshelter are diagnostic of time periods ranging from the Late Paleoindian through Protohistoric time periods.

Late Paleoindian

Dalton Cluster (n=2)

Two Late Paleoindain projectile points (Figure 4.1a,b) were recovered from Twin Knobs Rockshelter. Beaver Lake and Dalton points are similar types within the larger Dalton cluster and are considered contemporary in western Kentucky and date to approximately 8,500-7,500 B.C. (Justice 1987; Maggard and Stackelbeck 2008). The Dalton point (Figure 4.1a) was manufactured from St. Louis chert and has been laterally broken across the midsection. Although the point is broken, a width measurement of 28.1 mm was taken at the point's basal ears. Maximum thickness measured 5.7 mm and the point exhibited a biconvex cross section. A thinning platform is still present along the slightly concave basal edge, which indicates that the point was probably broken during the manufacturing process. Basal thinning is clearly visible on the haft; however, lateral and basal grinding was absent.

The Beaver Lake point (Figure 4.1b) was manufacture from an unidentified chert. Like the Dalton point, it is fractured across the midsection—although this break probably occurred during resharpening or pressure retouch. The point measures 26.9 mm in width at the basal ears, which are expanding. Maximum thickness was 6.0 mm, and the point exhibited a biconvex cross section. Significant basal thinning, as well as lateral and basal grinding was observed on the haft region.

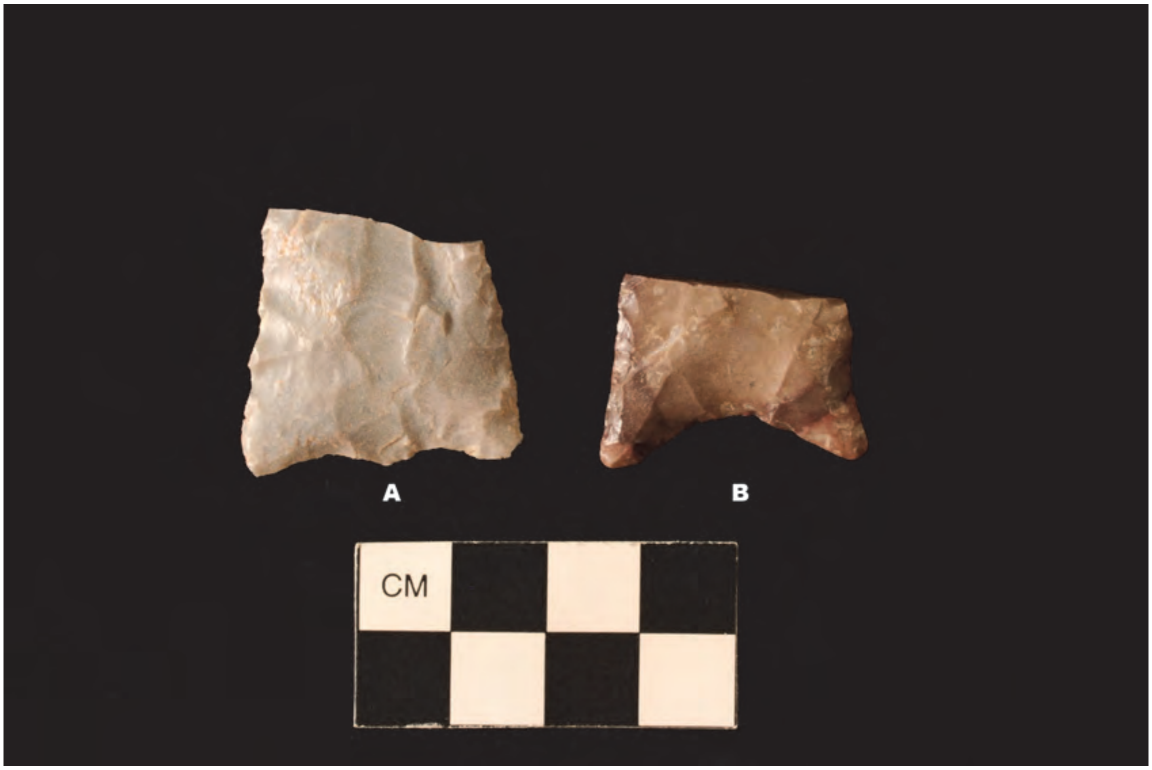

Figure 4.1. Late Paleoindian Points from the Twin Knobs Rockshelter: a, Dalton; b, Beaver Lake.

Early Archaic

Six identifiable Early Archaic (ca. 8,000-6,000 B.C.) points were recovered from the Twin Knobs Rockshelter. These points represent five distinct types, including Palmer Corner Notched, Kirk Stemmed, St. Charles, Hardin Barbed, and Big Sandy. These types are all contemporary or overlapping in age and span the relatively lengthy Early Archaic period. The presence of a wide variety of types suggest that rockshelter likely was frequented by different groups of people throughout Early Archaic period.

Palmer Corner Notched (n=2)

Two Palmer Corner Notched points were recovered from the rockshelter (Figure 4.2a,c). Palmer Corner Notched points are associated with the Early Archaic period and are believed to date to around 7,500-6,900 B.C. (Justice 1987). The Palmer points from the rockshelter are represented by proximal portions and are manufactured from St. Louis and Ste. Genevieve cherts, respectively (Figure 4.2a,c).

Both specimens exhibit biconvex cross-sections and have an average thickness of 6.35 mm. Average width—which was measured at the barbs—is 24.8 mm. Both points are basally ground and thinned, and have serrations along the lateral blade margins. The average width of the stem base is 22.9 mm and notch depth averages 4.05 mm. The specimen manufactured from St. Louis chert contains thinning flake scars that extend across the entire surface of one face (shown in Figure 4.2a).

Figure 4.2. Early Archaic Points from the Twin Knobs Rockshelter: a,c, Palmer Corner Notched; b, Kirk Stemmed; d, St. Charles; e, Hardin Barbed; f, Big Sandy.

Examination of the barb of the Palmer point illustrated in Figure 4.2c documented the presence of deep, linear striae subparallel to the edge (Aspect 1) (Figure

4.3). Nearby a domed area of crystals with bright, semi-flat to grainy polish and pitting was observed 5 mm from the point's edge. All of these attributes were most likely produced from the butchering of fresh, dirty hide.

Deep fractures were present along the edge of the tool where the distal portion had been transversely fractured (Aspect 2) (Figure 4.3). Crystals observed within these fractures and rounding of the lateral edges was probably caused by pressure being placed on a material harder than this particular tool. This may have resulted from butchering activities, such as the cutting of fresh bone.

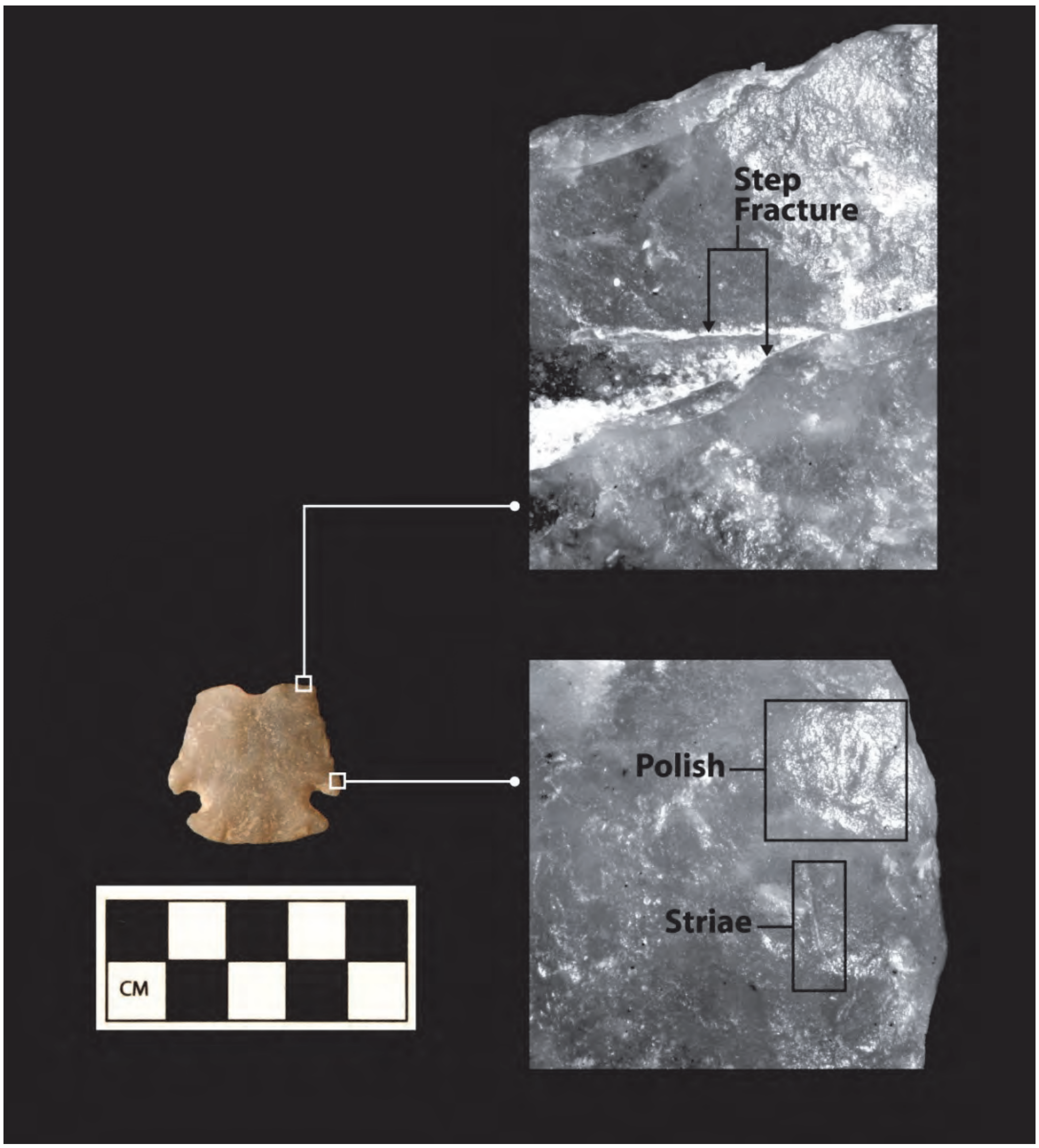

Figure 4.3. Microwear indicators on one Palmer point (Aspects 1 and 2).

Kirk Stemmed (n=1)

A single Kirk Stemmed point manufactured from St. Louis chert was recovered from Twin Knobs Rockshelter (Figure 4.2b). Kirk Stemmed points are believed range in age from 6,900-6,000 B.C. (Jefferies 2008; Justice 1987). This specimen is complete and measures 51.5 mm long, 28.1 mm wide, and 6.6 mm thick. The cross-section is biconvex. Blade length measures 40.5 mm in length and the average notch depth is 3.8 mm. The blade faces on this specimen are beveled and the coarsely serrated lateral margins are slightly incurvate. Both of these attributes are indicative of repeated blade resharpening. The stem has a slightly concave base that exhibits both basal grinding and thinning. The lateral margins of the hafting element are straight and also have been ground. The stem is 10.5 mm long, 14.4 mm wide, and 4.6 mm thick.

St. Charles (n=1)

A single St. Charles point consisting only of the haft element (stem and corner notches) was also recovered from the rockshelter (Figure 4.2d). St. Charles points are believed to date within an approximate range of 8,000-7,000 B.C. (Jefferies 2008; Justice 1987). The point is manufactured from St. Genevieve chert and is 24.3 mm wide and 5.9 mm thick at the haft. The cross-section of the expanding stem is biconvex. Basal thinning scars are present on both faces of the stem and all the extant margins have been heavily ground.

Hardin Barbed (n=1)

A single Hardin Barbed point manufactured from St. Louis chert was recovered from the rockshelter (Figure 4.2e). Hardin Barbed points are believed to range in age between 8,000-5,500 B.C. (Justice 1987). The expanding stem is 29.8 mm wide and 9.4 mm thick, and displays a biconvex cross-section. Average notch depth is 3.6 mm. Large flake scars extend across the blade on each face, and fine pressure flake scars are present on the straight to slightly excurvate, serrated lateral blade margins. The stem has a straight basal edge and all of the margins have been heavily ground. The stem measures 12.5 mm in length, 22.7 mm in width, and has a thickness of 6.4 mm.

Magnification of the distal facture (Aspect 1) revealed edge crushing and some loose grains along the fracture, which are suggestive of impact damage (Figure 4.4). Examination of the lower lateral edge (Aspect 2) of this specimen documented deep, linear striae (subparallel to the edge) and examination of a nearby edge serration identified rounding and smearing, and scalar fracturing (Figure 4.4). The observed use-wear along with the presence of semi-bright to bright, grainy polish suggests this tool may have been used for butchering, which would have included cutting/slicing of animal hide.

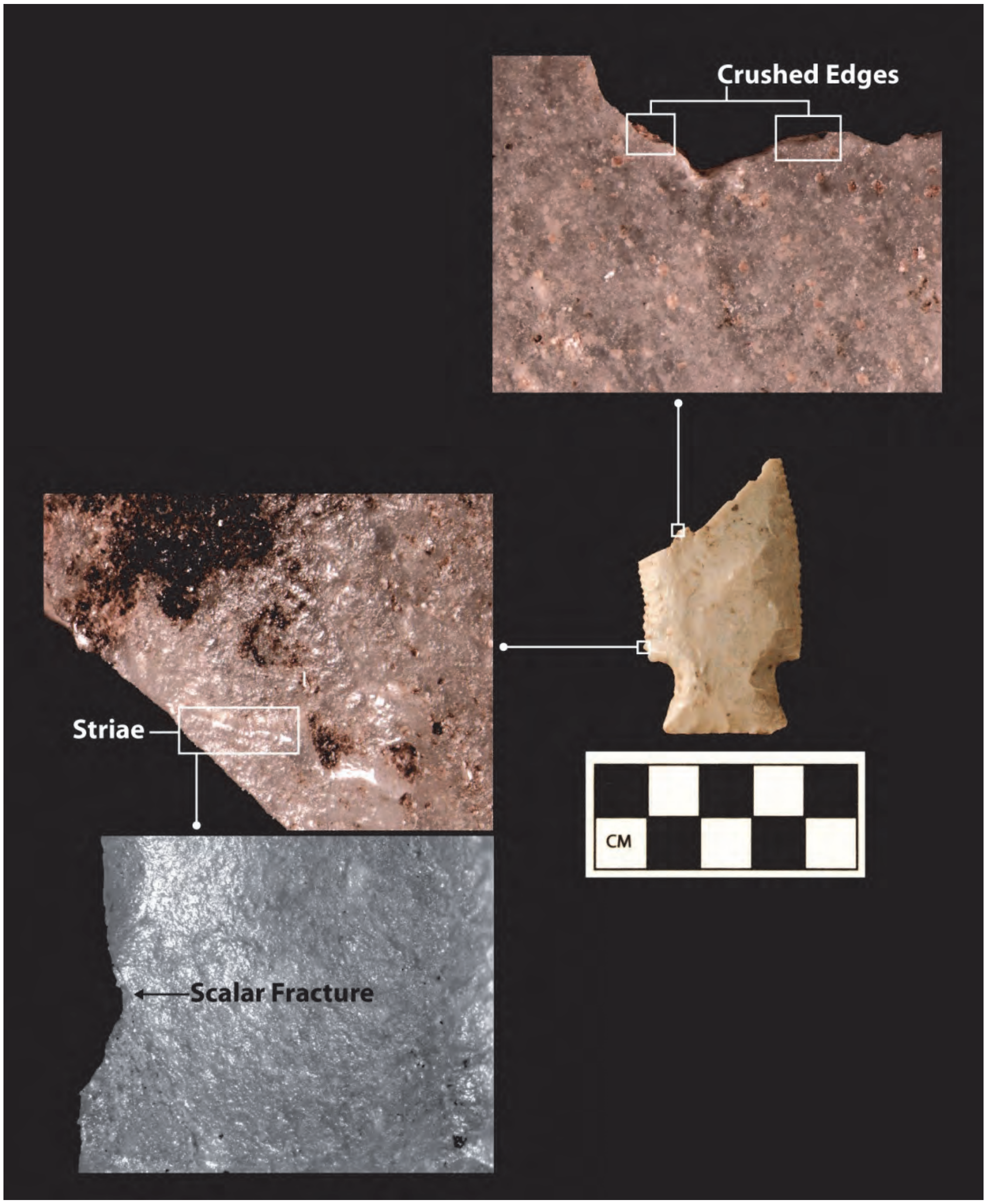

Figure 4.4. Microwear indicators on the Hardin Barbed point (Aspects 1 and 2): Top, Crushed Edges; Middle, Striae Perpendicular to Lateral Edge; Bottom, Scalar Fracture of Serrated Edge.

Big Sandy (n=1)

A single Big Sandy point manufactured from St. Louis chert was recovered (Figure 4.2f). Big Sandy points have an approximate age range of 7,500-6,000 B.C. (Jefferies 2008; Justice 1987; Kneberg 1956). The point measures 28.8 mm wide at the shoulders, is 7.7 mm thick, and has a biconvex cross-section. The lone intact notch has a depth of 5.6 mm and a width of 7.4 mm. The hafting element has squared basal ears and a straight basal edge. Basal thinning and basal grinding are present. Fine pressure flake scars and very fine serrations are present along the intact lateral blade margins.

Late Archaic

Four diagnostic Late Archaic period projectile points representing three types were recovered from the Twin Knobs Rockshelter (Jefferies 2008). These types include Matanzas Side Notched, Merom Expanding Stem, and Etley. These point types span the Late Archaic period (ca. 3,000-1,000 B.C.) and are indicative of repeated use of the rockshelter.

Matanzas Side Notched (n=1)

The Matanzas Side Notched projectile point was manufactured from St. Louis chert (Figure 4.5). Dated contexts containing Matanzas points indicate an age range that extends from the terminal Middle Archaic through much of the Late Archaic period (ca. 3,700-2,000 B.C.) (Cook 1976; Jefferies 2008; Justice 1987). This complete specimen measures 47.8 mm long, 22.2 mm wide, and 7.9 mm thick. The cross-section is biconvex. The point has a blade length of 38.5 mm and the average notch depth is 2.0 mm. Notch depth is shallow and the stem has a straight basal edge, which has not been ground. Medium to large random flake scars are present on both blade faces and the lateral blade margins are slightly excurvate.

Scalar flakes and rounded hinge fractures were noted near the straight to nearly beveled edge of this point. Both are associated with multiple resharpening episodes, as are dull to bright polish and grainy pitted areas observed on and near the edge of this specimen (Figure 4.5). All of these attributes are suggestive of butchering fresh meat and slicing plant material.

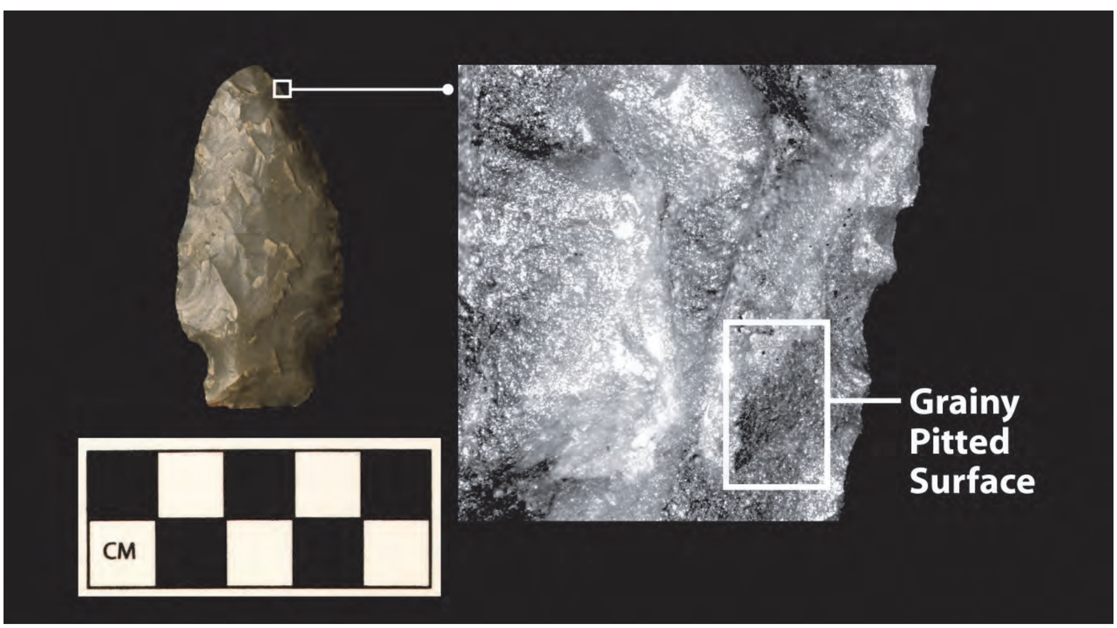

Figure 4.5. Late Archaic Matanzas Side Notched point from the Twin Knobs Rockshelter (Note: grainy pitted surface).

Merom Expanding Stem (n=2)

Two proximal portions of Merom Expanding Stem projectile points were recovered from Twin Knobs rockshelter (Figure 4.6a,b). Dated contexts containing Merom Cluster points—which includes the expanding stem form—suggest an age range of approximately 2,000-1,000 B.C. for these points (Jefferies 2008, 1996; Justice 1987). Both are manufactured from St. Louis chert, however the two points do have slightly different morphological characteristics. Specimen A has a straight basal edge, while Specimen B exhibits a concave basal edge. Specimen A is plano-convex in cross-section and Specimen B is biconvex. The average width of these specimens measures 16.8 mm at the shoulders and average thickness is 5.4 mm. The average notch depth is 3.3 mm. Light basal and lateral grinding was observed on the hafting elements of both specimens.

Figure 4.6. Late Archaic Merom Expanding Stem points from the Twin Knobs Rockshelter.

Etley (n=1)

The Etley point recovered from the shelter was manufactured from St. Louis chert (Figure 4.7). Etley points have been recovered from dated contexts that span the Late Archaic period (3,000-1,000 B.C.) (Jefferies 2008; Justice 1987). The specimen measures 27.8 mm wide at the shoulders, is 12.0 mm thick, and biconvex in cross-section. The average notch depth is 12.0 m. The stem is slightly expanding and is basally thinned. In addition, the stem exhibits a straight basal edge that lacks basal grinding. The lateral blade margins are incurvate and several step fractures are present, indicating resharpening.

Figure 4.7. Late Archaic Etley point from the Twin Knobs Rockshelter.

Terminal Archaic-Early Woodland Transition

Nine projectile points recovered from the Twin Knobs Rockshelter fall into the transitional period between the Late Archaic and Early Woodland (ca. 1,500-600 B.C.). The types identified include Buck Creek Barbed, Saratoga Parallel Stemmed, and Motley points. More points dating to the Terminal Archaic/Early Woodland transition (n=9) were recovered from the rockshelter than those considered exclusively diagnostic to Late Archaic period (n=4). Although the sample size is relatively limited, the greater frequency of the later-aged points suggests that the site witnessed more intensive use over time during the Late Archaic period, especially after 2,000 B.C.

Buck Creek Barbed (n=4)

The four Buck Creek Barbed projectile points were manufactured from a variety of raw materials, including St. Louis, Fort Payne, St. Genevieve, and one unidentified chert, respectively (Figure 4.8a-d). Buck Creek Barbed points have a date range of ca. 1,500-600 B.C. and are diagnostic of the Terminal Archaic-Early Woodland transition.

Specimens A and B have straight narrow stems that appear to have been intentionally snapped along the basal edge. The average length of these two points is 56.7 mm and the average thickness is 6.8 mm. Average blade length is 49.2 mm. Both points have biconvex cross-sections. The average notch depth is 5.4 mm. Both points show signs of resharpening and have triangular blades, although specimen B does exhibit a mucronate distal tip. Specimens C and D also have triangular blades and long, expanding stems that have been thinned nearly along their entire length. However, their stem bases exhibit a slightly rounded basal edge. Both lack basal grinding. Specimen C has downward projecting barbs, and the barbs on Specimen D have been fractured. In addition, Specimen D has been heavily resharpened. Both of these points have plano-convex cross-sections.

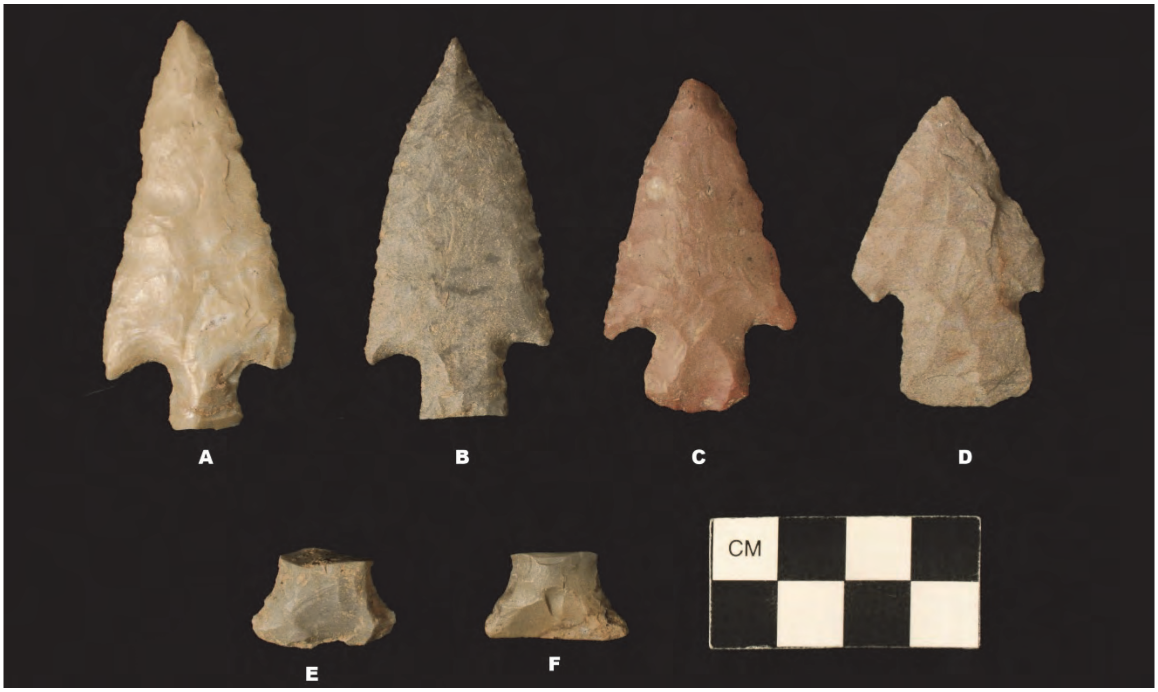

Figure 4.8. Terminal Archaic points from the Twin Knobs Rockshelter: a-d, Barbed Cluster; e-f, Motley.

Motley (n=2)

Two stem fragments of Motley points manufactured from St. Louis chert were recovered from the shelter (Figure 4.8e,f). Both fragments are expanding forms with biconvex cross-sections. Specimen E has a convex basal edge and the other has a straight basal edge. Both are basally thinned and exhibit basal and lateral grinding. The average width of the stems is 19.8 mm and the average thickness is 5.9 mm. Motley points appear in the Terminal Late Archaic period and extend well into the Early Woodland and have an approximate date range of ca. 1400-600 B.C. (Justice 1987:198-201).

Saratoga Parallel Stem (n=3)

The proximal fragments of three Saratoga parallel stem projectile points were recovered from the shelter. Each of the points is manufactured from St. Louis chert (Figure 4.9a-c). Saratoga cluster projectile points are typically considered diagnostic of the Late Archaic period (ca. 2,000-650 B.C.), but do extend into the Early Woodland (Applegate 2008; Jefferies 2008; Justice 1987). These examples have an average width of 30.0 mm and an average thickness of 10.9 mm. Specimens A and C are straight stemmed and specimen B is slightly contracting. All three of these points have a rounded basal edge and specimen B lacks basal grinding. Specimen A is plano-convex in cross-section. Specimens B and C have a biconvex cross-section. The shoulders on these specimens range from upward slanting to squared. The flaking characteristics observed in all three of these points (percussion thinning and irregular pressure retouch) are consistent with other descriptions of Saratoga cluster points (Justice 1987:156).

Figure 4.9. Late Archaic to Early Woodland Saratoga Parallel Stem points from the Twin Knobs Rockshelter.

Woodland Period

Two projectile points (Adena Stemmed and Lowe Flared Base) were recovered from the Twin Knobs Rockshelter that are diagnostic of the Woodland period (ca. 1,000 B.C. to A.D. 800) (Applegate 2008).

Adena Stemmed (n=1)

The Adena stemmed point was manufactured from St. Louis chert (Figure 4.10). In Kentucky, Adena stemmed points date from the Early to Middle Woodland periods (ca. 500-100 B.C.) (Applegate 2008:350-352). This example measures 75.1 mm long, 33.4 mm wide, and 10.9 mm thick. Blade length is 54.8 mm and has a biconvex cross-section. The point exhibits grinding along the basal and lateral margins of the haft element; however, the stem is not basally thinned. Blade margins are excurvate and fine percussion and pressure flake scars are evident on both blade faces.

Figure 4.10. Adena Stemmed point from the Twin Knobs Rockshelter.

Lowe Flared Base (n=1)

The Lowe Flared Base point was manufactured from Ste. Genevieve chert (Figure 4.11). Lowe Flared Base points range in age between the Terminal Middle Woodland to early Late Woodland (A.D. 200-600) (Applegate 2008; Butler and Wagner 2000; Justice 1987; Muller 1986). This example measures 35.0 mm long, 19.1 mm wide, and 6.0 mm thick. The blade length on this resharpened specimen is 24.8 mm and has a lenticular cross-section. Although resharpened, this point has retained excurvate blade margins. The haft element is basally thinned and ground with a straight basal edge. The stem is 9.9 mm long, 17.8 mm wide, and 5.0 mm thick. The average notch depth is 2.2 mm.

Figure 4.11. Lowe Flared Base point from the Twin Knobs Rockshelter.

Terminal Late Woodland/Late Prehistoric/Protohistoric

Madison (n=13)

Of the 13 Madison points recovered from the rockshelter, eight are complete and five are fragments (Figure 4.12a-h). Among the complete points, specimens A-E are straight sided, straight based Madison isosceles triangular arrowheads, while specimens F-H are shorter, excurvate Madison forms. Madison triangular arrowheads have a date range of A.D. 800 to 1750 (Justice 1987; Pollack 2008b).

Among the Madison isosceles triangular forms, specimens A-E have an average length of 35.9 mm, an average basal width of 16.2 mm, and an average mid-blade width of 12.5 mm. The average thickness of these points is 4.5 mm. Specimens A and B were manufactured from St. Louis chert, while C and E were made from Burlington chert. With the exception of Specimen B, all of the triangular forms were bifacially flaked. Specimen B was fashioned from a thin flake with fine pressure flake scars confined to the lateral and basal margins.

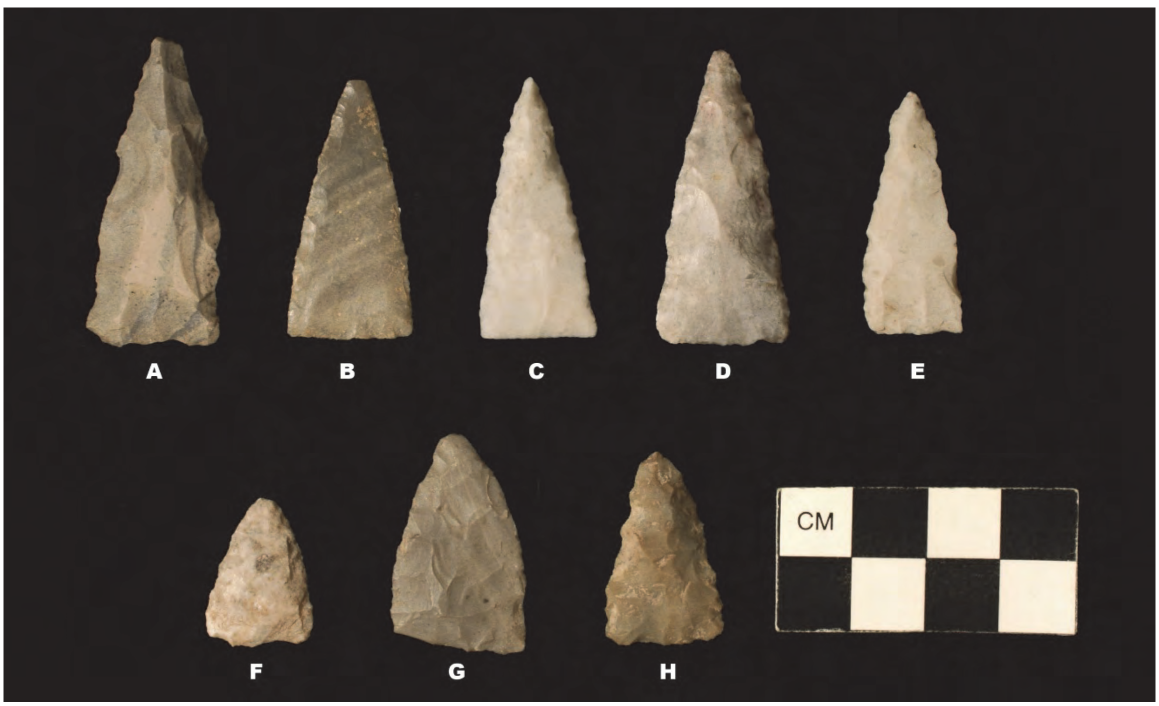

Figure 4.12. Terminal Late Woodland/Late Prehistoric points from the Twin Knobs Rockshelter: a-e, Madison Isosceles; f-h, Madison Excurvate.

The shorter, excurvate Madison forms have an average length of 24.6 mm, an average basal width of 15.4 mm, and an average mid-blade width of 13.1 mm. The average thickness of these points is 4.3 mm, and all were manufactured from St. Louis chert. Each of these points is bifacially flaked, and range from flattened, to plano-convex and biconvex in cross-section.

The five fragmented specimens were manufactured from Burlington (n=4) and St. Louis (n=1) cherts, and exhibited plano-convex cross-sections. Due to their fragmented condition, the only obtainable measurements were basal width and thickness. The average basal width of these specimens is 17.9 mm and the average thickness is 4.8 mm. All appear to have been bifacially flaked and may have been broken as a result of use.

Nodena (n=2)

The two Nodena points were manufactured from Warsaw and St. Louis chert, respectively (Figure 4.13a,b). Specimen A, which is bi-pointed, is 38.9 mm long, 13.5 mm wide, and 4.4 mm thick. Specimen B, which is tear-drop in shape and exhibits a rounded base, is 31.2 mm long, 12.6 mm wide, and 4.2 mm thick. Both points were manufactured with a combination of soft hammer percussion and pressure flaking. Nodena points are diagnostic of the late Mississippian and Protohistoric periods dating from approximately A.D. 1400 to 1700, and possibly later (Justice 1987; Pollack 2008b).

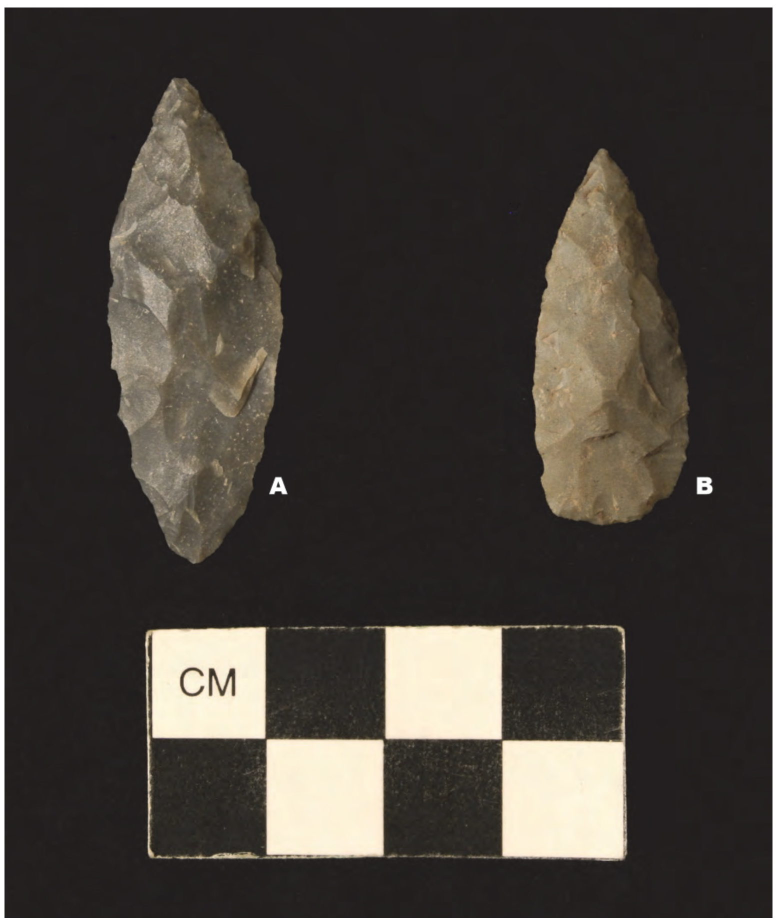

Figure 4.13. Nodena points from the Twin Knobs Rockshelter.

<u>Unidentified Projectile Points (n=7)</u>

Seven projectile points/point fragments could not be assigned to a known type (Figure 4.14a-g). Significant resharpening, recycling, or fragmentation of these specimens made it difficult to identify with confidence. Descriptions of each point fragment and, when possible, the probable temporal affiliation (based on extant characteristics) are presented in the following section.

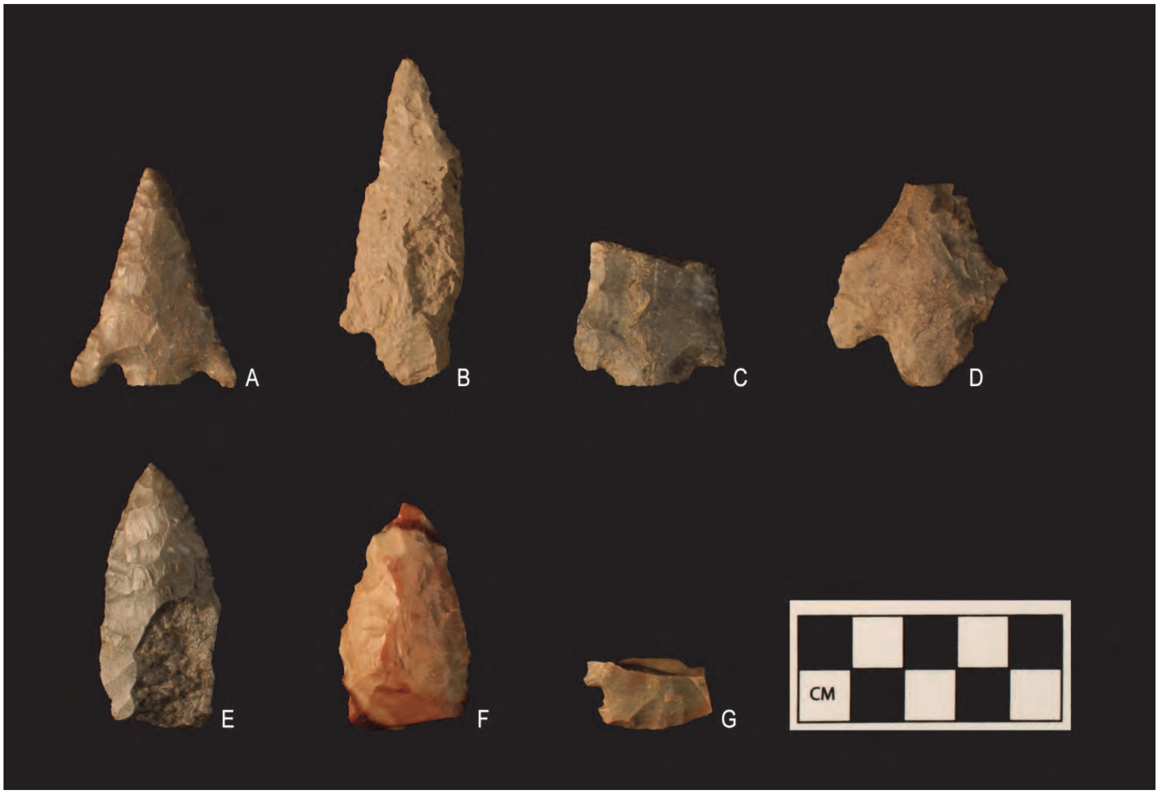

Figure 4.14. Unidentified Projectile Points from the Twin Knobs Rockshelter.

Specimen A is a medium-sized corner notched point with a broken haft element manufactured from Warsaw chert (Figure 4.14a). Due to the missing stem, maximum length measurement and average notch depth could not be recorded for this specimen. However, average blade length is 41.3 mm. Maximum width (measured at the barbs) is 30.4 mm. The cross-section of the blade is plano-convex and maximum thickness measures 5.3 mm. Both lateral blade margins are slightly incurvate and beveled as a result of resharpening. The corner notching, thin cross-section, and flaking style observed on both faces are attributes that often characterize Early Archaic types from the Thebes or Kirk Corner Notched Clusters. However, due to the missing hafting element, this specimen cannot be confidently identified as an Early Archaic point.

Although no striae were noted on Specimen A, small hinge and step fractures were observed on the upper portion of the lateral blade margin (Figure 4.15). All are associated with as pressure flaking that represents three to four episodes of resharpening. Scalar flake scars and dull to bright polish that represent the byproduct of cutting and slicing activities were observed along the edge of this point. This specimen may have been used for cutting and slicing plant materials, and for processing fresh animal hide.

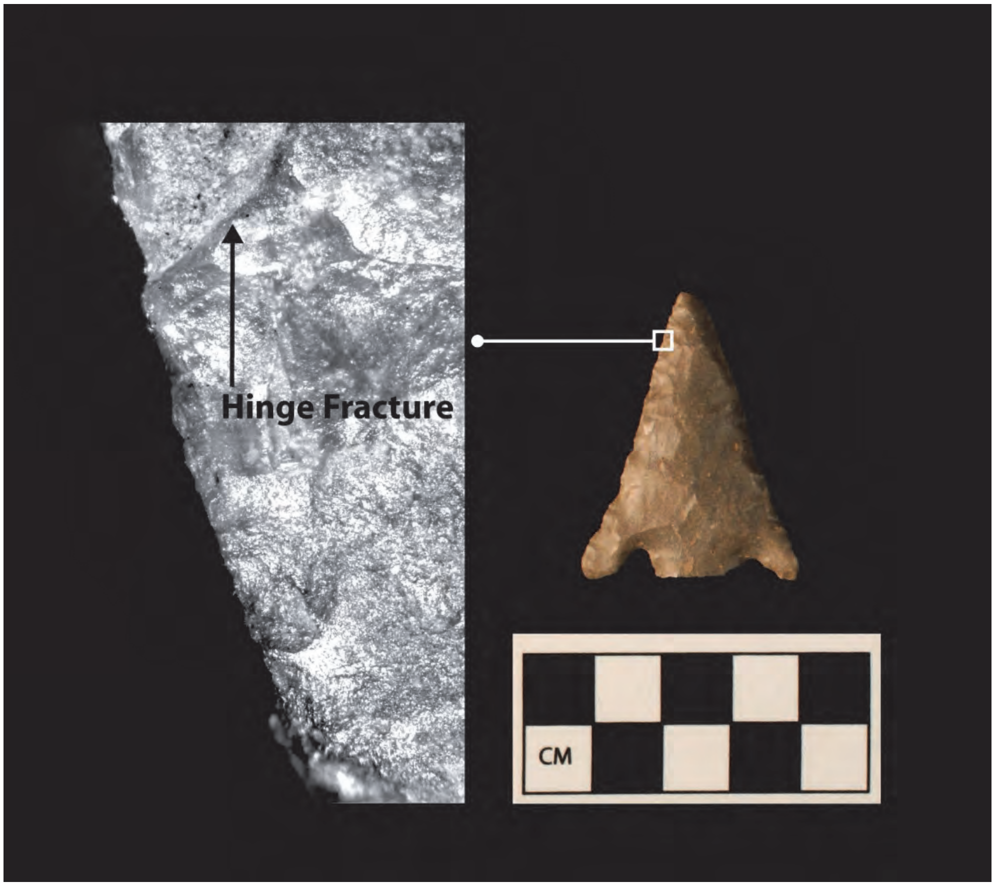

Figure 4.15. Microwear indicators on a possible Thebes or Kirk Corner Notched point from the Twin Knobs Rockshelter.

Specimen B is a laterally fractured and heavily resharpened point manufactured from an unidentifiable burned chert (Figure 4.14b). It has a maximum length of 61.4 mm and the extant blade has a length of 51.8 mm. The cross-section is biconvex and maximum thickness is 7.1 mm. This specimen has a slightly contracting stem with a rounded basal edge that lacks grinding. Due to the heavily burned (pot lidded) surfaces, the flaking characteristics could not be observed. Because the point was lacking several essential attributes, a temporal or cultural affiliation could not be assigned.

Specimen C is an extremely fragmented point manufactured from Fort Payne chert (Figure 4.14c). The stem and distal portion are both broken and the blade margins show signs of heavy resharpening. The cross-section is biconvex. Maximum thickness (7.8 mm) was the only measurement recorded for this specimen. The resharpened blade does display collateral flaking on both faces, which is often associated with Early Archaic lithic assemblages. In the absence of other attributes, however, this point cannot be confidently attributed to a specific time period.

Specimen D is a heavily fragmented proximal portion of a point manufactured from St. Louis chert (Figure 4.14d). It is missing all of the distal portion and the haft element also has been damaged. The point displays a biconvex cross-section and large random percussion flake scars can be observed on both blade faces. Due to its fragmented condition, no measurements were recorded for this particular specimen and it could not be assigned a temporal or cultural affiliation.

Specimen E is a lanceolate-shaped blade fragment manufactured from burned St. Louis chert (Figure 4.14e). Because the entire haft element is missing, maximum length was not recorded. Extant maximum width measures 22.2 mm. The cross section of the blade is biconvex and maximum thickness measures 7.6 mm. Very fine percussion and pressure flake scars are present on both blade faces. In addition, a medium ridge is present on one blade face. Recurvature or constriction can be observed on one of the lateral blade margin's lower portion. The absence of the haft element limits the analytical information from this point and it could not be assigned temporal or cultural affiliation.

Specimen F is a heavily resharpened, medium-sized point manufactured from Mounds Gravel chert (Figure 4.14f). It has a maximum length measurement of 43.0 mm and a maximum width of 23.7 mm. This specimen has a biconvex cross-section and measures 11.1 mm in maximum thickness. The basal edge is slightly convex and basal grinding is absent. The lateral blade margins are excurvate and numerous step fractures along the edges indicate episodes of resharpening; both of the side notches are almost completely obliterated. Because of the significant resharpening this point could not be assigned temporal or cultural affiliation.

Specimen G is a fragmented haft element of a point manufactured from Ste. Genevieve chert (Figure 4.14g). The highly fragmented state of this specimen it was difficult to determine the notching technique employed on the extant notch. The stem appears to be expanding with a convex basal edge that has basally thinned and ground. However, the point could not be assigned temporal or cultural affiliation.

Projectile Point Fragments (n=95)

Specimens determined to be portions of projectile points based on the recognition of a finished form, as well as thinness and refinement of the observable flake scar patterns but could not be assigned to a particular type were classified as projectile point fragments. Projectile point fragments from the Twin Knobs Rockshelter consist of distal portions (n=47), blade fragments (n=21), barb fragments (n=2), a haft element fragment (n=1). Specimens that were too fragmented to be assigned to a specific portion of a projectile point are referred to as indeterminate fragments (n=24).

Raw materials represented in the distal portions included St. Louis (19), Warsaw (n=7), Ste. Genevieve (n=8), Burlington (n=4), Fort Payne (n=7), Mounds Gravel (n=1), and unidentifiable (burned chert) (n=1). The blade fragments included St. Louis (n=17), Burlington (n=1), Fort Payne (n=2), and unidentifiable (burned chert) (n=1). The barb fragments were produced from St. Louis (n=1) and Warsaw (n=1) cherts. The haft element fragment was manufactured of Ste. Genevieve (n=1) chert. Raw materials for the indeterminate fragments consisted of St. Louis (n=10), Warsaw (n=6), Ste. Genevieve (n=3), Burlington (n=2), Fort Payne (n=1), and unidentifiable (burned) chert (n=2).

Drills/Perforators and Fragments (n=13)

One complete, one nearly complete (Figure 4.16a,b), and 11 drill fragments recovered from the Twin Knobs Rockshelter were manufactured from St. Louis (n=10) and Warsaw (n=3) cherts. The fragments consisted of distal portions of the bit (n=10) and one bit mid-section. Very fine pressure flaking and diamond-shaped cross-sections are evident on the bit, or medial portions on all of the specimens. The complete drill (Figure 4.13a) probably functioned as a piercing tool or perforator. The nearly complete drill (Figure 4.15b) has an expanding/rounded haft element. Drills/perforators were used for boring and/or piercing a wide variety of materials, such as bone, shell, antler, wood, stone, and leather.

Figure 4.16. Drills/Perforators from the Twin Knobs Rockshelter.

Examination under magnification of a drill/perforator tip documented the presence of a grainy and pitted surface and a semi-bright to bright polish near its distal end; but no polish was observed 0.5 cm from its tip (Figure 4.17). Use wear observed on this tool is suggestive of boring (drilling/perforating) hard materials, like wood or bone.

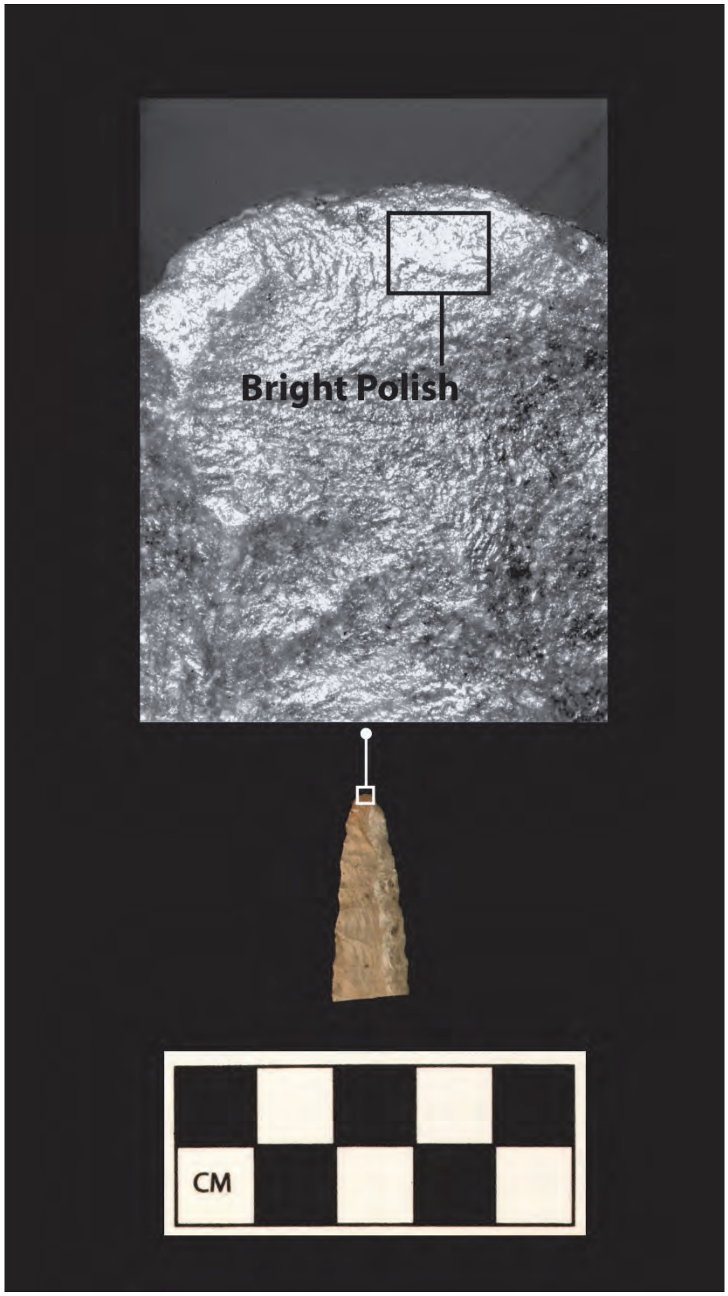

Figure 4.17. Drill/Perforator used to work wood.

<u>**Unifacial Endscraper Fragments (n=3)**</u>

The three unifacial endscrapers consists of distal fragments produced from Warsaw (n=1), Fort Payne (n=1), and Burlington (n=1) cherts. These specimens have working edge angles ranging from 60 to 70 degrees. The scrapers manufactured from Warsaw and Burlington cherts exhibit light polish from use on their ventral surface. These tools may have been multi-functional, serving a variety of tasks, including the cutting of soft materials and the scraping of harder materials.

Prismatic Blades (n=2)

The two prismatic blade fragments were manufactured from Fort Payne (n=1) and St. Louis (n=1) cherts (Figure 4.18a,b). Although only a portion of each tool was recovered, parallel medial margins can be observed on their dorsal surface and they display a prismatic cross-section. Modification is evident along the edges of both blade margins on both tools; however, it does not appear to be intentional retouch. The ventral surface on both specimens lacks observable polish, suggesting these tools were probably used for cutting, rather than scraping activities.

The presence of prismatic blades or bladelets at a site suggests a specialized lithic reduction sequence, in which a flake of a particular shape has been intentionally produced. Prismatic blades exhibit parallel margins and one or two raised ridges, which extend the length of the dorsal surface. Typically the flakes measure twice as long as they are wide and the platform shows evidence of preparation. Usually this type of tool is used for cutting or scraping and exhibits retouch on at least one blade margin. Although recognized primarily for their use during the Middle Woodland period, prismatic blades were also utilized by Paleoindian groups.

Figure 4.18. Prismatic Blade fragments from the Twin Knobs Rockshelter

The prismatic blade fragment (Figure 4.18a) manufactured from Fort Payne chert exhibits smearing and a homogeneous bright polish that was confined to the edge of its dorsal and ventral surfaces (Figure 4.19). Scalar scars, which are the result of cutting or slicing through a hard material also were observed along the edge of this tool. No striae were present and very little grain loss was observed. A single aspect was recorded for this implement and suggested an estimated action of slicing and cutting. The high-sheen polish and scalar scars indicated bone or hard wood being the estimated material use.

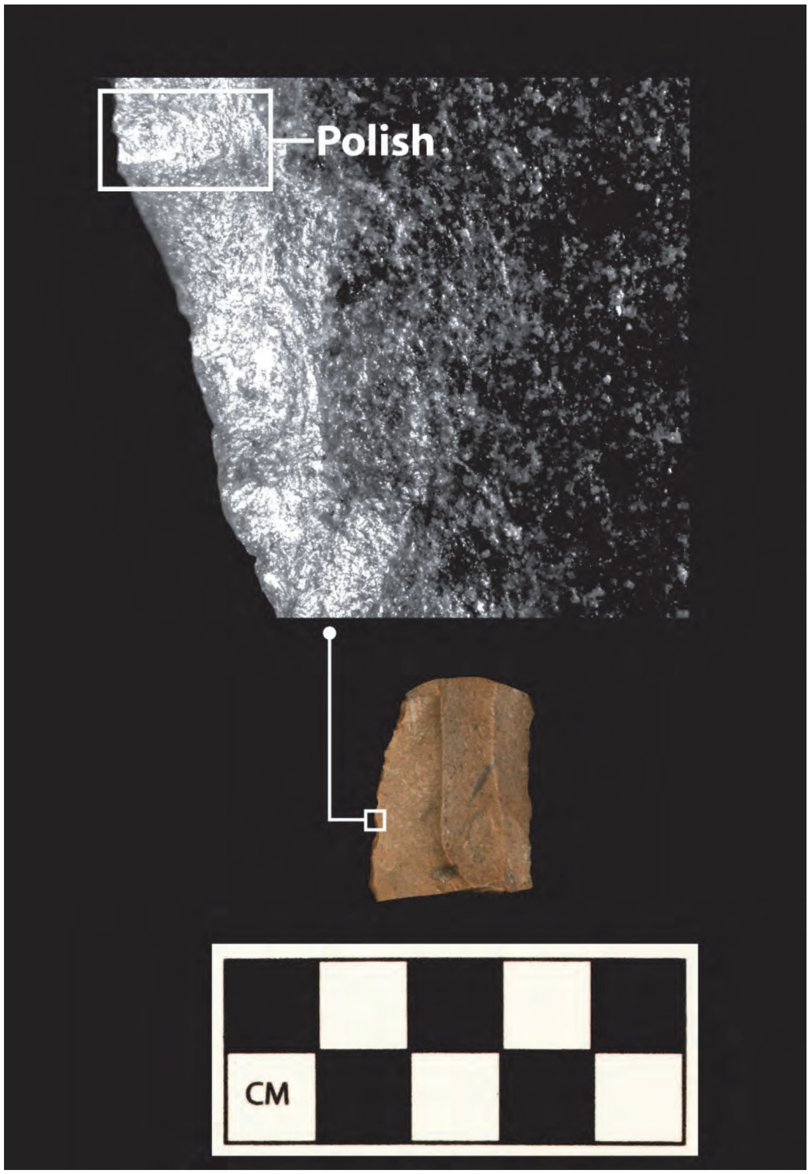

Figure 4.19. Prismatic Blade fragment showing polish along the lateral blade margin.

Bifaces and Biface Fragments (n=53)

The six complete bifaces and 47 biface fragments exhibit a variety of shapes and sizes. To provide some clarity to this group, they were divided into four subcategories: early stage, middle stage, late stage (Figure 4.20), and fragments. An early stage biface exhibits the initial outline of the chipped stone tool. Flake scars are widely spaced and the biface itself is relatively thick. A middle stage biface is thinned to the point where projections and irregularities are removed. As a result of this shaping they tend to be thinner than early stage bifaces, and their lateral blade margins are more defined. A late stage biface is essentially finished, well-thinned, and symmetrical in outline and cross-section. Biface fragments were further subdivided into proximal, middle, distal, and indeterminate categories that were too small to classify.

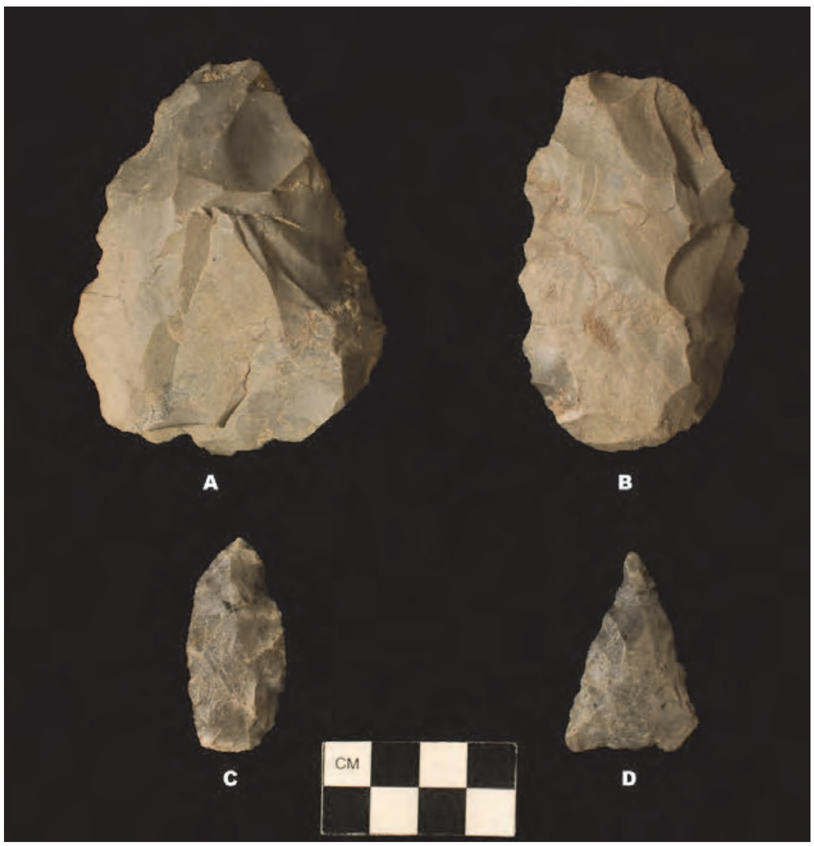

Figure 4.20. Bifaces from the Twin Knobs Rockshelter: a, Early Stage; b, Middle Stage; c,d; Late Stage Bifaces.

The complete bifaces consisted of early stage (n=1), middle stage (n=2) and late stage (n=3) specimens (Figure 4.20). The early stage biface was produced from St. Louis chert. The middle stage bifaces were manufactured from St. Louis (n=1) and Fort Payne (n=1) cherts. The late stage bifaces were produced from Warsaw (n=2) and Fort Payne (n=1) cherts. The biface fragments consisted of distal (n=2), proximal (n=13), mid-sections (n=4), and indeterminate (n=28). All of the distal and proximal fragments (n=15) were produced from St. Louis chert. The mid-section fragments were produced from St. Louis (n=2) and Warsaw (n=2) cherts. The indeterminate fragments were produced from St. Louis (n=12), Warsaw (n=8), Ste. Genevieve (n=2), Fort Payne (n=2), Mounds Gravel (n=2), and unidentifiable (burned) fragments (n=2).

In addition, the distal fragments originated from middle stage (n=1) and late stage (n=1) bifaces. The proximal fragments were derived from middle stage (n=6) and late stage (n=7) bifaces. The mid-sections consisted of middle stage (n=2) late stage (n=2) biface fragments. Although high quality Mississippian-age cherts were utilized to manufacture the majority of the stone tools at this site, it takes considerable force to fracture these types of raw material. Therefore, production failure in all stages of the manufacturing process is to be expected.

INFORMAL CHIPPED STONE TOOLS

Informal chipped stone tools are those artifacts that were manufactured for a specific task at, or shortly before the point at which they are to be used. These tools either show evidence of utilization without modification, or minimal modification through nominal retouching.

Retouched Flakes (n=30)

The retouched flakes (n=30) were produced from St. Louis (n=12), Warsaw (n=10), Ste. Genevieve (n=2), Burlington (n=3), Fort Payne (n=2), and Mounds Gravel (n=1) cherts. Possible uses of retouched flakes are suggested by Wilmsen's (1968) examination of the measurement of edge angles as an indicator of tool function. He conducted experiments on edges with different angles. His results indicated that edges with angles between 35 and 45 degrees would be most effective at cutting soft material and butchering. Edges with angles between 50 and 75 degrees would be most effective at cutting, scraping, or shaping hard materials, such as bone or wood.

Edge angles on the retouched flakes from Twin Knobs Rockshelter range from 35 to 72 degrees, suggesting these specimens were likely utilized for a wide variety of tasks, including cutting soft plant or animal material, butchering, and scraping or shaping hard materials, such as bone or wood. The variability in the shape of these flakes and the relatively simple level of modification is characteristic of situational production. These tools were probably expediently produced and used on an as-needed basis and discarded.

Semi-bright polish and a grainy, pitted surface were observed along the edge of a deeply beveled retouched flake. Several parallel and subparallel striae also were noted from the middle of the bevel to 1.5 mm from the edge (Figure 4.21). These striations were the end result of sawing and hacking. The specimen also exhibits flattened 'snowfields' of Keeley crystals, which are suggestive of friction on the distal end (Keeley 1980) (Figure 4.21). This informal tool may have been used for slicing, cutting, sawing, and hacking (butchering) hide, meat, and bone.

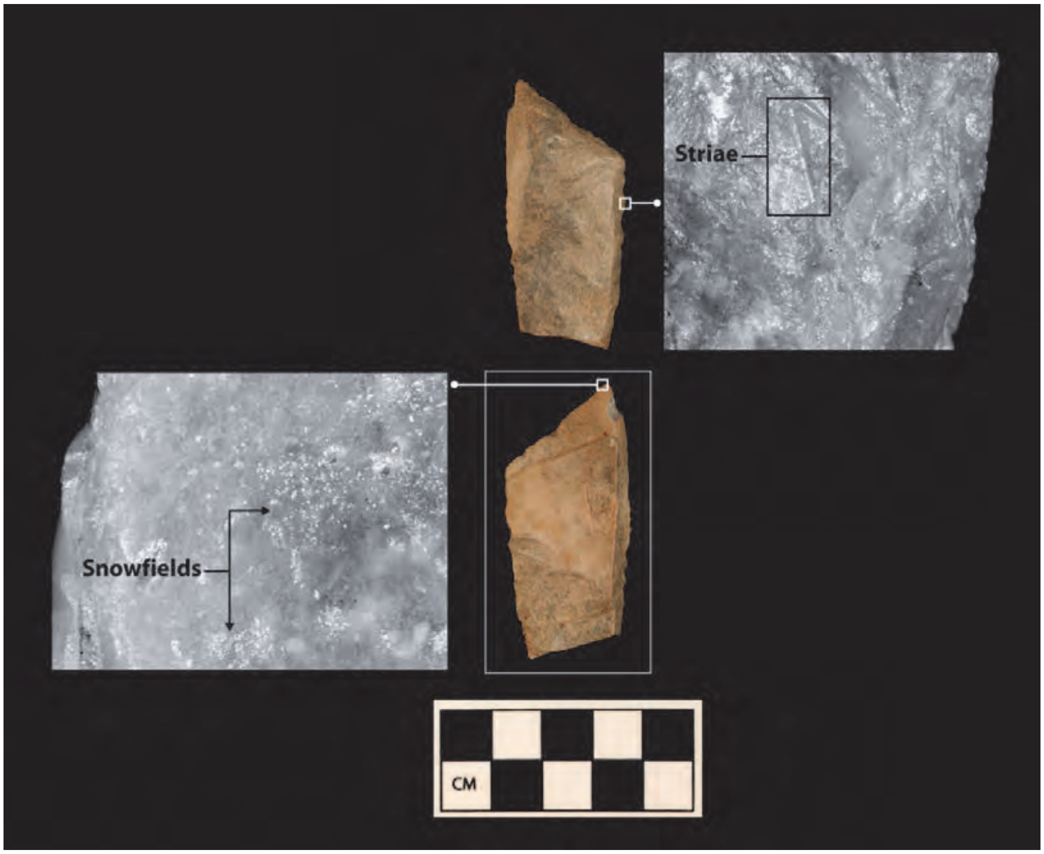

Figure 4.21. Deeply beveled retouched flake: top, striations; bottom, snowfields.

Blade-like Flakes and Fragments (n=5)

The blade-like flakes (n=5) exhibited a distinctive medial ridge or ridges on their dorsal surface (Figure 4.22). None of the blade-like flakes display the parallel medial margins, prismatic cross-sections, or platform preparation scars that are typical of Middle Woodland (Hopewellian) bladelets. They do, however, exhibit intentional retouch on one or both lateral blade margins. Three of the specimens exhibited polish from use on their ventral surface. Another exhibited polish on the dorsal surface. The blade-like flakes were fashioned from St. Louis (n=4) and Ste. Genevieve (n=1) cherts. Edge angles range from 38-78 degrees, indicating these specimens were possibly utilized for cutting plant materials and/or butchering animals.

Examination of the lateral margin (ventral surface) of one of the blades documented the presence of semi-bright polish along the tool's edge (Figure 4.23). Although not photographed, sporadic polish was recorded for the specimen's dorsal surface. Grain loss and discoloration of the chert also was noted. Loss of grain could possibly be attributed to a chopping action. It is suggested that this tool was used for slicing and chopping with plant matter being the estimated material use.

Figure 4.22. Blade-like Flakes from the Twin Knobs Rockshelter.

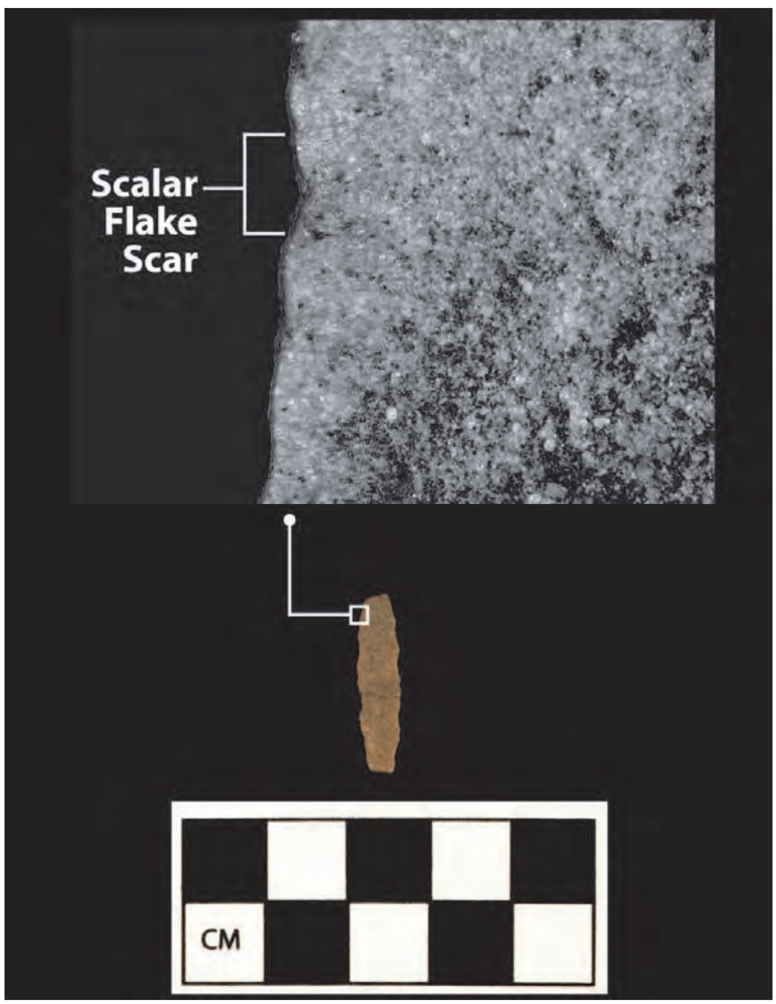

Figure 4.23. Scalar flake scar along the lateral blade margin.

Utilized Flakes (n=30)

The utilized flakes (n=30) were produced from St. Louis (n=16), Warsaw (n=8), Ste. Genevieve (n=4), and Mounds Gravel (n=2) cherts. Utilized flakes show modification through use, not intentional retouch along one or more margins of the tool. The variability in the shape of these flakes and the relatively simple level of modification strongly suggests they are informal tools. These tools were probably expediently produced and used on an as-needed basis for tasks, such as cutting and then discarded.

Two utilized flakes were examined for use-wear (Figures 4.24-4.25). Smearing and sporadic semi-bright polish was observed on, and away from the edge of the ventral surface of the utilized flaked illustrated in Figure 4.24. Polish was limited to the high points of the ventral surface. Grain loss and rounding also was noted along the edge. Several subparallel abrasion tracks are present along the lateral edge. These abrasion tracks are oriented subperpendicular to the edge. This tool may have been used for cutting and scraping wood or bone.

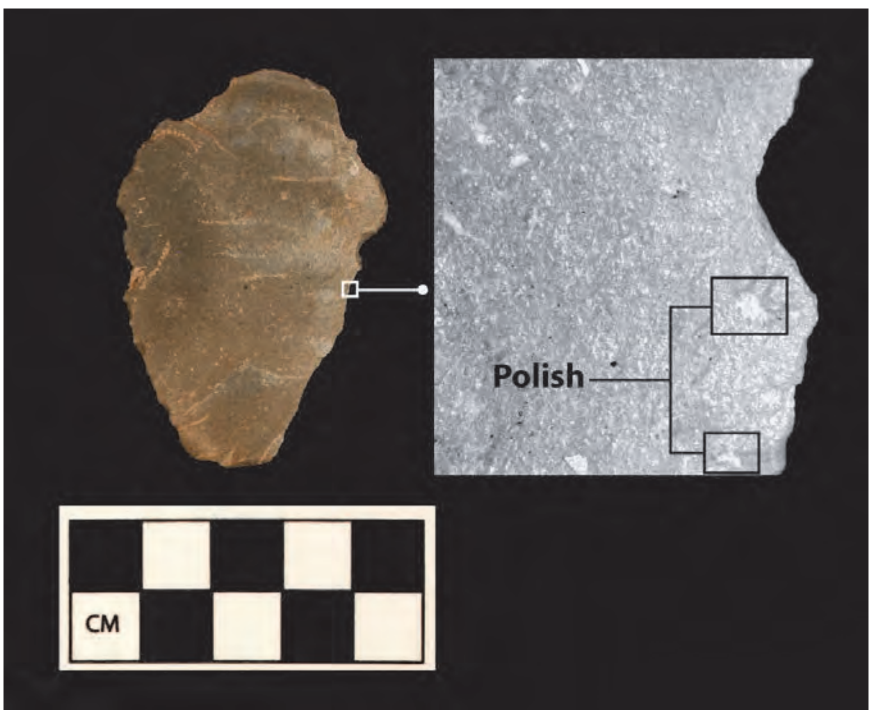

Figure 4.24. Utilized Flake with smearing and semi-bright polish.

A second utilized flake exhibits long narrow striations near the edge of the distal blade margin (Figure 4.25). Smearing and semi-bright to bright polish also was observed on the rounded edge of this implement. Dark veins representing either bitumen or tree resin were observed on the hafting region of this informal tool (Figure 4.25). The adhesive qualities of these substances would have played a key part in the hafting process. This tool may have been used for puncturing or gouging soft hide.

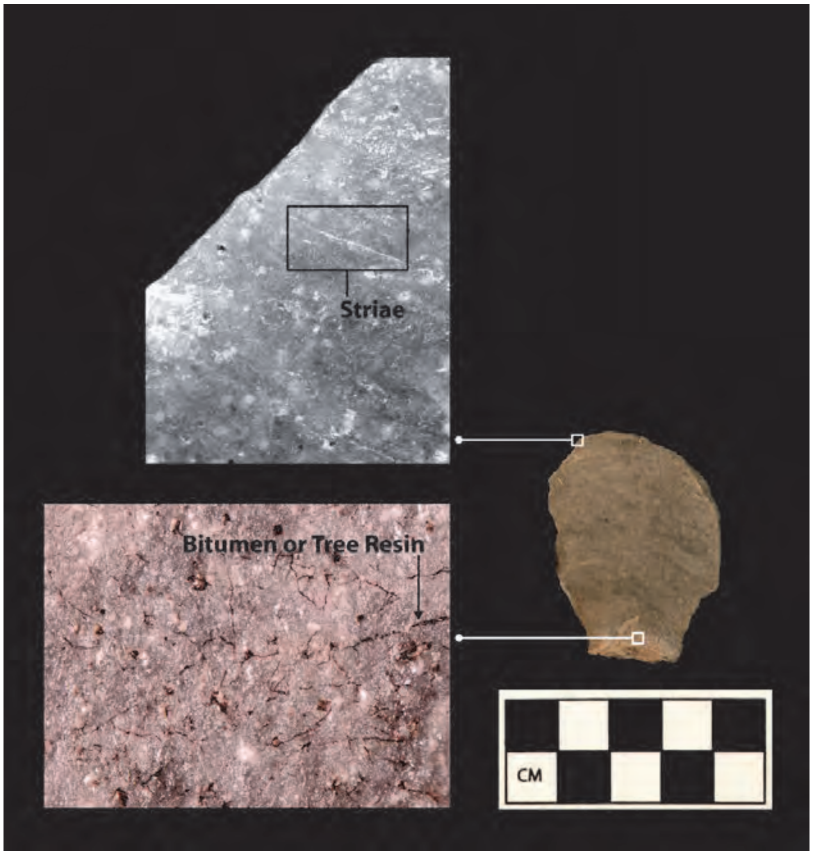

Figure 4.25. Utilized Flake showing striae, and traces of bitumen or tree resin.

GROUNDSTONE IMPLEMENTS

A total of four groundstone implements was recovered from the Twin Knobs Rockshelter. The groundstone tools included a pitted stone, two grinding slabs, and a granitic hammerstone/nutting stone. All four groundstone implements were found in close association with one another in the Late Archaic Zone E deposits (see Chapter Three) and are likely related to nut processing activities.

Pitted Stones (n=1)

The pitted stone (n=1) is a sandstone slab that displays a roughly circular, shallow, pecked or battered depression on the flat surface of the slab. (Figure 4.26). The slab is otherwise unmodified. Pitted stones have been interpreted as anvils for stone tool production or as slabs for processing nuts (Turnbow 1992).

Figure 4.26. Pitted Stone.

<u>Grinding Slabs (n=2)</u>

The two sandstone grinding stones or slabs exhibit a single smoothed, flat working surface (Figure 4.27a,b). The larger grinding slab (Figure 4.27a) has a working surface that measures 37.5 cm in length and 20.5 cm in width. The central portion of the flat working surface contains an oblong depression that measures 16.2 cm in length and 9.8 cm in width. The maximum depth of the depression is 17.0 mm.

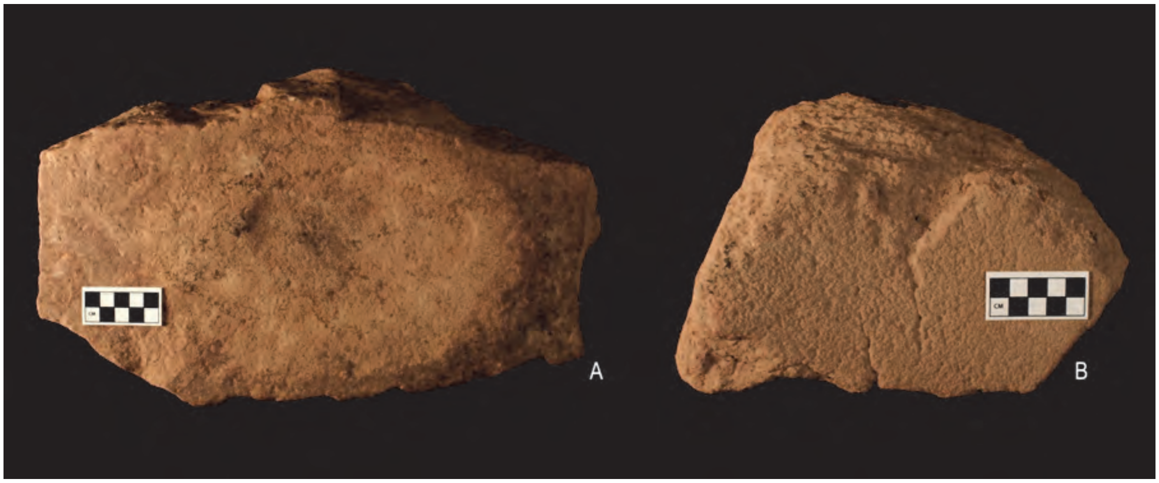

Figure 4.27. Sandstone Grinding Slabs.

The smaller grinding slab (Figure 4.27b) has a working surface measuring 21.9 cm in length and 11.5 cm in width. Both slabs represent relatively large stationary stones that were placed upon the ground. It is likely that they were paired with a smaller stone made of course material, such as granite. The smaller stone would have been drawn back-and-forth or used as a pounding implement over the flat or depressed surfaces in order to crush and/or grind starchy and oily plant materials or a variety of nuts.

Granitic Hammerstone/Nutting Stone (n=1)

Coarse-grained igneous rocks, such as diorite, gabbro, gneiss, and granite were often used prehistorically as hammers and other percussive tools. The granitic hammerstone recovered from Twin Knobs rockshelter shows pits on two of its flat surfaces and signs of battering over much of the cobble's exterior (Figure 4.28). The pitted and battered surface of this implement indicates that it may have been used for a variety of tasks, such a flint knapping, and processing starchy and oily plant seeds and nuts.

Figure 4.28. Granitic Hammerstone/Nutting Stone.

DEBITAGE

The French term debitage has two related meanings: 1) the act of intentionally flaking a block of raw material to obtain its products, and 2) the products themselves (Grace 1989, 1993). Commonly, the term debitage is used by prehistorians to describe flakes that have not been modified by secondary retouch and made into tools. For the purpose of this analysis, which is based on the research of Grace (1989, 1993), each type of debitage has been assigned to a specific class. These classes are as follows:

1) Initial reduction flakes (Initial): produced from hard hammer percussion; are typically thick; display cortex on all or part of their dorsal surfaces; and have large plain or simply faceted butts (striking platforms).

2) Unspecified reduction sequence flakes (Unsp.): applies to those pieces to which a specific reduction sequence cannot be assigned. With these pieces, it is impossible to tell whether they have been detached by simple core reduction or biface manufacture. For example, cortical flakes initially removed from a block of material can appear similar in both core and biface reduction strategies.

3) Biface initial reduction flakes (Bif/Initial): produced from hard or soft hammer percussion; are typically thick; display cortex on part of their dorsal surfaces; and have large plain or simply faceted butts (striking platforms). These flakes display more dorsal scars than initial reduction flakes.

4) Biface thinning and shaping flakes (BTS): result from shaping the biface while its thickness is reduced; generally lack cortex; are relatively thin; and have narrow, faceted butts, multidirectional dorsal scars, and curved profiles. Bifacial thinning flakes are typically produced by percussion flaking.

5) Biface finishing or trimming flakes (BFT): produced during the preparation of the edge of the tool. These flakes are similar in some respects to thinning flakes, but are generally smaller and thinner and can be indistinguishable from tiny flakes resulting from other processes, such as platform preparation. Biface finishing flakes may be detached by either percussion or pressure flaking.

6) Chips: flakes (< 1cm in length) that are detached during several different types of manufacturing trajectories. First, they can result from the preparation of a core or biface edge by abrasion, a procedure that strengthens the platform prior to the blow of the hammer. Second, tiny flakes of this type also are removed during the manufacture of tools like endscrapers.

7) Shatter: produced during the knapping process and through natural agents. Naturally occurring shatter is usually the result of thermal action shattering a block of chert. During biface reduction, shatter results from an attempt to flake a piece of chert with internal flaws (fossils) and fracture lines. For the purpose of this analysis, shatter is defined as a piece

of chert that shows no evidence of being struck by a human (i.e., bulb of percussion and faceted butt [striking platform]), but may nonetheless be a waste product from a knapping episode

8) Janus Flakes: produced during the reduction of a flake blank (Tixier and Roche 1980). The removal of a flake from the ventral surface of a larger flake results in a flake the dorsal surface of which is completely or partially composed of the ventral surface of the larger flake.

Discussion

A little over 40 percent of the unmodified flakes consist of unspecified reduction sequence flakes (n=11,030; 40.20 percent) (Table 4.1). The remaining specimens were classified as biface thinning or shaping flakes (n=4,390; 16.00 percent), biface finishing or trimming flakes (n=3,779; 13.80 percent), shatter (n=3,628; 13.20 percent), chips (n=3,013; 11.00 percent), biface initial reduction flakes (n=1,276; 4.70 percent), initial reduction flakes (n=174; 0.65 percent), and Janus flakes (n=123; 0.45 percent).

Table 4.1. Flake Types in the Twin Knobs Rockshelter assemblage.

Class	Flake Type	Frequency	Percent
1	Initial Reduction Flakes	174	0.65
2	Unspecified Reduction Sequence Flakes	11,030	40.20
3	Biface Initial Reduction Flakes	1,276	4.70
4	Biface Thinning or Shaping Flakes	4,390	16.00
5	Biface Finishing or Trimming Flakes	3,779	13.80
6	Chips	3,013	11.00
7	Shatter	3,628	13.20
8	Janus Flakes	123	0.45
Total		27,413	100.00

The high incidence of unspecified reduction sequence flakes could partially be attributed to breakage as a result of trampling by the human occupants of the rockshelter. Twin Knobs is a small cliff overhang with a confined floor space of approximately 25 m^2. However, it is equally likely that the relatively high percentage of unspecified reduction flakes within the assemblage may be evidence for the presence of some flake-oriented production that often is masked by the more readily identifiable debitage categories produced by bifacial reduction strategies (Odell 2003; Pecora 2001). The presence of blades and blade-like flakes, retouched flakes, and utilized flakes in the tool assemblage (discussed previously) indicate that at least some flake-oriented production occurred at the site. Although low in frequency, the presence of Janus flakes also lends support to this suggestion.

Nearly 35 percent of the debitage can be clearly attributed to bifacial reduction strategies (Table 4.1:Classes 3-5). This is not unexpected given the relatively large number of bifacial tools recovered. The entire sequence of bifacial reduction is represented in the debitage assemblage. However, early stage biface initial reduction flakes—which are derived from the initial thinning of cortex-bearing blanks or bifaces—are not well represented (n=1,276; 4.7 percent). The relatively low incidence of this debitage category, combined with the low frequency of initial reduction flakes (n=174; .065 percent) suggest that initial raw material reduction likely occurred at other locations.

Categories representing the later stages of bifacial production (Classes 4 and 5) comprise nearly 30 percent of the debitage assemblage (Table 4.1). The relatively high percentage of flakes from later stages suggests that the main focus of lithic manufacture at the site was likely the finishing and resharpening of bifacial tools. This corresponds well with the limited representation of initial reduction debitage and further supports the assertion that the initial reduction of raw materials was occurring at off-site locations.

OTHER CHIPPED STONE

Cores and Core Fragments (n=20)

Seven cores and 13 core fragments were recovered from Twin Knobs Rockshelter. Most of the complete cores (n=6) were classified as free-hand cores. These specimens had amorphous shapes and were fashioned from medium-size river-worn cobbles. A single core produced from St. Louis chert is rounded and exhibits flake scars indicating that blade-like flakes were systematically removed from the specimen’s dorsal surface. Amorphous cores are irregular in shape and usually have very few to several usable or abandoned striking platforms. This type of core often represents the final attempt of a knapper to extract the last usable flakes from a piece of raw material. The amorphous cores were produced from St. Louis (n=4), Warsaw (n=2), and Ste. Genevieve (n=1) cherts. The core fragments were produced from St. Louis (n=5), Warsaw (n=2), Ste. Genevieve (n=2), and unidentifiable (burned) (n=4) cherts.

When cortex (n=11) is present it is water worn. Since cores tend to be indicative of the primary lithic resources exploited, the presence of only river-worn specimens indicates that chert was likely procured from nearby streams. These cobbles may have been used exclusively for the purpose of core reduction at Twin Knobs rockshelter.

The main objective of core reduction is the production of flakes to be used as tools. However, cores represent a very small percentage of the chipped stone assemblage recovered from this site. The presence of blade-like flakes, prismatic blade fragments, and expedient flake tools in the assemblage indicate that some flake-oriented lithic production was occurring at the site. However, debitage profile indicates that the vast majority of flakes in the assemblage are by-products of the reduction of blanks or bifaces.

LITHIC RAW MATERIAL IDENTIFICATION

Raw material identification was conducted on all lithic debitage, as well as formal, and informal tools. Raw material types were identified on the basis of personal experience, physical properties of the raw materials (i.e., color, luster, fracture, and texture), reference to published descriptions (Koldehoff 1985; Ray 2003), and comparisons with chert specimens at the William S. Webb Museum of Anthropology in Lexington. A 10x hand lens, and on occasion higher levels of magnification with a Swift M27LED stereomicroscope, was used to identify inclusions and to evaluate texture and structure.

Cortex was described as being present or absent in residual (block) or cobble form. The presence of residual or block cortex denotes lithic procurement from primary sources or outcrops, while cobble cortex indicates procurement from secondary sources (i.e., stream gravel bars). Generally, residual cortex is rather coarse, while cobble cortex is smooth and often pitted and/or polished. Nearly all of the cortex-bearing specimens recovered from Twin Knobs Rockshelter exhibited cobble cortex, strongly indicating that raw materials were being procured from stream locales.

With regard to material type, the most productive chert-bearing units near Twin Knobs Rockshelter are that of the Mississippian-age St. Louis, Warsaw, and Ste. Genevieve Limestone formations.

St. Louis

St. Louis chert occurs in nodular and tabular form and is a smooth, fine-grained material. In extreme western Kentucky and southern Illinois it usually is light to medium gray in color and can be banded. However, it can also be different shades of white. It also occurs as green nodules being almost perfectly spherical in shape, often quite large in diameter, and very dense. Because of these qualities, St. Louis chert generally requires considerable force to fracture. The higher quality nodules often have a thick cortex, contain rust colored streaks of iron and small white fossil fragments St. Louis chert accounted for 44.40 percent of the lithic raw materials recovered from the site (Table 4.2).

Table 4.2. Frequency of Raw Materials in the Lithic Assemblage.

Chert Type	Formal Tools	Informal Tools	Bifaces and Biface Fragments	Cores and Core Fragments	Flakes	Total	Percent
St. Louis	83	32	31	9	12,133	12,288	44.4
Warsaw	20	18	12	4	4,397	4,397	15.9
Ste. Genevieve	17	7	2	3	1,547	1,547	5.6
Burlington	15	3	0	0	565	565	2.0
Ft. Payne	14	2	4	0	636	636	2.3
Mounds Gravel	1	3	2	0	126	126	0.5
Mill Creek	0	0	0	0	73	73	0.3
Unidentified	3	0	0	0	6,073	6,073	21.9
Unidentified Burned	5	0	2	4	2,004	2,004	7.2
Total	**158**	**65**	**53**	**20**	**27,413**	**27,709**	**100.0**

Warsaw

Warsaw chert originates from the Mississippian-age Warsaw Limestone Formation. It ranges from grainy to porcelaneous in texture and occurs in a variety of colors, including light to medium gray, and yellowish-gray to yellowish-brown. It commonly occurs as large nodules or in thick bedded lenses. The Warsaw chert recovered from Twin Knobs Rockshelter contained small white fossils and small rounded pits or voids were observed on the surface. Warsaw chert makes up 15.90 percent of the lithic assemblage recovered from this site (Table 4.2).

Ste. Genevieve

Ste. Genevieve chert recovered from Twin Knobs Rockshelter ranges from light brown and red to light gray and medium blue. The chert occurs in nodule and bedded form. The nodular form is vitreous, hard, can be semi-translucent and appears to have chipped well. However, the bedded variety of this material type is fossiliferous and frequently grainy in texture. Ste. Genevieve chert accounts for 5.60 percent of the lithic raw materials recovered from the site (Table 4.2).

Burlington

Burlington chert originates from the Mississippian-age Burlington limestone formation. This material type often occurs as residuum or bedded nodules and lenses. Burlington chert is known to outcrop throughout the lower Illinois River Valley. Burlington is a high quality chert, whose flaking properties can be enhanced with heat-treatment. The texture of this material can be grainy to smooth. Color ranges from various shades of white, gray, and brown. It may turn pink or red as a result of heat-treatment. Burlington chert accounts for 2.00 percent of the lithic raw material recovered from Twin Knobs Rockshelter (Table 4.2).

Fort Payne

The Mississippian-age Fort Payne chert recovered from Twin Knobs Rockshelter ranges from light to dark gray, mottled with areas or streaks of white to light-blue and light-gray. The texture of this chert can be earthy or granular in appearance. However, high quality (vitreous) forms of this material are not uncommon. Heat treatment of this material creates a more vitreous luster and the color can change to hues of red and pink. Only 2.30 percent of the lithic raw material recovered from the site was Fort Payne chert (Table 4.2).

Mounds Gravel

Mounds Gravel, often referred to as Lafayette Gravel, dates to the Pliocene Epoch. This material type was eroded and redeposited primarily by streams and occurs as ovoid cobbles that rarely exceed 10 cm in diameter. Mounds Gravel exhibits a thin weathered and often polished cortex. The chert itself is highly variable in both color and texture. However, it is commonly grainy and brown or gray in color, with streaks of red present usually near the cortex. Mounds Gravel accounts for only 0.45 percent of the lithic raw material recovered from the site (Table 4.2).

<u>Mill Creek</u>

Mill Creek chert occurs almost exclusively as long flat nodules, either in bedrock or as residuum and is generally believed to be derived from the Salem Limestone Formation. Its texture is grainy, containing small fossils and color is usually shades of brown or gray. Several source areas of Mill Creek chert have been identified; however, the Mill Creek quarries located at the town of Mill Creek in southwestern Illinois, are the best known. The quarries represent mining of Mill Creek for the production of large chert hoes used by Mississippian peoples. Mill Creek chert comprises 0.25 percent of the lithic raw materials recovered from the site (Table 4.2).

<u>Unidentifiable and Burned Chert</u>

The remaining material type consisted of unidentifiable and burned pieces of lithic debris. The unidentifiable chert primarily consisted of very small flakes or chips that were too small to make a positive identification of material type. The remaining unidentifiable materials most probably originated from Pliocene-Pleistocene gravels procured from the Ohio River and its tributary streams. Unidentifiable chert accounted for 21.90 percent of the lithic assemblage. Unidentifiable, burned chert accounted for 7.20 percent of the lithic assemblage (Table 4.2). Twin Knobs Rockshelter was inhabited repeatedly throughout much of prehistory. Consequently, the sites inhabitants would have been provided limited space to carry out a number of activities. Recurring activities from occupation within a small surface area probably explain the relatively large number burned lithic materials in the lithic assemblage.

Discussion

For the most part, lithic raw material utilized at Twin Knobs Rockshelter originated from nearby sources and probably were procured from local streams. Mississippian-age St. Louis, Warsaw, and Ste. Genevieve cherts appear to have been the preferred lithic raw materials. However, lesser amounts of Fort Payne, Burlington, Mounds Gravel, and Mill Creek cherts also were utilized by the site’s prehistoric inhabitants and suggest that at least some of the raw materials used at the site were acquired from some distance. Burlington, Mill Creek, and Mounds Gravel cherts do not occur locally and suggest either high mobility or participation in exchange networks, or both.

The evidence in the debitage assemblage that initial reduction of raw materials occurred at off-site locations fits well with results of the raw material analysis that indicate procurement from streams and limited use of non-local materials. Thus, most initial reduction probably occurred at the procurement locations with bifaces or blanks being transported to the site.

SUMMARY

Based on the recovery of Late Paleoindian, Early Archaic, Late Archaic, Early and Late Woodland, Late Prehistoric (Mississippian), and Protohistoric projectile points, Twin Knobs Rockshelter appears to have been periodically inhabited throughout much of prehistory.

A relatively wide spectrum of tools is present in the lithic assemblage. Their presence suggests that an equally wide variety of tasks and activities were undertaken at the site. Projectile points and fragments are by far the most prevalent tool form utilized at the site and suggest that hunting, and perhaps butchery, were the most common activities. Of particular interest is the relatively large number of different types of points of contemporary age represented in the assemblage. For example, two different Late Paleoindian points types are present, along with five different Early Archaic types, three Late Archaic types, and three Terminal Archaic/Early Woodland types. The variability in contemporary point types clearly indicates a long sequence of repeated occupation. However, it also may indicate that different contemporaneous groups (perhaps originating from different regions) were making use of the Twin Knobs Rockshelter.

In addition to hunting-related implements, a wide range of other activities are represented by the presence of retouched and utilized flakes, prismatic blades and blade-like flakes, drills/perforators, and grinding slabs and a pitted stone. Many of these tools (particularly the blade flakes, drills/perforators, and retouched and utilized flakes) may have been used in butchery or hide processing. The presence of grinding slabs and a pitted stone, however, provide strong evidence for plant and nut processing activities at the site and suggest that at least some of the informal tools in the assemblage (retouched and utilized flakes) likely are associated with these activities.

The debitage assemblage indicates that the full range of lithic reduction, which included the production of formal and informal stone tools, as well as the refurbishing of stone tools, took place at this site. However, very little in the way of early stage reduction was taking place at the rockshelter. Rather, the focus of lithic reduction seems to have involved the later stages (shaping, finishing, and resharpening) of formal, bifacial tool manufacture (predominantly projectile points).

For the most part, stone tools appear to have been manufactured from flake blanks or bifaces that were transported to the site. The limited amount of cobble cortex present suggests that the bulk of lithic raw material utilized at the site was obtained from local streams, although some non-local raw materials, such as Burlington and Mill Creek, was also being utilized. Locally available, high quality Mississippian-age cherts, such as St. Louis and Warsaw, dominate the lithic assemblage.

Core reduction and expedient tool manufacture also are represented in the lithic assemblage, but in much lower frequencies than the manufacture of formal bifacial implements. The presence of a few prismatic blades and blade-like flakes may suggest that some specialized flake production strategies were employed, but these few examples could also have been transported to the site in finished form.

In sum, the lithic assemblage from the Twin Knobs Rockshelter reflects an emphasis on the later stages of formal bifacial tool manufacture. Other formal and informal tools are represented, but in much lower frequencies. One of the most interesting aspects of the assemblage is the presence of a variety of contemporary point types throughout nearly all of the time periods in which the site was occupied. Given the prevalence of tools likely associated with hunting and animal processing and the focus on later stage (finishing and resharpening) tool manufacture, the variety of contemporary point types may indicate that the site was frequented by small hunting parties (perhaps from different areas) for much of its occupational history.

CHAPTER FIVE: PREHISTORIC CERAMICS FROM THE TWIN KNOBS ROCKSHELTER

by
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INTRODUCTION

The process of making ceramic containers is an additive one, in contrast to the reductive manufacture of stone tools. Ceramic analysis focuses on attributes of paste (the clay used to make the vessels), temper (particles added to the clay to aid in drying and firing), surface treatment, decoration, and form (shape, size and other characteristics that can be inferred, most often from fragments, about the complete vessel). Temper and surface treatment/decoration are major attributes used to classify prehistoric Kentucky ceramics.

The analysis of the prehistoric ceramic assemblage from Twin Knobs Rockshelter had three primary goals: to describe the salient characteristics of the ceramics recovered; to compare them to previously defined regional ceramic types; and to use the findings from this analysis to infer when the site was occupied and therefore characterize the prehistoric occupational history of this site.

This chapter begins with a definition of the assemblage parameters and a discussion of the methods used in this analysis. Next, descriptions of the salient characteristics of the ceramic collection are presented, organized by major ware group. A discussion characterizing the assemblage and comparing it to relevant, previously described regional ceramic types follows, and then the context of its recovery is considered with respect to the site's occupation. This chapter concludes with a consideration of Twin Knobs Rockshelter's occupational history from the perspective of the ceramics it produced.

ANALYTICAL PARAMETERS AND METHODOLOGY

A total of 50 sherds was recovered from the Twin Knobs Rockshelter (Table 5.1). They were recovered from dry-screened excavated units, from Zone D/Feature 1, and from disturbed contexts inside and outside the shelter. Due to the limited number of specimens of any size, all complete body sherds measuring 4 square cm or greater (n=18) were examined, as were all complete body sherds measuring 2 or 3 square cm (n=18). Also examined were all diagnostic sherds (e.g., rims, decorated sherds, appendages, etc.) regardless of size (n=3). Any sherds that glued together were considered a single sherd in analysis. These selection criteria produced a sample of 39 sherds, or 78.0 percent of the ceramics recovered from the site (Table 5.1). Sherds measuring less than 2 square cm and spalled sherds missing their exteriors (n=11) were not analyzed; they were simply lotted, counted, and scanned for the presence of shell temper.

Table 5.1. Ceramic Frequencies from the Twin Knobs Rockshelter.

Ware Groups/Ceramic Categories	Frequency	Percent
Fired Clay Tempered #1		
Cordmarked	21	53.8
Plain	3	7.7
Simple Stamped and Cordmarked	7	17.9
Total	31	79.4
Mixed Fired Clay #1 and Shell Tempered		
Cordmarked	2	5.2
Simple Stamped and Cordmarked	1	2.5
Total	3	7.7
Fired Clay Tempered #2		
Cordmarked	2	5.2
Plain	3	7.7
Total	5	12.9
Total Analyzed	**39**	**100.0**
Unanalyzed Sherds (<2 square cm)	**11**	
Grand Total	**50**	

Analyzed specimens were examined using a Fisher Scientific Stereomaster II binocular microscope at 15x magnification. Data recorded for each sherd, where germane, consisted of temper; paste inclusions; exterior and interior surface treatment and color; cordage twist; cordmark orientation (on rims only); width of simple stamp lands and grooves; vessel form; vessel fragment type (i.e., whether body or rim), lip shape; rim orientation and modification; decoration type and location; thickness (of body, lip, and rim [1 cm below lip]); and sherd size. Qualitative information about cordmarking execution and width; simple stamp execution; and decoration method and execution also was collected. Minimum number of vessels (MNV) was not estimated.

All analyzed specimens were examined to identify temper type(s) and type(s) of naturally occurring paste inclusions. Data on temper/inclusion abundance, size, and shape was collected from a sample of sherds within each ware group.

Surface treatment reflected a continuum in smoothing. For cordmarked sherds, this continuum was divided into cordmarked (clear or faint impressions), smoothed-over cordmarked (specimens that showed evidence of some obliteration of cord impressions due either to smoothing or light application of the paddle), and eroded cordmarked. In order to determine cordage twist, impressions from all sherds exhibiting exterior cordmarks were taken with Sculpey (a modeling clay that can be reused repeatedly and hardened by baking in an oven) and twist was then determined from the cast. A sample of cordmarked sherds from each ware group was examined to collect qualitative information about cordmark characteristics (relative cord thickness, closeness of impressions, etc.). For rim sherds, information also was collected on cordmark orientation relative to the lip.

On simple stamped and cordmarked specimens, information was collected on stamping execution. This consisted of measuring the width of the lands and grooves to the nearest .1 mm (taken on the sherd) with a Helios needle-nosed calipers. Qualitative information collected included aspects of stamp spacing and clarity.

For plain matte surfaces, the continuum was divided into smoothed, poorly smoothed, well-smoothed, and eroded smoothed. Poorly smoothed surfaces were lumpy and irregular. Some specimens showed where sand or other particles had been caught in the smoothing tool, thereby leaving a narrow groove or striation of variable depth on the surface. Well-smoothed surfaces were clear and even.

Sherd surfaces were considered eroded in cases where the exterior surface was still present, but was weathered or otherwise damaged beyond conclusive identification. Specimens with weathered or worn areas on their exteriors, but that otherwise had identifiable surface treatments, were considered eroded cordmarked or eroded smoothed, respectively.

Surface color was determined by visual inspection relative to this assemblage; no reference was made to Munsell soil color charts (Munsell Color 1975). Sherd thickness, measured to the nearest .1 mm, was taken at the thickest spot for all body sherds using Helios needle-nosed calipers. Likewise, thickness was measured on rims at the thickest spot at the lip (lip thickness) and 1 cm below the lip (rim thickness). Sherd size was estimated by placing each specimen on a 1-cm grid template and counting the number of squares the specimen covered.

Additional information was collected for rims. Rim modification was recorded as thinning to the lip, thickening to the lip, or no modification. Rim orientation and vessel form were recorded using categories developed for the Kentucky Fort Ancient Research Project (Turnbow and Henderson 1992:297-298, 336-338), but modified for use in this study. Lip shape was recorded using categories developed for the Muir site (Turnbow 1988:107). No rims were collected that were large enough to determine orifice diameter. Additional information about decoration (e.g., orientation of notching and method of notching**)** also was collected.

ARTIFACT DESCRIPTIONS

The Twin Knobs Rockshelter ceramics were assigned to three ware groups on the basis of temper attributes and to seven ceramic categories on the basis of exterior surface treatment (Table 5.1). The ceramics are described below.

Fired Clay Tempered #1 Ware Group

(n=31: 3 rims, 28 body sherds)
Figure 5.1b-c, Figure 5.2, Figure 5.3

Sherds in this ware group generally were sparsely tempered with mostly small (0.5 to 1.5 mm) and generally subrounded to subangular tan to brown or light grey fired clay particles, although a few angular examples were present. The fired clay particles themselves did not contain evidence of temper, so they were not considered grog (i.e., tiny fragments of crushed sherds. Note: most regional ceramic analysts do not make this distinction, referring to both fired clay temper and temper made from crushed sherds as "grog" [cf., Jackson and Butler 2012:131-132; 135]). In many cases, the temper was the same color as the paste, making it difficult to distinguish the temper particles from the surrounding matrix. The paste often had a chalky texture. Sherd size ranged from 2 to 10 square cm, with a mean of 3.9 square cm.

Sparse to moderate amounts of spherical hematite/manganese concretions, similar in size to the temper, were present in the paste of most specimens, and were considered natural inclusions. A few specimens also contained a few small subrounded to subangular quartz sand particles similar in size to the temper. These aplastics also were considered natural inclusions.

Exterior surface treatment consisted of cordmarked (n=21), plain matte (n=3), and simple stamped and cordmarked (n=7). The exclusively cordmarked specimens were subdivided into cordmarked (n=15), smoothed-over cordmarked (n=4), and eroded cordmarked (n=2). Plain matte surface treatment consisted of smoothed (n=1) and eroded smoothed (n=2). Exterior color ranged from orange to brown to gray.

For the exclusively cordmarked sherds, twist could not be determined for over half of the specimens (n=12; 57.1 percent). Of the remaining specimens (n=9; 42.9 percent), all were S-twist. For about half of the specimens, cordmarking appeared shallow and not particularly clear/distinct. This may be accounted for by the weathered nature of many sherds. The rest exhibited cordmarking of moderate depth, and one sherd had deeply applied cordmarking. Impressions were not narrow and closely packed, but tended to be of medium width and medium spacing. Cordmarking extended to the lip in all cases. It was oriented horizontally to the lip on one rim; diagonally to the lip on another rim; and vertically on a third rim.

The exteriors of seven specimens had been simple stamped, then cordmarked (Figure 5.1a,c). Most stamps were very clear; lands and grooves had straight, sharp distinct edges/boundaries and were regularly and closely spaced. Land width (raised ridges on the sherd surface) ranged from 1.2 to 1.9 mm, with a mean of 1.6 mm; while the grooves (the depressed areas on the sherd) ranged in width from 1.3 to 2.2 mm, with a mean of 1.8 mm. Cordmarks on these specimens were generally clear, though shallow; were relatively widely spaced; and crossed the stamped impressions diagonally. Cordage twist could be identified for six (85.7 percent) of these specimens: it was S-twist.

Interior surface treatment was plain matte, with smoothed (n=25), well-smoothed (n=3), and eroded smoothed (n=3) examples present. Interior color ranged from orange to gray to brown. Body sherd thickness ranged from 3.0 to 6.5 mm, with a mean of 4.2 mm.

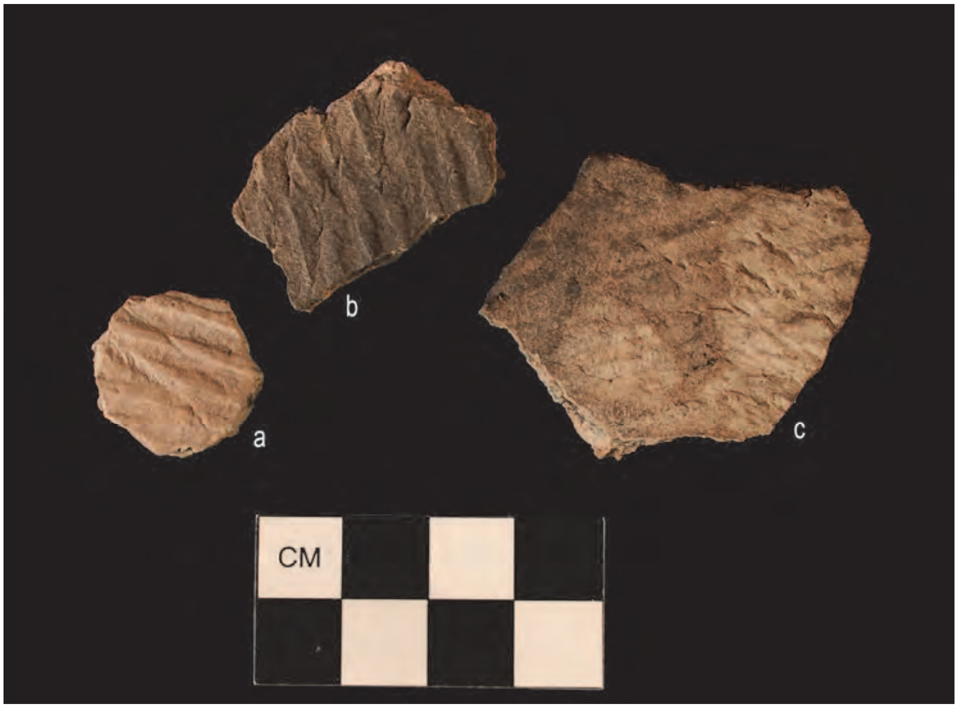

Figure 5.1. Simple Stamped and Cordmarked Body Sherds: a, Mixed Fired Clay # 1 and Shell Tempered (15.2.4); b,c, Fired Clay Tempered #1 (15.2.3 and 70.3; respectively).

Three cordmarked rims were assigned to this ware group, but because of small size, vessel form could not be determined. All lips were flat-rounded. All rims thickened to the lip. One rim could be oriented: it had straight, outslanting walls (Figure 5.2). Lip thickness was either 7.0 mm (n=2) or 7.1 mm (n=1), with a mean of 7.0 mm. Rim thickness ranged from 4.5 to 5.5 mm, with a mean of 5.0 mm.

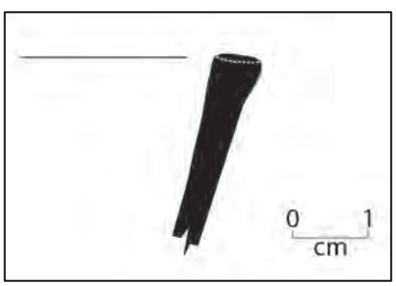

Figure 5.2. Fired Clay Tempered #1 Cordmarked Rim Profile (37.2).

Two rims had decorated lips (Figure 5.3). Both exhibit deep, broad (they measure between 6.5 and 7.8 mm wide), oval depressions/notches that extend diagonally across the entire lip. On one example (Figure 5.3a), clear peaks between the depressions give the lip a scalloped appearance. The notches were not made by using a fingernail; they may have been made with a dowel/stick or a fingertip.

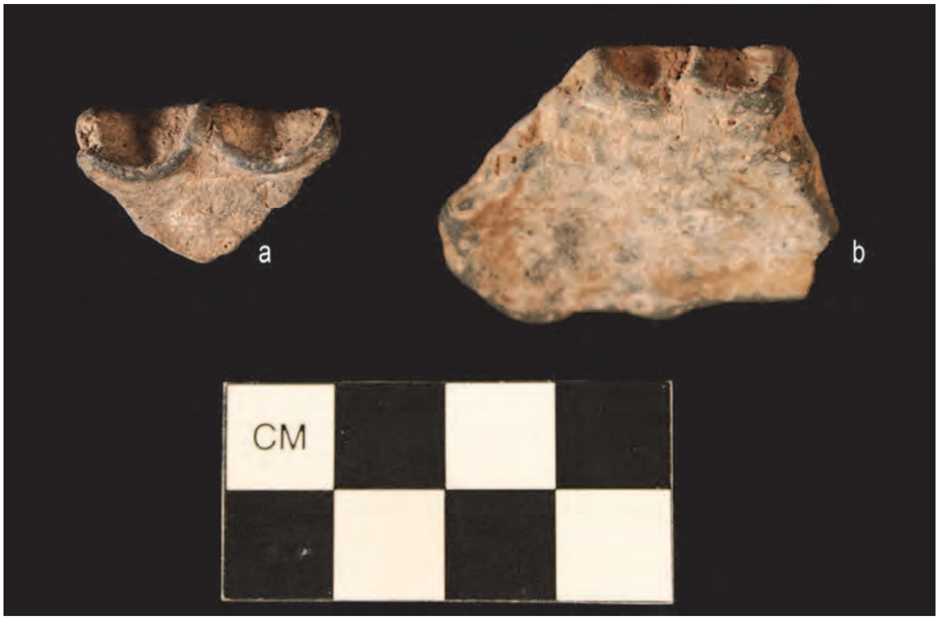

Figure 5.3. Fired Clay Tempered #1 Cordmarked Rims With Notched Lips (interior surface is shown for both specimens in order to show the notches (a, 43.9; b; 37.2).

<u>Mixed Fired Clay #1 and Shell Tempered Ware Group</u>
(n=3: 3 body sherds)
Figure 5.1a

Characteristics of the fired clay temper and paste/paste inclusions for these three specimens were the same as those described for the previous ware group. The difference lies in the presence of a very few, very small (0.3 to 0.5 mm), thin, platy/laminar voids. These are considered the locations of where fragments of calcareous fresh water mussel shell had leached-out. Sherd size ranged from 2 to 3 square cm, with a mean of 2.3 cm.

Exterior surface treatment consisted of cordmarked (n=1), smoothed-over cordmarked (n=1), and simple stamped and cordmarked (n=1) (Figure 5.1b). Exterior color for two sherds was orange, while the other was medium gray. The twist on all sherds was S-twist. Land width for the simple stamped specimen ranged from 1.2 to 1.8 mm, with a mean of 1.5 mm, while the grooves ranged in width from 1.9 to 2.3 mm, with a mean of 2.1 mm. The range of qualitative characteristics of the cordmarking and the simple stamping observed for these sherds was the same as for that described for the previous ware group.

Two sherds had smooth plain matte interiors, while the interior of the remaining sherd was well-smoothed plain matte. Interior sherd color was either brown, gray, or orange. Body sherd thickness ranged from 3.8 mm to 4.5 mm, with a mean of 4.1 mm.

Fired Clay Tempered #2 Ware Group
(n=5: 5 body sherds)
Not Illustrated

Characteristics of the fired clay temper and paste inclusions for these specimens were somewhat different from those described for the preceding ware groups. While the temper particles in these specimens tended to occur in similarly low quantities, the particles tended to be larger (1.8 to 2.4 mm) and the paste was not as chalky. One specimen actually may be tempered with fragments of crushed fired clay tempered sherds (i.e., grog), but this could not be conclusively determined. The same natural inclusions were present (subrounded to subangular quartz sand and spherical hematite/manganese concretions) and they were the same size as those described for the previous ware groups, but the paste of these specimens contained significantly more sand. The size of these sherds ranged from 4 to 9 square cm, with a mean of 6.2 square cm.

Exterior surfaces were either cordmarked (n=1), eroded cordmarked (n=1), or smoothed plain matte (n=3). Exterior color ranged from orange to brown to grey. Twist could be determined for the cordmarked sherd: it was S-twist. Cordmarks were shallow, relatively clear, and of medium width.

Interior surface treatment was smoothed plain matte. Interior color ranged from grey to orange. Body sherd thickness ranged from 5.7 to 7.8 mm, with a mean of 6.7 mm. Thus, these specimens were decidedly thicker, on average, than those assigned to the Fired Clay Tempered #1 ware group.

Summary

Investigations at the Twin Knobs Rockshelter produced a small, very fragmentary ceramic assemblage: the average size of the analyzed sherds is only 4.2 square cm. All sherds showed varying amounts of weathering, particularly sherd edges.

All specimens were tempered with sparse to moderate amounts of fired clay (not grog). Sherds assigned to a minor ware group (n=3) exhibited evidence of having had very small quantities of crushed freshwater mussel shell added as temper. Two different pastes were identified, a chalky paste (Fired Clay Tempered #1, n=34) and a sandy paste (Fired Clay Tempered #2, n=5). Although examples of the latter had somewhat thicker vessel walls, these two ware groups likely represent subtle variations in manufacturing and not temporal distinctions. Paste inclusions consisted of quartz sand particles and small hematite/manganese concretions.

Most sherds in this assemblage were cordmarked (n=25; 64.1 percent), followed distantly by simple stamped and cordmarked (n=8; 20.5 percent), and plain matte (n=6;

15.4 percent). Simple stamped and cordmarked exteriors were associated only with the chalky paste. Cordage twist was exclusively S-twist. Exterior surface color was predominantly orange, but ranged from gray to brown to orange. Interior surface color also was predominantly orange, but ranged from brown to gray to orange. Body sherd thickness was remarkably thin: the assemblage mean is 4.6 mm.

Three cordmarked rims were recovered, but because of their small size, vessel form could not be determined. Orientation was identified for one rim: it was outslanting with straight vessel walls. Rims thicken markedly to the lip, and lips are flat-rounded. Rims were only a bit thicker than body sherds, on average, ranging in thickness from 4.5 to 5.5 mm, with a mean of 5.0 mm. Lip thickness ranged from 7.0 to 7.1 mm, with a mean of 7.0 mm.

Only two specimens (5.1 percent) were decorated. They consisted of two rims with deep oval lip notching.

ASSESSMENT AND COMPARISON

Despite the small sample size and fragmentary nature of the Twin Knobs Rockshelter's ceramic assemblage, by comparing its salient characteristics (temper, exterior surface treatment, wall thickness, and lip decoration) to previously defined regional ceramic series and described site ceramic assemblages, some statements can be made regarding its age of manufacture and the site's occupational history.

While this small assemblage is fairly homogenous, it does exhibit some variation. This can be attributed to aspects of manufacturing technique, but also to age of manufacture. In terms of the former, Fired Clay Tempered #2 is likely a manufacturing variation of the major ware group, Fired Clay Tempered #1. The recovery of specimens containing small amounts of shell temper and specimens with simple stamped/cordmarked exteriors, however, indicates some time depth for the site's occupation.

Comparison to the Flat Top Site

The ceramic assemblages recovered from Twin Knobs Rockshelter and the adjacent Flat Top are similar in many ways (see Chapter Ten). Twin Knobs Rockshelter specimens assigned to the two exclusively fired clay tempered ware groups are similar to the ceramics recovered from the adjacent Flat Top site. Paste characteristics of Fired Clay Tempered #2 are more similar to the paste of the Flat Top specimens. The contrasting temper particle size ranges identified for Twin Knobs' exclusively fired clay tempered ware groups compare favorably to that of Flat Top.

S-twist cordmarked exteriors predominate within both sites' ceramic assemblages and for both, vessel walls are thin: average body sherd thickness of the Flat Top specimens falls between Twin Knobs' Fired Clay Tempered #1 (at 4.2 mm) and Fired

Clay Tempered #2 (at 6.7 mm). Rim and lip characteristics are similar in terms of lip shape, and rim modification and thickness, and at both, decoration consists only of notched lips, most commonly made with a dowel.

Three attributes in the Twin Knobs Rockshelter assemblage were not present at Flat Top (see Chapter Ten): examples of the chalky paste; minor amounts of shell temper; and sherds with simple stamped and cordmarked exteriors. The latter two attributes indicate a somewhat longer timespan for the Twin Knobs assemblage and suggest that the Twin Knobs inhabitants might have had more interaction with groups outside the locale.

Comparison to Regional Ceramic Series and Site Assemblages

The small number of sherds recovered from Twin Knobs Rockshelter, the diversity of regional ceramic types, particularly for the Late Woodland period, and the status of regional Woodland period ceramic studies in western Kentucky, southern Illinois, and southwestern Indiana, makes comparison to previously defined Woodland ceramic types challenging. However, through a process of elimination and a consideration of the assemblage's salient characteristics, the field of relevant ceramic series can narrowed down, potential typological affiliations can be offered, and therefore a suggestion can be made regarding when the Twin Knobs Rockshelter ceramics were manufactured and used.

Relevant distinguishing characteristics of the Twin Knobs Rockshelter ceramic assemblage include:

very thin vessel walls;
a predominance of fired clay temper;
a few sherds (7.7 percent) that contain shell temper mixed with the fired clay temper;
a predominance of cordmarked exteriors;
cordage twist that is exclusively S-twist;
a few sherds with simple stamped and cordmarked exteriors;
a lack of appendages;
decoration that is restricted to the lips of vessels; and
notched lips (with notching that extends across the lip).

In the region under consideration for this comparison (western Kentucky, southern Illinois, and southwestern Indiana), Early Woodland and early Middle Woodland ceramics are characteristically thick-walled, often cordwrapped dowel- or fabric-impressed jars. Later in time, they can exhibit Havana Hopewellian decorative elements, such as rim bosses, or dentate stamping (Butler and Jefferies 1986; Hargrave 1982). These ceramic series are affiliated with the Baumer/Crab Orchard ceramic tradition (Applegate 2008; Butler and Jefferies 1986; Cole at al. 1951; Herndon 1999:245-248; Maxwell 1951). No examples of this ceramic tradition were recovered from Twin Knobs Rockshelter.

Late Prehistoric Mississippian ceramics in this region, as elsewhere in the lower Ohio River Valley, are tempered with fired clay/grog and/or shell early in the sequence and exclusively with shell later in the period (Phillips 1970; Phillips et al. 1951; Pollack 2008b). The specimens that contain very minor amounts of shell temper may represent vessels manufactured during the Terminal Late Woodland/Early Mississippian period. Neither Phillips et al. (1951) nor Pollack (2004) describe simple stamped shell tempered ceramics for the Late Prehistoric period in this region, and Phillips (1970:97) indicates that simple stamping associated with shell temper is very rare. The specimen from this site is likely just an idiosyncratic ceramic feature of this site's assemblage.

Thus through a process of elimination, it can be determined that the bulk of the ceramics from Twin Knobs Rockshelter were most likely manufactured, used, and discarded sometime during the late Middle Woodland or Late Woodland periods. And the distinguishing characteristics of the Twin Knobs Rockshelter ceramic assemblage outlined above support a mainly Late Woodland affiliation for the bulk of the assemblage.

A host of thin-walled, fired clay tempered, mainly cordmarked Late Woodland ceramic types/series have been identified for this time period in surrounding Kentucky counties (cf. Applegate 2008) and adjacent states: Lewis, Raymond, and Dillinger (Cole et al. 1951; Hargrave 1982; Maxwell 1951); Duffy (Winters 1967); Yankeetown (Blasingham 1953; Redmond 1990; Winters 1967); Rough River (Schlarb et al. 2000); and Mulberry Creek Cordmarked and Baytown Plain (Clay 1963; Phillips 1970; Phillips et al. 1951). However, based on the characteristics of this site's assemblage (and taking into consideration aspects of the site's chipped stone tool assemblage and its setting and geographic location) only two, the Lewis and Raymond ceramic series, hold the highest potential/likelihood for affiliation.

Lewis ceramics (first defined in MacNeish's 1944 thesis and described in Cole et al. [1951:178-181] at Kincaid) are commonly found in the lower Ohio River Valley proper, from the mouth of the Saline River downstream to the Mississippi River at sites in southern Illinois south of the Shawnee Hills and in western Kentucky (Butler and Wagner 2000; Applegate 2008). Raymond ceramics were defined by Maxwell (1951) at sites north of the Shawnee Hills in southern Illinois. Both ceramic traditions have been discussed and characterized more recently by Herndon and Butler (2000, 2002), Butler and Wagner (2000), Butler (2007), and Butler and DiCosola (2008).

These two ceramic series date to the latter half of the Late Woodland period (A.D. 600-800/850) (Herndon and Butler 2000:125). Characteristics they share include thin vessel walls, "coconut-shaped" jars that are the predominant vessel form, grit or fired clay/grog temper, predominantly cordmarked exteriors, notched rims, and (rarely) wide incised/trailed exterior jar neck decoration (Herndon and Butler 2000:125, 2002:171). These ceramic traditions lack folded rims, appendages, and a diversity of vessel forms, attributes that are distinctive of later, Terminal Late Woodland Dillinger ceramics (cf., Hargrave 1992; Maxwell 1951).

The major ceramic differences between Lewis and Raymond are found in temper type and lip notching placement. Lewis assemblages are almost exclusively fired clay/grog tempered (Butler and Wagner 2000:688; Jackson and Butler 2012:132), while temper type in Raymond assemblages changes over time from grit (crushed igneous/metamorphic rock) to fired clay/grog (Herndon and Butler 2002:184-185). Notching on the lips of Lewis ceramics are initiated primarily from the rim exterior, while for Raymond ceramics, notching is initiated primarily from the interior (Butler and DiCosola 2008:30; Butler 2007; Herndon and Butler 2002:184-186; Jackson and Butler 2012:132).

Wagner and Butler (2000) documented a Late Woodland/Terminal Late Woodland occupation at the multicomponent Hills Branch Rockshelter in Pope County, Illinois that produced Lewis ceramics. The calibrated radiocarbon date for that component (at 2 sigma) was A.D. 680(875)1005 (Wagner and Butler 2000:59). The ceramics were thin (mean=4.7 mm); mainly cordmarked; and mainly fired clay/grog tempered. The assemblage lacked bowls, and lips were notched mainly on the exterior (Herndon and Butler 2000:137-138).

Much larger Lewis Series ceramic assemblages have been recovered from two lower Ohio Valley Stone Fort Complex sites: Hog Bluff (Brieschke and Rackerby 1973; Butler and DiCosola 2008:29-30) and Cypress Citadel (Jackson and Butler 2012; Klein 1981) in Johnson County. The Hog Bluff assemblage was almost completely fired clay/grog tempered and mostly S-twist cordmarked. The specimens were thin: thickness ranged from 2.1 to 13.0 mm, with a mean of 5.3 mm. Decoration consisted of lip notching with a dowel or stick, or with a sharp instrument, and most notching was initiated from the exterior. Distinctive broad line incised or trailed decoration occurred on 5.6 percent of the rims.

In contrast, at Cypress Citadel, incised/trailed decoration occurred on 31 percent of the rims (Jackson and Butler 2012:147, 155). Other aspects of the ceramics, however, were similar to those from Hog Bluff. The sherds were overwhelmingly tempered with fired clay/grog, exteriors were mostly cordmarked S-twist (Z-twist on the sherd, made by S-twist cordage) (Butler and DiCosola 2008:29-30; Jackson and Butler 2012:138, 154-155), and sherds were very thin (mean=4.5 mm) (Jackson and Butler 2012:154). Decoration occurred on lips (mainly exterior notched) and jar necks (incised/trailed geometric designs made up of multiple parallel straight lines) (Jackson and Butler 2012:154-155; Klein 1981:243-270).

In Kentucky, Lewis ceramics have been recovered from a few sites, like Fort Ridge (15Ca1/Ca57-60) (see Chapter Two) and the multicomponent Chestnut Lake site (15Lv222) (Herndon 2003). However, McGilligan Creek Village (15Lv199), a lower Ohio Valley Stone Fort Complex site, has produced the largest Lewis ceramic assemblage recovered from a Kentucky site (Henderson and Gray 2011; Henderson and Pollack 1996; Pollack and Henderson 2000:618-621; Stackelbeck 2005; also see Chapter Two).

The analyzed McGilligan Creek Village assemblage (n=1,703) is dominated by fired clay tempered (alone or in combination with grit or limestone) S-twist cordmarked sherds (93.7 percent) (Henderson and Gray 2011; but note that as of 2012, the assemblage is under analysis by Jackson). Sherds with plain, simple stamped, check stamped, and fabric-impressed exteriors make up only about 5.0 percent of the assemblage. Body sherd thickness ranges from 3.0 to 8.4 mm, with a mean of 5.3 mm. About 23.0 percent of the rims are incised, which is a much higher percentage than at Hog Bluff and more comparable to Cypress Citadel (Butler 2001; Jackson and Butler 2012; Klein 1981). Lips are decorated in a variety of ways (notching, punctation, castellation, and cordmarking/cordwrapped-dowel), but notching predominates. Importantly, notching on lip exteriors predominates at McGilligan Creek Village. Geometric designs made up of incised/trailed, single or multiple, straight or curved parallel lines occur below the lip on necks (body sherds). The inventory and execution of incised/trailed decoration is different between McGilligan Creek Village and Cypress Citadel (Jackson and Butler 2012:155).

In many ways, McGilligan Creek Village's topographic setting, on top of a mesa-like bluff feature ringed at its base with rockshelters, is much like the Twin Knobs Rockshelter and Flat Top locale, only writ large. Calibrated radiocarbon dates for McGilligan Creek Village (at 2 sigma) are A.D. 594(665)790 and A.D. 895(1025)1218, although the latter date is considered too late (Pollack and Henderson 2000:615).

Based on these comparisons, the two fired clay tempered ware groups from Twin Knobs Rockshelter meet all of the Lewis Ceramic Series criteria, although lip notching is situated neither on the lip exterior nor on the lip interior (this likely reflects its small sample size). In particular, these two ware groups are very similar to the dated Lewis assemblages recovered from Hills Branch Rockshelter and McGilligan Creek Village. Thus, the bulk of Twin Knobs Rockshelter's ceramic assemblage likely was manufactured sometime between A.D. 600-800/850.

One noteworthy attribute of the Twin Knobs Rockshelter assemblage is the presence of sherds with simple stamped exteriors that were subsequently cordmarked. A total of eight sherds (20.4 percent) exhibit this exterior surface treatment, associated with either exclusively fired clay (n=7) or mixed fired clay and shell (n=1) temper (see previous shell tempered discussion).

Simple stamping is rare at the McGilligan Creek Village site (Henderson and Gray 2011), and no examples of simple stamped or simple stamped/cordmarked specimens have been described for Lewis Series ceramic collections and/or for lower Ohio Valley Stone Fort Complex sites in Illinois (e.g., Hog Bluff [Brieschke and Rackerby 1973; Butler and DiCosola 2008; Butler and Wagner 2000; Hills Branch Rockshelter [Herndon and Butler 2000] or Cypress Citadel [Jackson and Butler 2012: 139-140; Klein 1981]).

In the Ohio River Valley in general, simple stamping is a minor surface treatment. It occurs in low quantities in many Ohio and Kentucky Middle Woodland ceramic assemblages. However, simple stamped ceramics predominate within LaMotte culture site assemblages of the Wabash River Valley (Clouse et al. 1971; Redmond and McCullough 2000; Ruby 2006; Winters 1967:52-60). The LaMotte culture's Embarrass Simple Stamped ceramics are tempered with either grit pebbles or sand. Jars have notching on the interior of lips, some with a piecrust form (Redmond and McCullough 2000:645-647; Winters 1967:85-86). Calibrated dates of A.D. 122 to A.D. 840 indicate a late Middle Woodland through early Late Woodland period affiliation for the LaMotte culture (Redmond and McCullough 2000:651).

Simple stamped specimens (grit, clay, or limestone tempered in that order of frequency) also make up 0.9 percent of the ceramics from the late Middle Woodland Mann site, located in southern Indiana about 25 km from the Wabash/Ohio River confluence (Keller 1979:103, 107; see also Ruby 2006). The mouth of the Wabash is only 60 km and almost directly north of Twin Knobs Rockshelter. Of the two simple stamped types Keller describes, the specimens from Twin Knobs Rockshelter more closely resemble the examples with the more sharply delineated broad grooves (Keller 1979:103-104, Figure 14i), which Ruby (2006:193) notes are likely the locally produced variant at the site. Keller (1979:103) attributed the simple stamped specimens to Southeastern ceramic techniques transferred to locally made vessels, and Ruby (2006:193) noted that the fine-spaced variety at Mann is likely imported.

Simple stamped sherds do occur in small quantities at sites in Kentucky's Green River Management Area (in the limestone tempered Rough River Ceramic Series [Hanson 1960; Schwartz and Sloan 1958; Schlarb et al. 2000:71-80]), and at sites in counties adjacent to Crittenden County (where Twin Knobs Rockshelter is located) (Applegate 2008:426; Henderson and Gray 2011). Thus, it is not necessarily surprising that Twin Knobs Rockshelter produced a few examples.

The temporal placement of the Rough River Series is not clear. Dated contexts that have produced Rough River Series ceramics range from about 800 B.C. to about A.D. 1300 (Applegate 2008:426). Schlarb et al. (2000) interpreted the simple stamped specimens at the Rough River site (15Gy 12; the type site for the series) as Middle Woodland in age. Based on his analysis of Green River drainage ceramic assemblages, however, Hansen (1960) suggested that the Rough River series continued into the Late Woodland. This would make the Rough River series nominally contemporary with the Embarrass series and therefore late Middle Woodland/early Late Woodland in age.

The simple stamped and cordmarked specimens at Twin Knobs Rockshelter do not differ in any appreciable way from the cordmarked varieties in their respective ware groups. Thus, the most parsimonious assessment should be to consider them minor constituents of the local ceramic tradition.

They may also represent a holdover from earlier times. It is worth noting that at some early Late Woodland Newtown (ca A.D. 300-800) (Pollack and Henderson 2000) sites in Kentucky, researchers also have documented small quantities of stamped (in this case, check stamped) and cordmarked sherds (cf., Henderson 1988:369-373; Henderson and Pollack 1985:150).

Summary

Based on these comparisons, the bulk of the ceramics recovered from Twin Knobs Rockshelter compare favorably with Lewis Series ceramics. The assemblage is most similar to the dated Lewis assemblages recovered from Hills Branch Rockshelter and McGilligan Creek Village. Thus, the bulk of the ceramics from Twin Knobs Rockshelter likely were manufactured sometime between A.D. 600-800/850.

The presence of simple stamped and cordmarked specimens suggests the site's occupation could extend earlier in time, into the late Middle Woodland period, but the continuation of LaMotte Culture occupations into the early Late Woodland periods holds out the possibility that these specimens are contemporary with the site's Lewis Series ceramics.

The recovery of a few mixed fired clay and shell tempered specimens also extends the site occupation later in time, into the Terminal Late Woodland/Early Mississippian period. This statement is supported by the recovery of triangular projectile points from the site (see Chapter Four).

CONTEXTUAL CONSIDERATIONS OF THE ASSEMBLAGE

Thirteen 1 x 1 m units and two .5 x 1 m units were excavated at Twin Knobs Rockshelter. Despite the small sample size, the site's ceramic assemblage presents clear stratigraphic patterning that provides additional information to help characterize it, its age, and the site's history of prehistoric occupation (Table 5.2). Horizontal patterning is more ambiguous.

Almost two-thirds (n=25; 62.5 percent) of the ceramics recovered from undisturbed contexts (n=40) were associated with Zone A/B. An abrupt drop in ceramic frequency occurs between Zone A/B and Zone C, and again between Zone C and Zone D/Feature 1. No ceramics were recovered from below Zone D/Feature 1 (zones E-H). Despite the differences in artifact frequency, the ceramic profiles for the three ceramic-producing zones are very similar, save that no Mixed Fired Clay #1 and Shell Tempered Ware Group specimens occur below Zone A/B.

The vertical distribution of the ceramic ware groups at Twin Knobs Rockshelter suggests that the occupation(s) represented by Zone A/B barely continued past A.D. 900, when shell temper began to be used, and that the occupation(s) represented by Zone C are more temporally restricted, occurring before A.D. 900. Because stamped specimens occur infrequently in this assemblage, and because the bulk of the assemblage is likely Lewis Series, a date closer to A.D. 600 seems a better fit for the beginning of the ceramic-producing occupation at Twin Knobs.

Table 5.2. Ceramic Frequencies by Zone at the Twin Knobs Rockshelter.

Ware Groups/ Ceramic Categories	Disturbed	Zone A/B	Zone C	Zone D/ Feature 1	Total
Fired Clay Tempered #1					
Cordmarked	4	11	5	1	21
Plain		3			3
Simple Stamped and Cordmarked	3	2	1	1	7
Total	7	16	6	2	31
Mixed Fired Clay #1 and Shell Tempered					
Cordmarked	1	1			2
Simple Stamped and Cordmarked	1				1
Total	2	1			3
Fired Clay Tempered #2					
Cordmarked		1		1*	2
Plain	1	1	1		3
Total	1	2	1	1	5
Total Analyzed	**10**	**19**	**7**	**3**	**39**
Unanalyzed Sherds (<2 square cm)		6	5		**11**
Grand Total	**10**	**25**	**12**	**3**	**50**

Zone D/Feature 1 produced a calibrated radiocarbon date of 1367-914 B.C., which falls within a Late Archaic/Early Woodland date range. From the perspective of this analysis, this date is incongruous. The ceramics from this context are like those from the zones above. This date cannot be supported by the ceramics recovered from this context or from the site at-large. Given this feature's proximity to a looter's pit and the fact that Zone D/Feature 1 specimens resemble others from the site, and in the absence of any corroborating ceramic data, the most parsimonious explanation is to consider the date correct but the three sherds from Zone D/Feature 1 intrusive, likely filtering down post-depositionally from upper deposits.

In terms of the horizontal distribution of ceramics, sherds were recovered from 11 of the excavated 14 units. Three of the four units that produced the most sherds (between five and eight specimens, respectively) are located adjacent to each other: Unit 3 with eight sherds; Unit 6 with seven; and Unit 11 with five. Unit 4 produced six sherds. Ceramic-producing units tend to be located in the center of the shelter, and are either mainly inside (units 4 and 6) or primarily outside (units 3 and 11) the dripline.

OCCUPATIONAL HISTORY

Based on these typological and comparative considerations, it appears that ceramic-producing prehistoric groups began to utilize Twin Knobs Rockshelter sometime during the very late Middle Woodland/early Late Woodland period. There is no evidence for any earlier ceramics within the assemblage. The Late Woodland occupation may have taken place early in the period, if the minor presence of stamped exteriors is any indication. Site use continued into the Terminal Late Woodland/Early Mississippian period, as reflected by the few sherds that contained very minor amounts of shell temper.

The groups that manufactured these vessels likely were culturally affiliated with the Lewis phase, despite how they notched the lips of their vessels**.** This departure can be accounted for by sample size. The use of this site was likely short-term and periodic/episodic, given the few sherds that were recovered. Most of these artifacts were deposited in general midden contexts in the center of the shelter and were not concentrated in features (i.e., pits or hearths).

The location of Twin Knobs Rockshelter below an isolated knob that also produced Lewis Series ceramics (Flat Top site) provides additional support for the assignment of the site's Late Woodland assemblage to the Lewis Series and, by extension, the Flat Top/Twin Knobs Rockshelter locale to the lower Ohio Valley's Stone Fort Complex (Brieschke and Rackerby 1973; Butler 2001; Butler and Wagner 2012; Klein 1981; Muller 1986:150-153). The spatial relationship of Twin Knobs Rockshelter and Flat Top mirrors the situation documented at McGilligan Creek Village, located only 33 km west in Livingston County. There, Lewis Series ceramic-producing occupants of the Mantle Rock Petroglyph site (15Lv160), Dollar Bill Shelter (15Lv212), and Kissing Rocks Shelter (15Lv213) lived below Lewis Series ceramic-producing occupants of the McGilligan Creek Village (15Lv199), which was situated on the blufftop above (Henderson and Pollack 1996; Stackelbeck 2005).

SUMMARY AND CONCLUSIONS

A small ceramic assemblage likely used mainly for utilitarian purposes was recovered during investigations at Twin Knobs Rockshelter. Characteristics of the assemblage suggest that it shares closest affiliation with Lewis Series ceramic assemblages, despite how lip notches were oriented. The recovery of simple stamped and cordmarked specimens and a few specimens with tiny amounts of shell temper suggest that the ephemeral use of the site by ceramic-manufacturing peoples may have extended from the very late Middle Woodland/early Late Woodland through the Terminal Late Woodland/Early Mississippian period, most likely sometime between A.D. 600/800-850.

The exclusively fired clay tempered ware groups at Twin Knobs Rockshelter are very similar to the fired clay tempered ware groups recovered from the Flat Top site, which is situated above Twin Knobs Rockshelter. Thus it seems clear that the two sites were occupied/used during contemporary times, if not simultaneously. However, occupation at Twin Knobs Rockshelter was longer than that of Flat Top, as illustrated by both the ceramic and chipped stone tool assemblages (see also summary in Chapter Eleven). Activities at Twin Knobs Rockshelter took place throughout this small shelter, but the distribution of ceramics suggests that the ceramic-producing groups tended to concentrate their activities in its center.

The Lewis phase occupation at the Flat Top/Twin Knobs Rockshelter locale is a smaller, less intensive expression of the situation documented at the McGilligan Creek Village locale in Livingston County. It indicates that these sites' occupants were participants in the lower Ohio Valley's Stone Fort Complex.

CHAPTER SIX:
FAUNAL REMAINS FROM THE TWIN KNOBS ROCKSHELTER

By
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INTRODUCTION

This chapter describes the 199 faunal remains (78.82 gm) recovered from the Twin Knob Rockshelter. The assemblage consists of 95 mammal (66.7 gm), seven bird (0.4 gm), five reptile (1.5 gm), 86 UID vertebrate (100.4 gm), and six mollusca (0.5 gm) specimens (Table 6.1). Although some of the remains may be from or been altered by nonhuman carnivores or scavengers that utilized the shelter when humans were absent, with the possible exception of a land snail, the approach taken in this chapter is that the recovered assemblage is directly tied to the human occupation of the shelter.

METHODS

Identification of the faunal remains was made to their lowest possible taxonomic level based on direct comparison to study specimens housed at the Archaeology Facility of the University of Kentucky's William S. Webb Museum of Anthropology. Additional assistance came from diagnostic information available within the relevant zooarchaeological literature (e.g. Olsen 1964, Reitz and Wing 1999, Schmid 1972, Steadman 1980). Quantification is based on the Number of Identified Specimens (NISP) and weights of recognizable species or animal size class (e.g., large mammal and large bird), element, side, and portion, plus if possible age and sex of taxon. The fragmentation of some specimens particularly those lacking diagnostic characteristics required classification into the broad taxonomic categories of unidentifiable (UID) mammal, bird, or vertebrate (Table 6.1).

Calculation for Minimum Number of Individuals (MNI) for species was based on the largest number of individual diagnostic bone elements by side and portion recovered for a particular taxon. All specimens were examined for cultural and natural modifications. Cultural modifications consist of any marks on the bones attributed to butchering and consumption activity. Burnt bone modifications were recorded as black or calcined (Shipman et al 1984). Burnt black bone results from relatively low heat that carbonized the organic components, while burnt calcined is from more intense heat generally over a prolong time that oxidized the carbon turning it a white or light blue color (Reitz and Wing 1999:133). Assemblages with high frequencies of calcined bone may possibly reflect human efforts to purposely dispose of bone.

Bones with gnaw marks, recorded as slight, moderate, or heavy, include those made by rodents (most likely squirrel and woodrats) and carnivores, typically dogs (Lyman 1994). If present, ingested bone called scat, recognized by pitting, polished edges, and eroded surfaces that are suggestive of dog or wolf digestion also was noted (Binford 1981:55, Schmitt and Lupo 1995:499).

High percentages of gnawed bone suggest that animals had greater access to bone than at sites where such evidence is are marginal or absent. The percentage of dog gnawed bone in particular is also a relative measure of bone preservation at a site, as gnawing will result in greater fragmentation (Binford 1981). A high frequency of canid gnawed bone also is suggestive of the presence of domestic dogs within a community or camp.

Table 6.1. Faunal Remains from Twin Knobs Rockshelter.

TAXON	NISP Screen (Perc)	NISP-Float (Perc)	MNI	WT (gm)	Burned*	Cut/ Polished*	Gnawed*
Mammals							
cf. Opossum	1 (0.5)	-	1 (mandible)	1.2	1BB	-	-
Deer	9 (4.5)	1 (0.5)	2(sub adult tooth, adult vertebra)	15.5	1BB	-	2R
cf. Deer	1 (0.5)	-	-	3.7	-	1C	-
Pig	1 (0.5)	-	1 (auxiliary metapodal)	1.1	-	1C	-
Rabbit	3 (1.5)	1 (0.5)	1(left tibia)	0.3	1BC	-	-
Groundhog	1 (0.5)	-	1 (incisor)	0.1	-	-	-
Large Mammal	69 (34.7)	3 (1.5)	-	40.3	22BB, 21BC	2C, 2P	-
UID Mammal	9 (4.5)	1 (0.5)	-	3.9	2BB, 3BC	-	-
Total	89 (44.4)	6 (3.1)	-			-	-
Total Combined	**95 (47.5)**		**6**	**66.1**	**26BB, 25BC**	**4C, 2P**	**2R**
Birds							
Large Bird	1 (0.5)	-	1 (long bone)	0.3	-	-	-
UID Bird	-	6 (3.0)	-	0.1	-	-	-
Total	1 (0.5)	6 (3.0)					
Total Combined	**7 (3.5)**		**1**	**0.4**	**-**	**-**	**-**
Reptiles							
Box Turtle	1 (0.5)		1(shell)	0.5	-	1P	-
UID Turtle	4 (2.0)	1 (0.5)	-	1.0	1BB, 1BC	-	-
Total	**5(2.5)**	**1(0.5)**					
Total Combined	**6 (3.0)**		**1**	**1.5**	**1BB, 1BC**	**-**	**-**
UID Vertebrate	41 (20.5)	45 (22.5)	-	10.4	12BB, 18BC	3C, 4P	2C
All Combined	**193 (96.9)**		**8**	**78.3**	**39BB, 44BC**	**7C, 7P**	**5R, 2C**
Mollousca							
Freshwater Bivalve	5 (2.5)	-	1 (shell)	0.4	-	-	-
Terrestrial Gastropod	-	1 (0.5)	1 (shell)	0.1	-	-	-
Total	5 (2.5)	1 (0.5)					
Total Combined	**6 (3.0)**		**2**	**0.5**	**-**	**-**	**-**
Total	**140 (70.4)**	**59(29.6)**					
Total Combined	**199 (100.00)**		**10**	**78.8**	**39BB, 44BC**	**7C, 7P**	**5R, 2C**

*BB=burned black, BC=burned calcined, C=cut, P=polished, R=rodent gnawed, and D=carnivore gnawed

FAUNAL ASSEMBLAGE COMPOSITION

The Twin Knob Rockshelter faunal assemblage (NISP=199) consists of 47.5 percent mammal (NISP=95), 3.5 percent bird (NISP=7), 3.0 percent reptile (NISP=6), 43.0 percent UID Vertebrate (NISP=86), and 3.0 percent mollusca (NISP=6) (Table 6.1). Most of the specimens (NISP=171) are too fragmented for more precise identification than class and animal size. No amphibian or fish remains were identified in the assemblage. Most (70.4 percent, NISP=140) of this assemblage comes from 6.35 mm mesh screened general excavations, with 59 (29.6 percent) specimens being recovered from flotation samples.

The preservation of remains at this rockshelter is considered moderate with only a few specimens recorded as in excellent condition or heavily weathered. The most common bone modification is burning (NISP=83, 41.7 percent). Of these 53 percent (NISP=44) are burned calcined and 47 percent (NISP=39) are burned black (Table 6.1). Most (61.4 percent, NISP=51) of the burned remains are mammal specimens.

<u>Mammal Remains</u>

Of the 95 mammal remains recovered from the site, only 18 (18.9 percent) were identifiable to the species level. They consisted of cf. opossum, deer, pig, rabbit, and groundhog (Table 6.1). The MNI for each taxon is one, except for deer, which is represented by two individuals. The other recovered mammal remains consist of unidentified fragments of long bones, vertebra, and metapodal bones (Table 6.1). Slightly over half (53.8 percent, NISP=51) of the mammal remains are burned. Two long bone specimens have cut marks and two exhibit surface polish (one long bone awl fragment and one UID bone).

Opossum is represented by a mandible burned black and missing the teeth though a root was present within one socket. It was associated with the Terminal Archaic/Early Woodland component.

Deer represented by ten specimens: a burned black mandible; three metatarsals; a 1st phalanx; a 3rd phalanx; two premolar/molars, one newly erupted subadult molar with no wear (Severinghaus 1949); and one thoracic vertebra, with a fused centrum epiphyses. The latter is suggestive of an adult two years or older (Purdue 1983).

The cf. deer specimen consists of a right tibia shaft fragment that has a length of 3.9 cm. It exhibits multiple transverse lithic cuts and embedded chert concentrated on one side within a span 0.71 cm long. The classification of such markings is best described as unintentional cuts likely produced during efforts to remove perhaps dried meat muscle from the bone (Binford 1981). It also exhibits possible rodent gnawing at one end and is heavily weathered with the surface periosteum cracked and exfoliated occurring after the cuts and deposition (Figure 6.1). Deer or cf. deer remains were recovered from the Terminal Archaic/Early Woodland (n=4), Late Woodland (n=4) and the Terminal Woodland/Mississippian components (n=2).

Pig is represented by an auxiliary metapodal specimen (Table 6.1). Recovered from Terminal Woodland/Mississippian component, the element is missing the distal epiphysis that had not fused. That the bones had not yet fused suggests the pig was a subadult individual. This element exhibits a knife cut mark on the medial side and likely represents remains that are intrusive into the prehistoric deposits. It also is suggestive of the consumption of pig feet perhaps during a short-term hunting trip.

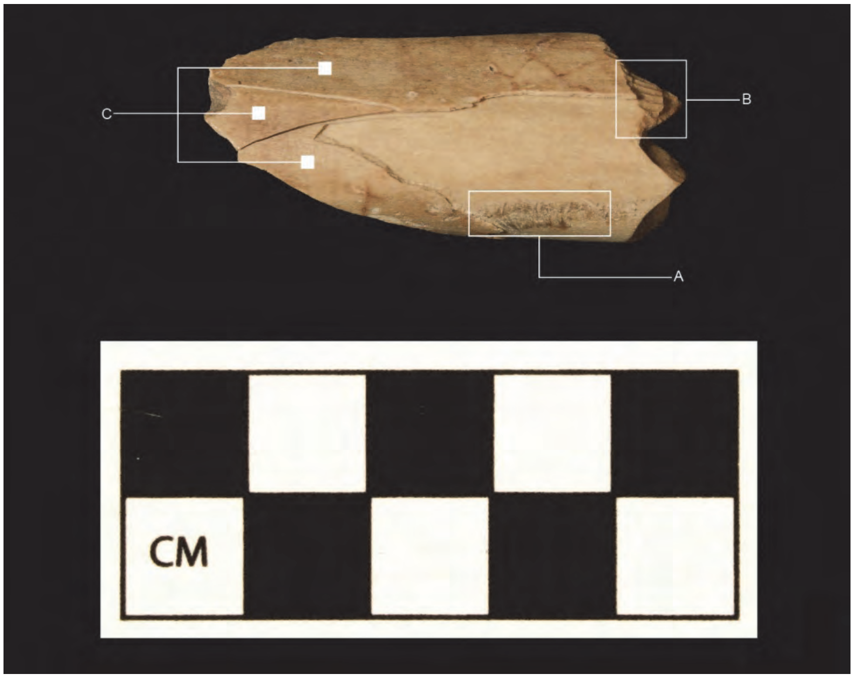

Figure 6.1. View of cf. deer, right tibia shaft fragment that exhibits multiple transverse cuts with embedded chert (A), rodent gnawing (B), and cracked, exfoliated bone surface (C).

Rabbit is represented by three specimens (Table 6.1). Of these, two are incisor fragments and the third is the distal shaft portion of a left tibia that is burned calcined. Rabbit remains were recovered the Late Woodland (n=1) and Terminal Woodland/ Mississippian (n=2) components.

Groundhog is represented by an incisor (Table 6.1). It was associated with the Terminal Archaic/Early Woodland component. This specimen appears to have been burned black.

Bird Remains

The assemblage contains only seven (3.5 percent of the assemblage) bird bones (Table 6.1). One is a long bone shaft that is too fragmented for identification beyond the general category of large bird. This specimen was found in association with the Terminal Archaic/Early Woodland zone. Given the lack of bird remains in this assemblage, this specimen was given an MNI of one to indicate that at least one bird skeleton was deposited at the site.

The remaining six specimens are eggshell fragments recovered from the Terminal Archaic/Early Woodland zone. The presence of these remains suggests that the collection of eggs was one of the gathering behaviors undertaken during short-term visits to the site. As such their presence is suggestive of a spring occupation. An MNI was not determined for the eggshell.

Reptile Remains

Of the six (3.0 percent) reptile specimens, all are turtle shell carapace (upper) or plastron (lower) fragments (Table 6.1). Only one could be identified to species. It was a box turtle (*Terrapene carolina*) carapace peripheral or edge bone to the upper shell. This carapace fragment exhibits moderate polish on the exterior surface and the interior surface shows slight rodent gnawing along the outer edge prior to braking from the shell and may be burned black. The polished surfaces suggest this fragment represents a worked turtle shell bowl but its small size makes such a conclusion fairly questionable.

Two of the UID turtle remains are burned, one black and one calcined. Turtle bones were recovered from Late Archaic (n=1), Terminal Archaic/Early Woodland deposits (n=3), and Late Woodland (n=2) contexts.

UID Vertebrate

Eighty-six specimens were classified as UID vertebrate (Table 6.1). Of these, 30 (34.9 percent) are burned (12 burned black and 18 burned calcined). Three exhibit lithic cut marks and four show polished exterior surfaces. Of the three gnawed UID vertebrate, one was gnawed by a rodent and two by a dog. Most (63.9 percent, NISP=55) of the UID vertebrate were recovered from the Late Archaic and Terminal Archaic/Early Woodland deposits. Of the remaining specimens, 17 (19.7 percent) were associated with the Late Woodland component and 13 (15.1 percent) the Terminal Woodland/Mississippian component. Only one worked UID vertebrate specimen was recovered from the site (see Modified Bone Section).

Mollusca Remains

The mollusca assemblage consist of one terrestrial gastropod shell fragment and five unidentified freshwater bivalve shell fragments (Table 6.1). The gastropod, which has an MNI of one. Though it was recovered from Terminal Archaic/Early Woodland deposits, it is considered the product of natural deposition not connected to human deposition or occupation. The five UID bivalves fragments were recovered from terminal Woodland/Mississippian (n=2), Late Woodland (n=2), and Late Paleoindian/Early Archaic (n=1) deposits. Although small and fragmented condition, the five bivalve fragments have an MNI of one. The lack of additional and larger bivalve shells at the shelter points to rather infrequent use of these aquatic freshwater resources at the site. This pattern is in sharp contrast to aboriginal use of freshwater bivalves recorded at many rockshelter and open-air sites throughout the southeast (Parmalee and Bogan 1999:35).

<u>Modified Bone</u>

Only four bone artifacts were recovered from the rockshelter. Of these, two are UID mammal bone fragments with one possibly burned black. Both show polish and longitudinal striations on their exterior surface. The bone edges do not appear cut but show old brakes indicating they are likely fragments from larger pieces of discarded worked bone. Both were recovered from Terminal Archaic/Early Woodland deposits.

Of the other two bone artifacts one is an fragment of an awl and the other a fragment of a spatula. The awl fragment is burned black and measures 2.2 cm in length and 0.9 cm in width. It ranges in thickness from 0.3 to 0.4 cm (Figure 6.2). It exhibits striations along the interior and exterior surface of the bone that are considered the product of sharpening. This specimen appears most likely to have been manufactured from deer bone. As with the other two modified bones, it was found in association with the Terminal Archaic/Early Woodland deposits.

Figure 6.2. Exterior and interior view of bone awl.

The spatula fragment measures in 2.3 cm in length, 2.0 cm in width, and 0.2 cm in thickness (Figure 6.3). All surfaces show heavy polish including the edges. Directly opposite the broken end, the polished “business” end of the tool exhibits a flake scar that likely occurred from use. One side of the spatula shows transverse cuts. Other surfaces have longitudinal scraps that are perhaps evidence of manufacturing or related to some method of use. Although classified as UID vertebrate the relative thinness of this specimen suggests this tool was manufactured from turtle shell. This tool was found in association with the Late Archaic deposits.

Recovery of the polished awl and spatula fragments offer the possibility that crafts, such as leather working and perhaps basketry took place, during the Late Archaic and Terminal Archaic/Early Woodland occupations of the shelter. That all of the modified bone was associated with these two components, points to longer or more frequent use of the shelter place during these two occupational periods relative to earlier and later use of the shelter.

Figure 6.3. Exterior and interior view of bone spatula.

SITE FAUNAL INTERPRETATIONS

The faunal remains recovered from the Twin Knobs Rockshelter, represent food remains utilized by prehistoric groups who periodically visited the site from the Late Paleoindian to Late Prehistoric periods. By order of abundance they consumed deer, turtle, rabbit, cf. groundhog, cf. opossum, and large bird. They do not appear to have consumed amphibians or fish. The limited prehistoric faunal assemblage recovered from the site when considered with other cultural materials and botanical remains, supports the suggestion that the shelter was primarily used on a short term intermittently basis for several thousand years.

Interestingly, historic use of the shelter appears to be similar to that of its prehistoric inhabitants. The pig foot bone was most likely discarded by people using the site as short term shelter perhaps during a hunting or camping trip.

CHAPTER SEVEN:
ARCHAEOBOTANICAL REMAINS FROM THE TWIN KNOBS ROCKSHELTER

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INTRODUCTION

This chapter discusses the plant remains recovered from 30 flotation samples (346 liters of soil) from Twin Knobs Rockshelter (Table 7.1). Five components are represented, including Late Paleoindian to Early Archaic (1 sample, 11 liters), Late Archaic (12 samples, 115 liters), Terminal Archaic/Early Woodland (9 samples, 95 liters), Late Woodland (4 samples, 54 liters) and Terminal Woodland/Mississippian (4 samples, 71 liters). The assemblage is dominated by nutshell (89.7 percent by frequency and 92.8 percent by weight). Also present are wood charcoal (n=611), wild plant seeds (n=222), and a trace amount of cultigens (n=20).

Perhaps most significant is the wide range of wild plant seeds. Plants from dryland, wetland, and wooded settings are present, demonstrating the variety of environmental settings from which plants were collected. Wild plant use persisted through the entire occupational sequence at Twin Knobs Rockshelter, with the greatest emphasis on plant gathering occurring during Terminal Archaic/Early Woodland times. Trace amounts of cultivated plants (corn, gourd, marshelder, and chenopod) occur in the Terminal Archaic/Early Woodland, Late Woodland, and Terminal Woodland/ Mississippian components. The paucity of cultigens suggests that this rockshelter was a plant gathering station rather than a primary occupation for agricultural groups.

Table 7.1. Frequencies and gram weights of general categories of plant remains from the Twin Knobs Rockshelter.

Category	Frequency	Percent	Gm Wt	Percent
Nutshell/nutmeat	7,679	89.7	94.3	92.8
Wood charcoal	611	7.1	7.3	7.2
Wild plant seeds	222	2.9	---	---
Cultigens	20	0.2	---	---
Unidentified - general/seeds	26	0.3	---	---
Total plant remains	8,558	100.0	101.6	100.0

METHODS

Botanical remains are produced from archaeological sites using a method known as water flotation. Soil samples are placed in a tank with agitated water, and the lighter charcoal and roots float to the surface, and are collected in a nylon bag. Portions of the sample that sink are caught below in fine screen. Samples were received already floated.

At the laboratory, samples were passed through a 2 mm geological sieve before sorting charcoal from uncarbonized contaminants, such as roots. Material such as wood and nutshell from the larger than 2 mm sample were identified, counted, and weighed. Sievings smaller than 2 mm were scanned carefully for seeds. This procedure is followed because fragments of wood and nutshell smaller than 2 mm are difficult to reliably identify. Specimens larger than 2 mm are representative of smaller specimens, with the possible exceptions of acorn and gourd rind (Asch and Asch 1975). Laboratory sieving thus saves considerable laboratory sorting time without a loss of information.

The samples were examined under a light microscope at magnifications of 10 to 30x. Identification of materials was aided by a comparative collection of both archaeological and modern specimens, along with standard catalogs (Delorit 1970; Martin and Barkley 1973; Panshin and deZeeuw 1970; U.S. Department of Agriculture 1948). When applicable, specimens are sorted by species, counted, and weighed to the nearest tenth of a gram. Macroscopic wood characteristics were observed from specimen cross-sections. Changes in the visibility of macroscopic characteristics that occur during carbonization were also accounted for, to ensure maximum accuracy of identification (Rossen and Olson 1985). Very small wood specimens or specimens that were badly deformed during the carbonization process were classified as "unidentified." Similarly, non-wood specimens that are badly deformed were classified as "unidentified-general" and deformed or fragmented seeds were classified as "unidentified-seeds."

Frequencies for nutshell lots containing more than 400 specimens represent carefully constructed estimates and not exact figures. Actual frequencies were recorded for lots containing fewer than 400 specimens. Estimates were derived in the following manner. Two hundred specimens were counted, this subsample was weighed, and the weight of the total sample was divided by the subsample. This number was then multiplied by 200. Estimates of the species composition of each sample were derived by identifying between 15 and 50 specimens. An estimate of the relative percentage of each species represented was then used to calculate the estimated frequency of each species in a sample. This is believed to be a reliable and efficient method for handling large lots of wood charcoal (Rossen 1991).

PRESERVATION

Archaeobotanical preservation varies greatly between sites for reasons that are only partially understood. Two factors that influence preservation are soil drainage and chemical composition of midden deposits (e.g., soil pH and ash content). The circumstances surrounding plant carbonization, including firing temperature and the amount of oxygen reduction present, also influence preservation. Soil particle size and inclusions affect whether or not carbonized plant remains are eroded or destroyed by mechanical grinding.

Preservation of carbonized plant material at the Twin Knobs Rockshelter generally is very good. Nutshell and fragile seeds are not eroded, and specimens retain fine surface reticulations and markings. Desiccated (non-carbonized) plant remains are also present. This either suggests excellent plant preservation at the site or intrusive later materials. Although Twin Knobs is not a dry shelter, the protected environment has resulted in relatively good preservation.

WOOD CHARCOAL

Eight species (or species groups) of wood charcoal were recovered, including (in order of frequency) white oak group (*Quercus* sp.), sycamore (*Platanus occidentalis*), red oak group (*Quercus* sp.), hickory (*Carya* sp.), black walnut (*Juglans nigra*), yellow poplar (*Liriodendron tulipifera*), cane (*Arundinaria gigantea*), and American chestnut (*Castanea dentata*) (Table 7.2).

Table 7.2. Wood charcoal from Twin Knobs Rockshelter.

Category	Frequency	Percent*	Gm Wt	Percent*
White oak group (*Quercus* sp.)	252	60.4	3.0	62.5
Sycamore (*Platanus occidentalis*)	39	9.4	0.6	12.5
red oak group (*Quercus* sp.)	39	9.4	0.3	6.3
Hickory (*Carya* sp.)	35	8.4	0.4	8.3
black walnut (*Juglans nigra*)	17	4.1	0.1	2.1
Yellow poplar (*Liriodendron tulipifera*)	14	3.4	0.1	2.1
Cane (*Arundinaria gigantea*)	14	3.4	0.1	2.1
American chestnut (*Castanea dentata*)	7	1.7	0.2	4.2
Total identified wood charcoal	417	100.0	4.8	100.0
Unidentified wood charcoal	194		2.5	
Total wood charcoal	611		7.3	

*calculated to nearest 0.1 percent

Crittenden County in western Kentucky is known for its oak-hickory forest, with sycamore, black walnut, hard and soft maples, American chestnut, ash, and American elm as strong secondary species. Yellow poplar would have been a tertiary species, along with slippery elm, black locust, sassafras, honey locust, and eastern red cedar (Campbell 1985; Rossen 1991). Cane breaks would have been common in low-lying and floodplain areas.

NUTSHELL AND NUTMEAT

Nutshell is the largest category of food remains, and is present in substantial amounts in all five components (Tables 7.3-7.7). It occurs in the greatest amounts in the Late Archaic and Terminal Archaic/Early Woodland components. Nuts were a focal resource throughout the Archaic and Woodland periods. In western Kentucky, a substantial use of nuts was maintained during the Late Woodland and Terminal Late

Woodland/Mississippian components. These data match the east-west model presented over two decades ago, which postulated that Mississippian peoples relied more heavily on nuts than did contemporary Fort Ancient peoples (Rossen and Edging 1987).

Table 7.3. Plant remains from Late Paleoindian to Early-Middle Archaic component (n=1 sample; 11 liters).

Plant Type/Species	Frequency	Gram Weight
Cultigen		
gourd – rind (*Lagenaria* sp.)	1	--
Nutshell/nutmeat		
hickory (*Carya* sp.)	624	7.8
Wild plant seeds		
sweetclover (*Melilotus* sp. cf. *alba*)*	4	--
Miscellaneous		
unidentified - general	1	0.0

*desiccated

Table 7.4. Plant remains from Late Archaic component (n=12 samples; 115 liters).

Plant Type/Species	Frequency	Gram Weight
Nutshell/nutmeat		
hickory (*Carya* sp.)	3,884	45.1
black walnut (*Juglans nigra*)	27	0.1
butternut (*Juglans cinerea*)	4	0.0
acorn (*Quercus* sp.)	1	0.8
hazelnut (*Corylus* sp.)	1	0.0
Wild plant seeds		
persimmon (*Diospyrus virginiana*)	2	--
grape (*Vitis* sp.)	2	--
grape – stem	1	--
sumac (*Rhus* sp.)*	1	--
spikenard (*Aralia* sp.)*	1	--
sweetclover (*Melilotus* sp. cf. *alba*)*	1	--
ragweed (*Ambrosia* sp.)	1	--
Miscellaneous		
unidentified - general	4	0.0
unidentified - seed fragments	8	--

* desiccated

Hickory (*Carya* sp.) (n=7,505), black walnut (*Juglans nigra*) (n=150), butternut (*Juglans cinerea*) (n=12), acorn (*Quercus* sp.) (n=7), and hazelnut (*Corylus* sp.) (n=5) were recovered (Tables 7.3-7.7). Except for four desiccated hazelnut fragments and one desiccated acorn fragment recovered from the Late Woodland component, all are carbonized. Hickory nuts were valuable for their high protein and fat content, and relative ease of collection, preparation, and storage. Swanton (1946) reviewed at length the ethnographic data on hickory nut use by southeastern Native Americans. The most common use was in a "hickory nut soup," prepared by cracking nuts and placing them into a pot of boiling water, where the nutshell would settle to the bottom leaving an oily white broth that was considered a delicacy.

Table 7.5. Plant remains from Terminal Archaic/Early Woodland component (n=9 samples; 95 liters).

Plant Type/Species	Frequency	Gram Weight
Cultigens		
sunflower (*Helianthus annuus*)*	2	--
marshelder (*Iva annua*)	1	--
Nutshell/nutmeat		
hickory (*Carya* sp.)	1,434	16.7
black walnut (*Juglans nigra*)	64	0.8
butternut (*Juglans cinerea*)	7	0.1
acorn (*Quercus* sp.)	5	0.0
Wild plant seeds		
hackberry (*Celtis* sp.)*	14	--
small-seeded nightshade (*Solanum* sp. cf *americanum*)	12	--
blackberry/raspberry* (*Rubus* sp.)	11	--
spikenard (*Aralia* sp.)*	10	--
pokeberry (*Phtyolacca americana*)*	8	--
grape (*Vitis* sp.)*	7	--
chenopod (*Chenopodium album*)*	6	--
grape – stem*	3	--
sumac (*Rhus* sp.)*	3	--
cherry (*Prunus* sp.)	2	--
sweetclover (*Melilotus* sp. cf. *alba*)*	2	--
serviceberry (*Amelanchier* sp.)*	1	--
hornpondweed (*Zannichelia* sp.)	1	--
pondweed (*Potamogeton* sp.)	1	--
ground cherry (*Physalis* sp.)*	1	--
Miscellaneous		
unidentified - general	2	0.0
unidentified - seed fragments	6	--

* desiccated

Black walnuts contain over three times more nutmeat (Styles 1981:82) and approximately 10 percent more protein and fat than hickory (Lopinot 1982:858-859). They may be more difficult to collect and utilize, however, because walnut trees do not grow in stands like hickories, and shelling and processing is more time-consuming. Butternut is widespread in the eastern U.S. archaeological record in small amounts, but it was more economically important in the northeastern U.S. The nutritional content, processing, and use of butternut are similar to black walnut. Butternut trees, however, only produce good harvests every two or three years, so butternut may not fit into a seasonal collecting strategy as well as other nut-bearing species that produce more consistent harvests (Krochmal and Krochmal 1982; U.S. Department of Agriculture 1948:110,202). The amount and availability of butternut throughout Kentucky is difficult to assess because blight has drastically reduced its numbers in recent years.

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species that produce more consistent harvests (Krochmal and Krochmal 1982; U.S. Department of Agriculture 1948:110,202). The amount and availability of butternut throughout Kentucky is difficult to assess because a blight has drastically reduced its numbers in recent years.

Table 7.6. Plant remains from Late Woodland component (n=4 samples; 54 liters).

Plant Type/Species	Frequency	Gram Weight
Cultigens		
gourd – rind (*Lagenaria* sp.)	11	--
marshelder (*Iva annua*)	4	--
Nutshell/nutmeat		
hickory (*Carya* sp.)	886	13.1
black walnut (*Juglans nigra*)	28	0.5
hazelnut (*Corylus* sp.)*	4	0.1
butternut (*Juglans cinerea*)	1	0.0
acorn (*Quercus* sp.)*	1	0.0
Wild plant seeds		
sumac (*Rhus* sp.)*	10	--
blackberry/raspberry* (*Rubus* sp.)	6	--
spikenard (*Aralia* sp.)*	5	--
pokeberry (*Phtyolacca americana*)*	4	--
cherry (*Prunus* sp.)	3	--
grape (*Vitis* sp.)	1	--
pondweed (*Potamogeton* sp.)	1	--
spikerush (*Eleocharis* sp.)	1	--
Miscellaneous		
unidentified - general	3	0.0

* desiccated

Table 7.7. Plant remains from Terminal Woodland/Mississippian component (n=4 samples; 71 liters).

Plant Type/Species	Frequency	Gram Weight
Cultigens		
corn – cupule (*Zea mays*)	1	0.0
chenopod (*Chenopodium berlandieri*)	1	--
Nutshell/nutmeat		
hickory (*Carya* sp.)	677	8.5
black walnut (*Juglans nigra*)	31	0.7
Wild plant seeds		
pokeberry (*Phytolacca americana*)*	73	--
sumac (*Rhus* sp.)*	11	--
sweetclover (*Melilotus* sp. cf. *alba*)*	8	--
pondweed (*Potamogeton* sp.)	2	--
grape (*Vitis* sp.)	1	--
cherry (*Prunus* sp.)	1	--
Miscellaneous		
unidentified - seed fragments	2	--

* desiccated

Acorn (*Quercus* sp.), which is usually underrepresented archaeologically (Asch and Asch 1975) was recovered from Late Archaic (Table 7.4), Terminal Archaic/Early Woodland (Table 7.5), and Late Woodland (Table 7.6) deposits at the Twin Knobs Rockshelter. It is probably the most abundant and reliable eastern U.S. nut, producing consistent annual masts, while other species vary more in annual production. Acorns, however, require special processing to remove the astringent tannic acid of the nutmeat. Furthermore, acorns are nutritionally inferior to other nuts, with only half the protein, and one-third the fat of hickory nuts. Despite this, acorn collection may be simpler than collection of other nuts, and nutmeat yields are high, so the net energy potential of acorn may be similar to that of other nuts (Lopinot 1982:726).

Hazelnut (either *Corylus americana*, the American hazelnut or *Corylus cornuta*, the beaked hazelnut) is a high protein and easily stored nut (Krochmal and Krochmal 1982:6-8). This is a thin nutshell that usually occurs in only trace amounts in Kentucky sites. Like acorn, this nut is probably underrepresented in Kentucky sites. The recovery of a large cache of hazelnuts from Late Archaic deposits at the Pierce site (15Cu96) in Cumberland County, Kentucky reinforces this notion. This cache suggests that the importance of hazelnut has probably been systematically underestimated due to preservation issues related to its thin fragile nutshell (Rossen 2010b).

CULTIGENS

Trace amounts of cultigens were recovered from three of the five components: the Terminal Archaic/Early Woodland (Table 7.5), Late Woodland (Table 7.6), and Terminal Woodland/Mississippian (Table 7.7) contexts. Sunflower and marshelder were recovered from Terminal Late Archaic/Early Woodland samples (Table 7.4), gourd rind and marshelder were present in Late Woodland samples (Table 7.6), and corn and chenopod were found in Terminal Woodland/Mississippian (Table 7.7) samples. Three of these plants, sunflower, marshelder, and chenopod are considered to be members of the "Eastern Agricultural Complex." This set of plants was cultivated for their starchy (chenopod) or oily seeds (sunflower and marshelder) throughout the eastern U.S. woodlands primarily during Late Archaic and Woodland times. With the establishment of corn as a staple about A.D. 1000, many areas deemphasized cultivation of native plants. However, in western Kentucky, there is substantial evidence for continued use of native cultigens during Mississippian times (Edging 1995). The low frequencies of cultivated plant seeds at Twin Knobs Rockshelter suggest that this site was not a primary occupation for agricultural groups, but functioned more as a plant gathering station.

Sunflower (*Helianthus annuus*) (n=2; desiccated)

Two desiccated specimens of sunflower, an oily-seeded native cultigen, were recovered from the Terminal Archaic/Early Woodland deposits (Table 7.5). An additional fragmented specimen associated with this component, may be either sunflower or marshelder. The independent domestication of sunflower in the lower Ohio Valley area is supported by genetic evidence (Harter et al. 2004). The cultivation of sunflower in Kentucky is demonstrated by a steady increase in seed size from the Late Archaic through the Woodland and Late Prehistoric periods. Yarnell considered the case of sunflower in detail in his now-classic study, noting that original wild sunflower achene lengths range from 4.5 to 5 mm, and that modern ruderal sunflowers have mean achene lengths of 4 to 7 mm, which is intermediate between wild and fully domesticated varieties (Yarnell 1978:291). According to Yarnell's compilations, the Kentucky prehistoric trajectory of sunflower achene growth was as follows: sunflowers from Late Archaic to Early Woodland sites, such as Salts Cave, Mammoth Cave, Carlston Annis Shellmound and Newt Kash Hollow, and from Middle to early Late Woodland sites, such as Hooten Hollow, Haystack Shelter, and Rogers Shelter, all exhibit achenes varying from 7 to 10 mm in length (Cowan 1979; Cowan et al. 1981; Yarnell 1969, 1978:292). Sunflower domestication further intensified during the Late Prehistoric period at Mississippian sites in Missouri and Fort Ancient sites Ohio, where mean achene length reached 10 to 12 mm (Yarnell 1978:293).

The two sunflower specimens from Twin Knobs each measure 8 mm in length, fitting within Yarnell's seed length trajectory for early cultivated specimens of the Early Woodland period.

Marshelder (*Iva annua*) (n=5; carbonized)

Marshelder seeds were recovered from the Terminal Archaic/Early Woodland (Table 7.5) and Late Woodland (Table 7.7) components. Marshelder is a plant with nutritious oily seeds that has a long history of utilization throughout the eastern U.S. woodlands (Asch and Asch 1985; Yarnell 1978). It came under cultivation sometime during the Late Archaic or Early Woodland subperiod, as indicated by gradual but large increases in seed length and its archaeological occurrence in large caches (Yarnell 1978). The Twin Knobs specimens range between 4.0 and 5.0 mm, somewhat small but within the range of cultivated specimens documented by Yarnell.

Gourd (*Lagenaria siceraria*) (n=12; carbonized)

Gourd rind is present in the Late Paleoindian to Early Archaic (Table 7.3) and Late Woodland (Table 7.6) components. Gourd remains are common at Kentucky sites dating from the Archaic to Late Prehistoric periods. The specimen associated with the Late Paleoindian to Early Archaic deposits, may be one of the oldest recovered in the U.S. Gourd is presumed to have declined in importance during the Woodland and Late Prehistoric periods with intensifying horticulture and technological advances in pottery making, although some Late Prehistoric sites, like Shippingport and Eva Bandaman, suggest that gourds retained their importance despite those cultural trends (Rossen 2010a).

Gourds have Old World origins and the circumstances of their prehistoric introduction to the New World remains uncertain (Lathrap 1977; Stone 1984). It is possible, however, that gourd arrived in the New World with its first aboriginal migrants

(Erickson et al. 2005). These plants were used as containers and fish floats, especially prior to the development of ceramics (Hart et al. 2004; Hudson 2004).

Chenopod (*Chenopodium berlandieri*) (n=1; carbonized)

A single specimen of cultivated chenopod was recovered from the Terminal Woodland/Mississippian component. Chenopod, also known as goosefoot or lambsquarters, was utilized for its greens as well as its abundant starchy seeds. The cultivated variety (*Chenopodium berlandieri*) was widely utilized in the southeastern U.S. (Jones 1936; Smith 1987; Watson 1989). Cultivated chenopod is distinguished from wild populations by its distinctive "truncate-margin" or "equatorial band" profile (as opposed to a simpler biconvex profile in wild seeds) and a thinner or absent seedcoat. The Twin Knobs specimen has the distinctive equatorial band and a diameter of 1.2 mm.

Also recovered were six desiccated wild chenopod (*Chenopodium album*) specimens. All were associated with the Terminal Archaic/Early Woodland component. These seeds are smaller, with thicker seedcoats and simple, biconvex cross-sections.

Corn (*Zea mays*) (n=1; carbonized)

One corn cupule was recovered from the Terminal Woodland/Mississippian component. This cupule has a spongy bottom with linear segmenting markings that is typical of the "Eastern Eight" variety. Corn was apparently introduced into the southeastern and Midwestern U.S. during the Early Woodland subperiod (Chapman and Crites 1987; Crites 1978; Ford 1987; Riley et al. 1991). It appears, however, only in low frequencies (Rossen and Hawkins 1995). Early in the Late Prehistoric period (ca A.D. 1000), corn suddenly became highly visible in the archaeological record in the Ohio Valley, dominating food remains at both Fort Ancient and Mississippian sites (Edging 1995; Rossen 1988; see Broida 1984; Cook and Schurr 2009; Lynott et al. 1986 for supporting stable carbon isotope data). With a couple of intriguing exceptions (Rossen 1992), there is a separation of corn varieties between the two cultures. Fort Ancient people generally cultivated a distinctive variety with a tapered cob, square cob cross-section, eight rows of kernels, and open cupules known as "Eastern Eight" to archaeologists, while Mississippian people to the west cultivated a variety without tapered cobs, with a hexagonal cob cross-section, twelve rows of kernels, and closed cupules that has been designated as "Midwestern Twelve." (Rossen and Edging 1987).

WILD PLANT SEEDS

Wild plant seeds represent probable economic plants and possible intrusive materials in the archaeological record. Wild plant seeds are most strongly represented in the Terminal Archaic/Early Woodland component (15 species), followed by the Late Woodland (8 species), Late Archaic (6 species), Terminal Woodland/Mississippian (6 species), and Early-Middle Archaic (1 species) components. Even if all these archaeological specimens were utilized plants, they would represent only a minor percentage of the wild plants that were utilized. The differences in species frequency between components represents sampling differences, preservation, and fortuitous recovery. It is apparent, however, that wild plant use was deemphasized during the Late Prehistoric period as corn-based agriculture intensified throughout the Ohio Valley. That this pattern is not replicated at Twin Knobs, again points to its use as a transient camp during Mississippian times. Recovered wild plants are described in order of overall frequency at Twin Knobs Rockshelter.

Sumac (*Rhus* sp.) (n=25; 11 carbonized and 14 desiccated)

Sumac (*Rhus* sp.) was a dependable resource through time, as indicated by its presence in Late Archaic, Terminal Archaic/Early Woodland, Late Woodland, and Terminal Woodland/Mississippian contexts. This is a bush or small tree that produces edible berries and is best-known for its prehistoric use in a high Vitamin C tea, although it is a high energy food source and medicinal plant as well (Gilmore 1931:47-48; Vogel 1982:378). The berries were often dried for storage (Swanton 1946:606). Sumac may also have been used as a flavoring for the hickory nut soup described above (Cowan 1979:9). Sumac appears in many eastern U.S. Woodland sites in low to moderate frequency (Lopinot 1982, 1988; Rossen 2007; Wymer 1990). In some regions, like central and eastern Kentucky, sumac became more important after A.D. 1000, when it may have been a protected or encouraged plant (Rossen 1992:196-199).

Fleshy fruits (n=43)

The fleshy fruits blackberry/raspberry (*Rubus* sp.) (n=17; desiccated), grape (*Vitis* sp) (n=17; 12 desiccated and 5 carbonized), cherry (*Prunus* sp.) (n=6; carbonized), serviceberry (*Amelanchier* sp.) (n=1; desiccated) and the tree fruit persimmon (*Diospyros virginiana*) (n=2; carbonized) were recovered in low frequencies from Late Archaic to Terminal Woodland/Mississippian contexts (Tables 7.4-7.7). These fruits were commonly used wild food resources, either eaten fresh or fire-dried for storage (Bartram 1955[1791]:321). The seeds are often recovered in low frequencies at other midwestern and southeastern U.S. sites (Yarnell 1969).

Wetlands plants (n=6)

The presence of three wetlands plants, pondweed (*Potamogeton* sp.) (n=4; carbonized), hornpondweed (*Zannichelia* sp.) (n=1; carbonized); and spikerush (*Eleocharis* sp.) (n=1; carbonized), attest to the occasional exploitation of that environment. Wetlands sedges, bulrushes, spikerushes, and pondweeds were an important dietary component during the Archaic period in the Ohio Valley (Rossen 2000). Their year-round availability allowed them to be exploited during times of the year when other plant sources were scarce, and they provided specific dietary aspects (such as trace elements and salt) and medicinal properties that were unavailable elsewhere (Rossen and Dillehay 2002). These plants largely disappeared from Kentucky archaeological sites towards the end of the Late Archaic period as cultivation of starchy and oily-seeded plants took hold.

The temporal distribution of these plants at Twin Knobs indicates some continuation of wetlands plant use past their Archaic heyday. Pondweed was recovered from Terminal Archaic/Early Woodland, Late Woodland, Terminal Woodland/Mississippian contexts. Hornpondweed is present in Terminal Archaic/Early Woodland contexts and spikerush in Late Woodland contexts. Similar wetland plants were associated with Mississippian deposits at the Shippingport site in Jefferson County (Rossen 2010a).

Ragweed (*Ambrosia* sp.) (n=1; carbonized)

One ragweed seed was recovered from the Late Archaic component. Though treated in this chapter as a wild plant, some researchers have periodically considered giant ragweed (*Ambrosia trifida*) to be a native cultigen (Cowan 1985). Harvest experiments showed that it is the least efficient of the entire range of starchy-seeded plants that could have been cultivated. Yet it is possible that it was cultivated in limited quantities in marginal areas where other plants couldn't be gardened. Whether considered to be a wild or domesticated plant, ragweed appears in many Kentucky prehistoric sites in low frequencies (Cowan 1985).

INTRUSIVE DESICCATED SEEDS

Some desiccated seeds in the Twin Knobs assemblage, such as pokeberry (*Phytolacca americana*) (n=85), spikenard (*Aralia* sp.) (n=7), sweetclover (*Melilotus* sp. cf. *alba*) (n=13), hackberry (*Celtis* sp.) (n=14), groundcherry (*Physalis* sp.) (n=1), and small-seeded nightshade (*Solanum sp. Cf. americanum*) (n=12) raise the question of intrusion through historic disturbances and bioturbation of more recent plants into prehistoric deposits. These plants or represent plants that were introduced to the Eastern U.S in historic times or are not thought to have been used by Native American groups. Sweetclover, which was associated all found components, clearly meets the former criteria as it introduced from southwest Asia during Colonial times.

Spikenard, present from the Late Archaic through the Terminal Woodland/Mississippian components, is a mountain woodlands plant with purple berries that are not generally considered edible. Pokeberry, hackberry and groundcherry, and small-seeded nightshade occur naturally in many historic sites in Kentucky but are almost never recovered in prehistoric deposits. It should also be noted, however, that some desiccated seeds in the Twin Knobs samples, such as sumac and blackberry/raspberry, are durable seeds that are probably prehistoric.

SUMMARY

The Twin Knobs Rockshelter contains a relatively small but varied archaeobotanical collection. Although most plant species are represented in only low frequencies, the site is representative of the wild plant collecting economy that developed in the Late Archaic and continued into native cultigen-based horticulture and Late

Prehistoric, corn-based farming. Corn, gourd, marshelder, sunflower, and chenopod (*Chenopodium berlandieri*) represent the plant cultivation and farming eras of Kentucky prehistory. The trace presence of cultivated plants suggests that Twin Knobs was not a primary settlement, but more of a seasonal collecting station. Nutshell, especially hickory, is present throughout the occupational sequence, reinforcing ideas that in western Kentucky, nuts retained significance as a key food resource well into the Late Prehistoric period. The variety of wild plant seeds points to use of dryland, wetland, and upland habitats. The continuing use of wetland plants, known to have been significant during the Archaic period prior to native plant cultivation, into Woodland and Late Prehistoric times is notable.

CHAPTER EIGHT:
EXCAVATION AND STRATIGRAPHY OF THE FLAT TOP SITE

EXCAVATION METHODOLOGY AND ZONE DESCRIPTIONS

A total of 30 1 x 1 m and two 50 x 50 cm units (totaling 30.5 m^2) was excavated at the Flat Top site (Figure 8.1). Each unit was hand excavated with shovel and trowel in natural levels to sterile subsoil or bedrock. In general, the sediments at the Flat Top site were very shallow, extending to a maximum depth of only 29 cm below surface. All sediment from excavation was screened through 6.35 mm wire mesh.

Units were opportunistically spaced across the relatively small, habitable surface of the knob in order to maximize horizontal subsurface information and attempt to document any possible occupational changes or spatial differences in activities/uses. As a result of this strategy, the majority of the units are isolated (non-contiguous). Two blocks (Blocks A [9 m^2] and B [4 m^2]) of contiguous units also were excavated in areas containing high artifact densities, particularly ceramic sherds, to provide fine-grained spatial data and increase the sample of diagnostic cultural materials (Figure 8.1). All units were excavated to sterile subsoil/bedrock.

The units excavated at Flat Top site documented a similar shallow stratigraphic profile across the surface of the knob. Three sediment zones were identified at the site (Zones I, II, and III). These zones consisted of a dark, loose humic zone (Zone I, 2-9 cm thick) that yielded relatively few artifacts; a grayish brown cultural zone (Zone II, 7-15 cm thick) that contained the vast majority of recovered cultural materials; and a pale brown subsoil/exfoliating, flaggy sandstone bedrock (Zone III) that appeared between 11-14 cm below surface across the site.

The overall stratigraphic pattern across the Flat Top site appears to represent a thin (7-15 cm thick), relatively homogeneous cultural zone (Zone II). Of the few artifacts were recovered from Zones I (humic layer) and III (subsoil), most likely represent minor, natural mixing and vertical displacement of artifacts through bioturbative processes (e.g., root and rodent activity, and sediment deflation/erosion) within the shallow knob top deposits.

BLOCK A

Because of the stratigraphic similarity across the Flat Top site, only the profiles from Blocks A and B are discussed in detail. Block A is an irregular shaped 4 x 4 m block located in the central/western portion of the site (Figures 8.1-8.4). Block A consists of nine adjoining 1 x1 m units (units 106, 116, 118, 121, 122, 124, 126, 128, and 130). Three sediment zones (zones I, II, and III) were identified during the excavation of Block A (Figures 8.5). Zone I consisted of a 10YR 2/2 very dark brown, loose, forest floor humic layer with numerous roots that extended from ground surface to 2-9 cm below surface. Zone II is a 10YR 5/2 grayish brown sandy silty loam with rock and pebble inclusions that appeared between 2-9 cm below surface and extended to a depth of 12-17 cm below surface. Zone III is a 10YR 6/3 pale brown sandy silt with numerous exfoliating/flaggy bedrock inclusions that appeared between 12-17 cm below surface and extended beyond the limits of the block (Figure 8.5).

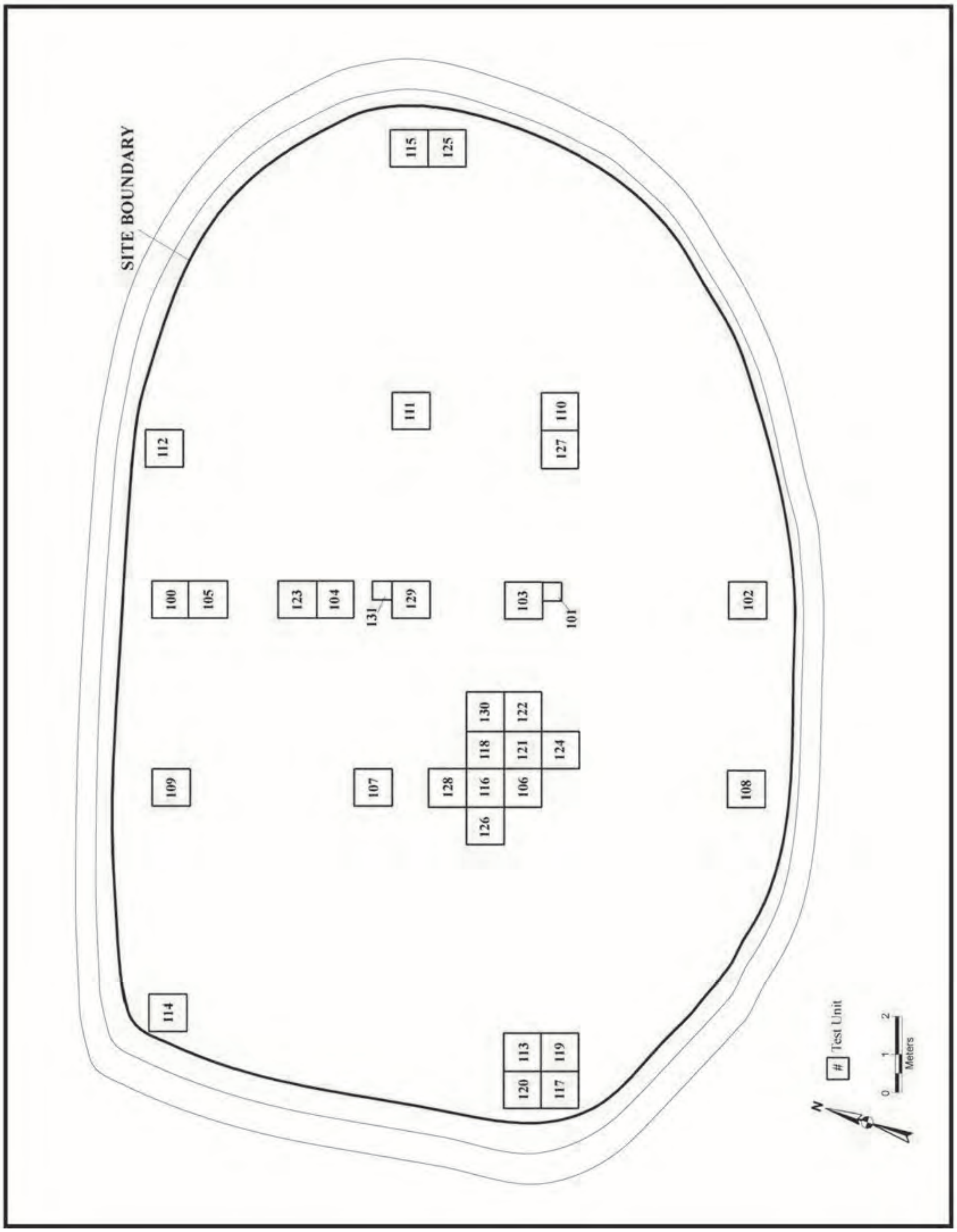

Figure 8.1. Plan of excavations at the Flat Top site.

Figure 8.2. Block A, Planview of the base of excavations.

Although Block A only extended to maximum depth of 17 cm below surface, a relatively substantial amount of prehistoric cultural materials including ceramics, lithic tools, debitage, one groundstone fragment, and polished hoe flakes, was recovered from the nine contiguous units.

Figure 8.3. View of Block A.

Figure 8.4. Unit 128 (Block A) looking east.

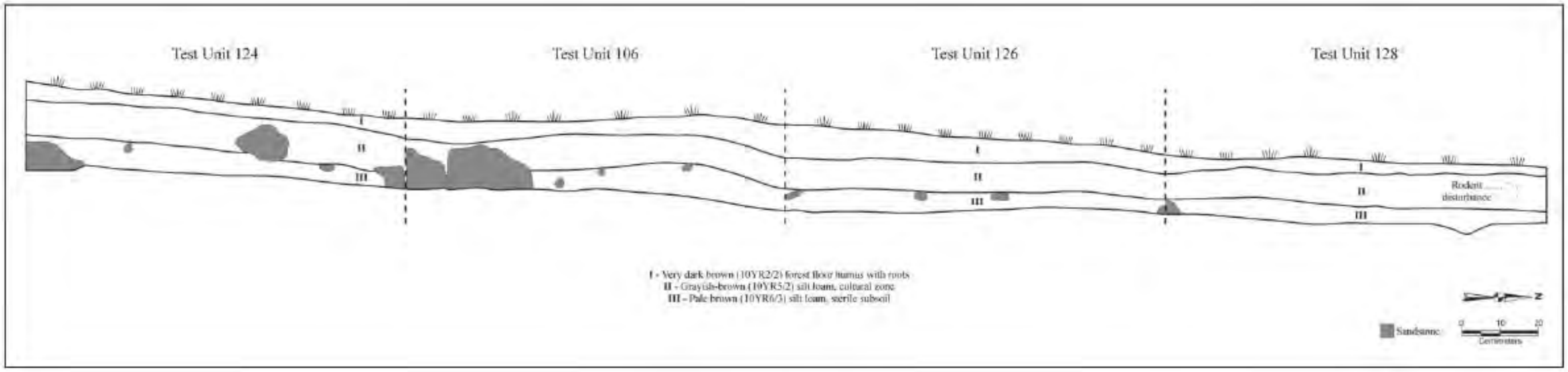

Figure 8.5. Profile of Block A West Wall (Units 124, 106, 126, and 128).

BLOCK B

Block B is a 2 x 2 m unit located on the far western edge of the Flat Top site. It consists of four adjoining 1 x 1 m units (113, 117, 119, and 120) (Figures 8.1 and 8.6). As with Block A, three sediment zones were identified in Block B (Figure 8.7). Zone I is a 10R 2/2 very dark brown, loose, forest floor humic layer and root mat that extended from the ground surface to 6 cm below surface. Zone II is a 10YR 5/2 grayish brown sandy silty loam with rock and pebble inclusions that appears between 4-6 cm below surface and extended to a depth of 13-17 cm below surface. The final zone, Zone III, appeared between 13-17 cm below surface and extended beyond the limits of the block. Zone III was a 10YR 6/3 pale brown sandy silt with exfoliating, flaggy sandstone bedrock.

The stratigraphy of Block B was similar to of Block A and suggests a relatively shallow cultural zone (Zone II) that overlies exfoliating bedrock (Figure 8.9). Zone II contained the vast majority of the prehistoric artifacts (Figure 8.7). Materials recovered from Block B, included ceramics, lithic tools, debitage, a Mill Creek chert hoe, and polished hoe flakes.

Figure 8.6. View of Block B.

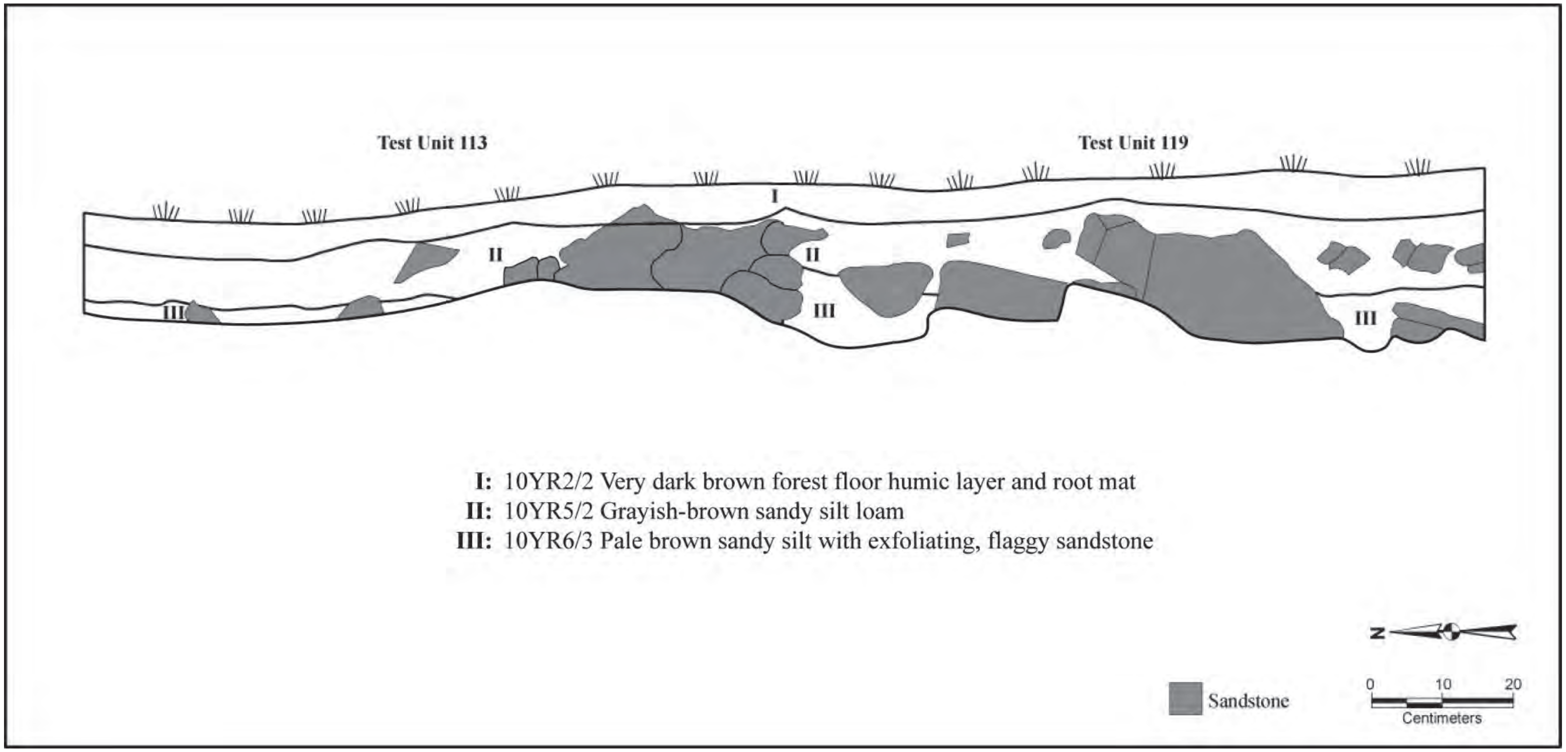

Figure 8.7. Block B East Wall Profile.

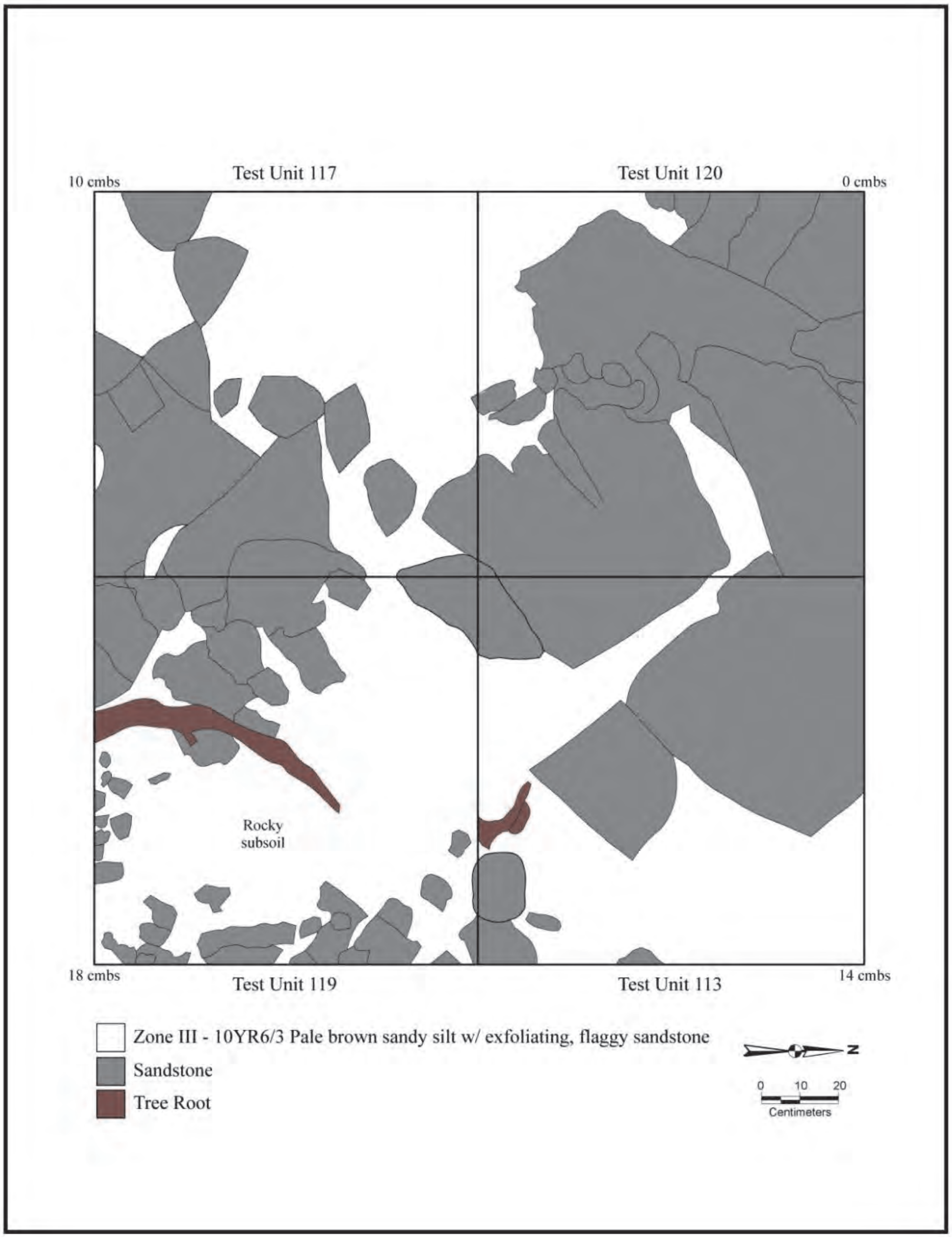

Figure 8.8. Base of excavations (Zone III) in Block B.

MATERIALS RECOVERED

A total of 4,910 artifacts, including lithic tools (n=50), lithic debitage (n=4,709), and ceramics (n=151) was recovered from the Flat Top site (Table 8.1 and Appendix II). All were recovered from the thin humic zone (Zone I) and Zone II and are suggestive of a single cultural component of Late Woodland age at the site.

Prehistoric ceramics from the site (n=151; 105 identifiable specimens) included Fired clay tempered (n=101) and Mixed Fired clay and Limestone tempered (n=4) sherds. Exterior surfaces included cordmarked and plain, although cordmarking is by far the more common surface treatment. In general, the ceramics from the Flat Top site appear to be characteristic of the early Late Woodland Lewis phase and are identical to the Late Woodland ceramics recovered from the nearby Twin Knobs Rockshelter.

Diagnostic lithic artifacts were relatively limited, but included Lowe Cluster projectile points (n=3) and a single Triangular projectile point. Lowe Cluster points are commonly associated with Lewis phase ceramics and support an early Late Woodland age for the site deposits. The Triangular point is probably associated with the terminal Late Woodland and may represent the temporal extent of Late Woodland use of the Flat Top site.

Other lithic tools recovered from the Flat Top site, include retouched flakes (n=6), utilized flakes (n=5), blade-like flakes (n=3), a polished Mill Creek chert hoe (n=1), a drill (n=1), a unifacial endscraper (n=1), projectile point fragments (n=12), cores and core fragments (n=6), and unidentified biface fragments (n=11). In addition to the tools and tool fragments, a relatively large number of flakes displaying polish on the dorsal surface and platforms consistent with hoe use were identified (n=39). A relatively wide range of domestic activities is indicated by the artifact assemblage from the Flat Top site and probably included plant and animal collecting and processing, food preparation, and tool/equipment manufacture/maintenance.

Table 8.1. Materials Recovered by Artifact Class at the Flat Top site.

Artifact Class	Frequency	Percentage
Lithic Debitage	4,709	95.9
Lithic Tools	50	1.0
Ceramics	151	3.1
Total	**4,910**	**100.00**

SUMMARY

In general, excavation of the Flat Top site indicated relatively shallow deposits across the surface of the knob. No features were identified during the excavation of the site and artifact densities were relatively low. The overall stratigraphic pattern is indicative of a thin (7-15 cm thick), single component depositional episode that appears to date to the Late Woodland period (ca. A.D. 400-900). A total of 4,910 artifacts including prehistoric ceramics, lithic tools, and debitage were recovered from the site. All of the artifacts were recovered from the thin humic layer and Zone II at the site.

A relatively wide range of domestic activities is represented by the artifact assemblage from the Flat Top site. These include lithic tool manufacture/maintenance, cooking/storage, gardening, and plant and animal processing. In spite of the range of domestic activities, the absence of features, relatively low artifact densities, and shallow, single component deposits suggest that the occupation of the site was probably short-term and seasonal and may have involved small groups, or perhaps individual family units.

CHAPTER NINE:
LITHIC ARTIFACTS FROM THE FLAT TOP SITE

A total of 4,759 chipped stone artifacts was recovered from the Flat Top site. The chipped stone assemblage (n=4,759) consists of flakes and flake fragments (n=4,670), projectile points and point fragments (n=16), a chert hoe (n=1), a drill fragment (n=1), edge modified/ retouched flakes (n=6), utilized flakes (n=5), blade-like flake fragments (n=3), a unifacial endscraper fragment (n=1), biface/fragments (n=11), core and core fragments (n=6), and hoe flakes (n=39).

ANALYTICAL METHODS

Current approaches to the analysis of lithic artifacts include a study of the step-by-step procedures utilized by prehistoric knappers to make tools. The term used to describe this process is referred to as *chaine operatoire* or reduction strategy (Grace 1989, 1993, 1997; Tixier and Roche 1980). The analysis of stone tool assemblages provides insights into the processes by which prehistoric flintknappers produced their implements. It also enables archaeologists to characterize the technical traditions of specific prehistoric cultural groups (Grace 1997).

The production of any class of stone tools involves a process that begins with the selection of a suitable raw material. The basic requirements of any raw material to make flaked stone artifacts include the following: 1) it can be easily worked into a describable shape; and 2) sharp, durable edges can be produced as a result of flaking (Grace 1997). Once an adequate source is located and a raw material is selected, the process of tool manufacture begins. Two different strategies can be utilized. One involves the reduction of a material block directly into a tool form, like a biface, or the production of a core. The second involves the preparation of a block of raw material so that flakes or blanks of a suitable shape and size can be detached. These blanks are then flaked by percussion or pressure flaking into a variety of tool types, including scrapers, bifacial knives, and projectile points.

Experimental work has shown that the former manufacturing strategy, involving a raw material block, begins with the detachment of flakes with cortical or natural surfaces. This is accomplished by direct percussion, usually involving a hard hammer (stone) that more effectively transmits the force of the blow through the outer surface. Having removed a series of flakes and thus created suitable striking platforms, the knapper begins the thinning and shaping stage. The majority of the knapping is conducted with a soft hammer (antler billet). The pieces detached tend to be invasive, extending into the mid-section of the biface. A later stage of thinning may follow, which consists of further platform preparation and the detachment of invasive flakes with progressively straighter profiles in order to obtain a flattened cross-section. By the end of this stage, the biface has achieved a lenticular or bi-convex cross-section. Finally, the tool’s edge is prepared by a combination of fine pressure work and pressure flaking if desired. It should be noted that flakes derived from biface reduction are sometimes selected for bifacial, unifacial, and expedient tool manufacture.

The second type of manufacturing trajectory, utilizing a flake or blank, begins with core reduction and the manufacture of a suitable flake blank. The advantages of employing a flake blank for biface reduction include the following: 1) flakes are generally light-weight and can be more easily transported in large numbers than blocks of material; and 2) producing flakes to be used for later biface reduction allows the knapper to assess the quality of the material, avoiding transport of poorer-grade chert.

The initial series of flakes detached from a blank may or may not bear cortex. However, they will display portions of the original dorsal or ventral surfaces of the flake from which they were struck. It should be noted that primary reduction flakes from this manufacturing sequence could be entirely non-cortical. Therefore, the presence of cortex alone to define initial reduction is of limited value. Biface reduction on a flake involves the preparation of the edges of the piece in order to create platforms for the thinning and shaping stages that follow. In most other respects, the reduction stages are similar to those described above, except that a flake blank often needs additional thinning at the proximal or bulbar end of the piece to reduce the pronounced swelling and achieve a thinned final product.

FORMAL TOOLS

The identification of formal and informal tools is useful in addressing questions involving the trajectory of reduction and the general activities undertaken by the prehistoric occupants of a site. Formal tools are defined as implements manufactured for a specific task, with a standard morphology. Formal tools in the Flat Top assemblage include, projectile points and point fragments (n=7), a chipped-stone hoe (n=1), and a unifacial endscraper fragment (n=1) and represent just 0.4 percent of the lithic assemblage. Analysis of the formal stone tool assemblage was based on comparisons of previously defined types (Butler and Wagner 2000; Applegate 2008; Justice 1987; Muller 1986; Railey 1996).

Projectile Points (n=4)

Four diagnostic projectile points (Lowe Flared Base [n=2], an unidentified Lowe Cluster [n=1], and a Madison [n=1]) were recovered from the Flat Top site. The points were assigned to known projectile point types if they exhibited all of the attributes consistent with that type. When possible, each was examined for size and shape, resharpening methods, flaking characteristics, blade and haft morphology, presence of basal thinning or grinding, notch flake scars, type of fracture(s) and material type. Length, width, and thickness measurements (in millimeters) were also collected when possible. “Length” was determined, using the maximum length along the axis of the point. “Width” was established using the position of maximum width that is perpendicular to the long axis of the point. The “Thickness” measurement is reflected by the point of maximum thickness on a plane that is perpendicular to that of the width.

Lowe Cluster (n=3)

Two complete Lowe Flared Base projectile points manufactured from St. Louis chert were recovered from the Flat Top site (Figure 9.1a,b). Lowe Flared Base points have an age range of A.D. 200-800 and span the terminal Middle Woodland to early Late Woodland in Western Kentucky (Butler and Wagner 2000; Justice 1987). Specimen A, exhibits a bi-convex cross section and weighs 15.4 grams. The maximum length of this point is 70.7 mm, maximum width is 24.4 mm, and maximum thickness is 9.2 mm. Average notch depth is 3.1 mm. The stem measures 12.3 mm in length and 19.5 mm wide along the basal edge. The stem’s basal edge and lateral margins have been lightly ground and thinned. Broad percussion flake scars are evident on both faces of the triangular blade. The presence of step fractures on both blade margins and grinding at the shoulder/haft juncture suggests resharpening.

Figure 9.1. Lowe Flared Base points from the Flat Top site.

Specimen B, also exhibits a bi-convex cross section and weighs 6.0 grams. The maximum length of this point is 51.5 mm, maximum width is 16.8 mm, and maximum thickness is 7.0 mm. Average notch depth is 2.5 mm. The stem measures 13.6 mm in length and 14.5 mm wide along the basal edge. The stem’s basal edge and lateral margins have been lightly ground and it has been thinned. Broad percussion flake scars have been obliterated on both blade faces due to heavy resharpening. Fine pressure flake scars are present along both blade margins and one blade margin is deeply serrated.

In addition to the complete Lowe points, a stem fragment from an expanding stem point manufactured from Ste. Genevieve chert also was recovered from the Flat Top site (Figure 9.2). This specimen measures 15.3 mm in length along the basal edge with a maximum thickness of 4.3 mm. This stem fragment reveals moderate grinding along the basal edge and lateral margins and it has been thinned. The expanding stem suggests that this point probably also represents a Lowe Cluster point type. Lowe Cluster point types include the Bakers Creek, Steuben Expanded Stem, Lowe Flared Base, and Chesser Notched types (Justice 1987:208-214).

Figure 9.2. Lowe Cluster Point haft element fragment.

Madison (n=1)

The proximal portion of a triangular Madison arrow point manufactured from St. Louis chert was recovered from the Flat Top site (Figure 9.3). Madison points have a date range of A.D. 800-1750 and span the Terminal Woodland to Protohistoric periods (Justice 1987; Pollack 2008b). The fragment measures 8.0 mm in length along the basal edge and has a maximum thickness of 4.1 mm. The excurvate basal edge is well-ground and thinned. Fine percussion flake scars are evident along both of the point's lateral margins.

Figure 9.3. Madison Point fragment from the Flat Top site.

Projectile Point Fragments (n=12)

Twelve non-diagnostic projectile point fragments were recovered from Flat Top site. These specimens were identified as fragments of projectile points based on the recognition of a finished form and the thinness and refinement of the observable flake scar patterns Projectile point fragments consist of distal portions (n=2), blade fragments (n=4), and indeterminate fragments (n=5). All 12 fragments were manufactured from St. Louis chert.

Polished Hoe (n=1)

The hoe is bifacial and was manufactured from Mill Creek chert (Figure 9.4). The specimen weighs 210.7 grams. Maximum length is 115.5 mm, maximum width is 56.2 mm, and maximum thickness is 32.3 mm. The 'bit' end of the hoe, both faces and the tool's lateral margins display episodes of resharpening. Numerous step fractures are also visible on these portions of the tool. The 'bit,' as well as both faces show signs of use wear in the form of bright polish.

Unifacial Endscraper Fragment (n=1)

The unifacial endscraper consists of a distal fragment produced from St. Louis chert. The specimen has been burned and contains several longitudinal flake scars extending from its ventral to dorsal surface. Edge angle along the distal portion of the tool is 77 degrees.

Figure 9.4. Polished Hoe manufactured from Mill Creek chert.

Drill Fragment (n=1)

The drill consists of a medial fragment manufactured from St. Louis chert. The fragment is characterized by fine pressure flaking and a diamond-shaped cross-section. Drills/perforators may have been used for boring and/or piercing a wide variety of materials, such as bone, shell, antler, wood, stone, and leather.

INFORMAL TOOLS

Informal chipped stone tools are those artifacts that were manufactured for a specific task at, or shortly before the point at which they are to be used. These tools either show evidence of utilization without modification, or minimal modification through nominal retouching. Informal tools represent 0.29 percent of the chipped stone assemblage.

Retouched Flakes (n=6)

The retouched flakes recovered from the Flat Top site were produced from St. Louis (n=5) and Ste. Genevieve chert (n=1). Possible use(s) of the retouched flakes may be suggested by Wilmsen's (1968) examination of the measurement of edge angles as an indicator of tool function. His results indicated that edges with angles between 35 and 45 degrees would be most effective at cutting soft material and butchering. Edges with angles between 50 and 75 degrees would be most effective at cutting, scraping, or shaping hard materials, such as bone or wood.

Edge angles on retouched flakes from the Flat Top site range from 40 to 56 degrees, suggesting these artifacts were utilized for a wide variety of tasks, including cutting soft plant or animal material, butchering, and scraping or shaping hard materials, such as bone, shell or wood. It should be noted that one of the retouched flakes recovered from this site was modified along two margins. On this implement, one edge angle measured 60 degrees, while the other was 45 degrees. This variance in edge angle suggests that this tool may have been multifunctional.

Blade-Like Flakes (n=3)

The three blade-like flake fragments recovered from the Flat Top site exhibited a distinctive medial ridge on their dorsal surface. Two of the specimens are shown in (Figure 9.5a,b). All three fragments; however, lack the parallel lateral margins, prismatic cross-sections, and platform preparation scars that are distinctive attributes of Middle Woodland (Hopewellian) bladelets. The blade-like flakes were produced from St. Louis (n=2) and Burlington (n=1) chert. All three specimens were analyzed with a Swift M27LED stereo microscope at 40X magnification. One of the blade-like flake fragments manufactured from St. Louis chert (Figure 9.5a) exhibited a semi-high to high sheen polish and striations on its ventral surface. The distal end of this tool also revealed a high sheen polish and rounding on the ventral surface. One of the lateral margins on this tool showed intentional retouch with an edge angle of 56 degrees. The blade-like flake fragment fashioned from Burlington chert (Figure 9.5b) also exhibited a semi-high to high sheen on its ventral surface and intentional retouch along one of the blade margins. The edge angle on the retouched margin was 52 degrees. The polish and striations are the result of use and these particular tools were probably utilized on hard surfaces to modify materials, such as bone or wood.

Figure 9.5. Blade-like flakes: a, St. Louis chert; b, Burlington chert.

<u>Utilized Flakes (n=5)</u>

The utilized flakes recovered from the site were produced from St. Louis (n=4), and Ste. Genevieve (n=1) cherts. Utilized flakes show modification through use and do not contain intentional retouch along one or more margins of the tool. The variability in the shape of these flakes and the relatively simple level of modification strongly suggests these are informal tools. These tools were probably expediently produced and used on a situational basis for a variety of potential tasks and then discarded.

OTHER CHIPPED STONE

<u>Biface/Fragments (n=11)</u>

The biface and biface fragments consist of a middle stage biface (n=1), middle stage biface fragments (n=3), the distal portion of a late stage biface (n=1), and indeterminate biface fragments (n=6). To provide some clarity to this group, they were divided into four subcategories: early stage, middle stage, late stage, and fragments.

Early stage bifaces exhibit the initial outline of the chipped stone tool. Flake scars are widely spaced and the biface itself is relatively thick. Middle stage bifaces are thinned to the point where projections and irregularities are removed. As a result of this shaping they tend to be thinner than early stage bifaces and the lateral blade margins are more defined. A late stage biface is essentially finished, well-thinned, and symmetrical in outline and cross-section.

The middle stage biface (Figure 9.6a) from the Flat Top site has well-defined blade margins, large percussion flake scars on both faces, and was manufactured from St. Louis chert. One of the middle stage biface fragments (Figure 9.6b) exhibited broad percussion flakes scars on both faces, step fractures on the extant blade margin and face, and was manufactured from St. Louis chert. The presence of step fractures likely indicates that the prehistoric knapper experienced difficulty thinning this specimen, which probably broke during the manufacturing process. Another middle stage biface fragment (Figure 9.6c) also exhibited step fractures along both blade margins. This specimen was made from Ste. Genevieve chert and also appears to have been broken during manufacture.

Figure 9.6. Biface fragments from the Flat Top site: a, middle stage biface; b,c, middle stage biface fragments.

The lone distal fragment and all of the indeterminate fragments (n=6) were manufactured from St. Louis chert. Each of the indeterminate fragments consisted of mid-sections that most probably are the result of production failures.

Core and Core Fragments (n=6)

One core and five core fragments were recovered from the Flat Top site. The core was made of St. Louis chert. The core fragments were fashioned from St. Louis (n=4) and Ste. Genevieve (n=1) chert. Each of these specimens is multi-platformed and have flakes detached over most of their surface areas. The method of flaking appears to have been opportunistic with striking platforms randomly selected during reduction.

DEBITAGE

The French term debitage has two related meanings: 1) it refers to the act of intentionally flaking a block of raw material to obtain its products, and 2) it refers to the products themselves (Grace 1989, 1993). Commonly, the term debitage is used by prehistorians to describe flakes that have not been modified by secondary retouch and make into tools. For the purpose of this analysis, which is based on the research of (Grace 1989, 1993), each type of debitage has been assigned to a specific class. These classes are as follows:

1) Initial reduction flakes: produced from hard hammer percussion; are typically thick; display cortex on all or part of their dorsal surfaces; and have large plain of simple faceted butts (striking platforms).

2) Flakes (Unspecified reduction sequence): applies to those pieces to which a specific reduction sequence cannot be assigned. With these pieces, it is impossible to tell whether they have been detached by simple core reduction or biface manufacture. For example, cortical flakes initially removed from a block of material can appear similar in both core and biface reduction strategies.

3) Biface initial reduction flakes: produced from hard or soft hammer percussion; are typically thick; display cortex on part of their dorsal surfaces; and have large plain or simply faceted butts (striking platforms). These flakes display more dorsal scars than initial reduction flakes.

4) Biface thinning flakes: result from shaping the biface while its thickness is reduced; generally lacking cortex; are relatively thin; and have narrow, faceted butts multi-directional dorsal scars, and curved profiles. Bifacial thinning flakes are typically produced by percussion flaking.

5) Biface finishing or trimming flakes: produced during the preparation of the edge of the tool. These flakes are similar in some respects to thinning flakes, but are generally smaller and thinner and can be indistinguishable from tiny flakes resulting from other processes, such as platform preparation. Biface finishing flakes may be detached by either percussion or pressure flaking.

6) Chips: flakes (<1cm in length) that are detached during several different types of manufacturing trajectories. First, they can result from the preparation of a core or biface edge by abrasion, a procedure that strengthens the platform prior to the blow of the hammer. Second, tiny flakes of this type also are removed during the manufacture of tools like endscrapers.

7) Shatter: produced during the knapping process and through natural agents. Naturally occurring shatter is usually the result of thermal action shattering a block of chert. During biface reduction, shatter results from an attempt to flake a piece of chert with internal flaws (fossils) and fracture line. For the purpose of this analysis, shatter is defined as a piece of chert that shows no evidence of being struck by a human (i.e., bulb of percussion and faceted butts [striking platform]), but may nonetheless be a waste product from a knapping episode.

8) Janus Flakes: produced during the reduction of a flake blank (Tixier and Roche 1980). The removal of a flake from the ventral surface of a larger flake results in a flake, of which the dorsal surface is completely or partially composed of the ventral surface of the larger flake.

Discussion

Among the 4,670 pieces of debitage in the Flat Top assemblage, more than 50 percent consist of unspecified reduction sequence flakes (n=2,604; 55.8 percent) (Table 9.1). Identifiable debitage consisted of shatter (n=596; 12.8 percent), biface thinning and shaping flakes (n=553; 11.8 percent), chips (n=340; 7.3 percent), biface finishing or trimming flakes (n=337; 7.2 percent), biface initial reduction flakes (n=191; 4.1 percent), initial reduction flakes (n=34; 0.7 percent), and Janus flakes (n=15; 0.3 percent) (Table 9.1).

Table 9.1. Flake Types in the Flat Top assemblage.

Class	Flake Type	Frequency	Percent
1	Initial Reduction Flakes	34	0.70
2	Unspecified Reduction Sequence Flakes	2,604	55.80
3	Biface Initial Reduction Flakes	191	4.10
4	Biface Thinning or Shaping Flakes	553	11.80
5	Biface Finishing or Trimming Flakes	337	7.20
6	Chips	340	7.30
7	Shatter	596	12.80
8	Janus Flakes	15	0.30
Total		4,670	100.00

Only 23.1 percent of the debitage can be clearly identified as a by-product of bifacial manufacture (Table 9.1. Classes 3-5). The frequency of bifacial debitage in the

Flat Top assemblage is relatively low (especially compared to the Twin Knobs Rockshelter assemblage, which contained 34.8 percent) and may suggest that the relatively high frequency of unspecified reduction sequence flakes (55.8 percent) is indicative of flake-oriented, expedient production. The relatively few projectile points recovered from the site—when compared with the larger number of retouched and utilized flakes and blade-like flakes—also suggests that although bifacial reduction was occurring, it was not the primary focus of lithic manufacture. Rather, the debitage frequencies, numbers of tools, and presence of amorphous flake cores suggest that flake-oriented reduction strategies comprised the majority of lithic activity at the Flat Top site.

Polished Hoe Flakes (n=39)

During the debitage analysis, a total of 39 flakes displaying visible polish on the dorsal surface were identified. These artifacts were not included in the debitage counts, but were analyzed as a separate dataset. All of the polished hoe flakes were derived from Mill Creek chert and appear to have been heat treated. The presence of polish on these flakes suggests that they were detached during resharpening from a heavily used hoe like the bifacial example recovered from the site (see Figure 9.4).

However, only six of the polished flakes contain striking platforms, and could be confidently identified as having been detached from a biface. The remaining flakes (n=33) showing polish on their dorsal surface were classified as unspecified reduction sequence flakes. Although microwear analysis was not conducted on these artifacts, research conducted on this type of flake indicates that the polish forms quickly, and is characteristic of tools, such as hoes, utilized for turning and preparing soil (Sievert 1995:176). The presence of the bifacial hoe and polished hoe flakes in the assemblage indicate that horticulture was an important component of the activities performed by the site's residents.

LITHIC RAW MATERIAL IDENTIFICATION

Raw material identification was conducted on all lithic debitage, as well as formal, and informal tools. Raw material types were identified on the basis of personal experience, physical properties of the raw materials (i.e., color, luster, fracture, and texture), reference to published descriptions (Koldehoff 1985; Luedtke 1992; Meadows 1977; Ray 2003), and comparisons with chert specimens at the William S. Webb Museum of Anthropology in Lexington**.** A 10X hand lens and a Swift M27LED stereo microscope (40X magnification) were used to identify inclusions and to evaluate texture and structure.

Cortex was described as being present or absent in residual (block) or cobble form. The presence of residual or block cortex denotes lithic procurement from primary sources or outcrops, while cobble cortex indicates procurement from secondary sources (i.e., stream gravel bars). Generally, residual cortex is rather coarse, while cobble cortex is smooth and often pitted and/or polished. The overwhelming majority of the cortex-bearing specimens recovered from the Flat Top site exhibited cobble cortex, strongly indicating that raw materials were being procured from local streams.

St. Louis

St. Louis chert occurs primarily in nodular and bedded form (Koldehoff 1985; Ray 2003) and is Mississippian in age. This chert can be found scattered in regional streambeds and terraces as alluvial deposits. St. Louis chert ranges in color from white, to red, light to medium gray, blue gray and differing shades of green. The majority of the St. Louis chert recovered from the Flat Top site is light, with some medium gray. The luster of light gray St. Louis chert is usually low but grades to medium (Ray 2003:12). Fossils commonly identified in the light gray variety, include crinoids, bryozoa, and siliceous spicules. St. Louis chert (n=3,525; 74.0 percent) constitutes the vast majority of lithic raw material used at the Flat Top site (Table 9.2).

Ste. Genevieve

Ste. Genevieve chert occurs in both nodular and tabular form and is Mississippian in age (Meadows 1977; Ray 2003). Ste. Genevieve chert ranges in color from light to medium blue-gray, very dark gray, to olive gray, yellowish gray, brown, and red. Ste. Genevieve chert is vitreous and can be translucent. It is considered to be a high quality knapping material. Ste. Genevieve chert (n=334) accounts for 7.0 percent of the lithic raw material recovered from the site (Table 9.2).

Mill Creek

Mill Creek Chert occurs almost exclusively as long flat nodules, either in bedrock or as residuum in stream beds (Koldehoff 1985). Mill Creek is derived from the Mississippian age Salem Limestone formation and outcrops in southwestern Illinois (Koldehoff 1985). Its texture is grainy, and colors range from cream to tan to yellow, to grayish brown and grayish orange, to grayish white to almost black. Chert distribution is very wide, and includes areas in Indiana, Kentucky, Missouri, Tennessee, and Arkansas. Mill Creek chert is grainy and somewhat porous. This material often is thermally altered to improve knappability. The use of Mill Creek chert (n=73; 1.5 percent) was relatively limited at the Flat Top site and is predominantly associated with a hoe and polished hoe flakes (Table 9.2).

Burlington

Burlington chert is Mississippian in age and is named for the formation from which it outcrops. Burlington chert commonly occurs as residuum or bedded nodules and lenses (Koldehoff 1985). This chert is highly variable in color; ranging from white to tan, brown, cream, yellows, oranges, reds, pinks, dark brown, and in some rare cases black. Burlington chert also is porous and often very fossiliferious. Heat treatment transforms the normal chalky and earthly looking material to a more waxy and vitreous luster, creating colors of red and pink. Burlington chert (n=9) was present in only limited amounts and accounts for 0.2 percent of the lithic raw material recovered from the site (Table 9.2).

<u>Chalcedony</u>

A single example of pale, off-white, translucent chalcedony was recovered from the site (n=1; 0.02 percent) (Table 9.2). Chalcedony is made of quartz; however, its crystals, instead of forming grains, grow as radiating fibers in bundles (Luedtke 1992:23). The resulting structure is more porous than that of microcrystalline quartz (Luedtke 1992:23).

Figure 9.2. Lithic Raw Material Types and Frequencies.

Chert Type	Formal Tools	Informal Tools	Bifaces and Biface fragments	Cores and Core fragments	Flakes	Hoe Flakes	Total	Percent
Burlington	0	1	0	0	8	0	9	0.2
Chalcedony	0	0	0	0	1	0	1	0.02
Mill Creek	1	0	0	0	33	39	73	1.5
Ste. Genevieve	1	3	1	1	328	0	334	7.0
St. Louis	17	10	10	5	3,483	0	3,525	74.0
Unidentified (burned)	0	0	0	0	817	0	817	17.2
Totals	**19**	**14**	**11**	**6**	**4,670**	**39**	**4,759**	**100.0**

<u>Unidentified (Burned) Chert</u>

Unidentifiable (burned) chert (n=817) comprise 17.20 percent of the lithic raw material recovered from the site (Table 9.2). The frequency of burned chert at the Flat Top site is relatively high (only 7.2 percent in the Twin Knobs Rockshelter). The higher incidence of burning at Flat Top is partly a reflection of the open-air setting. However, given the relatively thin soil development on top of the knob, episodes of prehistoric or historic burning likely would have directly impacted the artifact assemblage.

REGIONAL COMPARISONS

Due to their relatively close proximities, similar environmental settings, and association with the early Late Woodland Stone Fort Complex, the lithic assemblages from the Flat Top site and the McGilligan Creek Village site (15Lv199) are presented (Table 9.3). Like the Flat Top site, the McGilligan Creek Village assemblage contained Lowe Cluster points, biface fragments, retouched flakes, and polished hoe flakes of Mill Creek chert (Bergman and Miller 1996). Although the number of analyzed flakes are similar (Flat Top n=4,670; McGilligan Creek n=3,393), there are differences in the debitage profiles documented for these two sites.

Table 9.3. Flake Categories in the McGilligan Creek Village assemblage (Bergman and Miller 1996).

Flake Type	Frequency	Percent
Initial Reduction Flake	86	2.53
Initial Reduction Flake (Heated)	11	0.32
Unspecified Reduction Sequence Flake	354	10.43
Unspecified Reduction Sequence Flake (Heated)	84	2.48
Biface Initial Reduction Flake	284	8.37
Biface Initial Reduction Flake (Heated)	90	2.65
Biface Thinning and Shaping Flake	1,010	29.77
Biface Thinning and Shaping Flake (Heated)	259	7.63
Biface Finishing or Trimming Flake	255	7.52
Biface Finishing or Trimming Flake (Heated)	125	3.68
Chip	52	1.53
Chip (Heated)	17	0.50
Shatter	320	9.43
Shatter (Heated)	380	11.20
Microdebitage	8	0.24
Microdebitage (Heated)	15	0.44
Janus Flake	42	1.24
Janus Flake (Heated)	1	0.03
Totals	**3,393**	**100.0**

The debitage assemblage recovered from the McGilligan Creek Village is dominated by later stage biface reduction flakes, particularly those derived from biface thinning and shaping flakes (n=1269; 37.4 percent) and biface finishing or trimming flakes (n=380; 11.2 percent) (Table 9.3). Taken as a whole, these flake types comprise nearly 50 percent of the debitage recovered from the site. In contrast, later stage biface reduction flakes recovered from the Flat Top site comprise only 19 percent of the debitage assemblage (Table 9.1). The high percentage of later stage biface reduction flakes recovered from McGilligan Creek is probably reflects more length occupation (and greater amounts of tool maintenance and resharpening) than is believed to have occurred at the Flat Top site.

Another difference between the two assemblages is the frequency of unspecified reduction sequence flakes. Unspecified flakes (n=2,604) accounted for more than 55 percent of the Flat Top assemblage, which has been interpreted as evidence of flake-oriented reduction strategies. In contrast, unspecified flakes from McGilligan Creek Village (n=438) account for just under 13 percent of the assemblage. Although the debitage assemblages are similar in terms of categories represented, they do suggest an emphasis on different lithic reduction strategies at the two sites. The McGilligan Creek Village assemblage appears to indicate an emphasis on the production and maintenance/resharpening of bifacial tools, while the Flat Top assemblage is more indicative of flake-oriented reduction.

SUMMARY

The Flat Top site lithic assemblage is relatively unique in that it is derived from a single depositional zone. Although only a few temporally diagnostic tools were recovered from Flat Top, the presence of two Lowe Flared Base points and a single Madison point suggest that the site was likely occupied during the Late Woodland (ca. A.D. 600-900). The recovery of middle stage biface fragments, a core and core fragments indicates that both bifacial and core reduction was practiced by the inhabitants of this site. A relatively wide range of more expedient edge modified and utilized flakes were also recovered.

Analysis of the debitage indicates that, although biface production and tool maintenance took place at the site, flake-oriented reduction appears to have been the primary focus of lithic activities performed by the site’s prehistoric flint knappers. The overwhelming amount of cobble cortex documented in this assemblage indicates that the greater part of lithic raw material utilized at the Flat Top site was obtained from local streams. Mississippian-age St. Louis chert was, by far, the most commonly used raw material. However, other Mississippian-age lithic raw material, such as Burlington, Mill Creek, and Ste. Genevieve chert also were utilized.

The edge modified, retouched flakes and utilized flakes, and blade-like flakes recovered at Flat Top indicate that although the assemblage is relatively small, a wide variety of activities likely took place at the site. These tools could have been used for a number of tasks, including cutting soft plant or animal material, butchering, and scraping or shaping hard materials, such as bone, shell or wood. The recovery of a bifacial hoe and polished hoe flakes suggests horticultural-related activities were undertaken by the site’s residents. Given the limited surface area on the knob, the bulk of these activities probably occurred at nearby off-site locations. Although the expedient tools from the site could have been used for the processing of animal materials, given the evidence for horticultural activities it is likely that they are associated with the processing of plant materials.

CHAPTER TEN:
PREHISTORIC CERAMICS FROM THE FLAT TOP SITE

by

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INTRODUCTION

The process of making ceramic containers is an additive one, in contrast to the reductive manufacture of stone tools. Ceramic analysis focuses on attributes of paste (the clay used to make the vessels), temper (particles added to the clay to aid in drying and firing), surface treatment, decoration, and form (shape, size and other characteristics that can be inferred, most often from fragments, about the complete vessel). Temper and surface treatment/decoration are major attributes used to classify prehistoric Kentucky ceramics.

The analysis of the prehistoric ceramic assemblage from the Flat Top site had three primary goals: to describe the salient characteristics of the ceramics recovered; to compare them to previously defined regional ceramic types; and to use the findings from this analysis to infer when the site was occupied and therefore characterize the site's prehistoric occupational history.

This chapter begins with a definition of the assemblage parameters and a discussion of the methods used in this analysis. Next, descriptions of the salient characteristics of the ceramic collection are presented, organized by major ware group. A discussion characterizing the assemblage and comparing it to relevant, previously described regional ceramic types follows, and then the context of its recovery is considered with respect to the site's occupation. This chapter concludes with a consideration of the Flat Top site's occupational history from the perspective of the ceramics it produced.

ANALYTICAL PARAMETERS AND METHODOLOGY

A total of 151 sherds was recovered from the Flat Top site (Table 10.1). They were recovered from dry-screened excavated units/blocks. Due to the limited number of specimens of any size, all complete body sherds and basal sherds measuring 4 square cm or greater (n=48) were examined, as well as all complete body sherds measuring 2 or 3 square cm (n=53). Also examined were all diagnostic sherds (e.g., rims, decorated sherds, appendages, etc.) regardless of size (n=4). Any sherds that glued together were considered a single sherd in analysis. These selection criteria produced a sample of 105 sherds, representing 69.5 percent of the total number of ceramics recovered (Table 10.1). Sherds measuring less than 2 square cm and spalled sherds of any size missing their exteriors (n=46) were not analyzed. They were simply lotted, scanned for the presence of exclusively shell tempered examples, and counted.

Analyzed specimens were examined using a Fisher Scientific Stereomaster II binocular microscope at 15x magnification. Data recorded for each sherd, where germane, consisted of temper; paste inclusions; exterior and interior surface treatment and color; cordage twist; cordmark orientation (on rims only); vessel form; vessel fragment type (i.e., whether base, body, neck, or rim), lip shape; rim orientation and modification; decoration type and location; thickness (of body, base, lip, rim [1 cm below lip]); and sherd size. Qualitative information about cordmarking execution and width; and decoration method and execution also was collected.

Table 10.1. Ceramic Frequencies from the Flat Top Site.

Ware Groups/Ceramic Categories	**Frequency**	**Percent**
Fired Clay Tempered		
Cordmarked	75	71.5
Plain	20	19.0
Eroded	6	5.7
Total	101	96.2
Mixed Fired Clay and Limestone Tempered		
Cordmarked	1	1.0
Plain	3	2.8
Total	4	3.8
Total Analyzed	**105**	**100.0**
Unanalyzed Sherds (<2 square cm)	**46**	
Grand Total	**151**	

All analyzed specimens were examined to identify temper type(s) and type(s) of naturally occurring paste inclusions. Data on temper/inclusion abundance, size, and shape was collected from a sample of sherds within each ware group.

Surface treatment reflected a continuum in smoothing. For cordmarked sherds, this continuum was divided into cordmarked (clear or faint impressions) and smoothed-over cordmarked (specimens that showed evidence of some obliteration of cord impressions due either to smoothing or light application of the paddle). In order to determine cordage twist, impressions from the exteriors of all cordmarked sherds were taken with Sculpey (a modeling clay that can be reused repeatedly and hardened by baking in an oven) and twist was then ascertained from the cast. A sample of cordmarked sherds from each ware group was examined to collect qualitative information about cordmark characteristics (relative cord thickness, closeness of impressions, etc.). For rim sherds, information also was collected on cordmark orientation relative to the lip.

For plain matte surfaces, the continuum was divided into smoothed, poorly smoothed, well-smoothed, and eroded smoothed. Poorly smoothed surfaces were lumpy and irregular. Some specimens showed where sand or other particles had been caught in the smoothing tool, thereby leaving a narrow groove or striation of variable depth on the surface. Well-smoothed surfaces were clear and even.

Sherd surfaces were considered eroded in cases where the exterior surface was still present, but was weathered or otherwise damaged beyond conclusive identification. Specimens with weathered or worn areas on their exteriors, but that otherwise had identifiable surface treatments, were considered eroded cordmarked or eroded plain, respectively.

Surface color was determined by visual inspection relative to this assemblage; no reference was made to Munsell soil color charts (Munsell Color 1975). Sherd thickness, measured to the nearest .1 mm, was taken at the thickest spot for all body sherds using Helios needle-nosed calipers. Likewise, thickness was measured on rims at the thickest spot at the lip (lip thickness) and 1 cm below the lip (rim thickness). Sherd size was estimated by placing each specimen on a 1-cm grid template and counting the number of squares the specimen covered.

Additional information was collected for rims and possible basal sherds. Rim modification was recorded as thinning to the lip, thickening to the lip, or no modification. Rim orientation and vessel form were recorded using categories developed for the Kentucky Fort Ancient Research Project (Turnbow and Henderson 1992:338), but modified for use in this study. Lip shape was recorded using categories developed for the Muir site (Turnbow 1988:107). No rims were collected that were large enough to determine orifice diameter. Basal sherds were identified on the basis of morphology (basal shape) or extreme thickness relative to the rest of the analyzed sample. Additional information about decoration (e.g., orientation of notching and method of notching**)** also was collected. Minimum number of vessels was estimated for each ware group based on rim sherd characteristics.

ARTIFACT DESCRIPTIONS

The Flat Top site ceramics were assigned to two ware groups on the basis of temper attributes and to five ceramic categories on the basis of exterior surface treatment (Table 10.1). They are described below.

Fired Clay Tempered Ware Group

(n=101: 3 rims, 4 bases, 94 body sherds)
Figure 10.1

Sherds assigned to this ware group were tempered with sparse to moderate amounts of mostly small (0.8 to 2.5 mm) and generally subrounded to subangular (although a few angular examples were present), tan to brown fired clay particles. The fired clay particles did not contain evidence of temper, so they were not considered grog (i.e., tiny fragments of crushed sherds. Note: most regional ceramic analysts do not make this distinction, referring to both fired clay temper and temper made from crushed sherds as "grog" [cf., Jackson and Butler 2012:131-132; 135]). In many cases, temper particles were the same color as the paste, making it difficult to distinguish them from the surrounding matrix. Sherd size ranged from 2 to 13 square cm, with a mean of 3.9 square cm.

The most common aplastics in the paste, quartz sand and hematite/manganese particles, are considered natural inclusions. Most specimens contained moderate amounts of small (0.5 to 1.0 mm), angular to subangular quartz sand particles. Sparse to moderate amounts of rounded to subrounded hematite/manganese concretions, similar in size to the sand, also were present in the paste of most specimens.

Exterior surface treatment consisted of cordmarked (n=75) and plain matte (n=20). Due to their eroded exteriors, surface treatment could not be determined for six sherds. The cordmarked specimens included examples of cordmarked (n=38), smoothed-over cordmarked (n=19), and eroded cordmarked (n=18). Plain matte exteriors consisted of smoothed (n=15), poorly smoothed (n=2), well-smoothed (n=1), and eroded plain (n=2) examples. Exterior surface color ranged from light brown to light orange to medium gray to reddish orange, with light brown being most common.

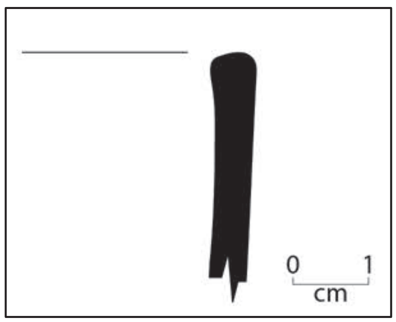

Figure 10.1. Fired Clay Tempered Cordmarked Rim Profile (513.2.1). Scale 1:1.

For most of the cordmarked sherds (n=52, 68.0 percent), twist could not be determined. Of those that remained (n=23; 32.0 percent), all were S-twist. Cordmark impressions generally were shallow to moderately deep and tended to be medium-wide to relatively wide. Impressions were regularly spaced and spacing ranged from closely packed to medium. On some specimens, cordmarking was sloppily applied.

All interiors were plain matte (n=98), with smoothed (n=86), poorly smoothed (n=5) well-smoothed (n=2), and eroded plain (n=5) examples present. Interiors for three sherds were eroded. Interior surface color ranged from light brown to light orange to medium gray, with light brown being most common. Body sherd thickness ranged from 3.5 to 7.5 mm, with a mean of 5.2 mm.

Three rims (two cordmarked and one eroded) were assigned to this ware group, but due to their small size, vessel form could not be determined. Only one rim could be oriented: it was direct (Figure 10.1). All three specimens had flat-rounded lips. For two, the rim thickened to the lip; the third lip exhibited no observable modification. Lip thickness ranged from 6.0 to 6.5 mm, with a mean of 6.3 mm, and rim thickness ranged from 5.0 to 6.2 mm, with a mean of 5.6 mm. Cordmarking on rims was oriented either vertically or diagonally to the lip.

All three rims had notched lips. Notches on one cordmarked specimen were broad (6.7 mm) and shallow, and extended diagonally completely across the lip. These may have been applied with a dowel. Deep diagonal notches extend completely across the lip of the eroded specimen and appear as if a fingernail was used. A complete notch measured 4 mm wide.

The identity of the lip decoration on the third rim, a cordmarked example (Figure 10.1), was difficult to confirm. This small specimen appeared to exhibit two shallow, very narrow (0.9 mm-wide), opposing diagonal notches that extend completely across the lip; and a 4 mm-wide, deeper, diagonal notch that extended completely across the lip. The latter possibly was made by a cord-wrapped dowel. Alternatively, the lip may be poorly cordmarked.

Four bases were present. One base was identified due to its morphology, but it was too fragmentary to determine its shape. The remaining three examples were considered to be bases due to their thickness, relative to the rest of the assemblage. Three had smoothed-over cordmarked exteriors, while the fourth sherd was smoothed plain matte. Basal thickness ranged from 8.3 mm to 9.9 mm, with a mean of 8.9 mm.

MNV was estimated based on characteristics of the three rims. Given differences in exterior surface treatment, and the direction and mode of lip notching, they appear to represent three different vessels.

<u>Mixed Fired Clay and Limestone Tempered Ware Group</u>
(n=4: 1 rim, 3 body sherds)
Not Illustrated

Characteristics of the fired clay temper and paste/paste inclusions for these specimens were the same as those described for the previous ware group. The difference lies in the presence (in about equal amounts) of small quantities of angular to subrounded voids within the paste, suggesting that particles from some kind of calcareous rock (limestone?) were present but have, over time, leached-out. Sherd size ranged from 1 to 7 square cm, with a mean of 4.3 cm.

Exterior surfaces were smoothed-over cordmarked (n=1) or plain matte (n=3). One plain example is smoothed and two are poorly smoothed, respectively. Exterior surface color was light brown (n=3) or medium gray (n=1). Twist was S-twist. Cordmarking was regularly applied, moderately deep, and moderately wide.

Interior surface treatment was smoothed plain matte (n=4). Interior surface color was light brown, reddish brown, or dark gray. Body sherd thickness ranged from 5.5 to 7.0 mm, with a mean of 6.2 mm.

Because of its size (1 mm), vessel form, lip shape, and rim orientation could not be determined for the rim assigned to this ware group. It had a poorly smoothed exterior and the rim thickened to the lip. Lip thickness measured 6.2 mm and rim thickness measured 5.9 mm.

The lip of the rim had been decorated with notches that extend diagonally completely across the lip. The notches are broad and shallow, but are incomplete due to the size of the specimen; therefore they cannot be measured. They likely were made with a plain dowel, but also could have been made with a fingernail inclined at an angle.

Based on the presence of this rim, this ware group has a MNV of one.

Summary

Investigation of the Flat Top site produced a small, very fragmentary ceramic assemblage: the average size of the analyzed sherds is only 3.9 square cm. All sherds showed varying amounts of weathering, particularly sherd edges.

The assemblage was almost exclusively tempered with fired clay (n=101; 96.2 percent), although a few specimens (n=4; 3.8 percent) also contained voids left by leached-out temper, probably limestone. Paste inclusions were common and consisted of small quartz sand particles and small hematite/manganese concretions. Most specimens exhibited a sandy paste.

Most sherds were cordmarked (n=76; 77.8 percent), and cordage twist was exclusively S-twist. The remainder (n=23; 22.2 percent) had plain matte exteriors. Exterior color ranged from light brown to light orange to medium gray, with light brown the most common. Interior surfaces were mainly smoothed plain matte and exhibited generally the same color range as exteriors, but decidedly fewer interiors were light orange.

Body sherd thickness for the assemblage as a whole was quite thin, ranging from 3.5 mm to 7.5 mm, with a mean of 5.2 mm. Rims were a bit thicker, on average, than bodies, ranging in thickness between 5.9 and 6.2 mm, with a mean of 5.7 mm, while lip thickness ranged from 6.0 to 6.5 mm, with a mean of 6.3 mm. Bases are significantly thicker than body sherds. They range in thickness from 8.3 to 9.9 mm, with a mean of 8.9 mm.

Due to the generally small size of the rim sherds, vessel form could not be determined for this assemblage, and only one rim could be oriented: it was direct. Lips were flat-rounded and most rims thickened to the lip.

Only four specimens, all rims, were decorated (3.8 percent of the assemblage). Decoration occurred exclusively on lips. It consisted of diagonal notching that extended completely across the lip. Notching was accomplished with a dowel or a fingernail and exhibited some variety: broad and shallow, and narrow and deep. Using rim morphology, temper, and exterior surface treatment, it was estimated that a minimum of four vessels was represented within the assemblage.

ASSESSMENT AND COMPARISON

Despite the small sample size and fragmentary nature of the Flat Top ceramic assemblage, by comparing its salient characteristics (temper, exterior surface treatment, wall thickness, lip decoration) to previously defined regional ceramic series and documented site ceramic assemblages, some statements can be made regarding its age of manufacture and the site's occupational history

The assemblage is very homogenous. Mixed Fired Clay and Limestone Tempered is probably just a minor variation of the major ware group, Fired Clay Tempered. This suggests that only one ceramic series is represented at the site, which in turn suggests that the assemblage may have accumulated over a relatively brief period of time.

Comparison to Twin Knobs Rockshelter

The ceramic assemblages recovered from Flat Top and the adjacent Twin Knobs Rockshelter are similar in many ways (see Chapter Five). The paste of the Flat Top specimens is most similar to the paste described for Twin Knobs Rockshelter's Fired Clay Tempered #2. Flat Top temper particle size spans the contrasting size ranges identified for Twin Knobs' exclusively fired clay tempered ware groups.

S-twist cordmarked exteriors predominate within both sites' assemblages, and vessel walls are thin at both sites: average body sherd thickness of the Flat Top specimens (5.2 mm) falls between Twin Knobs' Fired Clay Tempered #1 (at 4.2 mm) and Twin Knobs' Fired Clay Tempered #2 (at 6.7 mm). Rim and lip characteristics are similar in terms of lip shape, and rim modification and thickness, and at both, decoration consists only of notched lips, most commonly made with a dowel.

The two site assemblages are not identical, however. The Flat Top assemblage lacks examples of Mixed Fired Clay #1 and Shell Tempered, and lacks simple stamped and cordmarked specimens (see Chapter Five). This suggests a single component/shorter-term occupation for Flat Top in comparison.

Comparison to Regional Ceramic Series and Site Assemblages

The small number of sherds recovered from the Flat Top site, the diversity of regional ceramic types, particularly for the Late Woodland subperiod, and the status of regional Woodland period ceramic studies in western Kentucky, southern Illinois, southwestern Indiana, and makes comparison to previously defined ceramic types challenging. However, through a process of elimination and a consideration of the assemblage's salient characteristics, the field of relevant ceramic series can narrowed down, potential typological affiliations can be offered, and therefore a suggestion can be made regarding when the Flat Top ceramics were manufactured and used.

Relevant distinguishing characteristics of the Flat Top ceramic assemblage include:

very thin vessel walls;
a predominance of fired clay temper;
a predominance of cordmarked exteriors;
cordage twist that is exclusively S-twist;
a lack of appendages;
decoration that is restricted to the lips of vessels; and
notched lips (with notching that extends across the lip).

In the region under consideration for this comparison (western Kentucky, southern Illinois, and southwestern Indiana), Early Woodland and early Middle Woodland ceramics are characteristically thick-walled, often cordwrapped dowel- or fabric-impressed jars. Later in time, they can exhibit Havana Hopewellian decorative elements, such as rim bosses, or dentate stamping (Butler and Jefferies 1986; Hargrave 1982). These ceramic series are affiliated with the Baumer/Crab Orchard ceramic tradition (Applegate 2008; Butler and Jefferies 1986; Cole at al. 1951; Herndon 1999:245-248; Maxwell 1951). No examples of this ceramic tradition were recovered from Flat Top.

Late Prehistoric Mississippian ceramics in this region, as elsewhere in the lower Ohio River Valley, are tempered with fired clay/grog and/or shell early in the sequence, and exclusively with shell later in the period (Phillips 1970; Phillips et al. 1951; Pollack 2008b). No specimens of any size containing shell temper alone or mixed with fired clay/grog were recovered from Flat Top. Thus, through a process of elimination, it can be determined that the ceramics from Flat Top were most likely manufactured, used, and discarded sometime during the late Middle Woodland or Late Woodland subperiod periods.

The distinguishing characteristics of the Flat Top site ceramic assemblage outlined above support a Late Woodland affiliation. A host of thin-walled, fired clay/grog tempered, mainly cordmarked Late Woodland ceramic types/series have been identified for this time period in surrounding Kentucky counties (cf. Applegate 2008) and adjacent states: Lewis, Raymond, and Dillinger (Cole et al. 1951; Hargrave 1982; Maxwell 1951); Duffy (Winters 1967); Yankeetown (Blasingham 1953; Redmond 1990; Winters 1967); Rough River (Schlarb et al. 2000); and Mulberry Creek Cordmarked and Baytown Plain (Clay 1963; Phillips 1970; Phillips et al. 1951). However, based on the characteristics of this site's assemblage (and taking into consideration aspects of the site's chipped stone tool assemblage and its setting and geographic location) only two, the Lewis and Raymond ceramic series, hold the highest potential/likelihood for affiliation.

Lewis ceramics (first defined in MacNeish's 1944 thesis and described in Cole et al. [1951:178-181] at Kincaid) are commonly found in the lower Ohio River Valley proper, from the mouth of the Saline River downstream to the Mississippi River at sites in southern Illinois south of the Shawnee Hills and in western Kentucky (Butler and Wagner 2000; Applegate 2008). Raymond ceramics were defined by Maxwell (1951) at sites north of the Shawnee Hills in southern Illinois. Both ceramic traditions have been discussed and characterized more recently by Herndon and Butler (2000, 2002), Butler and Wagner (2000, 2012), Butler (2007), and Butler and DiCosola (2008).

These two ceramic series date to the latter half of the Late Woodland subperiod period (A.D. 600-800/850) (Herndon and Butler 2000:125). Characteristics they share include thin vessel walls, "coconut-shaped" jars that are the predominant vessel form, grit or fired clay/grog temper, predominantly cordmarked exteriors, notched rims, and (rarely) wide incised/trailed exterior jar neck decoration (Herndon and Butler 2000:125, 2002:171). These ceramic traditions lack folded rims, appendages, and a diversity of vessel forms, attributes that are distinctive of later, Terminal Late Woodland Dillinger ceramics (cf., Hargrave 1992; Maxwell 1951).

The major ceramic differences between Lewis and Raymond are found in temper type and lip notching placement. Lewis assemblages are almost exclusively fired clay/grog tempered (Butler and Wagner 2000:688; Jackson and Butler 2012:132), while temper type in Raymond assemblages changes over time from grit (crushed igneous/metamorphic rock) to fired clay/grog (Herndon and Butler 2002:184-185). Notching on the lips of Lewis ceramics are initiated primarily from the rim exterior, while for Raymond ceramics, notching is initiated primarily from the interior (Butler and DiCosola 2008:30; Butler 2007; Herndon and Butler 2002:184-186; Jackson and Butler 2012:132).

Wagner and Butler (2000) documented a Late Woodland/Terminal Late Woodland occupation at the multicomponent Hills Branch Rockshelter in Pope County, Illinois that produced Lewis ceramics. The calibrated radiocarbon date for that component (at 2 sigma) was A.D. 680(875)1005 (Wagner and Butler 2000:59). The ceramics were thin (mean=4.7 mm); mainly cordmarked; and mainly fired clay/grog tempered. The assemblage lacked bowls, and lips were notched mainly on the exterior (Herndon and Butler 2000:137-138).

Much larger Lewis Series ceramic assemblages have been recovered from two lower Ohio Valley Stone Fort Complex sites: Hog Bluff (Brieschke and Rackerby 1973; Butler and DiCosola 2008:29-30) and Cypress Citadel (Jackson and Butler 2012; Klein 1981) in Johnson County. The Hog Bluff assemblage was almost completely fired clay/grog tempered and mostly S-twist cordmarked. The specimens were thin: thickness ranged from 2.1 to 13.0 mm, with a mean of 5.3 mm. Decoration consisted of lip notching with a dowel or stick, or with a sharp instrument, and most notching was initiated from the exterior. Distinctive broad line incised or trailed decoration occurred on 5.6 percent of the rims.

In contrast, at Cypress Citadel, incised/trailed decoration occurred on 31 percent of the rims (Jackson and Butler 2012:147, 155). Other aspects of the ceramics, however, were similar to those from Hog Bluff. The sherds were overwhelmingly tempered with fired clay/grog, exteriors were mostly cordmarked S-twist (Z-twist on the sherd, made by S-twist cordage) (Butler and DiCosola 2008:29-30; Jackson and Butler 2012:138, 154-155), and sherds were very thin (mean=4.5 mm) (Jackson and Butler 2012:154). Decoration occurred on lips (mainly exterior notched) and jar necks (incised/trailed geometric designs made up of multiple parallel straight lines) (Jackson and Butler 2012:154-155; Klein 1981:243-270).

In Kentucky, Lewis ceramics have been recovered from a few sites, like Fort Ridge (15Ca1/Ca57-60) (see Chapter Two) and the multicomponent Chestnut Lake site (15Lv222) (Herndon 2003). However, McGilligan Creek Village (15Lv199), a lower Ohio Valley Stone Fort Complex site, has produced the largest Lewis ceramic assemblage recovered from a Kentucky site (Henderson and Gray 2011; Henderson and Pollack 1996; Pollack and Henderson 2000:618-621; Stackelbeck 2005; also see Chapter Two).

The analyzed McGilligan Creek Village assemblage (n=1,703) is dominated by fired clay tempered (alone or in combination with grit or limestone) S-twist cordmarked sherds (93.7 percent) (Henderson and Gray 2011; but note that as of 2012, the assemblage is under analysis by Jackson). Sherds with plain, simple stamped, check stamped, and fabric-impressed exteriors make up only about 5.0 percent of the assemblage. Body sherd thickness ranges from 3.0 to 8.4 mm, with a mean of 5.3 mm. About 23.0 percent of the rims are incised, which is a much higher percentage than at Hog Bluff and more comparable to Cypress Citadel (Butler 2001; Jackson and Butler 2012; Klein 1981). Lips are decorated in a variety of ways (notching, punctation, castellation, and cordmarking/cordwrapped-dowel), but notching predominates. Importantly, notching on lip exteriors predominates at McGilligan Creek Village. Geometric designs made up of incised/trailed, single or multiple, straight or curved parallel lines occur below the lip on necks (body sherds). The inventory and execution of incised/trailed decoration is different between McGilligan Creek Village and Cypress Citadel (Jackson and Butler 2012:155).

In many ways, McGilligan Creek Village's topographic setting, the top of a mesa-like bluff feature ringed at its base with rockshelters, is much like of the Flat Top and Twin Knobs Rockshelter locale, only writ large. Calibrated radiocarbon dates for McGilligan Creek Village (at 2 sigma) are A.D. 594(665)790 and A.D. 895(1025)1218, although the latter date is considered too late (Pollack and Henderson 2000:615).

Summary

Based on these comparisons, the Flat Top site ceramic assemblage meets all of the Lewis Ceramic Series criteria, although lip notching is situated neither on the lip exterior nor on the lip interior (this likely reflects its small sample size). In particular, its two ware groups are very similar to the dated Lewis assemblages recovered from Hills Branch Rockshelter and McGilligan Creek Village. Thus, the ceramics at Flat Top likely were manufactured sometime between A.D. 600-800/850.

SPATIAL CONSIDERATIONS

The density of ceramics at the Flat Top site is not great. Still, the assemblage exhibits clear horizontal patterning, and this can help to characterize the site's prehistoric occupation.

The Flat Top site is located on top of a small, roughly oval knob that measures approximately 425 square meters. Stratigraphy does not provide much spatial information, since all material culture remains, including the ceramics, were recovered from Zone I (0-12 cm below surface). This evidence does indicate, however, that the knob was never plowed.

The horizontal distribution of the ceramics can provide some insights, however. Sherds of any size were scattered across the entire site, recovered from 26 of the 30 1 x 1 m units (no sherds were recovered from the two .50 x .50 cm units) (Figure 10.2), but this distribution was uneven. Most sherds were recovered from units excavated in the western half of the site, and three areas in particular produced the highest concentration of sherds (Figure 10.2). Five units in these three areas produced 49.7 percent (n=73) of all sherds of any size recovered, but sherd density in these areas is still low: only between 13 and 17 total specimens. No concentrations of Mixed Fired Clay and Limestone Tempered sherds or decorated specimens occurred.

These patterns suggest that, while activities may have been concentrated in the western half of the bluff, these activities were not particularly intense, as ceramic accumulations were not dense. The complementary distribution of the two ware groups supports the suggestion that sherds assigned to the Mixed Fired Clay and Limestone Tempered Ware Group are simply a variation of the Fired Clay Tempered Ware Group.

The use of the Flat Top site during the Late Woodland subperiod period apparently was brief and not particularly intense. It may never even have been occupied, given the low artifact density and its proximity to Twin Knobs Rockshelter.

OCCUPATIONAL HISTORY

Based on these typological and comparative considerations, it appears that prehistoric peoples used the Flat Top site only during the Late Woodland. There is no ceramic evidence for any earlier or later use of the site (unlike Twin Knobs Rockshelter, see Chapter Five). The groups who manufactured these vessels were affiliated with the Lewis phase, despite variation in how they notched the lips of their vessels. This departure can be accounted for by sample size.

The Flat Top site's association with an isolated knob provides additional support for the assignment of the site assemblage to the Lewis Series and, by extension, the Flat Top/Twin Knobs Rockshelter locale to the lower Ohio Valley's Stone Fort Complex (Brieschke and Rackerby 1973; Butler 2001; Butler and Wagner 2012; Klein 1981;

Muller 1986:150-153). The spatial relationship of Flat Top and Twin Knobs Rockshelter mirrors the situation documented in the McGilligan Creek drainage, located only 33 km west in Livingston County. There, the Lewis Series ceramic-producing occupants of McGilligan Creek Village lived on a blufftop situated directly above Lewis Series ceramic-producing occupants of several rockshelters: Mantle Rock Petroglyph site (15Lv160), Dollar Bill Shelter (15Lv212), and Kissing Rocks Shelter (15Lv213) (Henderson and Pollack 1996; Stackelbeck 2005).

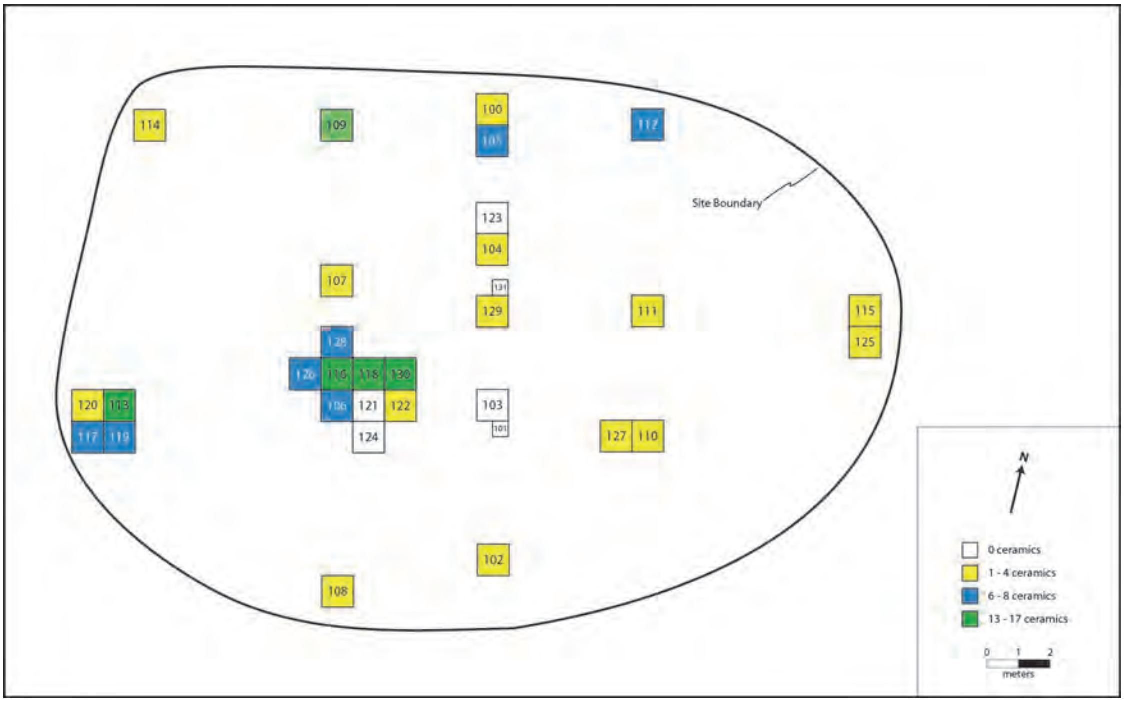

Figure 10.2. Horizontal Distribution of All Ceramics at the Flat Top site.

SUMMARY AND CONCLUSIONS

Investigations at the Flat Top site recovered a small Lewis Series ceramic assemblage reflecting utilitarian domestic activities that took place there sometime between A.D. 600-800/850. The ware groups from Flat Top are very similar to the two fired clay tempered ware groups recovered from Twin Knobs Rockshelter, which is situated directly below Flat Top. Thus it seems clear that the two sites were occupied/used during contemporary times, if not simultaneously. However, the Flat Top site's occupation apparently was shorter than that of Twin Knobs Rockshelter. Activities at Flat Top were not particularly intense, but the distribution of ceramics suggests that they may have been concentrated in the western half of the knob.

The Lewis phase occupation at the Flat Top/Twin Knobs Rockshelter locale is a smaller, less intensive expression of the situation documented at the McGilligan Creek Village locale in Livingston County. It indicates that these sites' occupants were participants in the lower Ohio Valley's Stone Fort Complex.

CHAPTER ELEVEN: SUMMARY AND CONCLUSIONS

Between 7 May and 9 August 2005, Kentucky Archaeological Survey (KAS) personnel excavated the Twin Knobs Rockshelter (15Cn50) and Flat Top (15Cn52) site in central-southern Crittenden County, Kentucky. This work was conducted for the Kentucky Transportation Cabinet (KYTC) in advance of the relocation of the U.S. 641 highway corridor between the towns of Marion, Crittenden County and Fredonia, Caldwell County, Kentucky. The Twin Knobs Rockshelter and Flat Top site are located on the side and top, respectively, of one of the relatively small, free-standing sandstone knobs that characterize central and eastern Crittenden County.

TWIN KNOBS ROCKSHELTER

The Twin Knobs Rockshelter is a small sandstone overhang situated on the southeastern face of the western peak of Twin Knobs at approximately 242 m amsl. The site measures 11 m east/west by 5 m north/south, although the flat, habitable space of the shelter measures only 5 m north/south by 5 m east/west. The site was originally identified in 2005 during an archaeological survey of the highway corridor re-alignment (Miller and Striker 2005).

The survey noted the presence of a large looter pit near the back wall of the shelter. At that time, artifacts were recovered from looter backdirt and an examination of the looter pit profile suggested a complex sequence of intact stratigraphy extending at least to a depth of 60 cm below surface. Additional modern disturbance of the shelter's surface was indicated by the presence of a low rock wall, a fire pit, and trash. Graffiti was observed on the rear wall of the shelter. Although no temporally-diagnostic artifacts were recovered during the initial recording of the site, the presence of intact subsurface sediment and recovery of a relatively substantial number (n=92) of artifacts from the looter backdirt suggested that the site contained potentially significant prehistoric cultural deposits. As a result, additional investigation of the Twin Knobs Rockshelter was recommended (Miller and Striker 2005).

KAS investigation of the Twin Knobs Rockshelter consisted of the excavation of 13 1 x 1 m^2 units and two 1 x 0.5 m^2 units, for a total of 14 m^2. The 15 units are contiguous and comprise an excavated block that measures 4 m north/south by 4.5 m east/west. The maximum depth of deposits at the Twin Knobs Rockshelter was 1 m below surface, although most units terminated between 75-90 cm below surface. This investigation documented the shelter's subsurface stratigraphy and intrasite spatial patterning, provided detailed information regarding the occupational history of the shelter, and recovered a relatively large artifact assemblage.

Five distinct sediment zones (Zones A/B, C, E, and H) and two features (Zone D [Feature 1] and Feature 2) were identified within the rockshelter. The appearance and thickness of individual stratigraphic zones varied (sometimes substantially) across the shelter area, resulting in a relatively complex stratigraphic sequence. Like many rockshelters, the complexity of the depositional history has been compounded by the persistent reuse of the shelter through time and bioturbative processes (e.g., rodent and root activity). In addition, modern recreational use of the shelter and looter activity disturbed a substantial portion of the uppermost deposits.

Each of the sediment zones and features identified within the shelter contained relatively high densities of cultural materials. Diagnostic lithic materials include a relatively large number of projectile points and projectile point fragments that span the Late Paleoindian to Late Prehistoric periods. Diagnostic ceramics recovered from the shelter are associated with the Late Woodland and Late Prehistoric periods.

Zone A/B represents the modern surface, historic use, and Late Prehistoric occupation of the shelter. Although distinguishable in profile, these two zones were combined during analysis because of the substantial modification and mixing of the uppermost deposits by looter and modern recreational activities. Madison Triangular points were the most common diagnostic projectile points associated with Zone A/B. A Nodena point, a Motley point, and a Buck Creek Barbed point also were recovered from these two zones. Madison points have been recovered from terminal Late Woodland through Mississippian contexts throughout the lower Ohio Valley. The presence of the Nodena points is suggestive of late Mississippian use of the shelter. The Motley and Buck Creek Barbed points date to the Late Archaic-Early Woodland subperiods and thus predate the Madison and Nodena points. The presence of these points within deposits of a clearly later age suggests that they are redeposited. Given the amount of looter activity (predominantly targeting a large Terminal Archaic/Early Woodland feature) documented at this site, it is very likely that these points were redeposited into later contexts as a result of those activities. It is also equally possible that the points were disturbed from their primary (and presumably deeper) contexts during the terminal Late Woodland/Mississippian occupation(s) and use of the shelter. In either event, they represent a minor component of the diagnostic lithic tools from Zone A/B—which overwhelmingly consists of arrow points.

Ceramics from Zone A/B included Fired Clay Tempered wares with cordmarked, simple stamped and cordmarked, and plain exteriors and Mixed Fired Clay and Shell Tempered wares with cordmarked exteriors. These ceramics are very similar to those recovered from the Late Woodland (A.D. 600-900) Lewis phase Zone C deposits, with the primary difference being the use of shell as a tempering agent. The overall similarity of these two ceramic wares suggests that the Mixed Fired Clay and Shell Tempered sherds were manufactured during Terminal Late Woodland times. The absence of later shell tempered Mississippian types, such as Mississippi Plain, Bell Plain, and Kimmswick Fabric Impressed, is rather striking given the large number of triangular projectile points recovered from Zone A/B.

Non-diagnostic lithic tools recovered from Zone A/B included drills, utilized flakes, and retouched flakes. The presence of these informal tools suggests that a range of activities likely took place at the shelter. It is likely, however, that these activities involved plant and animal collection and processing, food preparation, and tool/equipment maintenance.

The faunal and botanical evidence from Zone A/B is similarly suggestive of activities related to resource collection (particularly nuts and wild plants) and processing. Identifiable faunal materials from Zone A/B were limited, but included deer, rabbit, and pig. The presence of pig reflects the mixed nature of the upper deposits and is indicative of historic use of the shelter. Botanic materials included nuts (hickory and black walnut) and wild plant seeds (pokeberry, sumac, sweetclover, pondweed, grape, and cherry). Two native cultigens, an Eastern eight-row corn cupule (*Zea mays*) and a domesticated chenopod (*Chenopodium berlandieri*) specimen also were associated with this zone. Both were represented by single specimens. The presence of both is to be expected in terminal Late Woodland/Mississippian deposits. But what was not expected was that they would be so underrepresented in the botanical collection. This suggests that both may have been grown elsewhere and brought to site as trail food during periodic visits. The other plant remains could have been collected in the vicinity of the rockshelter.

Zone C varied in thickness across the shelter and is stratigraphically positioned between Zone A/B, and Zones D and E. Prehistoric ceramics consisted entirely of Fired Clay Tempered wares with cordmarked, plain, and simple stamped and cordmarked exteriors. The ceramics from Zone C appear to be representative of Late Woodland Lewis phase pottery (A.D. 600-900).

The diagnostic lithics are less conclusive when it comes to determining the age of the Zone C deposits. Identifiable projectile points consisted of a Madison triangular, an Adena Stemmed, a Motley, and a Buck Creek Barbed. The age of these points ranges from the Late Archaic to Early Woodland (Motley, Buck Creek, and Adena) to the terminal Late Woodland/Mississippian (Madison). Given the age suggested by the associated ceramics (Late Woodland), it seems likely that only the Madison point could potentially be in primary context. The presence of earlier Late Archaic and Early Woodland points is suggestive of some earlier materials having been incorporated into the Zone C sediments. It seems likely that the Late Woodland activities in the shelter resulted in the incorporation of some of the underlying Late Archaic and Early Woodland sediments into the Zone C deposits.

Non-diagnostic tools recovered from Zone C included retouched flakes, drills and utilized flakes. The presence of informal tools suggests that a range of activities likely were undertaken in the shelter by the Late Woodland occupants. As with the overlying Terminal Late Woodland/Mississippian occupations (Zone A/B), these activities probably involved plant and animal collection and processing, food preparation, and tool/equipment maintenance.

Faunal materials recovered from Zone C consisted of deer, rabbit, and turtle shell. Interestingly, one of the deer specimens evidences cut marks that are embedded with chert fragments—clearly indicating prehistoric butchering. In general, however, the faunal assemblage from Zone C is limited. Botanical materials associated with Zone C included nuts, wild plants, and native cultigens. Nut species dominate the plant remains from this zone, with hickory, black walnut, hazelnut, butternut, and acorn. Wild plant seeds included sumac, blackberry, spikenard, pokeberry, cherry, grape, pondweed, and spikerush. Native cultigens were the least well-represented, but did consist of fragments of gourd rind (*Lagenaria* sp.) and marshelder (*Iva annua*). The minimal presence of native cultigens in Zone C suggests that wild plant collection, and in particular nuts, was the principal focus of plant exploitation by the Late Woodland occupants of the shelter. It also suggests that the native cultigens many have been grown elsewhere and brought to the site during periodic visits.

Zone D (Feature 1) is a large Terminal Archaic/Early Woodland pit (perhaps a series of intersecting and overlapping, small pits) that was characterized by a dense, organically-rich dark sandy silt that appeared unevenly between 20-90 cm below surface in the central/back portion of the shelter. The dark sediment was visible in the profile of the large looter pit that had been excavated near the rear of the shelter and was originally identified as Zone D. It was not until several units had been excavated that the boundaries of Zone D were defined and it became clear that it was a large pit. The character of the Zone D deposits (very dark, organically-rich sediment) was distinct from the surrounding sediments and allowed for precise definition of the feature boundaries. Feature 1 measured 1.70 m north/south by 2.82 m east/west, although a substantial portion of the feature had been destroyed by looter activity. A single radiocarbon date of 2910±70 B.P. (3316-2863 cal B.P.; 1367-914 cal B.C.) obtained from a nutshell fragment recovered from a flotation sample in the upper portion of Zone D is suggestive of a Terminal Archaic/Early Woodland age for Zone D.

Only three ceramic sherds were recovered from Zone D and none correspond well with the Terminal Archaic/Early Woodland radiocarbon date. They consisted of two Fired Clay Tempered Cordmarked sherds and a Fired Clay Simple Stamped and Cordmarked sherd. All strongly resemble specimens from the overlying Late Woodland Zone C deposits. In terms of age, the diagnostic lithic tools from this feature are equally confounding. Four identifiable projectile points were recovered from this feature. None are diagnostic of the Terminal Archaic/Early Woodland, but one, a Lowe Flared Base, is consistent with the Zone C Late Woodland deposits and another, a Nodena, dates to the late Mississippian. The other two points, a Matanzas and an Etley point, date to the Late Archaic period.

The Lowe Flared Base and the Nodena recovered from Zone D are intrusive from the overlying Late Woodland Zone C deposits and likely filtered down post-depositionally from the upper deposits—perhaps mixed and redeposited by later site occupants or through looter activity. Because of the amount of sediment that must have been displaced during the original digging of Feature 1—and later through the substantial re-digging by looters—some mixing of both earlier deposits within the feature should be expected.

Other lithic tools recovered from Zone D included retouched flakes, utilized flakes, and a drill. The presence of informal tools suggests that activities probably involving plant and animal collection and processing, food preparation, and tool/equipment maintenance are reflected in the pit fill.

Faunal materials from Zone D included a relatively wide range of terrestrial resources. Identified species included deer, opossum, groundhog, bird, and turtle. In addition, three bird eggshell fragments were recovered from Zone D. Floral materials in Feature 1 are dominated by nutshell, but also included a wide range of wild plant seeds and a few native cultigens. Nut species identified, such as hickory, black walnut, butternut, and acorn, attest to an extensive use of upland forests. Wild plant species included hackberry, nightshade, blackberry, spikenard, pokeberry, grape, wild chenopod, sumac, cherry, sweetclover, serviceberry, hornpondweed, pondweed, and ground cherry. The presence of pondweed and hornpondweed—which are wetland plants—suggests exploitation of a wide range of ecological zones. The few native cultigens, which included sunflower (*Hellianthus annus*) and marshelder (*Iva annua*), suggest these food remains many have been grown elsewhere and brought to the site during periodic visits.

Zone E was characterized by a reddish-brown sediment of relatively uniform thickness that was present across much—but not all—of the shelter area. Zone E appeared relatively consistently between 20-38 cm below surface and extended to a maximum depth of 47-67 cm below surface. The relatively high density of artifacts and the presence of Feature 2 within Zone E, combined with the reddish (oxidized) appearance of the sediment, suggests that this zone may have had a different function from other zones at the Twin Knobs Rockshelter.

Four radiocarbon dates were obtained on nutshell fragments from Zone E. All are suggestive of a Late Archaic age for the stratum (Table 11.1). The dates range from 5463-3618 cal B.P. (3628-1669 cal B.C.) and generally reflect a pattern of older age with increasing depth within Zone E. These dates suggest relatively intensive use of the shelter during the Late Archaic period that probably involved seasonally-repeated occupations over multiple centuries.

Table 11.1. Radiocarbon dates from Zone E.

Unit/Level	Zone	Depth	^{14}C date	Cal BP*	Cal BC*	Sample ID
TU 9/Level 5a	E	40-45	3520±70	3983-3618	2034-1669	ISGS-6078
TU 6/Level 5b	E	45-50	4100±80	4828-4431	2879-2482	ISGS-6073
TU 11/Level 6b	E	55-60	4520±100	5463-4867	3514-2918	ISGS-6077
TU 6/Level 6b	E	55-60	4570±90	5446-5051	3628-3013	ISGS-6076

*Calibration data (Reimer et al. 2009)

Diagnostic projectile points recovered from this zone included a Merom point, two Terminal Archaic Barbed points, two Saratoga points, two Palmer Corner Notched points, a Hardin Barbed point, and a Dalton point. Two distinct age ranges are suggested by these points—the Late Paleoindian to Early Archaic period (Dalton, Hardin Barbed, and Palmer Corner Notched) and the Late Archaic period (Merom, Saratoga, and Terminal Archaic Barbed). Given the Late Archaic age suggested by the associated radiocarbon dates, the diagnostic Late Archaic points are likely in primary context within the Zone E deposits. It is likely that the earlier points are associated with a lower zone (Zone H) and were post-depositionally mixed into Zone E by activities performed by the Late Archaic occupants of the site.

Other lithic tools recovered from Zone E included a relatively large number of informal tools (utilized and retouched flakes) and drills. These tools are likely suggestive of a range of activities related to plant and animal collection and processing, food preparation, and tool/equipment maintenance.

Faunal materials recovered from Zone E were scant and consisted of a single fragment of turtle shell. Botanical materials, in contrast, were abundant in Zone E and were dominated by nutshell. Hickory, by far, was the most prevalent nut species represented. Black walnut, butternut, acorn, and hazelnut also were present but in much lower amounts. A few wild plant seeds also were recovered from Zone E. They consisted of persimmon, grape, sumac, spikenard, sweetclover, and ragweed. No native cultigens were present within Zone E.

A small hearth feature (Zone F [Feature 2]) was identified near the top of the Zone E deposits at 38 cm below surface and extended to a depth of 47 cm below surface. Feature 2 was originally identified as a distinct zone—Zone F—and was collected and recorded separately from the surrounding Zone E deposits. It is characterized by a small area (81 cm north/south by 74 cm east/west) of burned and mottled sediment associated with burned sandstone and four groundstone implements (two nutting stones and two sandstone grinding slabs). Other artifacts recovered from Feature 2 included a drill and lithic debitage.

The sediment of Zone F (Feature 2) was a dark reddish brown fine sandy silt mottled with ash and charcoal flecking. Unfortunately, no charcoal large enough to date was recovered from within the burned area of Feature 2. However, a date of 3770±70 B.P. (4407-3932 cal B.P.; 2458-1983 cal B.C.) on a nutshell fragment collected next to the groundstone tools suggests that the age of the feature is similar to that of the surrounding Zone E sediment (i.e., Late Archaic). Botanical materials from Feature 2 were dominated by hickory nutshell and wood, with black walnut and grape also present.

Given the similarity in radiocarbon dates from Zone E and Feature 2, these deposits probably should be considered together. The presence of nutting and grinding stones associated with a hearth, and a high frequency of hickory nutshell suggests that Zone E and Feature 2 likely represent a specialized Late Archaic plant (nut) processing locus. The diagnostic Late Archaic projectile points support the radiocarbon dates, and the relatively high number of informal lithic tools provide additional support for interpretation of these deposits as the location where nuts (and probably other plants to lesser degrees) were processed and prepared.

The absence of faunal remains may be related to site taphonomic or preservation issues, but it also seems possible that their relative absence in the Zone E/Feature 2 deposits reflects an emphasis on the collection of plant resources. An emphasis on plant collection and processing suggests that specialized task- or work-groups occupied the shelter on a seasonal basis (probably late summer to fall given the prevalence of nutshell). Because many centuries of use are indicated by the radiocarbon dates (ca. 5400-3600 cal B.P.; 3400-1600 cal B.C.), the Twin Knobs Rockshelter likely witnessed multiple, seasonally-repeated episodes of use by small, relatively specialized task groups.

The basal zone identified at the site was Zone H. It consisted of a homogeneous light yellowish-brown fine sandy silt that contained large rocks and exfoliating sandstone bedrock. Zone H is overlain by Zone C or Zone E depending on the location within the shelter, and appeared between 46-64 cm below surface and extended to a maximum depth of 1.00 m below surface.

Diagnostic projectile point types recovered from Zone H included a Beaver Lake, Kirk Stemmed, St. Charles, and Big Sandy. These points are suggestive of a Late Paleoindian to Early Archaic age for the Zone H deposits. The age of these deposits also suggests that the Late Paleoindian and Early Archaic points identified in the overlying Zone E sediments (Beaver Lake, Hardin Barbed, and Palmer Corner Notched) are likely associated with Zone H. The presence of these varied early point styles may indicate relatively persistent use of the shelter during the Late Paleoindian and Early Archaic periods or perhaps, that the Twin Knobs Rockshelter was visited by several different small groups or individuals.

Other lithic tools recovered from Zone H consisted of retouched and utilized flakes. No faunal materials were recovered from Zone H. The few botanical materials consisted of hickory nutshell, sweetclover, and a fragment of gourd rind.

Summary of the Twin Knobs Rockshelter

The material culture assemblage and stratigraphic data from the Twin Knobs Rockshelter reflects a long and significant record of indigenous human use of the site—spanning the Late Paleoindian through the Late Prehistoric periods. Nearly all of the prehistoric sequence of western Kentucky is represented in this relatively small shelter. Changes in material frequencies and deposition are suggestive of broad, long-term patterns of changing human behavior and use of this location. Although some mixing of artifacts is present, most of the stratigraphic zones are internally consistent enough in terms of diagnostic artifacts and radiocarbon dates, to be associated with specific prehistoric time periods. Investigation of the Twin Knobs Rockshelter has provided significant and important insights into several periods of the prehistory of western Kentucky.

The earliest use of the shelter during the Late Paleoindian and Early Archaic periods (ca. 8,500-6,000 B.C.) seems to have involved small groups or individuals and short-term occupations. The limited amount of faunal and floral materials recovered, and the limited range of chipped stone tools, suggests that the site probably served as a temporary hunting camp or stop-over. Evidence for use as a way station is reflected in the diversity of early point styles associated with the initial occupations of the site.

During the Late Archaic subperiod (ca. 3500-1200 B.C.), use of the site was more intensive and focused on the exploitation of upland plant resources—particularly nuts. A relatively large activity surface containing a hearth and groundstone implements was associated with large quantities of nutshell and some wild plant resources. Given the relative lack of faunal remains and absence of domestic features (other than the plant processing area), it appears that use of the shelter during the Late Archaic period probably involved small, specialized task-groups that visited the site on a seasonal basis (likely in the fall).

The emphasis on the exploitation of wild plant resources continued into the Terminal Archaic/Early Woodland (ca. 1200-800 BC). Use of the rockshelter at this time is indicated by the presence of a large pit that containing abundant nutshell and wild plant seeds (including some wetland plants). With the notable exception of the presence of native cultigens, the character of the Terminal Archaic/Early Woodland use of the site is very similar to that of the preceding Late Archaic occupations but may have involved exploitation of a more diverse range of ecological settings.

Late Woodland (ca. A.D. 400-900) use of the shelter appears to be more extensive in terms of species exploited, and included a range of terrestrial fauna and wild plants. Nuts, particularly hickory, remain the best represented resource. Interestingly, native cultigens—although present—still appear to represent only a minor source of food at the site. The wider range of exploited species is also reflected in the artifact assemblage, which demonstrates the first appearance of Lewis ceramics and a more diverse informal chipped stone tool assemblage. The more extensive use of the shelter during the Late Woodland is probably associated with the occupation of the nearby Flat Top site. During the Late Woodland period—and only in this period—is there evidence for contemporaneous use of both sites. During this period, these two sites should probably be considered part of a larger Lewis phase site complex.

The uppermost deposits in the shelter contain evidence of Terminal Woodland through Late Prehistoric period occupations (ca. AD 900-1700). The material assemblage from this period reflects a return to relatively limited used of the shelter. Projectile points are dominated by small triangular arrow points, with only a few mixed fired clay and shell-tempered sherds present. The relatively large number of arrow points and absence of common Mississippian ceramic types probably indicates that the primary use of the site once again returned to that of a temporary hunting camp that was repeatedly visited by small groups of individuals.

The Twin Knobs Rockshelter is located on a distinctively shaped landform equidistant between the Cumberland River (approximately 23 km to the south) and Ohio River (approximately 22 km to the north)—roughly a day's walk in either direction. This relatively conspicuous landmark (Gollege 2003), combined with evidence for repeated, short-term occupations and diversity of contemporary projectile point types (particularly during the Late Paleoindian, Early Archaic, and Late Prehistoric periods) suggests that the shelter may have persistently served as a known stop-over between the two large drainages. Only during the Late Archaic and Late Woodland periods did the site witness more intensive use and longer periods of occupation. Throughout most of the site's occupational history, it probably served as an easily recognized and convenient way-station for individuals or small parties of travelers moving along a natural overland corridor.

THE FLAT TOP SITE

The Flat Top site is located on the small, flat, upper surface of the western peak of Twin Knobs. The site measures 24 m north/south by 36 m east/west and encompasses the entirety of the flat surface of the knob top. Access to the knob top is difficult as the side-slopes are cliff-like. The site was identified by the presence of cultural material eroding down the knob slope.

In order to determine the nature and extent of the prehistoric use of this knob, units were opportunistically spaced across its relatively small, habitable surface. As a result of this strategy, the majority of the units are isolated. Two blocks (Blocks A [9 m^2] and B [4 m^2]) of contiguous units also were excavated in areas containing high artifact densities, particularly ceramic, to provide fine-grained spatial data and increase the sample of diagnostic cultural materials.

In general, units excavated at the Flat Top site documented relatively shallow deposits across the surface of the knob. No features were identified and artifact densities were relatively low. The overall stratigraphic pattern is indicative of a thin (7-15 cm thick), single component depositional episode that dates to the Late Woodland period (ca. A.D. 400-900). Identifiable prehistoric ceramics, included Fired Clay Tempered and Mixed Fired Clay and Limestone Tempered sherds. Exterior surfaces included cordmarked and plain, although cordmarking is by far the more common surface treatment. In general, the ceramics from the Flat Top site are characteristic of the early Late Woodland Lewis phase.

Diagnostic lithic artifacts were relatively limited, but included two Lowe Flared Base points and a single Madison projectile point. Lowe points are commonly associated with Lewis ceramics and are suggestive of an early Late Woodland age for the site. The Madison point is probably associated with the terminal Late Woodland and may represent the temporal extent of Late Woodland use of the Flat Top site.

Other lithic tools recovered from the Flat Top site consisted of retouched flakes, utilized flakes, blade-like flakes, a polished Mill Creek chert hoe (including 39 polished hoe flakes), a drill, and a unifacial endscraper. A relatively wide range of domestic activities is represented by the artifact assemblage. In spite of the range of domestic activities, the absence of features, relatively low artifact densities, and shallow, single component deposits suggest that the occupation of the site was not intensive (probably short-term and seasonal) and may have involved small groups, or perhaps individual family units.

Summary of the Flat Top site

The Flat Top site is contemporary with the Late Woodland deposits (Zone C) identified in the nearby Twin Knobs Rockshelter. Floral and faunal materials recovered from the rockshelter are suggest of the use of a relatively wide range of resources and environmental settings. The similarity in diagnostic artifacts between the two sites suggests that the occupants of the Flat Top site probably made extensive use of the nearby rockshelter as a location for processing or perhaps storing resources. During the Late Woodland subperiod, these two sites should probably be considered related aspects of a single site complex.

The presence of Lewis pottery and Lowe Flared Base points suggests that the occupation of the Flat Top site is probably associated with the regionally-defined early Late Woodland Lewis (A.D. 600-900) phase. The conspicuous location of the Flat Top site on top of a relatively inaccessible knob, Lewis phase age, and evidence for single component, short-term use suggest that it is a 'stone fort'. These characteristics are shared by other small Late Woodland 'stone fort' sites that have been identified in the lower Ohio Valley (see Butler and Wagner 2000, 2012; Muller 1986; also see discussion in Chapter Two, this volume). The Late Woodland Stone Fort Complex is primarily known from southern Illinois and only a few of these sites have been identified in Kentucky (see Pollack and Henderson 2000). As such, the information from the Flat Top site represents a significant and important addition to our understanding of the Late Woodland period in western Kentucky and the lower Ohio Valley region. At present, however, our understanding of the function(s) of 'stone forts' in the lower Ohio region remains relatively limited.

RE-THINKING 'STONE FORTS' AND EARLY LATE WOODLAND SOCIAL ORGANIZATION

It has been argued that greater settlement dispersal during the early Late Woodland period reflects a system of social organization characterized by relatively autonomous small groups (e.g., households or family units) (Butler and Wagner 2000, 2012; Muller 1986; also see Chapter Two, this volume). There is little archaeological evidence for formalized social differentiation in Lewis phase sites or artifact assemblages, and group size and membership likely was highly fluid. Muller (1986:145-146) sees this lack of differentiation and fluidity as expressions of the absence of centralized political authority, and further suggests that no supra-local coordination or high-level social integration was present during the Lewis phase.

Although the absence of higher level integrative mechanisms does provide an intriguing explanation for the dispersed nature of early Late Woodland settlement, as Pollack and Henderson (2000:613) have noted, some form of sustained regional interaction must have been occurring to have produced the widespread similarity observed in material culture and subsistence practices over such a broad region. Similarly, Braun and Plog (1982:515-518) argued that the lack of stylistic variability within a context of proliferating small-scale social units is evidence of some form of regional scale social integration. However, the form and character of these integrative mechanisms remains unknown and the archaeological record has provided little evidence to suggest what they may have been.

Early Late Woodland Stone Fort Complex

Although originally defined by several small sites in southern Illinois, the ‘stone fort’ tradition has expanded to include a few larger sites as well—most notably Cypress Citadel and McGilligan Creek (Butler and Wagner 2012; Pollack and Henderson 2000; also see Chapter Two, this volume). The physical and temporal similarity of the large Cypress Citadel and McGilligan Creek sites and the smaller ‘stone forts’ led to their association with each other—in what we refer to as the Stone Fort Complex (Butler 2001; Butler and Wagner 2000, 2012; Pollack and Henderson 1996, 2000).

However, as Butler (2001) has rightly pointed out, these two sites have more in common with each other than with the smaller ‘stone forts’. Their location at opposite ends of the Cache River/Bay Creek drainage (a broad wetland paleochannel of the Ohio River), similar inaccessible hilltop locations, associated stone burial mounds, and shared decorative styles of Lewis pottery are remarkably similar. This similarity has led to the recognition that Cypress Citadel and McGilligan Creek represent a distinct aspect of the ‘stone fort’ tradition—one that is functionally distinct from the smaller sites. Butler (2001) has argued that Cypress Citadel and McGilligan Creek represent the emergence of two different political centers within the Lewis phase. He also notes that the concentrated association of mortuary activity (stone mounds and cairns) at the two centers may represent some form of status or rank differences among group members.

If Cypress Citadel and McGilligan Creek do represent two separate political centers, then what are we to make of the scattered ‘stone fort’ sites (like the Flat Top site) that originally defined this cultural phenomenon? How did these small, seasonal or short-term sites articulate with the two political centers? The notion of increasing political centralization and status differentiation at this time is interesting, given the more complex political structures that characterize the later Terminal Late Woodland and Mississippian periods in the lower Ohio Valley. However, the question remains of how to reconcile early Late Woodland dispersed settlement and homogeneous material culture with greater political centralization and possible social differentiation. Does the presence of ‘stone fort’ sites indicate regional conflict and a concern for defense (see Brieschke and

Rackerby 1973)—which may be evidence of competition for territory, power, or status—or are these sites economic (Muller 1986) or ritual (Butler 2001; Butler and Wagner 2012) locations?

As the label 'stone fort' implies, these sites have been considered defensive locations since their earliest identification (Rafinesque 1824; Young 1910). If the settlement pattern represented by the Stone Fort Complex reflects an overarching concern for defense (Brieschke and Rackerby 1973), then the small, scattered 'stone forts' (located on promontories and high mesa-like landforms) would likely represent short-term defensible locations. The dispersed nature of early Late Woodland settlement suggests that the small 'stone forts' probably were occupied by individual family, or perhaps multi-family, units. In this scenario, the larger centers (i.e., Cypress Citadel and McGilligan Creek) also may have initially served as defensive locations—albeit as centralized settings where multiple, autonomous family units joined together in collective effort for extended periods of time (Pollack and Henderson 2000). Coordination of the autonomous family units for collective defense may have fostered temporary leadership positions or status differences among constituent groups or individuals (Butler and Wagner 2012). Aggregation at the larger sites also would have provided an opportunity for inter-group exchange, information sharing, and networking. The defensive scenario incorporates the similarity of both small and large sites in the region, as well as the general dispersed nature of settlement and lack of stylistic diversity in material culture that characterizes the Lewis phase. However, it does not easily account for the concentrated association of mortuary activities with the proposed centers (Butler and Wagner 2000; Pollack and Henderson 2000).

In addition, there is little evidence for either localized or endemic conflict in the region. Butler (2001) has noted that there is clear evidence for interaction between Cypress Citadel and McGilligan Creek based on the shared presence of the uncommon broad-line incised Lewis pottery and Mill Creek chert. The presence of exchange between the two centers would seem to suggest that inter-group conflict was low enough in frequency that trade could persist—which argues against an overriding concern for defense. Low-level intra- or inter-group conflict may have been a real or perceived threat, but it does not appear to have been substantial enough to warrant the defensive-like locations that characterize both the centers (McGilligan Creek and Cypress Citadel) and small, short-term 'stone forts' that characterize this complex.

The principle assumption of the defensive scenario is that the relatively inaccessible locations on which the 'stone forts' are located (e.g., promontories and high 'mesa'-like landforms) represent an attempt to provide protection and keep out other people. If the threat of conflict in the region was low, then it seems the conspicuous location of Stone Fort Complex sites (large or small) on high, steep-sided and inaccessible landforms may have been selected for purposes other than defense (Muller 1986; Butler and Wagner 2003). Given the absence of strong indications of conflict, we must consider that possibility that these locations were purposefully chosen for other reasons—perhaps related to visibility. Muller (1986:151) aptly described these site locations as "…look[ing] like Southwestern mesas if they were stripped of vegetation".

Indeed, if these locations were cleared of vegetation (as they may have been), they would have provided commanding views of both the surrounding terrain and/or night skies—given the typically high elevation.

If we recast the traditional functional characterization of these settings as ‘inaccessible’ to one of symbolic ‘conspicuous’ locations within the early Late Woodland landscape, then these sites assume entirely different social properties (Cosgrove 1984; Lawrence and Lowe 1990). Rather than simply keeping people out, these locations may have been purposefully selected to be seen, perhaps to provide a specific viewshed (cf. Moore 1996; Thomas 1993). It is also possible that these ‘conspicuous’ locations served as overt territorial markers (cf. Butler and Wagner 2012:296). Whatever the specific reason(s) for locating sites in high, inaccessible spots, the pattern was important enough that it was repeated at both the small, dispersed ‘stone fort’ sites and the large, semi-permanent to permanent village settlements/centers. Organizational repetition suggests that the different site types were used for similar purposes, but at different levels (e.g., local and regional) of social integration (Adler and Wilshusen 1990). It was noted previously that some form of regional integrative mechanism must have been operating during the early Late Woodland to have produced the widespread similarity in material culture that is documented across the lower Ohio Valley.

Because most ‘stone fort’ sites are typically small and contain only limited habitation debris, we have little indication of the types of activities other than quotidian that may have occurred in those locations. Given the characterization of early Late Woodland social organization as one of dispersed, relatively autonomous family units, it seems likely that the small ‘stone fort’ sites probably also relate to short-term use by autonomous family (or perhaps, multi-family) units. If Butler and Wagner (2012:295-297) are correct, then these sites may have served as ritual or ceremonial locations for individual family groups. Their location in high, inaccessible spots may have served to create some kind of segregated or liminal space in which those rituals were performed.

The larger Cypress Citadel and McGilligan Creek sites have similar organizational features and reflect the same demarcation of space that characterizes the smaller sites. The notable difference is that both the larger sites are surrounded by and associated with burial mounds and cairns (Butler and Wagner 2012; Pollack and Henderson 2000). It is possible that the large numbers of stone mounds associated with these centers are related to the integration of autonomous family units into a developing regional polity. If the small ‘stone forts’ were the location for individual family or multi-family group rituals or ceremonies, then the similar conspicuous locations of the centers could suggest that these were locations in which larger groups performed rituals or ceremonies. Larger ritual or ceremonial gatherings would have provided opportunities for intra-group (and perhaps inter-group) exchange and networking. They also could have provided opportunities for competing factions, lineages, or individuals to achieve some incipient or temporary status or rank differentiation (Aldenderfer 1993; Pollack and Henderson 1992; Potter 2000).

In this conceptualization, emplacement of the dead by relatively autonomous groups in stone mounds at or around one of the centers becomes a physical expression of membership in a larger, regional-scale socio-political unit. It cannot be demonstrated for certain that the stone mounds and burial cairns at the centers are related to different family units or if all of the mounds are contemporaneous with the period of village occupation (Butler and Wagner 2000). However, there is clear spatial patterning among the mounds at McGilligan Creek that could represent lineage or family unit clusters (Pollack and Henderson 2000). Not unlike later and more complex Mississippian societies, the construction of these mounds at a central location becomes a symbolic and material representation of the obligation of group membership (Lewis and Stout 1998; Lewis et al. 1998). The difference in the Stone Fort Complex is that the construction of the small stone mounds is not a corporate undertaking and does not represent a melding of the individual or family into a larger corporate identity. Rather, these mounds likely represent the maintenance and reification of individual or family identity (and autonomy) within the larger corporate group.

If the concentrated association of mortuary activities with the two centers is the mechanism through which dispersed, autonomous family units were integrated into a regional socio-political system, then both the small 'stone forts' and larger centers would appear to represent similar roles, albeit ones that were operating on markedly different scales of integration (sensu Chapman 1996). This scenario of regional integration is potentially quite powerful in that it ties together the conspicuous site locations and concentration of mortuary activities at the centers with the dispersed settlement pattern, relatively autonomous family-level social organization, and widespread artifact similarity into a single organizational system. Thus, the early Late Woodland Stone Fort Complex would represent a set of related (but not necessarily congruent) local and regional-scale processes articulated through mortuary rituals that facilitated regional integration.

In many ways, our understanding of the Stone Fort Complex is still in a nascent stage, and it is possible that aspects of both the defensive and regional integration scenarios discussed here are responsible for the architectural and material signatures that characterize this regional cultural expression. Still, it is important to recognize that seemingly small, isolated sites—like Flat Top and Twin Knobs Rockshelter—have the potential to inform and help shape our understanding of broad cultural processes.

CONCLUSION

The KAS excavations at the Twin Knobs Rockshelter and Flat Top site have provided significant information regarding the nature and duration of occupation at each site, along with information related to changing subsistence and technological practices. In addition, the results of these investigations have provided important insights into long-term patterns of regional landscape use and changing mobility and social organization within western Kentucky and the lower Ohio Valley region.

Given the relatively small size of the Twin Knobs Rockshelter, the quantity of recovered material and long record of occupation represents an impressive addition to the regional prehistory. Similarly, despite the small size of Flat Top, its conspicuous location and Lewis phase occupation allowed for the recognition of it as a Late Woodland 'stone fort' site—and association with the Stone Fort Complex. This identification has important implications for our understanding of Late Woodland social and settlement organization in the lower Ohio Valley region. Finally, because knobs like the Twin Knobs locality are present across east Crittenden and Caldwell counties, it is important to note that sites similar to Flat Top and Twin Knobs Rockshelter may be located throughout the region and provide an opportunity to provide further insights into the research issues presented in this report.

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APPENDIX I
Materials Recovered from the Twin Knobs Rockshelter

FS #	Provenience	Materials Recovered	Total	Zone
10	Surface	Lithic Debitage	41	A/B
13	Looter Pit backdirt	Lithic Debitage PPK fragment	287 1	Disturbed
14	Looter Pit wall cleaning	Lithic Debitage	96	Disturbed
15	Looter Pit backdirt	Ceramics Lithic Debitage Charcoal sample Bone Retouched flake	5 185 1 1 2	Disturbed
16	Looter Pit wall cleaning	Lithic Debitage	151	Disturbed
17	Looter Pit surface	Lithic Debitage PPK fragment	2 1	A/B
18	TU 1, Level 1	Lithic Debitage Charcoal sample PPK fragment Utilized flake	201 2 3 2	A/B
19	TU 1, Level 2	Lithic Debitage Charcoal sample Madison point PPK fragment Utilized flake Biface fragment	361 1 2 4 1 2	A/B
20	TU 1, Level 3	Lithic Debitage Charcoal sample Drill PPK fragment	203 1 1 2	C
21	TU 1, Level 4 (Zone D)	Lithic Debitage	13	D
22	TU 1, Level 4 (Zone D)	Lithic Debitage Charcoal sample	42 1	D
23	TU 1, Level 4 (Zone C)	Ceramics Lithic Debitage	1 140	C
24	TU 2, Level 1	Lithic Debitage Bone PPK fragment Utilized flake Retouched flake	146 1 1 1 1	A/B
25	TU 2, Level 2	Ceramics Lithic Debitage Motley Cluster point Unidentified Triangular point PPK fragment Biface fragment Charcoal sample Bone Shell	1 731 1 1 6 1 1 4 1	A/B

FS #	Provenience	Materials Recovered	Total	Zone
26	TU 2, Level 3	Ceramics	1	C
		Lithic Debitage	601	
		Drill	1	
		PPK fragment	5	
		Retouched flake	1	
		Utilized flake	1	
		Biface fragment	1	
		Charcoal sample	1	
		Bone	15	
		Shell	4	
27	TU 2, Level 4	Lithic Debitage	482	C
		PPK fragment	2	
		Biface fragment	1	
		Bone	38	
28	TU 2, Level 5	Lithic Debitage	191	D
		Utilized flake	1	
		Retouched flake	1	
		Core fragment	1	
		Bone	7	
29	TU 2, Level 6	Lithic Debitage	96	D
		Matanzas Cluster point	1	
		Drill	1	
		PPK fragment	1	
		Biface fragment	1	
		Core fragment	1	
		Bone	1	
30	TU 3, Level 1	Ceramics	2	A/B
		Lithic Debitage	142	
		Madison point	1	
31	TU 3, Level 2	Ceramics	6	A/B
		Lithic Debitage	386	
		PPK fragment	6	
		Utilized flake	1	
		Charcoal sample	1	
32	TU 3, Level 3	Lithic Debitage	240	C
		PPK fragment	1	
		Charcoal sample	1	
33	TU 2, Level 7	Lithic Debitage	80	H
		Retouched flake	1	
		Biface fragment	1	
34	TU 2, Level 8	Lithic Debitage	37	H
		Core fragment	1	
35	TU 4, Level 1	Ceramics	2	A/B
		Lithic Debitage	174	
		Madison point	1	
		Biface fragment	1	
		Utilized flake	1	
		Charcoal sample	1	
		Bone	1	
36	TU 4, Level 2	Lithic Debitage	286	A/B
		Bone	1	

FS #	Provenience	Materials Recovered	Total	Zone
37	TU 4, Level 3	Ceramics Lithic Debitage Bone	4 371 2	C
38	TU 4, Level 4 (Zone D)	Lithic Debitage Bone	220 23	D
39	TU 4, Level 4 (Zone E)	Lithic Debitage Terminal Archaic Barbed point PPK fragment Utilized flake Biface fragment Core fragment Bone	322 1 2 3 1 1 2	E
40	TU 5, Level 1	Lithic Debitage	13	A/B
41	TU 5, Level 2	Lithic Debitage PPK fragment Biface fragment	56 1 1	A/B
42	TU 5, Level 3	Lithic Debitage Biface fragment Core Core fragment	162 1 1 1	C
43	TU 6, Level 1	Ceramics Lithic Debitage Madison point Drill PPK fragment Retouched flake Utilized flake Biface fragment Bone	6 882 1 1 3 2 1 1 1	A/B
44	TU 6, Level 2	Lithic Debitage Unidentified projectile point PPK fragment Drill Biface fragment	558 1 10 2 1	A/B
45	TU 3, Level 3	Lithic Debitage Retouched flake	137 1	C
46	TU 3, Level 5b	Lithic Debitage PPK fragment Biface fragment	88 1 1	C
47	TU 3, Level 6b	Lithic Debitage	41	E
48	TU 3, Level 6a	Lithic Debitage Biface fragment	55 1	E
49	TU 5, Level 4	Lithic Debitage Retouched flake	101 1	C
50	TU 5, Level 5	Lithic Debitage Saratoga Cluster point PPK fragment Utilized flake	117 1 2 4	E
51	TU 6, Level 3	Lithic Debitage Unidentified projectile point Biface fragment Charcoal sample	136 1 1 1	C

FS #	Provenience	Materials Recovered	Total	Zone
52	TU 6, Level 3	Lithic Debitage	98	C
53	TU 3, Level 4	Lithic Debitage Utilized flake Biface fragment	239 2 1	C
54	TU 6, Level 4 (Zone E)	Lithic Debitage Palmer Corner Notched point Saratoga Cluster point Hardin Barbed Cluster point PPK fragment Retouched flake Charcoal sample	207 1 1 1 1 1 1	E
55	TU 6, Level 4 (Zone D)	Ceramics Lithic Debitage PPK fragment Charcoal sample Bone	1 37 1 1 2	D
56	TU 6, Level 4 (Zone D)	Lithic Debitage Bone	33 1	D
57	TU 6, Level 5a (Zone D)	Lithic Debitage Bone	52 4	D
58	TU 6, Level 5a (Zone E)	Lithic Debitage PPK fragment Charcoal sample	224 1 1	E
59	TU 6, Level 5b (Zone E)	Lithic Debitage PPK fragment Charcoal sample	61 1 1	E
60	TU 6, Level 6a	Lithic Debitage PPK fragment Charcoal sample Bone	66 1 1 4	E
61	TU 6, Level 6b	Lithic Debitage PPK fragment	131 1	E
62	TU 6, Level 7a	Lithic Debitage PPK fragment Biface fragment	64 1 1	H
63	TU 6, Level 7b	Lithic Debitage PPK fragment Retouched flake	77 1 1	H
64	TU 6, Level 7b	Lithic Debitage	12	E
65	TU 6, Level 8a	Lithic Debitage PPK fragment Retouched flake	60 1 1	H
66	TU 6, Level 8b	Lithic Debitage	122	H
67	TU 7, 40 cmbs (Zone D)	Lithic Debitage Biface fragment	7 1	D
68	TU 7, 40 cmbs (Zone D)	Ceramics Lithic Debitage Nodena Cluster Utilized flake Retouched flake Biface fragment Charcoal sample Bone	1 170 1 1 1 1 1 2	D

FS #	Provenience	Materials Recovered	Total	Zone
69	TU 8, 40 cmbs (Zone E)	Lithic Debitage Biface fragment Bone	71 1 1	E
70	TU 8, 40 cmbs (Zone D)	Ceramics Lithic Debitage Utilized flake Biface fragment Core fragment Bone	1 214 1 1 1 9	D
71	TU 9, Level 1	Ceramics Lithic Debitage Madison point Drill PPK fragment Biface fragment	1 310 2 1 1 1	A/B
72	TU 9, Level 2	Ceramics Lithic Debitage Biface fragment Core	2 460 1 1	C
73	TU 9, Level 3	Ceramics Lithic Debitage Drill Bladelet PPK fragment	1 250 2 1 1	C
74	TU 9, Level 4a (Zone C)	Lithic Debitage Buck Creek Barbed point Motley Cluster point PPK fragment Biface fragment	238 1 1 1 1	C
75	TU 9, Level 4b (Zone E)	Lithic Debitage PPK fragment Utilized flake Charcoal sample	435 2 1 1	E
76	TU 10, Level 1	Lithic Debitage Utilized flake	18 1	A/B
77	TU 10, Level 2	Lithic Debitage Madison point PPK fragment Biface fragment Shell	542 1 1 2 1	A/B
78	TU 3, 5, and 6 floor cleaning	Lithic Debitage Charcoal sample	43 1	Disturbed
79	Looter Pit cleaning	Lithic Debitage	12	Disturbed
80	TU 3, Level 6b	Lithic Debitage	6	E
81	TU 3, Level 7a	Lithic Debitage	13	H
82	TU 3, Level 7b	Lithic Debitage PPK fragment Biface fragment	63 1 1	H
83	TU 3, Level 8a	Lithic Debitage	42	H
84	TU 10, Level 1 and 2 (soil around removed boulder)	Ceramics Lithic Debitage PPK fragment Biface fragment	1 156 1 1	A/B

FS #	Provenience	Materials Recovered	Total	Zone
85	TU 10, Level 3	Ceramics Lithic Debitage Buck Creek Barbed point Utilized flake	1 426 1 1	A/B
86	TU 10, Level 4 (Zone C)	Ceramics Lithic Debitage PPK fragment Retouched flake Biface fragment	2 469 1 1 1	C
87	TU 3, Level 8b	Lithic Debitage Shell	38 1	H
88	TU 10, Level 5a (Zone E)	Lithic Debitage Terminal Archaic Barbed point Biface fragment Core fragment Charcoal sample	397 1 2 1 1	E
89	TU 5, Level 6a	Lithic Debitage	8	E
90	TU 11, Level 1	Ceramics Lithic Debitage Unidentified projectile point PPK fragment Utilized flake Biface fragment	1 150 1 1 1 2	A/B
91	TU 11, Level 2	Ceramics Lithic Debitage PPK fragment Biface fragment Bone	4 410 1 1 2	A/B
92	TU 11, Level 3	Lithic Debitage Retouched flake Charcoal sample	175 2 1	C
93	TU 11, Level 4	Lithic Debitage	128	C
94	TU 1, 4, 9, and 11 floor cleaning	Lithic Debitage	26	Disturbed
95	Looter pit profile and wall cleaining	Ceramics Lithic Debitage Saratoga Cluster point Utilized flake Biface fragment Charcoal sample	2 334 1 2 1 1	Disturbed
96	TU 11, Level 4 (Zone E)	Lithic Debitage PPK fragment	14 1	E
97	TU 6, Level 9a	Lithic Debitage Biface fragment	85 1	H
98	TU 6, Level 9b	Lithic Debitage PPK fragment Retouched flake	104 1 1	H
99	TU 6, Level 10a	Lithic Debitage Biface fragment Core fragment	63 1 1	H
100	TU 6, Level 10b	Lithic Debitage	38	H

FS #	Provenience	Materials Recovered	Total	Zone
101	Feature 1, 40 cmbs (Zone D)	Lithic Debitage Etley Cluster point Lowe Flared Base point Retouched flake Biface fragment Charcoal sample Bone	128 1 1 3 1 1 3	D
102	TU 1, Level 5a	Lithic Debitage Drill PPK fragment Nutting stone	106 1 1 1	E
103	TU 1, Level 5b	Lithic Debitage Unidentified projectile point PPK fragment	63 1 1	E
104	TU 1, Level 8b	Lithic Debitage PPK fragment	45 1	H
105	TU 1, Level 6b	Lithic Debitage Bone	30 1	E
106	TU 1, Level 6a	Lithic Debitage	21	E
107	TU 1, Level 7a	Lithic Debitage Unidentified projectile point	60 1	E
108	TU 1, Level 7b	Lithic Debitage Unidentified projectile point Core	60 1 1	H
109	TU 1, Level 9a	Lithic Debitage	51	H
110	TU 1, Level 9b	Lithic Debitage PPK fragment Biface fragment	65 1 1	H
111	TU 1, Level 10a	Lithic Debitage	40	H
112	TU 1, Level 10b	Lithic Debitage Bladelet Core fragment	55 1 1	H
113	TU 1, Level 7b-9b (Zone H)	Lithic Debitage Core fragment	27 2	H
114	TU 1, Level 8a	Lithic Debitage PPK fragment	42 1	H
115	TU 1, Level 5b	Charcoal sample	1	D
116	TU 4, Level 5a	Lithic Debitage Utilized flake Biface fragment	199 1 1	E
117	TU 4, Level 5b	Lithic Debitage Bone	133 4	E
118	TU 4, Level 6a	Lithic Debitage Biface fragment	48 1	E
119	TU 4, Level 6b	Lithic Debitage	61	E
120	TU 4, Level 7a	Lithic Debitage Kirk Stemmed point PPK fragment Retouched flake Biface fragment Charcoal sample	48 1 1 1 1 1	H

FS #	Provenience	Materials Recovered	Total	Zone
121	TU 4, Level 7b	Lithic Debitage PPK fragment	28 1	H
122	TU 4, Level 8a	Lithic Debitage Charcoal sample	31 1	H
123	TU 9, Level 5a	Lithic Debitage Unidentified projectile point Drill PPK fragment Utilized flake Retouched flake Nutting stone/hammerstone Core fragment	202 1 1 1 2 1 1 1	E
124	TU 9, Level 5b	Lithic Debitage Charcoal sample	185 1	E
125	TU 9, Level 6a	Lithic Debitage St. Charles point Bone	70 1 1	H
126	TU 9, Level 6b	Lithic Debitage PPK fragment	58 2	H
127	TU 9, Level 7a	Lithic Debitage	30	H
128	TU 9, Level 7b	Lithic Debitage	48	H
129	TU 11, Level 5a	Lithic Debitage PPK fragment Retouched flake	63 1 1	C
130	TU 11, Level 5b	Lithic Debitage Grinding slabs PPK fragment	16 2 1	E
131	TU 11, Level 6a	Lithic Debitage Dalton point Utilized flake Retouched flake	57 1 1 1	E
132	TU 12 Zone A/B	Lithic Debitage PPK fragment	241 1	A/B
133	TU 12 Zone E	Lithic Debitage Retouched flake	106 1	E
134	TU 12 Zone D	Lithic Debitage	49	D
135	TU 13 Zone A/B	Lithic Debitage Madison point PPK fragment	362 2 4	A/B
136	TU 12 floor scraping (Zone H)	Lithic Debitage	23	H
137	TU 9, Level 8a	Lithic Debitage	25	H
138	TU 10, Level 5b	Lithic Debitage Palmer Corner Notched point Unidentified projectile point Drill PPK fragment Core	405 1 1 1 1 1	E
139	TU 11, Level 7a	Lithic Debitage	8	E
140	TU 10, Levels 6a and 6b	Lithic Debitage PPK fragment Biface fragment	409 1 1	C

FS #	Provenience	Materials Recovered	Total	Zone
141	TU 10, Level 7a and 7b rock pedastle	Lithic Debitage PPK fragment Biface fragment	19 1 1	H
142	TU 10, Level 7b	Lithic Debitage PPK fragment Biface fragment	67 1 1	H
143	TU 10, Level 8a	Lithic Debitage Utilized flake	49 1	H
144	TU 10, Level 8b	Lithic Debitage Biface fragment	26 1	H
145	TU 11, Level 4 (Zone E)	Lithic Debitage Merom Cluster point	4 1	E
146	TU 10, Level 7a	Lithic Debitage Dalton point Big Sandy point	116 1 1	H
147	TU 11, Level 8a	Lithic Debitage	14	H
148	TU 11, Level 8b	Lithic Debitage	23	H
149	TU 11, Level 7b	Lithic Debitage Retouched flake	67 1	H
150	TU 14, Level 1, (Zone A/B)	Lithic Debitage Nodena Cluster Biface fragment	1 1 1	A/B
151	TU 14, Level 2 (Zone C)	Ceramics Lithic Debitage Madison point Adena Stemmed point Retouched flake Biface fragment Core	1 2 1 1 1 1 1	C
152	TU 15, Level 2 (Zone C)	Lithic Debitage Retouched flake Core	1 1 1	C
153	TU 15, Level 3 (Zone E)	Lithic Debitage	1	E
155	TU 2, Level 3 (Flot sample)	Lithic Debitage Charcoal sample Bone	110 1 7	A/B
156	TU 2, Level 3 (Flot sample)	Lithic Debitage Charcoal sample Bone	70 1 4	A/B
157	TU 2, Level 4 (Flot sample)	Lithic Debitage Charcoal sample Shell	67 1 1	D
158	TU 2, Level 4 (Flot sample)	Lithic Debitage Charcoal sample Bone Shell	71 1 2 1	D
159	TU 2, Level 5 (Flot sample)	Lithic Debitage Charcoal sample Bone Shell	78 1 6 1	D
160	TU 6, Level 3 (Flot sample)	Lithic Debitage Charcoal sample	287 1	E

FS #	Provenience	Materials Recovered	Total	Zone
161	TU 4, Level 4 (Flot sample)	Lithic Debitage Charcoal sample Bone	487 1 9	D
162	TU 6, Level 4 (Flot sample)	Lithic Debitage Charcoal sample Bone	168 1 15	D
163	TU 6, Level 3 (Flot sample)	Lithic Debitage Charcoal sample	305 1	D
164	TU 6, Level 5a (Flot sample)	Lithic Debitage Charcoal sample	346 1	E
165	TU 6, Level 5b (Flot sample)	Lithic Debitage Charcoal sample	258 1	E
166	TU 6, Level 6b (Flot sample)	Lithic Debitage Charcoal sample	123 1	E
167	TU 6, Zone D, Levels 5 and 6 (Flot sample)	Lithic Debitage Charcoal sample Bone	147 1 6	D
168	TU 6, Level 6a (Flot sample)	Lithic Debitage Charcoal sample	142 1	E
169	TU 6, Level 6b (Flot sample)	Lithic Debitage Charcoal sample	129 1	E
170	TU 9, Level 2 (Flot sample)	Lithic Debitage Charcoal sample	474 1	C
171	TU 9, Level 3 (Flot sample)	Lithic Debitage Charcoal sample	2 1	C
172	TU 11, Level 5a (Flot sample)	Lithic Debitage Biface fragment Charcoal sample	247 1 1	E
173	TU 11, Level 5b (Flot sample)	Lithic Debitage Core fragment Charcoal sample	269 1 1	E
174	TU 11, Level 6a (Flot sample)	Lithic Debitage Charcoal sample	236 1	E
175	TU 11, Level 6b (Flot sample)	Lithic Debitage Charcoal sample	161 2	E
176	TU 12, Zone A/B (Flot sample)	Lithic Debitage Madison point Retouched flake Charcoal sample Bone	1230 1 1 1 1	A/B
177	TU 12, Zone C (Flot sample)	Lithic Debitage Charcoal sample Bone	227 1 2	C
178	TU 12, Zone C (Flot sample)	Lithic Debitage Core Charcoal sample	38 1 1	C
179	TU 12, Zone D (Flot sample)	Lithic Debitage Biface fragment Charcoal sample Bone	181 1 1 3	D
180	TU 12, Zone D (Flot sample)	Lithic Debitage Charcoal sample Bone	50 1 1	D

FS #	Provenience	Materials Recovered	Total	Zone
181	TU 13, Zone C (Flot sample)	Lithic Debitage Charcoal sample	687 1	C
182	TU 1, Level 5a, Feature 2, 45 cmbs (Flot sample)	Lithic Debitage Drill Charcoal sample	153 1 1	F
183	Looter Pit profile west wall cleaning	Ceramics Lithic Debitage Charcoal sample Bone	3 144 1 2	Disturbed
184	TU 3, Level 1 (Flot sample)	Lithic Debitage	21	A/B
185	TU 9, Level 5a (Flot sample)	Lithic Debitage Charcoal sample	446 1	E
186	TU 12, Zone H (Flot sample)	Charcoal sample	1	H
Total			28013	

Appendix II
Materials Recovered from the Flat Top site

FS #	Provenience	Materials Recovered	Total
		Lithic debitage	30
500	TU 100, Level 1	Ceramics	2
		Lithic debitage	57
501	TU 101, Level 1	Retouched flake	1
		Lithic debitage	74
		Utilized flake	1
		PPK fragment	1
		Ceramics	3
502	TU 102, Level 1	Core	1
503	Surface (East side of Knob)	Ceramics	1
		Lithic debitage	250
		Drill	1
		Biface fragment	1
504	TU 105	Ceramics	8
		Lithic debitage	140
		Utilized flake	3
		Core	1
		Hoe flake	4
		Biface fragment	1
505	TU 106	Ceramics	9
		Lithic debitage	135
		PPK fragment	2
506	TU 109	Ceramics	16
		Lithic debitage	46
507	TU 108	Ceramics	1
		Lithic debitage	168
		PPK fragment	1
508	TU 103	Biface fragment	1
		Lithic debitage	101
509	TU 107	Ceramics	3
		Lithic debitage	226
		Biface fragment	1
510	TU 104	Ceramics	1
		Lithic debitage	62
		Lowe Flared Base	1
511	TU 110	Ceramics	3
		Lithic debitage	116
512	TU 112	Ceramics	5
		Lithic debitage	128
		Retouched flake	1
		Blade-like flake	1
		Core	1
513	TU 111	Ceramics	4
		Lithic debitage	78
514	TU 114	Ceramics	2

FS #	Provenience	Materials Recovered	Total
		Lithic debitage	170
		Mill Creek Hoe	1
		PPK frag	1
		Biface fragment	1
515	TU 113	Ceramics	7
		Lithic debitage	429
516	TU 117	Ceramics	7
		Lithic debitage	37
		Lowe Flared Base	2
517	TU 115	Ceramics	2
		Lithic debitage	97
		PPK fragment	1
		Biface fragment	1
518	TU 100	Ceramics	3
		Lithic debitage	266
		Hoe flake	8
519	TU 118	Ceramics	14
		Lithic debitage	276
		Hoe flake	6
		PPK fragment	1
		Biface fragment	1
520	TU 116	Ceramics	11
		Lithic debitage	157
		Blade-like flake	2
521	TU 119	Ceramics	8
		Lithic debitage	93
		Core	2
522	TU 120	Ceramics	1
		Lithic debitage	185
		PPK fragment	1
		Biface fragment	1
		Hoe flake	8
523	TU 121	Ceramics	2
		Lithic debitage	230
		Retouched flake	1
		PPK fragment	2
		Biface fragment	2
		Hoe flake	3
524	TU 122	Ceramics	2
525	TU 123	Lithic debitage	147
		Lithic debitage	198
		Core	1
526	TU 124	Hoe flake	2
		Lithic debitage	13
		Triangular point	1
527	TU 125, Level 1, Zone 1	Ceramics	1
		Lithic debitage	115
		Hoe flake	2
528	TU 126	Ceramics	5
		Lithic debitage	86
		Retouched flake	1
529	TU 127, Level 1, Zone 1	Ceramics	12

FS #	Provenience	Materials Recovered	Total
		Lithic debitage	80
		Retouched flake	2
530	TU 128	Ceramics	8
		Lithic debitage	49
		PPK fragment	2
		Biface fragment	1
531	TU 129	Hoe flake	1
		Lithic debitage	210
		PPK fragment	1
		Hoe flake	5
532	TU 130	Ceramics	7
533	TU 131 (flotation sample)	No artifacts	
534	TU 131 (flotation sample)	No artifacts	
535	TU 131 (flotation sample)	No artifacts	
		Lithic debitage	221
		Utilized flake	1
536	Tu 129, Level 1, Zone 1	Ceramics	3
Total			**4910**

APPENDIX III
SITE 15CN61

In addition to the KAS investigations conducted on the western peak of the Twin Knobs locality (Twin Knobs Rockshelter and Flat Top site), excavations also were conducted on the eastern peak (see Figure 1.4). KAS investigation of the eastern knob involved the excavation of a series of units within three possible "stone mounds" and two rock piles (referred to as 'stone rings'). This work resulted in the identification of an unnamed archaeological site (15Cn61) characterized by a light lithic scatter (eight small flakes) of undetermined size. The possible mounds and stone rings, however, were determined to be of natural origin.

Site 15Cn61 is located on the small, relatively flat, top of the eastern peak of Twin Knobs. The site measures 28 m north/south by 32 m east/west and encompasses most of the upper surface of the knob (Figure AIII.1). This previously unknown site was identified by the presence of several possible "stone mounds" and rock piles containing looter holes located on the top of the knob. Like the nearby Flat Top site, access to the top of the steep-sided knob was probably relatively difficult in the past, although a bulldozer track related to modern logging activity had been cut on the northeast face of the eastern peak. The track continued to the knob top, where extensive leveling and ground disturbance, along with a large bulldozer push pile, was documented.

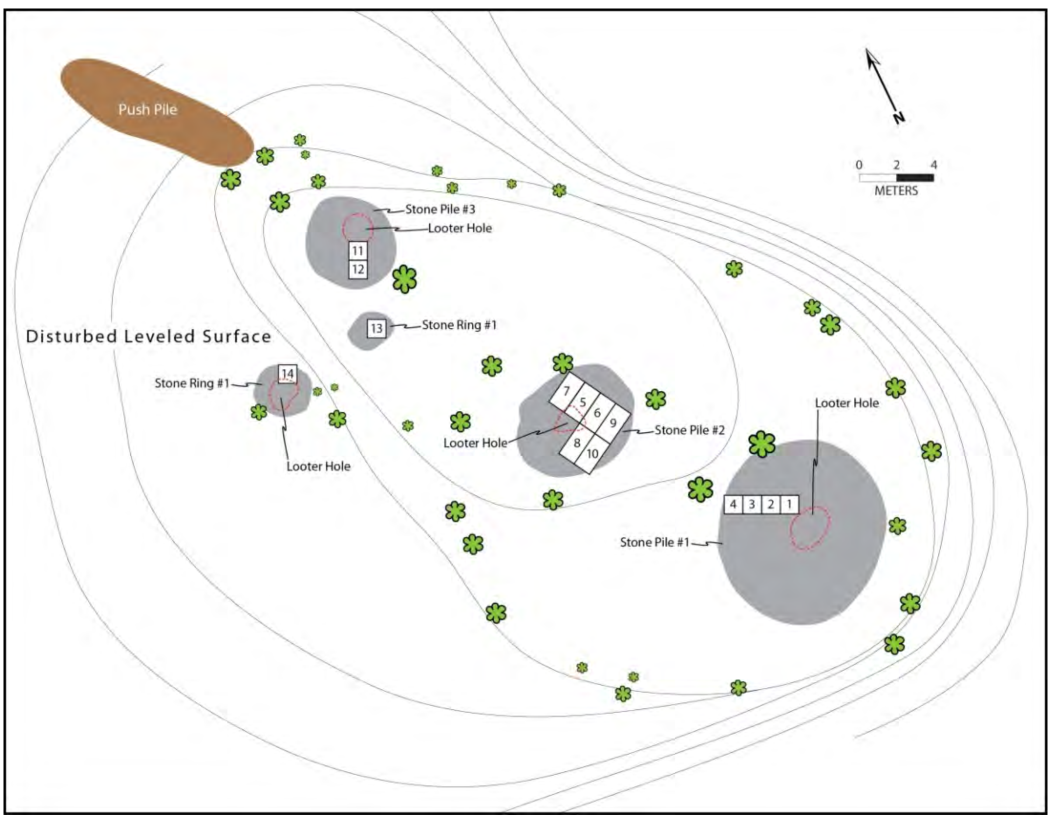

Figure AIII.1. Planview of Site 15Cn61.

Excavation units (n=14; 20 m^2) were positioned over a portion of each stone feature. Each unit was hand excavated with shovel and trowel in natural levels to bedrock, with all sediment screened through 6.35 mm wire mesh. Units were opportunistically located within the possible "stone mounds" and rock piles in order to document the stratigraphic profiles and determine if they were of prehistoric origin. In general, units excavated at Site 15Cn61 indicated a shallow stratigraphic profile of channery sediment and exfoliating bedrock across the surface of the knob.

Despite intensive investigation, only eight flakes were recovered from this site. The highest point on the knob, where one might expect to find the most material, had been logged in recent years. Any cultural deposits in this location had likely been disturbed or deflated by erosion. To the south of the bulldozed push pile were the potential "stone mounds" and 'stone rings'. Several of these rock "features" contained looter holes excavated in the center.

Possible "stone mound" 1 was the biggest feature and measured 9.8 m north/south by 8.5 m east/west (AIII.2). A large looter hole had been dug into its center to a depth of 75 cm below surface. Four 1 x 1 m adjoining units (Units 1-4) were excavated across the western portion of this feature in order to provide a stratigraphic profile and determine potential cultural origin (Figure AIII.1). In general, these units revealed a thin profile composed of a 10YR 4/2 dark grayish brown silty sand channery sediment that extended to a depth of 39-56 cm below surface (Figure AIII.3). Below the channery sediment was sandstone bedrock. A single flake was recovered from Unit 3.

Figure AIII.2. View of possible "Stone Mound" 1 facing south.

Figure AIII.3. Excavation trench (Units 1-4) in possible "Stone Mound" 1 (facing west).

Possible "stone mound" 2 was located near the center of the site, approximately 5.8 m north of "stone mound" 1 and measured 5.9 m north/south by 6 m east/west (Figure AIII.1). A large looter hole had been dug into its center to a depth of 90 cm below surface (after cleaning) (Figure AIII.4). Six 1 x 2 m adjoining units (Units 5-10) were excavated within the mound area (Figure AIII.5). These units revealed a layer of 10YR 4/2 dark grayish brown silty sand channery sediment that extended to a depth of 30-63 cm below surface and overlaid sandstone bedrock. In Units 5-10, the channery sediment was comprised of approximately 50-70 percent rock. A total of two flakes was recovered from the excavation of this feature (Unit 7 [n=1] and Unit 10 [n=1]).

Possible "stone mound 3" was located approximately 3 m south of the large push pile and measured 4.9 m north/south by 4.6 m east/west (Figure AIII.1). A looter hole had been dug into the northeast portion of this feature. After removing the leaf litter and root mat from the hole it extended to a depth of 58 cm below surface (Figure AIII.6). Two adjoining 1 x 1 m units (Units 11 and 12) were excavated adjacent to the southern edge of the looter hole. These units revealed a thin forest floor humic layer (Zone I) overlying a 10YR 3/2 very dark grayish brown silty sand channery sediment (with approximately 50 percent rock content) (Zone II) that extended to 25-30 cm below surface (Figure AIII.7). A sterile layer of 10YR 4/3 brown silty sand channery and bedrock was present beneath Zone II and extended beyond the limit of excavation (65 cm below surface). Most of Zone III consisted of sandstone bedrock (Figure AIII.8). Three small flakes were recovered from the upper part of Zone II (between 6-13 cm below surface) in Unit 12.

Figure AIII.4. Possible "Stone Mound" 2 with looter hole in center (prior to cleaning).

Figure AIII.5. Possible "Stone Mound" 2 after excavation.

Figure AIII.6. Looter hole in possible "Stone Mound" 3 after cleaning.

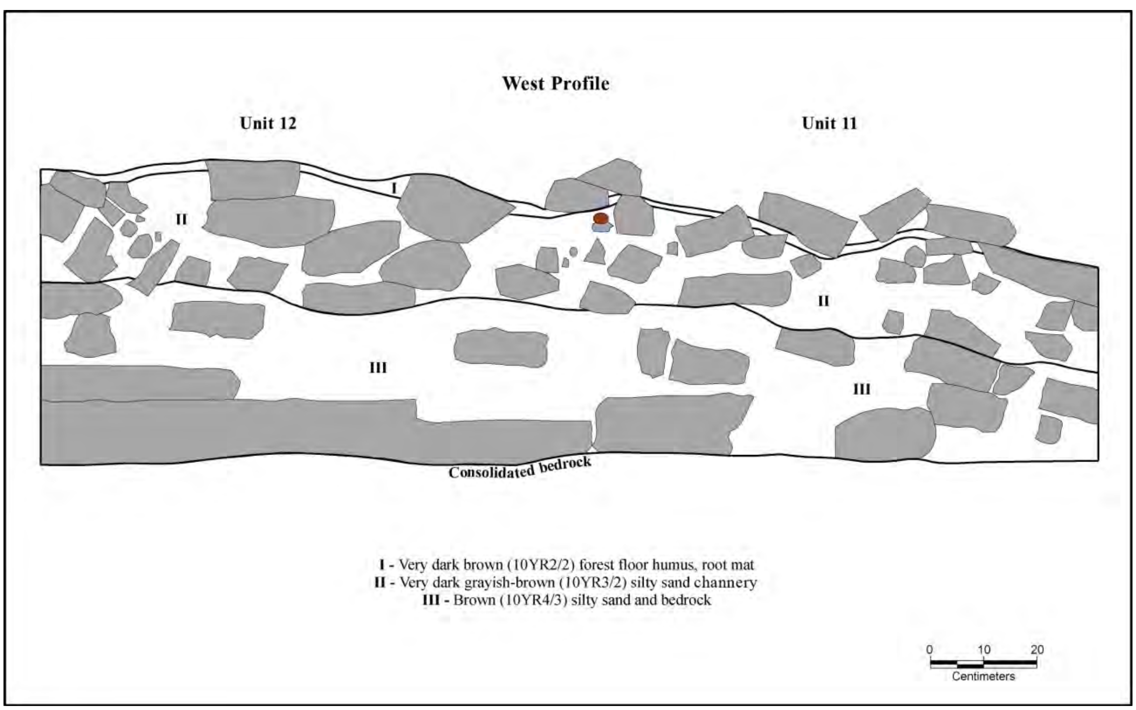

Figure AIII.7. West profile of possible "Stone Mound" 3.

Figure AIII.8. Photograph of Units 11 and 12 in possible "Stone Mound" 3.

In addition to the possible "stone mound" features, two 'stone rings' also were investigated. These 'rings' consisted of roughly circular, small, low piles of sandstone—one of which was dug into by looters. 'Stone ring' 1 was located 1.2 m south of possible "stone mound" 3 and measured 2.2 m north/south by 2.4 m east/west (Figure AIII.1). A single 1 x 1 m unit (Unit 13) was excavated near the center of the ring to a depth of 17 cm below surface. Unit 13 revealed a shallow profile consisting of a thin humic layer (Zone I) overlying a thin (2-11 cm below surface) 10YR 3/2 very dark grayish brown silty sandy channery sediment (Zone II) (Figure AIII.9). Zone III appeared between 12-15 cm below surface across the unit and consisted of a 10YR 4/3 brown silty sand and bedrock. No artifacts were recovered from Unit 13.

'Stone ring' 2 was located approximately 3 m southwest of 'stone ring' 1 and measured 2.8 m north/south by 3.2 m east/west (Figure AIII.1). A single 1 x 1 m unit (Unit 14) was excavated to the north of the looter hole dug into its center. The excavation of Unit 14 extended to a maximum depth of 25 cm below surface and revealed a similar, shallow profile similar to that of 'stone ring' 1 and possible "stone mound" 3 (Figure AIII.10). Zone I, the humic layer, extended from 0-3 cm below surface. Zone II was characterized by a 10YR 3/2 very dark grayish brown silty sand channery sediment that extended from 3-15 cm below surface. Zone III extended from 15 cm below surface beyond the limit of excavation and consisted of a 10YR 4/3 brown silty sand and bedrock. Two small flakes were recovered from Zone II in 'stone ring' 2.

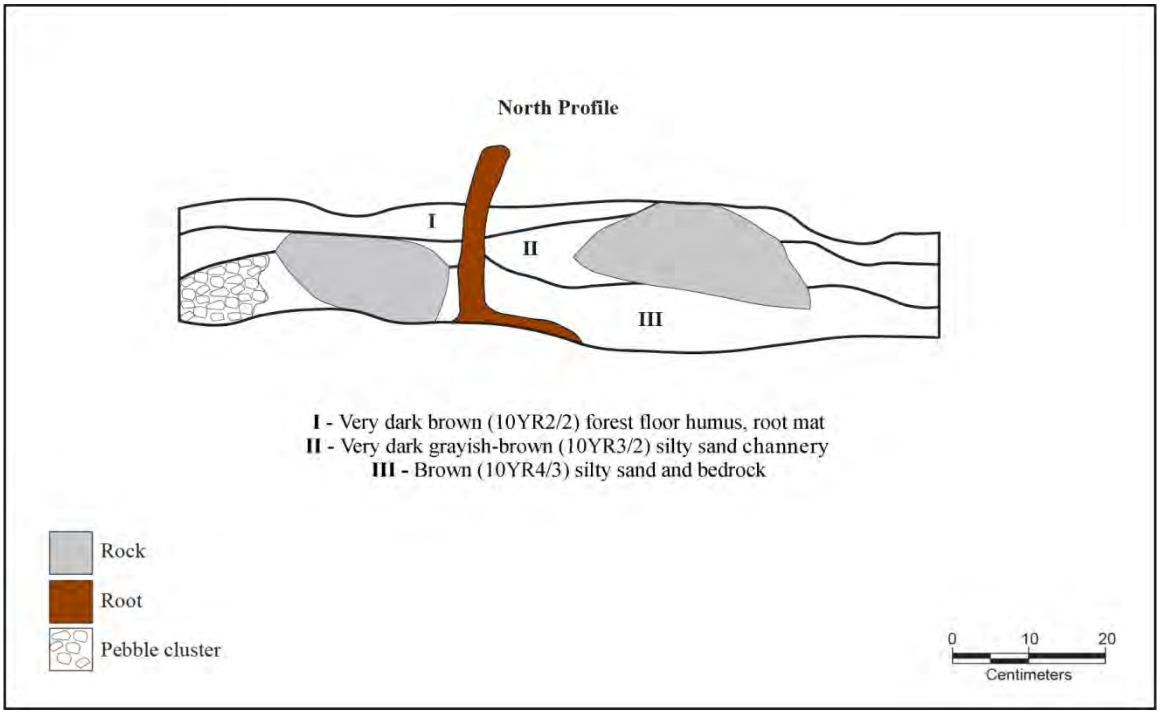

Figure AIII.9. Unit 13 North profile in 'stone ring' 1.

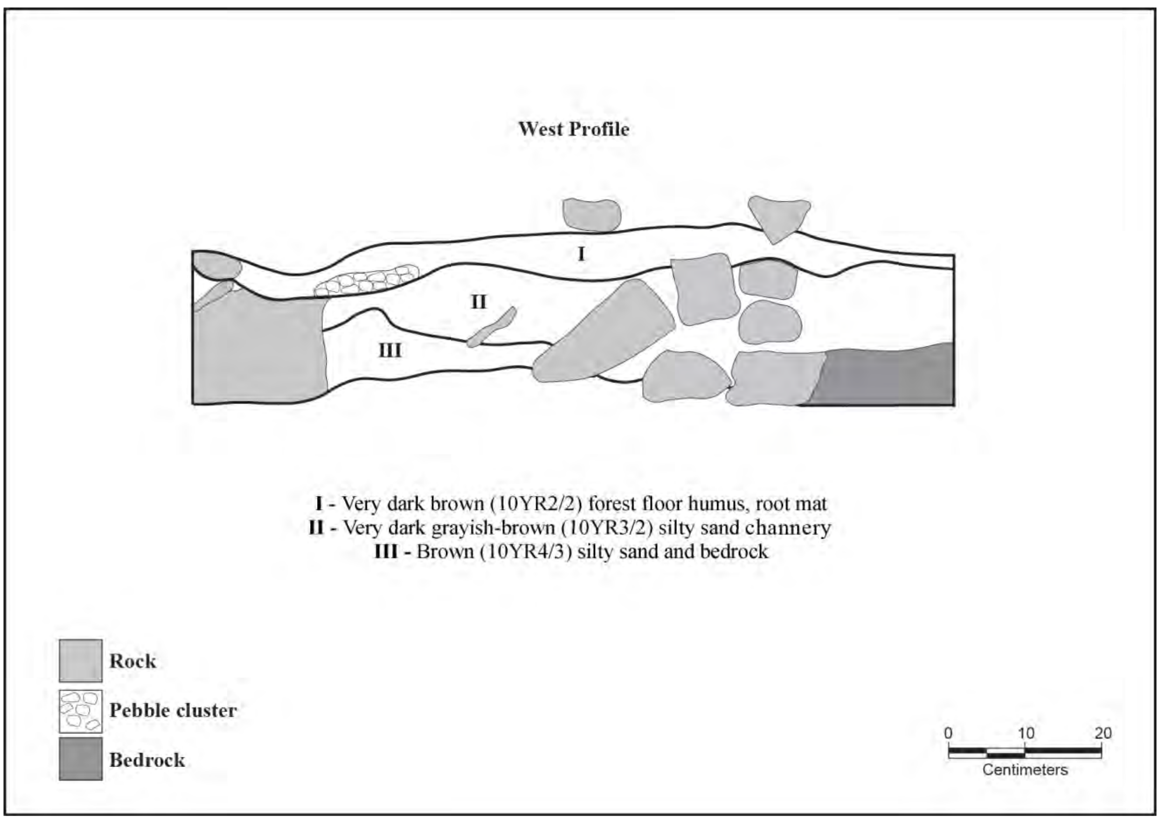

Figure AIII.10. Unit 14 West profile in 'stone ring' 2.

In general, the investigation of Site 15Cn61 indicates that the possible "stone mounds" and 'stone rings' are of natural origin. The stratigraphic profiles indicate a relatively thin layer (approximately 25-60 cm thick) of exfoliating and fractured bedrock across the surface of the knob. Minimal soil development is present and is predominantly characterized by sandy channery sediment. The effects of modern logging and bulldozing likely have increased erosion on the knob top and resulted in greater visibility of the naturally exfoliating sandstone. In addition, looter digging in the center of several of the stone piles has resulted in an artificial 'mounding' of rock that mimics prehistoric stone mound construction.

Only eight small flakes were recovered from the 20 m^2 of excavation. The presence of these materials indicates prehistoric use of the eastern knob, but suggests that it was much less intensive than at the Flat Top site on the nearby western peak. The absence of prehistoric features and low density of artifacts also support this suggestion.

Although we do not know the precise extent of logging and bulldozing, these activities have substantially disturbed much of the knob surface. It is possible that the density of prehistoric materials may have been greater in the past, but these activities—along with the subsequent increased erosion—have seriously impacted the site and limit our ability to form interpretations. Since the possible stone mounds and rings are not of prehistoric construction, artifact density is very low, and the majority of the knob top has disturbed by mechanical clearance and logging, no additional work was conducted at Site 15Cn61.