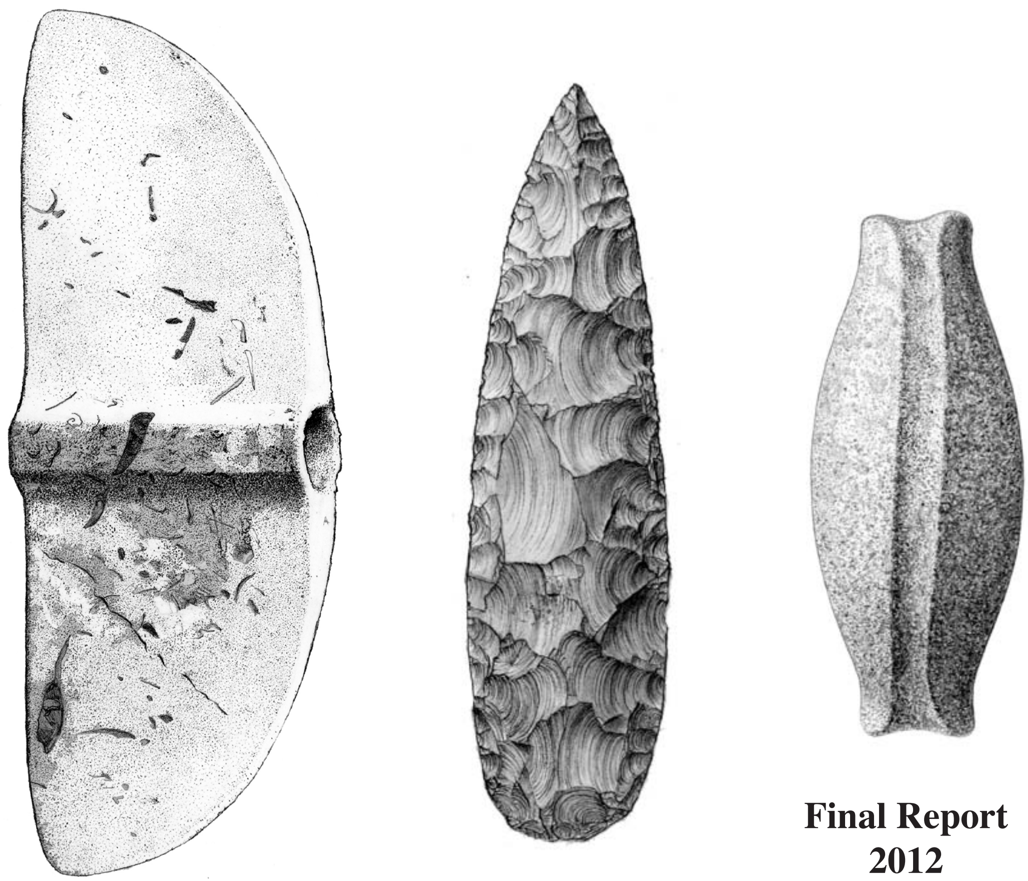
ARCHAEOLOGY AND BIOARCHAEOLOGY OF THE BUCKEYE KNOLL SITE (41VT98), VICTORIA COUNTY, TEXAS



Final Report
2012

Volume 1

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Contract Nos.

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Archaeology and Bioarchaeology of the Buckeye Knoll Site (41VT98), Victoria County, Texas

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Cover Illustrations

Drawings of Selected Mortuary Artifacts Recovered from Buckeye Knoll:
(Left) Limestone, Semi-Lunar, Winged Bannerstone, Burial 74;
(Center) Chert Biface, Burial 1-B;
(Right) Quartzite Grooved Stone, Burial 6.

Abstract

Archaeological data recovery excavations were conducted by Coastal Environments, Inc. (CEI), at the Buckeye Knoll site (41VT98) in Victoria County, Texas, between October 2000 and July 2001. This work was performed under contract with the U.S. Army Corps of Engineers, Galveston District (Corps), in response to planned widening and dredging of the Victoria Barge Canal. The excavations, subsequent analyses, and report preparation were done to mitigate possible effects associated with the proposed channel improvements. CEI had previously tested the site and had assessed it as significant in terms of potential National Register eligibility. In response to those initial recommendations, a Scope of Work was issued by the Corps for the preparation of a Data Recovery Plan, which was submitted and approved.

The 2000-2001 fieldwork consisted of mechanical backhoe trenching, shovel testing, and extensive hand excavations. These produced profuse evidence of recurrent prehistoric site occupations spanning the late Paleo-Indian to Late Prehistoric periods. In addition to a very large sample of faunal remains, numerous bone, stone, shell, clay, and ceramic artifacts were recovered and analyzed. This study also involved extensive geoarchaeological investigations to clearly document the geologic history of the site, palynological and residue analyses to provide information on past environmental conditions and diet, stone tool use wear analysis, and stone tool residue analysis.

Additionally, numerous prehistoric burials were encountered. The remains of at least 116 individuals from 75 discrete burial loci were identified, with most subjected to detailed skeletal and dental analysis and stable isotope study of selected samples of human tooth-pulp collagen. The majority of these dated to the later part of the Early Archaic period as it is defined in Texas (i.e., ca. 7,300-6,200 years B.P.). These seem to have been confined within a distinct mortuary precinct with no evidence of an associated domestic occupation. Many of the Early Archaic burials were associated with artifacts that form a unique mortuary assemblage heretofore unrecognized in Texas archaeological studies. Several of these suggest connections to the Middle Archaic period (i.e., ca. 8,000-5,000 B.P.) cultures in the Mississippi Valley region and beyond.

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Acknowledgments

Many individuals and groups helped in the various phases of the work at Buckeye Knoll and with the subsequent analyses and report preparation. The editors would first like to thank the U.S. Army Corps of Engineers, Galveston District (Corps), for selecting Coastal Environments, Inc., (CEI) for this work. The Corps and the Victoria Navigation District were co-participants in sponsoring the work. The Corps prepared the Scope of Work for this project and reviewed the Data Recovery Plan and Research Design submitted by CEI. It also took the lead in the consultation process with several Native American tribes concerning the treatment and reburial of all human remains and mortuary artifacts. Foremost among Corps personnel was Janelle Stokes, Chief Archeologist at the Galveston District. Ms. Stokes guided the data recovery at Buckeye Knoll from the beginning of the project until its final completion. She is to be commended for her perseverance and dedication to the project. Bryan L. Guevin, former archaeologist at the Galveston District, helped initiate the project and was instrumental in getting the first delivery order for fieldwork "up and running." Likewise, Gary B. DeMarçay, another former archaeologist at the Galveston District (now at the New Orleans District), aided in issuing subsequent delivery orders to process and analyze the recovered material and to write and produce the draft and final reports.

CEI would like to also thank personnel of the Dupont Corporation (now Invista, Inc.) for allowing access to their property on which the Buckeye Knoll site is located. Special recognition goes to Hugh Charlton and Amy Hodges for their interest in, and support of, this project. Dupont generously allowed us to tap into their water pumping station near the bank of the Guadalupe River, which provided a constant and reliable source of water for ongoing, onsite water screening.

Our field crew did a great job in maintaining the necessary attention to details during the nearly ten months of continuous excavation at the site through heat and cold and rain and shine. Sincerest appreciation is extended to Bruce Albert, Nancy Beaman, Ashley Hall, Kelly Janway, Floyd Jones, Donna Nagle, Richard Santos, Greg Sundborg, Kali Tighe, Matt Taylor, and Doug Wells for their patience and perseverance. David Martin and Jimmy Bluhm took on the huge task of water screening all of the excavated sediments.

Madeleine-Sophie Ricklis and Laurid Broughton, of CEI's Corpus Christi office, cleaned and cataloged the massive numbers of specimens from the site. Laurid also filed all of field photos and created a digital photographic record of the mortuary artifacts. She also assisted in the seasonality analysis of marine fish otoliths from the site.

Two dedicated avocational archaeologists, Bill Birmingham and the late E. H. "Smitty" Schmeidlin, made repeated visits to the site, sharing their knowledge of the archaeology of the Victoria area. Bill provided a tour of the nearby Linn Lake site on the Guadalupe River floodplain to share his first-hand knowledge of the nearby Blue Bayou cemetery site.

He also made accurate replicas of the finely crafted grooved stones found at Buckeye Knoll, using only the kinds of tools that would have been available to prehistoric people. Smitty provided photographs of Late Paleo-Indian projectile points from Victoria County, which helped form a perspective on the lanceolate dart points found in some of the Buckeye Knoll burials. Moreover, Smitty gave the entire crew amazing barbequed ribs and pork tenderloins, served up with his fantastic homemade jalapeno-spiced bread-and-butter pickles! We regret that Smitty is no longer around to see the final results of this project, in which he took an avid interest.

Glenn T. Goode, Texas archaeologist and accomplished flint knapper, visited CEI's archaeology lab in Corpus Christi to examine the lithic artifacts from the cemetery and made many helpful and interesting observations. Michael Collins and Stephen Black (Department of Anthropology, Texas State University, San Marcos) and Thomas Hester and Harry Shafer (Abasolo Archaeological Consultants, San Antonio), also viewed these materials, offering informative comments based on their extensive experience with early American and Texas archaeological materials.

Dr. Glen Doran (Department of Anthropology, Florida State University, Tallahassee) took on the task of directing the bioarchaeological analyses and, on two occasions, visited the site during fieldwork. Additionally, he transported a Geoprobe coring device from Tallahassee to the site and used it to extract the sediment cores that were used in palynological analysis by Dr. Bruce Albert. Doran is the author of Chapter 16, which examines age and sex distributions at Buckeye Knoll. He also is co-author (with Christopher Stojanowski) of Chapter 12, which details the skeletal analysis, as well as portions of Chapter 15, which examines periosteal reaction in Texas on Early Archaic time levels.

Dr. Jim Bruseth and Bill Nichols of the Texas Historical Commission, Austin, donated their time to carry out a magnetometer survey in the West Canal Bank Area of the site. Their willingness to do this only for the sake of contributing to a better understanding of the site is admirable and very much appreciated.

All of the contributing authors took on the various special analyses reported herein and are thanked for their professionalism and their contributions. Dr. Christopher Stojanowski (then Ph.D. candidate at Florida State University and currently Associate Professor in Anthropology at Arizona State University, Phoenix) also conducted the dental analysis and wrote the related section of this report, which is presented as Chapter 13. Susan L. Scott, Scott and Associates, LLC, Hattiesburg, Mississippi, was responsible for the analysis of the faunal remains recovered from selected units in the Knoll Top, West Slope, and East Area excavations. Her analysis is included as Chapter 8. Dr. Robert J. Hard (Department of Anthropology, University of Texas at San Antonio) and Dr. Noreen Tuross (Department of Human Evolutionary Biology, Harvard University, Cambridge, Massachusetts) carried out the stable isotopic analyses of selected samples of human tooth/bone collagen and examined its implications in understanding subsistence and diet. Their report is presented as Chapter 11.

Dr. Bruce M. Albert (formerly of the Department of Geography and the Environment, University of Texas at Austin) undertook the palynological analysis and examined Holocene environmental change in that area of Texas. His findings are included as Appendix B. Dr. Charles D. Frederick (Geoarchaeologist, Dublin, Texas, and Research Fellow at the Department of Geography and the Environment, University of Texas at Austin) and Dr. Mark D. Bateman (Department of Geography, University of Sheffield, Sheffield, South Yorkshire, United Kingdom) conducted the geoarchaeological investigations at Buckeye Knoll. Their findings and interpretations are presented as Appendix A of this report.

Dr. Jason W. Barrett (formerly at the Department of Anthropology, Texas A&M University, College Station, now at the Environmental Affairs Division, Texas Department of Transportation, Austin) undertook the use-wear analysis of selected stone tools at the Buckeye Knoll site, which is presented as Appendix D. Dr. Linda Scott Cummings and Kathryn Puseman of Paleo Research Institute in Golden, Colorado, performed additional pollen, phytolith, macrofloral, and protein residue analysis to examine environmental, subsistence, and dietary issues. Their findings are included as Appendix C.

Dr. J. Colette Berbesque (Department of Life Sciences, Roehampton University, London, United Kingdom) carried out the linear enamel hypoplasia analysis and wrote the related segments of the report, which are presented as Chapter 14. Dr. Jon C. Lohse (Center for Archaeological Studies, Department of Anthropology, Texas State University, San Marcos) analyzed the blades and blade-like flakes recovered from Buckeye Knoll and wrote the related sections of Chapter 7 dealing with the non-mortuary artifacts.

Dr. Bruce Rothschild (Laboratory of Biological Anthropology, Department of Anthropology, and the Biodiversity Institute, University of Kansas, Lawrence, Kansas) and Dr. Christine Rothschild (Arthritis Center, Baldwin, Kansas) were coauthors (with Glen Doran) of Chapter 15, which examined periosteal reaction in Texas on Early Archaic time levels.

Dr. Tim Riley (Palynology Research Laboratory, Texas A&M University, College Station) conducted the stone tool residue analysis presented as Appendix E. Alexander N. Cox of Whitehouse Station, New Jersey, produced the many fine illustrations of the site's mortuary artifacts that are contained in this report.

Several reviewers read the draft report and provided many useful and important comments and suggestions. Included were Samuel O. Brookes, former archaeologist with the National Forest Service in Jackson, Mississippi; Ed Baker of the Texas Historical Commission, Austin; and Janelle Stokes, Chief Archeologist, Galveston District, U.S. Army Corps of Engineers.

Compiling and organizing the massive amount of data presented in this study was a daunting task undertaken by three editors. Dr. Robert A. Ricklis, formerly of CEI's Corpus Christi office (now with TRC, Austin), served as Principal Investigator for the project and directed the excavations and laboratory processing and analyses. He also was the lead author and initial editor, writing many of the chapters contained herein and organizing the order of chapters in the report. Richard A. Weinstein, of CEI's Baton Rouge office, spent many months reviewing and editing the draft report, offered ideas on report organization, and helped guide the final report towards completion. Dr. Douglas Wells, also of CEI in Baton Rouge, participated in the excavations at Buckeye Knoll and was responsible for conducting much of the final editing that was necessary bring the study to a successful end. Don Hunter, of CEI's office in Baton Rouge, laid out the final report, reorganized and/or redrafted many of the figures, tables, and text, and substantially increased the visual quality of the final publication. We hope the efforts put forth by all of the participants in this project will provide a significant contribution to the prehistoric archaeology of both Texas and North America.

Robert A. Ricklis
Richard A. Weinstein
Douglas C. Wells

Chapter 1

Introduction

Robert A. Ricklis

The Buckeye Knoll site, 41VT98, is located on the upland margin directly overlooking the floodplain of the lower Guadalupe River, some 12 km south-southeast of the city of Victoria, Texas (Figure 1-1). At an elevation of 10 to 15 m above mean sea level, the site's archaeological deposits are contained within eolian and colluvial silty fine-sand sediments that reach thicknesses of over two meters and rest directly on eroded sandy clays of the Pleistocene Beaumont Formation. Topographically, the site is on the top and sides of a peninsular promontory, a remnant of the Pleistocene valley wall created by broad, arcuate meander cuts of the Guadalupe River into the Beaumont Formation during the late Pleistocene.

Surface evidence of prehistoric human occupation extends for at least 350 m along the topographic "spine" of this promontory, trending east to west. This evidence takes the form of dark brown-to-black, organically enriched "midden" soil, scattered chert debitage, and occasional fragments of animal bone brought to the surface by either modern mechanical disturbance or by burrowing animals. For the most part, however, the abundant prehistoric cultural debris is, in undisturbed areas of the site west of the Victoria Barge Canal, capped by a largely sterile brown fine-sand-silt soil that ranges in thickness from about 20 to over 70 cm. The site takes its name from a low but visually prominent knoll (Figure 1-2) at the western end of the promontory that is covered, during the spring, with blossoming wildflowers, including a profusion of the bright red flowers of the scarlet buckeye, a small and otherwise unimpressive, bush-like tree.

While the Guadalupe floodplain, at this point some 6 km wide, is presently an extensive, undeveloped and nearly uninhabited riverine woodland zone supporting a rich array of wildlife, the prairie uplands in the immediate vicinity of Buckeye Knoll have seen extensive development in recent decades by petrochemical industries. Immediately to the north and northeast of the site is the extensive Victoria Plant of Invista, Inc. (formerly of the DuPont Corporation). Several other petrochemical companies operate large facilities along the Victoria Barge Canal toward the coast. The Victoria Barge Canal was constructed by the Army Corps of Engineers in the late 1950s and early 1960s to serve as a transport artery for these plants, all of which are situated near the canal's east bank.

A number of impacts to the Buckeye Knoll site have directly or indirectly resulted from the industrial activities in the area. The most significant of these, by far, was the construction of the Victoria Barge Canal, which cuts an approximately 100-m-wide channel through the eastern part of the site. A number of local residents have reported seeing prehistoric stone artifacts as well as human bone exposed along the margins of the channel during canal construction (Ed Vogt, personal communication 2001; Weinstein 1992). As the presently reported investigations show, much of the site adjacent to the western edge of the canal (the West Canal Bank Area) has been severely disturbed by dredge disposal and mechanical soil moving. Also associated with the region's petrochemical industry are numerous buried pipelines, two of which cross the site.

At present, then, the Buckeye Knoll site is a mosaic of both intact and disturbed areas. Fortunately, with the exception of minor disturbances, the western end of the promontory and much of the slope down

Figure 1-1. Map of the central part of the Texas coast showing the location of the Buckeye Knoll site (41VT98) at the edge of the Guadalupe River valley.

to the Guadalupe floodplain remains largely intact, though evidence of uncontrolled digging by relic collectors is present. The northern and southern flanks of the site are capped by thick spoil deposits of, respectively, clay/gravel and sand. Much of the eastern end of the site has been essentially destroyed by canal construction and by the construction of an artificial levee that is approximately 50 m west of, and parallel to, the canal.

Previous Investigations

The first discovery of archaeological material at Buckeye Knoll probably took place at the time of the construction of the Victoria Barge Canal. Mr. Ed Vogt, a local avocational archaeologist, recognized the presence of the archaeological deposits at the time of canal construction. Vogt excavated one or more test pits at the site during the 1960s, and collected materials from several areas of the site. Weinstein (1992:275-276) has documented material collected by Vogt, which includes a variety of bifacial lithic tools and a number of Archaic dart points. Types represented in Vogt's collection spanned a long time frame and included a possible Early Stemmed Lanceolate point, as well as Andice, Early Triangular, Refugio, Bulverde, Tortugas, Morhiss, Kent, Gary, and Fairland dart points. Two arrow points are in the collection, one a Scallorn and the other of the Lozenge type. A discussion of the various locations from which Vogt collected these materials may be found in Weinstein's testing report (1992:271, 274).

The first professional archaeological recordation of the site was done by Carolyn Good of the U.S. Army Corps of Engineers in 1982 (site form on file, Texas Archaeological Research Laboratory). Good noted lithic materials on both sides of the Barge Canal south of the DuPont Bridge. She also observed several thin lenses of snail shells exposed along the edge of the canal channel two to four feet below the surface. Good was unable to document any artifacts in association with these lenses, which were not relocated during Weinstein's 1989 investigations.

The site was tested in 1989 by CEI under contract with the U.S. Army Corps of Engineers, Galveston District (Weinstein 1992). This work was part of an extensive program of survey and National Register eligibility testing along the Barge Canal directed by

Figure 1-2. Two views of the knoll and the west end of the Buckeye Knoll site. Top, looking west; the knoll top is immediately behind the standing dead tree, and the topography drops off to the Guadalupe River floodplain in the trees at the rear of the photo. Bottom, looking north at the knoll within a grove of live oak trees.

Richard A. Weinstein. Weinstein's work at Buckeye Knoll consisted of a varied program of backhoe trenching, auger boring, and hand-excavated 1x1-meter test units, and revealed archaeological materials both east and west of the Barge Canal, though most abundantly to the west of the canal. Additionally, a detailed topographic map of the site was prepared, and permanent on-site datum points were set by embedding stainless steel markers in concrete (which were readily relocated in our recent work, permitting us to work within the grid established by Weinstein).

A total of five backhoe trenches were dug during the 1989 testing. Trenches 1 through 3 were near the western edge of the Barge Canal bank line, where the soils/sediments were found to be highly disturbed. Trenches 4 and 5 were on the north and west slopes, respectively, of the western knoll (Figure 1-3). Trench 4 revealed a stratigraphy in which an approximately 40-cm-thick dark brown fine silty sand overlay a 50-to-60-cm-thick yellowish brown sand with clay or silt bands (lamellae); this in turn rested on a dark yellowish brown fine silty sand also containing silt or clay lamellae. This stratigraphy is similar to those encountered on this part of the site by the 2000-2001 investigations. The top 50 or so centimeters in the northwestern (downslope) part of this trench contained a mixed clay-sand-silt-gravel spoil (as encountered in all of the 2000-2001 backhoe trenches located downslope in this part of the site).

Backhoe Trench 5, on the west slope of the knoll exposed three soil strata. The uppermost was a very dark brown silty sand midden soil up to about 40 cm thick. This was underlain by dark yellowish brown clayey silty sand, about 50 cm thick, then light yellowish brown medium sand. The last two strata were considered by Weinstein to be Pleistocene terrace remnants. When reviewed in the context of our much more extensive work in 2000-2001, however, it seems possible that the soils/sediments in Trench 5 were in fact disturbed and redeposited. The lower two strata may be yellowish spoil sand, as encountered during our work. While our work did find intact remnants of a late Pleistocene Deweyville sand alluvial terrace, this was some three meters lower in elevation. Also suggesting disturbance is the extremely sharp break between the bottom of the dark brown midden soil and the yellowish sands, as though the midden soil had been mechanically pushed onto the underlying material.

A total of 67 auger borings was made in 1989, 14 east of the Barge Canal and 53 to the west of the canal. These were placed at 20-meter intervals on a grid, and served to delimit the midden areas to the west of the canal. An extensive area of sands revealed by augering to the south of the knoll was interpreted to represent a Pleistocene alluvial terrace. However, the extensive backhoe trenching done in this area in 2000-2001 clearly showed these sands to be modern dredge spoil.

Of the three 1-by-1-meter hand-excavated test units, one (N110E185) was approximately 30 meters east of the Barge Canal south of the DuPont Road, while the other two, S13W80 and S16W113, were located on the top and on the west slope, respectively, of the knoll west of the canal.

N110E185, east of the barge canal, contained pale brown sands and a moderate amount of chert debitage. No time-diagnostic artifacts or features were encountered, and this, along with an absence of heavy organic staining, led Weinstein (1992:283) to conclude that this portion of the site had not been intensively occupied.

In contrast, unit S13W80 on the top of the western knoll contained abundant prehistoric cultural materials and a rather thick, organically enriched midden stratum. Weinstein identified four distinct strata (which the 2000-2001 investigations showed to be present over most of the knoll). From top to bottom, these were (1) a very dark gray silty sand, 40-50 cm thick, containing relatively sparse cultural material; (2) a black silty sand midden stratum, 60-70 cm thick, with abundant debitage, faunal bone, burned-clay nodules, scattered freshwater mussel and *Rangia* shells, and several lithic tools, including a Morhiss dart point; (3) a dark grayish brown silty sand, 20-30 cm thick, containing debitage, a distal dart point fragment, and scattered faunal materials; and (4) a brown sand with minor amounts of debitage and faunal materials.

Samples of faunal bone from two 10-cm levels within Stratum 2 in S13W80 were analyzed. The materials from both samples indicated major reliance on white-tailed deer, freshwater fish and a variety of smaller mammals, birds and turtles.

Although S13W80 was placed within the bounds of what was determined in 2000-2001 to be a sizeable prehistoric cemetery, the only identified traces of human remains were an upper left third molar fragment from Stratum 3, a small fragment of parietal bone and three hand bones from Stratum 2 (Danforth 1992). Weinstein (1992:310) correctly suggested that these scattered remains likely represented displacement from human burials in the vicinity of this test unit.

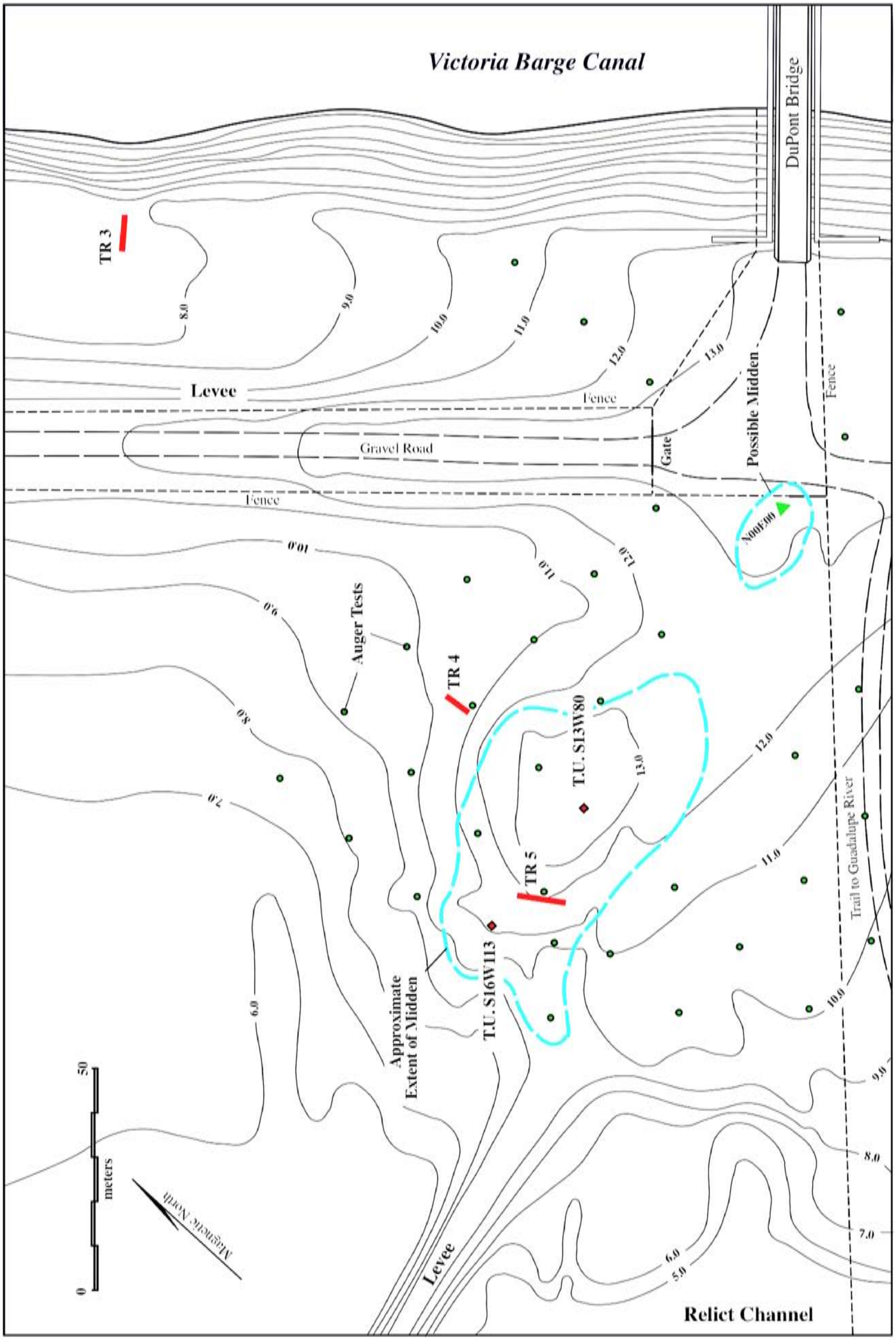


Figure 1-3. Contour map of the Buckeye Knoll site showing the locations of Weinstein's 1989 test units (S13W80 and S16W113), Backhoe Trenches 3-5, and delineated midden areas.

The third 1-by-1-m test unit excavated in 1989 was S16W113, located on the west slope of the knoll. This unit contained considerable prehistoric cultural material, within six definable strata, including abundant lithic debitage, blades, cores, a quartzite hammerstone, and two time-diagnostic projectile points. One of the points is a Late Prehistoric Scallorn arrow point, found at a depth of 140-150 cm below the surface; the other is a late Archaic Ensor dart point, found at 190-200 cm (the lowest 10-cm level reached in this unit). Weinstein noted that the two points were found in correct vertical positions as regards their relative ages, suggesting that the deep deposit in this unit represented an intact cultural sequence. Because early Archaic projectile points had been reported by Vogt to have come from a nearby bulldozer cut, Weinstein speculated that the archaeological deposits in this part of the site (the base of which was not reached in S16W113) might well represent a long sequence extending back in time into the Early Archaic period (Weinstein 1992:311).

Two specimens of human bone, possibly from a nearby burial or burials, were found in S16W113. An upper right premolar was found between 120 and 130 cm below the surface, and a distal femur fragment was found in the 140-150-cm level (Danforth 1992).

Based on the 1989 testing, Weinstein identified the area west of the Barge Canal as having the greatest potential to elucidate culture chronology and prehistoric adaptive change. Additionally, he defined two midden areas, one an extensive midden on the western knoll and extending down the west slope of the knoll toward the Guadalupe flood plain, and the other a smaller elliptical midden area to the east, near the road running along the top of the artificial levee. The time-diagnostic lithic artifacts recovered in 1989, along with earlier materials collected by Ed Vogt, indicated a long occupation, which Weinstein posited may have begun in late Paleo-Indian times and continued intermittently through the Early, Middle and Late Archaic periods and into the Late Prehistoric. Based on these findings and on the abundance of well-preserved faunal materials, Weinstein concluded that the site was one of the most important along the Victoria Barge Canal and was eligible for inclusion in the National Register of Historic Places (Weinstein 1992:327, 392).

Weinstein revisited the site in 1991 to perform limited subsurface testing in the area of the small elliptical midden east of the knoll. This consisted of an additional 15 auger holes and a 1-by-1-meter test unit. Primarily, this work resulted in the further definition of the midden stratum, which was an organically enriched stratum of silty sand (Weinstein 1991).

The only other professional attention given to the site prior to our 2000-2001 work was a reconnaissance done in the spring of 1993 by personnel from Prewitt and Associates, Inc., as part of a survey of four channel segments along the Victoria Barge Canal, under contract with the Galveston District, U.S. Army Corps of Engineers. The purpose of this work was to monitor the condition of the site (Gadus et al. 1993). It was observed that, while much of the site had been destroyed or disturbed by construction and maintenance of the Barge Canal, the area of the western knoll appeared to be stabilized by vegetation. Weinstein's previous assessment that the site was eligible for placement in the National Register was reaffirmed (Gadus et al. 1993:76).

The 2000-2001 Investigations

In the spring of 2000, the Galveston District, in response to plans to widen the Victoria Barge Canal in proximity to 41VT98, requested that CEI prepare a technical proposal for extensive investigations at the site based on a scope of work prepared by the Corps of Engineers (Guevin 2000). At that time, it was believed that the proposed work on the canal might affect the site by (a) accelerating erosion along the canal bank line and (b) requiring spoil deposition and associated large-scale machinery activity on and around the site. Thus, it was thought that the site might suffer adverse effects as a direct result of Corps of Engineers activities.

In the late summer of 2000 a data-recovery plan was submitted by CEI to the Galveston District (Ricklis 2000). This plan received approval from the District, with concurrence from the Division of Archaeology of the Texas Historical Commission (THC) in a meeting at THC's Austin offices on October 12, 2000, attended by William A. Martin and Ed Baker of the THC, Bryan Guevin of the Galveston District, and Richard A. Weinstein and the author of Coastal Environments, Inc. A final scope of work (Guevin 2000) was sent to the THC by the Galveston District under a cover letter from Ms. Carolyn Murphy, Chief, Environmental Branch of the Galveston District, on December 12, 2000.

This data-recovery plan outlined a fieldwork strategy with three distinct components, as follows:

> 1. Backhoe trenching and hand excavation in the West Canal Bank Area, i.e., that part of the site immediately adjacent to the

west bank line of the canal, east of the levee, and north of the DuPont Bridge spanning the canal (see map, Figure 1-3).

2. Excavation of a series of backhoe trenches around the margins of the site as defined by Weinstein's 1989 auger borings (Weinstein 1992).

3. Hand excavation of up to 40 2-by-2-meter units in portions of the site determined, on the basis of the 1989 testing and the 2000-2001 backhoe trenching, to contain intact archaeological deposits.

Each of these aspects of the fieldwork had a specific set of goals. The backhoe trenching and hand excavation in the West Canal Bank Area was intended to mitigate the effects of the proposed canal modifications by (a) determining if intact, significant archaeological deposits were present and, if such was the case, by (b) recovering sufficient information for effective archaeological interpretation.

The extensive program of backhoe trenching around the margins of the site was designed to define the extent and nature of archaeological deposits with more precision than had been possible within the limited testing carried out in 1989. Where a given backhoe trench revealed intact archaeological deposits that appeared to hold significant potential to address questions of site chronology or formation processes, it was proposed that a 2-by-2-m hand excavation unit be dug adjacent to that trench.

Finally, the hand excavations proposed on the western knoll were intended to better define the nature of the stratified deposits found there in 1989. Because this portion of the site had been recognized as having considerable research potential, and because of various past impacts to the knoll and the immediately surrounding terrain (e.g., relic-collector's holes, bulldozer cuts, spoil deposition, pipeline construction), it was deemed important to fully assess the significance of the locale for future management purposes.

Chapter 2

Environmental and Archaeological Contexts

Robert A. Ricklis

As mentioned earlier, the Buckeye Knoll site lies on a topographic promontory that is an erosional remnant of the upland surface of the Pleistocene Beaumont Formation, an essentially flat, extensive fluvial-deltaic geologic unit deposited under higher-than-modern sea level. The promontory is defined by broad meander cuts of the ancient Guadalupe River that probably were created during the late Pleistocene (Bureau of Economic Geology 1975; McGowen et al. 1976).

The soils/sediments on and around the site will be discussed in some detail further on in Chapter 3 and still further in Appendix A, devoted to a report on geoarchaeological investigations and inferences concerning site formation processes. For the present, suffice it to say that the Beaumont erosional remnant, consisting of tan sandy clay containing caliche ($CaCO_3$) nodules and iron oxide stains, is mostly capped with a veneer of silty sands of eolian and colluvial origins deposited since the terminal Pleistocene. As will be shown further on, these Holocene sediments, which contain the site's archaeological materials, did not accumulate continuously or at a uniform rate. Rather, the net accumulation of up to three meters or so of sediment is the result of processes involving both eolian deposition and erosion and concomitant colluvial redeposition of sediments in downslope locations. The ultimate outcome of these processes is that archaeological materials are found in stratified deposits that in places are marked by definable breaks or unconformities.

An important proximate source for the upland-margin silt/sand sediment veneer may have been the Guadalupe floodplain immediately to the west of the site (Figure 2-1). The floodplain itself is underlain by clay, silt and sand deposits of alluvial origin. Data acquired from sediment cores, taken during our fieldwork, suggest a significant colluvial slopewash component in the floodplain sediments at the base of the valley wall slope.

Additionally, much of the sand component in the site sediments can be inferred to derive from late Pleistocene Deweyville alluvial terrace deposits (Figure 2-2). Remnant Deweyville alluvial sands make up the basal sediments along the north slope of the promontory on which the site is located, and likely are found as well under modern spoil deposits that blanket the south and southwest slopes. Deweyville terrace remnants are mapped along the north slope by the Bureau of Economic Geology of the University of Texas at Austin (1975) and confirmed by late Pleistocene ages for initial deposition obtained during our fieldwork using the optically stimulated luminescence (OSL) technique, to be discussed in detail later in this report.

The regional climate is humid subtropical (Orton 1978; Larkin and Bomar 1983). Winters are generally mild, though temperatures can drop below freezing for short periods when arctic cold fronts or "northers" push into south Texas. Summers tend to be hot and humid. Annual precipitation along the Texas coastal zone shows a clinal gradient, with an annual average of 48 inches around Houston and 26 inches at the Rio Grande delta. Victoria County falls midway in this range, with an average annual precipitation of 36-38 inches.

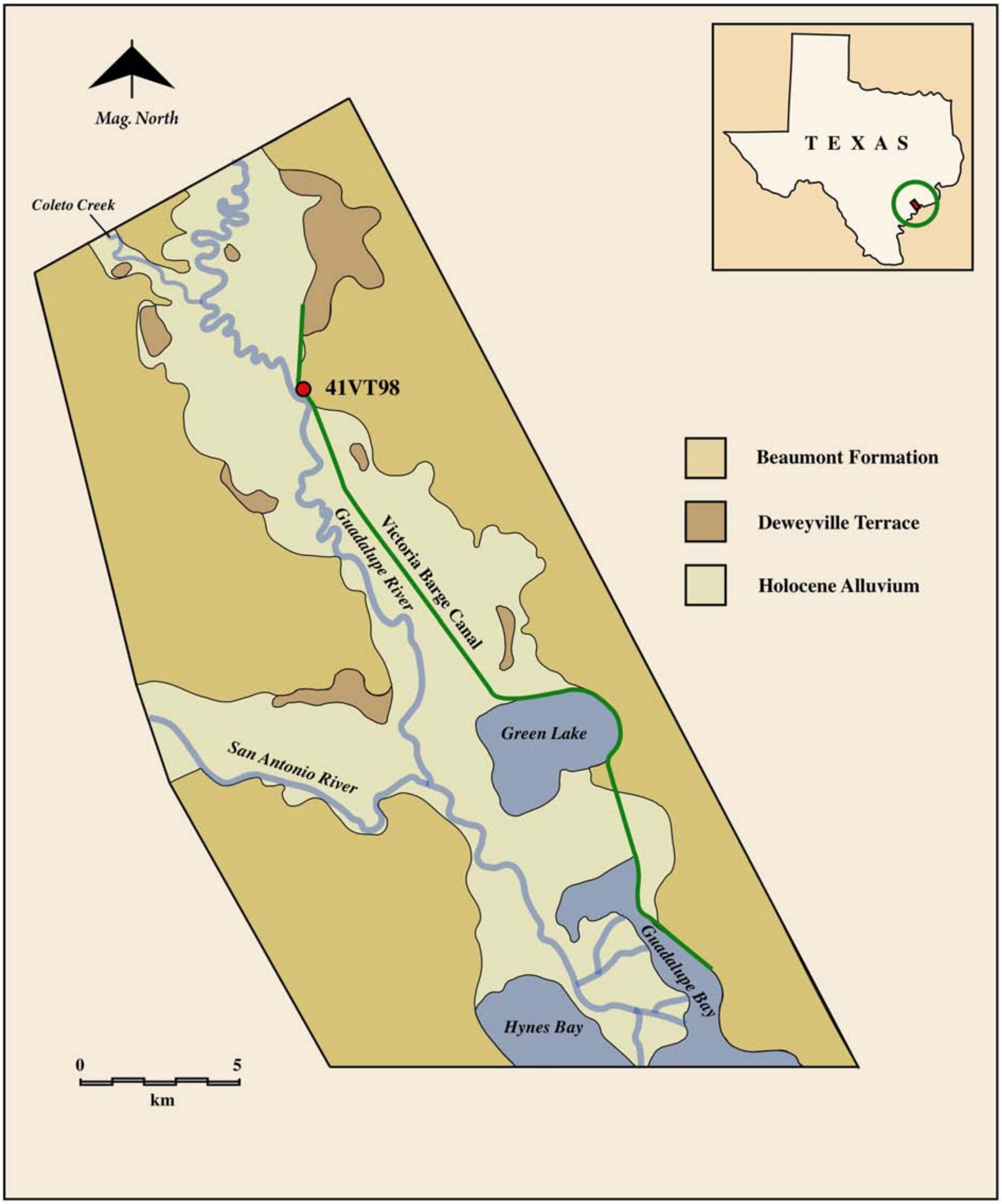


Figure 2-1. Geologic map of the lower Guadalupe River valley showing surface geologic units and the location of the Buckeye Knoll site on the valley's eastern margin.

Vegetation on and near the site presently consists of two basic plant communities, as it probably did, with some variation, throughout the Holocene. The upland surface is dominated by short to medium grasses and forbs, with stands of oak and anaqua trees in sandy areas. The heavier clay soils typical of the uplands away from the valley wall (see Bureau of Economic Geology 1975) support grasses and scattered thornbrush trees such as mesquite and hackberry. Huisache is found in moisture-collecting depressions

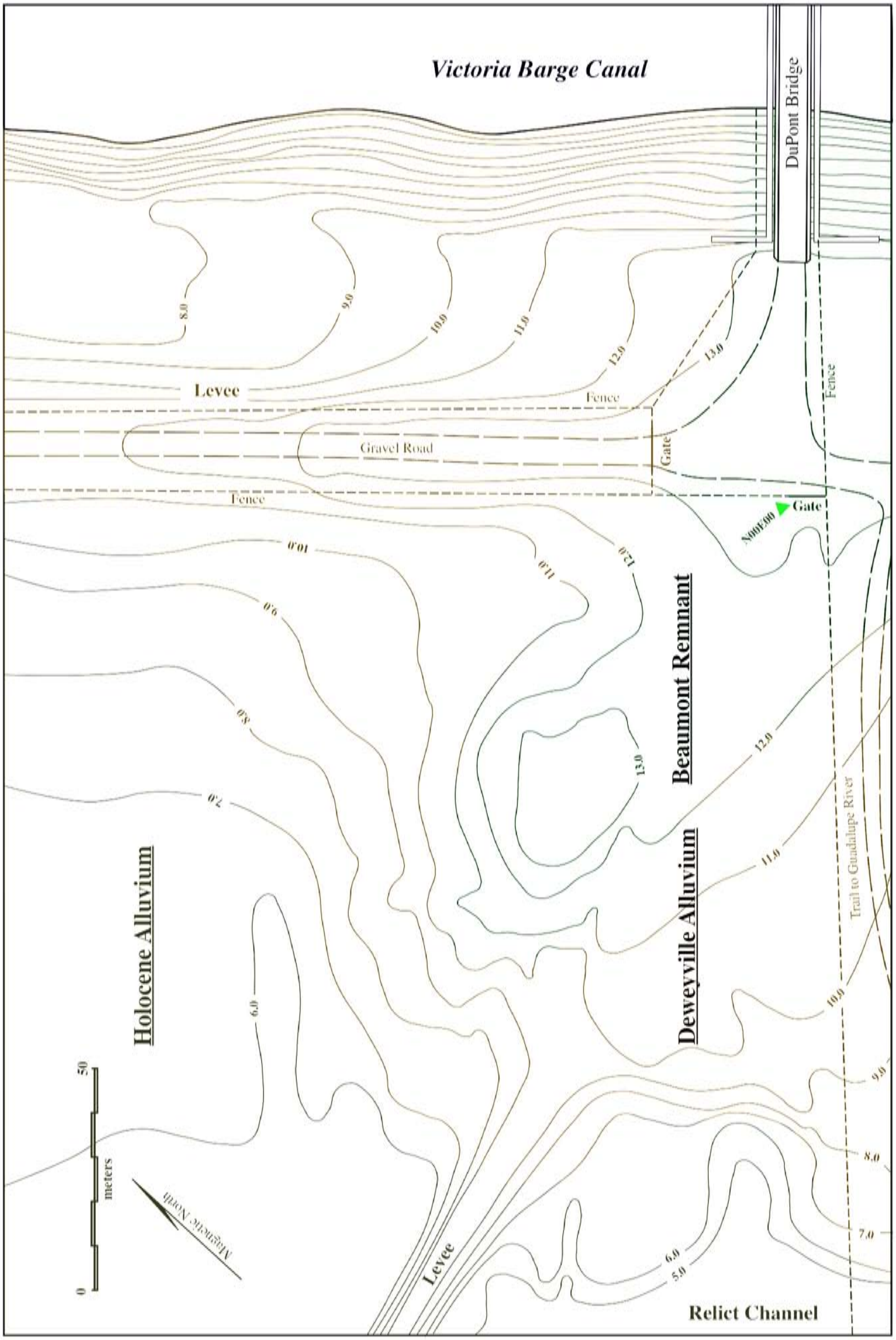


Figure 2-2. Contour map of the Buckeye Knoll site showing surface geology (exclusive of the Holocene sand-silt veneer that overlies all upland sedimentary units) based on extensive backhoe trenching, hand excavation, and sediment coring on the floodplain.

on the uplands. Prickly pear cacti (*Opuntia* sp.) grow individually and in clumps.

In contrast, the floodplain supports a dense arboreal woodland dominated by deciduous species such as pecan, ash and willow. These large trees form a more or less closed canopy so that understory vegetation is largely limited to short grasses.

Fauna in the area today remain abundant and varied. Mammals include white-tailed deer, coyote, gray fox, raccoon, striped skunk, opossum, bobcat, collared peccary (javelina), cottontail rabbits, pocket gophers, rats and mice. Bison herds were present on the coastal prairie in early historic times. A variety of bird species frequent the area today, including wrens, ducks, geese, wild turkey, owls, turkey vultures, black vultures, several species of hawk, and bald eagles. Amphibians and reptiles include frogs, hard- and soft-shell turtles, numerous snake species, including several venomous species, and the American alligator. The Guadalupe River is habitat for a variety of freshwater fish species including largemouth bass, buffalo fish, alligator gar and sunfish. Several species of freshwater mussel may be found in the lower Guadalupe River (Howells et al. 1996). Downstream, the Guadalupe empties into coastal embayments, where brackish-to-saline waters support various estuarine shellfish species and marine finfishes.

Regional Paleoclimate

Paleoenvironmental research over the last several decades indicates that climate during the Holocene geologic era (i.e., since around 11,000 B.P.) has undergone significant fluctuations in temperature and moisture. Changes in moisture are particularly significant in southern Texas, since the region is transitional between the moist woodlands of the northern Gulf coastal plain, where annual precipitation averages greater than 50 inches, and the dry region of deep south Texas and northeast Mexico, parts of which receive as little as 18 inches of precipitation a year. Currently available data suggest that the roughly north-south trending precipitation gradient of the larger Texas area underwent east-west oscillations over the course of the Holocene which, given the marginal position of the present project locale, would have had significant effects on vegetation patterns and overall biotic productivity. Modern environmental data show that even short-term fluctuations in moisture can have profound effects on regional ecology. For example, the drought conditions of the 1950s are known to have caused major expansion of xeric plant species (e.g., extensive prickly pear cactus communities) and concomitant areal shrinkage of vegetation adapted to moister conditions (Drawe et al. 1978). At the same time, reduced discharge of freshwater into coastal bay systems resulted in increased salinity levels and migration of relatively high-salinity molluscan species into secondary and tertiary bays and river estuaries (Parker 1959). Such changes on a broad time scale may have had profound effects on the human ecological patterns of prehistoric people at the Buckeye Knoll site and the surrounding region.

Most of the paleoclimatic evidence relevant to the Buckeye Knoll area comes from the larger Texas region. The normal progression of scientific research, along with an increasingly ecological orientation in regional archaeology over the past 15 years or so, has produced a cumulative body of data on environmental change since the end of the Pleistocene (e.g., Collins 1995; Collins and Bousman 1993; Johnson and Goode 1994). Accordingly, it has become increasingly apparent that environmental change during the last 12,000 years was not gradual, as once thought (e.g., Bryant and Shafer 1967), but, rather, was characterized by major fluctuations in climate and resultant vegetation patterns and the resource mosaics to which prehistoric peoples adapted (Figure 2-3).

Despite some persistent questions concerning the timing and intensity of environmental fluctuations (e.g., Ellis et al. 1995), a general consensus is developing concerning broad patterns of climate change. Because the combined human occupations of the Buckeye Knoll site span the entire Holocene era, it is worthwhile to here summarize the broad outline of what is known or reasonably inferred concerning regional paleoclimate.

During the 1970s and 1980s, palynological data from east-central and southwest Texas were used to suggest a gradual drying trend beginning at the end of the Pleistocene and continuing through the Holocene (Bryant and Holloway 1985; Bryant and Shafer 1977). Information obtained in southwest Texas cave sites suggested increasing aridity and a gradual shift from wooded parklands to dry scrublands. Somewhat contradictory evidence came from pollen sequences obtained from east-central Texas bog sites. Data from Soefje Bog, spanning approximately 8,000 years of the Holocene, indicated that percentages of key pollen taxa remained fairly constant during this time span; the generalized trend toward dryer climate suggested by the southwest Texas data was not in evidence (see Graham and Heimsch 1960). Simi-

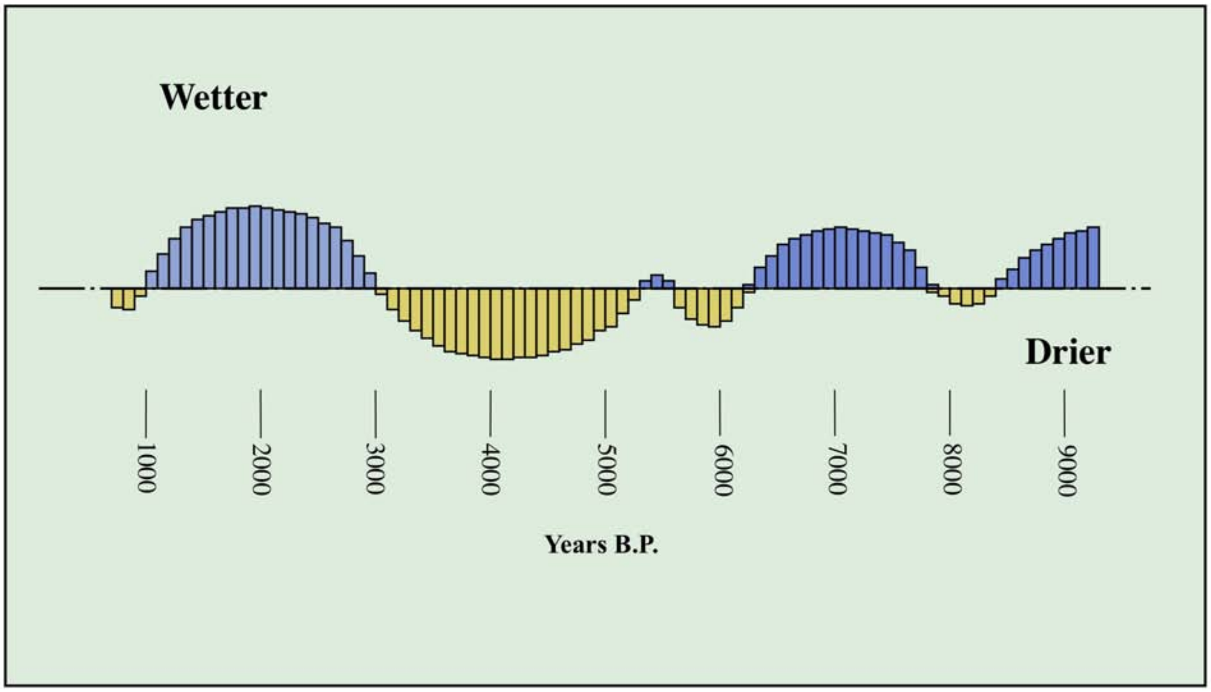


Figure 2-3. Diagram showing a model of Holocene climate change for Texas (after Johnson and Goode 1994). Ages are based on calibrated assays on charcoal samples. This model differs in details from others (e.g., Collins 1995) but is in accord with an emerging consensus that the early Holocene was a relatively wet period followed by dry conditions in the Middle Holocene and a return to a relatively moist climate in the late Holocene.

larly, long-term climatic stability was suggested by the pollen data from Hershop Bog, where a peat core spanning some 10,000 years showed evidence of more or less stable oak savannah upland vegetation and a variety of riparian woodland species (Bryant and Holloway 1985). Recently, however, the overall usefulness of the bog data has been questioned (Albert 2001) on the grounds that the perennially wet microenvironments in and around bogs are not necessarily an accurate representation of the environmental changes across the larger containing landscape.

Collins and Bousman (1993) have reinterpreted the east-central Texas bog data to suggest major changes in vegetation since the end of the Pleistocene. Changes in percentages of arboreal pollens from several bog sites, namely, Hershop, Weakly, South Soefje and Boriak, reflect relatively abundant arboreal vegetation between 17,000 and 8000 years B.P. This is followed by a notable decline in arboreal vegetation between 8000 and 4000 B.P. After 4000 B.P., arboreal pollen increases, though not to the levels seen prior to 8000 B.P.

Probably relevant are Stephen Hall's (1988) findings at Ferndale Bog in eastern Oklahoma. Palynological data from this locale suggest a shift from a relatively dry grassland and post-oak savannah to more mesic mixed oak-pine forest after ca. 5000 B.P.

The model presented by Collins and Bousman is appealing insofar as it agrees with more widespread findings that point to a major middle Holocene dry period in mid-continent North America, falling sometime between ca. 7,000 and 4,000 years ago (this is the so-called Altithermal of Antevs 1955). This was followed by a return to generally moister conditions during the late Holocene.

Recently, C. Britt Bousman (1998) presented a model of fluctuating climate since the late Pleistocene. Bousman's primary concern is the relative percentages of arboreal vs. grassland flora. He notes that the data from Boriak and Weakly Bogs suggest a general pattern of abundant arboreal vegetation in the late Pleistocene, to ca. 10,000 B.P., with an interval of poor arboreal pollen representation around 12,500 B.P. After around 10,000 B.P., there was a general trend toward drier conditions, with increasing abundance of grassland taxa and a peak in aridity during the middle Holocene between about 6000 and 4000 B.P. In keeping with other paleoenvironmental findings, greatest aridity is indicated for ca. 5000 B.P. After ca. 4,000 B.P. there was a general, though fluctuating, trend toward moister conditions, though the moisture levels of the Pleistocene were not repeated.

There is also a body of geological evidence to support the idea of a marked mid-Holocene dry period. Evidence from the lower Pecos River area suggests a period of intensive erosion and flooding in the middle Holocene, around 4,500 years ago (Johnson 1964; Dibble 1967). This is to be expected under arid conditions resulting in reduced vegetation ground cover due to decreased annual precipitation. On the southern High Plains, extended aridity during the middle Holocene is indicated by extensive eolian sedimentation at archaeological sites, with a resumption of soil development after ca. 4500 B.P. (Holliday 1989). Meltzer and Collins (Meltzer 1991; Meltzer and Collins 1987) have noted findings of middle Holocene aboriginal water wells at the Blackwater Draw Site, New Mexico and at the Marks Beach and Mustang Springs sites in the Texas Panhandle that they interpret to represent lowered water tables during this period.

Recent findings at site 41LE177 in Lee County in east-central Texas provide additional geologic evidence for mid-Holocene aridity. Geologic profiles in a series of backhoe trenches, along with both OSL and radiocarbon dating of humates in bulk sediment samples, indicate stream downcutting associated with lowered water tables by ca. 6000 B.P. Also, increased colluvial deposition on slopes at this time suggests generally reduced vegetation cover and, inferably, increasing aridity (Frederick et al. 2001; Ricklis 2001).

Faunal data from Hall's Cave in central Texas provide strong evidence for an extended period of aridity during the middle Holocene. Significant shifts in the proportional representation, at different levels in the cave deposit, of the mesically adapted least shrew and the desert shrew indicate increasing aridity after ca. 7000 B.P. Dryness peaked between ca. 5000 and 3500 B.P. (Toomey et al. 1993). The data also indicate a late Pleistocene dry interval and a return to relatively moist conditions in the late Holocene.

The limited paleoenvironmental data from the south Texas region, closer to the Buckeye Knoll site, tends to support a general model of mid-Holocene dry conditions. Phytolith data reported by Ralph Robinson (1979) suggest the following pattern of climatic fluctuation since 8000 B.P.: ca. 8000 B.P. (wet climate), before 4500 B.P. (very dry with low vegetation biomass), ca. 5000 B.P. (no oak, very short grass, and dry climate), ca. 2800 B.P. (very moist conditions, tall grass, and arboreal vegetation), and Late Prehistoric Period (wet, tall grasses, and arboreal pollen). These findings conform to the others discussed above, insofar as relatively moist conditions in the early Holocene give way to aridity by 5000 B.P., after which the late Holocene experienced a return to relatively moist climate.

Geologic information from the central and lower Texas coastal zone also points to mid-Holocene dryness, reduced vegetation cover, and extensive erosion along valley walls and upland margins (Ricklis and Cox 1998). At site 41HG118 in Hidalgo County, cultural materials were found within Zone II, a silty soil of eolian origin (Collins et al. 1989). This soil rested unconformably on an eroded surface of Pleistocene Beaumont clay. Radiocarbon assays on the humates from the base of Zone II yielded an age of 5200 B.P., indicating extensive erosion of the Beaumont surface prior to that date. This, in turn, suggests reduced vegetation cover in the early part of the middle Holocene. Similarly, at numerous sites along the upland margins overlooking Nueces Bay and the lower Nueces River, extensive erosion of the Beaumont surface is apparent, with radiocarbon assays placing the beginning of soil formation variously between ca. 7000/6000 and 5000 B.P. (Blum et al. 1995; Ricklis 1993; Ricklis and Cox 1998). Again, early middle-Holocene erosion appears to be indicated as a regional phenomenon.

In sum, the presently available evidence points to marked shifts in climate over the last 12,000 years. The data suggest moist (and probably relatively cool) conditions during most of the late Pleistocene, followed by a general drying trend, with expansion of grasslands at the expense of woodlands. Palynological evidence from site 41LE177 in east-central Texas suggests a relatively brief cool and dry period (Younger Dryas) in the terminal Pleistocene (Albert 2001). Dryness reached its peak during the middle Holocene, ca. 7000/6000-4000 B.P. when upland margins were extensively eroded due to reduced ground cover, and stream channels were downcut in response to falling water tables. After ca. 4000 B.P., there was a return to a more mesic climate and a trend toward a more wooded landscape. The implications of these trends for interpreting human ecology and modeling site formation processes at Buckeye Knoll are discussed in appropriate contexts further on in this report.

Coastal Plain Geology and Sea Level Change

Geological Basics

In order to place the Buckeye Knoll site within an environmental context, it is worthwhile to briefly

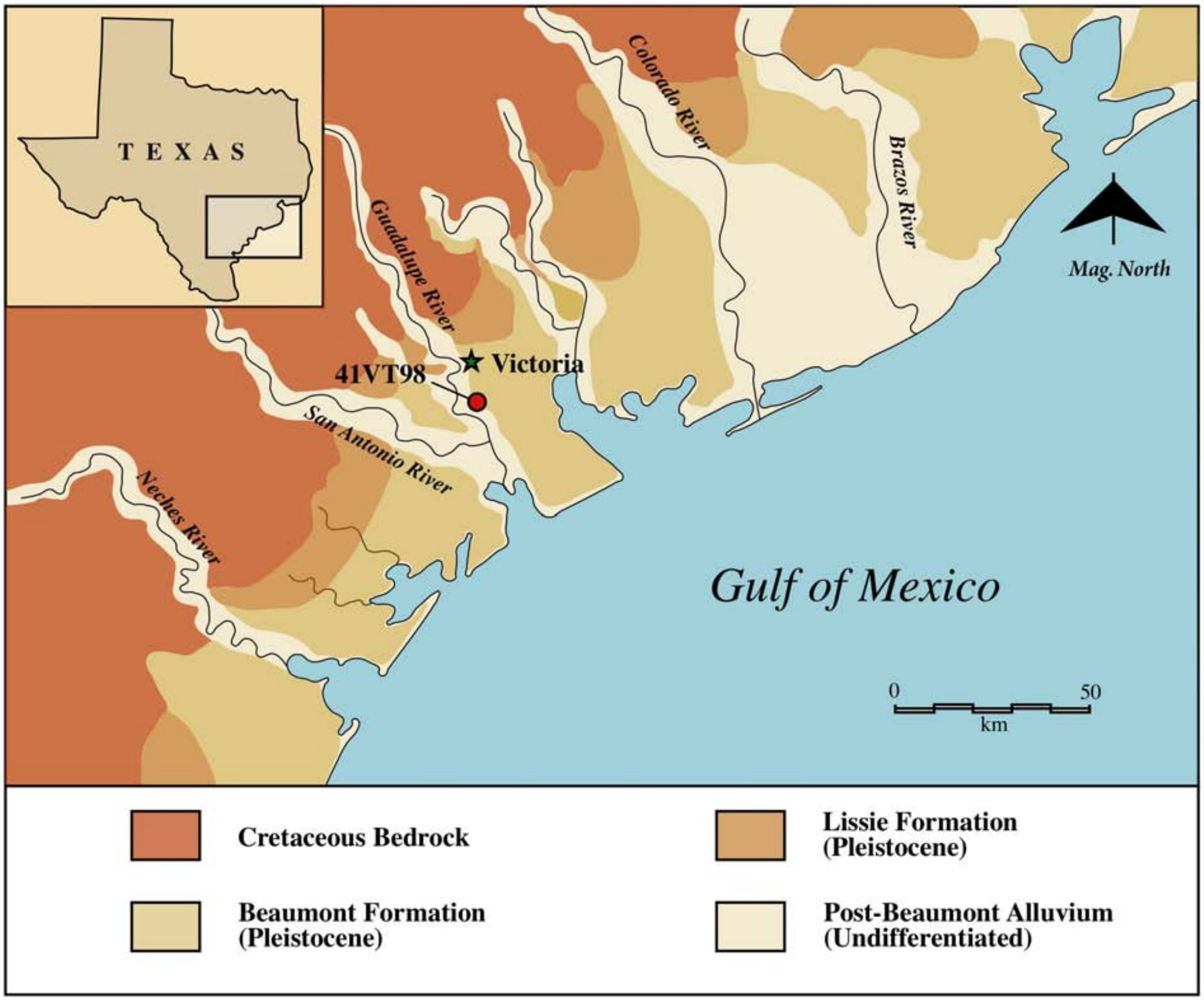


Figure 2-4. Map of the middle Texas coast showing simplified surface geology.

summarize the regional geology. Although the site is not, strictly speaking, in a coastal setting, it is close enough to the coast for estuarine resources such as certain low-to-moderate-salinity bivalves and a limited supply of marine fish to have been utilized by prehistoric residents. Moreover, the accessibility of the site to estuarine resources may have fluctuated with time, according to the transgression/regression of the Gulf of Mexico keyed to global sea-level change. Thus, a review of the currently credible models of Holocene sea-level rise and fluctuation is appropriate.

The coastal plain of Texas is part of the broad Gulf Coastal Plain, a physiographic unit that rises very gradually from the coast to the interior. Surface geology consists mostly of sandy clays and clayey sands deposited by fluvial-deltaic systems during Pleistocene interglacials, when sea level was higher than at present. As may be seen in Figure 2-4**,** the region's surface geology is marked by a series of sedimentary formations that approximately parallel the modern coastline. These formations, which are progressively older from the coast to the interior and which dip gradually coastward, consist of fluvial-deltaic clays, silts and sands that were deposited by streams and deltaic distributary channels under higher-than-modern sea levels (Brown et al. 1976; DuBar et al. 1991). Along the modern coastline is the Beaumont Formation, made up of silty and sandy clays and dating to the middle-to-late Pleistocene. Farther inland are surfaces of the Lissie Formation, comprised mainly of sandy clays and dating to the early-to-middle Pleistocene. The Beaumont Formation dips only slightly toward the coast, and thus the modern surface exhibits little erosional dissection and is essentially flat except where transected by stream channels.. Beaumont sediments consist of numerous cross-cutting sand-dominated meander belts and intervening clay-dominated flood basins (Aronow 1971; DuBar et al. 1991). The age of the Beaumont Formation was once generally placed strictly in the period of the Sangamon interglacial sea-level highstand, ca. 100,000 years B.P. (e.g., Aronow 1971), but recent re-examination of exposed Beaumont strata suggest a complex history that encompassed multiple glacial-interglacial cycles beginning in the middle Pleistocene. The Lissie Formation dips at a slightly greater angle and expresses a slightly more dissected topographic surface.

As shown in Figure 2-4, a series of major, subparallel stream channels crosscut the major fluvial-deltaic formations to discharge at the modern coastline. The modern bays into which most streams discharge represent late Pleistocene stream valleys that were inundated by rising sea level following the last glacial maximum of ca. 20,000 years ago. For the most part, even the larger of these streams, such as the Nueces, San Antonio, and Guadalupe rivers, carry insufficient sediment load to have caused delta progradation into the open Gulf of Mexico, so that only relatively small deltaic deposits are found at the heads of the modern bays. In contrast, the Brazos and Colorado rivers, with much larger volumes of discharge and correspondingly greater sediment loads, have created an extensive Holocene deltas that have completely filled the late Pleistocene valleys of those streams and prograded into the Gulf.

During the final interglacial period of the Pleistocene, alluvial deposition of sandy sediments occurred within stream valleys. As a result of stream downcutting during the last glacial maximum and subsequent scouring by meander channels during the Holocene, these sediments remain today as Deweyville terrace remnants (e.g., Brown et al. 1976; McGowen et al. 1976). These terraces are inset into broad meander scars along the valley walls cut into the Beaumont Formation. A number of Deweyville terraces have been mapped along the margins of the modern lower Guadalupe valley near the Buckeye Knoll site (see Figure 2-1). In fact, as mentioned above and discussed in some detail further on, the northern and western slopes of the Buckeye Knoll site consist of Deweyville sands inset into the Beaumont erosional remnant that forms the geologic core of the site.

Post-Pleistocene geology of the coastal plain consists of alluvial valley fills consisting of sands, silts and clays, plus the modern barrier islands that formed as the result of wave action and longshore drift during the Holocene. The modern surface of the Guadalupe floodplain bears numerous abandoned channel scars and oxbows that mark former stream channels (see Weinstein 1992 for detailed maps). The Guadalupe River has doubtless migrated laterally within its valley, though the precise position of the river during any given period of the Holocene cannot be defined with certainty.

Sea Level and the Evolution of Holocene Estuaries

At the time of the last glacial maximum, ca. 20,000 B.P., much of the global water supply was captured within continental and montane glaciers and sea level was some 100 m below its modern position (Suter 1987; Suter and Berryhill 1985). After ca. 18,000 B.P., a general global warming trend resulted in extensive melting of glaciers and a concomitant rise in sea level. By ca.10,000-9000 B.P., sea level was within perhaps 30 m of its present position and the lower reaches of stream valleys, which had been deeply downcut during the glacial maximum, were inundated by marine waters to form the prototypes of the modern Texas coastal bays (Brown et al. 1976; Byrne 1975; McGowen et al. 1976).

Various models of sea-level rise for the northwest Gulf of Mexico have been proposed. While these show significant variations in detail, they all posit incremental or stepwise rise, with periods of rapid rise interrupted by intervals of slowed rise, stillstand, or even slight regression (e.g., Anderson and Thomas 1991; Curray 1960; Frazier 1974; Nelson and Bray 1970; Paine 1991). The more recent of these geologic studies have suggested that the rise was relatively rapid before ca. 9000-8000 B.P. and between ca. 7000 and 6000 B.P.

Anderson and Thomas have modeled a stepwise pattern of Holocene sea-level rise in the Galveston Bay area based on alternating facies representing marine transgression on one hand and delta progradation on the other (Figure 2-5) (Anderson and Thomas 1991; Anderson et al. 1992; Thomas and Anderson 1994). These authors present seismic-reflection and vibracore data indicating that Trinity River valley fills on the now-submerged continental shelf represent periods of bay-head delta progradation (under conditions of relatively stable sea level) alternating with periods of delta overstepping and landward transgression of the shoreline (under conditions of rising sea level). They suggest that flooding surfaces associated with marine transgression formed ca. 9000, 7000 and 4000 B.P., the approximate times of rapid sea-level rise posited by Frazier (1974).

Data collected in the last two decades or so suggest a sea-level highstand after ca. 4500-4000 B.P., prior to attainment of essentially modern sea level by ca. 3000

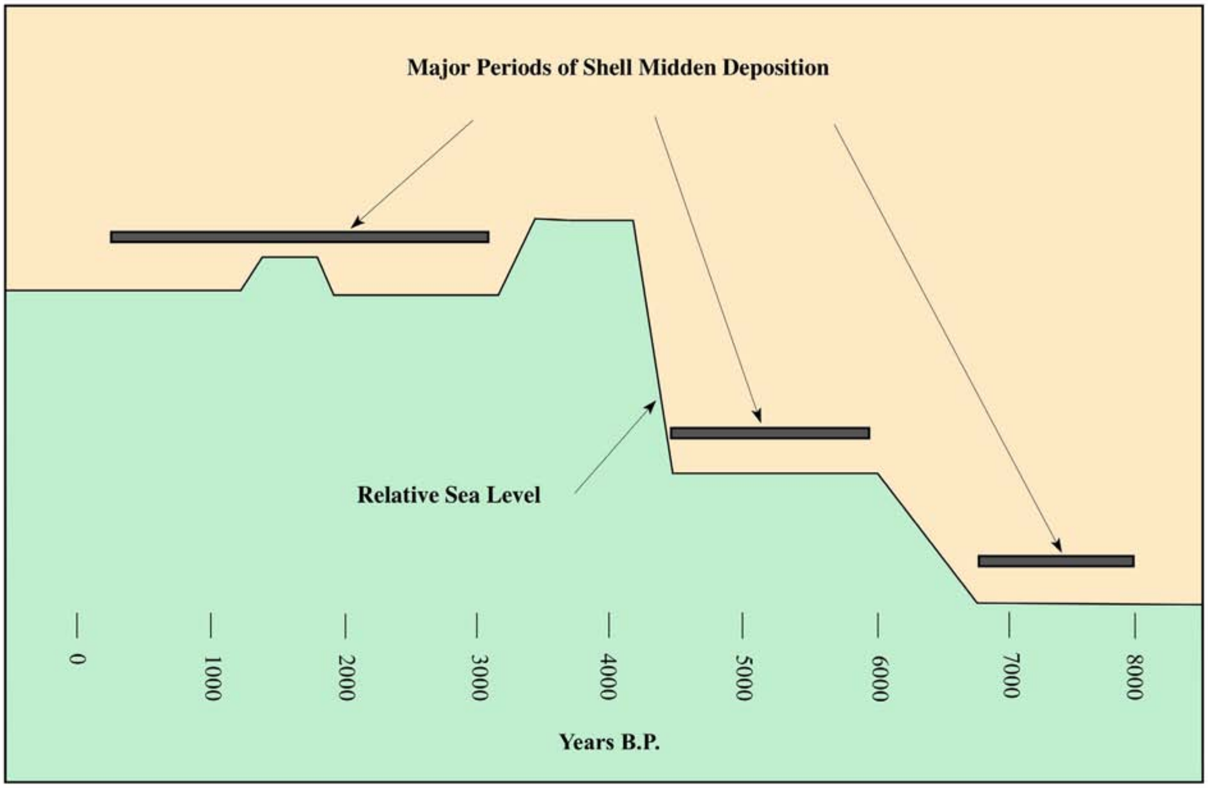


Figure 2-5. Diagram showing sea level rise for the western Gulf of Mexico (after data in Frazier 1974; Payne 1991; Anderson 1993) and major temporal clusters of radiocarbon ages (calibrated) from shell middens on the central Texas coast (after Ricklis and Cox 1991; Ricklis and Blum 1997).

B.P. Based on radiocarbon dating of buried tidal-flat muds above the modern tidal range at the Swan Lake site (41AS16) on Copano Bay, Paine (1991) has suggested a rapid rise to an approximately 1-m highstand between ca. 4400 and 2600 B.P. Recent research by Michael Blum at Mullen's Bayou on Copano Bay found evidence of a submerged or intertidal shoal (now a subaerially exposed berm) that inferably formed when sea level was up to three meters above modern MSL (Blum et al. 2001). These authors report six AMS radiocarbon ages (calibrated) on marine foraminifera from this berm, ranging from 5640 B.P. to 4800 B.P., and suggest a significant highstand at that time. However, they fail to consider the likelihood that foraminifera deposited within near-shore sediments probably had a mean resident age predating the time of deposition in the shoal. Studies conducted in the Gulf of California, for example, show that foraminifera collected from the modern surface of the bay-bottom sediments are some 1,300-2,000 years old (Martin et al. 1996). Since the average of the calibrated AMS dates from Mullen's Bayou is 5638 B.P., if a time lag similar to that evidenced in the Gulf of California is posited, the shoal actually would have formed under highstand conditions dating to around 4300 to 3600 B.P.

Additional evidence for a middle Holocene highstand is presently available. At the Mitchell Ridge site (41GV66) on Galveston Island, an assemblage of reworked estuarine shells (oyster, bay scallop, lightning whelk) was found to comprise the geologic core of the island. The shells produced calibrated radiocarbon age ranges of 5900-5730 B.P.. and 5560-5300 B,P. (Ricklis 1994a:509). Given that the shell deposits were found to lie some 2 to 3 m above modern MSL, it can be concluded that they reflect redeposition under highstand conditions (note that modern storm surges will not transport heavy shell hash materials more than .75 to 1 m above normal sea level; Morton 1998). Since the shells were reworked and redeposited, their radiocarbon ages must be older than the depositional event(s); that is, the highstand was later than ca. 5300 B.P.

Indirect but significant evidence from the Nueces Bay-lower Nueces River area strongly suggests that sea level was stable between ca. 6000 and 4200 B,P. so that, by implication, the postulated rapid rise in sea level to a highstand would have had to occurred after that time interval. A series of subsurface investigations at five archaeological sites along an approximately 12-km stretch of the southwest shoreline of Nueces Bay and the lower Nueces River have consistently encountered shell midden strata composed almost entirely of the clam species *Rangia flexuosa* and dating to between ca. 5900 and 4600 B,P. (see Ricklis 1988, 1995a; Ricklis and Cox 1993; Ricklis and Gunter 1986). *Rangia flexuosa* is a brackish-water species with low-salinity tolerance (Andrews 1977) that would thrive under stable sea level conditions in which freshwater discharge would have kept estuarine salinity relatively low. Inferably, had this time period been marked by rising sea level and marine transgression, bay salinities would have been considerably higher than the threshold conducive to long-term viability of *Rangia flexuosa*, and an abundance of higher-salinity bivalves and gastropods likely would occur on the relevant sites.

It has been previously suggested that the periods of relative sea-level stability (stillstand) along the upper and central Texas coastlines saw more or less intensive shoreline occupation and estuarine resource extraction by prehistoric peoples (Ricklis 1993, 1995a, 1998; Ricklis and Blum 1997; Ricklis and Cox 1991). Conversely, it has been posited that rapidly rising or fluctuating sea level would have destabilized estuarine ecosystems, as marine transgression led to rising salinity and increased turbidity and a resultant depression of primary productivity and overall estuarine biomass. As a consequence, bay/lagoon shorelines would have been less attractive for human occupation.

A tally of 77 available calibrated radiocarbon dates from regional shell middens on the central Texas coast (see Ricklis 1995a:270-272) showed distinct temporal clustering at ca. 7500-6800 B.P., ca. 5900-4200 B.P., and after ca. 3000 B.P. (see Figure 2-5). Only a few radiocarbon dates from shell-midden sites fall into the intervening periods of 6800-5900 and 4200-3000 B.P. Similarly, a large series of shell-midden dates from the upper Texas coast show a distinct gap in the second millennium B.P., as is the case on the central coast (Ricklis 1998). Finally, a series of radiocarbon dates from 11 shoreline sites on Baffin Bay on the lower Texas coast fall into two distinct time periods, one prior to ca. 4500 B.P. and one after 3000 B.P. (Ricklis and Albert 1998); again, a distinct hiatus in shoreline use appears to be indicated for the intervening period.

In sum, then, the available data strongly suggest that prehistoric peoples were exploiting coastal estuarines by 7500 B.P. (and unpublished data from the lower Lavaca River estuary indicate significant exploitation of *Rangia cuneata* clams by 8200 B.P.; Richard A. Weinstein, personal communication 2001). Widespread use of estuarine resources is again indicated for the intervals of ca. 5900-4200 B.P. and after 3000 B.P. A paucity of dates for shell middens in the intervening periods suggests markedly reduced shoreline occupation at these times. In fact, Anderson and Thomas (1991; Thomas and Anderson 1994) have suggested that these periods were times of rapidly rising sea level. The later of these occupational hiatuses, ca. 4200-3000 B.P., may correlate with a rapid sea-level rise to a 2-3 m highstand, as suggested by the evidence briefly summarized above (see also Figure 2-5).

There is general agreement that modern sea level was attained by ca. 3000 B.P. or perhaps shortly thereafter (Nelson and Bray 1970; Frazier 1974; Thomas and Anderson 1994). With stabilized sea level, ongoing sedimentation created extensive vegetated shallows optimal for high biotic productivity and high estuarine biomass. Additionally, coalescence of offshore shoals would have resulted in the modern barrier island system, thus creating the protected low-turbidity shallows readily exploited by aboriginal peoples. This is clearly reflected in the archaeological record for the entire Texas coast insofar as extensive shoreline sites, often containing abundant cultural debris and reflecting relatively intensive shoreline occupation, are particularly well represented for the post-3000 B.P. era in all investigated parts of the coastline (e.g., Aten 1983; Ensor 1998; Prewitt et al. 1987; Ricklis 1988, 1995a, 1996; Ricklis and Albert 1998; Ricklis and Blum 1997; Ricklis and Cox 1991; Story 1968; Weinstein 1992, 1994).

Archaeological Context

Culture-Historical Chronology

The Buckeye Knoll site lies approximately 45 km from the outer mainland shoreline of the Texas coast. At this distance, it falls near (and just inland of) what was a cultural boundary zone in Late Prehistoric and early Historic times, with the coastal Karankawa territory to the south and east, and the operational areas of various inland native groups to the west and north (Ricklis 1992a, 1996). As noted earlier, the presence of estuarine bivalve shells in some abundance in certain strata at Buckeye Knoll indicates that prehistoric occupants of the site were, at least at times, exploiting the inshore aquatic resources of the coastal estuaries. Thus, the site lies both near an aboriginal cultural boundary and within a major environmental ecotone, and it is therefore appropriate in the present background discussion to review the chronological evidence from both the coastal zone and the adjacent interior of southern Texas.

First, however, two basic issues should be briefly addressed. The first of these is the nature of the chronometric dating on which regional chronologies are based, and relevant concerns as to how these are applied to Buckeye Knoll. The second is the taxonomic question of how major archaeological time periods will be defined for the Buckeye Knoll findings.

Radiocarbon Dating and Regional Chronology Building

Radiocarbon dating was developed in the 1950s, prior to which archaeology generally could rely only upon stratigraphic contexts of excavated materials to determine their relative ages. By the 1960s, the radiocarbon technique was becoming widely used, and the increasing numbers of dates from site contexts permitted the development of regional chronologies based on real, or "absolute," ages of cultural manifestations. By 1980, a large series of radiocarbon dates was available for central Texas, a region that had seen a relatively large number of excavations. This, combined with the abundance of time-diagnostic chipped-stone projectile points from sites in this chert-rich region, resulted in the emergence of the central Texas chronology as a key reference for chronology building in adjacent areas that had seen less intensive research.

Until the mid-1980s, radiocarbon ages obtained on organic materials such as hearth charcoal were generally reported as assayed ages with statistically reliable margins of error (for example, 1500 ± 100 B.P.). By the 1980s, however, it was becoming widely recognized that these standard radiocarbon ages require a calibration in order to be more accurately expressed as calendar years before present. This requirement derives from the fact that the rate of absorption by living organisms of radioactive carbon (^{14}C) is not constant over time, but fluctuates parallel to oscillations in the amount of ^{14}C in the atmosphere. Since the radiocarbon technique determines time since the death of an organism based on the amount of ^{14}C in the sample that has decayed to stable carbon (^{12}C), variability in the absorption of ^{14}C affects the calculated age of the sample. By comparing standard radiocarbon ages obtained from materials with known ages (e.g., wood from within an established tree-ring chronology) it has been possible to define the amplitude of atmospheric ^{14}C fluctuations and, by extension, to construct calibration curves by which standard ages can be expressed in true calendar years before present.

This is of particular concern at the Buckeye Knoll site, since our reconstruction of the geologic history of the site is keyed to the optically stimulated luminescence (OSL) dating of quartz sand grains from various strata. The theoretical basis for OSL dating is discussed in Appendix A, but a key point here is that the ages obtained with this technique are taken to represent direct expressions of true calendar ages. Thus, OSL results must be regarded as the chronological equivalent of *calibrated* radiocarbon ages. While the need for this procedure may seem obvious in light of the factors just mentioned, the published literature often shows inconsistency, and it is not always explicitly stated whether radiocarbon-based chronologies are built upon calibrated or uncalibrated ages. For the more recent periods of prehistory (i.e., the last 3,500 years), this may not present a problem, because calibrated ages do not greatly differ from uncalibrated ones. However, for earlier periods, calibration is a significant factor. An uncalibrated age of 4,000 years, for example, calibrates to nearly 5000 B.P. In fact, uncalibrated ages falling between around 4000 and 9000 B.P. are fairly uniformly about 1,000 years older when calibrated. The discrepancy increases markedly with still greater age, so that uncalibrated ages of 10,000, 11,000 and 12,000 B.P. adjust, respectively, to ca. 11,200, 12,900 and 14,000 B.P.

In practical terms, then, a cultural-stratigraphic component dated by OSL to fall somewhere older than 6000 B.P. will have an age that is significantly older than an uncalibrated radiocarbon age for the same time. Thus, in terms of aligning radiocarbon results with those obtain using the OSL technique, it is essential to use calibrated radiocarbon ages. For this reason, it is important to frame the regional archaeological chronology in terms of calibrated radiocarbon ages, a procedure that will be followed throughout this report.

Existing Cultural-Taxonomic Frameworks

Speaking very generally, the prehistory of inland southern Texas can be divided into three periods. From oldest to youngest, these are the Paleo-Indian, the Archaic, and the Late Prehistoric (e.g., Hester 1980b; Black 1989). These periods lasted, respectively, approximately 4,000, 8,000 and 1,000 years.

Although these periods are widely recognized, there is presently no firm consensus on how to divide them into shorter time intervals in terms of calendar years. This ambiguity is in part due to our still-incomplete knowledge of regional prehistory, and in part the result of currently divergent conceptualizations among researchers.

Because much of southern Texas, especially the more northern part of the region, shows close parallels and affinities with central Texas, the better-defined chronology of the latter region understandably has offered a common springboard for chronology building. The most detailed chronology for central Texas is that devised by Prewitt (1981, 1985) who divided the temporal sequence into a series of thirteen phases preceded by a generalized Paleo-Indian period. Each phase is marked by one or more diagnostic projectile point types.

Although Prewitt's construct has come under some criticism and has seen various modifications, it has served as an important springboard for subsequent attempts to formulate a clearer definition of regional chronology. Perhaps the strongest objections to Prewitt's chronology have come from LeRoy Johnson (1986), who has suggested that insufficient data are available on prehistoric sociocultural patterns for specific time periods with which to define true phases. Johnson points out that a phase, as originally defined in American archaeology (Willey and Phillips 1958), should designate a past sociocultural reality such as a society or group of related societies. It cannot simply be defined on the basis of a single time-restricted trait (such as a projectile point type) or a small number of traits that could very well have cross-cut social, cultural and linguistic boundaries. Further, Johnson noted that even the temporal control for as many as eight of Prewitt's point types was too imprecise to assign them to discrete time intervals. For those periods that were reasonably well supported by the evidence, Johnson suggested that they be recognized simply as time periods marked by one or more diagnostic artifact types, thus not implying sociocultural correlates for which there was little supporting data.

More recently, Richard Weinstein (1992, 1994) has proposed a series of phases for the central Texas coast and the adjacent inland coastal prairie. This framework draws heavily upon the central Texas chronology, particularly the temporal ranges for specific point types proposed by Prewitt.

Weinstein's phases fall into various broader time periods, which he defines, from earliest to latest, as follows: Early Paleo-Indian (ca. 9,200-8,800 B.C.), Late Paleo-Indian (ca. 8,800-6,000 B.C.), Early Archaic (ca. 6,000-2,600 B.C.), Middle Archaic (ca. 2,600-1,000 B.C.), Late Archaic (ca. 1,000 B.C.-A.D. 700), Late Prehistoric (ca. A.D. 700-1528), Protohistoric (ca. A.D. 1528-1700), and Historic (ca. A.D. 1700-1840). Beginning with the Middle Archaic, each of these time periods contains one or more phases; prior to that time, no phase names are designated. For the most part, coastal phases are different from their inland counterparts at any given point in time beginning in the latter part of the Middle Archaic. Thus, Weinstein implies a clear dichotomy between inland and coastal adaptations and populations for the later eras of prehistory. The temporal sequence of Weinstein's periods and phases may be seen in Figure 2-6.

The time-diagnostic artifacts that Weinstein assigns to his Paleo-Indian and Archaic periods/phases are as follows: Early Paleo-Indian (Clovis points, followed by Folsom points); Late Paleo-Indian (Plainview and Merserve points, followed by Golondrina points and bifacial Clear Fork tools, followed by Scottsbluff, Angostura and "weak-shouldered lanceolate" points); Early Archaic (Gower, Wells, and Angostura points plus Guadalupe tools, followed by Andice, Bell, Martindale, Uvalde, Early Triangular and Early Corner Notched points plus unifacial Clear Fork tools and Guadalupe tools); Middle Archaic —Kent phase on the coast and no phase designation inland—(Bulverde, Nolan, Travis and possibly Tortugas and Refugio points followed by Bulverde, Palmillas, Pedernales, Kinney, Kent and Tortugas points). Weinstein's Late Archaic period has three defined inland phases and include the Morhiss phase (Morhiss and possibly Pedernales points); the Berger Bluff phase (Marshall, Williams, and possibly Castroville and Lange points); the Venom Hill Phase (Marcos, Montell, and Castroville points); and the Coleto Creek phase (Ensor, Darl, and Fairland points). Only one phase, the Aransas phase, has been defined for the coast. It is characterized by all of the point types found in the inland phases.

For the Late Prehistoric, Weinstein's two earliest phases are assigned to both the coastal and inland zones. The earliest of these is the Blue Bayou phase, estimated to fall between A.D. 700 and 950. This is defined as pre-ceramic, and the sole diagnostic artifact is the Scallorn arrow point; cemeteries are also ascribed to this phase, notably the Blue Bayou cemetery, located only 2.5 km north of the Buckeye Knoll site. The following Anaqua phase (A.D. 950-1150) is distinguished from the Blue Bayou phase by the addition of sandy paste, Goose Creek-like ceramics.

Beginning ca. A.D. 1150, Weinstein defines two separate phases for the coastal and inland Late Prehistoric. The coastal Rockport Phase is marked by Perdiz and Fresno arrow points, prismatic blade-core technology, and sandy paste and frequently asphaltum-coated/decorated pottery of the Rockport series.

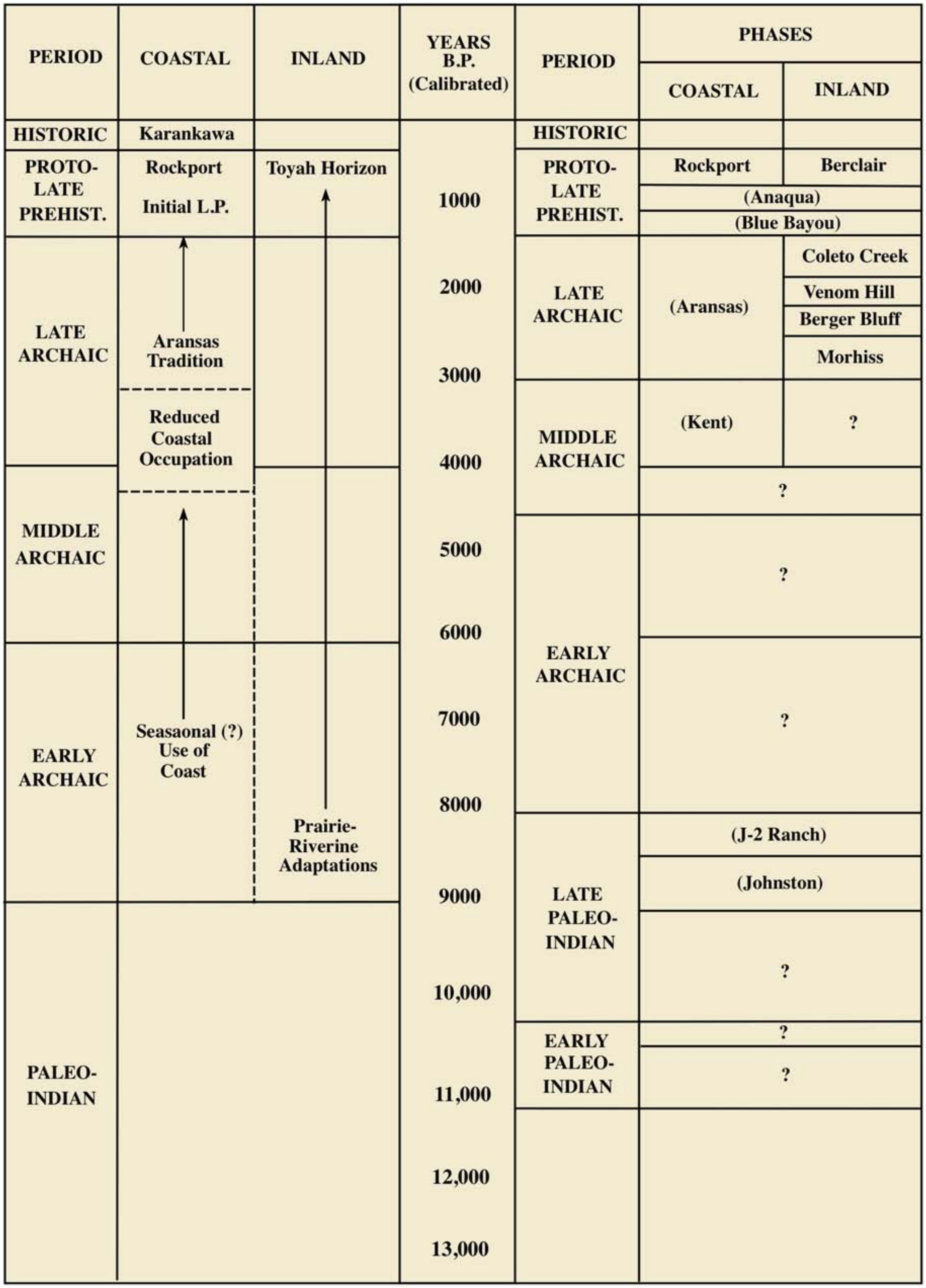


Figure 2-6. Chronology chart for the central Texas coast and coastal plain showing major periods referred to in this report (at the left) along with periods and phases previously defined by Weinstein (1992, 1994).

The contemporaneous inland cultural expression is the Berclair phase, characterized by bone-tempered plainware pottery (Leon Plain as defined in Suhm and Jelks 1962), Perdiz arrow points (and so-called Cliffton arrow points, probably Perdiz preforms) and prismatic blade-core technology. Both of these phases extend through the Protohistoric period.

The final aboriginal cultural manifestations in Weinstein's chronology pertain to the Historic Period. A.D. 1700-1840. The coastal Live Oak phase, the archaeological expression of the early Historic Karankawan tribes, represents direct continuity from the Rockport phase. Live Oak phase diagnostics include Rockport ceramics, Young and Bulbar Stemmed arrow points, and associated European artifacts. In the interior, the Linn Lake phase consists of Rockport and/or Goliad series ceramics, Fresno and Guerrero arrow points, and associated European artifacts.

Weinstein (1992:56) viewed this chronological framework as preliminary and tentative, noting that it "retains many gaps and questions." Thus, all phases prior to Rockport and Berclair were viewed essentially as time periods marked by specific artifact types, rather than true phases representing defined sociocultural entities as originally posited by Willey and Phillips (1958).

A Generalized Perspective on Regional Culture Chronology

In the present report, baseline archaeological chronology will be defined according to time periods that can be empirically supported by existing evidence (as shown in Figure 2-7). It is this writer's view that named phases should be avoided unless there are enough data to justify their use according to the precepts laid down by Willey and Phillips (1958). As Johnson (1986) has correctly pointed out, a phase is an archaeological taxon that can be more or less confidently thought to represent a past cultural and social group. At the very least, a phase must consist of an assemblage of material-culture traits that is shown to be clearly bounded in time and space. Preferably, at least some of the constituent traits of a phase should be reasonably inferred to be socially diagnostic (e.g., a ceramic style or a series of ceramic styles that can be linked with specific sites or groups of sites within limited and temporal and spatial parameters).

The time-diagnostic traits that are the markers of phases in Prewitt's (1981, 1985) central Texas chronology and in Weinstein's chronology for the lower Guadalupe (Weinstein 1992) and lower Lavaca (Weinstein 1994) drainages are, in fact, horizon markers as defined by Willey and Phillips (1958). By definition, horizon styles cross-cut sociocultural boundaries and thus do not define discrete phases. A good example in the present case is the Scallorn arrow point, which Prewitt places within his central Texas Austin phase and which is the key diagnostic of Weinstein's Blue Bayou phase. While distinct sociocultural entities presumably existed within central and southern Texas during the relevant time period, there are presently no archaeological data that permit phase-boundary definitions within the very large geographic area in which the Scallorn point is predominant during the early part of the Late Prehistoric period (i.e., central, east-central, and most of southern Texas). While the Scallorn point is a valid time marker, it is not, in itself, diagnostic of any definable social, linguistic or ethnic cultural pattern, other than an as-yet little-understood sphere of information exchange within which the type was the dominant arrow point style. The same applies, of course, to other "phases" defined on the basis of projectile point types which have geographic distributions beyond the bounds of the areas to which the various phases are believed to pertain (c.f. Prewitt 1995).

In Early Historic times the cultural geography of aboriginal southern Texas was a complex mosaic of social, ethnic and linguistic boundaries (e.g., Campbell 1988; Campbell and Campbell 1983), and there is no known reason to suggest a markedly different situation in prehistory. Thus, horizon markers such as time-diagnostic projectile points in general cannot be assumed to represent discrete, socioculturally definable phases in the proper sense of the term. Clearly, these items do represent temporally bounded expressions of material culture, and can be used to demarcate specific time periods and, indeed, Weinstein's sequence of time-diagnostic artifacts (mainly projectile point types) is mirrored to a significant degree by our findings at Buckeye Knoll. However, the ascription of phases to such time periods within geographic parameters that are defined arbitrarily (more according to the locations of archaeological research than by demonstrable prehistoric cultural boundaries) may only serve to mask actual boundaries that have yet to be defined on the basis of intensive collection of empirical evidence. In this report, then, cultural chronology will be treated primarily in terms of the inferable dynamics of human adaptive continuity and/or change as evidenced at the Buckeye Knoll site, and will not rely on categorical time frames as represented by sequences of named phases.

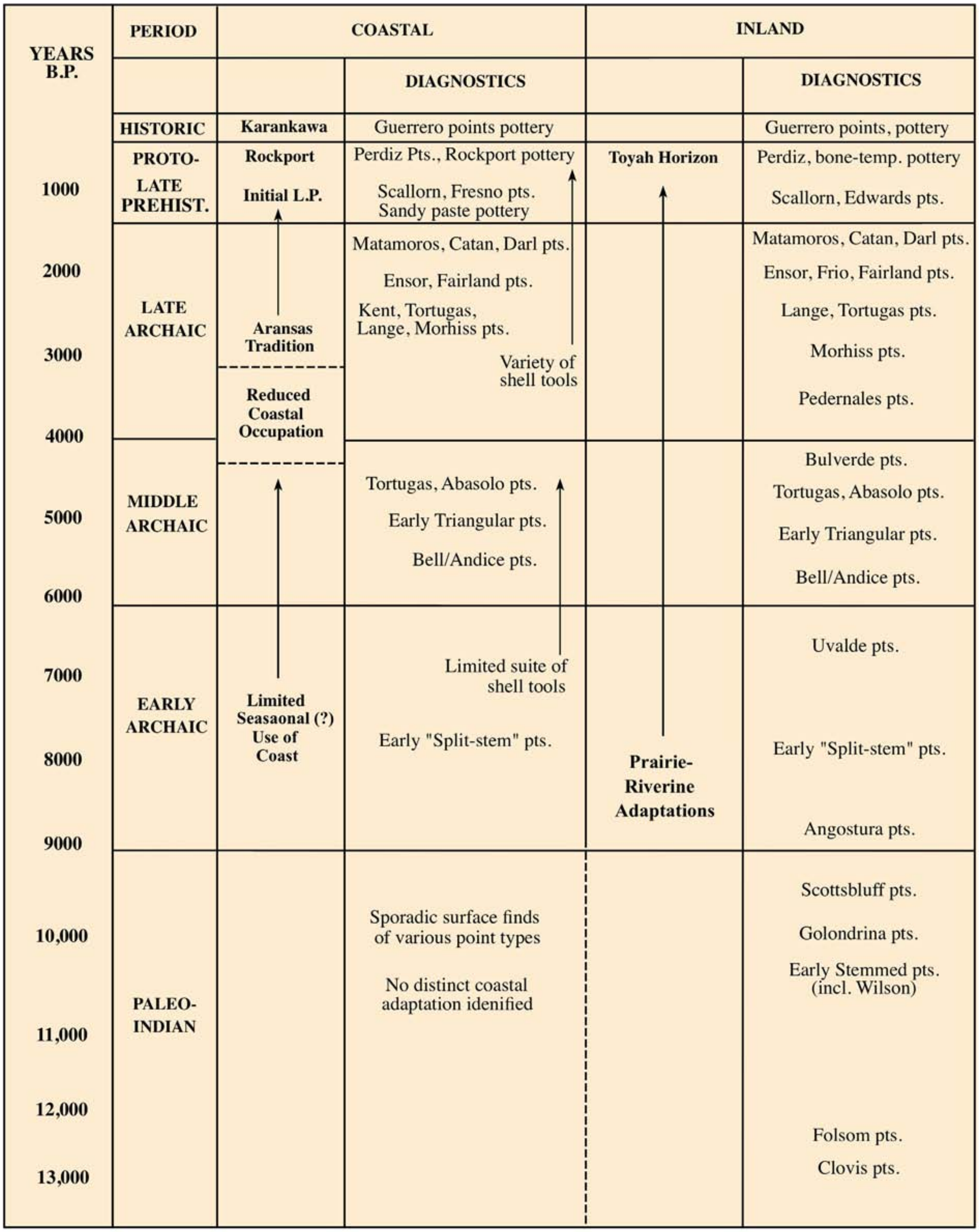


Figure 2-7. Generalized chronology chart for the central Texas coast and the adjacent inland coastal prairie showing key artifact-type time markers and basic adaptive patterns.

Definable Time Periods: Inland Central Texas Coastal Plain

The regional data presently available allow the construction of an empirically supportable archeological chronology based on the three major periods of the Paleo-Indian, the Archaic and the Late Prehistoric. Within these broad temporal units, subdivisions are possible based on two key variables: (a) time-diagnostic artifact types that are valid horizon markers across the greater Texas region, and (b) major periods of environmental change that may have significant correlates in shifts in cultural-ecological adaptive patterns.

Paleo-Indian Period

This broad, and as-yet rather poorly understood, period of human occupation in southern Texas spans the period of fundamental environmental change marked by the climatic shift from the terminal Pleistocene to the early Holocene (see Brown 2007 for a detailed discussion of climate change during this time interval). Leaving aside the possibility of earlier occupations, for which there is presently no unambiguous evidence in Texas, the earliest Paleo-Indian occupation is represented by the Clovis culture. The Clovis cultural pattern is remarkably widespread, with its diagnostic lanceolate, basally fluted Clovis point type reported from virtually the entire continental United States and extensively documented in all areas of Texas (e.g., Meltzer 1987, 1989, 1995; Prewitt 1995:98). Associated tools include large bifaces, scraping/cutting tools and distinctive, large prismatic blades and blade cores (Collins 1999). Clovis culture has been rather securely radiocarbon dated to ca. 10,800-11,200 B.P. or, in calibrated ages, to ca. 12,800-13,200 years ago. Although originally thought to have been based largely upon big-game hunting (e.g., Wormington 1957) due to the original discovery of Clovis points in New Mexico in association with mammoth bones, it is now thought that Clovis people subsisted by procurement of a rather broad range of animal and plant foods.

Immediately following Clovis is Folsom culture. The diagnostic thin, carefully flaked and fluted Folsom point is found over a vast area (though not as extensive as that of the Clovis point) that includes the high plains from Alberta to Texas, as well as adjoining areas of mid-continental North America. Adaptation during this period was significantly oriented toward hunting of large, early species of bison, and Folsom points have been found in Texas and elsewhere in direct association with bison remains (e.g., Dibble and Lorrain 1968). Generally speaking, this period, ca. 10,000-10,800 B.P. uncalibrated, or ca. 11,700-12,500 B.P., calibrated, saw the emergence of regional cultural patterns in North America (e.g., Anderson 1996), possibly in response to environmental change at the end of the Pleistocene.

Late Paleo-Indian cultural patterns, which span the end of the Pleistocene into the early Holocene (ca. 11,500-10,000/9000 B.P., calibrated), are still more regionalized. In Texas, an array of projectile point types has been identified as having both geographical and chronological ranges. As climatic conditions generally became warmer/drier, peoples probably developed adaptive strategies suited to the emerging environmental opportunities and constraints offered by particular regions. Thus, Plainview and Scottsbluff points, which are found commonly in the central part of the state and northward onto the High Plains, probably reflect adaptations to relatively dry, open environments, while types such as Dalton and San Patrice, confined largely to east Texas (and into the southeastern U. S.), were probably associated with woodland adaptations (see discussion in Johnson 1989). A variety of unstemmed, lanceolate types such as Golondrina, Barber, and St. Mary's Hall, plus the stemmed Wilson type (also referred to as Early Stemmed, cf. Collins et al. 1998; Turner and Hester 1999) represent the late Paleo-Indian period in south Texas, and relatively large samples of these and other more or less contemporaneous types have been found in the Victoria County area (e.g., Flaigg 1995; E. H. "Smitty" Schmeidlin, personal communication 2001).

Archaic Period

The broadly defined Archaic Stage of cultural development in North America was first formulated by William A. Ritchie on the basis of his findings at the Lamoka Lake site in central New York State (Ritchie 1932, 1944; Willey and Phillips 1958). Ritchie defined a general Archaic lifeway based on hunting, plant gathering and fishing, with populations well adapted to local and regional resource mosaics. To a large extent, the Archaic was defined negatively, insofar as it lacked horticultural food production and it predated the introduction or invention of ceramics and the bow and arrow. Researchers throughout North America recognized this broad pattern, and the Archaic concept has been widely adopted to designate post-Paleo-Indian and preceramic/prehorticultural lifeways (Willey and Phillips 1958).

In Texas, the distinction between the late Paleo-Indian and the earliest Archaic is generally made on the basis of the replacement of unstemmed lanceolate projectile points (such as Plainview, Golondrina, St. Mary's Hall, and Barber) by a variety of stemmed and side-notched types. The distinction is rather fuzzy, however. The stemmed Wilson point, for example, is placed in the late Paleo-Indian (Collins et al. 1998) while the lanceolate Angostura type is generally thought to represent terminal Paleo-Indian into earliest Archaic (e.g., Collins 1998; Prewitt 1981, 1985), along with the Early Stemmed Lanceolate type (Turner and Hester 1999; this point type has also been named Thrall [Collins et al. 1998] and Victoria [Davis 1991; Kelly 1983; see also Bousman et al. 2004]).

Perhaps a more fundamental factor in defining the emergence of the Archaic is the contemporaneous trend toward drier and/or warmer climate during the early Holocene and an inferable human-ecological correlate of specialized adaptations to various regional environmental conditions. The regionalism of the Archaic is exemplified in the appearance of a wide range of projectile point types that are usually more geographically restricted than were earlier Paleo-Indian types. An inferable correlate is that people and societies were less highly mobile and that residential camps were moved in response to the timing and spacing of key food resources. Since sites and diagnostic artifacts tend to become more common, it is generally believed that regional human populations were growing during the Archaic (e.g., Story 1985).

In most of the area within present-day Texas the key markers of the end of the Archaic, namely the appearance of ceramics and/or horticultural food production, were introduced only late in prehistory. Moreover, since domesticated plant cropping (of maize, beans and squashes) was largely restricted to the easternmost and westernmost parts of the state (i.e., the Caddo area of northeast Texas and the marginal Southwest in the El Paso area and the Canadian River of the Panhandle), the shift to horticultural lifeways cannot be used to define the end of the Archaic in much of the state. In central and southern Texas, the end of the Archaic has thus come to be defined by the appearance of the bow and arrow, as represented by small, thin arrow points as opposed to thicker, heavier dart points. This shift took place around A.D. 700-800 (Prewitt 1981, 1985; Turner and Hester 1999).

In the Southeast and Southwest regions of the United States, however, ceramics appeared much earlier, at least by ca. 1000-500 B.C., so the Archaic ended considerably earlier than in most of Texas where ceramics did not appear in any abundance until perhaps as late as A.D. 1200-1300 (Ricklis 1995b). Thus, the Late Archaic in central and southern Texas has generally been placed between ca. 1000/500 B.C. and ca. A.D. 700 or slightly later (e.g., Hall et al. 1986; Hester 1980b; Prewitt 1981, 1985; Taylor and Highley 1995). The Middle Archaic has generally been dated to ca. 3000 to 1000 or 500 B.C. (5000-3000/2500 B.P.). In most of North America, on the other hand, the Middle Archaic is dated to ca. 8000/7000-5000 B.P., while the Late Archaic begins around 5000 B.P. and ends around 3000 B.P. (e.g., Anderson and Sassaman 1996; Sassaman and Anderson 1996).

Better aligning the chronology in Texas with the rest of the continent, some researchers (e.g., Collins 1995, 1998; Johnson and Goode 1994; Prikryl 1990) have redefined the time ranges for the Archaic subperiods, terminating the Early Archaic around 6000 B.P. and the Middle Archaic at ca. 4000 B.P. This approach has the advantage of helping to more accurately align major culture periods when investigating geographically broad patterns of cultural change/development that crosscut provincial boundaries. For example, the documented presence of large cemeteries on the Texas coastal plain by ca. 3000/2500 B.P. (e.g., Cox and de France 1998; Hall 1981; Ricklis 1997; Story 1985; Taylor and Highley 1995) may correlate with Late Archaic/Early Woodland mortuary patterns that emerged in much of North America at that time. By assigning these developments in Texas to the Late Archaic, as opposed to the Middle Archaic (e.g., Taylor and Highley 1995), the possible broad cultural linkages suggested by such contemporaneous developments are more readily conceptualized. In this light, a tripartite Early-Middle-Late Archaic chronology that largely reflects these recent revisions will be employed in this report (see Figure 2-7).

Early Archaic Period (ca. 9000-6000 B.P.)

This period is marked in southern Texas by several types of flaked-stone projectile points (Angostura, Thrall, Gower, Hoxie, and Uvalde; see Turner and Hester 1999 for descriptions of these and other types discussed herein). The earliest of these is Angostura, dated to between 8800 and 8100 B.P., uncalibrated (ca. 10,000-9000 B.P., calibrated) at the Wilson-Leonard site (41WM235) in central Texas (Kerr and Dial 1998:487). As noted above, this is an unstemmed lanceolate point with basal edge grinding that often bears the careful parallel pressure flaking characteristic of many late Paleo-Indian types. Evidence from the Wilson-Leonard site places the Thrall point type (or "Early Stemmed Lanceolate" or "Victoria" type) between 8700 and 7000 B.P., uncalibrated (ca. 9000-8000 B.P., calibrated). Other relatively early types are Hoxie and Gower (both falling under the generic heading of "early split-stem or "bifurcated-base" series; see Kerr and Dial 1998). Probably slightly younger in age is the Uvalde type (e.g., Prewitt 1981), another "split-stem" point type that typically does not have the basal/stem edge grinding common on Hoxie, Gower and early unstemmed forms (e.g. Turner and Hester 1999).

The chronological placements of these various point types, while probably generally reliable, should not be taken as precise. At Wilson-Leonard, there was considerable overlap of type occurrences within strata, possibly due to post-depositional mixing of materials but also possibly reflecting temporal overlap of types. Indeed, at the Loma Sandia site (41LK28) in southern Texas, a discrete cache of lithic artifacts contained points that could be classified as Thrall, Angostura, Hoxie and Uvalde (see Dodt-Ellis and Highley 1995). The co-occurrence of these specimens in a single discrete feature strongly suggests the types are contemporaneous and thus some overlap in the actual time ranges.

All of the data currently available suggest that Early Archaic adaptation involved relatively high mobility, probably mostly by more or less small groups of people, and a broad-based foraging food-procurement strategy. In central Texas, limestone clasts were being used for cooking, though not yet in the massive quantities that would come to characterize later Archaic adaptations (Collins 1998; Prewitt 1985). Story (1985) has suggested that population density during the Early Archaic was low relative to that of later Archaic times (though, as will be seen further on, the evidence from the Buckeye Knoll site calls for significant revision concerning the presumed high mobility and generally low population density during the Early Archaic).

Middle Archaic Period (ca. 6000-4000 B.P.)

This period is marked by a variety of projectile point types that have specific chronological ranges. The time ranges for most of the diagnostic types are derived from the chronology for central Texas, though important chronometric data also come from research in southern Texas.

Presently available information suggests that the earliest Middle Archaic points are of the basally notched and heavily barbed Bell and Andice types, both variants of the Calf Creek type, with combined distributions in the southern plains from Missouri into south Texas. These types are placed by Prewitt (1981, 1985) in his central Texas Jarrell phase, dated to 5100-6100 B.P. Corroborative evidence from south Texas comes from the McKinzie site (41NU221) overlooking the Nueces River delta near Corpus Christi, where Bell points have been found in a discrete shell midden stratum rather securely dated to 5920-5340 B.P. (the combined 1-sigma calibrated range on three assayed samples of *Rangia flexuosa* shell; Ricklis 1988).

Also pertaining to this general time period are Early Triangular points, estimated by Turner and Hester (1999) to date to ca. 3700-3600 B.C. (or approximately 5700-5600 B.P.). For central Texas, Prewitt (1985) places these points (which he terms Taylor and Baird Beveled Blade) in his Oakalla phase, dated to 5,100-4,600 B.P. Data from south Texas fit the combined age estimates of Turner and Hester and Prewitt quite well. An Early Triangular point was found in a stratified deposit at site 41NU267 near Nueces Bay that was radiocarbon dated to 4990-4860 B.P., calibrated. At the Means site (41NU184) near the lower Nueces River, numerous Early Triangular points have been found in apparent association with an extensive *Rangia flexuosa* shell midden with a single calibrated radiocarbon date range of 5630-5340 B.P. (Ricklis 1995a:273; Ricklis and Gunter 1986).

Later point types falling into the Middle Archaic as here defined include stemmed forms such as Nolan and Bulverde, types which have yet to be securely dated in south Texas, though they are widely distributed in the region (e.g., Cox 1996; Hall et al. 1986). Turner and Hester (1999) estimate the Nolan type to date to ca. 6000-4500 B.P,, while Prewitt places it in his Clear Fork phase at ca. 4600-4100 B.P. The Bulverde type is believed to fall slightly later in time; Turner and Hester (1999) place it at ca. 5000-4500 B.P., while Prewitt identifies it as the primary marker for his Marshall Ford phase at 4100-3500 B.P.

A common point type in south Texas during this period is Tortugas. Evidence from the Choke Canyon Reservoir area, situated at the confluence of the Frio and Nueces rivers, suggests an association between Tortugas points and hearth charcoal dated to 5380-4340 B.P. (Hall et al. 1982). At the McKinzie site near Corpus Christi, a Tortugas point was found in the same stratum that produced the Bell points, dated to 5920-5340 B.P. This type apparently was long-lived, as it has been securely documented in a Late Archaic context at the Loma Sandia site (41LK28) in the Choke Canyon area, where it was found in abundance with burials dated to 2800-2550 B.P. (Taylor and Highley 1995; Turner and Hester 1999).

As Collins (1998) has pointed out, the Middle Archaic conforms chronologically to what was probably the driest climatic interval of the middle Holocene. In central Texas, this period saw intensive use of limestone clasts for cooking and the accumulation of large, thick, limestone burned-rock middens (e.g., Prewitt 1981; Ricklis and Collins 1994) that may reflect a correspondingly intensive processing of certain plant foods, perhaps especially xeric species such as sotol (e.g., discussion in Black and Creel 1997). A paucity of discrete components of the period, combined with limited ecofactual preservation, limits our present ability to infer the human-ecological effects of middle Holocene aridity in south Texas. However, there is little reason to assume that this climatically marginal environment was not significantly affected by prolonged aridity, with concomitant adaptive responses by resident hunter-gatherers. The specific shifts in adaptive strategies that these folk may have used to respond to environmental change or stress have yet to be identified.

Late Archaic Period (ca. 4000-1200 B.P.)

This prolonged time interval of approximately 3,000 years saw a series of shifts in diagnostic projectile point time markers. In central Texas, the abundant and seemingly almost ubiquitous Pedernales point type is dated to ca. 3550-2600 B.P. in Prewitt's (1981, 1985) Round Rock phase. Turner and Hester (1999) suggest a somewhat earlier time range of ca. 4000-3200 B.P. The type is widely, though less abundantly, distributed throughout the northern part of south Texas (e.g., Hall et al. 1982, 1986; Hudler et al. 2002; Schmiedlin 2001).

Possibly overlapping in its time range with Pedernales is the Morhiss type, a generally rather large, broad-bladed point with a round-based stem. This type is distinctive to the Texas middle coastal plain, and is abundantly documented at the Morhiss site (41VT1), a major Archaic period midden on a Pleistocene terrace remnant some eight kilometers northwest of Buckeye Knoll (Campbell 1979). The time range for Morhiss points is not precisely known, but probably falls around 3000 B.P., plus or minus a few centuries. At site 41GD21 in Golilad County, a radiocarbon date on charcoal of 2750 B.P. was tentatively associated with Morhiss points (Fox 1979). This finds support in the evidence from Loma Sandia, where Morhiss points were found, along with Lange and Tortugas points, in burials dating to ca. 2800-2600 B.P. (Taylor and Highley 1995). At the Smith Bridge site (41DW270) on Coleto Creek in De Witt County, a sample of 19 Morhiss points was believed to be associated with a stratum dated to 2860 B.P. (Hudler et al. 2002). Because Morhiss points tend to be largely confined to the lower Guadalupe River valley and the surrounding inland central coastal plain (see Prewitt 1995:121), a sociocultural correlate has been assumed, thus leading some researchers to speak of a "Morhiss complex" or a "Morhiss phase" (Campbell 1960; Weinstein 1992). The specific traits (other than Morhiss points) or adaptive patterns that would distinguish this construct remain undefined. However, the geographically limited distribution of the Morhiss point does suggest some kind of territorial correlate, and the relative abundance of the type inland and its limited occurrence on the coast (e.g., Cox 1996; Suhm and Jelks 1962) suggests a primarily inland riverine-prairie adaptation.

The (at least partly) contemporaneous Lange point has a much broader distribution, and is concentrated mainly in central Texas (Prewitt 1995:114). Since the cultural mechanism(s) by which this point type entered into south Texas assemblages is unclear, the type can, at present, only be viewed as yet another time marker or horizon style (*sensu* Willey and Phillips 1958).

Later dart point types common in south Texas that still fall within the generalized Late Archaic period are various notched and stemmed forms such as Marcos, Montell, Castroville, Ensor, Frio and Fairland. None of these types has been securely dated in south Texas, but they all are horizon markers, having continuous distribution into central Texas where age ranges have been proposed. The Marcos, Montell and Castroville types are all thin, broad-bladed, and usually shoulder-barbed points that Prewitt places in his Uvalde phase, dated to 2250-1800 B.P. The Castroville and Montell types are largely restricted to central Texas, though they do occur sporadically in the northern part of south Texas. The Marcos type has a broader distribution and is found throughout most of south Texas including the coastal zone (see Prewitt 1995). None of these types is recognized in our sample of dart points from Buckeye Knoll.

The Ensor and Fairland types are both small- to medium-size points with triangular blade outlines and basal side notching. Morphologically, the types tend to intergrade. Prewitt places these in his Twin Sisters phase of central Texas, dated to 1800-1400 B.P. Both types have very wide distributions and are found in significant quantities in both inland and coastal south Texas (Cox 1996; Hall et al. 1982; Hester 1980b; Hudler et al. 2002; Ricklis 1995a). The Frio type is roughly contemporaneous and has a similar form to Ensor and Fairland, except that the base is deeply indented. This type is moderately abundant in the northwestern part of south Texas, particularly within 100 or so km of the Rio Grande (Prewitt 1995:106).

The final expression in the long Archaic continuum is a short period of perhaps 200 years, ca. 1200-1400 B.P. Diagnostic projectile points tend to be small and/or thin and relatively light, suggesting that at least some may represent early arrow points. The Darl point, a finely flaked, narrow-bladed, stemmed type, is found abundantly in central Texas but has a wide distribution into about the northern two-thirds of south Texas. In deep south Texas and along the coast, the unstemmed Matamoros and Catan types are believed to pertain to this time period, though they may extend both back into earlier Archaic times and persist into the Late Prehistoric period, especially in the Rio Grande delta area of deep south Texas (e.g., Hester 1980; Turner and Hester 1999).

General Comments on the Archaic of Inland South Texas

The above review, purely a chronological summary of time-diagnostic traits, says little about actual adaptive patterns. Despite some three decades of fairly continuous research into the regional culture continuum, important aspects of culture and human ecology remain obscure. Throughout the region as a whole, there are, as yet, no data with which to identify clear geographical boundaries between contemporaneous cultural expressions. Very generally, there is a clear tendency for the more northern part of the region to share artifact types/styles with central Texas. The long sequence of the various stemmed and notched points of the latter region is essentially replicated in northern south Texas, though the unstemmed triangular and sub-triangular types more prevalent to the south are often found in association (e.g., the clear association of the triangular Tortugas point with stemmed Lange points at the Loma Sandia cemetery site in Live Oak County; see Taylor and Highley 1995). The unstemmed types such as Tortugas and Abasolo become increasingly common in Archaic assemblages as one moves south, so that in deep south Texas and along the Rio Grande (and into northeastern Mexico) these types overwhelmingly dominate assemblages (see distributional data in Prewitt 1995).

During the middle Holocene, the appearance of massively barbed Bell and Andice points in south Texas appears to mark the southern terminus of a broad horizon that extends northward through central Texas and into Oklahoma and beyond. Given the distinctive stylistic and technological characteristics of these points, they probably have, at some level, a demographic and/or sociocultural correlate, and Collins (1994) has suggested that people migrated southward from the central plains as they followed expanding bison herds.

During the early part of the Late Archaic, the Morhiss complex or phase appears to represent an as-yet poorly understood sociocultural phenomenon. As mentioned above, the geographic concentration of the diagnostic Morhiss point in and around the lower Guadalupe drainage suggests some level of internally heightened information flow. Thus, at a very general level, there appear to have been geographically circumscribed spheres of culture in inland south Texas that probably correlated with human-ecological, social and even linguistic patterns, but in ways that presently cannot be empirically defined.

The limited data on subsistence patterns suggest a broad-based, more or less mobile hunting and gathering lifeway throughout the Archaic. Sites tend to be located along stream terraces or on upland margins overlooking stream valleys. Large, multi-component sites covering several thousand square meters or more are common (e.g., Hester 1980b; Hall et al. 1982, 1986) suggesting either sizeable resident groups or frequent reoccupation by smaller groups, or both. Commonly procured mammals include white-tailed deer and, at some sites, bison and antelope. Sites near large streams frequently yield freshwater mussel shells and fish bone, though not in profusion. A variety of knives, scrapers and woodworking tools (e.g., Clear Fork unifaces and bifaces) are found throughout the continuum, though certain tool forms such as the Early Archaic Guadalupe Biface are restricted to definable time periods. Manos and metates, usually made of sandstone, are found at some sites, suggesting localized gathering and processing of plant resources.

Late Prehistoric Period of Inland South Texas (ca. 1300-300 B.P.)

The Late Prehistoric period can be divided into two sub-periods, termed here the Initial Late Prehistoric (ca. A.D. 800-1250), and the Final Late Prehistoric (ca. A.D. 1250/1300-1700), or simply Late Prehistoric I and Late Prehistoric II. In central Texas, it has long been recognized that a time interval marked by thin, side-notched Scallorn arrow points and an absence of ceramics preceded the final prehistoric cultural period characterized by contracting-stem Perdiz arrow points and bone-tempered plain and occasionally decorated pottery. Prewitt has subsumed the earlier manifestation under his Austin phase, dated between ca. A.D. 700/800 and 1250/1300, while the later period is designated the Toyah phase, ca. A.D. 1250/1300-1700. The date of A.D. 1700 approximately marks the time by which native cultures of central Texas began to be significantly affected by Euroamerican colonization and its effects. Most likely, the processes of group displacements and depopulation caused by introduced Old World diseases began as early as the middle of the seventeenth century in the area (e.g., Collins and Ricklis 1994).

Research carried out in the past quarter century in southern Texas has evidenced a parallel chronological sequence. By ca. A.D. 800, the relatively large and heavy dart points of the Archaic were mostly, if not completely, replaced by arrow points, suggesting an essentially coeval introduction of the bow and arrow in central and southern Texas. As in central Texas, the side-notched Scallorn arrow point is predominant, though the similar Edwards type, which has a more deeply concave base, is fairly common (e.g., Black 1989; Hall et al. 1982, 1986; Hester 1980b). This represents the Initial Late Prehistoric period.

By ca. A.D. 1300, with the beginning of the Final Late Prehistoric period, the Perdiz arrow point and bone-tempered plainware pottery were widespread throughout southern Texas, with the probable exception of deepest south Texas around the Rio Grande delta area and the nearby Rio Grande valley area. Both traits have been reported widely throughout the region (e.g., Black 1986; Hester 1975, 1980b; Hester and Hill 1875; Hester and Parker 1970; Ricklis 1992b). Based upon major excavations at the Hinojosa site (41JW8) in Jim Wells County, Stephen L. Black (1986) identified a distinctive Late Prehistoric assemblage of Perdiz arrow points, blade-core technology, small unifacial end scrapers, alternately beveled knives and bone-tempered pottery. Pointing out the close similarities with the Toyah phase of central Texas, he suggested that the assemblage had the hallmarks of a broadly distributed cultural horizon (*sensu* Willey and Phillips 1958), and subsumed these materials under the Toyah Horizon. The broad geographic distribution of this assemblage, from south Texas into central, west-central and east-central Texas, supports Black's nomenclature (cf. Black 1986; Creel 1990; Jelks 1962; Hester 1980b; Highley 1986; Johnson 1994; Prewitt 1981, 1985; Ricklis 1994b, 1996b).

Subsistence patterns during the Austin phase appear to have been essentially similar to those of the Late Archaic (e.g., Prewitt 1985; Ricklis 1994b). A broad-based hunting-and-gathering economy was the rule; white-tailed deer and smaller species were hunted, and a variety of plant species were doubtless gathered. Campsites were generally located on stream terraces and upland margins overlooking stream valleys.

The Toyah horizon represents some departure from this pattern. Virtually all Toyah sites have produced bison bone, and it has been suggested that the Toyah lithic assemblage represents, to some degree, an adaptive shift to at least some emphasis on large game procurement (e.g., Black 1986; Ricklis 1992b, 1994b; Johnson 1994). The numerous Perdiz arrow points found on Toyah sites may reflect this, and the relatively abundant beveled knives and end scrapers inferably were used for butchering and hide processing, respectively (e.g., Creel 1991). With the exception of a few rock shelter sites in central Texas, Toyah sites are open-air campsites characterized by only thin deposits of debris, suggesting that no one location was intensively occupied for extended periods of time. The overall picture is one of relatively high mobility, as would be expected for people adapted to hunting large herd animals such as bison.

Early Historic Native Groups

Judging by the extant radiocarbon dates from Toyah sites in central and southern Texas, the Toyah phase as a complete artifact assemblage probably ended by ca. A.D. 1700 (see Ricklis 1994b:303). However, it is clear that key traits continued into eighteenth-century colonial times. Although the nearly ubiquitous Perdiz arrow point was replaced by unstemmed, triangular or lanceolate Guerrero points (Turner and Hester 1999:216), end scrapers and prismatic blade-core technology survived well into the eighteenth century at Texas coastal-plain Spanish colonial mission sites (e.g. Gilmore 1974; Mounger 1959; Ricklis et al. 2000; Walter 1997, 1999, 2007). In fact, the bone-tempered plainware of late prehistory becomes an integral part of colonial-period technology, serving as a domestic utility pottery, termed Goliad Ware, at the mission as well as surrounding secular communities throughout the eighteenth century and into the early nineteenth century (e.g., Perttula 2002; Ricklis et al. 2000; Walter 2007).

The *Relación* of Álvar Nuñez Cabeza de Vaca (Covey 1963), the Spaniard marooned by shipwreck on the Texas coast in 1528, offers the only documentary record of regional aboriginal life during the earliest period of European contact. Cabeza de Vaca lived with native groups in Texas for several years before finally making his way westward and then southward into New Spain. One of these groups, the Mariames, is believed to have lived along the lower Guadalupe River (Campbell and Campbell 1981) and their territory may well have encompassed the location of the Buckeye Knoll site. The *Relación* offers a remarkable first-hand account of aboriginal lifeways in the area of our present interest. The pertinent observations, as gleaned and synthesized by T. N. and T. J. Campbell (1981), are briefly summarized here.

Linguistically, the Mariames were distinct from the Quevenes, a nearby coastal group who probably spoke some form of the Karankawan language (Newcomb 1983). The Mariames subsisted by hunting, plant gathering and riverine fishing, and Cabeza de Vaca explicitly stated that no horticulture was practiced. They spent most of the year in the vicinity of the lower Guadalupe River, moving campsites frequently. During the summer months, they moved south to an area of abundant prickly pear cacti to gather ripe *tunas*, or prickly pear fruits. Campbell and Campbell (1981) place the prickly pear grounds in the area of present-day Duval and Jim Wells Counties. Although periodic food shortages occurred, the Mariames were able to endure hunger, and there is no indication of malnutrition or starvation.

Campbell and Campbell (1981:15) note that the *Relación* suggests that the Mariames numbered about 200 people. They base this on an observation that 60 males (presumably adults) were seen fishing in one place. However, some households had at least five individuals, so the actual population could have been closer to 300. Since there is no indication of more than one local group of Mariames, this may represent the total population. If this is the case, the Mariames, as a sociopolitical entity, can perhaps be equated in a general way with the macrobands recorded ethnographically for hunter-gatherers, in which several hundred people tended to congregate at various times during the year and which formed viable social and mating networks (e.g., Hassan 1981; Lee and De Vore 1965).

Hunting was a male activity, while gathering of plants and firewood and cooking were women's tasks. The mention of bison-skin robes, moccasins and shields suggest that this animal was hunted. Deer were also hunted by both lone individuals and sizeable hunting parties. The burning of prairie grasses was practiced as a means of controlling movement of deer by driving the animals into unburned areas where they could be easily killed. The bow and arrow is mentioned and presumably was the primary hunting weapon. Fish were caught, particularly during spring floods when they could be easily taken from pools after flood waters receded. Fish bones were said to have been saved and ground into a powder that could be eaten. Smaller mammals, such as rats and mice, as well as snakes, snails and certain insects, were eaten as well. Plant foods included pecans and roots, which could be stored, as well as the summer prickly pear tunas.

Information on social organization is very limited. Marriage was apparently monogamous and involved group endogamy, which the Campbells suggest implies a patrilineal descent system (Campbell and Campbell 1981:20). Cabeza de Vaca lived with a family that consisted of a man, his wife, his sons and one other individual, suggesting that nuclear or small extended families may have been the basic residential unit. Population size was apparently limited by the practice of female infanticide. Warfare is mentioned, and the Mariames regarded surrounding groups as either enemies or potential enemies.

In early Historic times, the south Texas landscape was occupied by literally hundreds of named, native groups (Campbell 1988; Campbell and Campbell 1981). For most of these, little is known beyond a name and sometimes a geographic location. Although these various groups were once generally subsumed under the rubric of "Coahuiltecans" (Newcomb 1961; Ruecking 1955), later research has shown that Coahuilteco was only one of several native languages spoken in south Texas (Campbell 1988; Goddard 1979). The group most closely associated with the coastal plain mission of Nuestra Señora del Espíritu Santo de Zuñiga were the Aranama, believed to have originally resided in the area of the lower Guadalupe River valley. This mission was first established in 1722 near Garcitas Creek, across from the first location of the presidio of Nuestra Señora de Loreto. Together, this mission and presidio complex was commonly known as "la Bahía" due to its proximity to Matagorda Bay. A few years later, both the mission and presidio of la Bahía were relocated to the Guadalupe River just north of present-day Victoria. They were moved again, in 1749, to their final location on the San Antonio River at present-day Goliad.

During the eighteenth century, the numerous native groups of south Texas suffered depopulation from introduced Old World diseases and were dispersed by intrusive, horse-mounted Apaches and Comanches. Some of the survivors of these effects turned to the colonial missions for refuge, while others probably moved southward into northern Mexico. By the early nineteenth century, the region was largely devoid of aboriginal native population, and the Comanches reigned as the dominant Native American inhabitants (Campbell 1988; Newcomb 1961).

The Archaeological Sequence in the Coastal Zone

The coastal fringe of southern Texas includes the Central Coast, from the Colorado River delta southward to the northern shores of Baffin Bay, and the Lower Coast, from Baffin Bay to the Rio Grande delta (Ricklis 1995a). These stretches of coastline can be distinguished both in terms of modern environmental factors and the patterns of prehistoric human adaptations and material culture expressions.

The central coast, which is of concern here, is marked by a series of bays protected by a continuous chain of barrier islands. The shallow estuarine waters in the bays sustain a rich aquatic life. Major economic fish species include black drum *(Pogonias cromis*), red drum (*Sciaenops ocellata*), spotted sea trout (*Cynoscion nebulosis*), Atlantic croaker (*Micropogonius undulatus*), sea catfish (*Aurius felis*), southern flounder (*Paralichthys lethostigma*), sheepshead (*Archosargus probatocephalus*) and mullet *(Mugil cephalus*). Molluscs are abundant, and were readily gathered by prehistoric peoples, who left extensive shell middens along bayshores. From the relatively high-salinity waters on the landward side of barrier islands and near tidal passes, various gastropods such as lightning whelk (*Busycon perversum*), shark eye (*Polinices duplicatus*), banded tulip *(Fasciolaria lilium*) and Florida horse conch (*Pleuroploca gigantea*) were gathered. In more moderate-salinity locales in the landward portions of primary bays, bivalves such as southern quahog (*Mercenaria texana*), cross-barred venus (*Chione cancellata*), sunray venus *(Macrocallista nimbosa*), and bay scallop (*Argopectin irradians*) were common, while in the river-influenced secondary bays and in the tidal-influenced lower reaches of streams, low-salinity rangia clams (*Rangia cuneata, Rangia flexuosa*) were gathered in large numbers. The common oyster (*Crassostrea virginica)* is found in profusion in low- to moderate-salinity areas of secondary and primary bays (Andrews 1977).

Paleo-Indian Period (ca. 13,200-8200 B.P.)

This era is represented along the coast by only sporadic surface finds of diagnostic dart points. Early Paleo-Indian types such as Clovis and Folsom are present but rare, while later types such as Plainview, Golondrina, Scottsbluff and Angostura are only slightly better represented (Cox 1996; Hester 1980). These finds, scattered along uplands bordering stream valleys, do not represent actual coastal occupation, since during Paleo-Indian times sea level was still significantly lower than today and the Gulf shoreline was some distance seaward of its present position.

Archaic Period

Early Archaic Period (ca. 8200-6000 B.P.)

By ca. 9000 B.P. sea level had risen to the extent that transgressive marine waters had inundated the lower reaches of coastal-plain streams and the precursors of the modern bays had formed. Beginning in the Early Archaic, shell middens were deposited along the inland heads of bays. To date, Early Archaic shell middens have not been found on the more seaward bay margins, which may reflect removal of early sites by later Holocene bay shore erosion. Alternatively, since the protective barrier islands probably had not yet formed during Early Archaic times and sediment infilling presumably had not yet created extensive, exploitable shallows, seaward bay margins would not have provided an accessible and highly productive aquatic resource mosaic. By contrast, inland bay-head areas would have infilled relatively rapidly, creating biotically productive estuarine shallows of the kind attractive to prehistoric hunter-gatherers.

On uplands overlooking Nueces Bay, Early Archaic components have been identified at three sites (41NU136, 41NU153, 41NU266). The deposits consist of thin (5-15 cm-thick) strata of oyster shell containing sparse artifacts such as chert debitage, utilized chert flakes and rare examples of edge-flaked sunray venus clamshell knives or scrapers (Ricklis 1993; Ricklis et al. 1995). No diagnostics have been found in limited excavations, but early split-stem dart point types (such as Gower and Uvalde) have been noted as surface finds in the area and probably pertain to the same period as these oyster deposits. The thinness of these deposits and the low density of artifacts suggest short-term campsites representing perhaps only limited seasonal use of the shoreline during this period. Calibrated radiocarbon ages place these components in the period of ca. 7500-6800 B.P.

To the north, on uplands overlooking the lower Lavaca River estuary, Weinstein's extensive excavations at the Kendrick's Hill site (41JK35) and the Possum Bluff site (41JK24) revealed a combined total of four components that fall into the Early Archaic as here defined. At Kendrick's Hill, a stratified sequence of thin oyster and *Rangia cuneata* deposits was found. The three components were dated at 8200, 7500, and 6400-6000 B.P. At Possum Bluff, the basal oyster stratum was dated to 6950-6700 B.P. (Weinstein 1994, n.d.). The results have yet to be published in full, but generally artifacts were not abundant. Several side-notched dart points were found in contexts dating to 6400-6000 B.P.; these do not have known counterparts to the west in central Texas, and they may be related to side-notched points such as the Trinity type found in East Texas and dating to as early as ca. 6000 B.P. (e.g., Ensor 1998:347). Judging by the predominance of oyster shells in these deposits, the Possum Bluff and Kendrick's Hill localities, while now overlooking the lowermost part of the Lavaca River, were probably adjacent to a bay-head estuary during the Early Archaic, prior to sediment infilling of the inundated valley during the later Holocene.

In summary, recent research confirms an Early Archaic occupation of the central Texas coast. Shell-midden deposits are more or less thin with low artifact densities, suggesting short-term occupations, perhaps by relatively small groups of people and perhaps only on a limited seasonal basis. Based on the presently limited evidence, occupation was focused on back-bay, river-influenced areas. Generally, faunal bone is not present, presumably due to decay. However, fish otoliths, which are generally highly resistant to decay, are scarce, suggesting that coastal fishing was as yet only a limited subsistence activity.

Middle Archaic Period (ca. 6000-4200 B.P.)

There is some evidence to suggest that during the Middle Archaic, the coastal zone was more intensively occupied. Extensive survey, testing and excavation in the Nueces-Corpus Christi Bay area has identified 12 site components pertaining to this time period (see Ricklis 1995a:273-274). As is the case with Early Archaic sites in this area, occupation was commonly on upland margins overlooking the estuarine bay-head environments, though one component has been documented at site 41SP120 in a more seaward setting on the northeastern shore of Corpus Christi Bay. The four-fold increase in the number of identified components suggests increased use of the shoreline zone and, while shell midden deposits are still thin (<30 cm thick), they may be larger than before, attaining sizes of 5,000 square meters or more (e.g. at 41SP153, 41NU221, and 41NU184).

At Possum Bluff (41JK24) overlooking the lower Lavaca River estuary, Weinstein reports a thin (5-10 cm-thick) Middle Archaic oyster-shell stratum dated to 5950-5700 B.P. Analysis results are in preparation (Richard A. Weinstein, personal communication 2001); preliminary testing produced a profusion of oyster shells and remains of Atlantic croaker, but not artifacts (Weinstein 1994:161-163).

Artifacts are more abundant, overall, for this period, also suggesting relatively more intensive occupation than during the Early Archaic. At the McKinzie site near the modern Nueces River delta, a 20-to-25-cm-thick deposit of *Rangia flexuosa* and oyster shell, dated to ca. 5900-5300 B.P,, yielded fairly abundant chert debitage, two Bell dart points, a Tortugas point, an Early Triangular point, and a rounded-based dart point, in addition to several non-diagnostic lithic tools and oyster shell tools (Ricklis 1988). At site 41SP153 limited excavations in an oyster stratum of similar age produced abundant chert debitage, a Gower dart point (possibly a curated/redeposited earlier item) and a barb fragment of an Andice point. An Early Triangular dart point was recovered from a 1x1-m excavation unit at site 41NU281 from a level dated to 4990-4860 B,P, (Ricklis et al. 1995). Numerous Early Triangular points have been surface collected from the Means site within an area of *Rangia flexuosa* midden probably coeval with an excavated *Rangia flexuosa* deposit at that site dated to 5630-5340 B.P. (Ricklis and Gunter 1986). Shell artifacts recovered for this period include perforated oyster shells (possible net weights) and edge-flaked sunray venus clamshells; the various conch-shell artifacts that were to become common during the Late Archaic have yet to be documented for this period.

Generally, faunal bone in these components is not preserved. However, fish were clearly represented at the McKinzie site, where the Middle Archaic stratum produced otoliths of marine catfish, black drum, spotted sea trout and Atlantic croaker. Otoliths have also been recovered from sites 41NU184, 41NU267, 41SP156 and 41SP148. Clearly, marine fish were part of the subsistence economy at Middle Archaic shoreline sites. However, the densities of ototiths per volumetric unit of excavated shell midden are far lower than in Late Archaic sites (see Ricklis and Blum 1997), suggesting that fishing was, as yet, not an intensive subsistence activity. Given that Middle Archaic deposits are on average much thinner and smaller than major Late Archaic middens, it is inferable that shoreline occupation was less intensive than was later the case.

Only very limited information is available on the internal structure of Middle Archaic shell middens. Hearth features have, as yet, been unreported. However, the floor plan of a small, presumably domestic structure was exposed at the Means site. It consisted of an arcuate arrangement of small post molds, 3.2 m across and apparently associated with a concentration of *Rangia flexuosa* shells radiocarbon dated to 5630-5340 B.P. (Ricklis and Gunter 1986).

Late Archaic Period (Aransas Tradition) (ca. 3000-1200/1000 B.P.)

During the Late Archaic, shell middens along the central Texas coast attain sizes and thicknesses far surpassing those of Early and Middle Archaic times. The Mustang Lake site (41CL3) on the southeastern shore of San Antonio Bay extends along a lagoonal shoreline for at least 1.5 km and, where tested, consists of a dense shell midden deposit 1.3 m thick (Ricklis 1995a:279). The Kent-Crane site (41AS3), up to 1.5 m thick (Campbell 1952), parallels the Copano Bay shoreline for almost one km (see Cox and Smith 1988). At Ingleside Cove, on the northeast shoreline of Corpus Christi Bay, dense Late Archaic shell midden deposits extend along the shoreline for over two kilometers (Corbin 1963; Ricklis 1996; Story 1968); excavations there revealed cultural deposits in places attaining a thickness of over a meter. Even less impressive midden deposits are markedly thicker and more extensive than those documented for earlier periods. At the partially destroyed Guadalupe Bay site (41CL2) near the Guadalupe River delta, Late Archaic shell midden deposits are up to about 60 cm thick, and the surviving remnant of the once-larger site extends over some 5,000 m^2 (see Weinstein 1992:120, 2002). At the Swan Lake site (41AS16) on Copano Bay, the main shell midden covered an area of over 5,000 m^2 and was 30-40 cm thick (Prewitt et al. 1987).

Artifact density in Late Archaic shell middens is variable, but can be high. Assemblages include flaked lithic dart points and other tools, debitage, groundstone abraders, bone awls, pins and flaking tools, basketry-impressed pieces of asphaltum, and occasionally shell or bone beads and conch-shell pendants (e.g., Story 1968; Ricklis 1995a; Weinstein 2002). An array of shell tools includes edge-flaked sunray venus clamshells, perforated oyster shells, oyster-shell tools, bi-pointed conch columellae, adzes made from cut sections of large lightning whelk body whorls, whelk hammers, perforated whelk shells used as tools or net weights, and conch columella gouges.

Based on radiocarbon dates, it is apparent that the Late Archaic of the central coast lasted for about two millennia. The beginning of the period can be placed at around 3000 B.P. Calibrated radiocarbon dates run on shell samples from the bottom of the massive shell middens at Kent-Crane and Mustang Lake both fall at ca. 2700 B.P. (Cox and Smith 1989; Ricklis 1995a), suggesting that these major deposits began to form shortly after the time of stabilization of modern sea level, which is generally thought to have occurred around 3,000 years ago (e.g., Brown et al. 1976; Ricklis and Blum 1997; Thomas and Anderson 1993). At site 41SP120 on Ingleside Cove, the basal portion of the Late Archaic shell midden deposit yielded a calibrated age range of 3160-2950 B.P., while charcoal from the lowest Late Archaic component at site 41NU46 near Oso Bay was dated to 3340-2850, B.P. In short, it can be inferred that as sea level stabilized, ongoing sedimentation created the high-biomass estuarine shallows behind protective barrier islands that characterize the modern coastal environment, along with a rich resource mosaic that attracted and supported intensive occupations by relatively large groups of people (see discussions in Ricklis and Cox 1991; Ricklis and Blum 1997; Weinstein 1992).

Major sites appear to have been occupied recurrently throughout the Late Archaic and, in most cases, into the Late Prehistoric period. Numerous radiocarbon assays document occupation from the last millennium B.C. through the end of the Archaic at sites 41SP120, 41CL3 (Ricklis 1995a), 41CL2 (Weinstein 1992, 1999), and 41JK35 (Weinstein 1994, 2003).

The cultural sequence during this period is reflected in shifts in predominant projectile point types. At the Kent-Crane site, where the base of the shell midden is radiocarbon dated to 2700 B.P., the best-represented points in the lowest of three strata (Campbell 1952) are unstemmed Tortugas and Matamoros types and the stemmed Kent type (Figure 2-8). Also present are Morhiss and Lange points, plus a small percentage of Ensor points (probably intrusive from overlying strata). This is congruent with the fact that Tortugas, Morhiss and Lange points were all found in close association at the inland Loma Sandia cemetery in Live Oak County, dated to ca. 2800-2600 B.P. (Taylor and Highley 1995). On the upper Texas coast at the Eagle's Ridge site (41CH252), Kent points were the overwhelmingly predominant type in the Late Archaic Stratum 2, dated to the last millennium B.C. (Ensor 1998). In the middle stratum at Kent-Crane, Kent and Ensor types predominate, suggesting that this zone represents occupation from the end of the last millennium B.C. into the first few centuries A.D., the estimated period established for Ensor points in central Texas (Prewitt 1981). In the top stratum, the Ensor type predominates; Kent points are a minor element, and very late Late Archaic types such as Ellis and Catan are present. The Catan type, along with the small Matamoros dart point type, has been securely dated with seven radiocarbon assays (on both shell and charcoal sample) to ca. A.D. 1000 at site 41SP120 on Corpus Christi Bay (Ricklis 1995a:280).

In sum, the artifact assemblage for the coastal Late Archaic shows both continuity and change. The suite of shell tools that formed one of the bases for Campbell's (1947, 1952, 1960) Aransas Focus have been found throughout the Late Archaic sequence. On the other hand, changes in diagnostic projectile points appear to parallel those documented for inland south and central Texas. Continuity in adaptive strategies is represented in site locations, with productive shoreline locales such as Mustang Lake on San Antonio Bay, Kent-Crane on Copano Bay, and Ingleside Cove on Corpus Christi Bay seeing recurrent occupation throughout the Late Archaic and into the Late Prehistoric. Even seasonality of occupation appears to show more continuity than otherwise, with major emphasis on fishing during the fall through early spring at large shoreline sites (Ricklis 1996; Scott 2002; Wilson 2002).

The long-term continuity in aspects of technology and settlement patterns suggests an essentially *in situ* cultural development. Overlaid upon this are changes in projectile point types as expressions of broadly distributed horizon styles. On the basis of the two-millennia-long time frame and the evidence for adaptive and technological continuity, this period is referred to herein as the Aransas Tradition. The use of the concept of the "tradition" (*sensu* Willey and Phillips 1958) is further bolstered by the continuation of traits and adaptive patterns into the Late Prehistoric period, as summarized below.

The geographic boundaries of the Aransas Tradition can be approximately defined on the basis of the diagnostic shell-tool assemblage. Conch adzes, whelk columella gouges, perforated oyster shells, and edge-flaked sunray venus clamshells are reported from the Baffin Bay area northward to Matagorda Bay. On the lower Texas coast, a well-developed shell industry has been reported (e.g., Hester 1980b, 1995; Mason 1935), but emphasis was on a variety of ornamental items rather than on the largely more utilitarian tool assemblage of the Aransas Tradition. Moreover, there were probably significant differences in adaptive strategies, since the hypersaline waters of the lower coast (i.e., lower Laguna Madre) did not support the abundant mollusks, the shells of which are found in profusion on Aransas Tradition sites. To the north, on the upper Texas coast, the abundant use of conch, whelk and bivalve shells for tools is not documented. Perforated oyster shells and the occasional whelk-shell tool are reported (e.g., Aten 1983; Ricklis 1994a), but nowhere as commonly as on the central coast.

A final point that must be made in this brief overview of the central-coast Late Archaic is that the available evidence suggests that the intensity of fishing as an important economic activity increased with time. Fish otoliths are, as noted earlier, present in only limited quantities on Middle Archaic site components, and are more abundant after ca. 3000 B.P. at Late Archaic sites. The density of otoliths per excavated volume of midden increases from this time onward. The combined data from a series of sites in the Corpus Christi-Nueces Bay area show a trend in otolith density from less than 20 per cubic meter of excavated shell midden at ca. 3000 B.P. to over 250 per cubic meter by A.D. 1000. Similarly, at the Mustang Lake site (41CL3), otolith counts per 10-cm level in a 1-by-2-m test excavation rose from less than five at ca. 2700 B.P. to 20-30 by ca. 1400 B.P. (see Ricklis and Weinstein 2005). These data are interpreted to reflect increasing fish biomass in bays as ongoing bottom sedimentation resulted in increasingly extensive shallows that were ideal as fish spawning and nursery areas.

Late Prehistoric Period

Late Prehistoric I (ca. 1200/1000-700 B.P.)

The Late Prehistoric on the coast is marked by the appearance of arrow points and ceramics. In the

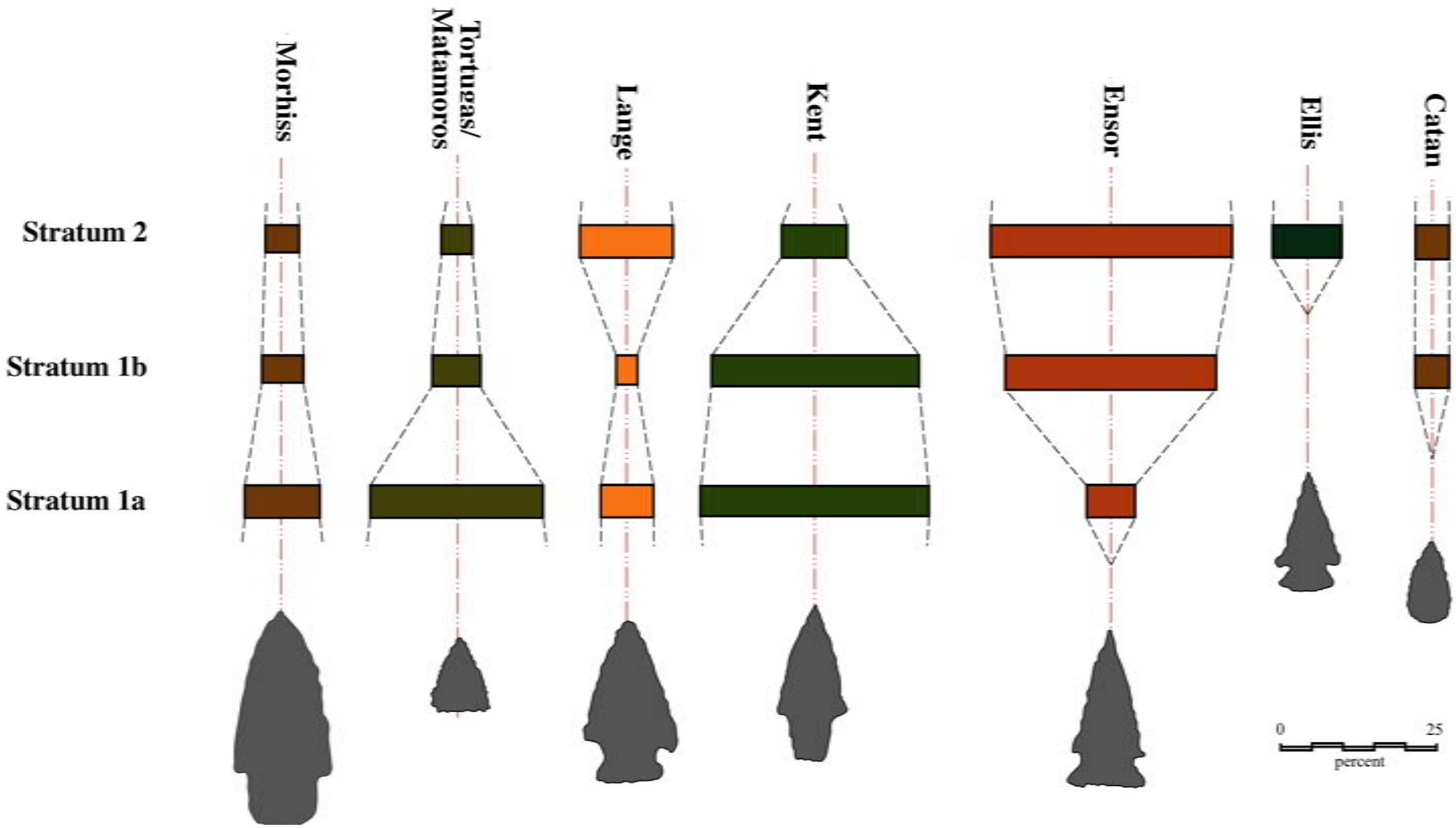


Figure 2-8. Graph showing seriation of the percentages of major projectile point types from the three main strata at the Kent-Crane site (oldest at bottom), central Texas coast. Typology is based on the author's assessment of illustrations in Campbell (1952).

northern part of the central coast, the Scallorn arrow point appears to be the predominant early arrow point form. Scallorn points have been found without associated ceramics at some sites (Richard A. Weinstein, personal communication 2000) and with sandy-paste pottery similar to the Goose Creek plain ware of the upper Texas coast at other sites (e.g., Story 1968; Weinstein 1994). Weinstein (1992:94) has hypothesized that the plain sandy-paste ware represents diffusion of ceramic technology from the upper Texas coast and that this material developed into the somewhat thinner sandy paste Rockport wares of the final Late Prehistoric era, an idea essentially in agreement with a scenario suggested by Campbell (1961). Scallorn points become less common toward the south (e.g., Corbin 1974) and the earliest dominant arrow point at site 41SP120 on Ingleside Cove at Corpus Christi Bay is an unstemmed triangular form generically assignable to the Fresno type (see Turner and Hester 1999), and dated there to ca. A.D. 1000-1250 (Ricklis 1995a:284).

Other artifacts in the Late Prehistoric assemblage are bone pins, awls and flaking tools and a suite of shell tools similar to that of Late Archaic. Indeed, aside from the diffusion of ceramic technology and the bow and arrow, there is at present no reason to infer major changes in settlement patterns or basic adaptive strategies during this time period (though shellfish appear to decline in dietary importance during the Final Late Prehistoric; see Ricklis 2009, 2010).

Data from the Blue Bayou site (41VT94), a Late Archaic to Initial Late Prehistoric cemetery located approximately 3 km north of Buckeye Knoll, suggest that a major coastal-inland cultural boundary already was in place by this time. Stable isotopic data (on ^{13}C and ^{15}N) indicate that the diet of the Blue Bayou population was terrestrial with no significant input from marine resources (Huebner and Comuzzie 1992:193-200). Thus, it can be inferred that people living this far inland did not include the coastal zone within their operational area. This boundary appears to presage that defined for the following Final Late Prehistoric period, discussed below.

Late Prehistoric II (ca. 700-300 B.P.)

Beginning around A.D. 1250 or 1300, a distinctive artifact assemblage emerges on the central coast, marking the emergence of the Rockport phase. Diagnostic traits of the Rockport phase assemblage are arrow points, primarily of the Perdiz type, small unifacial end scrapers, thin bifacial knives that are sometimes alternately beveled, chert drills of both cylindrical and expanded-based forms, a prismatic blade-core technology, and Rockport ware ceramics.

The lithic assemblage is essentially the same as that of the inland Toyah horizon (cf. Black 1986; Highley 1986; Hunter 2002; Ricklis 1992b, 1996). As noted earlier, this assemblage is generally associated with bison bone, and can be thought of as a technocomplex suited to the procurement and processing of large game (see Ricklis 1994b). It is telling in this regard that the appearance of the pertinent traits in the coastal zone corresponds to the common presence of bison bone in Rockport phase sites. Inferably, as bison herds pushed into south Texas ca. A.D. 1250/1300 (Dillehay 1974), coastal peoples responded readily to the influx of this new, economically significant resource and adopted what they perceived to be an appropriate tool kit (see also discussion in Black 1986; Ricklis 1992b, 1994b).

At the same time, Rockport ceramics are distinctly a coastal phenomenon, probably deriving from a coastwise diffusion of technology from the upper coast and representing an *in situ* stylistic development unique to the central coast. Indeed, the common use of asphaltum (natural beach tar) for coating and decoration on Rockport pots is a distinctly central coastal-zone trait that diffused inland to Toyah Horizon potters only to a limited extent (e.g., Black 1986; Hester and Parker 1971; Ricklis 1994b:306-311).

Cultural continuity in the coastal zone is suggested by the persistence of distinctive shell tool forms such as edge-flaked sunray-venus clamshells, whelk hammers, and whelk body-whorl adzes. The common use of asphaltum to coat ceramic vessels can be reasonably interpreted as a continuation of the Late Archaic pattern of asphaltum coating on baskets. Fundamental continuity is also suggested by continued use of favored shoreline locations as major fishing camps, plus a fall through early spring emphasis on shoreline occupation and attendant fishing activities.

The distinctive coastal ceramics of the Rockport phase allow, for the first time in the cultural sequence, a clear delineation of coastal vs. inland artifact assemblages and, in fact, the differing distributions of inland Toyah and coastal Rockport ceramics indicates a major boundary zone approximately 40 km from the mainland shoreline (Ricklis 1996).

Within the more inland part of the Rockport phase area, along upland margins of streams, are found numerous small sites that appear to represent hunting camps, in clear contrast to the large fishing camps on the bay and lagoon shorelines. These sites tend to be small, with only thin deposits of camp debris and faunal remains indicating a primary focus on procurement of large game (white-tailed deer and bison). Seasonality analysis of the limited samples of fish otoliths from these sites suggest warm-season occupations, and it is inferable that a spring-summer dispersal of larger groups living at fall through early spring fishing camps is represented. This is a scenario supported by ethnohistoric information on the Karankawa tribes of the central coast area, whose Late Prehistoric antecedents are represented by the Rockport phase (Ricklis 1992a, 1996a).

Early Historic Karankawa Tribes

When the expedition of René-Robert Cavelier, Sieur de la Salle, landed at Matagorda Bay in the winter of 1685, it encountered a sizeable camp of native people living at the northern end of Matagorda Island along Passo Caballo. These were the Clamcoehs, known several decades later by the Spanish as the Carancaguases, by early-nineteenth-century Anglo-American settlers as the Carancahuas, and eventually as Karankawas in final Anglicized form.

As noted previously, in 1722, the Spanish colonial authorities in New Spain established the mission of Nuestra Señora del Espíritu Santo de Zuñiga and the presidio of Nuestra Señora de Loreto, both commonly known as la Bahía, within Karankawa territory on Garcitas Creek near Matagorda Bay. During the course of the eighteenth century, the Karankawa had a tenuous connection with this and other missions, though by 1790 a peace was negotiated that was to lead to political alliance between Karankawas and Spaniards (Ricklis 1996a:143-158).

The colonial authorities and military personnel recognized five coastal groups as closely related by culture and language. These included the Carancaguases, or Karankawa proper, plus the Cocos, Coapites, Cujanes and Copanes. Each of these was a Karankawan subgroup that inhabited its own section of the coastline, though shared camps and intermixing were apparently common (Newcomb 1983; Ricklis 1996a).

There is little doubt that the Rockport phase is the archaeological correlate of the Karankawa tribes. The distribution of stylistically unique Rockport pottery is isomorphic with the combined territorial range of these groups, even to the point that the inland margin of Karankawa territory was 25 leagues (40 km) from the coast, the same distance as the common occurrence of Rockport pottery (see Ricklis 1996a). Further, Rockport pottery is the overwhelmingly predominant native ceramic at the site of the mission of Nuestra Señora del Rosario de los Cujanes at Goliad, established in 1754 for the Karankawan tribes (Gilmore 1974; Ricklis et al. 2000), as well as the first location of Presidio La Bahia, established on Garcitas Creek in Victoria County, and known to have had relations with local Karankawa groups (Ricklis 2007).

Although the Karankawa groups suffered depopulation from Old World diseases, so that their population had been reduced by perhaps two-thirds by the middle of the eighteenth century, their numbers stabilized during the late eighteenth and early nineteenth centuries and they remained a viable sociocultural and political presence along the coast. However, with the collapse of the Spanish colonial system after 1815 and the intrusion of Angloamerican and Mexican settlers and ranchers in the 1820s and 1830s, the Karankawa were increasingly exposed to attacks, and the area of their effective territory was rapidly reduced. By the 1850s, virtually all the Karankawa were either absorbed into the emerging regional ranching economy or were pushed southward to find refuge in northern Mexico.

Chapter 3

Excavations: Strategies and Stratigraphy

Robert A. Ricklis

As mentioned in Chapter 1, the 2000-2001 investigations at Buckeye Knoll involved several aspects of work. The first of these was extensive testing of the area between the Barge Canal and the Levee Road, that portion of the site most likely to be heavily impacted by proposed work on the canal. This work in this part of the site, designated the West Canal Bank Area (Figure 3-1), is described shortly.

The second aspect of the work was a series of backhoe trench excavations west of the Levee Road, designed to define the limits of the site and to better understand the nature of the sedimentary stratigraphy. A total of 50 backhoe trenches were excavated around what were believed to be the probable margins of the site, based on Weinstein's 1989 testing.

The final aspect of the investigations was hand excavation of 2-by-2-m units within defined midden areas. The goal of this work was to obtain detailed information about stratigraphy and cultural components. This work was carried out in three areas of the site, namely, the Knoll Top (KT), the West Slope (WS) and what was termed the East Midden Area (EA) (see Figure 3-1).

The procedures and stratigraphic findings made in each of these areas are discussed below. The investigations in the West Canal Bank Area (WCBA) indicated an absence of intact cultural deposits, leading to the conclusion that more intensive work was not required there. The thoroughly disturbed condition of the sediments in the WCBA preclude meaningful interpretations and, for this reason, the findings in this area will be described immediately below and need not be reiterated further on, where detailed descriptions and interpretations of the important intact deposits in other areas are presented.

West Canal Bank Area

The investigations of 2000-2001 in this part of the site were carried out to determine if significant cultural resources exist and if they would be directly affected by the proposed modifications to the Barge Canal. While Weinstein's 1989 findings suggested that the WCBA was heavily disturbed by canal-related machine activities (Weinstein 1992), his limited testing could not answer this question with full confidence.

The criteria established for affirming the presence/absence of significant cultural deposits first included the presence/absence of intact cultural deposits identifiable as discrete subsurface strata and/or features. Second would be the recovery or, conversely, non-recovery, of in situ human skeletal material that would signify the presence of a prehistoric cemetery area within the bounds of the WCBA.

Methodology

The methodology employed involved a variety of field techniques, which, in combination, would allow confident assessment concerning the presence/absence of significant archaeological deposits. The first was the excavation of backhoe trenches. These were placed closely enough to each other (at 15-meter intervals) to maximize the probability that the presence/absence of intact archaeological components could be confidently determined. In total, 12 backhoe trenches were

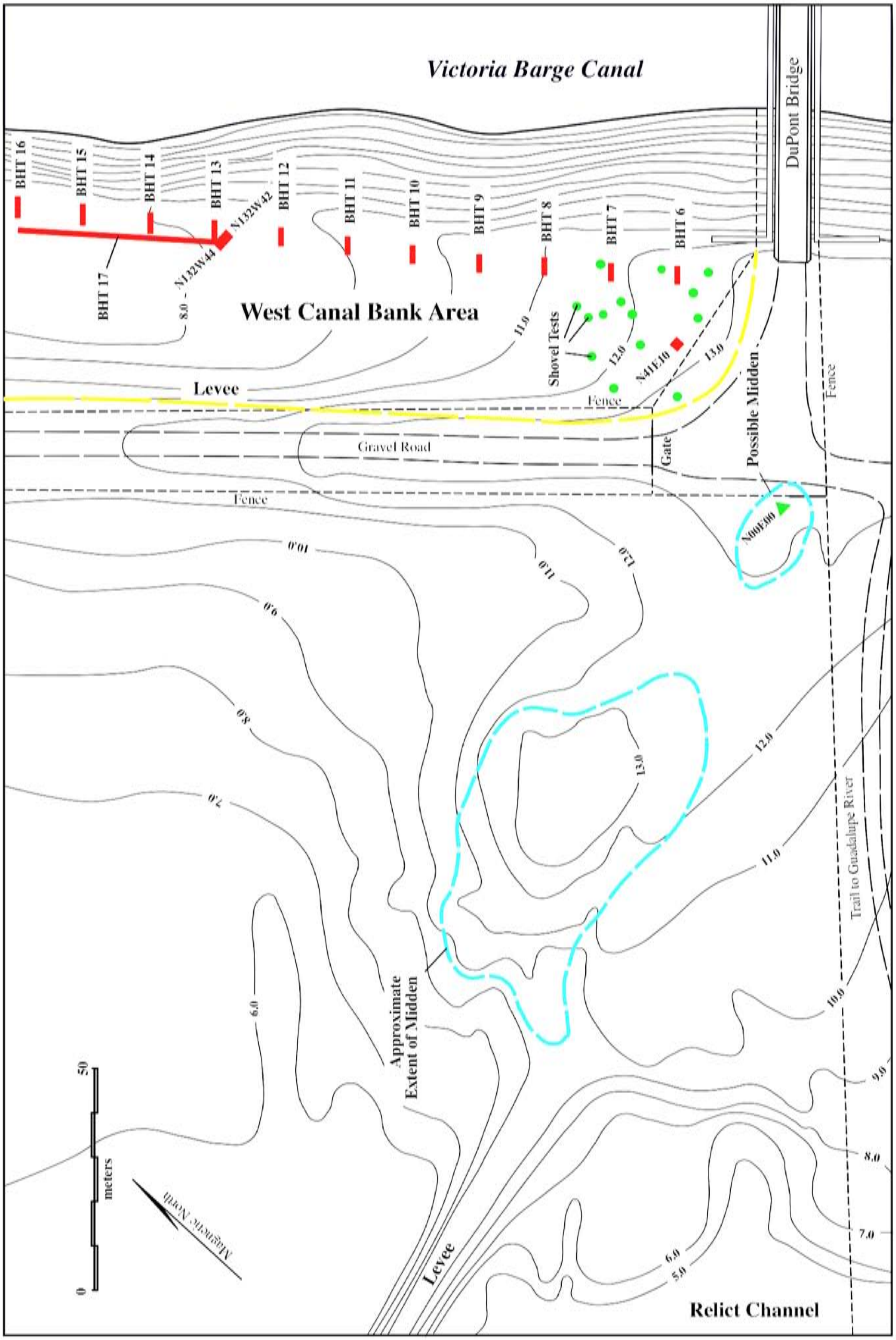


Figure 3-1. Map of the Buckeye Knoll site showing the West Canal Bank Area (WCBA), including locations of backhoe trenches, shovel tests, and hand-excavated units.

excavated within the WCBA. The profiles of each trench were photographed and recorded in scale drawings, with soil texture and color noted on prepared data forms. Approximately 20 liters of soil/sediment was dry-screened through 1/8-inch-mesh hardware cloth from each of the 30-cm levels excavated by the backhoe, in order to determine if small cultural materials were present and, if so, in what relative abundances.

The second methodology included hand-dug shovel tests. These, numbering 14, consisted of holes measuring approximately 50 cm in diameter and 1 meter deep. They were excavated with hand shovels in 25-cm-thick arbitrary levels. All excavated soil/sediment was dry-screened through 1/8-inch-mesh hardware cloth.

A final technique employed was a magnetometer survey. This was done on the higher ground in the southern end of the WCBA. The purpose was to attempt to identify subsurface anomalies, which might represent prehistoric features, especially burials. It was thought that patterned clusters of such anomalies might be recognizable and, if this was the case, hand-excavated shovel probes might determine if such patterns represented prehistoric cultural deposits, most particularly cemeteries. The magnetometer survey was performed courtesy of Dr. James Bruseth and Bill Nichols of the Texas Historical Commission. Dr. Bruseth kindly provided CEI with computer-generated printouts of the survey results. Unfortunately, however, the results were quite ambiguous, with no discernible pattern in the many anomalies recorded (which likely actually represent the numerous cobbles and gravel revealed by the shovel testing, discussed below).

Results

Backhoe Trenching

The locations of the 11 backhoe trenches excavated within the WCBA may be seen in Figure 3-1. The number sequence of the trenches was started at 6, in order to maintain the numerical sequence of backhoe trenches established in 1989 by Weinstein. With the exception of Backhoe Trench (BHT) 17, all trenches were approximately 5 meters long and were positioned at a right angle to the canal bank and in a southeast-to-northwest trend that paralleled the canal bank (see Figure 3-1). As noted, these trenches were located at 15-meter intervals (Figure 3-2). BHT 17 was 60 meters in length and ran parallel to the canal (i.e., in a southeast-to-northwest alignment), starting near BHT 16.

Examination of the wall profiles of each trench, plus inspection and sample-screening of excavated sediment failed to reveal any indications of culturally significant sediments or strata. Prehistoric cultural materials were extremely sparse, as may be seen in the list of findings from the 20-liter samples screened from each of the 30-cm levels in BHTs 6-13 (Table 3-1). The following paragraphs describe the sediments exposed in BHTs 6-13.

BHT 6

The stratigraphy recorded in BHT 6 is illustrated in Figure 3-3. From the surface to approximately 50-60 cm below surface, the sediment in this trench was a light brown sand (Munsell color 10YR 4/3-4/2). This appears to be a weakly developed A horizon. This was underlain by a massive, unconsolidated light gray (10YR 7/2) sand. The latter sand was very unstable, collapsing within minutes of excavation (and thus precluding entry of personnel into even the upper portion of the trench). It extended to the bottom of the trench, 3.5 meters below the surface.

BHT 7

The stratigraphy here was similar to BHT 6. The upper 50-60 cm consisted of brown sand (10YR 4/3 and 10YR 4/2) mixed with lumps of clay. This admixture suggested a degree of mechanical disturbance, a situation more clearly observed in all other backhoe trenches within the WCBA. Under the brown sand was the same massive deposit of light gray, unconsolidated sand seen in BHT 6. This continued downward to the bottom of the trench, 3.5 meters below the surface.

BHT 8

A thin veneer of mixed sand-and-clay spoil capped the sediments in this trench, to a depth of 25 cm below the surface. This was underlain by light gray sand similar to that seen in BHTs 6 and 7. This extended to a depth of approximately one meter, at which point a clayey silt zone (a probable illuvial Bt horizon) was encountered that extended to the base of the trench at 1.5 m below the surface.

BHT 9

The uppermost layer here was a mixed sand-and-clay spoil that reached a depth of 40 cm. Below this was a light gray sand similar to that seen in BHTs 6-8, but with the inclusion of natural illuvial lamellae of

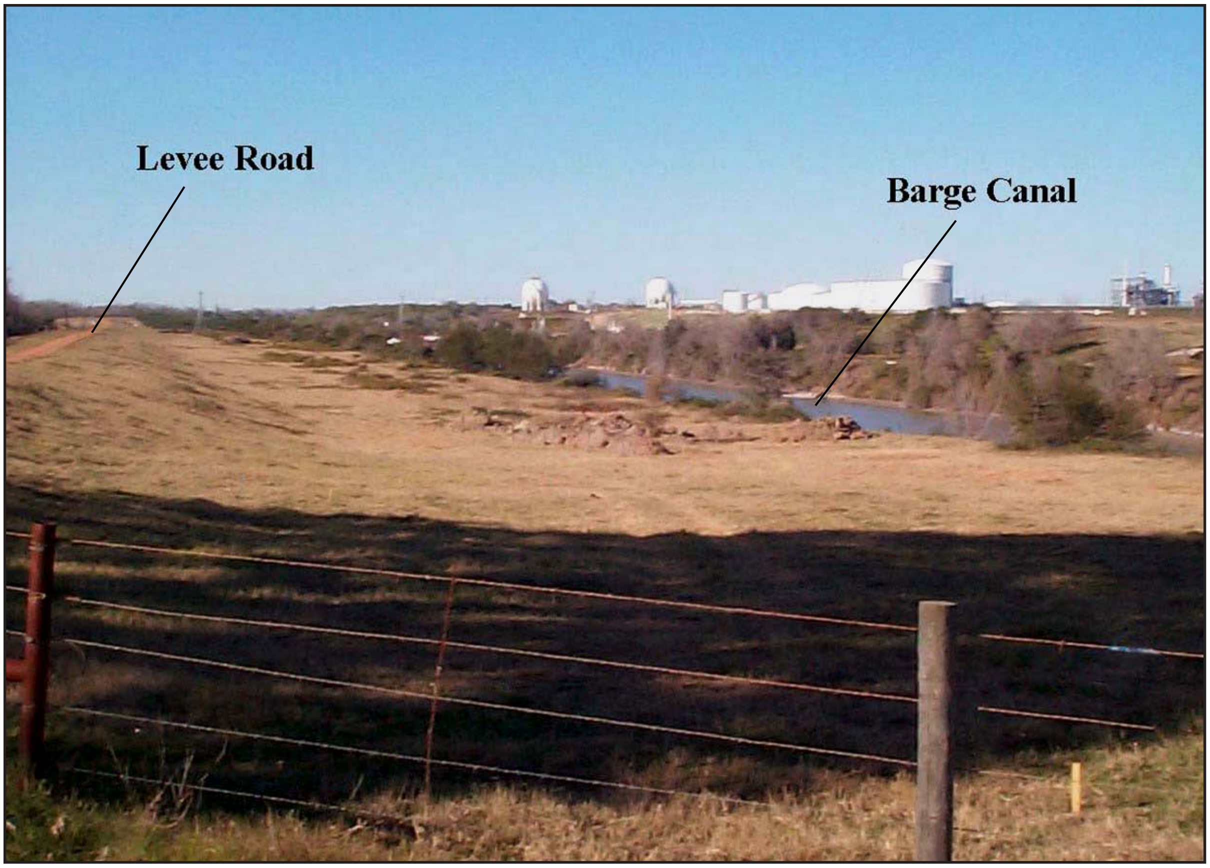


Figure 3-2. View of the West Canal Bank Area at the Buckeye Knoll site looking northwest and showing backhoe trenches during excavation.

red (oxidized) silty clay (Munsell color 7.5YR 5/6). The sand with lamellae extended to the bottom of the trench at 1.4 meters below the surface.

BHT 10

The stratigraphy here was the same as seen in BHT 9. The above-mentioned light gray sand with red silt-clay lamellae extended to the bottom of the trench, 1.5 meters below surface.

BHT 11

The stratigraphy in this trench (Figure 3-4) was the same as in BHTs 9 and 10. The bottom of the trench was at 1.5 meters below surface.

BHT 12

This trench had the same stratigraphy as in BHTs 9-11, except that the top sand-clay spoil layer was thicker, reaching a depth of 75 cm. The bottom of this trench was 1.6 meters below the surface.

BHT 13

This trench represents a departure from the previous ones in terms of stratigraphy (Figures 3-5 to 3-6). Several layers of sand were observed, some of which were initially thought to perhaps represent a partially intact stratigraphic sequence. The top 5-10 cm was a dark brown (10YR 3/2) sand. This was underlain by a fairly thick (approximately 70 cm) layer of fine, white (10YR 8/1) sand with numerous inclusive lumps of greenish-gray (Gley 1 6/10GY), gleyed clay. Under this was a mixed brown (10YR 4/3) sand, some 60-70 thick, containing scattered lumps of clay. A flaked chert biface (preform) was found in the south wall of the trench near the base of this zone. Below this was a light brownish-gray (10YR 6/2) sand that extended to the bottom of the trench, approximately 150 cm below the surface. The two thickest sand zones (the white sand and the brown sand) contained scattered bits of charcoal. While it was initially recognized that the inclusive clay lumps in the two thick sand zones represented some degree of disturbance, it was uncertain that the sand matrix was entirely disturbed/mixed;

Table 3-1. Materials Recovered from Backhoe Trenches 6-13 at Buckeye Knoll by 30-cm Levels.

Trench	30-cm Level	Non-Human Bone	Lithic Debitage	Burned Clay Nodules
BHT 6	1	0	0	0
	2	0	0	0
	3	0	1	0
	4	1	0	0
	5	0	2	1
	6	0	0	0
	7	0	0	0
	8	0	0	0
	9	0	0	0
	10	0	0	0
BHT 7	1	0	0	0
	2	0	0	1
	3	2	1	0
	4	0	4	0
	5	0	0	0
	6	0	0	0
	7	0	0	0
	8	0	0	0
	9	0	0	0
	10	0	0	0
BHT 8	1	0	0	0
	2	0	0	0
	3	0	1	0
	4	0	0	0
	5	0	0	0

Trench	30-cm Level	Non-Human Bone	Lithic Debitage	Burned Clay Nodules
BHT 9	1	0	1	0
	2	0	0	0
	3	0	0	0
	4	0	0	0
BHT 10	1	0	1	0
	2	0	1	1
	3	0	0	0
	4	0	0	0
BHT 11	1	0	0	0
	2	0	0	0
	3	0	0	1
	4	0	0	0
	5	0	0	0
BHT 12	1	1	0	0
	2	0	3	0
	3	0	0	0
	4	0	0	0
	5	0	0	0
BHT 13	1	0	0	0
	2	0	0	0
	3	0	2	0
	4	0	1	2
	5	0	1	0
Totals		4	19	6

conceivably, some of the lumps of clay could have been introduced anthrogenically by prehistoric people. The presence of the chert preform (as well as several chert flakes) suggested the possibility that intact or partially intact cultural deposits might be present. It was not until two hand-dug 2-by-2-m units (N132W42 and N132W44) were opened immediately adjacent to BHT 13 that the completely disturbed nature of the deposit was definitely ascertained. Additionally, a very similar stratigraphy was later noted in BHT 17, and obviously modern materials buried within this trench fill confirmed the artificial nature of these sediments.

BHT 14

This trench contained a series of lensed/laminated clays and sands that were clearly artificial spoil. As may be seen in Figure 3-7, the undulating and discontinuous nature of these sand and clay lenses is characteristic of the kinds of fluid (water-saturated) sediments that are pumped up from subaqueous environments, as during canal dredging. Because of the obviously artificial nature of the sediments in this trench, sediment samples were not screened (this was also the case with BHTs 15, 16 and 17). The basal stratum in

Figure 3-3. South wall of Backhoe Trench (BHT) 6 showing brown weakly developed sandy A horizon on top of light gray sand.

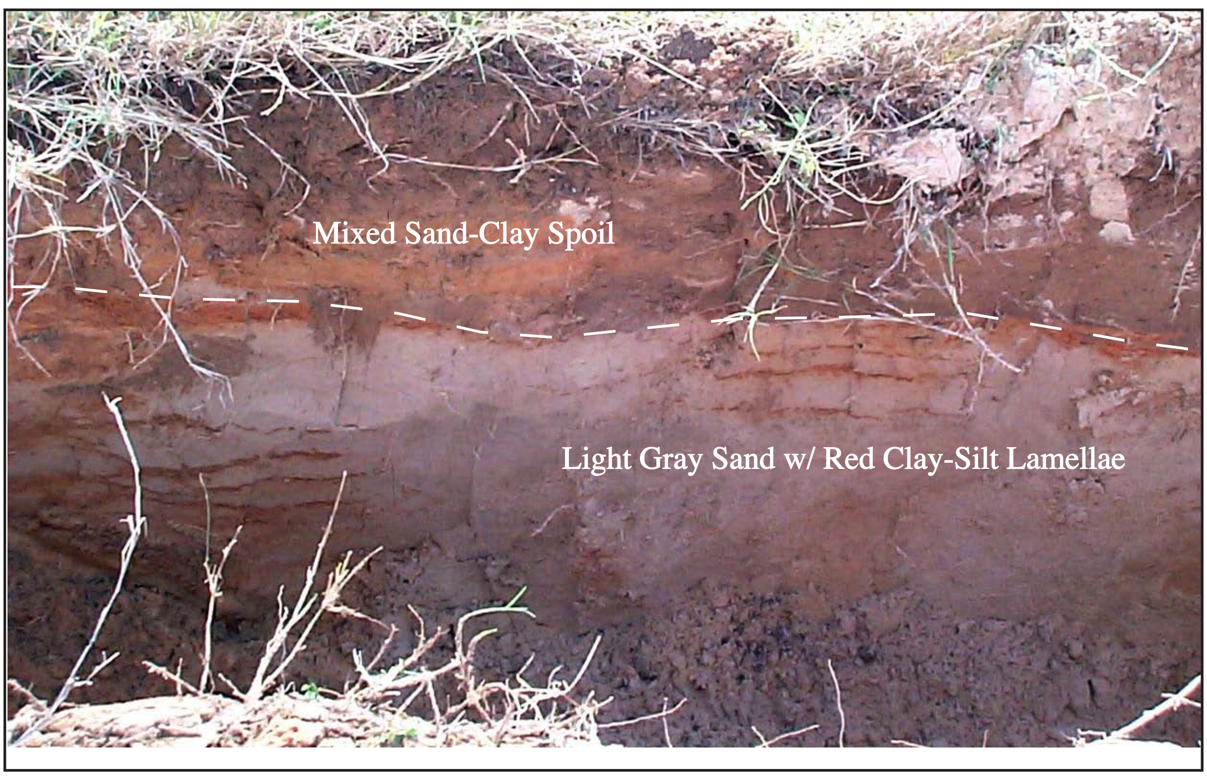


Figure 3-4. South wall of BHT 11. Note that a layer of sand-and-clay spoil rests on top of light gray sand with illuviated silt-clay lamellae.

Figure 3-5. BHT 13, south profile. Dashed lines delineate layers of artificial spoil.

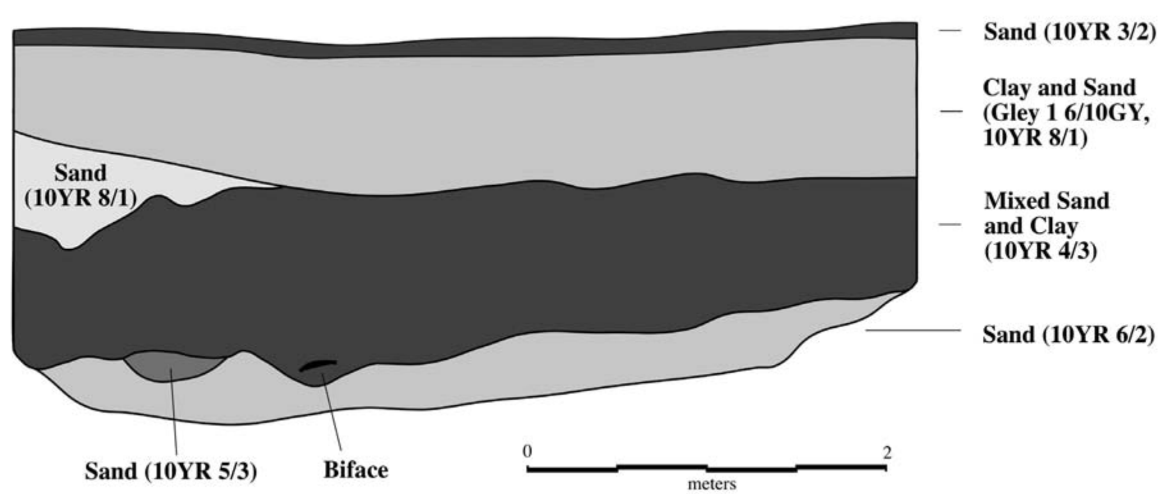


Figure 3-6. Drawing of part of the south wall of BHT 13 showing layers of mixed sand and clay spoil.

Figure 3-7. Profile of the south wall of BHT 14. Note laminated layers of clay and sand spoil deposit.

this trench, extending to the bottom at 1.4 m, is a bluish, dark gray homogenous gleyed clay that is similar in appearance to natural gleyed clays in the bottom of BHT 17. These are interpreted as paleochannel fill (see below).

BHT 15

Here, again, the sediments were clearly disturbed spoil. They consisted of a mix of brown sand and large lumps of bluish-gray (gleyed) and red clays. This trench was dug to a depth of 1.1 m.

BHT 16

The sediments in this trench were the same as those seen in BHT 15. They were clearly mixed by massive artificial disturbance and presumably represent spoil fill from canal construction and/or dredging. This trench was dug to a depth of 1.2 m.

BHT 17

This exceptionally long (60 m) backhoe trench, dug parallel to the Barge Canal, was placed so as to provide a sediment profile running at approximately a right angle to the hill slope (see Figure 3-1). Throughout the length of the trench, at least two layers of mixed sand and clay spoil were observed (Figures 3-8 to 3-9). The upper and generally thicker layer was a dark brown (10YR 3/2) sand mixed with abundant lumps of red and gray clay. The lower layer was a grayish brown sand mixed with similar clay inclusions. Two distinct episodes of broad deposition of spoil apparently are represented. The artificial nature of the sediments was confirmed by the presence of a long section of 2-inch steel cable firmly embedded at the base of the upper sand layer, near the south end of the trench. Also, bits and chunks of charcoal similar to those seen in the profile of BHT 13 were liberally scattered throughout the sand spoil layers. In places, these were observed to be parts of burned branches and stumps of smaller trees, sometimes with partially unburned wood attached. Field examination of the grain characteristics of the wood indicated that these trees were a species of oak. Seemingly, then, artificially deposited sediments were mixed with burned and presumably uprooted oak trees that once were in the area.

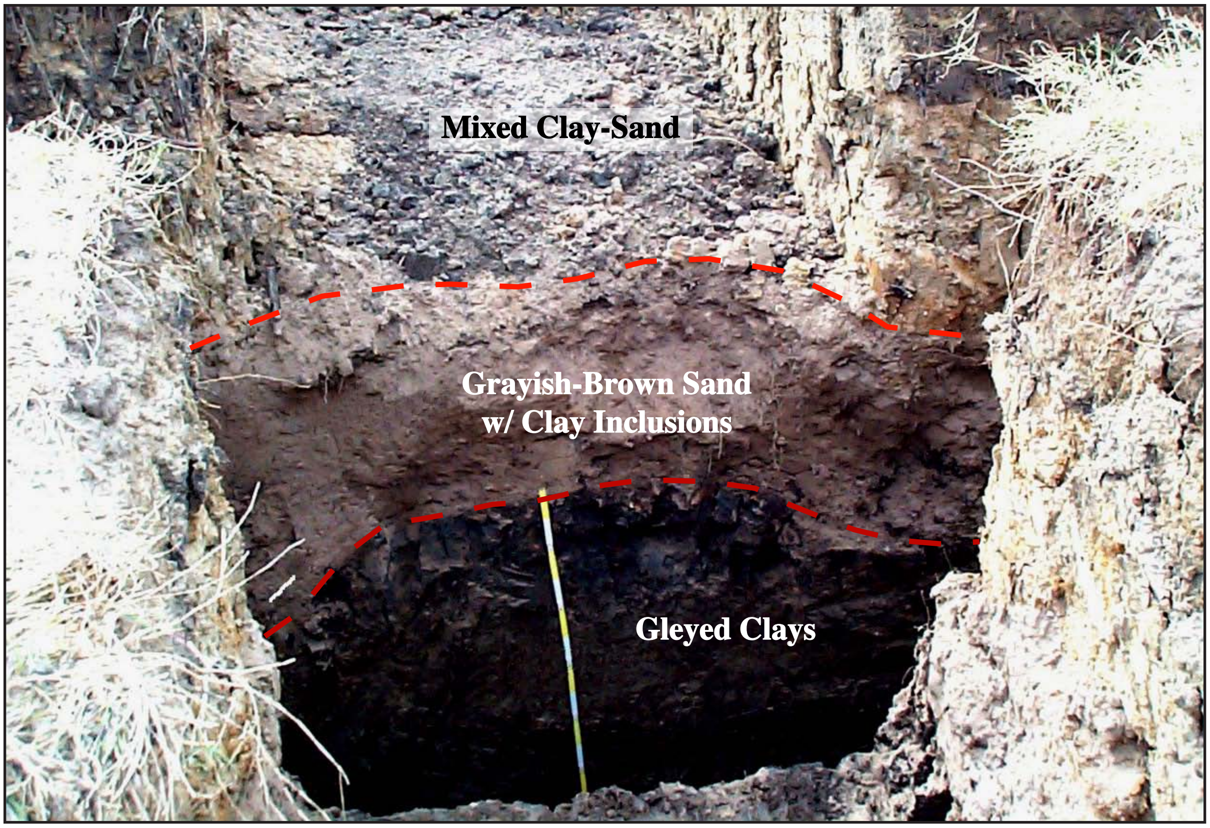


Figure 3-8. Stratified spoil overlying natural gleyed clays in BHT 17. Deeper clays are exposed by the hand-dug basal portion of a secondary backhoe trench cut at a right angle to the main trench. Looking west.

Underlying the spoil deposits were natural deposits of stratified, gleyed clays (see Figures 3-8 and 3-9). These were exposed to a depth of three meters below the surface in a combination of backhoe and hand excavation (as shown in profile in Figures 3-8 and 3-9). Unlike the spoil sediments, which are highly mixed clays and sands, these deposits are homogeneous in texture and color and have a blocky structure with clear slickensides.

The gleying of the clays suggests deposition in an anaerobic, subaqueous environment. In view of the topographic location of these clays at the base of the hill on which 41VT98 is situated and at the approximate elevation of the modern floodplain, the clays are interpreted as alluvial fill in slack-water paleochannels or oxbows.

Summary of Backhoe Trench Data

The combined stratigraphic information from the 12 backhoe trenches allows a general reconstruction of the sedimentary stratigraphy in the WCBA. A cap of spoil sediment was found virtually over the entire area. For the most part, this consisted of a mix of sand and inclusive lumps of clay and, in places, burned remnants of small trees.

The spoil deposit was quite thin (approximately 40-50 cm thick) on the upper slope of the WCBA, but thickened downslope, where it was as much as 1.5 m thick (in BHTSs 13 and 17).

The natural sediments observed beneath the spoil deposits were of two kinds. On the upper and middle slopes was found a massive deposit of fine, unconsolidated light gray sand (with illuvial, reddish silt-clay lamellae developed in the mid-slope sands). At the base of the slope, at the approximate elevation of the modern Guadalupe River floodplain, was found a stratified series of gleyed clay deposits, believed to represent low-energy alluvial infilling of a paleochannel or oxbow.

Presumably, all of these deposits overlie the eroded Pleistocene Beaumont clays, which form the upland margin and valley walls. A semi-schematic rep-

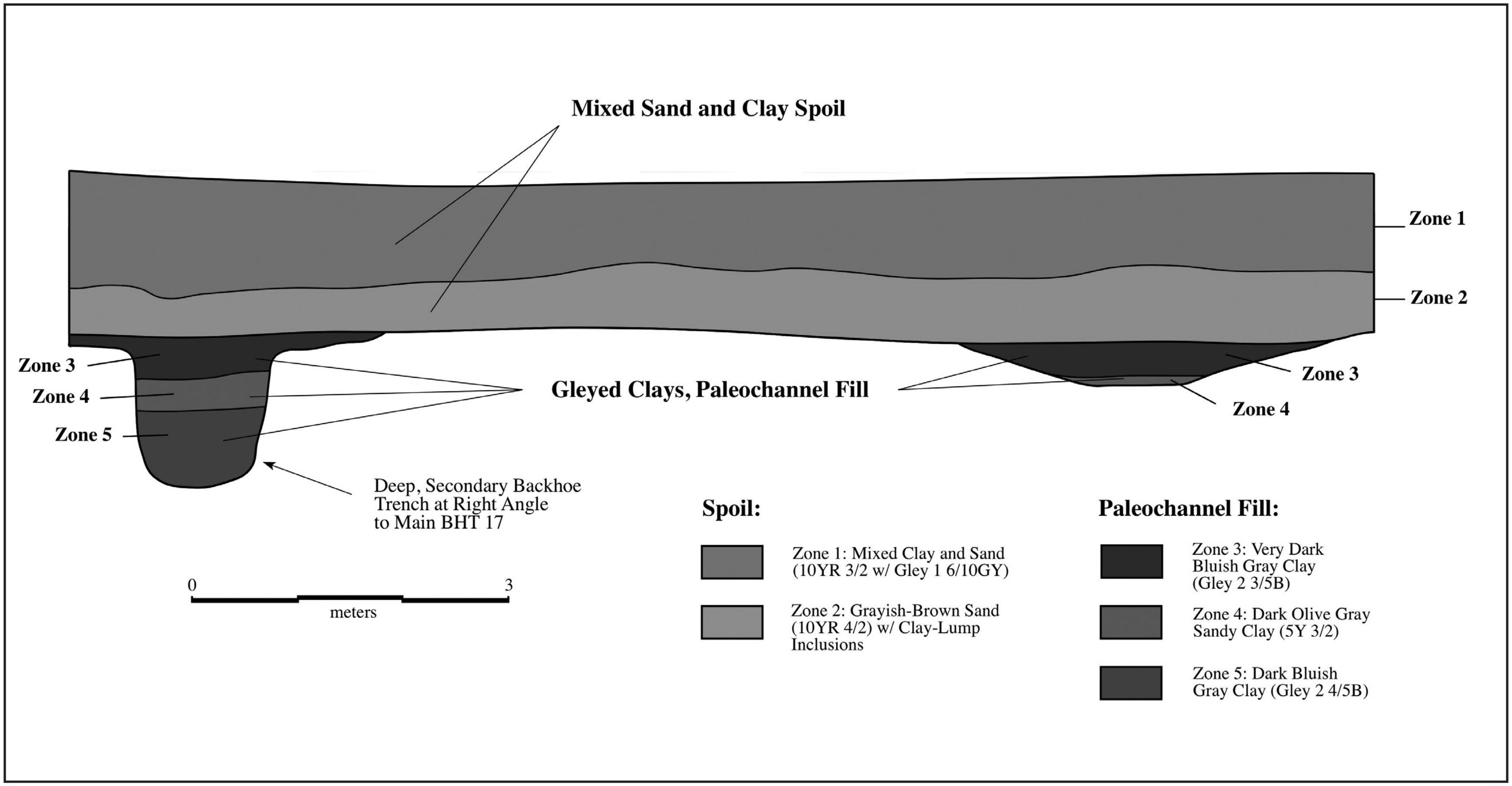


Figure 3-9. Profile of part of BHT 17 looking west. Note two major layers of sand-clay spoil overlying intact, natural gleyed clays interpreted as paleochannel fill.

resentation of the stratigraphy in the backhoe trenches is shown in Figure 3-10, and a schematic profile of the generalized sedimentary stratigraphy is presented in Figure 3-11.

Hand-Excavated 2-by-2-m Units

Three hand-excavated 2-by-2-m units were opened.[1] One of these, N41E10, was located near the top of the slope, immediately north of the fence line that separates the WCBA from the gravel pavement that conjoins the Levee Road with the Dupont Bridge (see Figure 3-1). The other two units were an adjoining pair, N132W42 and N132W44, excavated immediately south of BHT 13.

Unit N41E10

The stratigraphy in this unit (Figure 3-12) was very similar to that seen in nearby backhoe trenches. An approximately 50-cm thick layer of mixed sand-and-clay spoil overlay a massive natural deposit of light gray unconsolidated sand. The depth of the sand is indeterminate, since the bottom of the deposit was not reached by hand excavation, which, for safety reasons, was terminated at 1.5 m below the surface. However, the absence of cultural material in the lowest 40 cm of the unit suggests that the archaeologically relevant zone within this sand had been entirely encompassed by the excavation. The sparse cultural material found in this unit is discussed below.

Units N132W42 and N132W44

Not surprisingly, the sediment profile in these units (Figures 3-13 to 3-15) was generally similar to that in nearby BHT 13, insofar as layered sand with inclusions of clay lumps and burned wood characterized the deposit. The upper 50-60 cm were mechanically removed by the backhoe because it was clear from examination of the wall profile in adjacent BHT 13 that this sediment was modern spoil (i.e., it was a mix of sands and profuse, large lumps of clay).

Hand excavation was started once this obvious overburden had been removed, and the 10-cm level designations represent only these hand-dug sediments (i.e., Level 1 began at the depth at which the machine stopped digging). As may be seen in Figures 3-14 and 3-15, the hand-excavated layered sands exhibited a laminated quality and lumps of red and black clay appeared to be scattered at random throughout. These sediments are interpreted as modern spoil, a conclusion supported by the discovery of several modern artifacts at various depths within the deposits (including iron fragments, wire nails, brick fragments and plastic toys; see Table 3-2 for precise unit-level proveniences). Prehistoric artifacts, mostly lithic debitage, were found scattered throughout.

The excavation of these units was terminated at approximately 160-170 cm below the surface (i.e., hand-excavated Levels 11-12) at the top of a massive, dark gray gleyed clay similar to the natural deposit observed in lowest depths of BHT 17. This is believed to represent the same paleochannel fill found in BHT 17. Interestingly, the surface of the dark clay exhibited trough-like, elongated depressions that probably represent modern machine blading. If this is in fact the case, then the entire overlying sand spoil deposit was piled on after mechanical removal of an indeterminate thickness of original, natural sediment/soil. This makes good sense insofar as the admixture of modern and prehistoric artifacts (plus the inclusion of burned wood and anomalous clay lumps within the sand) combine to suggest massive disturbance, mixing, and redeposition of sediments. Inferably, at least some part of the sand component was originally within a natural sediment deposit, as is still present in the backhoe trenches on the upper and middle slopes in the WBCA. This would account for the presence in the disturbed sand of scattered prehistoric lithics, which were found within the undisturbed sands in upslope trenches, Unit N41E10, and shovel tests. Much of the past mechanical activity suggested by the mixing of sediments and apparent blading of the underlying gleyed clay may have been associated with construction of the nearby artificial levee.

Magnetometer Survey and Shovel Tests

The results of the magnetometer survey were ambiguous, insofar as no patterning was apparent in the many anomalies. Moreover, the above-mentioned subsurface excavations showed that the entire surveyed area was capped with spoil sediment that contained dense lumps of clay and scattered river cobbles. Two of the shovel tests (Nos. 1 and 7) were in fact excavated at the precise locations of magnetometer anomalies and revealed clay lumps and cobbles that probably account for those anomalies (Figure 3-16). It was concluded in the field that no prehistoric features could be identified with the mag-

[1] Note that each hand-excavated unit was identified by the grid coordinate of its southwest corner.

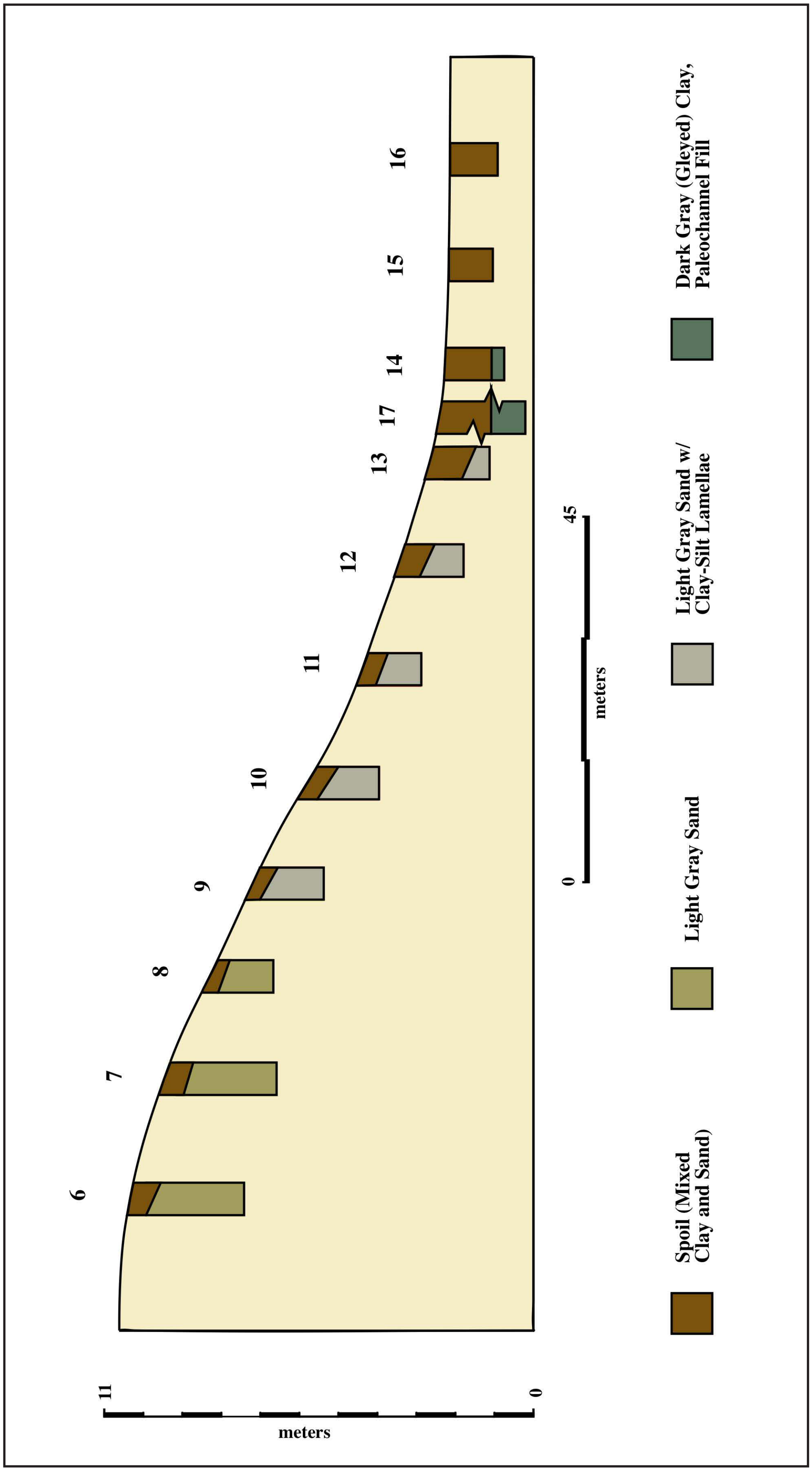


Figure 3-10. Schematic representation of backhoe trenches and their sedimentary stratigraphies in relation to the north-dipping slope in the West Canal Bank Area, looking west.

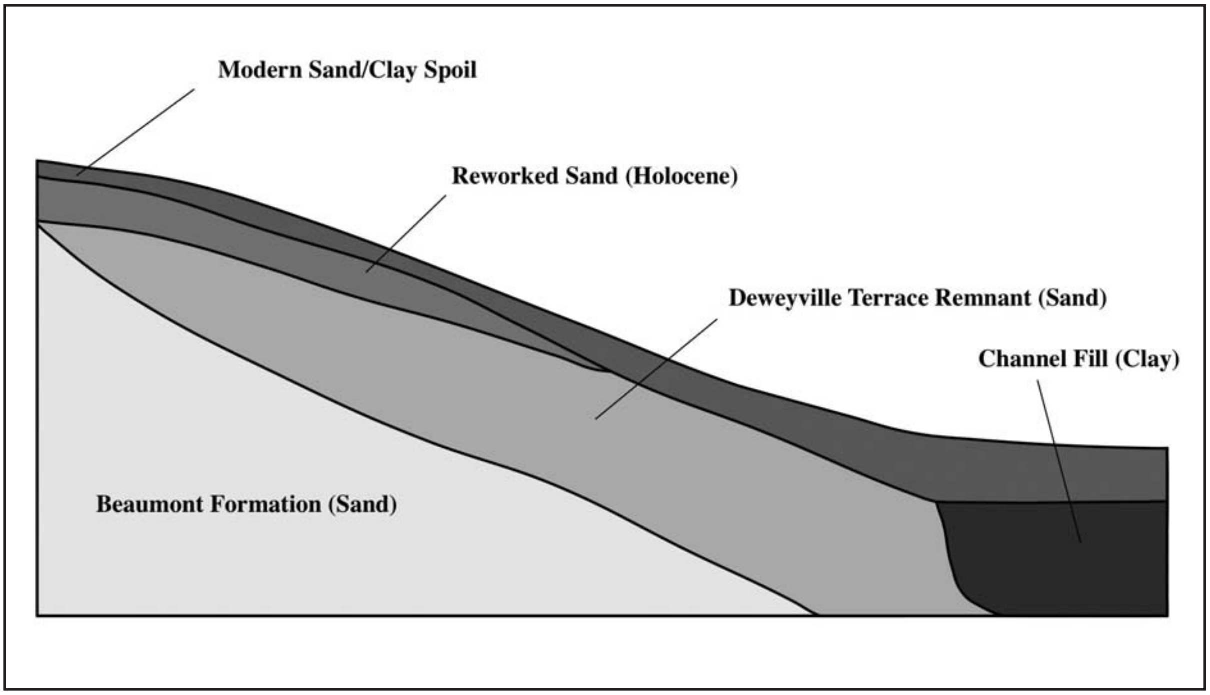


Figure 3-11. Schematic diagram showing generalized sedimentary stratigraphy of the West Canal Bank Area, looking west, based on data from backhoe trenches, hand-dug units, and shovel tests. The underlying Beaumont Formation is inferred based on geological information (e.g., Bureau of Economic Geology 1976) and findings elsewhere on the site. The sands are attributed to the late Pleistocene Deweyville terrace, based on OSL dates (see Appendix A).

Figure 3-12. Completed 2-by-2-m hand-dug Unit N41E10, looking northeast. Note the layer of sand-clay spoil, approximately 50 cm thick, overlying light gray sand.

Figure 3-13. Excavation in progress in Units N132W42 and N132W44, looking west. Note BHT 13 immediately behind the excavation units.

Figure 3-14. East wall of Unit N132W42. Note laminated/contorted nature of the spoil deposits.

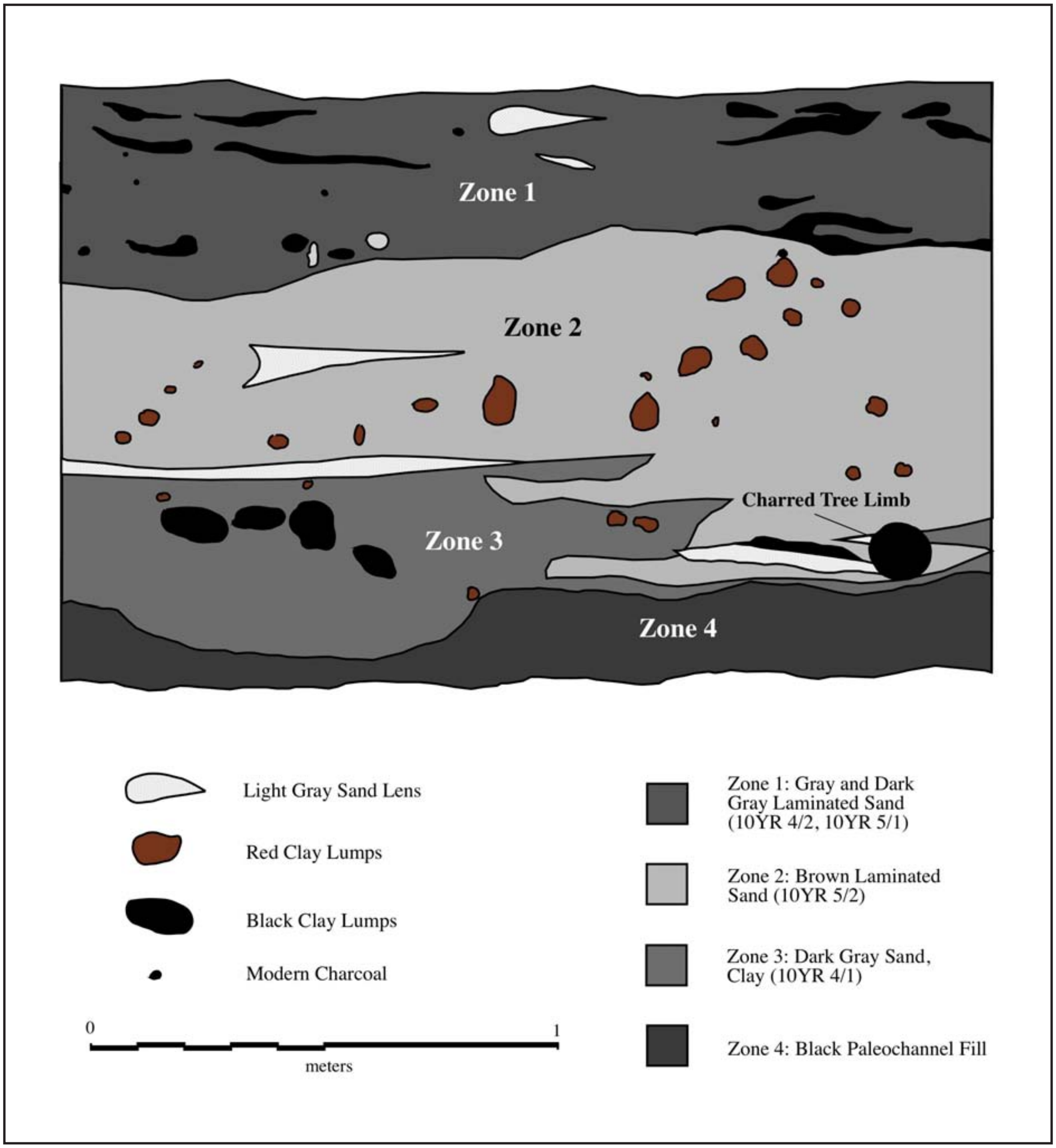


Figure 3-15. Drawing of north wall profile of Unit N132W42.

netometer, given the variable and often dense nature of the spoil that caps the area.

The 12 shovel tests were all dug on the upper part of the slope within the WCBA. As previously stated, all were excavated in 25-cm-thick arbitrary levels to a depth of 1 m and all excavated sediment was dry-screened through 1/8-inch hardware cloth. Most of the sediment excavated consisted of mixed sand-clay spoil containing sporadic gravel and cobbles (see Figure 3-16) overlying natural, light-gray sand. The thickness of the spoil ranged from 30 to 95 cm. Prehistoric cultural materials were found in small quantities; these consisted almost entirely of lithic debitage. The sediment stratigraphy (spoil overlying natural sand) was essentially the same in all the shovel tests; the variations may be seen by reference to Table 3-3.

Table 3-2. Materials Recovered from Unit N41E0 at Buckeye Knoll by 10-cm Levels.

Level	Non-Human Bone		Lithic Debitage		Burned Clay Nodules		Other Artifacts
	No.	Wt. (g)	No.	Wt. (g)	No.	Wt. (g)	
1	0	—	0	0	0	—	—
2	0	—	7	6.4	0	—	—
3	0	—	0	—	0	—	—
4	0	—	0	—	0	—	—
5	3	1.9	17	9.1	0	—	—
6	1	< 0.1	31	11.7	1	1.6	1 Biface Fragment
7	1	< 0.1	61	53.7	0	—	1 Utilized Flake
8	1	< 0.1	84	54.8	1	0.2	—
9	3	0.1	93	62.6	15	47.7	—
10	1	0.5	102	89.9	16	30.2	1 Morhiss Point
11	0	—	0	—	0	—	1 Biface Fragment; 1 Utilized Flake
12	0	—	0	—	0	—	—
13	0	—	0	—	0	—	—
14	0	—	0	—	0	—	—
15	0	—	0	—	0	—	—
Totals	10	2.5+	395	288.2	33	79.7	—

Artifacts and Faunal Remains

As already noted, prehistoric cultural debris found in the WCBA consisted almost entirely of sparsely distributed chert flakes and flake fragments (debitage). A total of 1,839 pieces of debitage was recovered, 19 from the backhoe trenches, 395 from Unit N41E10, 1,333 from Units N132W42 and N132W44, and 92 from the shovel tests. Also present was a very sparse representation of burned-clay nodules (55 total from the WCBA) and faunal bone (62 fragments total from the WCBA). Faunal bone consisted almost entirely of small unidentifiable splinters. The five exceptions are a bovid (bison/cow) molar from Shovel Test 2, Level 2, a white-tailed deer carpal from Unit N41E10, Level 5, a distal white-tailed deer tibia fragment from N132W42, Level 3, and two deer molars, one each from N132W42, Level 8 and N132W44, Level 3.

Non-debitage lithics number only 7. These include a Morhiss type dart point from N41E10, Level 10 (Figure 3-17, c), a Refugio type dart point from N132W44, Level 6 (Figure 3-17, f), an Early Triangular dart point from Shovel Test 5, Level 4 (see Figure 3-17, b), three medial biface (dart point) fragments, one from Unit N132W42, Level 6 (see Figure 3-17, g), one from N41E10, Level 6 (a probable medial Angostura point fragment with biconvex cross-section and lateral edge grinding (see Figure 3-17, a), and one from N41E10, Level 11 (see Figure 3-17, d), a preform from BHT 13 (see Figure 3-17, e), and a purple quartzite hammerstone from N132W42, Level 10 (Figure 3-18).

Figure 3-16. Shovel Test 7 at 30-35 cm below surface. Note cobbles mixed with the sand-clay spoil; such inclusions may account for the random anomalies seen in the magnetometer survey.

The diagnostic items recovered suggest that the lithics represent occupations from terminal Paleo-Indian/earliest Archaic times (probable Angostura point), the Middle Archaic Period (Early Triangular point), and the Late Archaic Period (Morhiss point).

Modern artifacts number 19. These consist of 11 wire nails, 2 amorphous iron fragments, a piece of pipe tar, 2 brick fragments (Figure 3-19), 4 small glass fragments, and 3 toys (a ping-pong ball with a "happy face," a rubber alligator eraser, and a plastic bumble bee) (Figure 3-20).

Conclusions and Recommendations

Based on our findings, it is concluded that no significant archaeological deposits are present within the West Canal Bank Area. It is clear from the stratigraphy in the backhoe trenches, hand-dug units, and the shovel tests, that the area has been heavily disturbed by machine work. Virtually the entire upper and middle slope is capped with a layer of mixed sand and clay spoil. On the lower ground to the north, all sediments resting on the dark-colored, gleyed clay, interpreted as paleochannel fill, are heavily disturbed and consist of a mixture of sand and clay lumps along with inclusions of modern wood charcoal and partially burned wood. The occurrence of modern artifacts and burned wood at various depths supports the interpretation that these sediments, while containing debitage and a smattering of other prehistoric artifacts and faunal bones, are hopelessly mixed such that meaningful archaeological data cannot be recovered.

On the upper slope, the massive natural sand deposit underlying the surficial clay-sand spoil contains scattered lithic material and very sparse burned-clay nodules and faunal materials. The sparseness of cultural materials here strongly suggests that this area is at the margin of the site, and the absence of concentrated debris, discernable strata of cultural materials, and, insofar as our work could determine, intact features, strongly suggests that no significant archaeological data could be obtained by further excavation here.

Table 3-3. Sediments Recorded in Shovel Tests in the West Canal Bank Area at Buckeye Knoll.

Shovel Test	Depth (cm)	Sediment
1	0-50	Mixed Sand-Clay Spoil
	50-100+	Light-Gray Sand
2	0-50	Mixed Sand-Clay Spoil
	50-100+	Light-Gray Sand
3	0-75	Mixed Sand-Clay Spoil
	75-100+	Light-Gray Sand
4	0-50	Mixed Sand-Clay Spoil
	50-100+	Light-Gray Sand
5	0-40	Mixed Sand-Clay Spoil
	40-100+	Light-Gray Sand
6	0-50	Mixed Sand-Clay Spoil
	50-100+	Light-Gray Sand
7	0-80	Mixed Sand-Clay Spoil
	80-100+	Light-Gray Sand
8	0-55	Mixed Sand-Clay Spoil
	55-100+	Light-Gray Sand
9	0-50	Mixed Sand-Clay Spoil
	50-100+	Light-Gray Sand
10	0-90	Mixed Sand-Clay Spoil
	90-100+	Light-Gray Sand
11	0-30	Mixed Sand-Clay Spoil
	30-100+	Light-Gray Sand
12	0-95	Mixed Sand-Clay Spoil
	95-100+	Light-Gray Sand

It is also likely that the unconsolidated and very loose sand in this area has been subjected to considerable bioturbation (especially by pocket gophers, whose presence on the site was observed during our fieldwork), so that any meaningful associations which might once have been present are now lost. This inference is supported by the linear increase in the quantity (and mass) of lithic debitage recorded in N41E10 (see Table 3-2), a pattern that suggests time-dependent downward translocation of cultural artifacts.

Moreover, the absence of cultural materials in N41E10 below 110 cm suggests that our hand excavation did, in fact, reach the bottom of the culturally relevant deposits, suggesting that it is improbable that deeply buried materials are present in this area. In sum, all indications are that no significant archaeological deposits are present within the West Canal Bank Area. Thus, the proposed work on the canal should be able to proceed without concern for impacts on significant cultural resources within this area.

Work West of the Levee Road

Subsurface investigations west of the Levee Road involved two basic approaches. The first was excavation of a series of backhoe trenches around the margins of the core area of the site, as defined by the middens that Weinstein (1992) identified in his 1989 testing. The second was hand excavation of 32.5 2-by-2-m units. Most of these units fell into one of three areas of the site, namely, the Knoll Top Area, the West Slope Area and the East Midden Area. These are discussed below, along with a summary of the stratigraphy in each area and in the various backhoe trenches, on the basis of which stratigraphic correlations can be made across the site.

Backhoe Trenches

These trenches were given BHT numbers in the order that they were excavated. While the numbering of the trenches starts with BHT 18 and ends with BHT 56, for a total of 39 numbered trenches, number 46 was designated but not excavated, so that, in fact, only 38 backhoe trenches were dug west of the Levee Road. The locations of these trenches are shown in Figure 3-21.

Trenches were all approximately four meters in length and 80 cm wide. Depths varied according to how deep excavation needed to be in order to identify the nature and thickness of culturally relevant sediments. All were excavated in approximately 25-30-

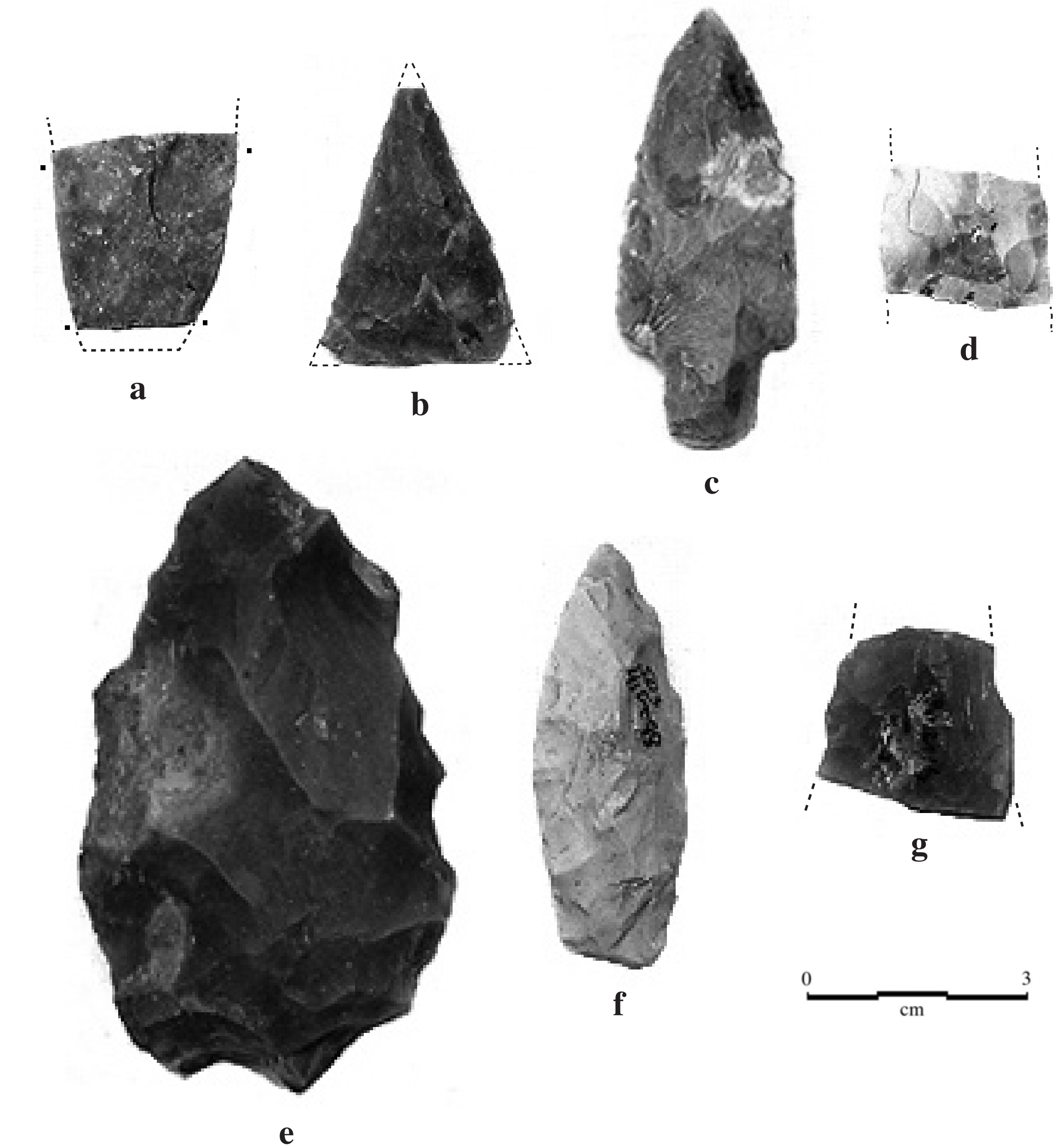


Figure 3-17. Flaked chert artifacts, West Canal Bank Area: a, medial fragment of a probable Angostura point from Unit N41E10, Level 6 (dots indicate extent of heavy edge grinding; b, Early Triangular point from Shovel Test 5, Level 4; c, Morhiss point from Unit N41E10, Level 10; d, medial point fragment from Unit N41E10, Level 11; e, preform from BHT 13; f, Refugio point from Unit N132W44, Level 6; g, medial biface fragment (probably a dart point) from Unit N132W42, Level 6.

cm increments, and a 5-gallon bucket of excavated sediment from each level was water screened through 1/8-inch hardware cloth mesh as a check against the presence/absence and relative quantity of cultural material. One of the long (lengthwise) walls of each trench was recorded by scale drawings and digital and color- slide photographs.

For the most part, trenches in proximity to one another yielded similar results and stratigraphies, in accord with localized changes in natural and artificial sediment deposits across the site. For this reason, it is unnecessary to describe each trench individually. In order to provide an adequate descriptive summary, trenches with similar stratigraphy are described below by groupings.

Figure 3-18. Purple quartzite hammerstone, N132W42, Level 10.

Figure 3-19. Modern brick fragment, N132W44, Level 3.

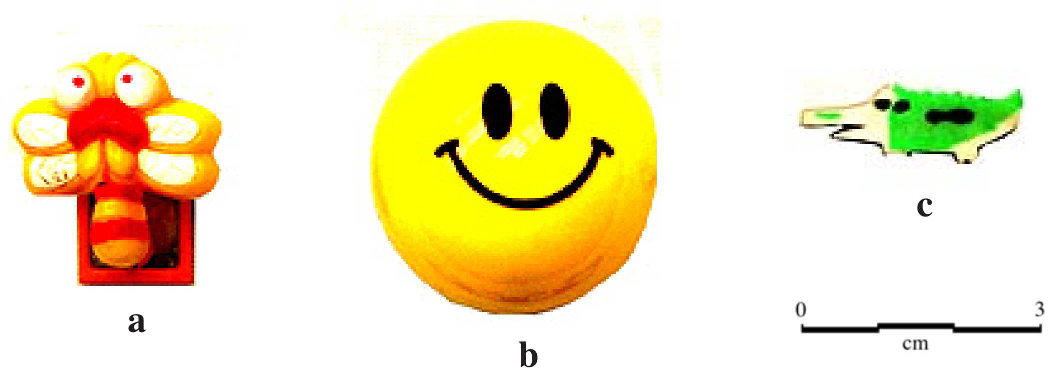


Figure 3-20. Modern toys found in spoil deposits in Units N132W42 (a-b) and N132W44 (c): a, plastic bumble bee pin; b, ping-pong ball with "smiley face;" c, rubber alligator eraser.

BHTs 18-29

This group of 12 trenches was located between the Levee Road and the highest ground on the site atop the West Knoll. Prior to construction of the levee, this area of the site was a north-facing slope. All 12 trenches showed a massive sand deposit, the upper part of which was disturbed and mixed with clay spoil. As discussed further on in the geoarchaeological section of this report, the natural sand in this area of the site is late Pleistocene alluvium, part of a Deweyville terrace remnant, the upper portion of which contains artifacts and was reworked during the Holocene.

Trenches at higher elevations contained sparse to moderate amounts of chert debitage. Occasional pieces of modern debris (glass, metal) were found in the upper, disturbed levels. The color of the natural sand was a dark brown (10YR 3/3) in the upper 40-50 cm and graded to a lighter brown (10YR 4/3-5/3) with depth. This is interpreted to reflect the development of an A-horizon soil in the upper part of the sand.

BHTs 30-31, 34-35, 38-39

These trenches were located on the lower aspect of the north slope of the western knoll. They contained an artificial spoil deposit consisting of a mix of gravel and clay. The gravel consisted of small clasts of chert and caliche, generally pea- to golf ball-sized, while the clays varied in color from black (10YR 2/1 to dark gray (10YR 4/1). Although trenches were generally dug to 140-145 cm depths, the bottom of the spoil deposit was not reached. The spoil was not screened for artifacts due to its obviously modern origin.

BHT 32

This trench was unique in that it had a stratigraphic profile showing both Holocene silty sand and underlying late Pleistocene Deweyville terrace sediments (Figure 3-22). The Holocene sand was stratified, with a dark grayish brown (10YR 3/2) A horizon in the top 40-50 cm that graded to a yellowish brown (10YR 5/6) silty clay. Sparse chert debitage was found in these sands. These deposits rested unconformably on a very pale brown (10YR 7/3) sand with abundant caliche nodules. This in turn rested on a light yellowish brown (10YR 6/4) medium sand that, based on its elevation and similarity in color and texture to other OSL-dated sands elsewhere on the site, is interpreted to represent the Deweyville alluvial terrace remnant mentioned above.

The stratigraphy in this trench is interpreted to bracket several tens of millennia. The remnant Deweyville terrace (which may include the pale brown sand and caliche stratum), perhaps 50,000 years old, was later beveled off by slope erosion, after which Holocene sands were deposited, probably by, both colluvial and eolian processes.

BHTs 36 and 40-43

All of the trenches in this group contained intact sand deposits. The top 40-60 cm was darker in color

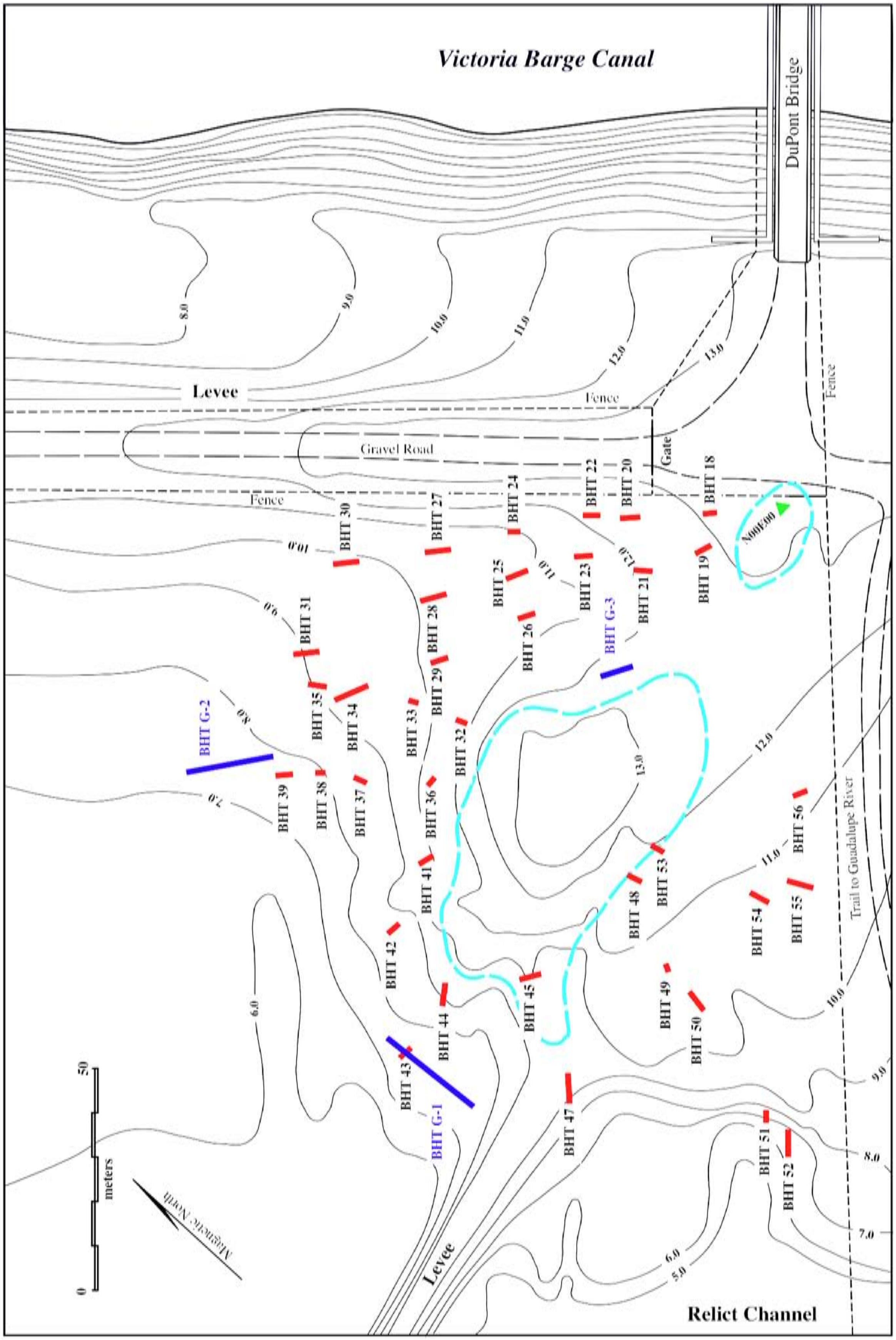


Figure 3-21. Map of the Buckeye Knoll site showing locations of backhoe trenches west of the levee road.

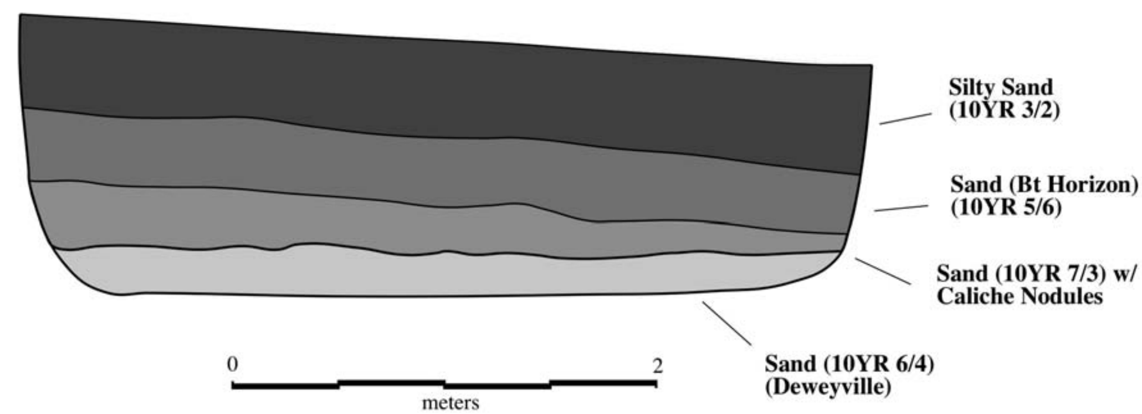


Figure 3-22. Drawing of the profile of the west wall of BHT 32 showing silty-sand Holocene deposit capping earlier deposits with probable Deweyville sand at the bottom of the trench.

than the lower levels in all trenches. In Trenches 36 and 40, those at the highest elevations (nearest the top of the West Knoll), this upper zone was very dark grayish brown in color (10YR 3/2) and contained chert debitage. This dark (organically enriched) sand can be considered part of the knoll-top midden area, and indeed these two trenches are near the margins of the midden as defined by Weinstein (1992; and shown herein in Figure 1-3). A similar stratigraphy was observed in Trenches 41 and 42, downslope from Trench 40. There, the upper 25-30 cm was a very dark grayish brown (10YR 3/2) sand that graded to grayish brown toward the bottom of BHT 41 (150 cm below the surface) and to dark grayish brown (10YR 4/2) in Trench 42. Chert debitage was found in all levels of Trenches 41 and 42.

BHTs 44 and 45

The content of these trenches are distinguished from the previous group by a higher density of cultural materials. In BHT 44, a very dark grayish brown (10YR 3/2) silty sand was found to a depth of approximately 60 cm (Figure 3-23). Chert debitage was present throughout, and two deer teeth fragments were found between 30 and 60 cm. A Pedernales dart point was found near the bottom of this zone. Below 60 cm, color graded to dark grayish brown (10YR 4/2) sand and to a gray sand from about 90 cm to the bottom of the trench at 150 cm below the surface. A Tortugas dart point was found between 60 and 90 cm, and debitage was found in the basal level (90-150 cm).

BHT 45 was excavated only to a depth of 80 cm, at which point numerous pieces of lithic debitage, faunal bone fragments and burned-clay nodules had been recovered by screening. At the 80-cm level, a particularly high density of cultural debris was noted; this material included numerous chert flakes, burned-clay nodules, faunal bone fragments, and scattered *Rangia cuneata* shells. The abundance of these materials suggested that further investigation through hand excavation was advisable, as opposed to continuation of the relatively imprecise backhoe work. The subsequent hand excavation, placed at the north (upslope) end of BHT 45, revealed an important, intact stratified deposit. Ultimately, six contiguous 2-by-2-m hand-excavated units, designated the West Slope Excavation, were opened here.

BHT 47

This trench was situated close to the base of the west slope of the West Knoll. At seven meters long, this was the longest of these backhoe trenches. The top 30 cm consisted of a layer of yellow (10YR 7/7-7/8) artificial sand spoil (Figure 3-24). Beneath this, between 30 and 90 cm below the surface, was an intact black (10YR 2/1) silty sand midden containing abundant debitage, faunal bone fragments, and burned-clay nodules. The relative abundance of rangia shells noted in BHT 45 was not present here. Below 90 cm, cultural materials were still fairly abundant, but the color lightened slightly to very dark grayish brown (10YR 3/2). Below the silty sand was pale brown sand (10YR

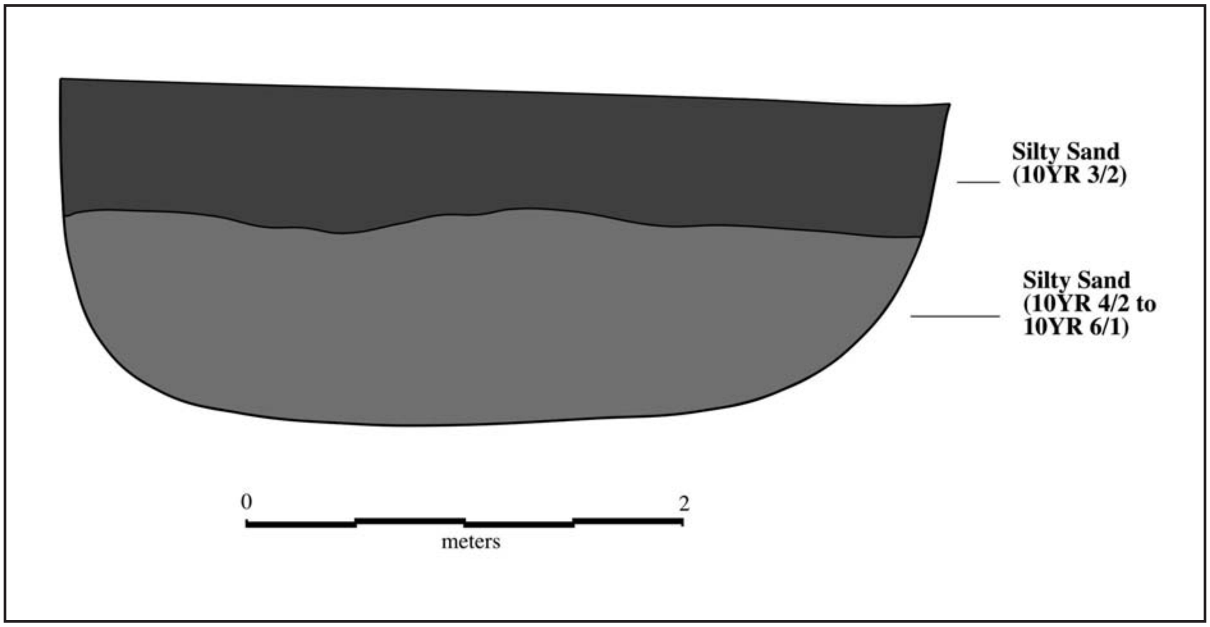


Figure 3-23. Drawing of the profile of the south wall of BHT 44. Note dark A horizon developed in the upper part of the Holocene sand deposit.

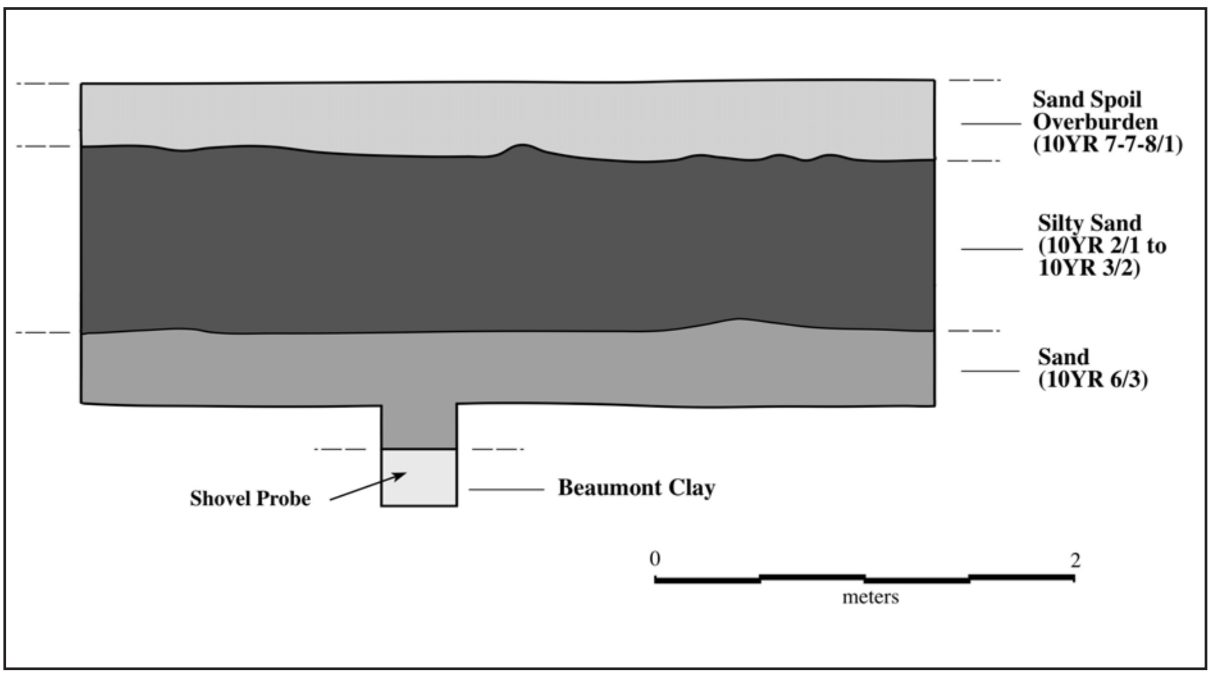


Figure 3-24. Drawing of the south wall profile of BHT 47. Note that the shovel probe reaches the surface of the basal Beaumont Formation clay.

6/3). Due to safety concerns, the trench excavation was terminated at 150 cm. From this depth, however, a 30-cm-wide shovel probe was excavated to the basal clay of the Beaumont Formation, which was reached at 175 cm below the surface.

BHT 47 was longer than other trenches so that the profile of the midden deposit relative to the slope, which dropped sharply at this point toward the nearby Guadalupe River floodplain (see Figure 3-21), could be defined. The midden appeared to dip

Figure 3-25. West wall of BHT 55 showing laminated sandy spoil sediment deposit throughout the trench. Similar spoil was encountered in other backhoe trenches in this area south of the West Knoll Slope.

downslope, parallel to the ground surface, suggesting that the relatively precipitous drop-off here is a natural terrace-edge configuration rather than the artificial product of modern machine activity. However, as noted shortly, the massive deposit of sand spoil to the south of BHT 47 (of which the yellow sand at the top of the trench is the thinned-out margin) produced an artificial leveling effect that creates the false impression of a terrace edge on what was originally a more gradually sloping surface.

BHTs 48 and 53

These trenches were located at the base of the West Knoll. BHT 48 contained natural, dark brown Holocene silty sand, but was obviously heavily disturbed, with scattered clumps of intrusive gray and orange clay that are interpreted to represent mixing of the original soil with modern clay spoil. BHT 53, on the other hand, revealed undisturbed silty sand midden soil containing chert debitage, burned-clay nodules and faunal bone fragments. The color throughout was very dark gray to dark grayish brown (10YR 3/2-3/2) to the bottom of the trench at 120 cm below the surface.

BHTs 49-52, 54-56

These trenches all have in common the fact that they revealed a massive, extensive deposit of modern spoil that covered that part of the site from the base of the West Knoll to the scarp that bounded the eastern edge of the Guadalupe River floodplain. The spoil consisted of innumerable lenses of sand of varying colors but mostly shades of yellowish brown to light brown, interspersed with scattered lumps of gray and orange clay (Figure 3-25). The thin lensing of the sand suggests deposition in a fluid state, probably the result of pumping water-saturated sediment from the Barge Canal. Generally, these trenches were excavated to depths of 140-150 cm.

In an attempt to determine the thickness of the spoil deposit, BHT 56 was excavated to a depth of 320 cm. However, the base of the spoil was not reached at this depth. This strongly suggests that the gradually sloping, terrace-like topography southwest of the West Knoll is artificial, and that the original topography showed a somewhat steeper slope down to the margin of the floodplain. Given that the spoil continued up to, and doubtless beyond, the fence line along the south side of the site, it is probable that the terrace-like lobe of ground in this area consists of modern spoil.

Because the trenching did not penetrate the spoil deposit, the nature of the underlying sediments must remain conjectural. However, the presence of organically enriched, silty-sand midden soil at the northern margins of the spoil area (i.e., in BHTs 47 and 53), as well as black, silty sand containing rangia shells and scattered artifacts observed at the base of the scarp at the edge of the floodplain, suggests that a continuous midden deposit may underlie the spoil sediments. If this is assumed to be the case, then the midden area as originally defined should be extended to the south and west to cover the original valley wall slope from the West Knoll down to the Guadalupe River floodplain.

Hand-Excavated 2-by-2-m Units

As mentioned previously, hand-excavated units were loosely grouped into three areas west of the Levee Road, namely, the East Area, the Knoll Top Area and the West Slope Area (see Figure 3-1). In some cases, excavations were undertaken with the goal of better defining the cultural and depositional sequences in midden areas defined by Weinstein (1992) and identified by him as of particular potential significance. In other cases, excavation was deemed appropriate due to potential significance suggested by findings in nearby backhoe trenches dug in the early stage of our 2000-01 field work (a phased approach called for by the Corps of Engineer's scope of work and our data-recovery plan).

All units measured 2-by-2 m and were incorporated into the site grid established by Weinstein in his 1989 testing. This grid was relocated based on two permanent datum points placed on the site in 1989; these consisted of small stainless steel disks bearing stamped grid coordinates that were welded to metal loops set into concrete at grid points N00E00 and N00W40. Once these were relocated, a set of grid lines was laid out across the site using a transit and metric tapes, with coordinates marked at 10-m intervals with wooden stakes.

Units in the Knoll Top Area were subdivided during excavation into 1-m-square quadrants, and all soil matrix and materials excavated within each quadrant and each 10-cm level were provenienced accordingly. This yielded a higher resolution on the horizontal distributions of the various classes of cultural debris than would be possible within the 2-m grid units, the goal being to eventually map distributional patterns and check for patterned correlations between debris classes and/or features.

Basic procedures were followed consistently in the excavation of all hand-dug units. First, with specific exceptions mentioned below, excavation was done with small hand tools (pointed trowels and brushes). Excavation was in 10-cm arbitrary levels. Where arbitrary levels crosscut discernible strata, soil/sediment was separated according to strata and processed and labeled accordingly. Third, all soil was transported in 5-gallon buckets to be water screened through 1/8-inch-mesh hardware cloth; the water-screen operation was located about 1 km north of the site at the DuPont (now Invista, Inc.) cooling pumps near the bank of the Guadalupe River. Unit and level proveniences were maintained throughout the screening process by tying pieces of surveyor's flagging tape onto bucket handles and placing a second piece of tape into the soil in the bucket. Provenience information was written onto each piece of tape using indelible black markers; this information included site trinomial, unit number, unit level, unit-level quadrant in the case of the Knoll Top Excavation, date, and initials of the person(s) who carried out the excavation. Upon completion of the screening of a unit level, recovered materials were placed on drying screens; once dry, they were put in labeled polyethylene Ziploc bags, along with the labeled flagging tapes, for transportation to the laboratory.

A five-gallon bucket of matrix was extracted for each 10-cm level in each unit for fine water screening (through 1/16-inch hardware cloth). All screened materials were collected from the screens, again placed in polyethylene zip-loc bags with outside labels and inside tags with provenience data, and transported to the laboratory.

Each 10-cm level in each unit was documented on printed unit-level forms, which included a scale map on which unique artifacts, features, and larger faunal bone fragments were plotted. Where appropriate, digital and color-slide photographs were taken of unit floors, and all completed unit walls. A five-gallon soil sample was bagged for laboratory flotation from each unit level.

Unique artifacts (e.g., tools, projectile points, potsherds, etc.) were designated by field specimen numbers assigned in the order that finds were made. These items were placed in separate polyethylene zip-loc bags with provenience labeling, and recorded in a log for unique field specimens. The location and unique number of each item were recorded on the unit-level form, including precise plotting of location on the unit-level map on the form when the specimen was recovered in situ.

Features were documented on forms prepared for that purpose, and photographed with digital and color-slide photographs. Samples of soil matrix associated with features were taken for flotation in the laboratory.

The nature of the deposits and the stratigraphy found in the various hand excavations are discussed, according to areas, below. The exceptions are Units S40W66 and S12W60. The deposits in both these units were sufficiently disturbed and mixed with modern spoil that they do not contribute to our understanding of site stratigraphy or cultural chronology. However, the artifactual findings made in these units, though from disturbed contexts, will be described in a subsequent chapter along with materials from other excavations.

East Midden Units

A total of seven 2-by-2-m units were excavated in this area. As may be seen in Figure 3-26, only three of these units were actually within the area of possible midden originally designated by Weinstein. However, because all seven units were clustered at the eastern end of the project area (just west of the Levee Road on the spine of the topographic promontory on which the site is located), they are reasonably grouped together. The units within the defined midden area are S6W4, S6W12, and S4W12. To the southwest of the midden are S18W18 and S20W20. To the northwest of the midden are N6W22 and N8W32. Each of these groupings represents a subcluster of units with distinct stratigraphic profiles. The stratigraphies are briefly described in the paragraphs below.

Units S06W04, S06W12, and S04W12

Basically, the same stratigraphy was found in these three units, in which a sequence of Holocene silty sands lay unconformably on the eroded surface of the Pleistocene Beaumont Formation (Figures 3-27 and 3-28). These units present an intact stratigraphic sequence except for a localized disturbance from a pipeline excavation in the east half of S6W4. Four strata or zones were defined in the Holocene sediments.

Zone 1 consisted of a Dark gray (10YR 4/1) fine to medium sand and silt. This zone was some 25-35 cm thick. It contained a moderate density of chert debitage and faunal bone fragments.

Zone 2 was a very dark gray (10YR 3/1) silty fine-sand midden, organically enriched with abundant chert debitage, faunal bone and burned-clay nodules. Unstemmed triangular and subtriangular dart points suggest a Middle to Late Archaic age. This zone, which was some 40-60 cm thick, graded into underlying Zone 3. Numerous subparallel clay-silt lamellae, some 5-10 mm thick, were observed in the lower part of Zone 2 (see Figures 3-27 and 3-28). It is this dark, organically enriched zone that was the basis for Weinstein's (1991, 1992) suggestion that this contained a discrete midden.

Zone 3 was a dark grayish brown (10YR 4/2) silty fin sand, with clay/silt lamellae in the upper part that grades from overlying Zone 2. Thickness was 60-70 cm. Zone contained abundant cultural debris in the form of lithic debitage, occasional flaked-stone artifacts and faunal bone.

Zone 4 consisted of a thin zone, only some 5-10 cm thick, of dark yellowish brown (10YR 4/4) clayey sand. This lies immediately on the weathered Beaumont surface.

Units S18W18 and S20W20

These units are clearly outside the midden area defined by Weinstein. The dark-colored, organically enriched soil of Zone 2 in the three units just described is absent. Rather, the stratigraphy here consists of a thick deposit of sand or slightly silty sand, dark grayish brown (10YR 4/2) in color, extending from the surface to a depth of some 90-100 cm (Figures 3-29 to 3-30). The upper 30-40 cm of this deposit, designated Zone 1, is disturbed and contains scattered lumps of gray and orange clay spoil material. The fact that most of the sediment in the disturbed zone contains Late Prehistoric artifacts (lithics, ceramics), and is the same texture and color as that beneath (Zone 2), suggests that the disturbance took the form of mixing of some spoil material with the original upper part of the silty sand. Middle Archaic diagnostics were recovered from Zone 2, the lower and undisturbed part of this deposit.

Zone 3 was a very dark gray to very dark grayish brown (10YR 3/1-3/2) stratum of silty sand some 12-25 cm thick. This contained moderately abundant lithic debitage and fragments of broken lanceolate dart

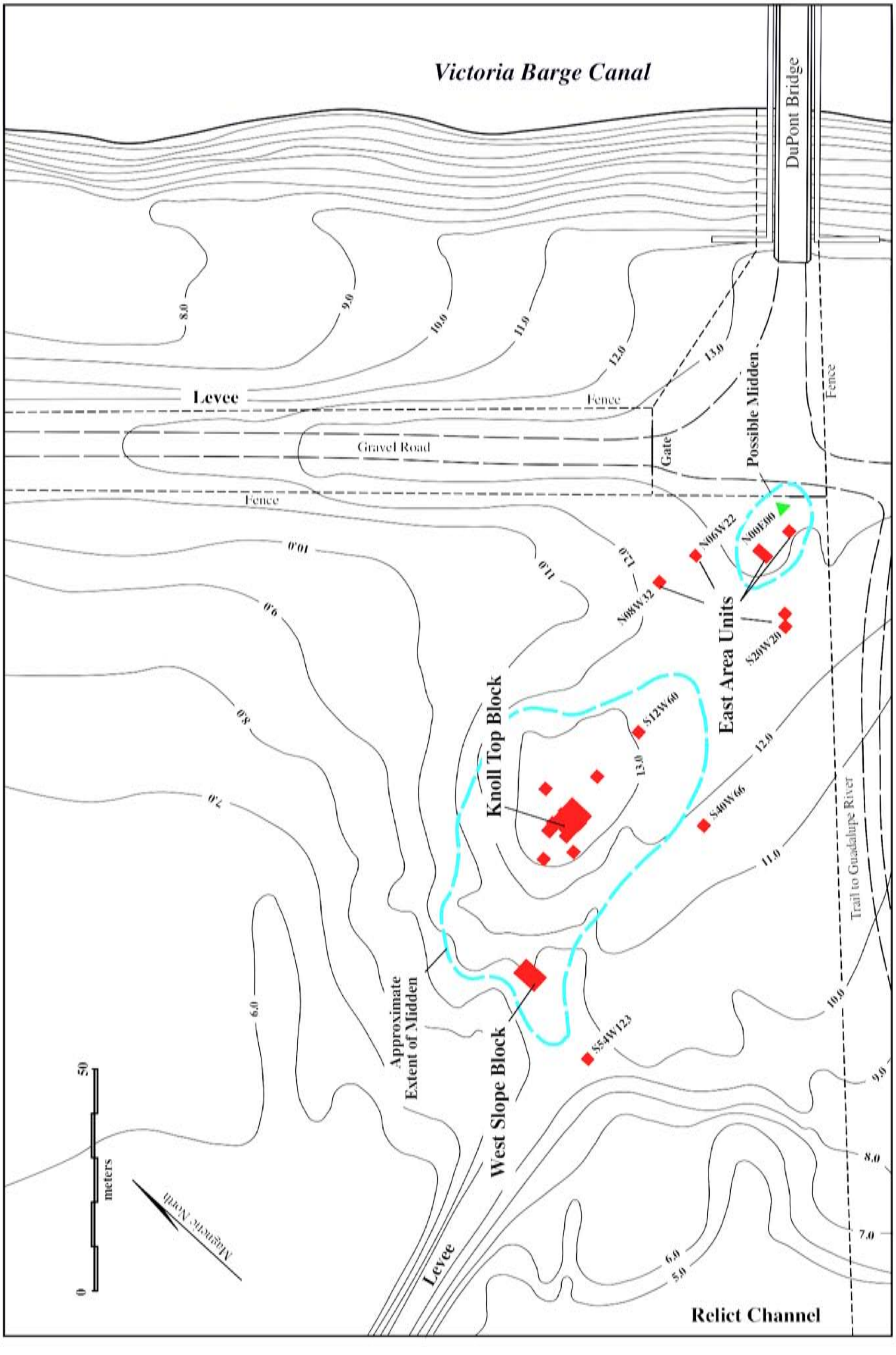


Figure 3-26. Map of the Buckeye Knoll site showing the locations of hand-dug units excavated west of the levee road.

Figure 3-27. West wall of 2-by-2-m Unit S06W12 in the East Midden Area. Note the relatively light-colored Zone 1 at top, overlying darker Zone 2 (midden), as well as silt-clay lamellae in Zone 2 and underlying lighter-colored Zone 3.

points with bifacial parallel pressure flaking representing a Late Paleo-Indian period occupation. Zone 4 was a very thin (5 cm or less), lighter-brown clayey-sand sediment that separated Zone 3 from the basal clay of the Beaumont Formation.

Units N06W22 and N08W32

These two units produced similar stratigraphies that are quite distinct from the units just described above. Basically, the entire Holocene deposit here consisted of fine-medium sand, with little silt, that tended to slump readily when dry. The top 10-15 cm of the sand was a weakly developed A horizon, dark grayish brown (10YR 4/2) in color; this was designated Zone 1 (Figure 3-31). The underlying sand, Zone 2, was much thicker and of a much lighter color, light brownish gray (10YR 6/2). Zone 2 thickened downslope, so that it was 30-65 cm thick in N6W22, increasing to a thickness of 70-100 cm in N8W32.

Zone 3 was a very thin (<5 cm thick) layer of dark reddish brown (5YR 2.5/2) clayey sand. This is similar to Zone 4 in S6W12 and other units within the midden area, though the slightly more reddish color suggests greater oxidation and/or high iron content. Although artifacts were found in Zone 3, they appeared to be embedded in its surface and probably originated from overlying Zone 2. Immediately beneath Zone 3 was the undulating, eroded surface of the Beaumont Formation.

Lithic artifacts were fairly abundant in Zone 2. These consist of chert debitage, tool fragments and projectile points. The points are mainly of Late Archaic types and include Ensor, Kent and Pedernales. Zone 1 and the upper 20 cm of Zone 2 produced scattered Late Prehistoric materials, including several small fragments of Rockport ware pottery and a Perdiz arrow point. Faunal bone was sparsely represented in the top 20-30 cm of the sand but was nearly absent at lower levels, probably due to decay.

Summation of Stratigraphy

The seven 2-by-2-m units excavated in and near the East Midden provide, in combination, a variable but coherent stratigraphic picture. In the midden area proper,

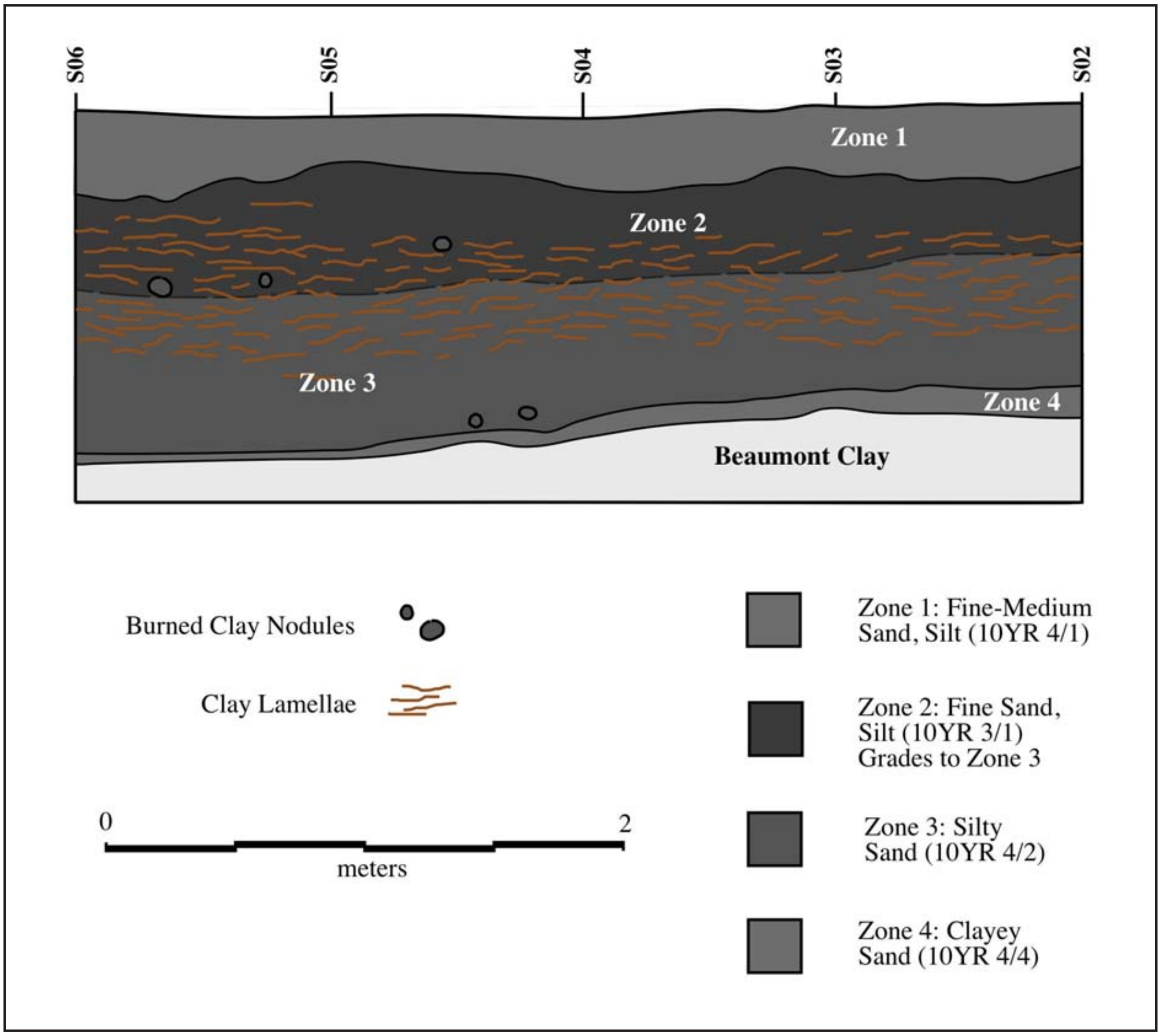


Figure 3-28. Drawing of the west wall of Units S06W12 and S04W12 in the East Midden Area.

Units S6W4, S6W12 and S4W12 show a stratigraphic profile in which a dark-colored, organically enriched midden soil (Zone 2) essentially "floats" within Holocene silty sand. The dark color of the midden probably represents particularly high organic input associated with relatively intensive human occupation during the Middle to Late Archaic. As will be seen further on, this is the same general time period represented by the larger midden on the West Knoll. The silt-clay lamellae found in the lower part of the Zone 2 midden and the upper part of Zone 3 represent illuviation of finer sediment particles. The relatively high silt-clay content may, in fact, represent anthrogenic introduction associated with intensive human occupation, a point discussed in greater detail in the geoarchaeological section of this report (Appendix A).

To the south, in Units S18W18 and S20W20, the Zone 2 midden is absent, and the deposit there is, largely, a moderately dark, fine sand with a minor silt component. Materials of Late Prehistoric age were found in the upper levels, while Archaic materials were found in the lower part of Zone 2. The Zone 3 stratum there is sand with a good deal of silt and some clay and is markedly darker in color than the overlying sand. Paleo-Indian diagnostics were found in this zone.

The northernmost units in this group, N6W22 and N8W32, contained a nearly pure fine-to-medium sand containing Late Prehistoric and Archaic materials. This probably represents a reworking of the Pleistocene alluvial sands of the Deweyville terrace that underlies Holocene deposits farther downslope.

Figure 3-29. North wall of 2-by-2-m Unit S20W20 in the East Area. Dashed line marks the base of disturbed Zone 1.

In sum, the stratigraphy in the East Midden Area is, in the grossest sense, a Holocene veneer, over a meter thick, lying on the Beaumont erosional remnant that forms the geologic core of the Buckeye Knoll site. A long cultural sequence is represented, with the greatest intensity of occupation during the Archaic period taking place within the confines of the midden area proper along the highest spine of the promontory. The Paleo-Indian materials found in S18W18 and S20W20 may be in primary context within Zone 3 or may have been transported by colluvial slope wash from the higher ground a few meters to the north. In the latter case, the distance of transport was short.

Units on the West Slope of the Knoll

A total of seven 2-by-2-m units were excavated of the site in and adjacent to the western margin of the main midden area (see Figure 3-26). Six of these were contiguous, forming a rectangular excavation measuring four by six meters, designated the West Slope Block Excavation (see Figure 3-1). This block was placed, as mentioned above, at the east end of BHT 45, which produced evidence of a particularly dense midden deposit. The seventh 2-by-2-m unit, S54W123, was located farther downslope, close to the scarp that drops directly to the floodplain and immediately next to the south wall of BHT 47 that also exposed a productive midden deposit.

West Slope Block Excavation

Six contiguous 2-by-2-m units were excavated on the West Slope. These included S33W118, S33W116, S31W118, S31W116, S29W118 and S29W116 (see Figures 3-26, and 3-32 to 3-33). Because the bottom of the culturally relevant deposits extended below the safety limit of 1.5 m, a 2-by-2-m excavation centered on grid point S33W116 was extended down to the surface of the Beaumont clay; this was designated Unit S32W117 according to the grid coordinate of the unit's southwest corner.

Four distinct stratigraphic zones were identified in the West-Slope Block (Figures 3-34 to 3-35). Zone 1 was a silty fine sand, dark gray (10YR 4/1) in color. This zone contained moderately dense cultural material with diagnostic projectile points of Late Archaic types. A small number of potsherds and an arrow point fragment indicate that the upper part of

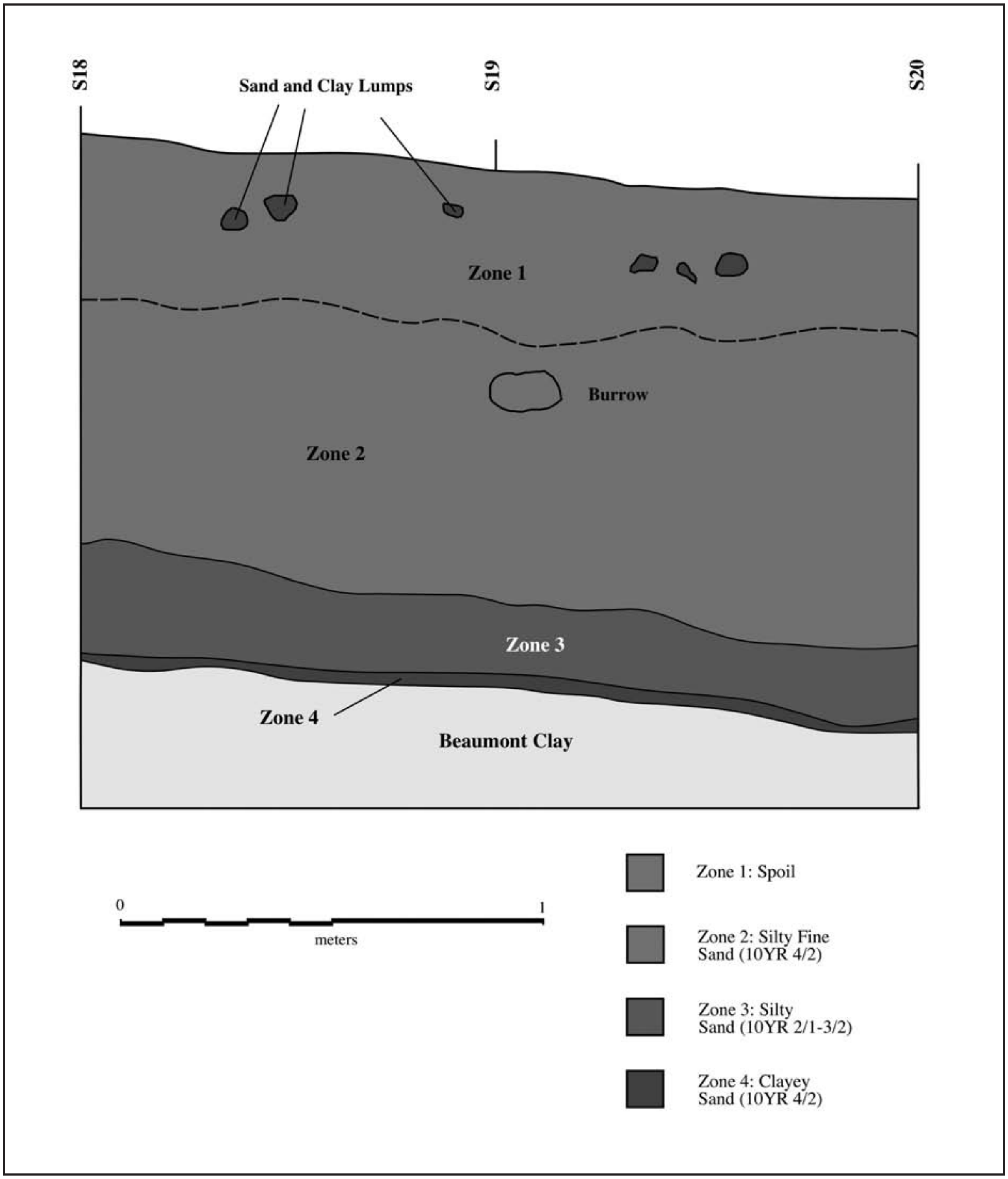


Figure 3-30. Drawing of the east wall of 2-by-2-m Unit S20W20.

Zone 1 contains debris from the Late Prehistoric period. The thickness of Zone 1 varied considerably, in part due to dipping of underlying Zones 3 and 4 toward the north. A southward dipping of the ground surface is the result of partial removal of the original surface associated with a nearby old bulldozer cut that removed some of Zone 1 in the southeast corner of the West Slope Block (see Figure 3-35). Nonetheless, it is apparent that Zone 1 deepened and thickened toward the north where it filled the mentioned dip in the underlying zones. The maximum thickness of Zone 1 at this point was 130 cm. At the south end of the block, maximum thickness was 45-50 cm. An optically stimulated luminescence (OSL)

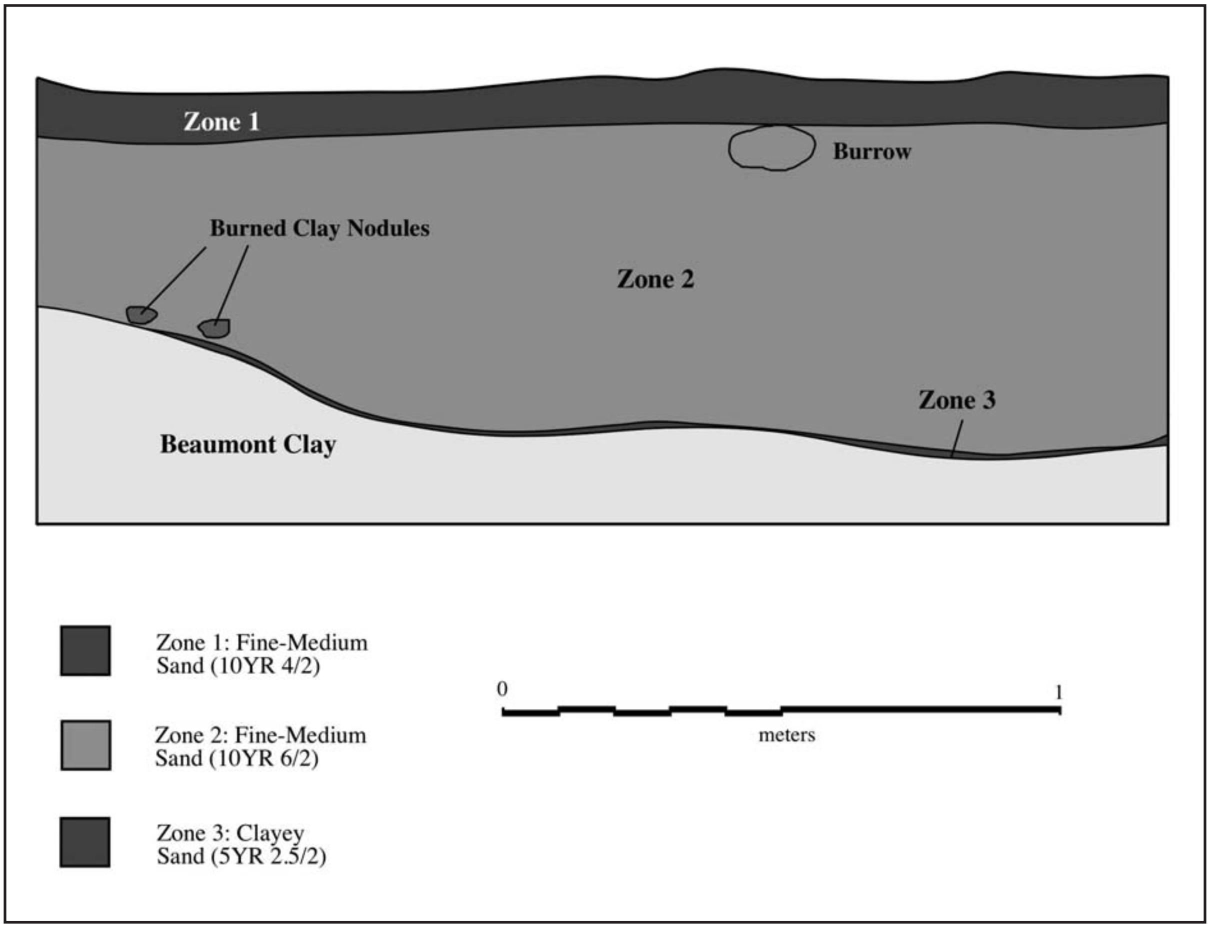


Figure 3-31. Drawing of the north wall of 2-by-2-m Unit N06W22. Note the undulating and sloping surface of the basal Beaumont Formation clay.

date on sand from the bottom third of Zone 1 has an age of 2400 years B.P.

Zone 2 was a black to very dark gray (10YR 2/1-3/1) midden soil containing a profusion of prehistoric stone and bone tools, and anthrogenic debris, including lithic debitage, faunal bone, burned-clay nodules and shell (*Rangia cuneata*, oyster, freshwater mussel). The thickness was generally between 30 and 60 cm. Diagnostic projectile point types included Morhiss, Pedernales, Bulverde and Refugio, suggesting a late-Middle to early-Late Archaic time period. This zone also contained several small hearth features. A single isolated burial (Burial No. 30) was found at the base of Zone 2; this individual was extended with the head toward the southeast. Two OSL dates on sand from this zone are 3690 and 3610 B.P.

Zone 3 was a dark grayish brown (10Y R4/2) silty sand containing abundant cultural material, including debitage, lithic tools, faunal bone, and burned-clay nodules. Diagnostic projectile points were of only three types: Early Triangular, Refugio and Andice. Two hearth features were found in the upper part of this zone. Two OSL dates on Zone 3 sand bracket its age between ca. 4500 and 6000 B.P.

Zone 4 was a yellowish brown to pale brown (10YR 5/4-6/3) fine-to-medium sand with only sparse cultural material. It rested on the undulating eroded surface of the Beaumont Formation clay. The relatively sparse cultural material recovered from Zone 4 is intrusive from above, as indicated by optically stimulated luminescence (OSL) dates on the sand of 39,900 and 49,900 B.P. These place deposition of the sand in the late Pleistocene. Thus, Zone 4 is interpreted to be part of a Deweyville alluvial terrace inset against the Beaumont-clay valley wall.

Unit S54W123

This isolated 2-by-2-m unit was, as already noted, excavated immediately adjacent to the southeast wall of BHT 47 (see Figures 3-21 and 3-26). The top stra-

Figure 3-32. Overview of the main excavation block in the West Slope Area, looking south.

Figure 3-33. View of the West Slope Block Excavation, looking southeast. Units S29W116 and S29W118 are in the early stages of excavation in the foreground.

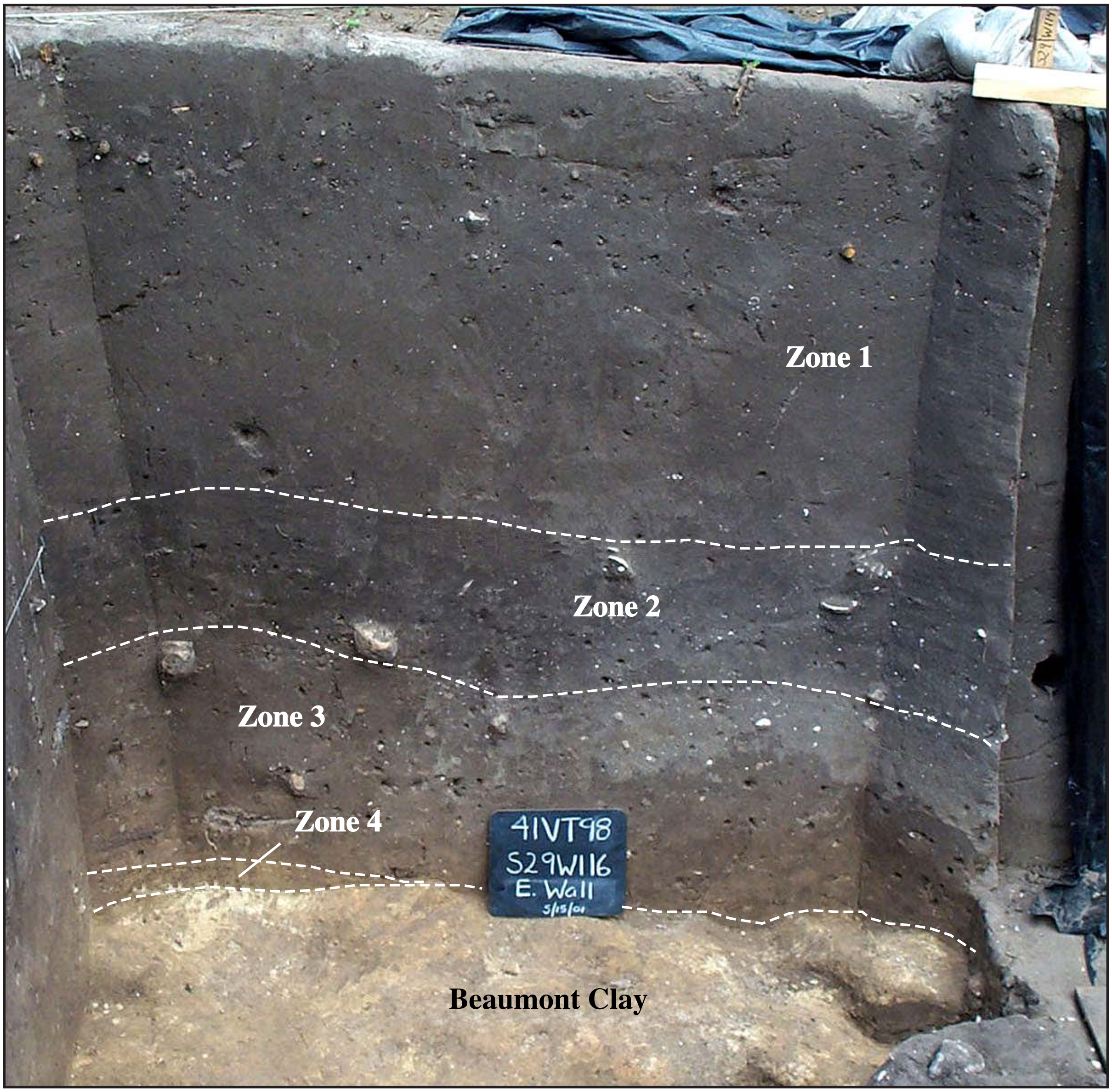


Figure 3-34. East wall of 2-by-2-m Unit S29W116 with strata delineated by white dashed lines. Note the undulating, eroded surface of the basal Beaumont Formation clay.

tum consisted of the same yellow sand spoil observed in the trench. Beneath this, the stratigraphy was similar to that in the West Slope Block, as may be seen in Figures 3-36 to 3-37.

Due to high water table and resultant water saturation of the lowermost stratum (Zone 3) at the time of excavation, work in this unit did not reach the basal Beaumont clay. However, judging from the results in nearby BHT 47, the excavation came within approximately 20 cm of the clay surface.

Cultural materials were found throughout the excavation levels beneath the spoil overburden, and were most abundant in Zone 2, an organically enriched, black midden zone that contained abundant debitage, burned-clay nodules and faunal bone. In terms of color, texture, thickness and most kinds of cultural debris, this stratum was analogous to Zone 2 in the West Slope Block. However, the relatively abundant estuarine bivalve shells (oyster, rangia) found in the latter area were absent in S54W123.

The Knoll Top Excavations

A total of 16.5 2-by-2-m units were excavated on the top of the knoll (see Figure 3-26). Twelve and one-half of these formed a block of contiguous units with a maximum north-south dimension of six meters (between grid lines S10 and S16) and a maximum east-west dimension of 10 meters (between grid lines W80 and W90) (Figures 3-38 to 3-39). Additionally, 40-cm-wide extensions were made on the north and south walls of Units S12W88 and S12W90 (in the northwest corner of the block) to clean unit walls that, despite protective covering, had slumped due to water saturation associated with torrential rains and hurricane-force winds that hit the area on May 5, 2001 (locally, this storm generated 11 inches of rain and tornadoes).

The four remaining 2-by-2-m units were basically outliers of the block; these were Units S12W74, S6W84, S16W96 and S20W90 (again, with unit designations based on the grid coordinate at the southwest corner of each unit). This arrangement is shown in Figure 3-39.

Weinstein's 1989 testing included hand excavation of a single 1-by-1-m test unit on the top of the knoll at grid coordinate S14W81 (see Weinstein 1992).[2] Weinstein identified a stratigraphy identical to that documented in the 2000-01 excavations, including a black, organically enriched midden zone that contained abundant cultural debris. Based on his findings, Weinstein concluded that the Knoll Top Area had very significant archaeological potential and, on this basis, this area was targeted for relatively intensive investigation in 2000-01.

Our initial work on the Knoll Top involved excavation of a 2-by-2-m unit at grid coordinate S12W82 (as with all of the 2000-2001 units, the unit designation was based on the grid coordinate at the southwest corner). It was immediately apparent that the stratigraphy here was essentially the same as that identified by Weinstein.

The Knoll Top strata comprised, in the aggregate, some 1.5 to 2 m of sediments spanning at least 9,000 years of prehistoric human occupation. The stratigraphic zones on the Knoll Top (Figures 3-40 to 3-42) are summarized in the following paragraphs.

Zone 1 generally ranged between 50 and 70 cm thick, this consisted of dark gray (10YR 4/1) silty sand containing scattered cultural materials. Occasional round and square-cut nails and plain whiteware ceramic sherds suggest that one or more insubstantial structures may have existed here in the late nineteenth to early twentieth centuries; no evidence was found of more permanent structures and the sporadic occurrence of these materials suggests only occasional use of the Knoll Top during this late historic period. Aboriginal materials in Zone 1 consisted of scattered chert debitage and faunal bone fragments. These tended to be more abundant toward the bottom of the stratum and probably represent upward displacement of material from Zone 2.

For the most part, Zone 1A was a very thin (5 cm or fewer) lens of dark grayish brown to pale brown (10YR 5/1-7/2) fine sand at the base of Zone 1 resting on the surface of Zone 2. Where the top of Zone 2 dipped downward, Zone 1A was considerably thicker, having the appearance of a natural fill in low spots on the Zone 2 surface (see Figure 3-41). In these areas, sporadic lenses of dark gray silty fine sand were present; these were included within Zone 1A. Overall, Zone 1A appears to represent eolian and possibly colluvial infilling of low spots in the Zone 2 surface.

Zone 2 was a silty fine-sand midden, black to very dark gray in color (10YR2/1-3/1), and generally was between 70 and 80 cm thick. The dark color is attributed to heavy organic staining associated with relatively intensive prehistoric human activity.

Prehistoric cultural debris was found in profusion in Zone 2 and included lithic debitage, burned-clay nodules, faunal bone, freshwater mussel shells, estuarine bivalve shells (*Rangia cuneata*, oyster), lithic points and tools, bone and shell artifacts and native ceramics. Although there is evidence for some mixing, time-diagnostic projectile point types generally were vertically distributed at depths according to chronological expectations, with most arrow points in the upper levels, Morhiss and Lange dart points in the lower levels, and various later Late Archaic dart points such as Ensor roughly in the middle of the stratum. Thus it can be inferred that Zone 2 represents recurrent occupations in the Late Archaic and Initial Late Prehistoric periods, approximately 4000/3000-1000 B.P.

A number of Middle Archaic points (Bell, Andice, Early Triangular, Refugio) were found at or very close to the contact between Zones 2 and 3, suggesting deposition prior to any significant accumulation of Zone 2. It is also noteworthy that no diagnostic lithics from the Final Late Prehistoric period were found in Zone 2.

[2] Weinstein actually identified this unit as S13W80, since he used the northeast corner of the unit as its identifying coordinate. In keeping with the methods established for the current investigations, wherein the grid coordinate of a unit's southwest corner is used for identification, Weinstein's test unit now would be labeled S14W81.

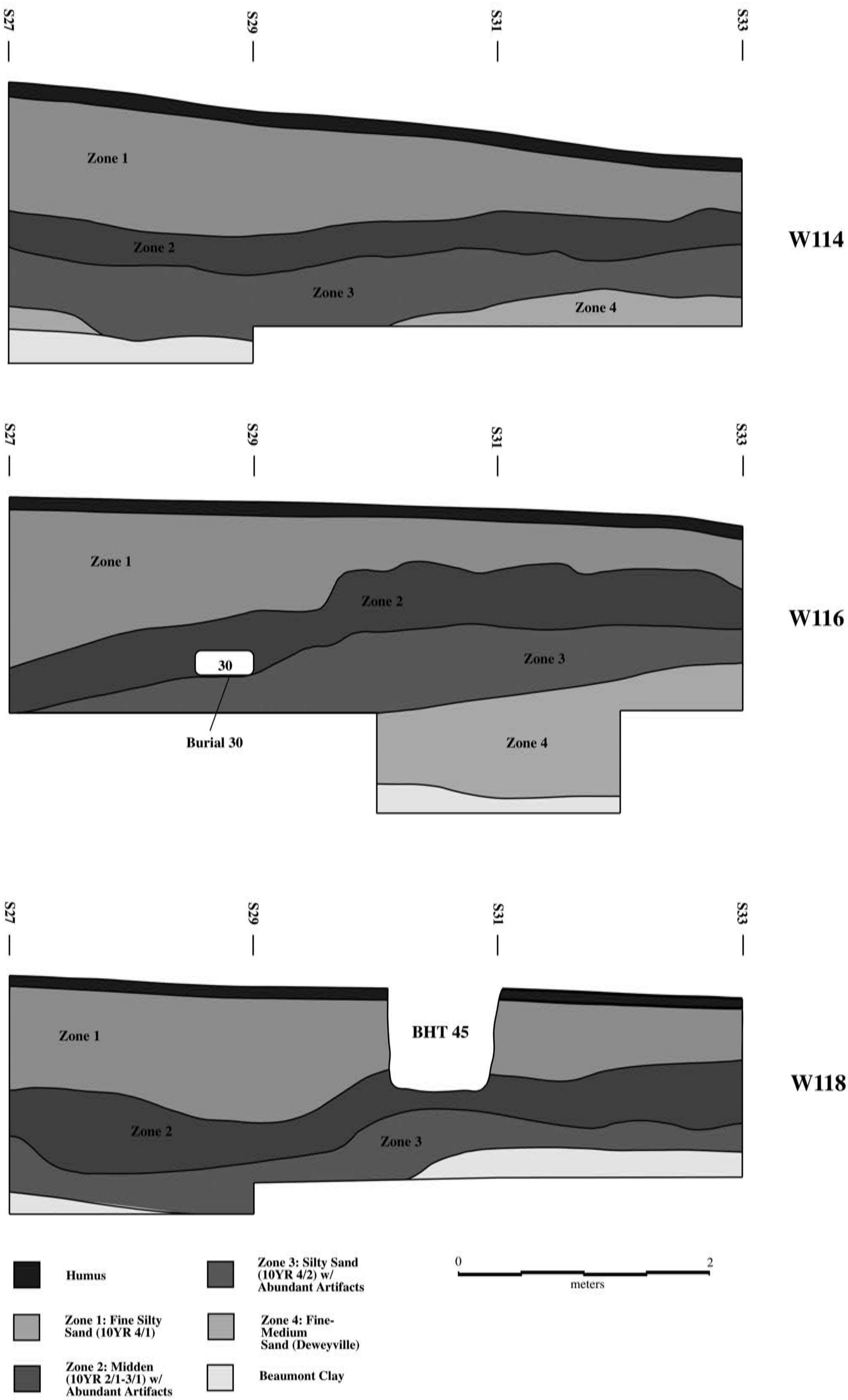


Figure 3-35. Drawings of the profiles along grid lines W114, W116, and W118, West Slope Block Excavation block showing stratigraphic Zones 1-4, as well as inset Deweyville alluvial sand and the basal Beaumont Formation clay. All views look east.

Figure 3-36. West wall of Unit S54W123. Circle surrounds a Kent dart point in situ in the floor of a 10-cm level within Zone 3.

Numerous Scallorn points and a few other arrow points of types of comparable age (e.g., Alba, Bonham) were found, but the Perdiz type, ubiquitous at coastal plain sites of the Final Late Prehistoric, was virtually absent. Thus, it can be inferred that occupation on the Knoll Top largely ceased prior to ca. A.D.1250 or 1300.

Zone 3A was a grayish brown (10YR 5/2) silty fine sand stratum that ranged in thickness from about 15 cm to 55 cm. During excavations, the contact between Zones 2 and 3A was usually quite clear, despite some mottling, due to the much lighter color of Zone 3A and a marked reduction in the amount of bivalve shell and faunal bone in the matrix. Zone 3 contained a high density of lithic debitage, though overall somewhat lower than was the case in Zone 2. In general, there was only limited mixing of materials from Zone 2, as evidenced by the vertical distributions of time-diagnostic lithics. Diagnostic dart points found in Zone 3 are attributable to the Late Paleo-Indian period and include lanceolote Golondrina and St. Mary's Hall types, and the stemmed Wilson type.

These diagnostic artifacts place Zone 3 at around 9000-11000 B.P., calibrated. Thus, the occupations represented in Zone 3 predate those pertaining to the lower part of Zone 2 by some 6,000 or more years. This strongly suggests a geological unconformity at the contact of these two strata, such that the upper part of Zone 3 was removed by erosion during the middle Holocene, ca. 6000-5000 B.P., prior to the accumulation of Zone 2. Given that AMS radiocarbon dating of human burials found in Zone 3 place interments at between ca. 6200 and 7300 B.P., it stands to reason that the erosional stripping of the upper part of the zone took place after this time interval. The interpretation of an unconformity between Zones 2 and 3 is further supported by various lines of geoarchaeological evidence discussed in Appendix A.

Zone 3B also consisted of silty fine sand, this stratum is distinguished on the basis of its lighter, pale brown color (10YR6/3). The contact between Zones 3A and 3B was in many places difficult to clearly pinpoint during excavation, due to considerable mottling

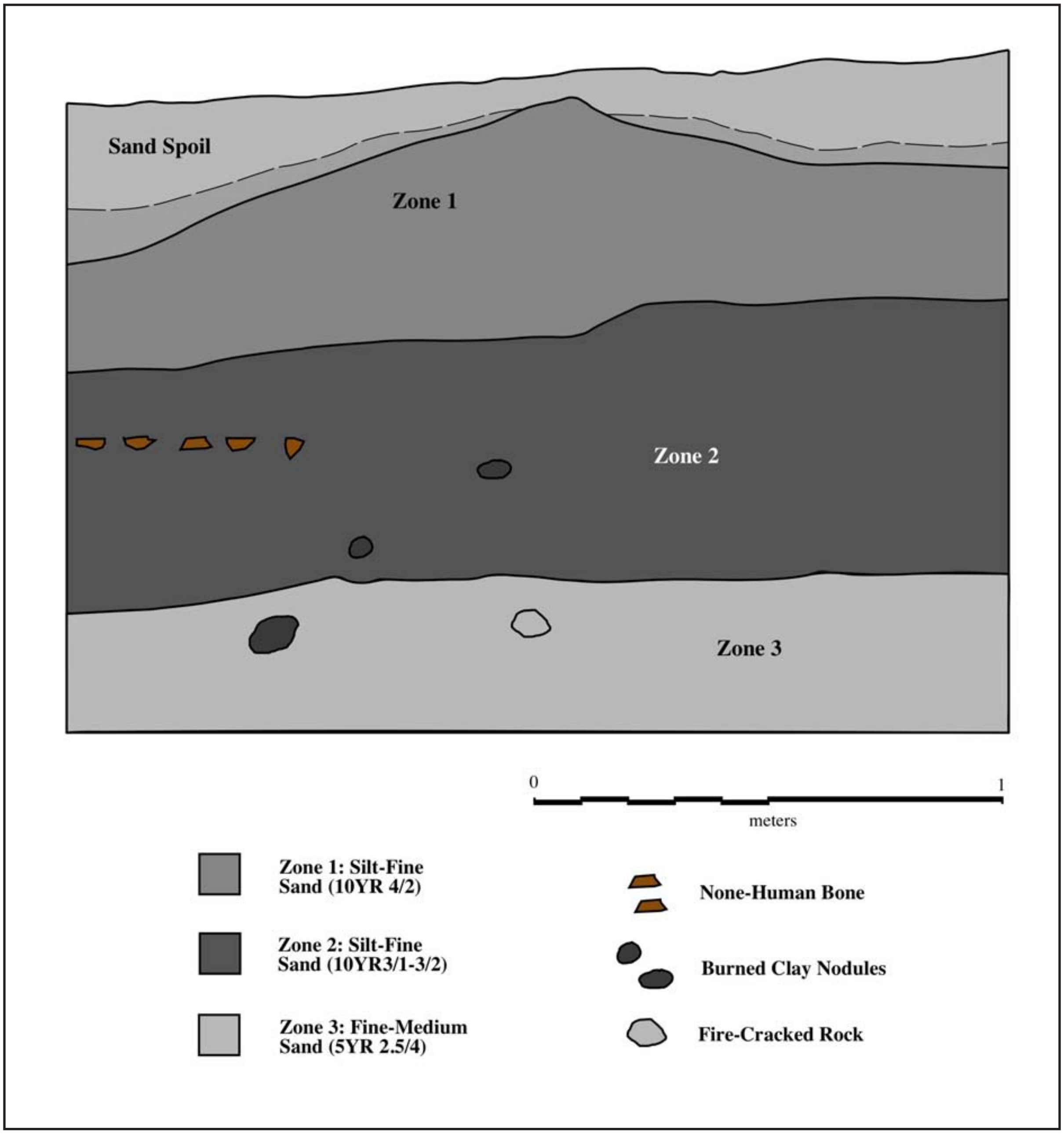


Figure 3-37. Drawing of the west wall profile of 2-by-2-m Unit S54W123.

that was probably the result of bioturbation (rodent burrowing and/or root activity). In wall profiles, however, the two strata were quite distinct, though the contact between them tended to undulate.

Zone 3B contained less cultural debris than did Zone 3A, and it is likely that most if not all of the debris in Zone 3B was intrusive, having been translocated by bioturbation from Zone 2A. Zone 3B was generally thinner than Zone 3A and rested directly on the eroded surface of the Pleistocene sandy clay of the Beaumont Formation. In places, Zone 3B thinned out and disappeared altogether; this generally was toward the edges of the Knoll Top and it is probable that the middle Holocene erosion that removed the upper portion of Zone 3 in places penetrated through Zones 3A and 3B to the underlying Beaumont. This is quite apparent in the excavation profiles in units S12W88 and S12W89, which show clearly the cross-section of an erosional gully that cut through Zone 3 and into the top of the Beaumont clay, after which the gully was filled by the accumulation of Zone 2 and Zone 1 (see Figure 3-41).

Figure 3-38. View of the Knoll Top Block Excavation in the early stage of work, looking southwest.

Stratigraphy of Mortuary Components on the Knoll Top

Human burials were encountered in all of the 12.5 contiguous 2-by-2-m units that made up the Knoll Top Block, as well as in Unit S16W96, the westernmost of the four outlying units on the Knoll Top. In total, at least 77 individual burials were documented and excavated on the knoll, with three in S16W96 and the remaining 74 in the main excavation block (the exact number of individuals represented can only be expressed as a minimum number, based on the inventory done during bioarchaeological analysis). Two temporally distinct mortuary components are represented: A Late Archaic (and possibly Late Prehistoric) component, and an Early Archaic component.

The Late Archaic Mortuary Component

At least four burials in the Knoll Top Block can be attributed to the Late Archaic. These can be temporally separated from earlier burials on the basis of (a) stratigraphic positions, (b) very good to excellent bone preservation as compared to much poorer bone condition in earlier burials, (c) body position/orientation, (d) in two cases, associated time-diagnostic artifacts, and (e) an AMS date (Burial 23, dated to ca. 100 B.C.).

Four of these burials (Nos. 23, 25, 32 and 37) were clearly associated with Zone 2. Burials 23, 32 and 37 rested at the bottom of Zone 2, while Burial 25 was in an oblong burial pit that originated in Zone 2 and was clearly visible by virtue of its fill, the black midden soil characteristic of Zone 2, that intruded into and contrasted in color with the lighter-brown Zone 3 matrix. Burial 20 was in the top few centimeters of Zone 3 and no intrusive pit outline was discernible; however, the very good condition of the bones in this burial suggests that it may be Late Archaic in age; bioturbation may have obscured the kind of clear pit outline seen in the case of Burial 25.

Burials 23 and 25 were extended interments, both in Unit S12W84. In both cases, the bodies had been placed on their backs with the head oriented toward

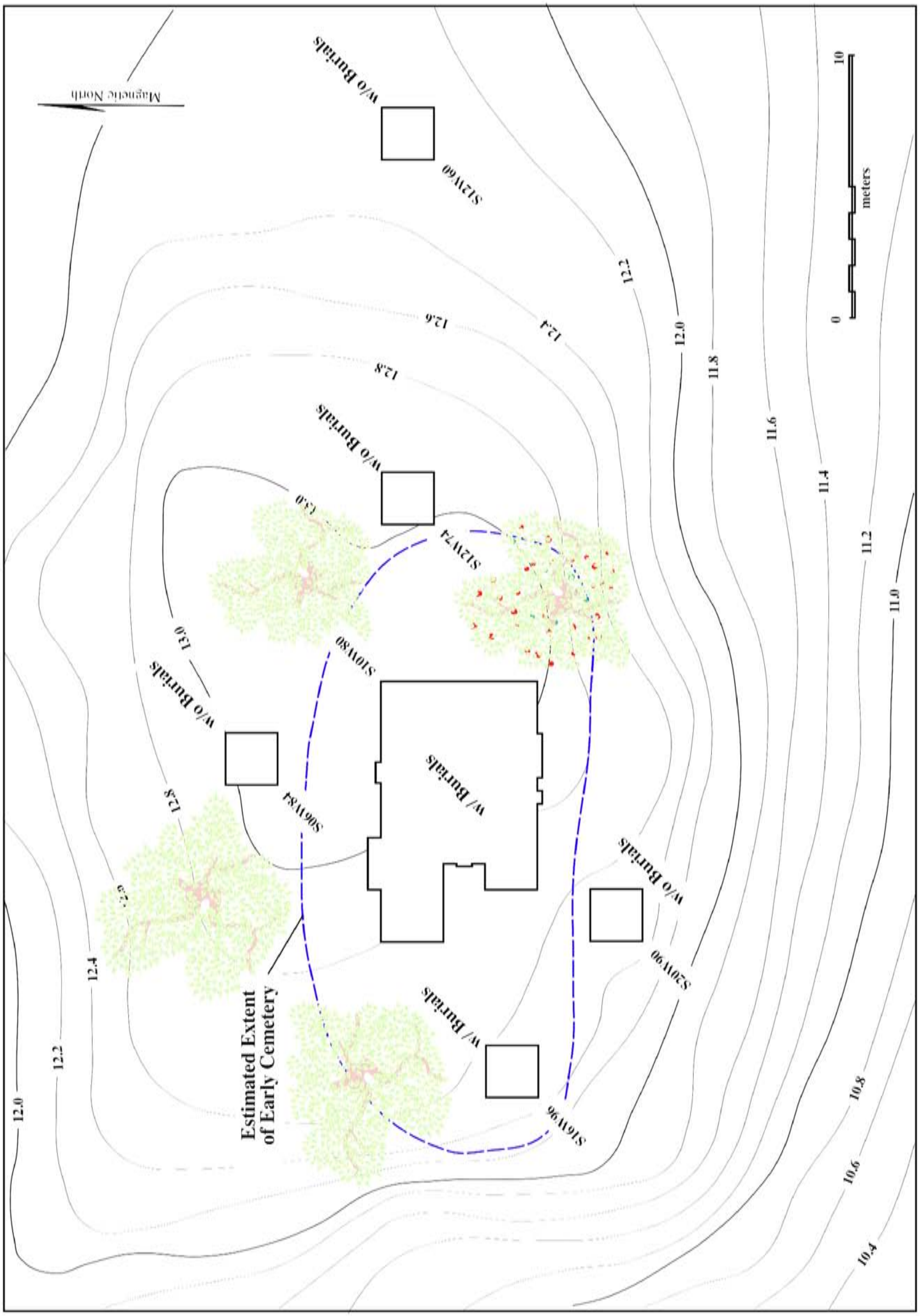


Figure 3-39. Contour map of the Knoll Top Area showing the main excavation block and outlying 2-by-2-m units. Contour interval is 20 cm.

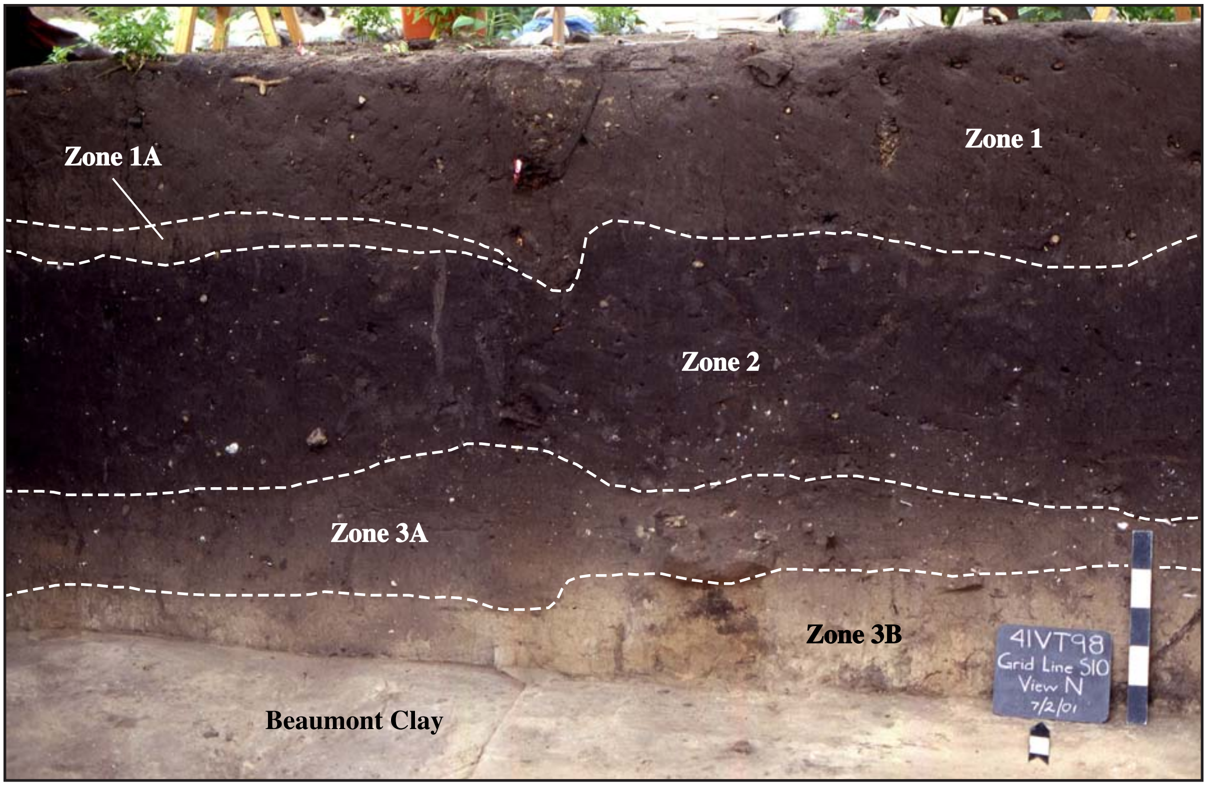


Figure 3-40. Knoll Top Block Excavation profile along grid line S10, looking north, with stratigraphic zones delineated by dashed white lines. The scale in the lower right is marked in 10-cm increments.

the southeast. A Lange dart point and an Ensor-like point and other associated mortuary objects place these burials in the Late Archaic, probably ca. 2500-2000 B.P. No artifacts were found with Burials 20 and 32, but these also appear to have been extended, though for reasons to be discussed later, the entire skeletons were not recovered.

Burial 37 is anomalous in this group, as it was loosely flexed and placed on its right side. The body position may be more typical of Late Prehistoric burials on the central coastal plain of Texas (e.g., Hall 1982; Huebner and Comuzzie 1992), suggesting that this likely is an isolated Late Prehistoric burial.

The Early Archaic Mortuary Component

All Early Archaic burials were clearly within Zone 3. Despite careful examination of horizontal and vertical excavation planes, no evidence was found in any instance of pits intruding from overlying Zone 2. The early burials were found in both Zones 3A and 3B, reflecting variations in depths of graves rather than systematic differences in the ages of interments. Some of the burials were found very close to the top of Zone 3 and yet, unlike the Late Archaic Burial 25, clearly were not in pits dug from Zone 2. This is interpreted to reflect the fact that the original surface of Zone 3, from which the Early Archaic burials were interred, was eroded down during the subsequent Middle Holocene (i.e., Middle Archaic) period so that the present top of Zone 3 is in proximity to many of the burials. As noted above, this interpretation is accords with the idea that the contact between Zones 2 and 3 is a geologic unconformity.

Also distinguishing the Early Archaic burials from the later interments associated with Zone 2 are (a) consistently poorer condition of human bone (poor to fair condition in the Zone 3 burials, very good to excellent condition in the burials associated with Zone 2), (b) absence of extended interments (all Early Archaic burials were either flexed, seated, or secondary bundle burials as opposed to the mostly extended body positions of the Late Archaic burials), (c) a distinctive and unique mortuary artifact assemblage that includes early projectile point types, and (d) AMS radiocarbon dates on bone collagen from 16 different Zone 3 burials falling into a combined calibrated age range of 6290-7460 B.P.

A minimum of 66 burials can be confidently ascribed to the Early Archaic mortuary component. An additional three are probably associated with this component; these were found at the interface of Zones 2 and 3 and were either tightly flexed or bundled and bone condition was only fair, both suggesting more similarity to the Early Archaic burials than the Late Archaic interments. As discussed in detail further on, based on their number and density, the Early Archaic burials clearly can be considered to represent a cemetery.

Stratigraphic Interpretations

In combination, the stratigraphic information obtained from the backhoe trenches and the hand-excavated units permits a reasonably accurate reconstruction of stratigraphy across the site and some basic inferences concerning site formation processes. The trajectories of the stratigraphic profiles are shown in Figure 3-43. Figure 3-44 shows the reconstructed sediment profile in an east-west line across the site (as indicated by line A in Figure 3-43). The most basic factor in the sediment profile is that the geologic foundation of the site is the sandy clay of the Beaumont Formation; this was easily recognized by its density and hardness, its pale grayish brown color, and the fact that it was completely devoid of cultural material. At lower elevations (in the westernmost part of the cross section shown in Figure 3-44), a thin remnant of Deweyville alluvial-terrace sand is inset onto the Beaumont clay.

For the most part, the Holocene sediments consist of silty fine-sand deposits ranging in color from yellowish brown (Zone 3B on the Knoll Top) to grayish brown (Zone 3A on the Knoll Top and Zone 3 on the West Slope, to dark grayish brown (Zone 1 on the Knoll Top and the West Slope and Zones 1 and 3 in the East Midden Area). In the East Midden, Knoll Top and West Slope areas, Zone 2, a black to very dark gray midden, is sandwiched between these various lighter-colored strata. The origin of the Holocene sediments at upper elevations can be inferred to be eolian deposition, while the deposits on and below slopes is inferably the result of some combination of eolian and colluvial sedimentation.

Line B in Figure 3-43 delineates a roughly north-south cross section through the East Midden Area, as depicted in Figure 3-44**.** This shows the silty fine-sand midden of Zone 2 “floating” within lighter-colored silty-sand deposits and a zone of clay lamellae that probably represent downward translocation (illuviation) of fine particles (silt and clay) from Zone 2. A thin, relatively dark zone of clayey sand is found throughout the area, resting directly on the Beaumont clay. This basal zone thickens somewhat downslope, toward the south, possibly as a result of colluvial redeposition. The presence of lithic debitage and several Paleo-Indian artifacts (point fragments and a Dalton adze) within this clayey-sand sediment indicates that it is not a soil developed within the Beaumont clay, but rather a separate terminal Pleistocene or earliest Holocene deposit lying on the Beaumont surface.

Line C in Figure 3-43 represents a second north-south cross section of the site. This is shown in Figure 3-44, which depicts the narrow spine of the Beaumont erosional remnant and overlying natural and artificial sediments. The alluvial sand of the Deweyville terrace remnant is inset onto the sloping valley wall of the north side of the Beaumont promontory. Inferably, this is probably also the case on the south side of the promontory, though the backhoe trenches did not penetrate the thick sand spoil in the latter area. The Holocene silty sand veneer, with various midden strata, overlies the Beaumont clay on the Knoll Top and the Deweyville sands on the lower slopes of the knoll. To the north and south of the knoll the Holocene sediments are capped with, respectively, clay-gravel and sand spoil. A much smaller and thinner patch of sand spoil is present along the northern edge of the Knoll Top.

In sum, the sedimentary history of the Buckeye Knoll site can be very generally summarized in the following manner. First, during the Pleistocene, at least some 100,000 years B.P., fluvial-deltaic sedimentation under higher-than-present sea level resulted in the deposition of the sandy clays of the Beaumont Formation.

Later in the Pleistocene, when sea levels were lower than at present, the ancestral Guadalupe River channel downcut to form the present valley, with the adjacent Beaumont Formation uplands forming the valley wall. Around 50,000 to 40,000 B.P., judging by OSL dates from Buckeye Knoll (see Appendix A), alluvial deposition created the sandy Deweyville terraces inset against the earlier Beaumont clays of the valley wall.

During the last glacial maximum, ca. 20,000 B.P., renewed downcutting and lateral channel migration of the Guadalupe River reduced Deweyville terraces to more or less localized remnants, as mapped regionally (see Figure 2-1) and as evidenced in the stratigraphy at the Buckeye Knoll site.

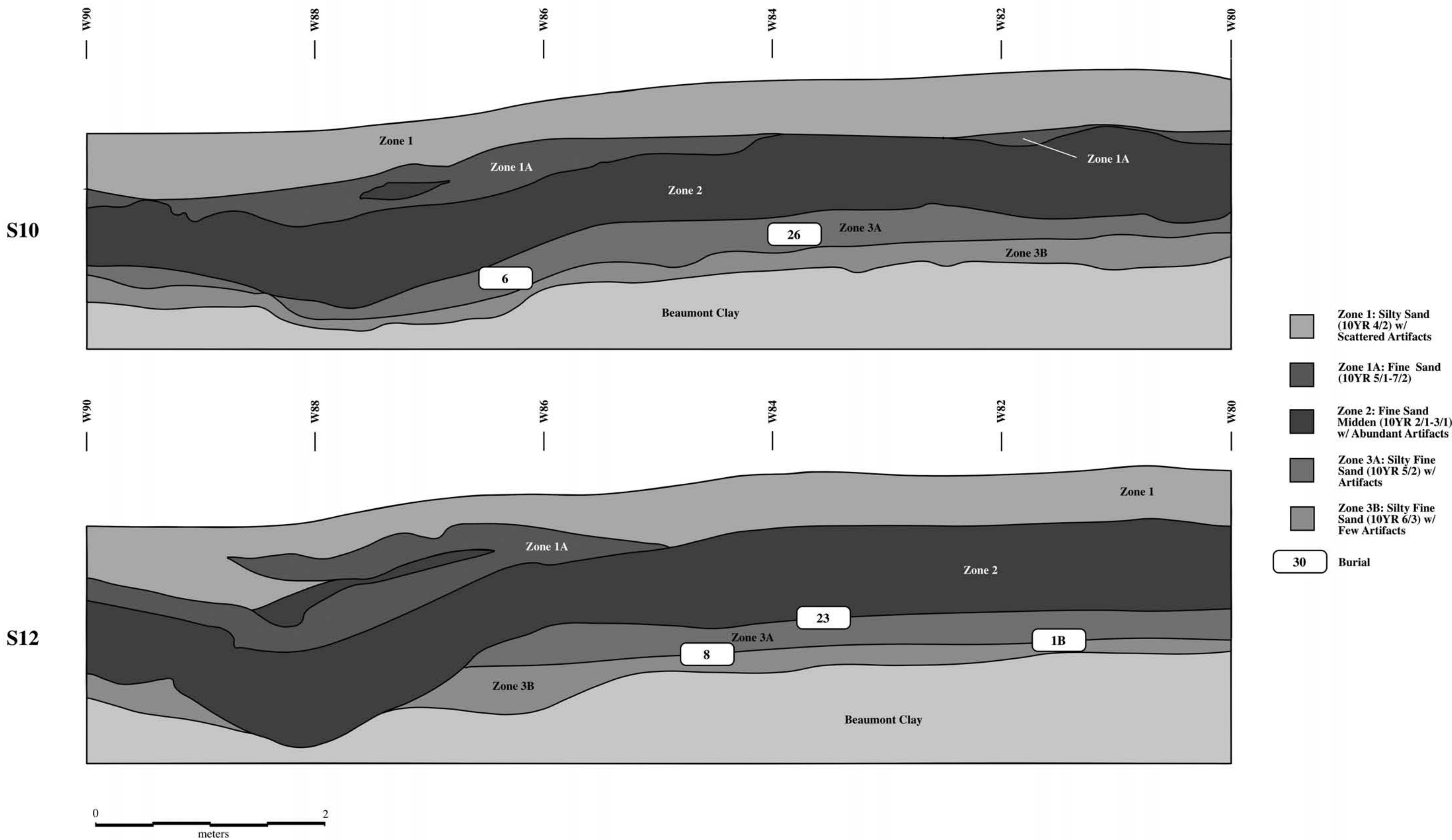


Figure 3-41. Drawings of Knoll Top Block Excavation profiles shown along east-west grid lines at 2-m intervals.

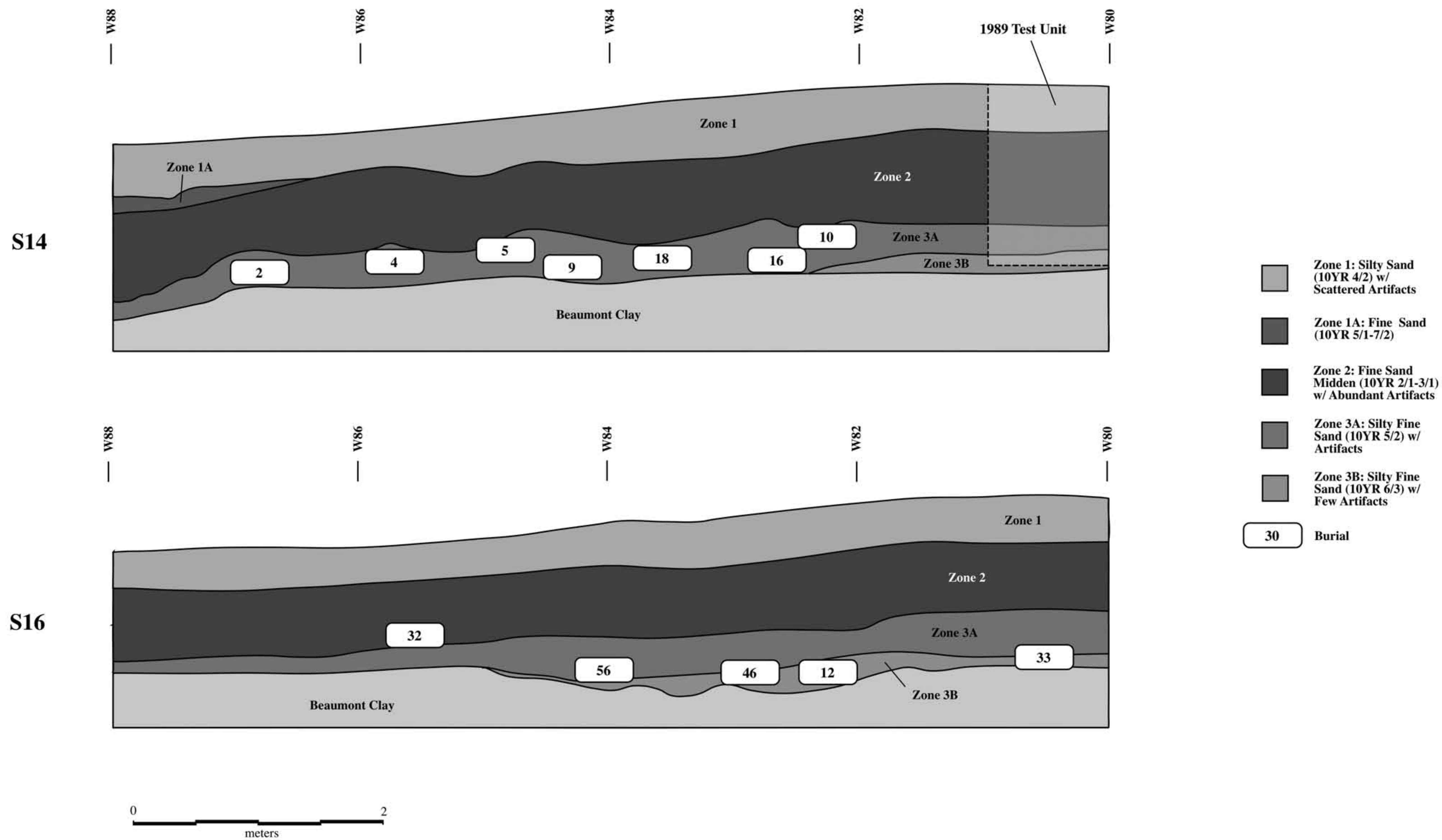


Figure 3-42. Drawings of Knoll Top Block Excavation profiles shown along east-west grid lines at 2-m intervals. Note that most burials are clearly within Zone 3.

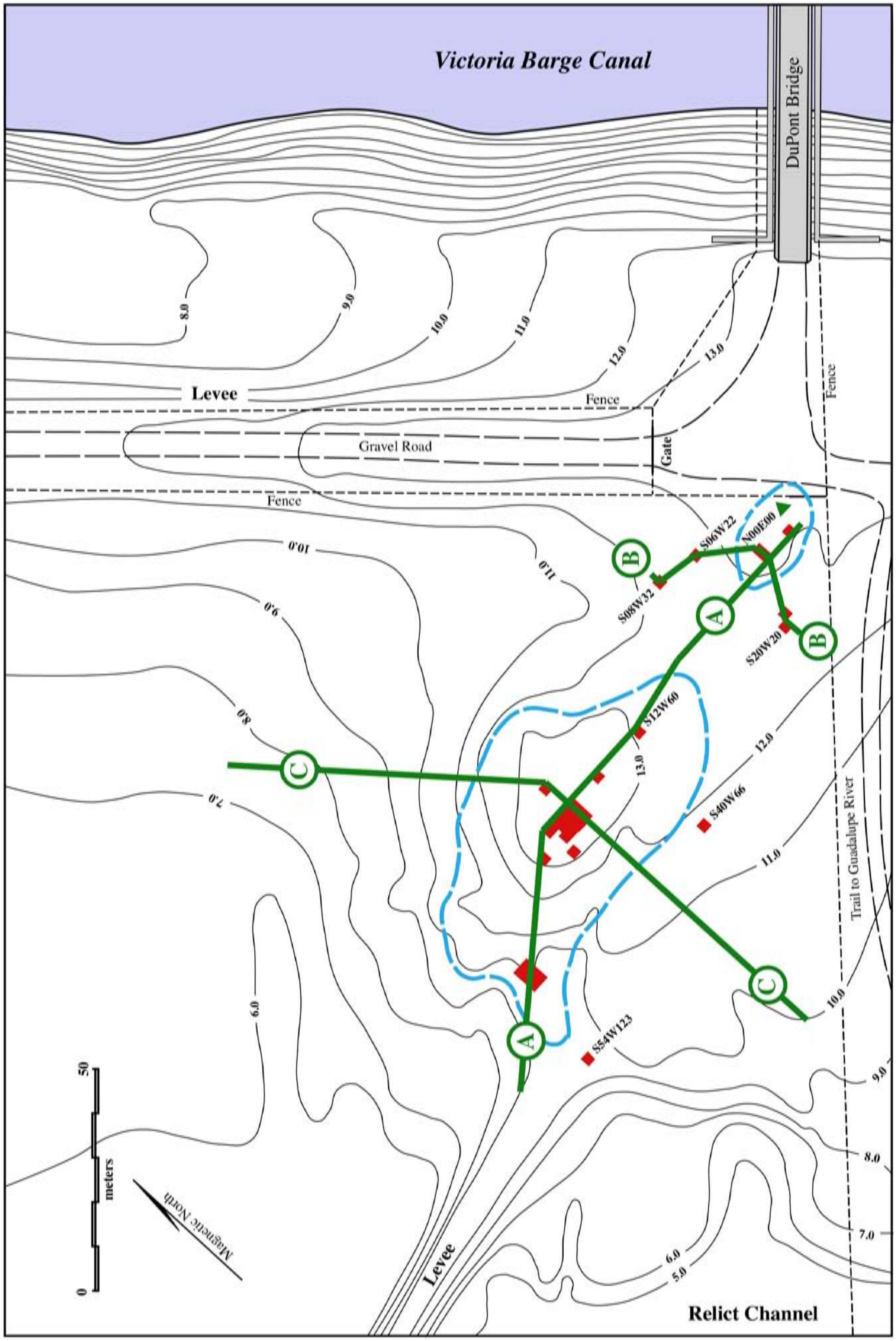


Figure 3-43. Map of the Buckeye Knoll site showing trajectories of sedimentary cross sections discussed in the text and shown in the accompanying profile drawings.

During the terminal Pleistocene to earliest Holocene, ca. 12,000-10,000 B.P., silty sand sediment accumulated on the top of the West Knoll to form Zone 3. The presence of Paleo-Indian diagnostics within Zone 3A suggests more or less contemporaneous Paleo-Indian occupation. Similarly, Zone 4 in the East Midden Area contains scattered Paleo-Indian artifacts, suggesting eolian or, on slopes, colluvial deposition during this period. No Paleo-Indian diagnostics were recovered from excavations on the West Slope, with the exceptions of two basal fragments of St. Mary's Hall points that were probably redeposited from upslope by middle Holocene erosion and colluviation. It is possible that this part of the site was not occupied at this time. Alternatively, evidence for Paleo-Indian occupation may have been stripped off by erosion or, possibly, our sampling may simply have been too limited to recover what could be sparsely distributed diagnostic material of the period.

The bulk of the silty-sand sediments on the site produced diagnostic artifacts assignable to Middle Archaic, Late Archaic and Late Prehistoric cultural periods. In the Knoll Top Excavation, Zone 2 was noted as a dark-colored, heavily organically enriched midden which, judging from the array of diagnostics present, began to accumulate in the early part of the Late Archaic, perhaps ca. 4000 B.P., with deposition lasting into the early part of the Late Prehistoric period, ca. 1000 B.P. or a bit later.

It is apparent that the contact between Zones 2 and 3 on the Knoll Top represents a geological unconformity, given that several thousand years seem to have elapsed between the accumulation of Zone 3 and the beginning of Zone 2 formation. As noted earlier, this is supported by the fact that the Early Archaic burials that were dug into Zone 3 were found in many cases to rest near or virtually at the top of Zone 3, meaning that the original surface of this stratum had to have been deflated by erosion prior to Zone 2 deposition.

Zone 1 on the Knoll Top contained only sparse prehistoric debris, mostly scattered debitage probably mixed by natural turbation from Zone 2. Zone 1 accumulated since the latest more or less intensive occupation of the site.

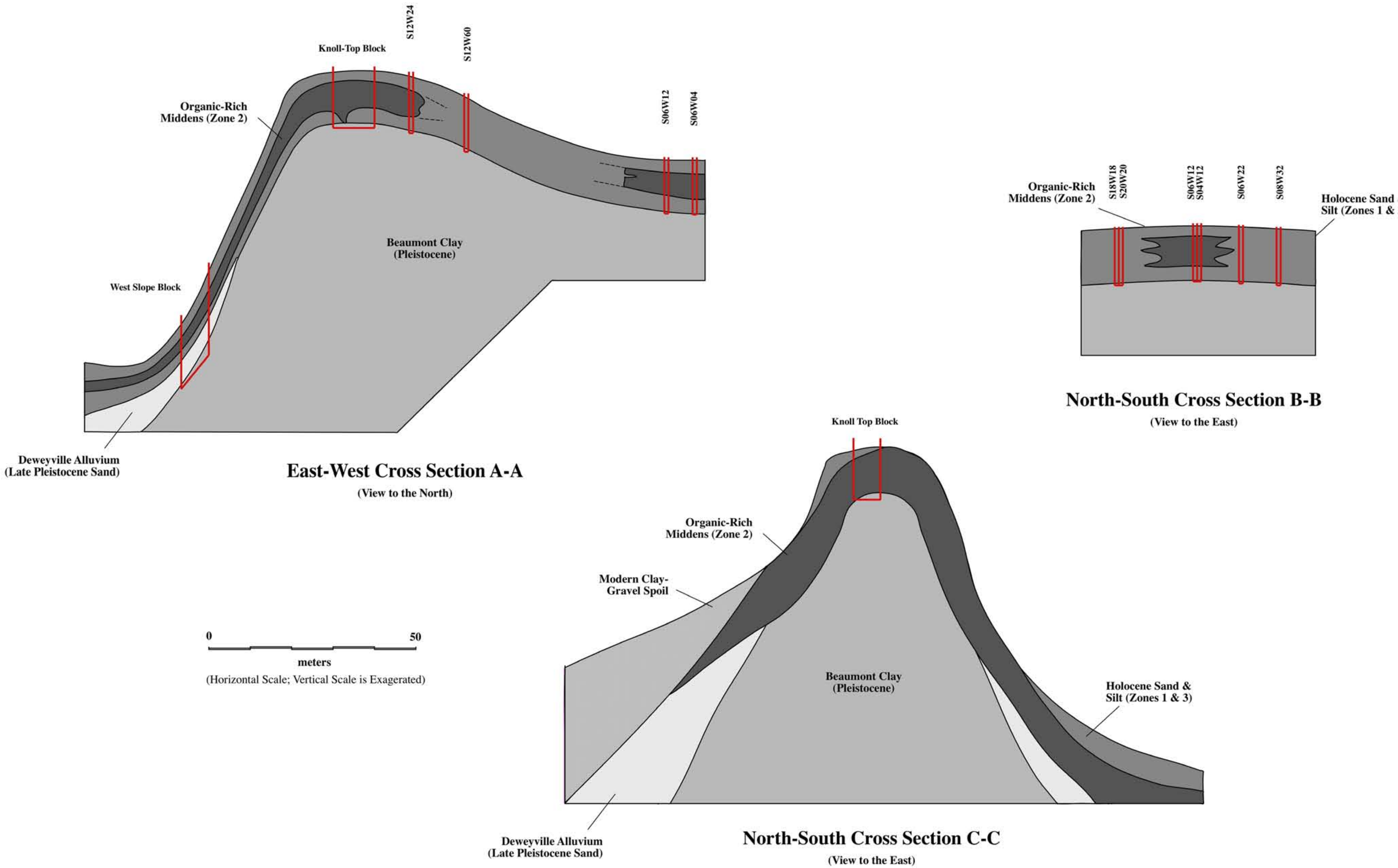


Figure 3-44. Schematic cross sections of the Buckeye Knoll site based on backhoe trenches and hand excavations. The vertical scale is exaggerated. The horizontal trajectories of these cross sections are shown in Figure 3-43.

Chapter 4

Non-Mortuary Features

Robert A. Ricklis

A total of 20 feature numbers was assigned to material anomalies discovered during the course of the 2000-2001 fieldwork at the Buckeye Knoll site. Of these, 17 were non-mortuary features. Two numbered features pertain to mortuary activities at the site. Feature 6, found in Zone 3 in Unit S12W82 on the Knoll Top, proved to be human remains that were part of the sizeable Early Archaic cemetery subsequently defined by concurrent excavations. Feature 18, a tight cluster of chert preforms in Zone 3 in Unit S10W88, also on the Knoll Top, is believed to be associated with one or more nearby Early Archaic burials. Because of their mortuary provenience, these features are best described in the appropriate context further on in this report.

Feature 7 was a basin-shaped deposit of light gray fine sand in the northwest corner of Unit S16W88 on the Knoll Top. Because of its apparent basin-like configuration, this was initially thought to be a possible cultural feature. However, subsequent excavation in nearby units demonstrated that this apparent anomaly was actually only an undulation in the contact between Zone 1A and Zone 2 and thus part of the natural sediment stratigraphy.

The 17 anomalies that are interpreted to be actual non-mortuary cultural features include 10 hearths or hearth remnants, two pits, two possible postmolds, two caches of lithic materials and one large, basketry-impressed slab of asphaltum. The features are described below according to the excavation areas in which they were found.

Soil samples were extracted from within all hearth and pit features for flotation in the laboratory to determine if carbonized macrobotanical materials were associated. The results of this effort are presented in Appendix C.

Features in the East Area Excavations

Only two features were found in this general area of the site. Both were possible postmolds, and both were found in Unit N8W32, northwest of the East Midden proper.

Feature 1

Feature 1, a possible postmold (Figures 4-1 to 4-2), was located in the sand matrix of Zone 2 in the southwest quadrant of Unit N8W32. The feature was first observed as an oval patch of very dark grayish brown (10YR 3/2), organically stained sand, within the lighter pale brown (10YR 6/2) Zone 2 sand matrix. In plan, the dimensions of the oval patch, which was first discernible at 35 cm below ground surface, were 60 cm northeast-southwest and 53 cm northwest-southeast. The feature was cross-sectioned, and exhibited a shallow, basin-like profile (see Figure 4-1) with a depth from the surface of the feature of 15 centimeters.

At the bottom of the basin, a smaller circular patch of dark-stained soil (10YR 3/2), the possible post mold, was apparent within the surrounding Zone 2 matrix (see Figure 4-2). This could be

Figure 4-1. A photograph showing Feature 1 in Zone 2, Unit N08W32, in the East Area Excavation. The view shows a dark oval stain with a basin-shaped cross section as exposed at 35 cm below surface.

Figure 4-2. A photograph showing Feature 1 in Zone 2, Unit N08W32, in the East Area Excavation. The view shows a possible postmold found at the base of the basin as it appeared at 58 cm below surface.

traced vertically for an additional 21 cm, at which point it faded out.

No artifacts, charcoal, or other cultural residue were found in obvious association with this feature that might help to clarify its function. It appeared to be a shallow pit with a postmold at the bottom; perhaps the pit was dug to insert a post or for placement of some kind of packing or bolstering material, though none was observable.

Feature 2

Feature 2 (Figures 4-3 to 4-4), which appears to be another possible postmold, was a small stain of dark-colored (10YR 3/2) sand in Zone 2 sand matrix in the northwest quadrant of Unit N8W32. As may be seen in Figure 4-3, in plan the stain was oval, measuring 8 by 10 centimeters. The feature, which was first discernible at 64 cm below the surface, was cross sectioned, showing a bluntly U-shaped profile with a maximum depth of 71 centimeters (so that the feature had a total vertical dimension of only 7 cm) (see Figure 4-4).

The possibility that this possible postmold was functionally or structurally related to nearby Feature 1 was considered in the field. However, the fact that the surfaces of the two features were separated in elevation by 29 cm may argue against such a relationship.[1]

Features on the West Slope

Eight features were found in excavation units on the western slope of the site. Two of these were in Unit S54W123, while the other six were in the six contiguous 2-by-2-m units comprising the West Slope Block Excavation. The eight features include six hearths or hearth remnants, one pit, one materials cache, and a large slab of basketry-impressed asphaltum.

Feature 3

Feature 3 (Figure 4-5) consisted of three "tested" water-worn chert cobbles resting together in Level 9 (80-90 cm below surface) in Unit S54W123, Zone 2. The lengths of the cobbles ranged from 9.2 to 10.6 centimeters. One specimen bears the scar of a single flake removal; the second shows scars of three flake removals, while the last exhibits five flake scars. These artifacts are described in greater detail further on in Chapter 7, in which lithic artifacts are discussed. The presence of a relatively high density of cultural debris in this level in Unit S54W123 suggests that this cache may be associated with a discrete occupation component or perhaps even a distinct living surface.

Feature 4

This feature, an apparent hearth remnant, consisted of a loose cluster of seven relatively large burned-clay (Figure 4-6) nodules in Level 12 (110-120 cm below surface) near the south-central edge of Unit S54W123. These nodules were all made of a sandy clay and were orange in color, indicating firing in an oxidizing atmosphere. Maximum dimensions of the nodules range from approximately 4 to 8.5 cm. The overall dimension of the cluster in plan view was 25 by 18 cm, though it may conceivably have been longer if it extended beyond the south wall of the unit. There was no appreciable depth to the feature; all seven of the nodules rested at essentially the same elevation. No charcoal was associated.

Feature 8

Feature 8, an apparent hearth (Figure 4-7), was a rather dense, oval mass of burned-clay nodules located in Unit S31W118 within the West Slope Block Excavation (see Figure 4-8 for the horizontal location of this feature and all other features within the main excavation block on the West Slope). Measuring about 45 by 33 cm, Feature 8 rested at the contact of Zones 2 and 3 and, judging by the fact that the clay nodules were embedded within Zone 3 matrix, the feature can probably be attributed to Zone 3. Scattered *Rangia cuneata* shells and a fragment of faunal bone were found within the cluster of burned-clay nodules, though in no greater density than in the surrounding immediately overlying Zone 2 matrix, suggesting a questionable direct association with the hearth. The burned-clay nodules were mostly oxidized to an orange color, though a few were dark gray in color, indicating variable exposure to oxygen during firing. No charcoal was associated. As was the case with Feature 4 (and indeed, as with other hearth features at Buckeye Knoll), Feature 8 had no appreciable thickness, as it consisted of a single layer of burned-clay nodules, all resting essentially on the same horizontal plane.

The use of limestone clasts in hearths and/or ovens has been extensively discussed for prehistoric

[1] Unfortunately, the absence of other features or detectable concentrations of cultural materials in association with Features 1 and 2, along with the underlying priority of investigating other aspects of the site within the project's time frame and budget, led to the decision not to pursue further investigation of the possible linkage between these features.

Figure 4-3. A photograph showing Feature 2, initially considered a possible postmold, in Zone 2, Unit N08W32, in the East Area Excavation. The photograph shows a plan view at 64 cm below surface.

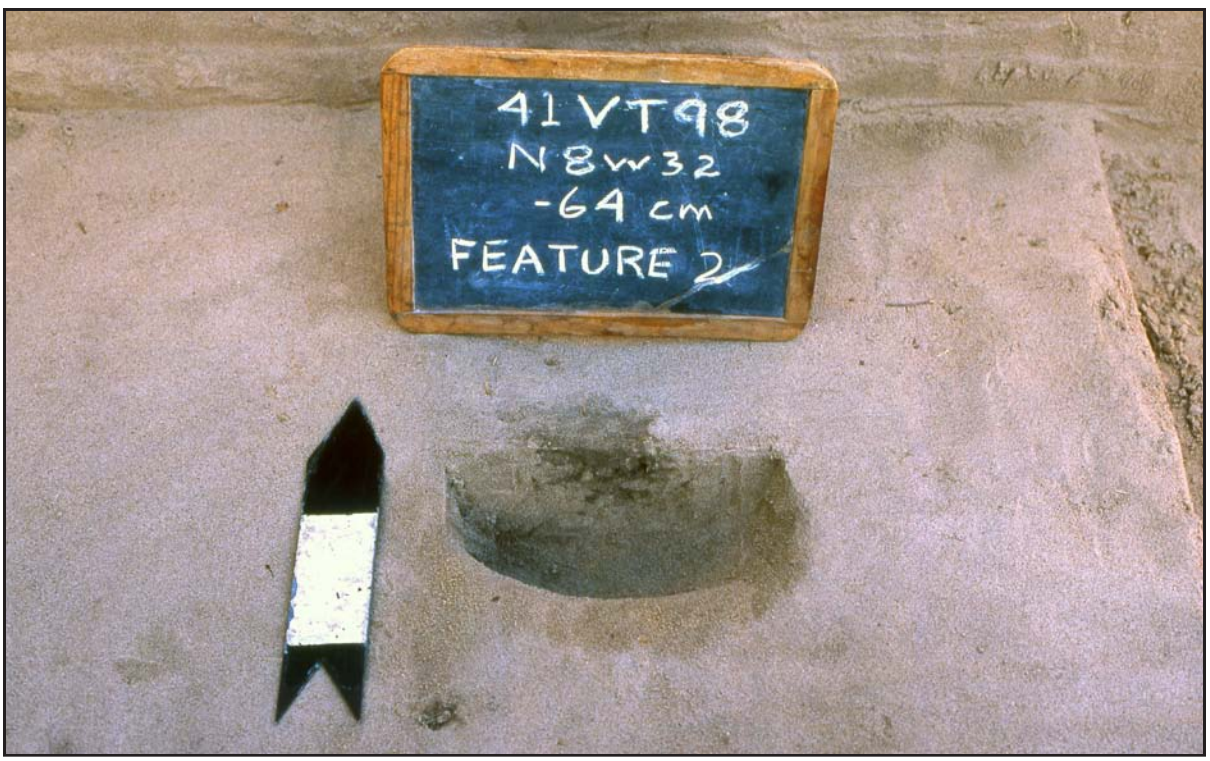


Figure 4-4. A photograph showing Feature 2, in Zone 2, Unit N08W32, in the East Area Excavation. The photograph shows the cross section, which illustrates the shallow extent of the feature, suggesting it may not be a postmold.

Figure 4-5. A photograph showing Feature 3, a cache of three tested chert cobbles, as exposed in Level 9 (80-90 cm below surface) in Unit S54W123.

Figure 4-6. A photograph showing Feature 4, a small cluster of burned clay nodules interpreted as representing a hearth remnant, as exposed in Level 12 (110-112 cm below surface) in Unit S54W123.

Figure 4-7. A photograph showing Feature 8, a cluster of burned clay nodules interpred as a hearth, in the top of Zone 3, West Slope Block Excavation Unit S31W118.

features documented in the Edwards Plateau area of central Texas (see Black and Creel 1997; Ricklis and Collins 1994), where circular to oval clusters of burned clasts are interpreted to be hearths. Closer to the Buckeye Knoll site, various sites on the more inland margin of the coastal plain have produced similar clusters of burned sandstone and/or chert cobbles, also thought to be hearths of cooking features (e.g., Hall et al. 1982; Hudler et al. 2002). The morphologically similar clusters of burned-clay nodules at Buckeye Knoll, including Feature 8, are interpreted to be small hearths, with the fired clay clasts serving as surrogate hearth stones within the stone-poor environment of the outer coastal plain. This functional interpretation is supported by the fact that two such features at Buckeye Knoll were seen to include sandstone clasts in addition to burned-clay nodules (Features 9, 11 and 12, described below).

Feature 10

Feature 10, another hearth remnant (Figure 4-9), was a dense but small cluster of burned-clay nodules found in Level 6 (50-60 cm below surface) in Unit S33W116, within Zone 2 in the West Slope Block Excavation (see Figure 4-8 for location). The feature measured 28 by 14 cm. Because of its small size, it is interpreted to represent the remnant of a hearth, the rest of which was perhaps scattered at the time of occupation or subsequently (but before the feature was buried by accumulating sediment). The profusion of burned-clay nodules found within culturally relevant strata at Buckeye Knoll (discussed later on in Chapter 7) presumably reflects, at least in large part, just this sort of dispersal of hearth residues. No charcoal was found associated directly with this feature.

Feature 12

Feature 12 (Figure 4-10) was a small, loose cluster of fragments of tabular sandstone and burned-clay nodules, which appeared to represent the remains of another hearth. It rested at the interface of Zones 2 and 3 in Level 12 (110-120 cm below surface) in Unit S33W116 in the West Slope Block Excavation (see Figure 4-8). As with other similar features, there was no depth and no associated charcoal.

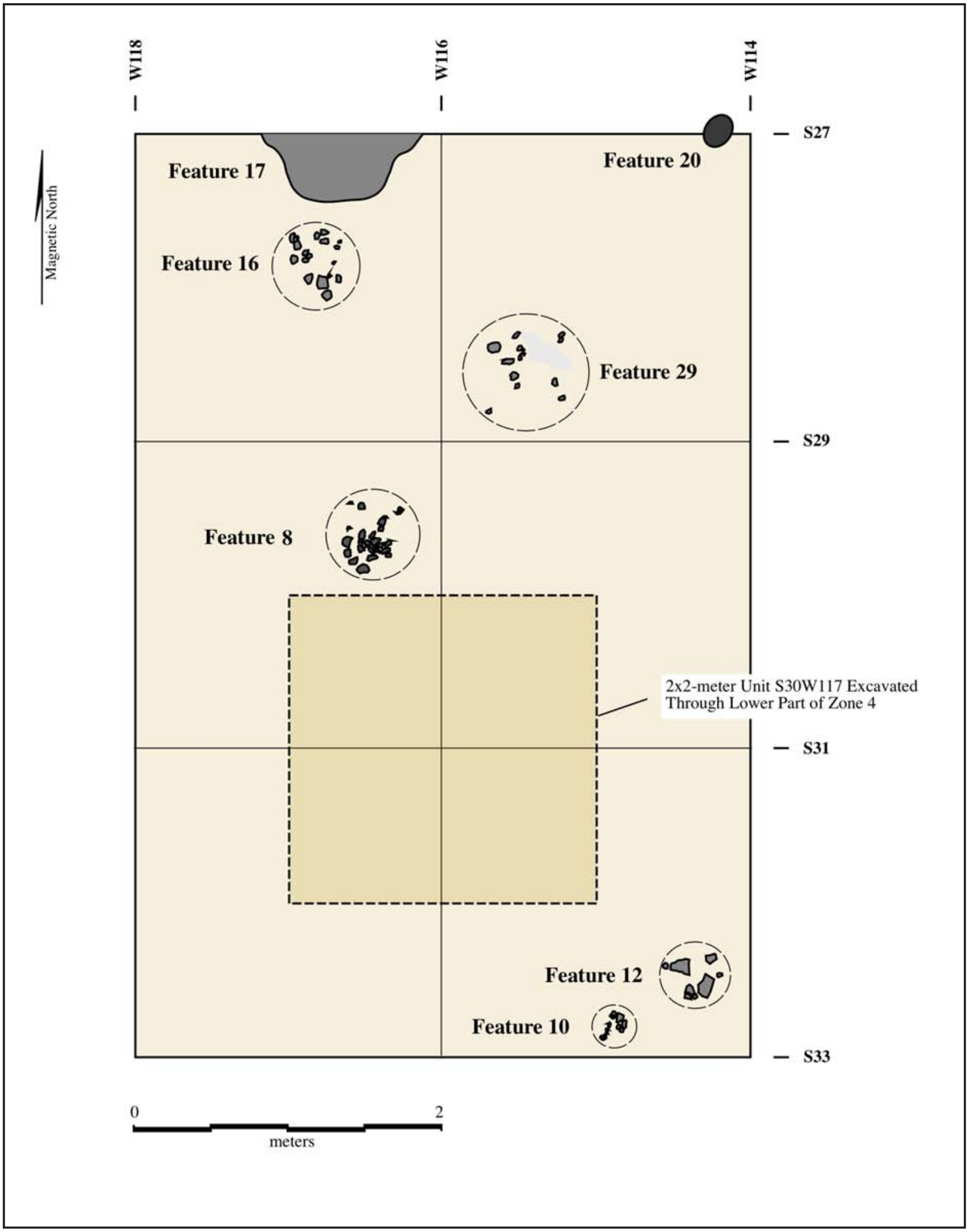


Figure 4-8. A plan view of the West Slope Block Excavation showing the locations of various features. Features 10 and 17 were within, or originated in, Zone 2. Features 12, 19, and 20 were at the contact of Zones 2 and 3. Features 8 and 16 were in the upper part of Zone 3.

Figure 4-9. (Left) A photograph showing Feature 10, a cluster of burned clay nodules, interpreted as a small hearth remnant, in Level 6, West Slope Block Excavation Unit S33W116.

Figure 4-10. (Right) A photograph showing Feature 12, a small cluster of burned sandstone and burned clay nodules interpreted as a small hearth remnant, at the interface of Zones 2 and 3, West Slope Block Excavation Unit S33W116.

Figure 4-11. A photograph showing Feature 16, a cluster of burned clay nodules interpreted as a hearth remnant, in the top of Zone 3, West Slope Block Excavation Unit S29W118.

Feature 16

Feature 16 (see Figures 4-8, 4-11) was a loose cluster of burned-clay nodules, roughly oval in plan view, found in Unit S29W118 at the interface of Zones 2 and 3. The cluster measured 46 by 32 cm in its maximum north-south and east-west dimensions, respectively. As was the case with Feature 8, the nodules appeared to rest within Zone 3 matrix, suggesting that it is associated with that stratum. The color of the burned-clay nodules ranged from orange to gray, indicating variable exposure to oxygen during firing. Several valves of *Rangia cuneata* clamshell were found near or within the confines of the cluster, but these are unburned and presumably derive from the immediately overlying Zone 2 midden matrix. All the burned-clay nodules rested on essentially one horizontal plane. No associated charcoal was present.

Feature 17

Feature 17, a pit, was found along the north wall of Unit S29W118 and was thus transected by grid line S27 (see Figures 4-8, 4-12 to 4-14). Since the adjoining unit to the north was not excavated, only part of the feature was exposed. An east-west profile (see Figures 4-13 to 4-14) was created of the feature along the north wall of S29W118. The pit was evidenced as a roughly semicircular patch of dark-colored (10YR 2/1-3/2) silty fine-sand fill against the light-colored matrices of Zones 3 and 4, through which it intruded. The color of the pit fill was the same as Zone 2, from which the pit appears to have originated. Also suggesting a contemporaneity of the pit and Zone 2 is the fact that a Morhiss point was found in the feature fill, and Morhiss points were found elsewhere in Zone 2 (in contrast to the clear association of earlier Early Triangular points with Zone 3). The pit fill contained fragmented faunal bone, scattered rangia shell and chert debitage.

The full dimensions of the pit could not be ascertained, as it extended beyond the northern limits of the West Slope Block Excavation (grid line S27). Given that the exposed part of the plan view (see Figure 4-12) is roughly semi-circular in plan, it is quite possible that about one-half of the feature was exposed and excavated. If this was, in fact, the case, the maximum plan dimension of the pit (at least that discernible against the lighter matrix at the top of Zone 3) would have been approximately 80-90 cm. In profile, the pit had a cylindrical configuration.

Figure 4-12. A photograph showing Feature 17 along the northern wall of West Slope Block Excavation Unit S29W118 at the base of Level 18 (180 cm below surface). Note that the feature is observable as a dark, roughly semicircular stain against the lighter brown soil of the Zone 3 matrix.

Figure 4-13. A photograph of then northern wall of West Slope Block Excavation Unit S29W118 showing the base of pit Feature 17 extending from dark-colored Zone 2 through Zones 3 and 4 and into the surface of the basal Beaumont Formation clay.

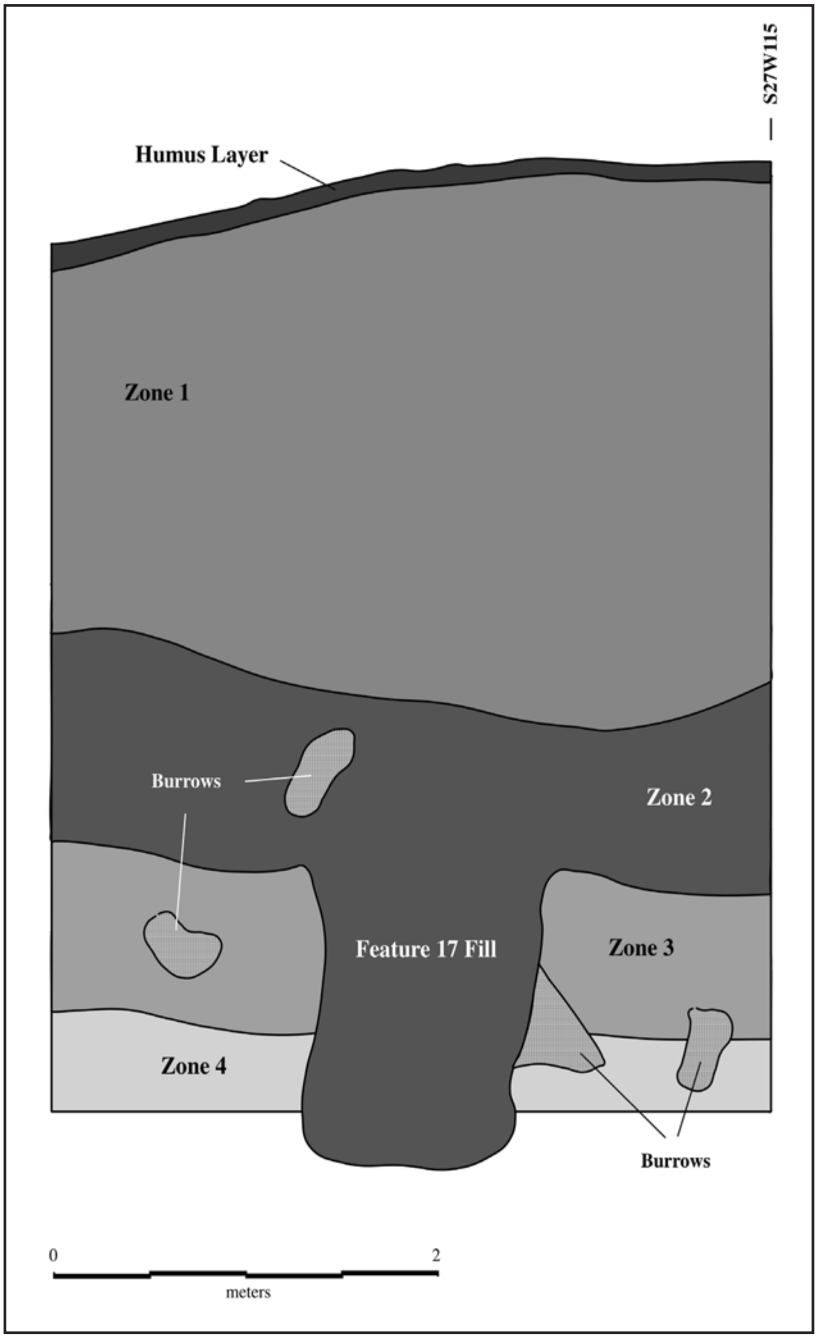


Figure 4-14. Drawing of the profile of pit Feature 17, originating in Zone 2 and extending downward into the surface of the basal Beaumont Formation clay. Profile is along grid line S27 on the northern wall of Unit S29W118 in the West Slope Block Excavation.

Although the plan views exposed in succeeding 10-cm level floors, suggest that the diameter of the pit became smaller with increasing depth, this actually may not be the case, since, as can be seen in the profile view in Figure 4-14, the greatest horizontal dimension may be exaggerated by the effects of lateral animal burrowing. If this was the case, the actual maximum width of the feature may have been closer to around 60 cm than the 80-90 cm cited above. The greatest observable depth of the pit (i.e., from the base of Zone 2 to the bottom) was 60 cm.

Feature 19

Feature 19 (see Figure 4-8), another hearth remnant, was a loose cluster of burned-clay nodules, again at the contact between Zones 2 and 3 in Unit S29W116. Most of the clay nodules rested within Zone 3 matrix

Figure 4-15. A photograph showing Feature 20, a large slab of basketry-impressed asphaltum, on grid line S27 at the northeast corner of Unit S29W116 in the West Slope Block Excavation. Looking northeast; scale is in centimeters.

and, as in the case of Features 8 and 16, this feature is believed to have most likely been associated with Zone 3. The loose cluster was amorphous in plan, with the burned-clay nodules rather dispersed over an area measuring approximately 48 cm east-west and 58 cm north-south. No charcoal was found in association with the feature.

Feature 20

Feature 20 (see Figures 4-8, 4-15) was an unusually large piece of asphaltum (natural beach tar) found in the north wall of Unit S29W116 and extending beyond the limits of the excavation (see Figure 4-8). Although this item is actually only an unusually large artifact, it was assigned a feature number due to its size. Because the artifact was unique and of potentially considerable significance, it was decided to expose it in its entirety by removing a small block of matrix above and to the sides of the asphaltum where it extended beyond the limits of the block excavation. After in situ documentation, the artifact was removed in its entirely within the underlying soil matrix in which it was embedded.

The asphaltum was in numerous fragments, though it was clear that these were all closely conjoined and that fragmentation had taken place in situ over time, presumably as the result of ground pressure. The larger artifact measured 30 cm long by 29 cm wide, and rested nearly horizontal but at a slight downward dip to the west. Thickness was slightly variable but generally about 6 cm. The upper surface was slightly concave, while the lower surface was correspondingly slightly convex. Parallel impressions of twisted-fiber basketry were observable on the upper (concave) surface, suggesting that the shape of the piece is the result of its having been pressed against the curved outer surface of a basket when the asphaltum was hot and in a liquid or semi-liquid state. In this regard, this artifact resembles other "sherds" of impressed asphaltum recovered from Archaic contexts on sites on the central Texas coast (e.g., at Kent-Crane, 41AS3 [Campbell 1952], and at 41NU267 near Nueces Bay [Ricklis et al. 1995]).

Features in the Knoll Top Block Excavation

A total of six non-mortuary features were documented in the excavations on the Knoll Top. These include three hearths, a possible hearth remnant, a pit, and a lithic-materials cache. The horizontal locations of these features are shown in Figure 4-16.

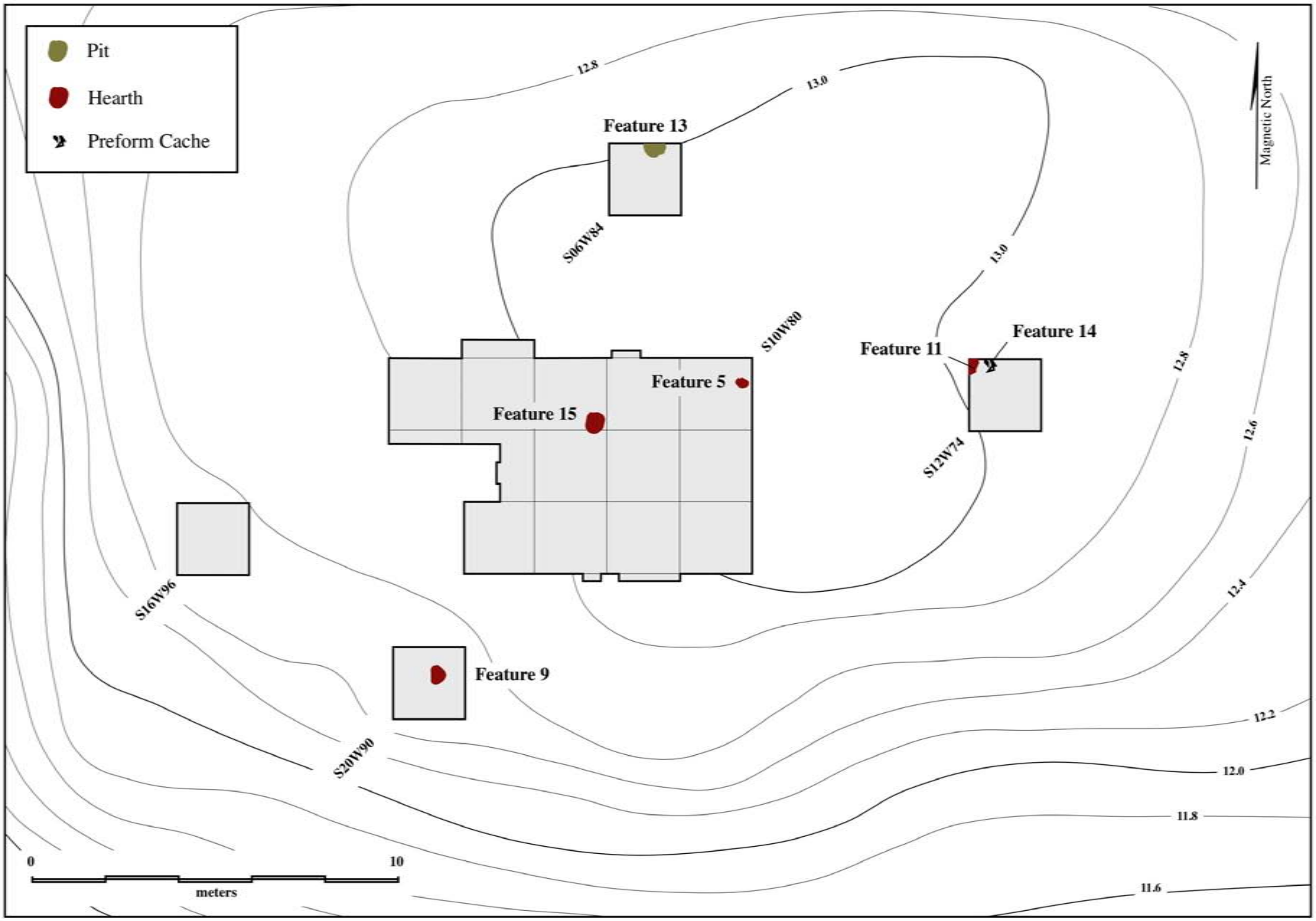


Figure 4-16. A contour map of the Knoll Top Excavation showing the horizontal locations of the features. All are in, or originating in, Zone 2, except Feature 14, a cache of two bifaces in Zone 3.

Feature 5

Feature 5, a possible hearth remnant (Figure 4-17), consisted of a small cluster of sandstone clasts and burned-clay nodules in Level 10, Unit S12W82. These objects rested at 95-100 cm below the surface within Zone 2. They consist of only two pieces of tabular sandstone and two relatively large burned-clay nodules, both of which were fired to an orange color. One of the sandstone clasts is a fragment of milling stone and is described further on.

The small size of this cluster makes interpretation tenuous. The tight clustering (see Figure 4-17) and the relatively large size of the objects at least suggest that they may represent a largely dispersed hearth. A relatively dense accumulation of cultural debris at this level, including the large thick biface to the southwest of the feature, shown in Figure 4-17, suggests that the feature may be associated with a discrete cultural component within Zone 2.

Feature 9

Feature 9, a hearth (Figure 4-18) was a tight cluster, oval in plan, of burned sandstone fragments and burned-clay nodules. It rested within the base of Zone 2 in Unit S20W90, between 71 and 81 cm below the surface. In plan, the feature was 40 long and 30 cm in maximum width. As with other hearth features at the site, it had no discernible depth but rested on a single plane. The burned-clay nodules ranged from orange to dark gray in color. No charcoal was associated.

Feature 11

Another hearth, Feature 11 (Figure 4-19), was represented by a tight cluster of burned-clay nodules and sandstone in Zone 2; also included was a burned chert cobble. The feature was located in the northwest corner of Unit S12W74 (see Figure 4-19) between 45 and 51 cm below the surface. A fragment of faunal bone was found within the cluster, though it was unburned and may not be directly associated with the hearth. All materials rested on a single plane and there was no discernible vertical depth to the feature. No charcoal was associated.

Feature 13

Feature 13 (Figures 4-20 to 4-21) was a pit, similar and size and shape to Feature 17 (found in the West Slope Block Excavation and described above). As was the case with Feature 17, Feature 13 originated in Zone 2 and had been dug down through underlying strata. In this case, the pit penetrated Zones 3A and 3B and had been dug into the basal clay of the Beaumont Formation. Feature 13 was transected by the north wall of Unit S6W84 (grid line S4). Thus, the feature was only partially exposed/excavated, as it extended beyond the limits of the excavation of S6W84. The fill of the pit was a silty fine sand, black to very dark gray in color (10YR 2/1-3/1) save for the bottom along the west edge, which was slightly lighter dark grayish brown (10YR 4/2). For the most part, the fill was visually indistinguishable from the Zone 2 midden but was clearly discernible against the lighter-colored matrices of Zones 3A and 3B. The fill contained small fragments of faunal bone, chert debitage, scattered small burned-clay nodules and a thick, non-diagnostic biface.

Assuming approximate symmetry between the excavated and unexcavated portions of the pit, it had a cylindrical in shape. The profile, as exposed along the north wall of Unit S6W84, was deep and U-shaped. In plan view (which was discernible only below Zone 2) the exposed part of the feature was semicircular in shape. A clear semicircular configuration was present where the pit had been dug into the surface of the Beaumont clay.

Feature 14

A cache of chert preforms (Feature 14) (Figure 4-22) was found in Zone 3 in Unit S12W74. This feature consisted of a pair of large, early-stage, bifacially flaked chert performs. The material is grayish-brown chert, probably bifacially reduced from the kind of river cobbles that provided the overwhelming bulk of the raw material used by occupants of the site. The two specimens are virtually the same size, one measuring 938 mm in length, the other 943 mm.

It is possible that Feature 14 is an Early Archaic mortuary offering, given that it was found in Zone 3, the stratum that contained the early cemetery component on the knoll, and that a large cache of preforms was found in clear mortuary context in Unit S10W88 (Feature 18). However, no human remains were found in association with Feature 14, and very few human bone fragments were found scattered within the overlying Zone 2 deposit in Unit S12W74, in contrast with the occurrence of relatively numerous, small bone elements and human teeth in units that contained burials. Given these facts, its is perhaps most likely that Feature 14 represents a non-mortuary materials cache, similar to the cluster of tested cobbles (Feature 3) found in S54W123 in the West Slope Block Excavations.

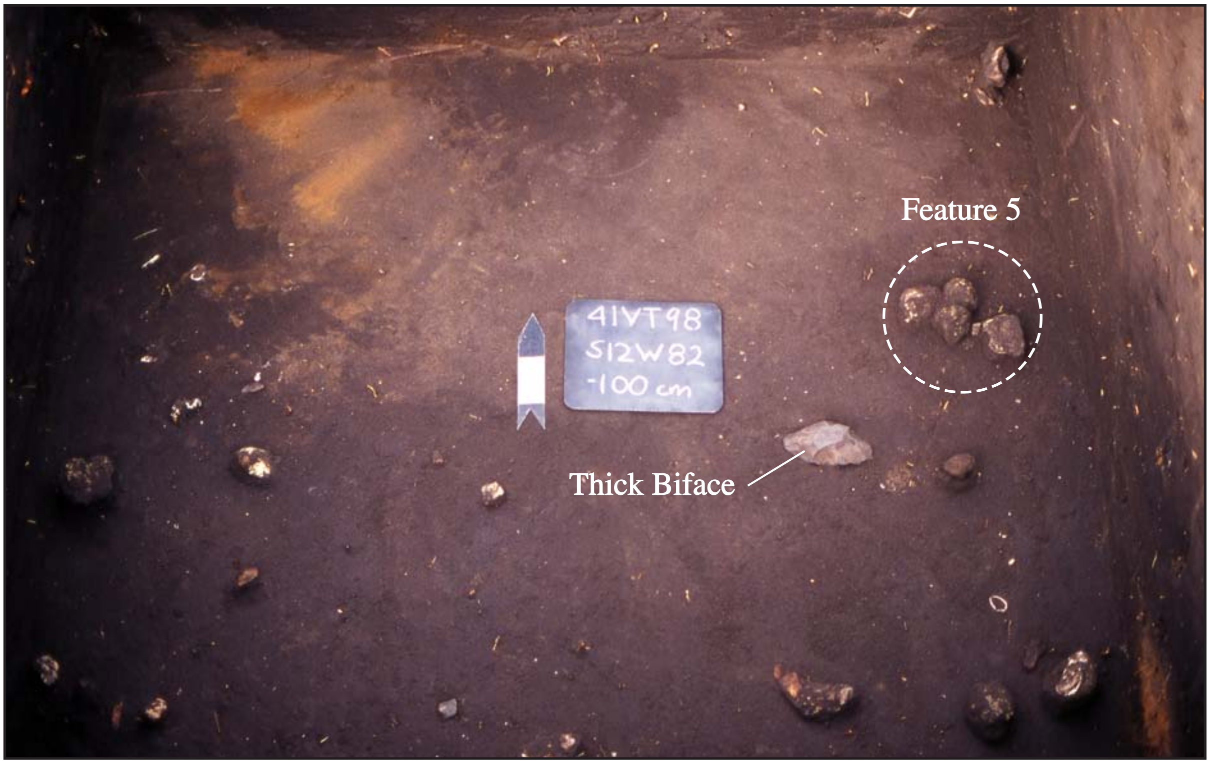


Figure 4-17. A photograph showing cultural debris in situ in the middle (100 cm below surface) of Zone 2, Unit S12W82, in the Knoll Top Block Excavation. Feature 5 is a small cluster of sandstone clasts and burned clay nodules.

Figure 4-18. A photograph showing Feature 9, a cluster of sandstone and burned clay nodules at the base of Zone 2, Unit S20W90, in the Knoll Top Block Excavation. Feature 9 is interpreted as representing a hearth.

Figure 4-19. A photograph showing Feature 11, a cluster of sandstone and burned clay nodules, which was interpreted as a hearth, in Zone 2, Unit S12W74, in the Knoll Top Block Excavation.

Figure 4-20. A photograph showing the northern wall of Unit S06W84 in the Knoll Top Block Excavation and the outline of pit Feature 13. Note that the pit originates in the dark midden soil of Zone 2 and extends downward to penetrate the top of the basal Beaumont Formation clay.

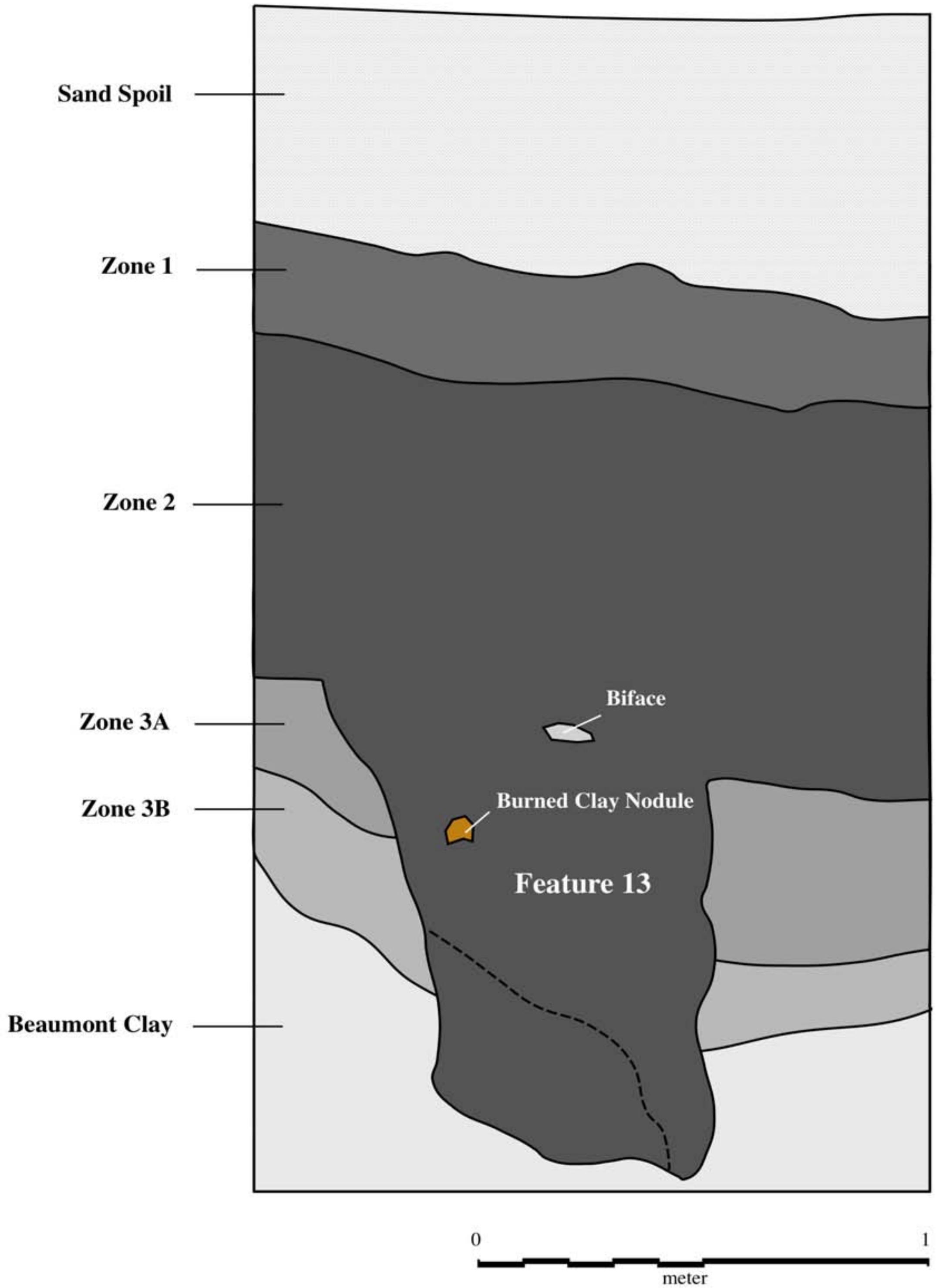


Figure 4-21. Drawing of the profile of pit Feature 13 along the northern wall of Unit S06W84 in the Knoll Top Block Excavation.

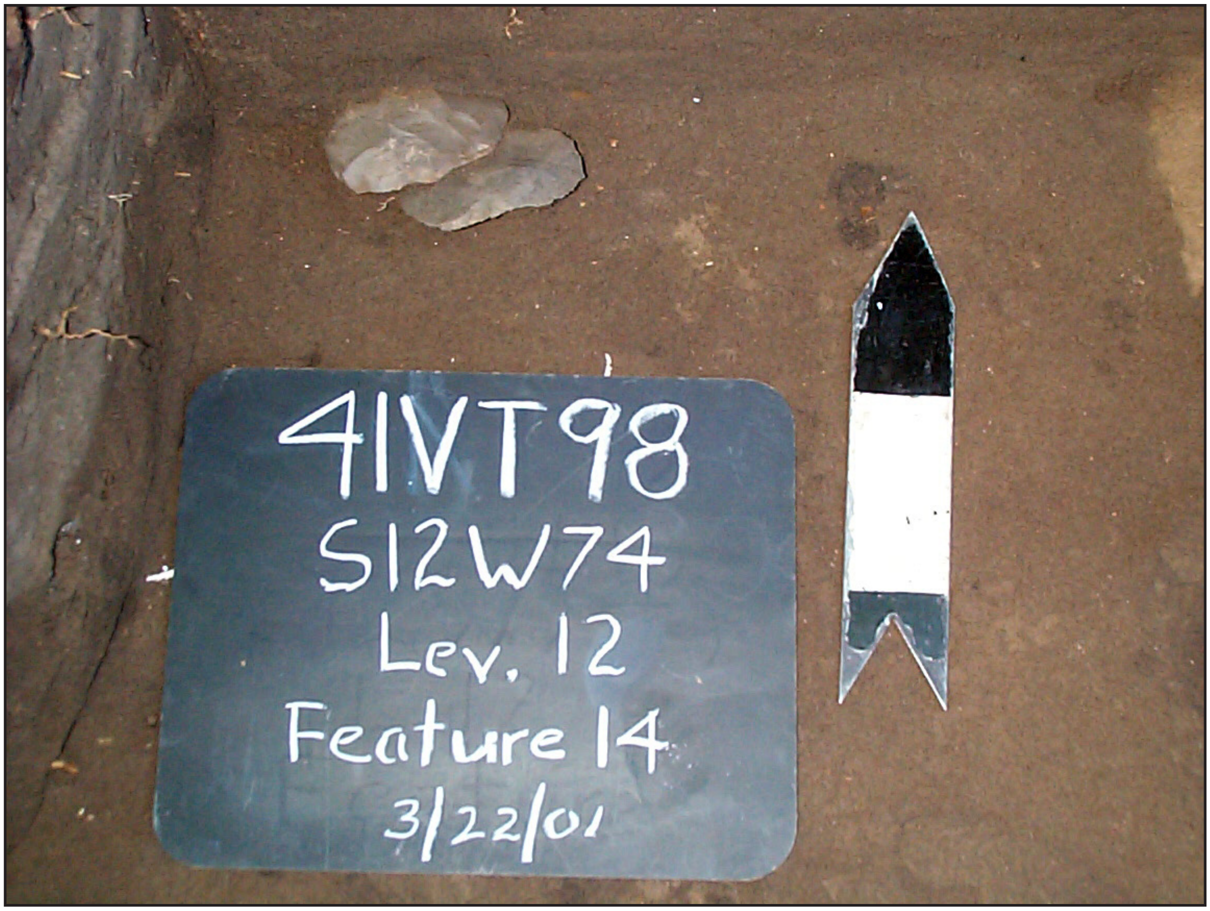


Figure 4-22. A photograph showing Feature 14, a pair of apparently cached bifacial chert preforms, in Zone 3, Knoll Top Block Excavation Unit S12W74.

Feature 15

Another hearth, Feature 15 (Figure 4-23), consists of a small but tight cluster of burned-clay nodules found in Zone 2, Unit S12W86 (and extending a few cm into adjacent Unit S14W86). It rested between 90 and 100 cm below the surface and all nodules were on a flat plane, showing no appreciable thickness in the feature profile. No charcoal was associated.

Discussion of Non-Mortuary Features

Interpretation of the features described above is limited by the fact that the site is largely a cumulative palimpsest wherein repeated occupations have hopelessly smeared and obscured whatever horizontal patterning of cultural materials that may have been associated with the features. One of the striking aspects of the presently available information is the relatively small number of hearths discovered. A total of some 126 square meters was excavated west of the Levee Road, resulting in the exposure of only six hearths and four hearth remnants. By contrast, a total of 10 burned-rock (sandstone) hearth features were found with 30 square meters during recent investigations at the multi-component Smith Creek Bridge site (41DW270) in nearby DeWitt County, Texas (Hudler et al. 2002). Thus Buckeye Knoll produced only about one-fourth the number of hearth features per unit area of excavation (depths of the deposits at the two sites were roughly comparable; see Hudler et al. 2002). It should be noted in this context that close watch was maintained at Buckeye Knoll for hearth or cooking features other than those represented by clusters of burned-clay nodules or stones (e.g., concentrations of charcoal, ash, burned soil), but none was found.

The paucity of hearths at Buckeye Knoll should not be attributed to ephemeral use of the site during prehistory. The densities of cultural debris are considerable, with excavations yielding hundreds of diagnostic projectile points and other tools and hundreds of thousands of specimens of debitage, faunal bone, shell, and burned-clay nodules. Indeed, it is the abun-

Figure 4-23. A photograph showing Feature 15 in Zone 2, situated mainly in Knoll Top Block Excavation Unit S12W86. This cluster of burned clay nodules was interpreted as a hearth.

dance of burned-clay nodules found liberally scattered through the deposits that may offer the best clue as to why there were so few identifiable hearths. Given that lumps of fired clay were clearly used as surrogate hearth stones, the abundance of burned-clay nodules may indicate that hearths were commonly dispersed by treading or other human activities during occupation (or during succeeding recurrent occupations) of the site. In fact, the small number of hearth features that survived what must have been frequent and repeated use of occupation locales may be more a reflection of the relatively intensive use of the site than the converse.

All of the hearths are small clusters of burned-clay nodules or a combination of burned-clay nodules and stones. None show any appreciable thickness or depth, suggesting that they represent small cooking/heating features on level ground or, perhaps, in very shallow basins that could not be detected during excavation. It should be noted that the clay nodules cannot be the result simply of fire building on pre-existing ground surfaces, since the soils on the site are sedimentologically quite distinct, consisting of silty sand, not the clay or sandy clay from which the nodules were produced. Given this fact, it is clear that the clay was intentionally transported to the site and presumably fashioned into the apparently amorphous lumps that were then used as surrogate stone for cooking and/or heating tasks. In fact, as discussed in Chapter 7, there is ample evidence from the site to indicate that clays were intentionally brought onto the site and manipulated in a variety of ways to serve various functions. The presence of organic residues on some of the burned-clay nodules from hearth features strongly suggests that they were used in the cooking of a variety of plant foods (see Appendix C).

The absence of charcoal (and ash) associated with the hearths is probably a factor of lack of preservation. This is strongly suggested by the general dearth of charcoal, even small bits, within the midden deposits at the site; apparently carbonized wood has not preserved well, possibly as the combined result of generally more or less complete combustion and/or leaching of charcoal from the deposits. A few small bits of wood charcoal, identifiable to species, were, however, recovered during flotation, and these indicate the use of a variety of hardwoods, (e.g., oak, mesquite, anacua) that were burned at the site (see report by Puseman and Cummings, Appendix C).

The two pits, Features 13 and 17, are of some interest. Both are of similar size and shape and closely resemble the kinds of sizeable and fairly deep pits found in presumably more sedentary village sites and generally interpreted as storage facilities. Similar features have yet to be documented at hunter-gatherer camp sites in southern Texas or the Texas coastal plain (with the exception of a complex of fairly large and deep pits from a Protohistoric context at the Mitchell Ridge site, 41GV66, on Galveston Island; see Ricklis 1994a:112-119, 132-135). It is inferable that the two Buckeye Knoll pits represent storage of foodstuffs, perhaps gathered plant resources. As noted in Chapter 2, the lower Guadalupe River valley supported large pecan groves that were intensively exploited in Protohistoric and early Historic times, and pecan harvests produced a superabundance of nuts that were stored through the winter. Features 13 and 17 may well represent this sort of food storage. Both pits appeared to originate in Late Archaic strata (Zone 2 on the Knoll Top and Zone 2 on the West Slope), suggesting the emergence of some degree of food storage at the site by Late Archaic times.

The presence of lithic materials caches such as Features 3 and 14 is interesting, insofar as it suggests strategic mobility patterns in which the site was recurrently occupied on a more or less regular and predictable basis. Had mobility been relatively stochastic or "untethered," it seems unlikely that prehistoric residents of the site would intentionally cache materials, given that return visits to the site, during which cached materials could be recovered for use, would have been unpredictable. The rarity of materials caches is not surprising, given that caching behavior would have served little purpose if most caches were not relocated and their constituent materials removed for their intended use(s).

In sum, then, the features at Buckeye Knoll contribute, in a general way, to a picture of intensive and frequently recurring use of the site. The profusion of burned-clay nodules within soil matrices, in combination with the paucity of hearth features, suggests frequent and presumably multifunctional occupation of the site with attendant human treading and dispersal of abandoned features. The sizeable pits most likely indicate storage of foodstuffs, a behavior presumably associated with extended occupations that lasted for weeks or months. Finally, the caching of materials points to more or less regular and predictable re-occupation of the site. As will be seen further on, the kinds and functional ranges of artifacts found at the site are congruent with these generalized interpretations of prehistoric human behavior.

Chapter 5

Prehistoric Mortuary Patterns

Robert A. Ricklis

Numerous prehistoric mortuary sites have been reported on the Texas coastal plain that represent various major time periods. These sites vary greatly in size and in the extent to which they have been studied and reported. In general, few mortuary sites are known for the Paleo-Indian, Early Archaic and Middle Archaic periods. In contrast, numerous components have been identified for the Late Archaic and the Initial Late Prehistoric. The Final Late Prehistoric period is, for reasons as yet not adequately explored, rather poorly represented, in terms of mortuary components, in the regional archaeological record.

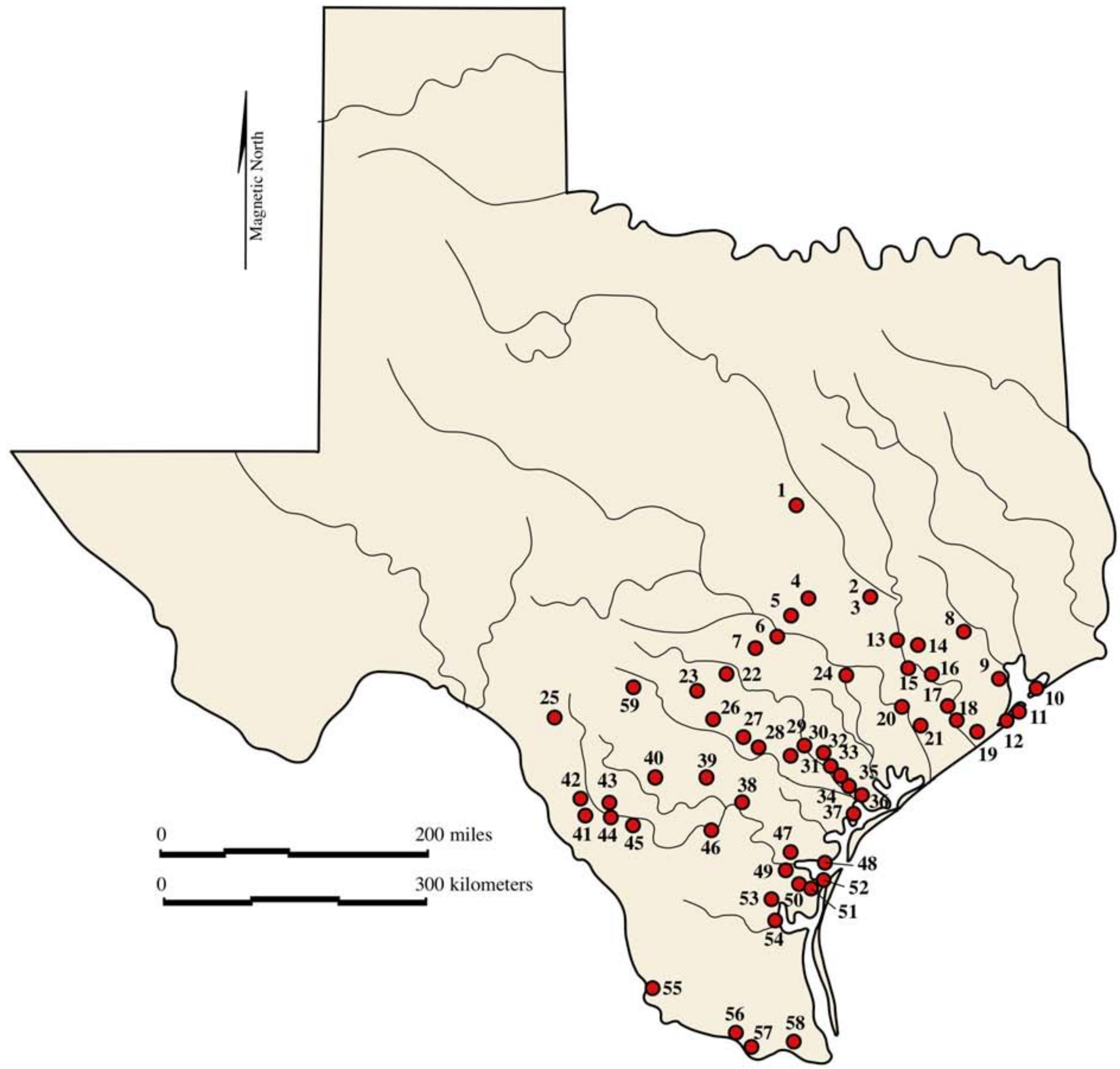
Mortuary sites range in size from single, apparently "isolated", burials to cemeteries containing the remains of 200 or more individuals. At some sites, accompanying mortuary artifacts are relatively few, while at others a significant percentage of interments contained offerings, with some burials accompanied by an array of artifacts of domestic and non-mundane items of material culture.

The exact count of mortuary sites reported to date along the Texas coastal plain depends upon how the area is defined geographically. For the present purposes, our focus is upon the coastline, adjacent coastal prairies, and the inland plains that lie east and south of the Balcones Escarpment that defines the eastern margin of the Edwards Plateau. This study area is bounded on the north by Galveston Bay, and thus excludes the easternmost portion of the Texas coastal zone, from Galveston Bay to the Sabine River, and the adjacent interior of southeast Texas. While some basic geographic continuity of prehistoric cultural patterns can be identified between these areas and our present study area, it is thought best to exclude the former areas because they ultimately fall within the generalized Eastern Woodlands cultural macro-region and are in basic ways ecologically and culturally separable from our region of primary concern. The southern terminus of our area is in deep-south Texas, generally south of the Nueces River, where archaeological data become scarce until one reaches the lower Rio Grande and adjoining upland plains. The latter area is discussed here only briefly, as it appears to have been home to a mortuary tradition(s) that shared some aspects in common with patterns along the Nueces River and on the central coastal zone but had no discernible direct affiliation with patterns identifiable at the Buckeye Knoll site.

The locations of known mortuary sites within the area are shown in Figure 5-1. Additionally, four sites in the Lower Rio Grande area are indicated, as these are discussed briefly in the following pages. Excluding these Rio Grande valley sites, there is a total of 54 reported mortuary sites in the central part of the Texas coastal plain that are of concern here. A few other sites are known, but so little information is available that these are not shown in Figure 5-1 or discussed herein.

Previous Regional Overviews

During the last 20 years or so, there has been some interest in the broad patterns of prehistoric mortuary site distributions on the Texas coastal plain, densities and site-specific traits. This is an expectable outcome of a significant increase in the regional data base that is in large part the result of major excavations at large



1. Asa Warner (41ML46)
2. S. C. Casner No. 1 (41BU16)
3. Winnie's Mound, (41BU17)
4. Loeve-Fox (41WM230)
5. Norman's Crossing (41WM13)
6. Pat Parker (41VT88)
7. Greenshaw (41HY29)
8. Kobs (41HR7)
9. Harris County Boys School (41HR80)
10. Caplen (41GV1)
11. Mitchell Ridge (41GV66)
12. Jamaica Beach (41GV5)
13. Leonard K (41AU37)
14. Ernest Witte (41AU36)
15. Goebel (41AU1)
16. Albert George (41FB13)
17. Big Creek (41RB2)
18. 41FB42
19. Shell Point (41BO2
20. Piekert (41WH14)
21. Crestmont (41WH39)
22. Locke Farm (41CM25)
23. Olmos Dam (41BX1)
24. Frisch Auf! (41FY2)
25. Ralston Burial (41KY26)
26. Shrew (41WN73)
27. Quarry (41WN29)
28. Moy (41WN???)
29. Kerlick Creek # 3 (41DW244)
30. Pat Dunn (41DW234)
31. Morhiss (41VT1)
32. Vic Urban (41VT12)
33. Blue Bayou (41VT94)
34. TWI Ranch (41VT67)
35. Buckeye Knoll (41VT98)
36. Green Lake (41CL13)
37. 41AS9
38. Loma Sandia (41LK28)
39. Deadman's Tank (41AT9)
40. Williams
41. Speys (41DM1)
42. Patterson (41DM28)
43. Walker
44. Minus (41DM28)
45. Catarina
46. Miles (41MC150)
47. Odem (41SP1)
48. Ingleside Burial (41SP78)
49. Berryman (41NU178)
50. Oso Dune (41NU37)
51. Rod Field (41NU29)
52. Callo del Oso (41NU2)
53. Scarborough (41KL30)
54. Dietz (41KL14)
55. 41ZP8
56. Ayala (41HG1)
57. McAllen (41HG27)
58. Floyd Morris (41CF2)
59. Silo (41KA102)

Figure 5-1. Map showing the locations of the Texas coastal plain mortuary sites discussed in the text.

cemeteries such as the Ernest Witte site in the lower Brazos River drainage (Hall 1981), the Blue Bayou Cemetery on the Lower Guadalupe River (Huebner and Comuzzie 1992), and the Loma Sandia site near the Nueces River in Live Oak County (Taylor and Highley 1995). The investigations at these and other sites have served as catalysts for developing regional contexts that elucidate site distributions, site-specific patterns of burial, the typological and stylistic variables of associated mortuary artifacts, and geographically definable cultural patterns.

These various overviews are summarized here. Following these summaries, some key sites are briefly described, after which some basic observations on temporal and cultural-geographic distributions of mortuary patterns are presented.

The Ernest Witte Site and Hall's Hypothesis

The single largest excavation of a prehistoric mortuary site on the Texas coastal plain, sponsored by the Houston Lighting and Power Company, was carried out at the Ernest Witte site (41AU36) under the direction of Grant D. Hall (1981). Four discrete cemetery components, designated as Groups 1-4, were identified at the site, in addition to a sequence of stratified deposits containing limited evidence of campsite occupations. A total of 228 individual burials was documented in the field; the minimum number of individuals (MNI) in the Group 1 cemetery was 61, while Groups 2, 3 and 4 had MNIs of 145, 10 and 12, respectively. Group 1, the earliest cemetery, was assigned to the Middle Archaic, Groups 2 and 3 were placed within the Late Archaic, while Group 4 was interpreted as a Late Prehistoric component.

The large Group 2 cemetery received the most attention in Hall's interpretive overview. Two radiocarbon assays (Hall 1981:49) were obtained on this component, the earlier providing a date of 520 ± 130 B.C. and the later yielding a date of A.D. 360 ± 80, placing Group 2 well within the Late Archaic period as regionally defined. The time range for this cemetery was, importantly, coeval with the Early Woodland and Middle Woodland cultural expressions to the east (these radiocarbon data, along with others currently available for mortuary sites on the Texas coastal plain, are shown in Table 5-1).

Almost one half (48.3 percent) of the Group 2 burials contained associated artifacts, a fact which, in combination with the relatively large size of the cemetery, led Hall (1981:285-299) to infer a well adapted and sizeable regional population carrying out relatively elaborate mortuary practices. Moreover, the presence of certain artifact traits was inferred to represent wide-ranging patterns of interaction that linked the mortuary complex at Ernest Witte to developments in other regions, mainly to the north and east. Finely ground and polished boatstones and stone gorgets found in Group 2 were thought to reflect linkages with the Ouachita Mountains area of west-central Arkansas whence came the raw material for manufacture. Hall also pointed to the presence of similar items in the Coral Snake Mound, a partly contemporaneous, attenuated Hopewellian manifestation in the Sabine River valley of westernmost Louisiana (Jensen 1968; McClurkan et al. 1966; also see Story 1990:257).

Also thought to represent far-reaching cultural influences were the large whelk shell pendants found in some burials; the size and shape of these items are essentially the same as specimens found in certain terminal Archaic and Early Woodland manifestations of the Eastern Woodlands, where they represent long-distance transport from the Gulf coast of Florida and Alabama. Indeed, Hall suggested that the Ernest Witte specimens may have originated along the northeast Gulf coast, despite the availability of large whelk shells on the nearby Texas coast. He based this inference on the fact that modified body-whorl sections of whelk shells at Texas coast sites take the form of mundane tools (e.g., adzes) rather than ornamental and/or ceremonial objects. However, this comparison may not be a valid one, since the mundane shell middens from which the Texas coast data come will predictably represent the technoeconomic aspect of material culture and. thus, are not necessarily comparable to the ceremonial dimension of culture represented by cemetery components.

In any case, Hall's postulation of a general sphere of exchange of materials (and, presumably, ideas) appears to be supported by the close similarities in size and shape, as well as the contemporaneity, of the Ernest Witte shell pendants to forms found extra regionally to the east and northeast (e.g., as far north as the Glacial Kame culture of the upper Midwest and lower Great Lakes region; e.g., Ritchie 1955). Hall further pointed to interactions to the west in the Edwards Plateau area, which was most likely the source for the high-grade cherts from which the distinctive corner-tang knives, represented at Ernest Witte, were manufactured.

Drawing analogies for increasing cultural complexity with cultural patterns exhibited to the east (e.g.,

Table 5-1. Radiocarbon Data from Mortuary Sites on the Texas Coastal Plain.

Site Name/Number	Period	Age (Uncorrected)	Age (Corrected for 13C)	Age Range (Calibrated)	Source
Ernest Witte (41AU36) Group 1	Middle-Late Archaic	4120±140	4560±150	5450-4990	Hall 1981
		—	3610±35	3980-3850	Hard et al. 2002
		3270±70	3480±90	3830-3630	Hall 1981
Group 2	Late Archaic	2460±70	2470±130	2550-2350	Hall 1981
		1650±70	1590±80	1550-1360	Hall 1981
		—	1390±40	1335-1270	Hard et al. 2002
Group 3	Late Archaic	—	2030±35	1980-1860	Hard et al. 2002
Group 4	Late Prehistoric	—	675±40	670-560	Hard et al. 2002
Crestmont (41WH39)	Late Archaic	—	2145±35	2300-2060	Hard et al. 2002
		—	2145±40	2300-2060	Hard et al. 2002
Bowser (41FB3)	Late Archaic	—	2075±115	1895-2125	Patterson 2000
		—	2150±120	1010-2250	Patterson 2000
		—	2230±160	2140-2460	Patterson 2000
		—	2240±120	2190-2430	Patterson 2000
		—	2490±75	2415-2565	Patterson 2000
		—	2580±130	2610-2870	Patterson 2000

Note: All ages are in years B.P.

continued.

Table 5-1. (concluded.)

Site Name/Number	Period	Age (Uncorrected)	Age (Corrected for 13C)	Age Range (Calibrated)	Source
Morhiss (41VT1)	Early Archaic	—	6280±30	7260-7100	Hard et al. 2002
		—	5910±30	6780-6670	Hard et al. 2002
		—	3580±35	3960-3780	Hard et al. 2002
		—	3460±35	3830-3640	Hard et al. 2002
		—	2410±50	2460-2360	Pertulla 2001
Blue Bayou (41VT94)	Late Prehistoric	—	1590±210	1770-1300	Huebner and Comuzzie 1992
		—	1490±90	1520-1310	Huebner and Comuzzie 1992
		—	1240±280	1410-920	Huebner and Comuzzie 1992
		—	1120±80	1180-950	Huebner and Comuzzie 1992
Olmos Dam (41BX1)	Late Archaic	—	1920±160	2050-1690	Lukowski 1988
Loma Sandia (41LK28)	Late Archaic	2710±90	—	2800-2620	Taylor and Highley 1995
		2680±80	—	2760-2600	Taylor and Highley 1995
		2640±100	—	2740-2540	Taylor and Highley 1995
		2640±90	—	2730-2550	Taylor and Highley 1995
		2550±90	—	2640-2460	Taylor and Highley 1995
		2420±90	—	2510-2330	Taylor and Highley 1995
Cayo del Oso (41NU2)	Late Archaic	2740±50	2720±50	2930-2750	Taylor and Highley 1995
		—	1270±35	1260-1170	Hard et al. 2002
		—	1180±35	1170-1050	Hard et al. 2002
Oso Dune (41NU37)	Late Archaic	2720±70	—	2950-2720	Cox and deFrance 1997

Note: All ages are in years B.P.

Poverty Point and later Hopewellian developments), Hall hypothesized that the mortuary patterns evidenced in the Late Archaic at Ernest Witte were part of a geographically broad pattern of mortuary-ritual florescence that was ecologically supported by Late Archaic adaptation to rich riverine resource bases, along the lines posited by Joseph Caldwell's (1958) concept of "primary forest efficiency." With the ecological basis for a population well adapted to the Lower Brazos Valley riverine woodland/prairie ecotone, local societies were in a position to devote time, energy and resources to some degree of ritualistic elaboration, which, in this case, involved integration of extra-regional cultural traits into their indigenous mortuary patterns.

Ecological Correlates of Cemeteries

More recently, Grant Hall has further explored his suggestion of ecological correlates of prehistoric cemeteries on the Texas coastal plain (Hall 1995a, 1995b). He observes that mortuary sites, especially sizeable cemeteries, are not evenly distributed across the landscape, but rather tend to cluster in several specific kinds of settings, namely, along major stream valleys and near coastal bays.

Following Story (1985), Hall suggests that major cemeteries represent growing populations that settled into favorable resource zones through the establishment of discrete territorial ranges. Story (1985) posited that the emergence of cemeteries in the Middle and Late Archaic (periods herein subsumed under the Late Archaic) reflects ecological conditions that were favorable to the growing regional populations, resulting in increased cultural complexity, reduced group mobility, and the emergence of territorial controls over key resource zones:

> *…it is quite probable, because of increased population, that group mobility was more circumscribed…. Not only would movement be reduced, but territorial boundaries and group claims to resources should begin to emerge. Good evidence for the existence of territory-specific groups comes from cemeteries, since they imply that a group had frequent and repeated access to a locale. Cemeteries could also have served to make known, perhaps even sanctify, a group's right to resources. Reference to the remains of ancestors, especially if these represent a number of generations, provide an easily-understood, awe associated means for the living to communicate their title to valued resources of an area. According to this interpretation, the appearance of the first early cemeteries at Morhiss and Ernest Witte was linked to gradually expanding populations. It is hypothesized that this expansion dictated the creation and maintenance of territories with carrying capacities adequate to insure group survival* [Story 1985:44-45].

With these premises forming a working hypothesis, Hall goes on to examine the correlation between the distribution of native pecans in historic times and the locations of major known prehistoric cemeteries. He points out that pecan nuts, in addition to providing a food high in caloric, fat, and carbohydrate values, can be readily stored for extended periods, as is in fact documented ethnohistorically (Hall 1995a:638-643; c.f. Campbell 1975:18-19).

Hall's survey shows a fairly good correspondence between the historic distribution of abundant native pecans (by counties) and the locations of major cemeteries where the Brazos, Colorado, Guadalupe and Nueces rivers traverse the coastal plain (see Hall 1995a:Figure 379). The correspondence is not apparent, however, in north-central Texas, where cemeteries are unreported but pecans are relatively abundant, nor along the coast, where major cemeteries are known but pecans are essentially absent. For the coastal zone, Hall suggests that the high biomass of estuarine food resources would have provided an analogous systemic catalyst for relatively dense populations and the corollaries of discrete territoriality and cemetery formation, and notes that the basic ecological issue is environmental productivity, not the particular kinds of resources involved. For north-central Texas, Hall is less explicit, offering no satisfactory explanation for the breakdown in the correlation between nut biomass and cemetery locations.

Hall (1995a) extends his arguments further to suggest that circumscribed territories containing relatively dense populations may have fostered the emergence of individuals of special status—so-called "big men" (*sensu* Binford 1983)—who coordinated control of rich resource areas, in effect representing a measure of societal differentiation and incipient social complexity among growing populations. Further, it is suggested that such prominent individuals may have formalized their influence through interactions with analogous persons in other groups, thus creating and reinforcing social relations between groups and territories that could serve as a risk-minimization strategy in the event that local resources failed to provide adequate sustenance for a particular group. Hall notes that such a strategy may have been particularly advantageous to groups relying heavily on pecans as a staple, given that abundant nut harvests occur within a given area only once every two to three years.

Finally, Hall relates these hypothetical processes to the appearance of relatively abundant and sometimes exotic mortuary artifacts at major cemeteries such as Ernest Witte, Group 2. He speculates that the presence of items such as boatstones made of rock from the Ouachita Mountains may reflect exchange among special-status persons or "big men" to affirm intergroup alliances. Presumably, these artifacts were buried with their possessors, and this means of disposal effectively removed such items from common circulation, thus enhancing their special social value. For another major, and approximately contemporaneous mortuary site, Loma Sandia in Live Oak County, Hall suggests an analogous situation, but one more oriented toward a southern Texas exchange network than the northerly orientation seen at Ernest Witte (a geographic distinction further discussed below).

Possible Geographically Definable Traditions

Timothy K. Perttula (2000) has summarized extant information on prehistoric mortuary sites in southern Texas. On the basis of documented differences in modes of burial and kinds of associated artifacts, Perttula has posited the existence of several distinct mortuary traditions, each largely contained within its own geographic area, as described in the following paragraphs.

Brazos-Colorado

This area centers upon the lower Brazos and Colorado River valleys in present-day Austin, Fort Bend and Wharton counties. Major sites include Ernest Witte (41AU36), Geobel (41AU1), Big Creek (41FB2), Albert George (41FB13), Crestmont (41WH39), and Bowser (41FB3). Aside from their geographic proximity, the mortuary components at these sites show affinity by virtue of (a) dating to the Late Archaic, (b) containing a preponderance of extended inhumations, and (c) sharing a distinctive mortuary artifact assemblage that includes boatstones, stone gorgets, large whelk-shell pendants, conch-columella ornaments, and bone pins bearing rather intricately engraved geometric designs. This mortuary tradition is the Late Archaic phenomenon that Hall (1981) links to his hypothesized Import-Export Sphere. Leland Patterson had also recognized it as a distinct cultural expression in southeast Texas, and refers to it as the Late Archaic Mortuary Tradition (LAMT) for that region, though he suggests that the tradition persisted into the following Early Ceramic period of Southeast Texas, dated to A.D. 100-600 (Patterson 2000).

Karnes and Wilson Counties

A group of sites in this area, also pertaining to the Late Archaic, contains both extended and flexed burials. The mortuary artifact assemblage is marked by large bifaces, corner-tang knives, occasional polished boatstones and stone gorgets, and sometimes, shell ornaments.

Inland Central Coastal Plain

This includes the area around the confluence of the Guadalupe and San Antonio rivers. Both extended and flexed burials are present, along with whelk-shell artifacts and engraved bone pins similar to those from the lower Brazos-Colorado river area.

Loma Sandia

Perttula defines a distinct mortuary tradition on the basis of the large number of graves and the array of associated artifacts found at this cemetery locale. In contrast to the commonly extended burials in the Brazos-Colorado area, the overwhelming majority of the burials at the Loma Sandia site (41LK28) rested in flexed or semi-flexed positions. Radiocarbon dating places the site within a relatively narrow temporal range between ca. 800 and 500 B.C., approximately contemporaneous with the early range estimated for the Group 2 cemetery at Ernest Witte. The mortuary artifact assemblage is distinguished by abundant dart points (primarily of the Tortugas type, secondarily of the Lange type), sizeable sandstone-slab metates, manos, tubular sandstone pipes, unmodified antler in/over graves, and whelk-shell pendants. The last-named differ from the whelk pendants at Ernest Witte and other sites in the lower Brazos-Colorado area by a generally somewhat smaller size and the frequent use of decorations made up of rows of small drilled dots in the shell surface. This type of pendant has been reported from occupation sites on the central Texas coast (e.g., Dreiss 2002; Ricklis n.d.), suggesting this as the source area for these items.

South Texas

This includes sites south of the Edwards Plateau and the Nueces River from which little data are available. Most sites have yielded only single interments.

South-Central Coast

This is perhaps more of a geographically defined area than it is a cultural pattern. Included are Archaic and Late Prehistoric sites that shared characteristics with inland southern Texas as well as the Brazos-Colorado area to the north and the Rio Grande valley to the south. Mortuary sites tend to be characterized by flexed interments in clay dunes (e.g., the Callo del Oso site [41NU2] and the Oso Dune site [41NU37], on Oso Bay and Oso Creek, respectively, as well as certain sites in the Baffin Bay area to the south).

Rio Grande

Perttula makes a distinction between the inland lower Rio Grande (primarily the area around Falcon Reservoir and the confluence of the Rio Grande and Rio Salado) and the Rio Grande Delta area. He identifies a distinctive Late Prehistoric pattern of isolated burials or small cemeteries containing Caracara arrow points and various shell and bone artifacts. The Archaic sites in this area appear to have traits in common with both Loma Sandia to the north and the Rio Grande Delta and lower Texas coast areas.

Discussion

Several basic distributional patterns are clear in the information presented and synthesized by Perttula. First, it is apparent that during the Late Archaic, extended supine burials were the predominant mode of burial in the northern part of the coastal plain. Secondly, the same sites contain a distinctive assemblage characterized by large shell pendants, boatstones and sometimes stone gorgets, conch-columella ornaments, and engraved bone pins. To the south, these associations give way to an overwhelming predominance of flexed or semi-flexed burials associated with ground stone tools such as metates and manos, caches of dart points, and tubular stone pipes. Still farther to the south, in deep south Texas and along the Rio Grande, burials are still mainly flexed and are sometimes accompanied by tubular stone pipes, but tubular bone beads, sometimes made from human longbone, are common.

Other Overviews

To the works of Hall and Perttula can be added regional summaries of mortuary sites by Huebner and Comuzzie (1992) and Taylor and Highley (1995). The former work offers a brief overview of known prehistoric cemetery sites on the central Texas coast and the adjacent coastal prairie as a general context for their report on the Blue Bayou burial site (41VT94) near the Guadalupe River south of Victoria. The overview by Taylor and Highley is more extensive, listing information on mortuary sites by counties for a larger region that includes all of south Texas, the lower Pecos River area and central Texas near, and to the east of, the Balcones Escarpment (Taylor and Highley 1995:666-677). A total of 80 sites, spanning the chronological spectrum from Paleo-Indian to the Late Prehistoric, is listed for this large area (Taylor and Highley 1995:669).

Several key points are made by Taylor and Highley in their discussion of the regional data, and these are worth briefly summarizing here. First, most of the larger cemetery locales appear to be the result of multiple periods of use, in contrast to the Loma Sandia cemetery, wherein all 205 interments apparently pertained to a single time period (ca. 800-500 B.C., thus falling into the Late Archaic as defined here). Generally, individuals buried within cemeteries were not spatially segregated by age or sex, as was the case at Loma Sandia (though the authors caution that data on this subject are limited by poor skeletal preservation at many sites). In-flesh inhumation was the predominant type of burial within the region, though cremations and bundle burials are present at some sites. Headward orientation of burials was variable. At some sites, orientation was seemingly random, while at others, there was a tendency for heads to be oriented more often than not in one direction. At some sites, such as the Group 1 and Group 2 components at Ernest Witte, there was a near consistency in direction of head orientation. Body position in primary (in-flesh) burials varied across the region of southern Texas. However, Archaic cemeteries on the central coastal plain tended to have bodies placed in extended, supine positions, while in south Texas and along the southern margin of the Balcones Escarpment, burials were generally in flexed or semi-flexed positions. There was little apparent spatial arrangement of burials, other than the fact that burials were clustered as discrete cemeteries at most sites. The presence of mortuary artifacts with burials varied considerably between sites, geographic areas and, perhaps, time periods. Additionally, the percentages of burials with associated artifacts varied greatly by area and time periods.

Central Coastal Plain Mortuary Practices

Given the fact that previous authors have reviewed the site-specific data for prehistoric mortuary practices on the Texas coastal plain (Huebner and Comuzzie

1992; Taylor and Highley 1995), it is unnecessary here to review this information in great detail. However, it is worthwhile to summarize briefly findings at certain better-known locales in order to establish an empirical baseline for further discussion, which is in turn formulated as a partial cultural-historical context for the mortuary findings at Buckeye Knoll. The focus here, then, is on well-documented mortuary data from sites that can be shown to represent one or more of the prehistoric mortuary traditions definable for the region. Data from mortuary sites in the region are summarized in Tables 5-1 through 5-3.

By far, the most information is available from sites that can be assigned to the Late Archaic period. A somewhat less extensive information base is available for Late Prehistoric sites. The following discussion is grouped according to these broad time periods. Tables 5-1 and 5-2 present collected information on estimated time periods and size of cemetery populations and on mortuary traits from individual sites, respectively.

Paleo-Indian

Only two sites with mortuary remains can be placed within the Paleo-Indian period (Figure 5-2). Strictly speaking, neither of these is on the Gulf coastal plain, but they are in proximity and are included herein as the sole representatives of the period within the larger region.

The Wilson-Leonard site (41WM235) lies near the edge of the Balcones Escarpment near the town of Leander in Williamson County. The site contains a deeply stratified record of human occupation from Paleo-Indian times through the Archaic and into the Late Prehistoric (Collins 1998). In one of the deeper levels at the site, a single flexed human burial was found during the course of excavations in 1983 (Parvin 1983; Weir 1995). Dated on the basis of soil matrix and associated charcoal, this individual can be placed within the late Paleo-Indian period. Associated artifacts include a grinding stone, a limestone cobble, and a fossil shark tooth.

The Horne Shelter No. 2 site (41BQ46) in Bosque County in north-central Texas contained the graves of an adult male and a juvenile, both in flexed positions (Redder 1985; Young et al. 1987). Charcoal and shell from the stratum at which the burial pit originated were dated between 9500 ± 200 years B.P. and 10,310 ± 150 years B.P. The burial was covered with limestone slabs and contained 80 marine shell beads, bird claws, four perforated non-human canine teeth, two antler billets and sandstone slabs. The human skeletal materials were partially mineralized and in good condition. Osteological analysis showed that, while the adult male exhibited some robusticity, the skeletal attributes were basically similar to later individuals from the central Texas region (Young et al. 1987).

Early Archaic

Only two components on the Texas coastal plain can be definitively placed within this period (Figure 5-3). One is the early cemetery at the Buckeye Knoll site, and the other is represented by two radiocarbon-dated burials from the Morhiss site located on the Guadalupe River floodplain, some eight km northwest of Buckeye Knoll. A total of 250 burials were excavated at Morhiss (Campbell 1976; see also <www.texasbeyondhistory.net>) and no distinctions can be made at present as to the number that may pertain to the Early Archaic period. To date, only five of the Morhiss burials have been AMS dated, with two yielding Early Archaic age ranges (calibrated) of 7260-7100 B.P. and 6780-6670 B.P. (Hard et al. 2002). Interestingly, these age ranges fall within the range of the radiocarbon assays available for the early cemetery at Buckeye Knoll (see Table 6-4, below).

The only other Early Archaic mortuary sites currentl known within some proximity to the Texas coastal plain are two sinkhole burial shafts on the Edwards Plateau. The Bering Sinkhole site (41KR241) on the southern Edwards Plateau yielded the remains of 22 individuals assigned to this period, along with a suite of lithic artifacts that includes Martindale and Uvalde dart points (Bement 1994). A series of radiocarbon dates from the Early Archaic stratum produced calibrated ages ranging from 7760 to 5100 B.P. At the site of Seminole Sink in Val Verde County, a minimum number of 21 individuals was believed to be associated with an Early Corner Notched dart point and calibrated radiocarbon age ranges of between 6729 and 6197 B.P. (Turpin 1988). The Early Corner Notched point appears to be morphologically similar to the Uvalde type, assigned to the Early Archaic period in central Texas (e.g., Prewitt 1981, 1985; Turner and Hester 1999).

Middle Archaic

Mortuary sites of this period in the Texas coastal plain are as scarce as sites of the Early Archaic; presently, only two components have been radiocarbon dated approximately to this period, while a third (Piekert site) is estimated to pertain to the Middle Ar-

Table 5-2. Period Placement for Texas Coastal Plain Mortuary Sites Based on Table 5-1 and on Information Discussed in the Text.

Site Name/Number	Early Archaic	Middle Archaic	Late Archaic	Late Prehistoric I	Late Prehistoric II	MNI
Asa Warner (41ML46)	—	—	—	—	x	7
Winnie's Mound (41BU17)	—	—	x	—	x	12
Loeve-Fox (41WM230)	—	—	—	x	—	37
Norman's Crossing (41WM13)	—	—	—	x	—	4
Pat Parker (41VT88)	—	—	—	x	—	14
Greenhaw (41HY29)	—	—	—	—	—	2
Kobs (41HR7)	—	—	x	x	x	4*
Harris Co. Boys' School (41HR80)	—	—	x	x	-	29*
Caplen (41GV1)	—	—	?	x	x	65*
Mitchell Ridge (41GV66)	—	—	x	x	x	51*
Jamacia Beach (41GV5)	—	—	—	x	—	29*
Leonard K (41AU37)	—	—	x	—	—	9
Ernest Witte (41AU36) Group 1	—	x	x	—	—	61
Ernest Witte (41AU36) Group 2	—	—	x	—	—	145
Ernest Witte (41AU36) Group 3	—	—	x	—	—	10
Ernest Witte (41AU36) Group 4	—	—	—	x	x	12
Crestmont (41WH39)	—	—	x	—	—	28
Piekert (41WH14)	—	x	-	—	—	10
Goebel (41AU1)	—	—	x	—	—	36
Albert George (41FB13)	—	—	x	—	—	12
Big Creek (41FB2)	—	—	x	—	—	75
Bowser (41FB3)	—	—	x	—	—	35
Shrew (41WN73)	—	—	x	—	—	9
Pat Dunn (41DW234)	—	—	x	—	—	1
Morhiss (41VT1)	x	x	x	—	—	250*
Blue Bayou (41VT94)	—	—	x	x	—	38
TWI Ranch (41VT9)	—	—	x	—	—	22
Buckeye Knoll (41VT98)	x	x	x	—	—	111*
Green Lake (41CL13)	—	—	x	—	—	10
Loma Sandia (41LK28)	—	—	x	—	—	205
Deadman's Tank (41AT9)	—	—	x	—	—	50
Odem (41SP1)	—	—	?	x	—	65
Ingleside (41SP78)	—	—	x	—	—	5
Berryman (41NU173)	—	—	—	x	—	32
Oso Dune (41NU37)	—	—	x	—	—	200**
Rodd Field (41NU29)	—	—	x	—	—	11
Callo del Oso (41NU2)	—	—	x	—	—	300**
Scarborough (41KL30)	—	—	?	—	—	10
Dietz (41KL14)	—	—	?	—	—	21

* Multiple time periods. ** Gross Estimate

Table 5-3. Traits Found at Various Mortuary Sites on the Texas Coastal Plain.

Traits	41AU1	41AU36-1	41AU36-2	41AU36-3	41AU37	41FB13	41FB42	41FB3	41WH14	41WH39	41CL3	41VT1	41VT9	41VT98	41AS59	41SP1	41SP78	41NU2	41NU29	41NU37	41KL14	41KL30	41LK28	41KA23	41KA102	41BX1	41BT1	41CM25
Burials (MNI)	36	61	145	10	9	24	75	35	10	28	10	250	22	6	50	65	5	300	11	200	21	10	205	5	—	13	6	75
Burial Type: Flexed/Semi-Flexed	x	x	x	x	x	x	?	—	x	x	x	x	x	—	?	?	—	x	?	x	?	?	x	x	x	x	x	x
Burial Type: Extended	x	x	x	—	x	x	?	x	x	x	—	x	x	x	?	?	x	—	?	—	?	?	—	x	—	—	—	—
Burial Type: Bundle	—	—	x	—	—	—	?	—	—	—	—	x	x	—	?	?	—	x	?	—	?	?	—	—	—	—	—	—
Burial Type: Cremation	—	x	x	—	—	—	—	—	—	—	—	x	—	—	—	?	—	—	?	—	?	?	—	—	?	—	?	—
Head Orientation: North	—	—	—	x	—	—	—	x	—	x	—	—	x	—	—	—	—	—	—	x	—	—	x	—	—	—	—	x
Head Orientation: Northeast	—	—	x	—	—	—	—	—	—	x	—	—	—	—	—	—	—	—	—	—	—	—	x	—	—	x	—	x
Head Orientation: East	—	—	—	—	x	—	—	—	—	—	—	—	—	—	—	—	—	—	—	x	—	—	x	—	—	x	—	—
Head Orientation: Southeast	—	—	x	—	—	—	—	—	—	—	—	—	—	x	—	—	x	—	—	—	—	—	x	—	—	x	—	x
Head Orientation: South	—	—	—	x	—	—	—	—	—	—	—	—	x	—	—	x	—	—	—	—	—	—	x	x	—	—	—	—
Head Orientation: Southwest	—	—	—	—	—	—	—	—	—	x	—	—	—	—	—	—	—	—	—	x	—	—	x	x	—	—	—	—
Head Orientation: West	—	—	—	—	—	—	—	—	—	—	—	—	x	—	—	—	—	—	—	—	—	—	x	—	—	x	—	x
Head Orientation: Northwest	—	—	—	x	x	—	—	—	—	x	—	—	—	—	—	—	—	—	—	x	—	—	x	—	—	—	x	—
Hearth Over Body	—	—	—	—	—	—	—	—	—	—	—	x	—	—	—	—	—	x	—	—	—	—	—	—	—	—	—	—
Stone Slabs in Grave	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	x	—	—	—	—	—	—	x	—
Dart Points	x	x	x	x	—	x	—	x	x	x	x	x	—	x	x	—	—	—	—	—	—	—	x	x	x	x	x	—
Perdernales	—	x	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Kent	—	—	x	—	—	—	—	—	—	x	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Morhiss	—	—	—	—	—	—	x	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	x	—	—	—	—	—
Lange	—	—	—	—	—	—	—	—	—	—	—	—	—	x	—	—	—	—	—	—	—	—	x	—	—	—	—	—
Tortugas	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	x	—	—	—	—	—
Ensor/Fairland	—	—	x	—	—	—	—	—	—	—	—	—	—	—	—	x?	x	—	—	—	—	—	—	—	—	—	—	—
Gary	x	—	—	—	—	x	—	—	—	x	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Godley	—	—	—	—	—	—	—	—	—	x	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Other	—	—	—	—	—	—	—	x	—	—	—	—	—	—	—	—	—	—	—	x	—	—	x	x	—	x	—	—
Thin Bifaces/Knives	—	—	x	—	—	—	—	—	—	x	—	x	—	x	x	—	x	x	x	—	—	—	x	x	x	x	—	x
Corner-Tang Knives	—	—	x	—	—	—	—	x	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	x	x	—	—	—
Flaked Lithic Tools	—	—	—	—	—	—	—	—	—	—	—	x	—	—	x	—	—	—	—	—	—	—	x	—	—	—	—	—
Manos/Metates	—	—	—	—	—	—	—	—	—	—	—	x	—	—	—	—	—	—	—	—	—	—	x	—	—	x	x	—

Note: Listed artifacts are associated with burials as grave goods.

continued.

Table 5-3. (concluded.)

Traits	41AU1	41AU36-1	41AU36-2	41AU36-3	41AU37	41FB13	41FB42	41FB3	41WH14	41WH39	41CL3	41VT1	41VT9	41VT98	41AS59	41SP1	41SP78	41NU2	41NU29	41NU37	41KL14	41KL30	41LK28	41KA23	41KA102	41BX1	41BT1	41CM25
Abraders	x	—	x	—	x	—	—	x	—	x	—	—	—	—	—	—	—	—	—	—	—	—	x	x	—	x?	—	—
Hammerstones	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	x	—	—	—	x	—	—	—	—	—
Boatstones	—	—	x	—	—	x	x	x	—	—	—	x	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Gorgets (Stone)	—	—	x	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	x	—	—	—	—
Ochre	x	—	x	—	—	—	—	x	x	x	—	x	—	x	—	—	—	x	—	—	—	—	x	—	—	—	—	x
Asphaltum	—	—	—	—	—	—	—	x	—	—	—	x	—	—	—	—	—	—	—	x	—	—	x	x	—	x	—	—
Stone Beads	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	x	—	—	x	—	—	—	—	—
Tubular Stone Pipes	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	x	—	x	x	x	—	—	—	—	—
Bone Awls/Pins	x	—	x	—	x	—	—	x	—	x	—	—	—	—	—	—	x	x	—	x	—	—	x	—	—	—	—	—
Engraved Bone Pins	x	x	x	x	—	x	—	—	—	x	x	x	x	—	—	—	x	—	—	—	—	—	x	—	—	—	x	—
Bone Beads	x	—	—	—	—	—	—	x	—	—	x	x	—	—	—	—	—	—	—	x	—	x	x	—	—	—	—	—
Bone Points	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	x	—	—
Antlers/Antler Racks	—	—	x	—	—	—	—	—	—	x	—	x	—	—	—	—	—	—	—	—	—	—	—	x	—	x	—	—
Modified Antler	—	—	—	—	—	—	—	—	—	x	—	—	—	—	—	—	—	—	—	—	—	—	x	—	—	—	—	—
Human Bone Artifacts	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	x	x	—	—	—	—	—	—
Tourtise Shell Rattles	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	x	—
Large Whelk Shell Pendants	x	—	x	x	x	x	x	x	—	x	—	x	—	x	—	—	—	—	—	—	—	—	—	—	—	—	—	x
Welk Pendants w/ Dots	—	—	x	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	x	—	—	x	—	—
Discodial Conch Beads	—	—	x	—	—	—	—	—	—	x	—	x	x	—	—	—	—	—	—	—	—	—	—	—	—	x	—	x
Conch Columella Beads/Danglers	—	—	x	—	—	—	—	x	x	x	—	—	x	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Olive Shell Beads/Tinklers	—	—	—	—	x	—	—	—	—	—	—	x	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	x
Olivella Beads	—	—	x	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Conch Shell Tools	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	x	—	—	—	—	—	—	—	x	—	—
Unmodified Conch Shells	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	x	—	—	—	—	x	—	—	—	—	—
Conch Columellas	—	—	—	—	—	—	—	—	—	x	—	—	—	—	—	—	—	x	—	—	—	—	x	—	—	—	—	—
Mussel Shell Pendants	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	x	—	x	—	—	—	—	—	—	—	—
Mussel Shell Beads	—	—	—	—	—	—	—	—	x	—	—	x	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Bivalve Shell Stacks	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	x	—	—	—	—	—	—	—	—	—	—	—
Native Copper Pins	—	—	—	—	—	—	—	x	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Note: Listed artifacts are associated with burials as grave goods.

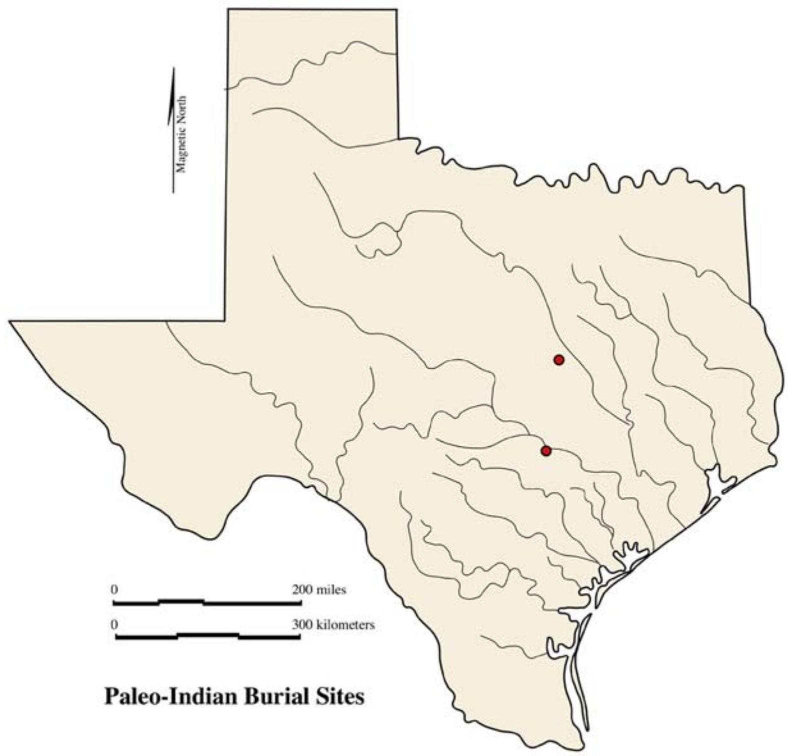


Figure 5-2. Map of Texas showing the locations of Paleo-Indian burial sites near the coastal plain.

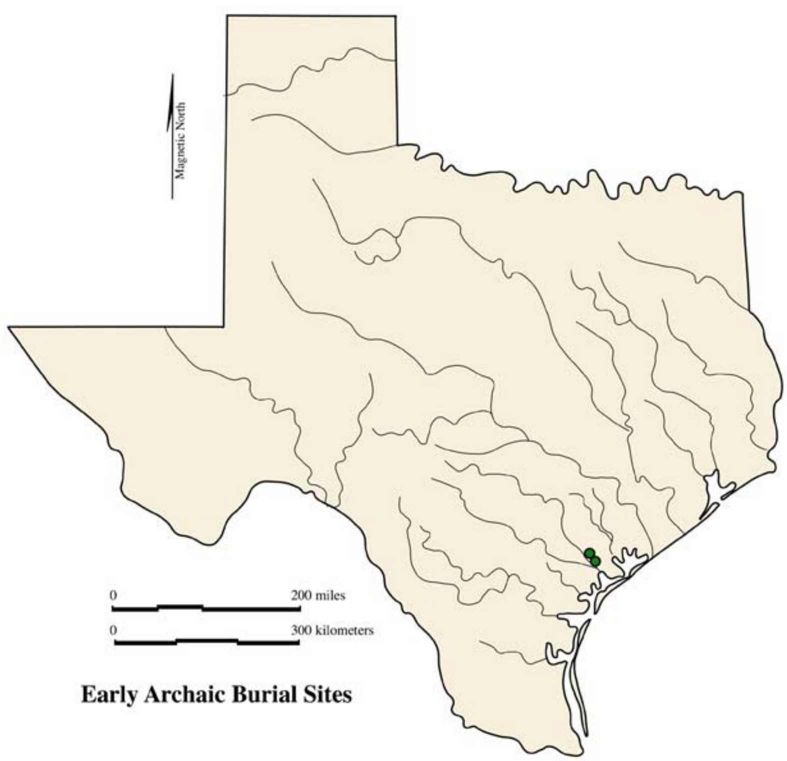


Figure 5-3. Map of Texas showing the locations of the two known Early Archaic burial sites on the coastal plain, Morhiss (41VT1) and Buckeye Knoll (41VT98).

chaic based on certain traits (Figure 5-4). The best-known is the Group 1 cemetery at the Ernest Witte site, which in fact appears to straddle the time line between the Middle Archaic and the beginning of the Late Archaic (i.e., ca. 4,000 B.P.), as defined herein. Burials in this group were generally primary interments, with bodies placed in supine, extended positions and headward orientations fairly consistently to the southeast. Three dates are currently available for this component; two of these, reported by Hall (1981), are 5450-4990 B.P. and 3830-3630 B.P. The third date is reported by Hard (2002), with a calibrated age range of 3980-3850 B.P. The only time-diagnostic projectile point type found in this cemetery was a Pedernales point, which fits fairly well with the two more recent age ranges from burials as this point type is placed no earlier than ca. 3600 B.P. in the central Texas chronology (Prewitt 1981, 1985). Patterson (2000) reports a similar age range for three radiocarbon dates on the earlier two burial groups at the nearby Bowser site (41FB3), with a combined calibrated age range of 3630-3275 B.P. Strictly speaking, these are also referable to the early part of the Late Archaic as defined here, and it is worth noting that the pertinent burials appear to predate the later elaboration of the mortuary pattern as represented by a variety of grave goods (see Patterson 2000).

Two radiocarbon dates obtained on human bone from the Morhiss site suggest the presence of a component of similar age. The calibrated age ranges on these two burials are 3960-3780 B.P. and 3830-3630 B.P. (Hard et al. 2002), thus placing at least some of the burials at Morhiss within the same time range as the Ernest Witte Group 1 cemetery.

Strictly speaking, Ernest Witte Group 1, the early burial group at Bowser, and the mentioned dated burials at Morhiss all fall largely or completely within the time range of the earliest part of the Late Archaic as here defined. However, the fact that cemeteries may have been used for extended periods of time at least suggests that some portion of these mortuary components may pertain to the latter centuries of the Middle Archaic. This is particularly the case at Morhiss and Ernest Witte, where the earliest burials fall either within or very close to the temporal range of the end of the Middle Archaic. In any case, the currently available evidence suggests that Middle Archaic cemeteries on the Texas coastal plain are relatively few and far between, and the findings at Ernest Witte, Bowser and Morhiss combine to suggest a relatively unelaborated mortuary pattern prior to the last millennium B.C.

The Piekert site (41WH14) produced the remains of 10 or 11 individuals. Burials were in semi-flexed position, with the exception of one tightly flexed individual. The site has been assigned to the Late Archaic on the basis of a Yarbrough dart point embedded in human bone (Hall 2002:117; Taylor and Highley 1995:676). However, there is some evidence that Yarbrough points, traditionally not well placed chronologically (e.g., see Turner and Hester 1999), may actually be of Middle Archaic age. For instance, Ensor (1998:351) suggests that the type falls in the chronological spectrum at between 4000 and 2000 B.C., the period here defined as the Middle Archaic. He further cites radiocarbon data from Fort Hood in central Texas, reported originally by Quigg and Ellis (1994), where two calibrated age ranges of 3086-2905 B.C. and 2890-2621 B.C. on charcoal came from a stratigraphic unit containing a Yarbrough point.

While the presence of the Yarbrough point at the Piekert site only suggests a Middle Archaic age for this cemetery, it is perhaps relevant to note that the mortuary artifact assemblage differs from that found at Late Archaic sites in the same area. The Piekert materials consist of mussel-shell beads, tubular shell beads, bone beads and pendants, and red ochre. The large whelk-shell pendants and engraved bone pins that characterize Late Archaic mortuary assemblages in the area are lacking, as are stone items such as boatstones and corner-tang knives. It is perhaps also relevant that the Piekert burials were semi-flexed and flexed, in contrast to the extended positions documented for Late Archaic cemeteries in the area.

Late Archaic and Late Prehistoric

After ca. 3,000 B.P., there seemingly was a florescence in the number and size of mortuary sites in the region. All of the largest cemeteries known on the Texas coastal plain, in fact, appear to date to between ca. 800 B.C. and the first few centuries A.D. Notable examples, all with at least minimal radiocarbon data, include the Group 2 cemetery at Ernest Witte, the Loma Sandia cemetery, and the Callo del Oso and Oso Dune cemeteries, both in coastal settings in the Corpus Christi area. The sizeable number of other, smaller sites (Figure 5-5) that can be culturally linked (on the basis of various attributes) to these large cemeteries, attests to the overall picture of a major increase in cemetery use during this period.

The exponential increase in the number of mortuary sites during the Late Archaic offers an expanded

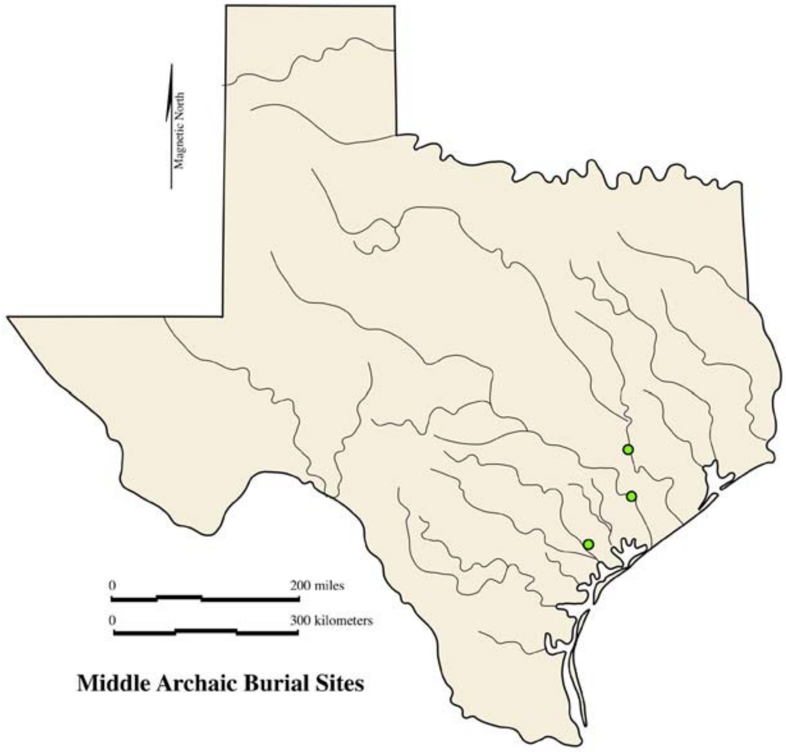


Figure 5-4. Map of Texas showing the locations of the three known Middle Archaic burial sites (from north to south, Ernest Witte Group 1, Piekert, and Morhiss).

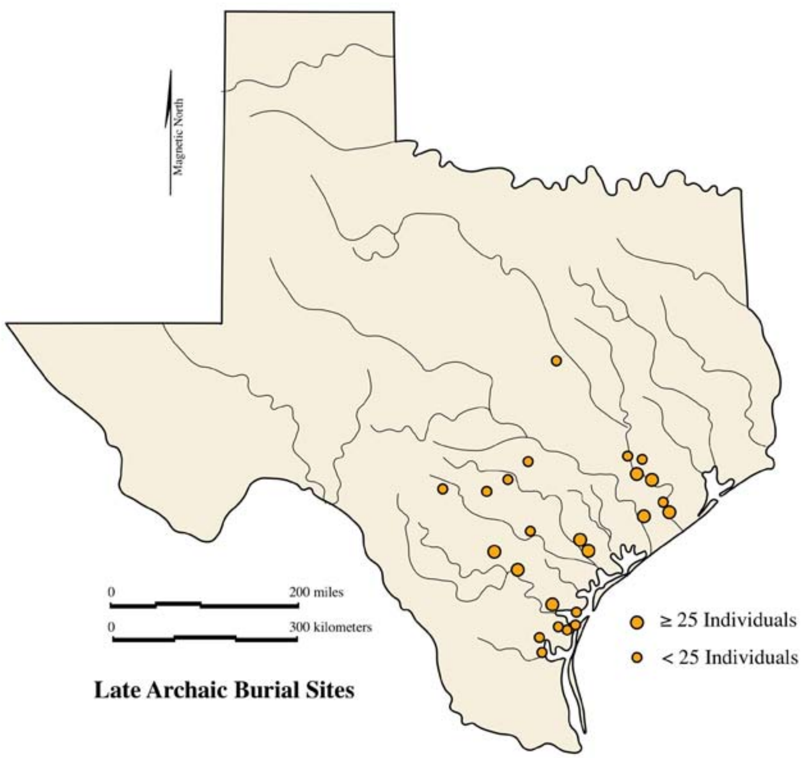


Figure 5-5. Map of Texas showing the locations of Late Archaic burial sites on or near the coastal plain. The map excludes sites in the lower Rio Grande valley, as most are poorly dated.

data base that is useful for comparative studies and the identification of geographically definable mortuary patterns or traditions. The combined information from various sites of the period indicate clear shifts in mortuary behavior from north to south along the coastal plain; for this reason, key sites are discussed here in that geographical order.

As may be seen in Figure 5-6, mortuary sites pertaining to the early part of the Late Prehistoric period (ca. A.D. 800-1200/1300) are also relatively abundant. However, during the latter part of the Late Prehistoric, ca. A.D. 1300-1700, mortuary sites were relatively few, for reasons not yet understood (Figure 5-7). No sites on the central coastal plain or in south Texas presently can be assigned to this period with confidence; the only proven cemeteries of the period are in the Galveston Bay area and in the Middle Brazos drainage of east-central Texas.

One of the clearest concentrations of Late Archaic cemeteries on the Texas coastal plain is in the area of the lower Brazos and Colorado River drainages. Sites in this area are located on upland margins overlooking floodplains, and include Ernest Witte (41AU36) and the nearby much smaller Leonard K site (41AU37), Goebel (41AU1), Albert George (41FB13), Big Creek (41FB2), Piekert (41WH14), and Crestmont (41WH39). Each is briefly discussed, below.

Ernest Witte (41AU36)

As alluded to above, the best-known site in this group is Ernest Witte, at which 228 individual burials were excavated (Hall 1981). Of the four distinct cemetery groups identified by Hall, two, Groups 2 and 3, were assigned to the Late Archaic. Due to budgetary constraints, radiocarbon dating of the Ernest Witte cemeteries was very limited, with only four assays on human bone (apatite fractions) reported by Hall (1981:49). As already mentioned, two of these were run on samples from the Group 1 cemetery, while the other two were from the Group 2 cemetery, and calibrate to 2550-2350 B.P. and 1550-1360 B.P. These results appear to indicate a rather long use for the Group 2 cemetery, from as early as 600 B.C. to perhaps as late as A.D. 590. More recently, a radiocarbon assay obtained by Robert Hard (Hard et al. 2002) extends the time range of Group 2 even later, with a calibrated age range of 1335-1270 B.P. (A.D. 615-680). Hall believed that the small Group 3 cemetery, which contained only 10 individuals in semi-flexed and extended positions, was slightly later in time than Group 2. However, a radiocarbon assay recently obtained by Robert Hard (Hard et al. 2002) on a Group 3 burial (collagen fraction, human bone), produced a calibrated age range of 1980-1860 (30 B.C.-A.D. 90)., suggesting that the distinction between Groups 2 and 3 may have been more an artifact of interpretation and limited chronometric data than actual temporal difference. As an examination of the site maps (Hall 1981) shows, there was no horizontal separation of Groups 2 and 3, which may further suggest that both groupings may pertain to essentially the same cemetery.

The great majority of the Late Archaic graves at Ernest Witte contained single individuals buried in extended positions with heads oriented to the northeast. Approximately one-half (48 percent) of the Group 2 burials were accompanied by mortuary artifacts. As mentioned above, the most distinctive artifact traits included large whelk-shell pendants, conch/whelk-columella ornaments (beads, “dangles”), boatstones, corner-tang knives, socketed deer-metapodial points, and bone pins bearing finely engraved geometric designs.

Leonard K (41AU37)

Located near the Ernest Witte site, Leonard K revealed the burials of nine individuals (Hall 1981:104-107). This mortuary component was not radiocarbon dated. Skeletons were found in both flexed and extended positions. Despite the lack of absolute dating, one of the burials, an adult male, was accompanied by a whelk-shell pendant and pointed bone implements (one a socketed deer-metapodial point and another piece bearing an intricate geometric engraved design). These items suggest at least partial contemporaneity of the Leonard K burials with the Late Archaic interments at Ernest Witte.

Crestmont (41WH39)

The remains of 28 individuals were recovered during controlled salvage operations at this site, which is situated near Caney Creek approximately two kilometers from the present channel of the Colorado River (Vernon 1989; Hall and McClure 2002). The burials were overwhelmingly placed in extended positions with the heads oriented most frequently to the northeast, though orientations to the north, southwest, and northwest were also observed. Mortuary artifacts accompanied a high percentage (68%) of the individuals. These items included numerous large, undecorated whelk-shell pendants, whelk-columella beads, smaller whelk pendants or flat beads, numerous bone pins with finely engraved geometric de-

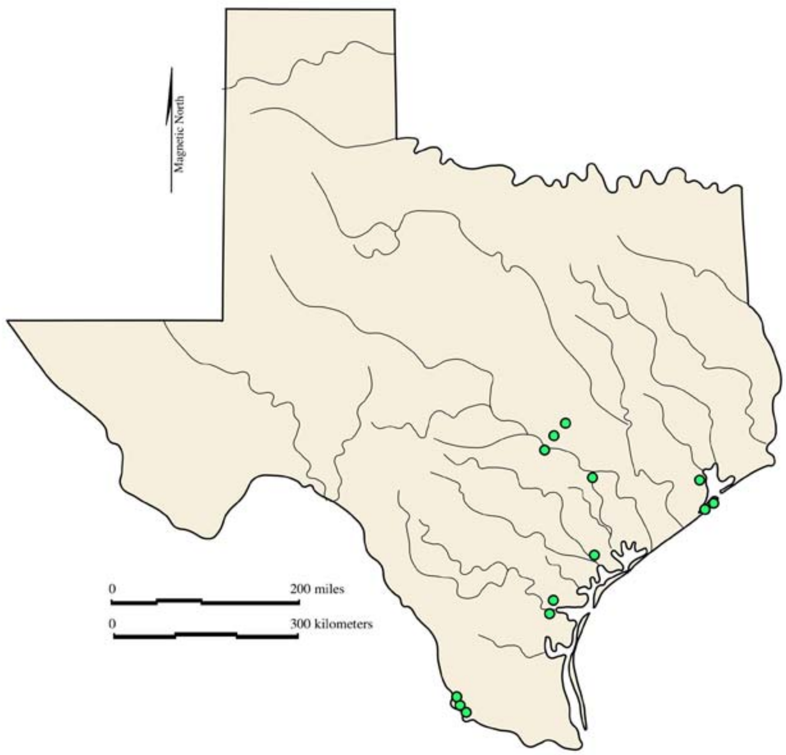


Figure 5-6. Map of Texas showing the locations of burial sites pertaining to the early part of the Late Prehistoric Period (Late Prehistoric I).

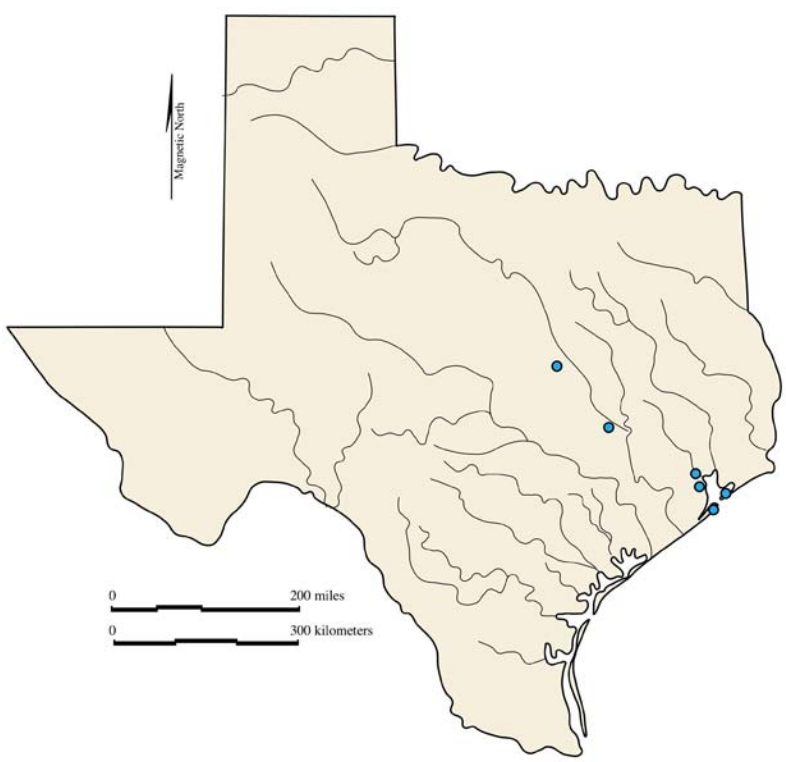


Figure 5-7. Map of Texas showing the locations of burial sites pertaining to the latter part of the Late Prehistoric Period (Late Prehistoric II).

signs, socketed bone points, a few rectangular bone pendants, and Late Archaic dart points (Gary, Godley and Ensor types). The extended body positions, the headward orientation of many individuals toward the northeast, plus the assemblage of mortuary artifacts all combine to link this site closely with the Ernest Witte, Group 2 cemetery.

Goebel (41AU1)

The remains of about 36 individuals were excavated in 1959 by avocational archaeologists at this site on the lower Brazos River not far from Ernest Witte (Flemming and Flemming 1959; Duke 1961, 1981). Many burials were extended, but flexed interments were also present. Large whelk pendants, columella beads, engraved bone pins, and an Archaic-age Gary dart point all combine to place at least a good part of the remains at this site in the Late Archaic and demonstrate cultural affiliation with other Late Archaic mortuary sites in the area.

Big Creek (41FB2)

Located in the lower Brazos drainage, this site was dug extensively in 1952 by relic collectors. At least 75 burials were present (see Hall 2002; Taylor and Highley 1995:672). The presence of whelk-shell pendants, engraved bone pins and at least one boatstone links at least some part of these remains to the other Late Archaic sites in the area. Unfortunately, there is no information on the positions of the bodies or headward orientation.

Bowser (41FB3)

As mentioned above, this site contained two chronologically separate burial groups. The earlier dates to the very early part of the Late Archaic, in the second millennium B. C. The later mortuary component has produced six radiocarbon dates, with a combined calibrated age range of 2870-1895 B.P. (Patterson 2000:29). Patterson (2000) reports over 35 burials from this component, and notes extended body positions. Around 60 percent of the burials had grave goods, with a wide variety of materials represented. These included red ochre, shark teeth, asphaltum lumps, boatstones containing pebbles, a variety of bone implements, tubular shell beads, whelk-shell pendants, Ellis-type dart points, and a corner-tang knife. A most interesting find as a grave good was a native-copper pin or awl (see Patterson 2000:Figure 10). Grave goods were found with men, women and subadults. Some of the mortuary artifacts, such as the bone pins, had been purposely broken when placed in the graves.

Albert George (41FB13)

Not far from the Big Creek site, this mortuary component yielded the remains of at least 12 individuals in both extended and flexed positions (Walley 1955). Found in association with these remains were a boatstone, engraved bone pins, conch- (whelk-?) shell ornaments, and Late Archaic dart points (Hall 2002:117).

Guadalupe and San Antonio River Sites

Mortuary components of variable size are reported along the lower Guadalupe River and the middle and upper reaches of the San Antonio River. As discussed further on, these sites show some similarities to the Lower Brazos-Colorado area just discussed, but also differ in some significant ways from the pattern represented in that region.

Morhiss (41VT1)

This site was investigated in the late 1930s and early 1940s under the auspices of the Works Progress Administration (Dockall and Black 2006; see also Texasbeyondhistory.net/morhiss/index/html). The site lies on a natural mound-like knoll that is a Pleistocene erosional remnant that rises above the surrounding Holocene alluvium of the Guadalupe River floodplain. The WPA-sponsored work here involved the entire site through the excavation of over 5,000 5-ft^2 units. This massive effort produced a large inventory of prehistoric occupation debris spanning the late Paleo-Indian, Archaic, and Late Prehistoric periods. Two hundred and fifty burials were found within the midden deposits that capped the knoll. The burials clearly pertain to more than a single time period, as evidenced by the Early and Middle Archaic radiocarbon dates cited above, to which can be added a Late Archaic calibrated age range of 2,460-2,360 B.P.

Most of the information collected at Morhiss remains unpublished, and no inventory or systematic description of the burials or associated mortuary artifacts is available. At present, then, all that can be said with certainty is that the site saw occupation over many millennia, and a sizeable number of burials were made, presumably in connection with these occupations. Despite the large number of burials, the site probably was not a formal cemetery, and the burials most likely represent interment of individuals who were buried within or adjacent to domestic encampments at the site.

Texas West Indies (41VT9)

This site is located on the upland margin overlooking the west side of the Guadalupe River floodplain a few kilometers downstream from the Buckeye Knoll site. The site was accidentally uncovered in 1960 during construction of a ranch road, at which time human bones were observed. In 1961, salvage excavations were conducted that resulted in the discovery of the remains of 22 individuals. Additionally, artifacts collected from road-construction backfill are believed to have been directly associated with the human remains (Birmingham and Huebner 1991).

Because the cemetery was uncovered accidentally by road construction machinery, information on the positions/orientation of the interments is limited. Birmingham and Huebner (1991) report specific bits of information on seven of the burials. One individual was flexed with head to the south, one was semi-flexed with head again to the south, while two individuals rested in extended positions on their backs; one had its head to the west and the other had its head to the north. Four individuals—two adults and two juveniles—were believed to be contained within a secondary (bundle) burial.

Artifacts collected from the site and believed to have been associated with burials included engraved bone pins, whelk-columella beads, and a small whelk-shell pendant. The engraved bone pins and the columella beads are similar to specimens from sites in the lower Brazos-Colorado River area.

Blue Bayou (41VT94)

Located on the property of the DuPont Corporation (now Invista, Inc.), this is a major cemetery that was exposed by road construction along the sloping upland margin on the east wall of the Guadalupe valley. The site is situated on a sandy Deweyville terrace, approximately three kilometers north of the Buckeye Knoll site. After its discovery, the site was partially excavated in 1982-1983 by Bill Birmingham, an avocational archaeologist and then a DuPont employee, and a team of avocational and professional archaeologists. A detailed report of the archaeology and bioarchaeology of the site was prepared by J. Huebner and A. Comuzzie (1992), with the cost of publication funded by a grant from DuPont.

Thirty-seven burials were recorded, and more burials are probably located beyond the limits of the excavations (Bill Birmingham, personal communication 2001). Due to road-construction disturbances, not all human bone recovered could be assigned to a discrete burial feature, and the minimum number of individuals represented by the recovered remains was 45. The majority of burials were placed in flexed or semi-flexed positions, with only a single interment in an extended position. The most common headward orientation was to the southeast. Only 17 percent of the graves were accompanied by artifacts. The most common artifacts were projectile points; all were Scallorn arrow points with the exception of a single Ensor dart point. Other lithics included a biface and a biface fragment and several utilized flakes. One bone awl or pin with a single engraved line around the base, a bone needle, two small tubular bone beads, sections of deer antler, two small triangular freshwater mussel-shell pendants, and two clusters or caches of unworked marine shells complete the inventory.

Four radiocarbon assays run on human bone and associated charcoal produced a combined one-sigma calibrated age range of A.D. 184-1030. Although these results were somewhat older than expected, they do overlap with the expectable temporal range of the Scallorn points, the predominant time-diagnostic lithic type at the site. The earlier end of the age range fits well with expectations for the Late Archaic Ensor dart point (cf. Prewitt 1981).

In sum, the Blue Bayou cemetery appears to have been used primarily during the earlier centuries of the Late Prehistoric period, with limited use during the terminal Late Archaic. The overwhelming predominance of flexed/semi-flexed burials may reflect the mainly Late Prehistoric affiliation of the cemetery, as there is some evidence for a replacement of extended burials by flexed interments during this time period in the region (e.g., the Late Prehistoric Group 4 cemetery at Ernest Witte contained only flexed or semi-flexed interments, while earlier, Late Archaic cemeteries contained almost exclusively extended burials). The mortuary artifact assemblage from Blue Bayou is quite limited in both its distribution within the cemetery and in its range of materials, in contrast to the quantity and array of materials found at Late Archaic cemeteries such as Ernest Witte, Group 2, Crestmont and, probably, the TWI site. Notably absent from the Blue Bayou assemblage are Late Archaic items such as whelk/conch-shell ornaments and finely engraved bone pins. The occurrence of such items at the nearby TWI site suggests that their absence at Blue Bayou may reflect more a temporal difference than geographic separation.

Vic Urban (41VT12)

This site is a combined occupation and mortuary locale on the western edge of the Guadalupe River floodplain, a few kilometers upstream from Morhiss and Blue Bayou. Although the findings at this site are unpublished, a brief review of field drawings and photographs (Huebner and Comuzzie 1992:11-13) is informative. The remains of thirteen individuals were excavated from within and 8-by-16-m area. Five burials were in extended positions, four were tightly flexed, and three were secondary bundle burials. No associated mortuary artifacts were reported. No radiocarbon dates are available from this site, though the plurality of extended burials suggests that at least some part of the cemetery is of Late Archaic age.

Olmos Dam (41BX1)

This occupation and mortuary site is located on Olmos Creek near its confluence with the San Antonio River, just a few kilometers south of the Balcones Escarpment. The remains of 13 flexed individuals were exposed and documented. Radiocarbon dates on associated charcoal place the cemetery in the Late Archaic, ca. 2,000 B.P. (Lukowski 1988). Mortuary artifacts were found with an unusually high percentage (85 percent) of the burials. These items include racks of deer antler, whelk-shell pendants, whelk-columella beads, freshwater mussel-shell pendants, bone beads, an undecorated bone awl or pin, chert cobbles, cores and bifaces, a ground-stone slab, and red ochre. The columella beads are similar to specimens from the TWI site and the lower Brazos-Colorado sites, but the whelk pendants are decorated with rows of drilled punctations and thus more closely resemble specimens from the Loma Sandia site in south Texas than the larger and undecorated whelk pendants found at the sites in the northern part of the central coastal plain. Notably lacking from the assemblage are the finely engraved bone pins that occur in mortuary assemblages in the Brazos-Colorado area and at the TWI site on the lower Guadalupe River.

Locke Farm (41CM25)

This sizeable cemetery site is located on the Blackland Prairie near the head of the Comal River, a tributary of the Guadalupe River. At least 75 burials were reported from the site, most found by relic collectors, though a crew from The University of Texas exposed 19 burials during excavations in the 1930s (Woolsey 1936). Artifacts found in graves include a boatstone, a stone gorget, whelk-shell pendants and columella beads or dangles, a large biface, and red ochre. This assemblage indicates that at least a part of the remains date to the Late Archaic. The boatstone, the gorget, and the whelk-shell ornaments suggest some degree of cultural affiliation with the coastal-prairie cemeteries in the lower Brazos-Colorado area. The flexed mode of burial, however, differentiates the overall mortuary pattern at Locke Farm from that of the latter area.

Other Sites

A series of mortuary sites on the plains along the San Antonio River in Wilson and Karnes Counties has been reported. The limited information from these sites has been collected by Perttula (2000:22-28). None of these sites has seen in-depth study, so little can be said about the numbers of interments present, though the findings of the remains of from one to a very few individuals suggests that these mortuary components were probably not large. Information on body position is available for four of these sites (41WN73, 41KA23, 41KL89 and 41KA102). Most burials were flexed or semi-flexed, though one sitting interment was documented at 41WN73 and one extended burial was found at 41KA23, as was also the case at 41KA102.

Mortuary artifacts from these sites include dart points, large thin chert bifaces, corner-tang knives, biface preforms, a mano, abrading stones, and seven stone paint palettes, a quartz crystal, polished pebbles, a stone gorget, an antler tine from 41KA23, and a whelk-shell pendant from 41KA102. Aside from the corner-tang knives and the single stone gorget, these items share little in common with sites to the east and north. The predominance of flexed burials, the relative abundance of flaked lithics and the presence of the mano and abrading stones suggest a closer linkage with the mortuary assemblage from the Loma Sandia site and other locals to the south.

Loma Sandia (41LK28)

By far the best-documented mortuary site in south Texas, Loma Sandia was excavated by the Texas Highway Department in the early 1980s and is the subject of a major report (Taylor and Highley 1995). Lying on a knoll near the confluence of the Nueces, Frio and Atascosa rivers in Live Oak County, this cemetery was virtually excavated in its entirety, resulting in the recovery of the remains of 205 individuals. A series of radiocarbon dates on associated charcoal from various features places time of cemetery use within a relatively short period between ca. 800 and 500 B.C. Taylor and Highley (1995) attribute this time range to the latter part of the Middle Archaic. However, for reasons discussed earlier in the present report, this period is considered to fall into the Late Archaic as defined herein. Leaving such taxonomic concerns aside, however, it is apparent that the Loma Sandia cemetery is approximately contemporaneous with the earlier range of the large Group 2 cemetery at Ernest Witte and, as will be seen further on, coeval with the earlier range of major coastal cemeteries in the Corpus Christi Bay area. Indeed, based on present evidence, and with the notable exception of the Early Archaic cemetery at Buckeye Knoll, the millennium or so beginning at ca. 800-500 B.C. appears to have seen the establishment of the largest cemeteries in the region.

The overwhelming majority of the burials at Loma Sandia were of single individuals placed in flexed or semi-flexed positions with headward orientation to various compass directions. Cremations were present but uncommon.

Mortuary artifacts were abundant and varied, with slightly over one-half (51.8 percent) of the graves accompanied by one or more classes of artifacts. Particularly common were flaked lithic artifacts that include numerous dart points. By far the most common point type was Tortugas, a type that is most abundantly distributed from the Nueces River southward (see Prewitt 1995). Of secondary and tertiary abundance are Lange and Morhiss points, respectively; these stemmed types suggest limited cultural linkage/interaction to the north of Loma Sandia. Other common flaked-stone items were knives, scrapers, gouges and preforms. Ground stone artifacts were also well represented, particularly in the forms of sandstone-slab metates or milling stones, manos, abraders and tubular stone smoking pipes. Bone awls or pins were present, though these were mostly plain; specimens with intricate engraving as found on more or less contemporaneous sites to the north were rare at Loma Sandia. Several burials contained pieces of unmodified deer antler. Tubular bone beads were also present. Marine shell artifacts included whelk pendants with drilled-dot designs similar to those from the Olmos Dam site to the northwest in Bexar County and also found at Late Archaic occupation sites on the central coast of Texas (e.g., Dreiss 2002; Ricklis n.d.). Also present were whole whelk shells and bi-pointed whelk columella sections; these have counterparts at the Callo del Oso site, a large, partly contemporaneous, coastal Late Archaic cemetery near Corpus Christi (Ricklis 1997).

These materials have, for the most part, a distinctly south-Texas cast. Particularly notable in this regard are the abundance of Tortugas points and the tubular stone pipes, an artifact form repeatedly found in south Texas (e.g., Hester 1980; Taylor and Highley 1995:504). At the same time, the abundance and variety of mortuary items suggests a degree of elaboration comparable to that seen in Late Archaic cemeteries to the north such as Ernest Witte Group 1 and Crestmont. Hall (1995a) has already remarked upon this point, suggesting that, despite apparent cultural differences, all of these sites reflect a more or less contemporaneous florescence of mortuary ritual that had its cultural-ecological basis in the abundance of resources found along the major river floodplains of the Texas coastal prairie (or, in the case of large coastal cemeteries, in the rich biota of bay-lagoon estuary systems).

Other mortuary sites are reported in the interior of south Texas. A geographic cluster of sites reported on the northern Rio Grande Plain along/near the upper Nueces River (see Figure 5-1) consists of single, possibly isolated, burials with little in the way of associated artifacts. The Deadman's Tank site (41AT9) in Atascosa County apparently was a fairly large cemetery at which some 65 burials were reported but, unfortunately, none were professionally excavated and there are little data from this site.

Mortuary Sites Along the Coast

Relatively large numbers of mortuary sites have been reported from the coastal fringe of the central coastal plain of Texas. As the following brief review indicates, these sites appear to represent distinctly coastal populations while, at the same time, they show a number of linkages to inland cultural patterns.

Galveston Bay Area

A number of sites around Galveston Bay and nearby Galveston Island have mortuary components. Aten's seminal research at the Harris County Boy's School site (41HR80) identified a distinctive Galveston Bay Mortuary Tradition (Aten et al. 1976) assigned to later ceramic periods which approximately correspond chronologically to the terminal Archaic and Late Prehistoric periods as defined herein. The key traits of this tradition are a preponderance of flexed or semi-flexed interments in small, spatially discrete cemeteries, a minority of graves with associated ornamental or other non-mundane artifacts, and red ochre in some graves. Mortuary artifacts include beads of shell and/

or bone, small bone tablets, bird-bone whistles, and turtle-shell rattles. An absence of any apparent highly differentiated placement of artifacts within cemeteries led Aten to postulate that this mortuary tradition reflected a basically egalitarian social order.

Many of the traits of the Galveston Bay Mortuary Tradition were evident at other sites in the area, the better known of which are Caplen (41GV1) on Bolivar Peninsula (Campbell 1957), and Jamaica Beach (41GV5; Aten et al. 1976) and Mitchell Ridge (41GV66) on Galveston Island. At Mitchell Ridge, where a wealth of diverse bioarchaeological and mortuary data was obtained, four small cemeteries were excavated (Ricklis 1994a). These cemeteries were assigned mainly to the Late Prehistoric, Protohistoric and early Historic periods, based on numerous radiocarbon dates and associated time-diagnostic artifacts. While sharing many traits with those reported by Aten, the Mitchell Ridge data suggest that aboriginal social organization may have been less egalitarian than previously assumed. Only a minority of graves contained associated mortuary artifacts in three of the four cemeteries, while over 90 percent of the graves in the fourth cemetery contained a wide array of mundane and non-mundane artifacts, suggesting some degree of spatial segregation of relatively higher-status burials.

One of the burials at Mitchell Ridge, Burial 10 in the "Cross Area" cemetery, was anomalous. This burial was that of an adult male interred in a supine extended position with the head oriented to the northeast. Associated artifacts consisted of a Godley type dart point, a piece of pumice, seven socketed deer-metapodial points and four deer metapodial fragments that were probably blanks for such points, a deer-ulna awl, and two shell scrapers. A calibrated radiocarbon date range of 45 B.C.-A.D. 310 on human bone collagen indicates that this burial is contemporaneous with the Group 2 cemetery at Ernest Witte (and presumably similar mortuary sites in that area) and is in line with the presence of the Late Archaic, Godley point.

The supine, extended body position and northeastward head orientation of Burial 10 replicates the pattern at Ernest Witte Group 2, suggesting a measure of cultural affiliation. While the paucity of contemporaneous burials from the Galveston Bay area makes any conclusions tenuous, the data at least suggest participation in a broader mortuary pattern in southeast Texas during the latter part of the Late Archaic period. Also, the preponderance of flexed and semiflexed burials during the Late Prehistoric period matches an apparent shift in the lower Brazos-Colorado area, as seems to be evidenced by the data from the Group 4 cemetery at Ernest Witte. Moreover, Aten's observation that only a minority of burials in his Galveston Bay Mortuary Tradition contain associated artifacts may match an apparent decline in the abundance of such items at Ernest Witte Group 4, as well as a general dearth of artifacts in graves at the Late Prehistoric Blue Bayou cemetery farther to the south on the lower Guadalupe River. However, the abundance of mortuary items in one of the Mitchell Ridge cemeteries should caution against highly generalized conclusions concerning an apparent reduction of mortuary accoutrements by Late Prehistoric times; while fewer mortuary artifacts may indicate a general simplification of mortuary ritual, this may not necessarily indicate a corresponding reduction in social complexity.

Central Texas Coast

A number of cemeteries, some quite large, have been reported along the central Texas coast from the San Antonio Bay area southward to the Corpus Christi area. On the basis of our currently limited information, these sites all can be assigned to the Late Archaic and/or Late Prehistoric periods.

The Green Lake site (41CL13) is on the upland margin overlooking Green Lake near the juncture of the Guadalupe River floodplain and the modern Guadalupe River delta. Once doubtless an estuarine extension of Guadalupe Bay (an extension of San Antonio Bay), Green Lake is now basically landlocked due to deltaic sedimentation. The northeastern side of the lake is bounded by the edge of the Pleistocene uplands upon which are situated numerous Late Archaic and Late Prehistoric shell midden deposits. Ten flexed/semi-flexed burials were uncovered here in 1960 (Wingate and Hester 1972). Artifacts associated with the burials included a heavily patinated and reworked, untyped stemmed dart point, a carved stone disk, an engraved tubular bone bead and several other engraved bone artifacts. Because the burials appeared to have been placed within deposits containing Rockport ware potsherds, Wingate and Hester (1972) believed the burials were Late Prehistoric in age, and that the dart point had been "salvaged" from an earlier site and reworked by the people responsible for the cemetery. Grant Hall (1995b), however, has suggested that the dart point and the engraved bone items may indicate that at least some of these burials date to the Late Archaic.

Site 41AS9 was an apparently rather large cemetery located near the shoreline of St. Charles Bay in Aransas County. Little information exists on this site, as it was excavated by relic collectors in 1919. In 1931 George C. Martin, an avocational archaeologist then living in Corpus Christi, reported that over 50 burials had been excavated, and that associated artifacts included dart and arrow points, lithic knives and scrapers, and a (ceramic?) elbow pipe (Martin 1931). No information is available on body positions or orientations. The report of both dart and arrow points, if accurate, suggests a relatively long-term cemetery with a time range from at least the later Archaic into the Late Prehistoric.

The Ingleside Burial site (41SP78) is located on the lagoonal shoreline of Redfish Bay near the south end of Live Oak Peninsula, northeast of Corpus Christi. Although this site was destroyed by construction activities, the remains of five extended burials were documented by Hester and Corbin (1975). Associated artifacts included an Ensor dart point, a large triangular biface, engraved bone pins, and stacks of bivalve shells. The Ensor point, the extended position of the bodies, and the engraved bone pins strongly suggest that the burials pertain to the Late Archaic. The extended positions and the engraved bone pins suggest some degree of cultural linkage to the Late Archaic mortuary tradition manifested at Ernest Witte, Crestmont and other sites in the lower Brazos-Colorado area.

The Odem site (41SP1) was an apparently sizable cemetery on the upland margin near the head of Nueces Bay. Some 65 burials were reported from the site, mostly dug by relic collectors (Hughes 1950; TARL site files). Burials were flexed and semi-flexed and associated mortuary artifacts were apparently few. Scallorn arrow points were found, and at least one of these was embedded in human bone. These points, along with flexed/semi-flexed burials and a dearth of associated artifacts, suggest that the cemetery pertained largely to the early part of the Late Prehistoric period. However, a side-notched dart point embedded in human bone suggests that at least some of the burials were Late Archaic in age.

Immediately south of the Nueces River, a few kilometers upstream from the head of Nueces Bay, the Berryman site (41NU173) was partially excavated in the late 1970s by an avocational archaeologist, E. R. Mokry, Jr. (Hester 1980:81; Mokry 1979). Heavy machinery had exposed the remains of at least 32 individuals, and Mokry's careful excavations documented the flexed and semi-flexed remains of 16 individuals. Mortuary artifacts were few, consisting of a small-marine shell ornament and a modified marine shell. Scallorn arrow points and a round-based biface, possibly a thrusting-spear point, were found embedded in and among the bones of one individual. This cemetery is assigned to the early part of the Late Prehistoric period on the basis of the Scallorn arrow points.

The Callo del Oso burial site (41NU2) is located in a clay dune near the northeastern shoreline of Oso Bay, a secondary bay connected to Corpus Christi Bay (Jackson 1933; Martin 1930). Numerous burials have been exposed over the years by erosion and home construction; this cemetery probably contained hundreds of burials. The site was partially investigated in 1933 for The University of Texas by A. T. Jackson, who reported flexed, semi-flexed, and several secondary (bundle) burials with and a limited array of associated mortuary artifacts (Jackson 1933; Jackson et al. 2003; see also Jackson et al. 1986). Reported burial artifacts included a chert knife and scrapers, a hammerstone, red ochre, bone awls and flakers, small marine and freshwater mussel-shell pendants and beads and a tubular stone pipe. Recent testing at the site exposed the remains of a partially disarticulated but essentially flexed adult female in a discernible grave pit containing whole, unmodified lightning whelk shells, a modified, bi-pointed whelk columella (possibly a hair pin), and yellow sand placed over the body (Ricklis 1997). A probable ritual fire over the body had scorched the bones; associated wood charcoal provided a 1-sigma calibrated radiocarbon age range of 2930-2750 B.P. Two recently acquired dates on human bone collagen (Hard et al. 2002) produced calibrated age ranges of 1260-1170 and 1170-1050 B.P., indicating that the cemetery was used into terminal Archaic and perhaps earliest Late Prehistoric times.

Another very large cemetery, the Oso Dune site (41NU37) is located on Oso Creek, a few kilometers upstream from the head of Oso Bay. This site, also situated within a clay dune, has been severely eroded, as well as damaged by relic collectors. As the result of these disturbances, a profusion of human bone has been observed at the site along the eroded margin of the clay dune in a north-south linear distribution that extends for some 140 meters (Cox and deFrance 1997:16). In places, burials were very densely packed, such that many interments had been disturbed by more recent ones. Kim A. Cox and Susan D. deFrance (1997) published a report on controlled excavations carried out under the direction of Herman A. Smith of the Corpus Christi Museum of Science and History in the late 1980s. Adult burials were in flexed or semi-flexed positions, although young juveniles were found in both flexed and extended positions.

Associated mortuary artifacts included stemmed and unstemmed dart points, sandstone slabs, pieces of impressed asphaltum, deer-ulna awls or flaking tools, a tubular deer-bone bead, a perforated bone fragment, and a set of unique, large T-shaped freshwater mussel-shell pendants. Some burials were noted to have smoothed pebbles or pieces of a resin-like substance placed within their mouths. A single radiocarbon assay on human bone provided a calibrated age range of 2950-2720 B.P.

Another cemetery site on Oso Creek, the Rodd Field site (41NU29), produced the remains of 11-13 individuals (Johnson 1981). The body positions are unknown, though the preponderance of flexed burials at the other cemetery sites in the area suggests that they were likely flexed or semi-flexed. Associated artifacts were not abundant; these included several untyped corner- and side-notched dart points, a biface, chert flakes, a possible hammerstone, a tubular stone pipe, balls of resin, and three bison scapulas with designs made up of rows of drilled punctations (Hester 1980a:80; Perttula 2000:35) similar to those seen on certain whelk-shell pendants from burials at the Loma Sandia and Olmos Dam sites. The presence of the notched dart point indicates an Archaic age for this site, while the drilled-punctated designs on the bison scapulas may indicate a stylistic affiliation with the aforementioned Late Archaic whelk-shell pendants from Loma Sandia and Olmos Dam.

At the southern end of the central coast area, two apparently sizeable cemeteries are reported from clay dune settings along the shores of Grullo Bay, an extension of Baffin Bay in Kleberg County. The little information available on these sites, Dietz (41KL14) and Scarborough (41KL28), comes from field notes on file at the Texas Archeological Research Laboratory (TARL) and brief published summaries (Hester 1980b; Reed 1937). Large quantities of human bone were observed eroding from the sediment matrices, but lack of controlled excavation precluded identification of body positions. Associated artifacts included tubular stone pipes, untyped dart points, and tubular bone beads, some made from human longbones. The tubular stone pipes suggest a Late Archaic age, given the presence of such artifacts at the Loma Sandia cemetery.

Mortuary Sites in the Lower Rio Grande Valley

Numerous cemetery and isolated-burial sites have been reported along the lower Rio Grande from south of Laredo to the coastal zone of the river delta (e.g., Boyd 1996, 1997, 2000; Collins et al. 1969; Hester 1969, 1980a:72-76; Hester and Ruecking 1969; McGraw 1983; Perttula 2000). The great majority of the known sites have yielded the remains of only single burials, most of which have been seen in erosional exposures. However, professional archaeologists or capable avocationals have investigated a number of these apparently small mortuary sites in Webb and Zapata counties, as well as in Tamaulipas, Mexico. Burials are usually flexed or semi-flexed and contain only a limited variety of associated artifacts. Some pertain to the Archaic, as suggested by the presence of dart points and tubular stone pipes. Others are clearly Late Prehistoric, especially a series of sites producing Caracara arrow points, as reported along both sides of the Rio Grande in Zapata County, Texas, and Tamaulipas, Mexico. A recurrent feature of both Archaic and Late Prehistoric mortuary artifact assemblages is the presence of large quantities of tubular bone beads in some graves. Other items found sporadically include bone tools, small freshwater- and marine-shell ornaments, and ornaments made from human teeth or long bones (see Perttula 2000:19-21).

In and near the Rio Grande Delta area, good-sized cemeteries have been reported. The Floyd Morris site (41CF2) in Cameron County contained 18 documented burials; the site had been severely disturbed by land leveling operations, and it is likely that it originally contained additional burials. The documented interments were flexed and bundled, and there was an array of mortuary artifacts that included triangular projectile points, numerous tubular bone beads, perforated canine teeth, *marginella* and noetia shell beads, olive-shell tinklers, conch-columella disk-shaped beads, severed human distal radii, discoidal beads of stone and conch shell, red ochre, and a tubular jadeite bead. At the Ayala site (41HG1) in Hidalgo County, 44 flexed and bundled burials were documented. Associated artifacts included bone beads and pendants, perforated canine teeth, a conch-shell pendant, conch-columella disk beads, and olive-shell tinklers and beads (Hester 1969). These cemetery sites have been attributed to the Late Prehistoric Brownsville Complex (Hester 1980b; 1995). It should be pointed out, however, that few radiocarbon dates have been obtained and the temporal duration of these sites remains only inferential. Marked variability in bone preservation was observed at Floyd Morris (Collins et al. 1969), and this conceivably could indicate that a considerable time span is indicated. Importantly, Tiffany Terneny (2005) has reported radiocarbon dates on human bone collagen that produce calibrated ages older than ca. 3000 B.P.

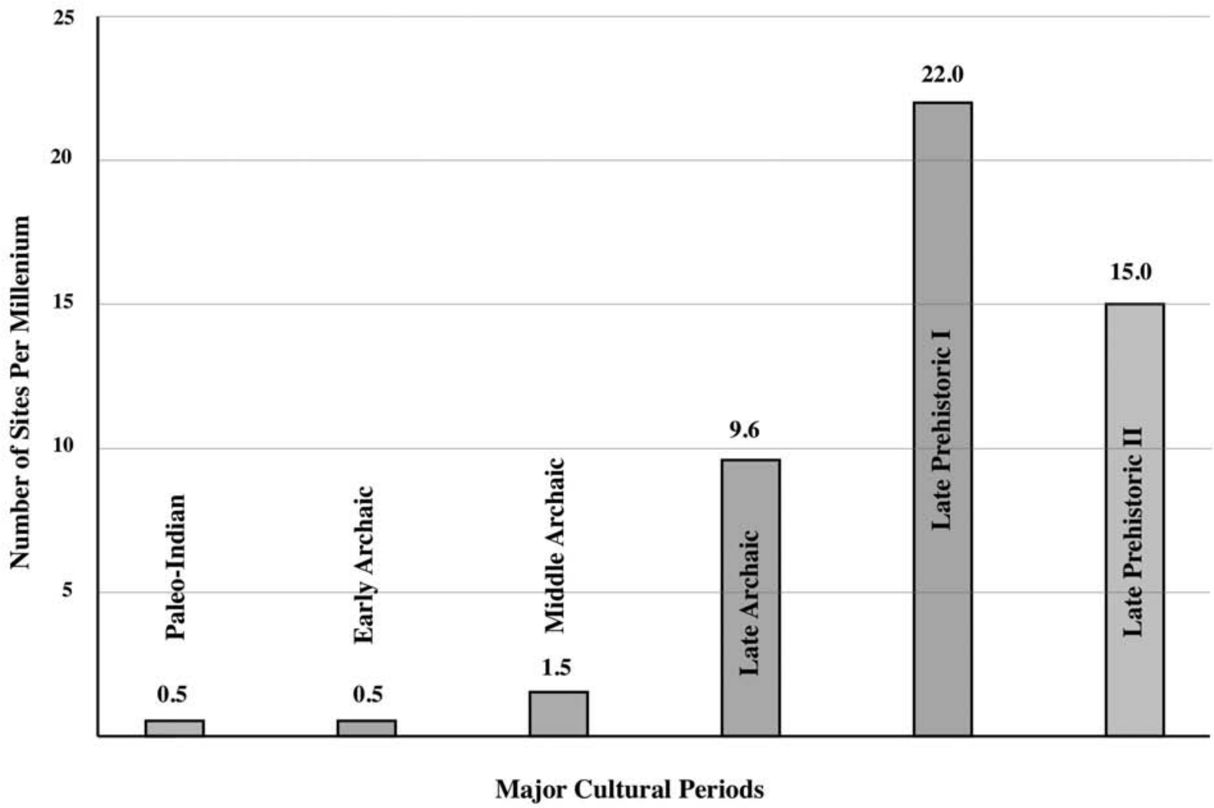


Figure 5-8. Bar graph showing the number of Texas coastal plain mortuary sites per millennium for the major cultural periods. The totals are based on the number of sites known for a period divided by the estimated length in years of that period (e.g., the Early Archaic period lasted 4,000 years and has two known burial sites for a result of 0.5 sites per millennium).

In sum, the numerous burial sites documented in the lower Rio Grande area span at least the Late Archaic and Late Prehistoric periods. Burials are flexed, semi-flexed and bundled and are accompanied by a variety of stone, bone and shell artifacts. Red ochre is frequently present in graves. Ornamental artifacts are relatively abundant and include numerous bone beads, occasional beads of human bone and teeth, bone pendants, stone beads, and a variety of marine-shell beads and tinklers. Tubular stone pipes have been found in graves in the area of Zapata County and adjacent Tamaulipas (see Perttula 2000:24). Although temporal control is poor for the Rio Grande delta, a discrete Late Prehistoric mortuary pattern, marked by isolated burials or small cemeteries and Caracara arrow points, has been defined for the Zapata County-Tamaulipas area.

Patterns of Prehistoric Mortuary Behavior

As the review presented above shows, the information available on mortuary sites on the Texas coastal plain is variable in both quantity and quality. Nonetheless, there are at this time enough reliable data to identify some basic patterns of behavior in both time and space. With the notable exception of the Buckeye Knoll site, information on mortuary patterns is extremely limited prior to the Late Archaic.

Diachronic Patterns

After ca. 3000 B.P. there was a marked increase in the number of mortuary sites in the region of the Texas coastal plain. As may be seen in the previous series of maps (see Figures 5-2 through 5-7), known sites are few and far between during the Paleo-Indian, Early Archaic, and Middle Archaic periods, whereas, for the Late Archaic, sites are numerous. These data are expressed graphically in Figure 5-8, which shows the numbers of mortuary sites per millennium for the Paleo-Indian, Early, Middle and Late Archaic, as well as the earlier and later parts of the Late Prehistoric; the raw data for this presentation are shown previously in Table 5-2, which tabulates the known sites and indicates the mortuary components and the number of interred individuals by period. Likewise, Table 5-3

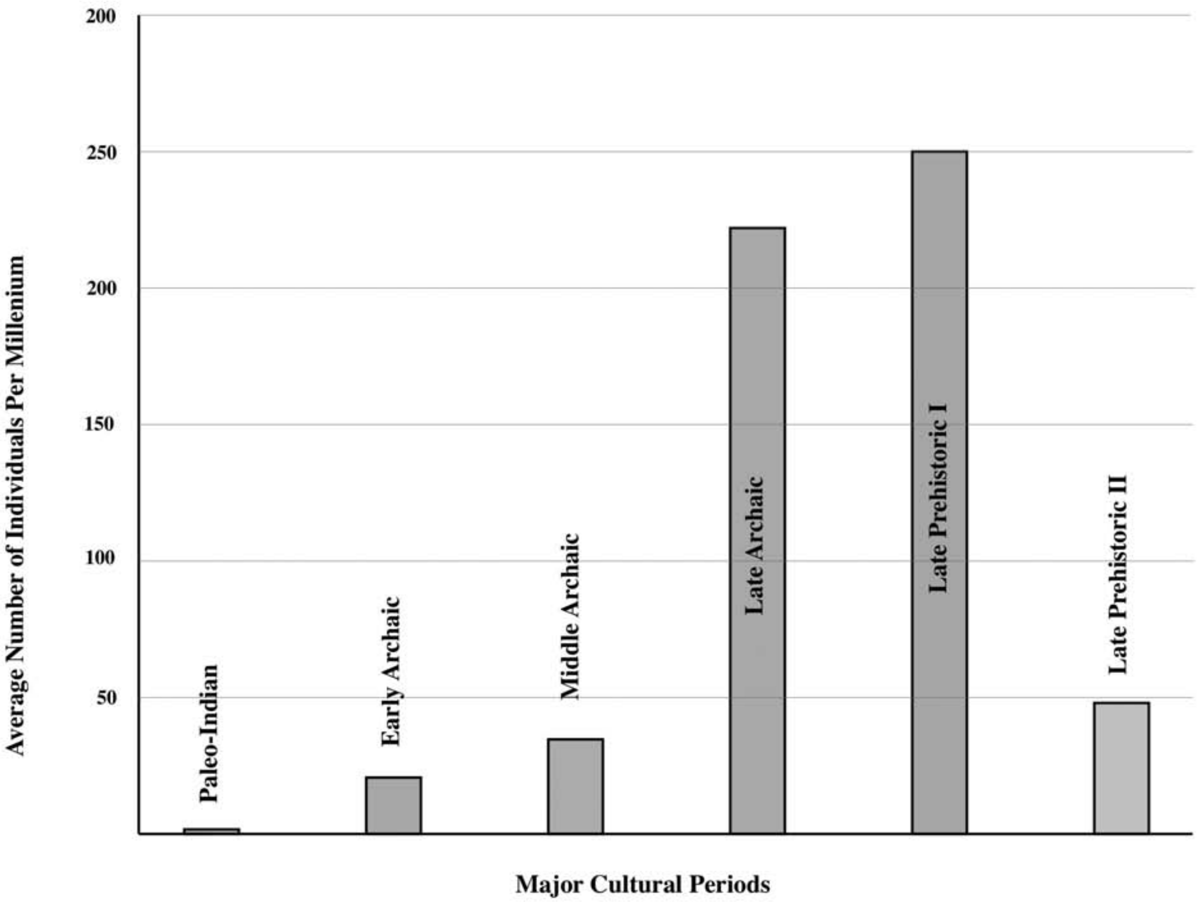


Figure 5-9. Bar graph showing the average number of individuals in burial sites, per millennium, as reported for the various major cultural periods of the Texas coastal plain (based on the data in Table 5-2). Note that sites with multiple periods for which internal chronological control is lacking are not included here.

presents data on the various burial-practice traits and mortuary artifact assemblages discussed below.

Also, the limited radiocarbon dates and the distributions of time-diagnostic mortuary artifacts strongly suggest that cemeteries attained maximum size, in terms of numbers of interred individuals, during the Late Archaic. When the average numbers of individuals per millennium in cemeteries assignable to discrete time periods are considered, as shown graphically in Figure 5-9, there is a dramatic peak in the Late Archaic and the subsequent early part of the Late Prehistoric.

Taken at face value, these data tend to support the postulations by previous researchers (Hall 1995a; Story 1985) that growing populations led to reduced group mobility patterns and the emergence of cemeteries as both a product of population density and as markers of group territories. On the other hand, there was a marked reduction in both the number of mortuary sites and the numbers of interred individuals during the Late Prehistoric II, as a glance at Figures 5-8 and 5-9 will show. Following the reasoning presented by Story and Hall, does this mean that population levels were correspondingly in decline and that, as a corollary, territorial boundaries were expanding and/or breaking down? Data have been presented elsewhere, by various authors, to show that by ca. A.D. 1250-1300, a Plains-like lithic technocomplex characteristic of the Toyah phase or horizon was rapidly adopted over a vast region of inland Texas (e.g., Black 1986; Johnson 1994; Prewitt 1981) as well as in the coastal zone (Ricklis 1992b, 1994a, 1994b). To some degree, the broad pattern of diffusion may have been accompanied by actual population movements or, in any case, was facilitated by increased group mobility. Inferably, these processes were catalyzed by a major influx of bison herds into central and southern Texas at this time (bison influx postulated by Dillehay 1974), along with the increased mobility inherent in an adaptive system involving search and pursuit of large herd animals such as bison. Thus, the reduction in the apparent number of burials during the latter part of the Late Prehistoric may reflect basic changes in group mobility and expansion and/or dissolution of earlier territorial boundaries.

However, this does not automatically account for other shifts in mortuary behavior that appear to have taken place by the beginning of the early part of the Late Prehistoric. As the preceding presentation shows, in the northern part of our area of concern, extended burials gave way to flexed interments. Additionally, this period is marked by a general reduction in the quantity and variety of artifacts buried with the dead. As shown graphically in Figure 5-10, in major Late Archaic cemeteries, approximately one-half or more of interments contain associated artifacts. In marked contrast, at major Late Prehistoric cemeteries for which good data exist, the percentages of graves with mortuary artifacts ranges from 0 at Ernest Witte Group 4 to only 16.7 at Blue Bayou.

These data are interesting insofar as there is marked reduction of mortuary accoutrements even during the early part of the Late Prehistoric (i.e., at Blue Bayou, Berryman and Loeve-Fox, as shown in Figure 5-10) when cemeteries and average numbers of documented interments have not yet declined (see Figures 5-8 and 5-9). Inferably, then, some other factor than simply a reduction in the use of cemeteries (as does appear to be the case in the Late Prehistoric II period) was operative at the end of the Late Archaic. It may be significant that a similar simplification in burials—including cessation of burial mound construction as well as a marked reduction in the interment of mortuary goods—was a widespread phenomenon in much of the Eastern Woodlands at this time, particularly in marginal areas such as the Northeast and upper Midwest where there was not a transition from Middle Woodland cultural patterns into relatively elaborate Mississippian ones (e.g., Fitting 1970; Ritchie 1965). Generally the result of the decline and demise of the widespread Hopewellian and related Middle Woodland cultural expressions, this phenomenon is marked by a predominance of simple, flexed modes of burial with minimal grave furnishings during the Late Woodland Stage, beginning ca. A.D. 500-800. Hall (1981, 1995a) has already suggested that Late Archaic peoples on the Texas coastal plain were participating in broad spheres of interaction and exchange during Early-Middle Woodland times, and that such interregional dynamics may have supplied the exotic material and artifacts (e.g., boatstones, large shell pendants) interred at Ernest Witte and other sites. Moreover, he has suggested that an analogous and at-least-partly contemporaneous phenomenon is manifest at the south Texas Loma Sandia site. If this is indeed the case, the post-Archaic decline in mortuary goods in Texas coastal plain cemeteries may reflect a cessation of this sort of interaction along with the presumable cultural-ideological ritual patterns that may have been its corollaries. Thus, the shifts in mortuary behavior that took place on the Texas coastal plain at the end of the Archaic may, in fact, reflect broad and fundamental changes in cultural ideologies and attendant forms of ritual behavior, as much, if not more so, than they do changes in regional demography, subsistence patterns and related human-ecological variables. A persistent linkage between the developments in the East and those on the Texas coastal plain is implied; a theme that is discussed at greater length further on in this report.

Late Archaic
Geographical Parameters

For the more recent part of the Late Archaic period, ca. 3000-1200 B.P., at least two and probably three distinct mortuary traditions can be identified on the Texas coastal plain (Figure 5-11). Each tradition is distinguishable on the basis of key traits, namely (a) predominant body positions of buried individuals, (b) the kinds of mortuary artifacts included in graves, and (c) geographic parameters within which these traits are concentrated. While there may have been significant diachronic changes and/or trends within each tradition during the Late Archaic, the chronological data from mortuary sites are, at present, too limited for clear definition of temporal differences within the period.

The best information comes from the more extensive and detailed investigations at larger cemetery sites, because of both the quality and quantity of data, and the fact that larger cemeteries contain a wider range of cultural information than do small sites. There is some evidence that there were geographic zones of transition or overlap in the areas of the definable traditions (see Figure 5-11), though the limited nature of the data preclude determination of whether these represent culturally distinct sub-areas, boundary-zone movement of diagnostic artifacts, or temporal oscillations of expansion-contraction of the major cultural patterns.

These Late Archaic mortuary patterns are succinctly defined below. The geographic distributions of key traits in defining these traditions are depicted in Figures 5-12 through 5-14.

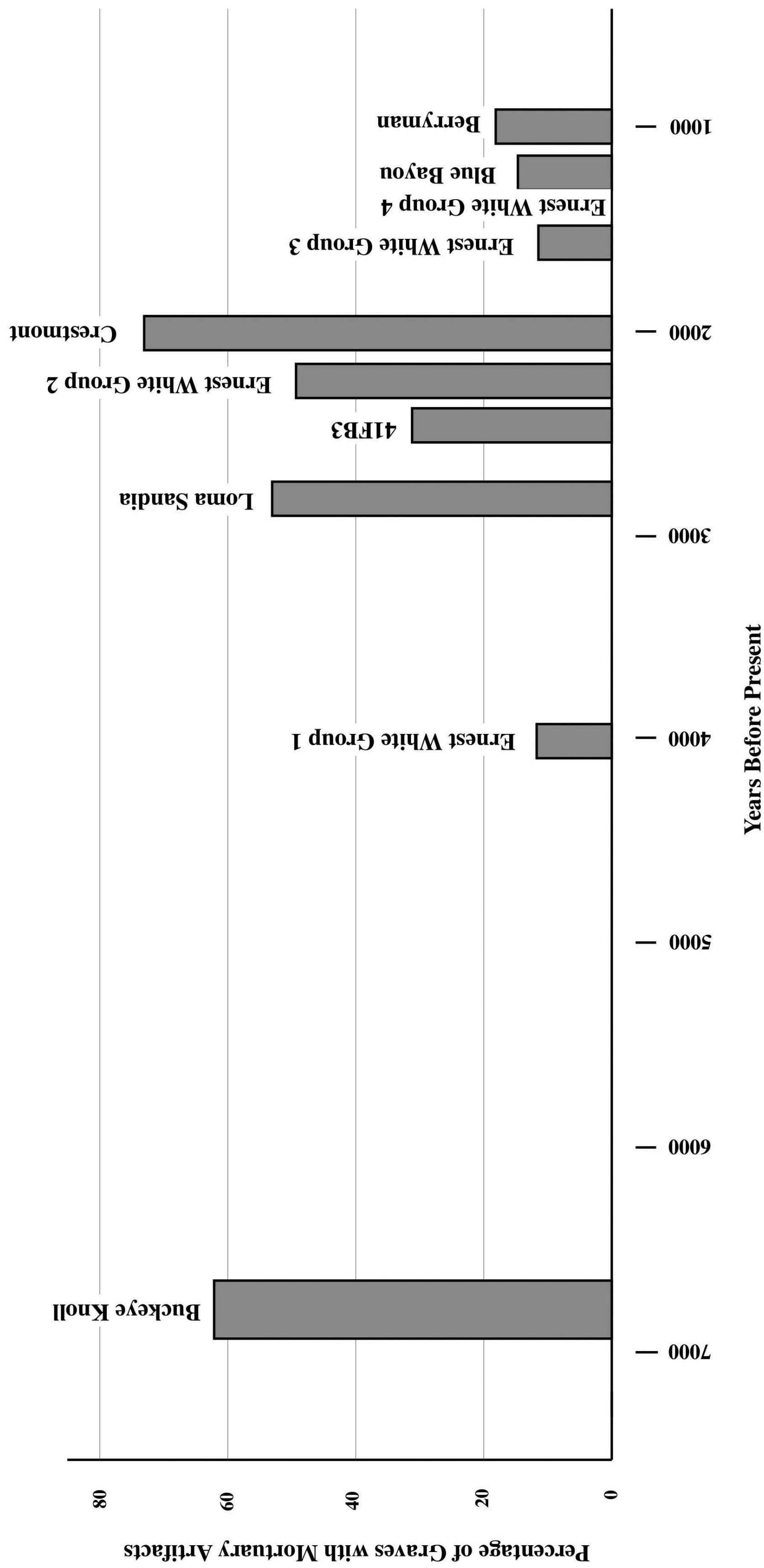


Figure 5-10. Bar graph showing the percent of graves with mortuary artifacts from Middle Archaic, Late Archaic, and Late Prehistoric burial sites on the Texas coastal plain. Sites other than Buckeye Knoll are based on data in Perttula (2000). Sites listed by Perttula for which chronological information is ambiguous are not included here. Note the dramatic peak in the Lake Archaic and subsequent sharp decline in the Late Prehistoric.

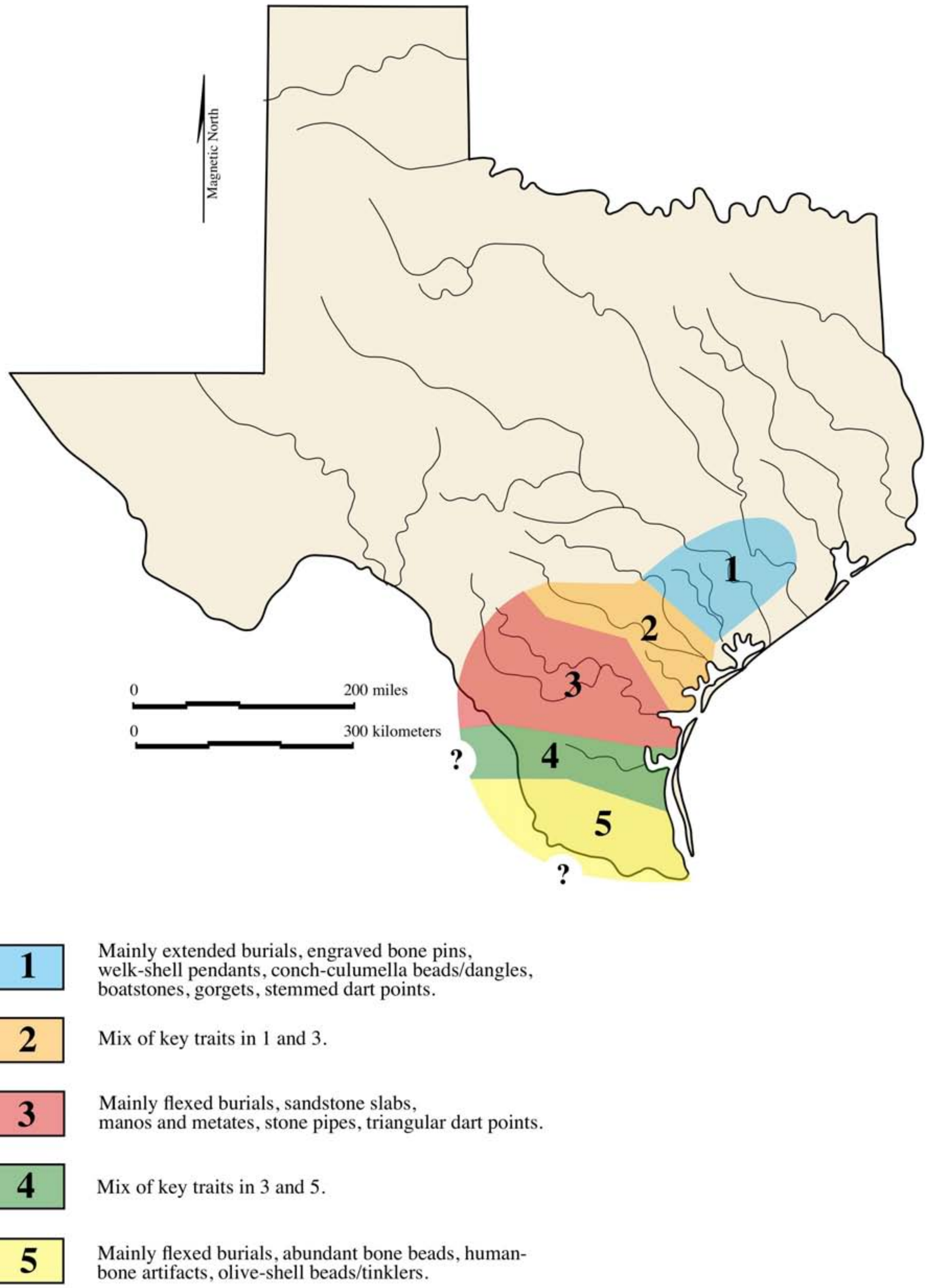


Figure 5-11. Map showing the estimated geographic ranges of three suggested Late Archaic mortuary patterns and inferred zones of transition and/or interaction between them (areas of mixed traits).

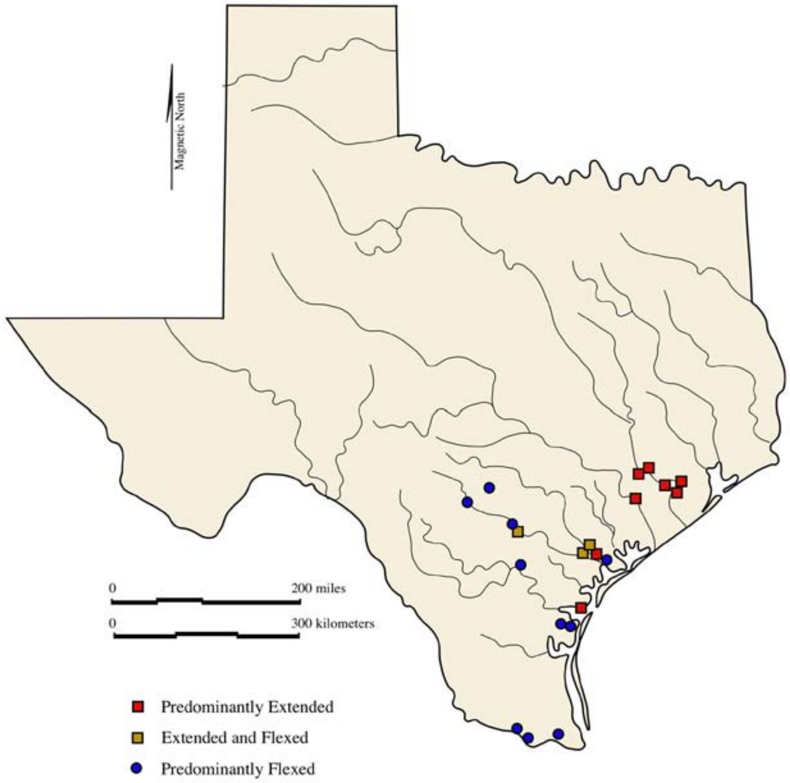


Figure 5-12. Map showing the locations of Texas coastal plain Late Archaic sites with primary burial positions.

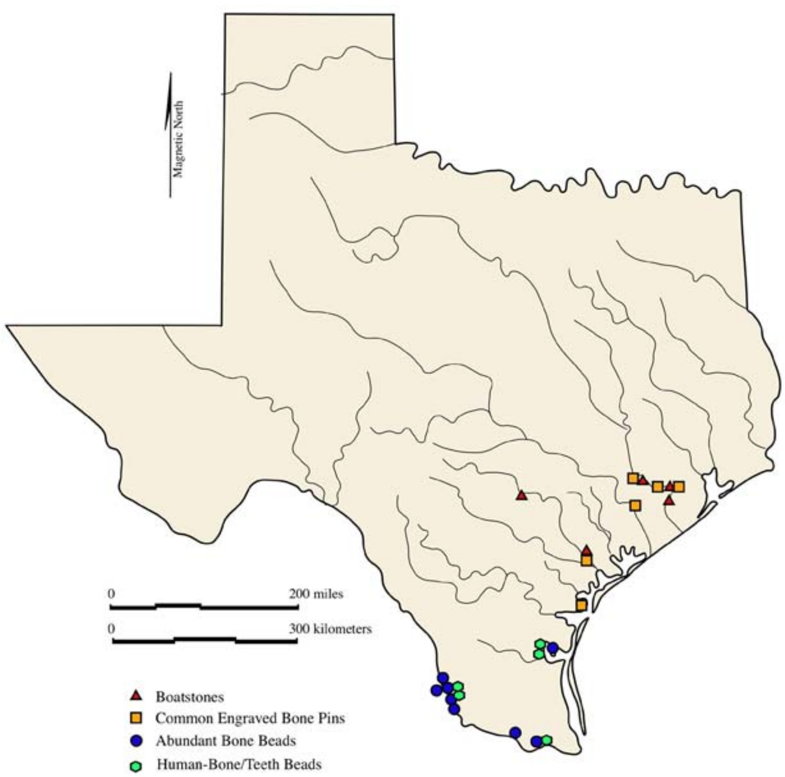


Figure 5-13. Map showing the locations of Texas coastal plain Late Archaic sites with key mortuary artifact traits shown in the legend.

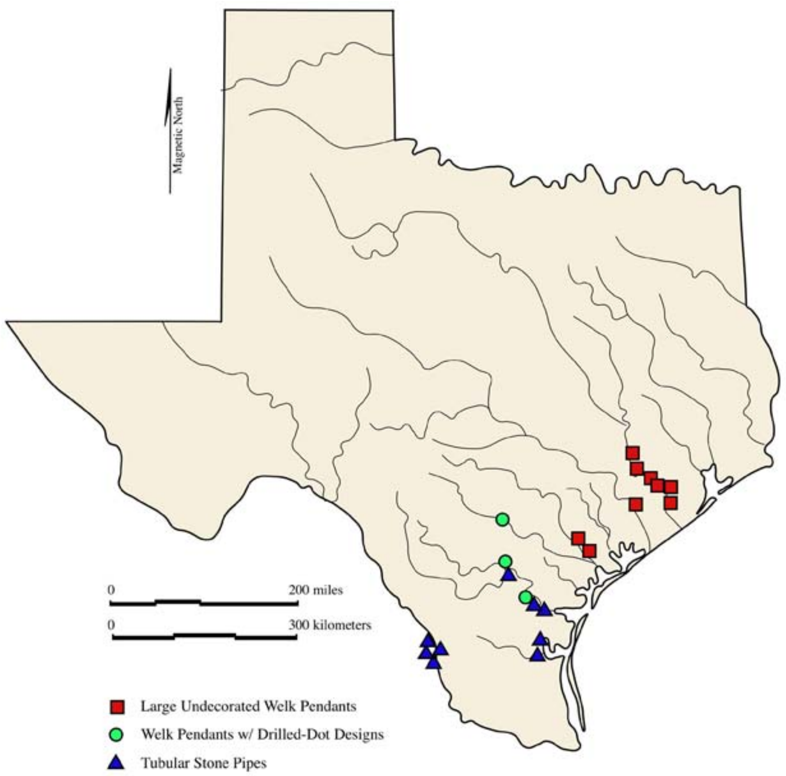


Figure 5-14. Map showing the locations of Texas coastal plain sites with mortuary artifact traits shown in the legend.

Lower Brazos and Colorado Rivers

As repeatedly noted above, a number of Late Archaic cemetery sites along the lower Brazos and Colorado rivers share key traits. These include (1) an overwhelming predominance of supine, extended interments (see Figure 5-12); (2) the occasional presence of ground and polished stone artifacts such as boatstones (see Figure 5-13) and gorgets; (3) recurrence of large, undecorated whelk-shell pendants as mortuary goods (see Figure 5-14); (4) recurrence of conch columella beads and dangles as mortuary goods; (5) recurrence of bone pins bearing finely engraved geometric designs; and (6) occasional presence of corner-tang knives in graves.

The redundant co-occurrence of these traits appears to be diagnostic of this area and tradition. Additional mortuary goods include flaked lithic dart points of various stemmed and notched Late Archaic types, various other flaked lithic tools, undecorated bone tools, the occasional presence of unworked deer antlers, and red ochre in graves.

While the presently available information clearly shows that this tradition was centered in the lower Brazos-Colorado area, there is considerable evidence for southward/westward extensions of key traits. For example, extended burials accompanied by engraved bone pins and whelk-collumela beads are documented at the TWI site on the lower Guadalupe River. Still farther south, extended burials with engraved bone pins have been documented at the coastal Ingleside Burial site northeast of Corpus Christi. As discussed further on in some detail, the Late Archaic mortuary component at the Buckeye Knoll site clearly shows affinities with the Lower Brazos-Colorado pattern in key traits, such as supine extended burials and large, undecorated whelk-shell pendants. Also probably relevant is the occurrence in Late Archaic midden (non-mortuary) contexts at Buckeye Knoll of the same types of engraved bone pins that occur in this mortuary tradition, suggesting a cultural linkage, albeit one that is not apparent in the limited mortuary artifact assemblage from the few Late Archaic burials documented at the site.

South Texas

As far as the evidence now permits, it is possible to suggest that a pattern of large cemeteries emerged in south Texas, perhaps centered along the Nueces and San Antonio drainages, after 3000 B.P. The fully investigated Loma Sandia site provides the most complete information on burial practices for south Texas. Key attributes of the Loma Sandia mortuary pattern include the following: (1) an overwhelming preponderance of flexed and semi-flexed primary interments (see Figure 5-12); (2) a mortuary artifact assemblage dominated by lithic artifacts; (3) an abundance of flaked-chert lithics, including dart points (predominantly of the unstemmed triangular Tortugas type), bifacial knives, and preforms; (4) placement of sandstone metates and manos in graves; (5) occasional placement of sandstone tubular pipes in graves (see Figure 5-14); and (6) whelk-shell pendants bearing designs elements made with rows of drilled punctations (see Figure 5-14).

This pattern is distinctly different from that seen in the Lower Brazos-Colorado River area. Mode of burial is typically flexed rather than extended, while the mortuary artifact assemblage differs in the greater emphasis on lithics and in the kinds of diagnostic projectile points. The predominance of unstemmed Tortugas points at Loma Sandia contrasts with the stemmed and notched types found in the Lower Brazos-Colorado sites, a situation that mimics the geographic differences in distributions of Late Archaic dart point types seen from occupation sites (e.g., Corbin 1974; Hester 1980a; Prewitt 1995). The tubular stone pipes are lacking in the Lower Brazos-Colorado assemblage, as is the recurrent placement of large metates and manos in graves. Modified bone artifacts are present at Loma Sandia, but are largely restricted to undecorated awls; the abundant, finely engraved pins found in the Lower Brazos-Colorado sites are not present. Whelk-shell pendants are present at Loma Sandia, but are on average smaller and bear rows of drilled punctations not seen on the large, plain pendants typical of the Lower Brazos-Colorado assemblage. The conch-columella beads commonly found in the Lower Brazos-Colorado area are altogether absent at Loma Sandia. Polished stone items such as boatstones and gorgets are absent from the Loma Sandia assemblage, as are corner-tang knives (though such knives may, in any case, postdate the Loma Sandia cemetery).

Various key traits found at Loma Sandia are documented at other sites in south Texas. As may be seen in Figure 5-12**,** flexed/semi-flexed burials are the norm in most of inland south Texas during the Late Archaic, in contrast to the extended burials in the Lower Brazos-Colorado area. Tubular stone pipes are a recurrent trait at south Texas mortuary sites both on the coast and in the interior (see Figure 5-14). Large, undecorated whelk-shell pendants are absent from south Texas sites, while the somewhat smaller whelk pendants with drilled-punctation designs are reported from the Corpus Christi area and the Olmos Dam site near San Antonio (see Figure 5-14). The latter items are not reported farther to the south, and thus may be restricted mainly to the Nueces and San Antonio drainages. Certain items recur in both the Lower Brazos-Colorado area and south Texas, such as the placement of red ochre and unmodified deer antler in graves. The latter trait was particularly in evidence at the Olmos Dam site, where numerous antler racks were found covering one individual.

Unmodified whelk shells and bi-pointed whelk columellas have been reported from both Loma Sandia and a contemporaneous burial at the coastal Callo del Oso site (Ricklis 1997). While stable-isotope data from human bones indicate distinct coastal and interior adaptations during the Late Archaic (Hard et al. 2002), such commonalities, along with the regional emphasis on flexed/semi-flexed burials, suggest those basic aspects of mortuary behavior cross-cut this human-ecological boundary.

Generally speaking, the area between the San Antonio River and the lower Brazos and Colorado rivers may be tentatively seen as a transition zone. At certain sites, such as Olmos Dam and Locke Farm (both on the Blackland Prairie near the Balcones Escarpment), there are apparent mixes of traits. Olmos Dam may be most closely linked to south Texas, as it contained flexed burials, punctation-decorated whelk pendants and lacked the suite of diagnostics for the Lower Brazos-Colorado pattern. However, several whelk-columella dangles were found there, and these have more abundant counterparts at Lower Brazos-Colorado sites such as Goebel and Crestmont. The Locke Farm burials were flexed and also lacked most of the Lower Brazos-Colorado mortuary artifact assemblage, but a limited connection to that area may be indicated by a boatstone and a polished stone gorget.

The series of small sites containing from one to a few burials near the San Antonio River in Wilson and Karnes counties do not completely fit into the Loma

Sandia-South Texas pattern, though the limited data from these sites preclude any firm conclusions. Most burials are flexed, though one site (41WN73) contained an extended burial. The presence of dart points, performs, and thin bifaces may suggest a linkage to south Texas, while corner-tang knives from 41KA23 and 41KA102 and a stone gorget from 41KA23 suggest cultural affinities to the north.

Lower Rio Grande

As pointed out above, mortuary data from the lower Rio Grande is both diverse and, at the same time, limited, especially in terms of chronological control. Nonetheless, there are some notable differences between this area and the more northern part of south Texas, just discussed, which suggest that a valid cultural-geographic distinction can be made.

Burials along the Rio Grande, from Webb County southward and eastward to the Rio Grande delta area, mainly are primary flexed interments. While this suggests some basic commonality with mortuary patterns at Loma Sandia and other south Texas sites, a minority of secondary bundle burials represents a recurrent presence in the delta area and this may, with more information, prove to be a significant distinction. More clearly distinguishing the Rio Grande area from the northern part of south Texas are the following recurrent traits in the mortuary artifact assemblage: (1) large quantities of small tubular bone beads in some graves; (2) beads made from human long bones and teeth; (3) common inclusion of olive-shell beads and/or tinklers in graves; and (4) disk-shaped whelk-shell beads as a recurrent mortuary item.

The geographic distributions of certain traits suggest spatial overlap between the South Texas mortuary pattern and that of the lower Rio Grande area. Several burial sites along the river, south of Laredo (and across the river in the Mexican state of Tamaulipas), have produced tubular stone pipes (see Figure 5-14), Tortugas points, and biface caches of the kind found farther north at Loma Sandia, along with large quantities of tubular bone beads more typical of the Rio Grande area (see Perttula 2002:Table 7). The Dietz and Scarborough sites on Baffin Bay at the southern end of the central coast area have yielded beads of human bone, plus a large number of animal-bone beads (at Scarborough), suggesting linkages with the Rio Grande valley area (see Perttula 2000:Table 13). Also present were tubular stone pipes such as those at Loma Sandia and other south Texas sites.

Chapter 6

CHRONOLOGY AT BUCKEYE KNOLL

Robert A. Ricklis

It is clear from even a cursory review of the findings at Buckeye Knoll that the site saw human occupation over a long period of time. Paleo-Indian lithics, in the form of diagnostic stone dart points, were found in all excavation areas, where they were generally overlain by a wide range of Archaic lithics and, finally, by Late Prehistoric arrow points and ceramic sherds.

It was apparent even in the field, prior to any laboratory inventorying or analysis, that time-diagnostic artifacts were largely found in vertical or stratigraphic positions that were congruent with expectations based on the known time frames for the various projectile point types that were being recovered. On the Knoll Top, arrow points and potsherds, Late Prehistoric diagnostics, were recovered largely from the upper part of Zone 2, immediately under Zone 1, which was essentially sterile. The middle part of Zone 2 yielded dart points of types such as Ensor, Fairland and Godley, all pertaining to the later part of the Late Archaic period in central and southern Texas (e.g., Hester 1980b, 1995, 2004; Prewitt 1981, 1985). The lower part of Zone 2 produced dart points of types assigned to the early part of the Late Archaic, such as Lange and Morhiss. Zone 3 yielded preponderantly Late Paleo-Indian point types such as Golondrina, St. Mary's Hall, and Wilson, all virtually absent in superior strata, strongly suggesting that the materials in this zone largely represent occupation(s) in Late Paleo-Indian times.

Thus, the contact between the base of Zone 2 and the top of Zone 3 appeared to represent a large time gap, between the Late Paleo-Indian period and the early Late Archaic, or some six millennia. On this basis, it was suspected that this stratigraphic contact was in fact a geologic unconformity, a suspicion supported by (a) the fact that Early Archaic burial pits, all in Zone 3, must have been dug from a surface that was later deflated by erosion, given that some of those burials were resting at, or very close to, the top of Zone 3, and (b) the lower part of Zone 2 contained dart points from a long time range (e.g., Bell/Andice, Early Triangular, Morhiss, Lange, Morrill types), suggesting admixture of artifacts as would occur if the original containing sediment matrix had been deflated. In sum, the findings on the Knoll Top initially suggested a coherent sequence, albeit one that had seen a measure of disruption by deflation of the upper part of Zone 3, which included the ground surface when the Early Archaic cemetery was used, as well as the matrix for Middle Archaic materials that were left behind to become mixed into the bottom of Zone 2 and top of Zone 3.

Similarly, an apparently coherent cultural sequence is represented in the West Slope Area. Late Archaic points (Ensor, Kent) plus Late Prehistoric materials (an arrow point fragment and a few potsherds) were all found in Zone 1. Zone 2 yielded dart points considered herein to pertain to terminal Middle Archaic to early Late Archaic times, such as Bulverde, Pedernales, and Morhiss. In Zone 3, an earlier assemblage of points, restricted to the Early Triangular, Refugio and Bell/Andice types, was found.

In the East Area, our excavations yielded arrow points in the upper 30 cm, along with sporadic potsherds identifiable as Rockport ware and/or Leon Plain. The bottom 20-30 cm produced a limited array of Late Paleo-Indian artifacts, including fragments of lanceolate dart points showing the parallel pressure flaking characteristic of that period, as well as a good example of a Dalton adze. In between these chronological poles, the middle levels in the East Area units produced a limited array of triangular and stemmed dart points pertaining to the Archaic period.

Thus, in all three excavation areas a basically intact sequence of culturally relevant deposits was noted. At the same time, it was recognized that the rather light, sand-silt sediments have seen significant bioturbation that can be expected to have translocated many artifacts from their original positions within the deposits, as was in fact recognized in many instances during field work (e.g., Late Prehistoric arrow points or fragments thereof occurred in strata otherwise dominated by earlier Archaic or Late Paleo-Indian materials).

Having said all this, it is necessary to state an important caveat, which is that the culturally relevant strata at the site are all cumulative palimpsests, meaning that fairly large amounts of archaeological materials representing millennia of site occupation have been compressed into deposits usually less than two meters thick. As a corollary, there has been sufficient mixing of materials from different time periods and representing different occupational episodes that patterning of human activities at the site cannot be spatially delineated. Our attempts to do so (including examination of the density in horizontal distributions of debris classes in relation to identifiable features such as hearths) were consistently unsuccessful.

In order to assess the chronological integrity of the deposits and define temporal parameters in absolute terms, a program of chronometric dating was followed, relying mainly on two techniques: radiocarbon dating, including accelerator mass spectrometry (AMS), and optically stimulated luminescence (OSL) dating of the sand fraction of the actual sediment matrices.

Radiocarbon/AMS Dating

During excavation, special attention was given to searching for datable organic materials, preferably charcoal, that could be confidently assumed to be in primary association with definable strata, such as would be the case with charcoal in hearths or other discrete cultural features. Such materials were not found; although a number of hearth features and pits were located in the Knoll Top and West Slope excavations, they did not contain appreciable amounts of charcoal or other clearly and directly associated organic materials. Therefore, under the assumption that the very small bits and flecks of charcoal in the deposits had a high chance of having been displaced by post-depositional turbation (e.g., by rodent burrowing and/or root action), radiocarbon dating of the cultural strata at the site was accomplished by means of assays on faunal bone fragments, which were found in abundance in all excavation areas, as well as on estuarine bivalve shells (*Rangia cuneata* and oyster) that were present in the Knoll Top and West Slope areas. The working assumption is that these larger and heavier materials would not be as readily moved from their original loci of deposition as would small pieces of charcoal. This assumption appears to be largely vindicated, based on the data presented below.

The faunal bone samples consisted of longbone fragments of white-tailed deer (*Odocoileus virginianus*) that were culled from the total faunal-bone samples in specific units and arbitrary 10-cm levels that were selected for dating. All deer longbone fragments in selected units and 10-cm levels were collected for submission to Beta Analytic, Inc., for standard radiocarbon dating of the collagen fraction. Sampling was limited to longbone fragments due to their comparatively high density and relatively good state of preservation. However, the samples were generally too small in volume/weight to produce reliable results using the standard radiocarbon technique (because of the imperative to date samples strictly from the targeted proveniences, the bone samples were limited to the materials available from those proveniences, and could not be augmented without mixing material from two or more arbitrary levels). Thus it was decided to rely on AMS dating of the collagen that could be extracted from the deer bone available from relevant unit-level bone samples. Shell samples did not present this problem, since the mass of the shells from pertinent unit levels was sufficient for the standard radiocarbon dating procedure.

The assay results for all deer bone and shell samples are shown in Table 6-1**,** along with corrections for the 13^{C} fraction and dendrochronological calibrations (at 1-sigma) of the 13^{C}-corrected ages (using the CalPal calibration program). It should be noted here that a marine reservoir correction is not applied to the shell samples because previous research has shown that this appears to be inappropriate for shallow-water estuarine shells from the Texas coast (see discussion

Table 6-1. Results of AMS Assays on Deer Bone and Standard Radiocarbon Assays on Shell from Non-Mortuary Contexts at Buckeye Knoll.

Sample	Lab No.	Material	Unit	Area	Level/Zone	C14 Age	13C/12C	Corrected	2-Sigma Cal. (Yrs. B.P.)	2-Sigma Cal. (BC-AD)
41VT98-10	Beta-191091	Non-Human Bone	S14W86	Knoll Top	6 (Zone 2, upper)	740±40	-22.4 o/oo	780±40	760-660	AD 1190-1280
41VT98-5	Beta-191086	Non-Human Bone	S12W82	Knoll Top	7 (Zone 2, upper)	1040±-60	-20.5 o/oo	1110±60	1170-930	AD 780-1020
41VT98-11	Beta-191092	Non-Human Bone	S14W86	Knoll Top	9 (Zone 2, middle)	1650±-40	-20.9 o/oo	1720±40	1720-1540	AD 230-410
41VT98-6	Beta-191087	Non-Human Bone	S12W82	Knoll Top	10 (Zone 2, middle)	1950±40	-20.4 o/oo	2030±40	2100-1890	BC160-AD 60
41VT98-13	Beta-191094	Non-Human Bone	S14W86	Knoll Top	14 (Zone 3)	2140±40	-20.3 o/oo	2220±40	2340-2130	BC 390-180
41VT98-12	Beta-191093	Non-Human Bone	S14W86	Knoll Top	11 (Zone 2, lower)	2460±40	-20.2 o/oo	2540±40	2660-2480	BC 710-530
41VT98-8	Beta-191089	Non-Human Bone	S12W82	Knoll Top	13 (Zone 2, lower)	2550±40	-20.2 o/oo	2630±40	2780-2730	BC 830-780
41VT98-7	Beta-191088	Non-Human Bone	S12W82	Knoll Top	12 (Zone 2, lower)	2800±40	-20.6 o/oo	2870±40	3090-2870	BC 1140-920
41VT98-9	Beta-191090	Non-Human Bone	S12W82	Knoll Top	14 (Zone 3A)	3940±40	-20.3 o/oo	4020±40	4570-4410	BC 2620-2460
41VT98-22	Beta-191103	Oyster	S12W82	Knoll Top	12 (Zone 2, lower)	4450±50	-2.9 o/oo	4810±60	5600-5470	BC 3650-3520
41VT98-23	Beta-191104	Oyster	S14W86	Knoll Top	11 (Zone 2, lower)	4910±50	-2.7 o/oo	5280±50	6150-5980	BC 4200-4030
41VT98-19	Beta-191100	*Rangia cuneata*	S14W86	Knoll Top	11 (Zone 2, lower)	5070±60	-4.8 o/oo	5400±60	6260-6080	BC 4310-4130
41VT98-16	Beta-191097	*Rangia cuneata*	S12W82	Knoll Top	12 (Zone 2, lower)	6180±50	-3.9 o/oo	6530±50	7490-7380	BC 5540-5430
41VT98-20	Beta-191101	*Rangia cuneata*	S14W86	Knoll Top	14 (Zone 3A)	6610±50	-3.7 o/oo	6960±60	7850-7720	BC 5900-5770
41VT98-17	Beta-191098	*Rangia cuneata*	S12W82	Knoll Top	13 (Zone 2, lower)	6910±60	-1.8 o/oo	7290±60	8150-8030	BC 6200-6080
41VT98-18	Beta-191099	*Rangia cuneata*	S12W82	Knoll Top	15 (Zone 3A)	7340±60	-6.9 o/oo	7640±60	8500-8390	BC 6550-6440
41VT98-14	Beta-191095	Non-Human Bone	S29W116	West Slope	12 (Zone 1)	1240±40	-20.2 o/oo	1320±40	1300-1170	AD 650-780
41VT98-25	Beta-201532	Non-Human Bone	S33W116	West Slope	9&10 (Zone 2)	3290±40	-20.7o/oo	3360±40	3650-3530	BC 1700-1580
41VT98-24	Beta-191105	Oyster	S29W116	West Slope	12 (Zone 2)	3120±60	-3.1o/oo	3480±60	3830-3670	BC 1880-1720
41VT98-15	Beta-191096	Non-Human Bone	S29W116	West Slope	18 (Zone 3)	3520±50	-19.7 o/oo	3610±50	4010-3820	BC 2060-1870
									4080-4030	BC 2130-2080
41VT98-26	Beta-201533	Non-Human Bone	S33W116	West Slope	12-14 (Zone 3)	3900±-40	-20.8 o/oo	3970±40	4520-4300	BC 2570-2350
41VT98-21	Beta-191102	*Rangia cuneata*	S29W116	West Slope	12 (Zone 2)	4920±50	-2.5 o/oo	5290±50	6160-5990	BC 4210-4040

Note: Calibrations were obtained using CalPal program.

in Ricklis 1999). Clearly paired samples of such shell and charcoal on Texas coast sites have shown that shell ages, once corrected for 13^{C}, are virtually the same as ages on charcoal, suggesting that these bivalves lived within an essentially atmospheric carbon reservoir (similar to that found in shallow lakes; see Stuiver 1986). This also appears to indicate that ingestion by living organisms of "old" organic carbon upwelling from the sea bottom, which can cause shell dates to appear too old and to thus require and adjustment by the marine-reservoir correction factor (see discussion in Ricklis 1999), is not a significant factor in the shallow estuaries behind the coastal barrier islands.

Table 6-2. Calibrated Ages from the Knoll Top and West Slope Excavations at Buckeye Knoll.

Knoll Top	
Zone 2 (Upper)	760-660 B.P. (bone)
	780-1020 B.P. (bone)
Zone 2 (Middle)	1720-1540 B.P. (bone)
	2100-1890 B.P. (bone)
Zone 2 (Lower)	2750-2480 B.P. (bone)
	2780-2730 B.P. (bone)
	3090-2870 B.P. (bone)
	5600-5470 B.P. (shell)
	6150-5980 B.P. (shell)
	6260-6080 B.P. (shell)
	7490-7380 B.P. (shell)
	8150-8030 B.P. (shell)
Zone 3	2340-2130 B.P. (bone)
	4570-4410 B.P. (bone)
	8500-8390 B.P. (shell)
West Slope	
Zone 1	1300-1170 B.P. (bone)
Zone 2	3650-3530 B.P. (bone)
	3830-3670 B.P. (shell)
	6160-5990 B.P. (shell)
Zone 3	4080-3820 B.P. (bone)
	4520-4300 B.P. (bone)

As noted, the results for all radiocarbon and AMS assays made on faunal bone and shell are shown in Table 6-1, along with corrections for 13C and 1-sigma calibrated age ranges. The calibrated ages are largely congruent with the relative depths of the samples in the excavation, insofar as ages on deer-bone collagen and shell increase with increasing depth. The calibrated age ranges from the Knoll Top and West Slope are presented in Table 6-2.

In viewing Table 6-2, it may be seen that shells produced considerably older ages than deer bone from the same stratigraphic zones and levels within zones. The age discrepancies are too great (on the order of thousands of years) to be accounted for by a marine correction factor, which would adjust for discrepancies of only several hundred years (e.g. Stuiver et al. 1986; Taylor 1987). The same can be said as regards the freshwater reservoir correction postulated by Aten (1983) to involve only hundreds of years, not millennia. Most of these age divergences are best explained as due to taphonomic factors. The relatively old ages of the shells from the lower part of Zone 2 on the Knoll Top are inferably due to incorporation of shell left as lag material when the upper portion of Zone 3 was deflated by middle Holocene erosion of the Knoll Top, and subsequently incorporated into the later accumulation of the basal part of Zone 2. The old age for rangia shell (8500-8390 B.P., calibrated) from Knoll Top Zone 3A is interpreted to represent turbational incorporation into the remaining Zone 3 sediments prior to erosional stripping of the upper part of that stratum. Since the dated shells must have been deposited on the surface of Zone 3 prior to its deflation after use of the location for the cemetery, it can be inferred that the 8500-8390 age range dates some part of the time range (presumably the later end) of the KT AU 4 occupation. (Explications of AUs, or Analytical Units, are presented below. Those related to the Knoll Top are identified by the "KT" preface; those associated with the West Slope by the "WS" preface.) The same inference can be made regarding the only slightly more recent date on rangia shell of 8150-8030 B.P. from the bottom of Zone 2; inferably these shells remained on the Knoll Top as lag materials from Zone 3 that were incorporated into the initial deposition of the Zone 2 sediments. It must be noted that similar age lags are not represented by assays on deer bone, as bone of these ages has decayed and thus were not recoverable for dating.

On the West Slope, the shell ages are not so consistently out of line with results obtained on deer-bone collagen. Thus, bone and rangia shells from the same stratum, Zone 2, produced very similar ages (3650-3530 B.P, and 3830-3670 B.P., respectively); the small discrepancy here of only decades can be easily assumed to accurately represent the actual span of occupations during a single archaeological time period. The second shell date for Zone 2 shows a discrepancy of over 2,000 years, however, suggesting, once again, a taphonomic factor. In this case, the age discrepancy may be explained as originating in the same erosional process just alluded to for the Knoll Top. The shell age in the West Slope, Zone 2 of 6160-5990 B.P. dates the Knoll Top occupation during which it was discarded, while the sample's stratigraphic context suggests colluvial redeposition on the West Slope by ca. 3800-3500 B.P.

On the basis of these inferences, it can be suggested that the most reliable dates for establishing site chronology are the AMS results on deer-bone collagen. These results suggest the following chronology for the Knoll Top. Zone 1 post-dates Zone 2, after ca. 600-700 B.P. Zone 2 (upper) would date around 1020-660 B.P., while Zone 2 (middle) appears to date 2100-1720 B.P. The lower portion of Zone 2 probably dates 3090-2480 B.P. The range of bone samples in Zone 3 is 4570-2130 B.P. This overlaps with later strata, probably because bone is largely or entirely intrusive from higher zones. The lack of bone ages that accord with the Late Paleo-Indian time-diagnostic lithics in Zone 3 suggests that faunal bone from that period has completely decayed. Two dates on rangia shell have a combined range of ca. 8500-8000 B.P. Since these ages predate the early cemetery component by at least a millennium, and precede the erosional deflation of the Knoll Top by an even greater margin, it can be inferred that the dates represent deposition of oyster shell by site occupants on the surface of Zone 3 and that they therefore pertain to earlier use of the site (i.e., KT Analytical Unit 4, discussed further on). Because this age range is later by at least a millennium than the posited ages of many of the dart point types found in KT AU 4 (e.g., Golondrina, St. Mary's Hall, Wilson, all dated to before 9,000 B.P.), it may be suggested that it corresponds to occupation(s) of the site that left behind points whose temporal range is presently ambiguous (such as, for instance, the untyped lanceolate forms and the triangular-lanceolate points, discussed below).

Following these lines of reasoning, the dates for the West Slope can be interpreted in the following manner. Zone 1 dates 1300-1170 B.P., while Zone 2 dates 3830-3530. Zone 3 is estimated to date 4520-3820.

Radiocarbon Dates and Point Type Chronology

A key test of the reliability of the radiocarbon dating of archaeological strata at Buckeye Knoll is how well the dates agree with the accepted ages of time-diagnostic artifacts such as stone projectile points of established types. In fact, as may be seen in Table 6-3**,** such temporal correlations at Buckeye Knoll are quite good, suggesting that the radiocarbon ages obtained on deer-bone samples can be accepted as reliable.

The dominant point type in the upper part of Zone 2 on the Knoll Top is the Scallorn arrow point. This type is assigned to a time range of 1250-650 years B.P. in central Texas, the region in the state with the most detailed and reliable chronology of prehistoric cultural periods and their diagnostic artifacts (Prewitt 1981, 1985). The deer-bone AMS results from upper Zone 2 in fact provide a calibrated age range of 1170-660 B.P., well within the expectable time range of Scallorn points.

The middle part of Zone 2 on the Knoll Top is dominated by Late Archaic point types such as Ensor and Fairland. In central Texas, these types are dated to a combined range of ca. 2000-1400 B.P. The deer-bone collagen age range for the middle of Zone 2 is 2100-1540 B.P., a close correspondence.

Lange and Morhiss type dart points were recovered from the lower part of Zone 2 on the Knoll Top. The Lange point is a diagnostic of the San Marcos phase in central Texas, dated to 2600-2250 B.P. (Prewitt 1981). Morhiss points are not diagnostics in the central Texas chronology, as they are found mainly on the central Coastal Plain of the State (Prewitt 1995), where they have been estimated to date to ca. 2800 B.P. (Hudler et al. 2002; Turner and Hester 1999). Both Lange and Morhiss points were found in the Late Archaic (as here defined) Loma Sandia cemetery (41LK201), dated to ca. 2800-2600 B.P. (Taylor and Highley 1995). The deer-bone collagen age range for lower Zone 2 corresponds rather closely, at 3090-2480 B.P.

On the West Slope, Zone 1 appears to represent recurrent occupation from the later part of the Late Archaic, represented by Kent and Ensor points, into the Late Prehistoric, as represented by an untyped arrow point fragment and several potsherds. The age range obtained on deer-bone collagen from this zone is 1300-1170 B.P. which fits between the Central Texas age range of Ensor points (i.e., 1800-1400 B.P.; Prewitt 1981, 1985) and the Late Prehistoric period, the beginning of which is generally placed in central and

Table 6-3. Correlations Between Radiocarbon, OSL, and Typological Ages, of the Knoll Top and West Slope Excavations at Buckeye Knoll.

Area	Zone	AMS: Cal. Age Range	OSL Age (cal. yrs. B.P.)	Principal Type(s)	Estimated Range of Type, cal.
Knoll Top	1	undated	1830 ± 200 2050 ± 240	—	—
	2 (Upper)	1020-660 B.P.	1210 ± 130	Scallorn	1250-650 B.P.
	2 (Middle)	2100-1540 B.P.	1710 ± 80	Ensor Fairland	1800-1400 B.P. 2000-1600 B.P.
	2 (Lower)	3090-2750 B.P.	3780 ± 420	Lange Morhiss	2600-2250 B.P. ca. 2800 B.P.
	3		3990± 440 6050 ± 610 7670 ± 790	— Golondrina St. Mary's Hall	— ca. 9000 B.P. 9900-8700 B.P.
West Slope	1	1300-1170 B.P.	2400 ± 250	Ensor Kent	1800-1400 B.P. ca. 2800-2200 B.P.
	2	3830-3530 B.P.	2770 ± 280 3690 ± 400 3610 ± 380 3620 ± 360	— Morhiss Pedernales Bulverde	— ca. 2800 B.P. 3500-2600 B.P. 4100-3500 B.P.
	3	4520-3820 B.P.	4640 ± 460	Early Triangular	5100-4600 B.P.

Note: Age ranges for Morhiss points are from Hudler et al. (2002) and Turner and Hester (1999); St. Mary's Hall points from Dial et al. (1998); Kent points from Ensor (1998) and Ricklis (2004); all other point-type ages from Prewitt (1981, 1985).

southern Texas at ca. 1200 B.P.. (e.g., Hester 1995, 2004; Prewitt 1981, 1985).

West Slope, Zone 2 produced Morhiss and Pedernales points and a single Bulverde point. The combined age range for these types is 4100-2800 B.P., while the age range for the deer-bone collagen from Zone 2 falls within this range, at 3830-3530 B.P.

OSL Dates

A series of optically stimulated luminescence (OSL) dates was obtained on sands within site sediments in the Knoll Top and the West Slope excavations (see Frederick and Bateman, Appendix A). Samples were extracted by insertion of one-foot-long sections of 2-inch pvc pipe into excavation wall profiles, thus facilitating a clear correlation with a given stratigraphic position in the wall profile at the sampling location.

Since the sediment matrices at Buckeye Knoll are believed to be cumulic deposits largely of eolian origin (see Frederick and Bateman, Appendix A), it is assumed that the gradual accumulation of sediment was taking place during occupations at the site. Thus, the OSL ages on sediments should essentially match the ages of the cultural materials they contain. These data are included in Table 6-3**,** along with the AMS dating results on deer bone collagen from the various strata and the estimated age ranges of the predominant point types associated with each stratum. Figure 6-1 shows these same chronometric data as plotted graphically on a time line.

The OSL data are largely in agreement with the AMS results on deer-bone collagen and with the estimated age ranges of dart and arrow point types associated with the strata. Thus, the upper part of Zone 2 on the Knoll Top yielded an OSL age of 1210 B.P., which falls within the early part of the estimated time range of Scallorn arrow points, the type of point that predominated therein; the AMS age is only slightly later, with a range of 1020-660 B.P.. A still better fit between OSL and AMS ages was obtained on samples from Middle Zone 2, with the AMS age range on deer bone collagen falling at 2100-1540 B.P.. and the OSL date for that zone at 1710 B.P.. Both sets of results are in accord with the combined age ranges for the predominant point types (Ensor and Fairland), ca. 2000-1400 B.P. For the lower part of Zone 2, the results are only approximately congruent, with the OSL technique producing an age of 3780 B.P., as compared to a calibrated age range from AMS dating of deer-bone collagen falling at 3090-2750 B.P. The predominant point types in Lower Zone 2 are Morhiss and Lange, estimated to date to ca. 2800-2250 B.P. The OSL age for Lower Zone 2 is thus slightly too old relative to the AMS and typological ranges, possibly due to incomplete resetting of the luminescence "clock" resulting from incomplete exposure of sand grains to light at the time of their eolian deposition.

The OSL ages on Knoll Top, Zone 3 are interesting. They are considerably later than should be expected based on the associated point types, which include Late Paleo-Indian types (e.g., Golondrina, St. Mary's Hall, Wilson) believed to have ages in excess of 9,000 years. The OSL results on Zone 3 are 3990 B.P., 6050 B.P. and 7670 B.P. The first of these is so recent as to suggest a sampling problem; perhaps the sample, which was recorded as coming from the top of Zone 3, actually included sand from the bottom of Zone 2. Interestingly, on the other hand, the two earlier ages quite neatly bracket the age range of the Early Archaic cemetery in Zone 3 (well dated by AMS on human bone collagen samples to ca. 7300-6200 B.P., calibrated). Taking into account the plus-or-minus error margin of the OSL dates (610 and 790 years), the ages could easily fall well within the period of cemetery use. It is possible, therefore, that the OSL ages of 7670 and 6050 B.P. actually reflect resetting of sand grains (i.e., exposure to sunlight) during the period of cemetery use, when the containing matrix was significantly disturbed and exposed to light during the digging of the many closely spaced graves in Zone 3 sediment.

Analytical Units

The data presentation and discussion in the preceding pages show that (a) the strata identified at Buckeye Knoll represent a basically intact record of the sequence of human occupation of the site, and that (b) that sequence accords, in terms of broad cultural time periods and associated diagnostic artifacts, with chronological expectations derived from the archaeological records of central and southern Texas, as currently known. While some of the data are not in complete accord (e.g., the ages on shells are too old, inferably for taphonomic reasons, and some of the OSL dates appear to be out of line with the radiometric data, due to causes that are reasonably explainable), there is sufficient congruence between the radiometric and luminescence dating and the estimated ages of strata derived from typology to justify identification of temporally relevant analytical units (AUs) in the two main excavation areas. These AUs, which will be referenced in much of the remainder of this report, are delineated in Figure 6-2**,** and their ages, cultural affiliations, and diagnostic artifact types

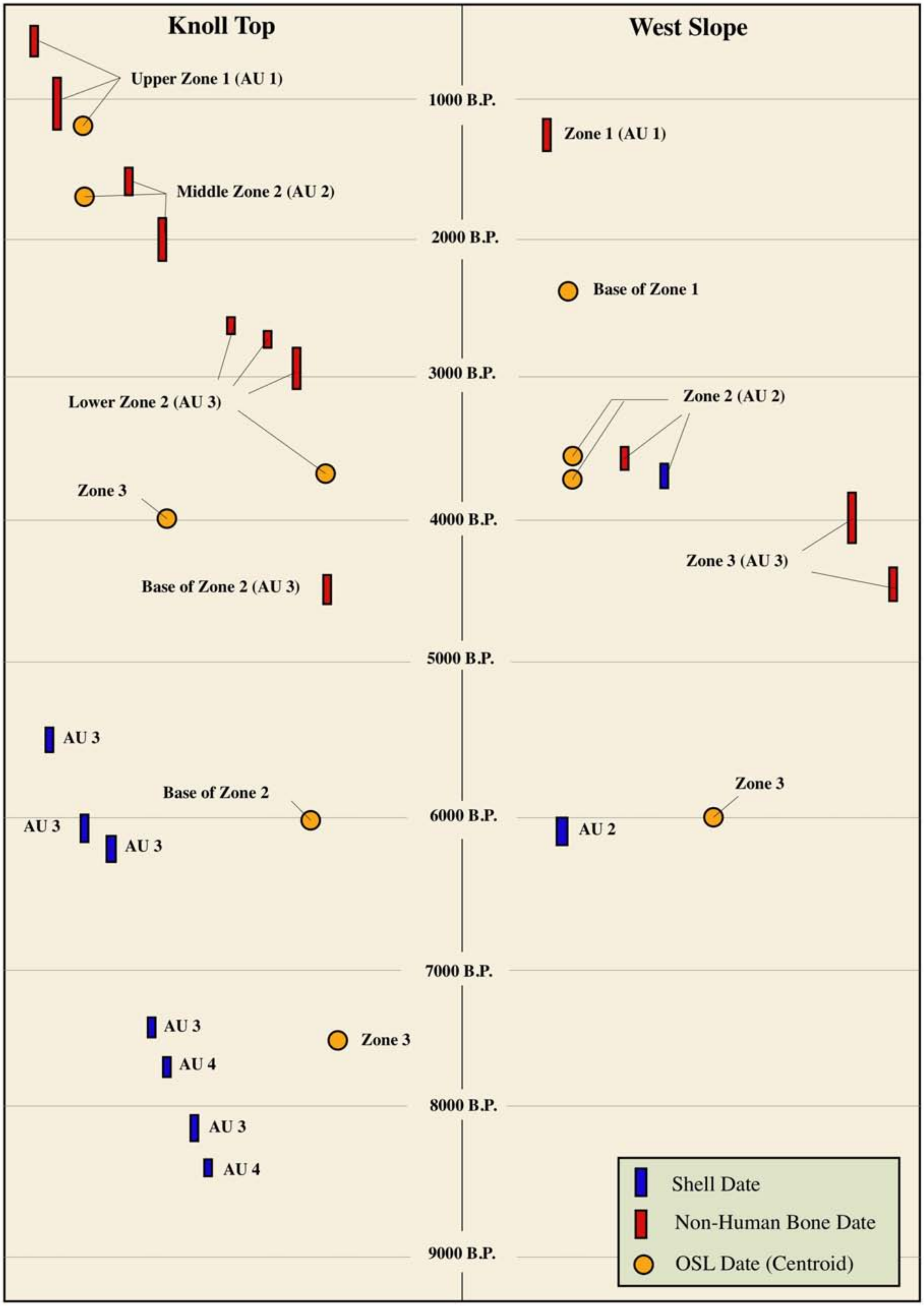


Figure 6-1. Chronological chart showing the positions of calibrated radiocarbon age ranges on non-human bone and shell samples, as well as OSL date centroids, for the Knoll Top and West Slope areas.

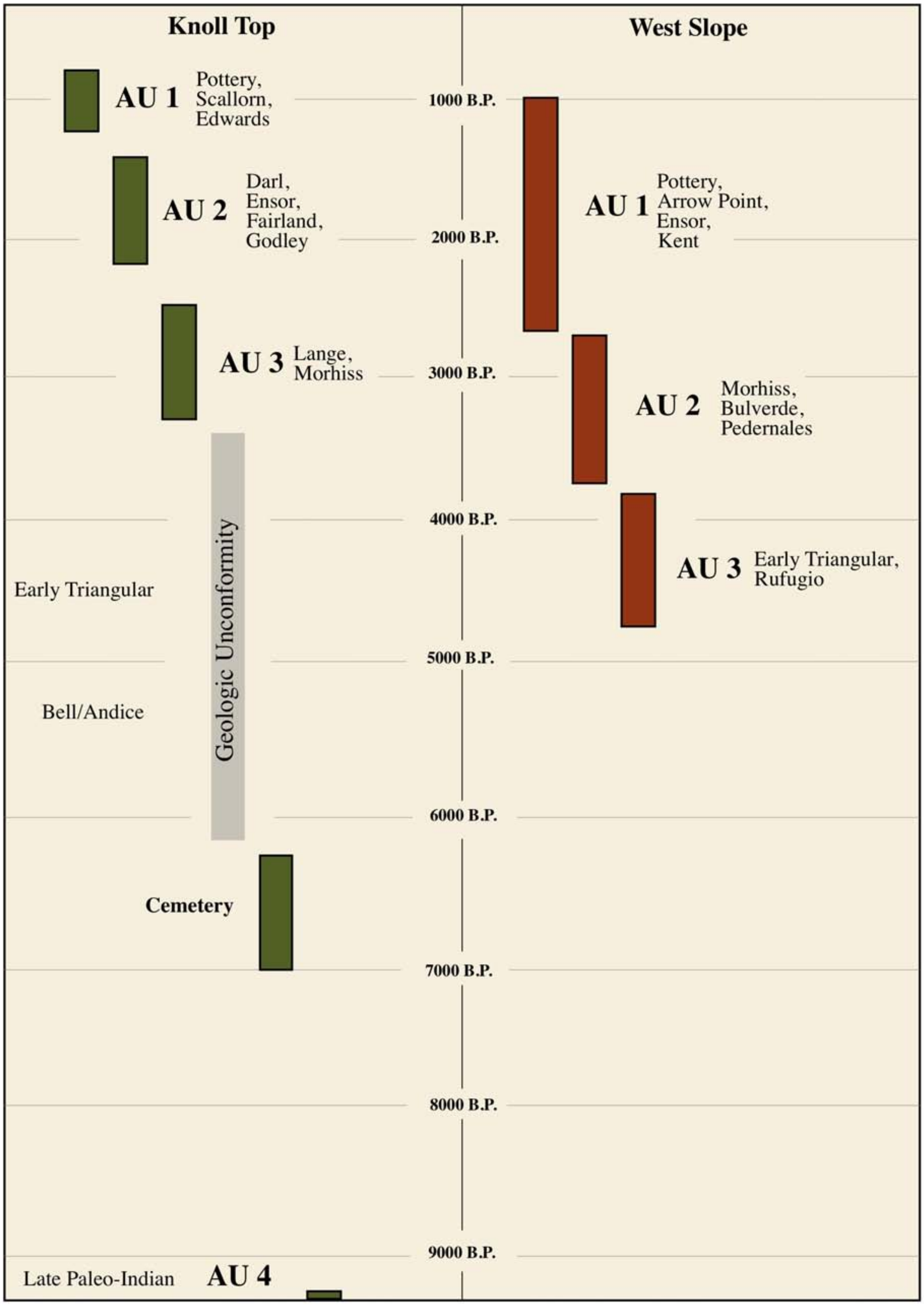


Figure 6-2. Chart showing the estimated chronological positions of the analytical units for the Knoll Top and West Slope excavation areas.

Table 6-4. Estimated Ages, Cultural Periods, and Diagnostic Artifacts Associated with the Analytical Units Defined for the Knoll Top and West Slope Excavation Areas at Buckeye Knoll.

Area	AU	Age Range	Culture Period	Diagnostic Artifacts
Knoll Top	1	1250-650 B.P.	Initial Late Prehistoric	Scallorn arrow points, Ceramics (?)
	2	2100-1540 B.P.	Late Archaic II	Ensor, Fairland points
	3	3780-2200 B.P.	Late Archaic I	Morhiss, Lange points
	4	ca. 10,000 B.P.	Late Paleo-Indian	Golondrina, St. Mary's Hall, Wilson points
West Slope	1	2800-750 B.P.	Prehistoric	Arrow point, pottery, Kent, Ensor points
	2	4100-2800 B.P.	Late Archaic I	Morhiss, Pedernales, Bulverde, Refugio points
	3	5100-3820 B.P.	Middle Archaic	Early Triangular, Refugio points.

are listed in Table 6-4. They are defined as in the following paragraphs

Knoll Top Excavations

Knoll Top AU 1

Knoll Top (KT) AU I is equated with the Initial Late Prehistoric period, estimated to date ca. 1250-650 B.P., or A.D. 700-1300. This AU is the upper one-third of Zone 2. This has been determined for each 2-by-2-m excavation unit by calculating one-third of the thickness of Zone 2 and separating that fraction as a group of 10-cm levels. Thus, for example, in S12W82, Zone 2 was approximately 80 cm thick, with the upper margin identified in Level 6 and the basal limit occurring in Level 13. The upper part of Zone 2, segregated as KT AU 1, was contained within Levels 6, 7 and 8 (i.e., that part of Zone 2 between 50 and 80 cm below the ground-surface datum point at the northeast corner of the unit). The middle part of Zone 2, or KT AU 2, is represented by Levels 9, 10, and 11 (80-110 cm b.s.), while the lower part of the zone, KT AU 3, consists of Levels 12 and 13 (110-130 cm b.s.). Zone 2 in other units was similarly divided, with the thicknesses of the upper, middle, and lower thirds dependent upon on the thickness of Zone 2 in any given unit. Since Zone 2 was of fairly uniform thickness in most the excavation, the three divisions generally were the same as that just described for S12W82.

Clearly, there is an arbitrary element in this procedure, insofar as the prehistoric occupational surfaces that implicitly are contained within Zone 2 doubtless did not conform to the horizontal (level) cuts made in excavating our 10-cm levels. However, given the absence of discernible stratigraphic distinctions within the visually homogeneous sediment of Zone 2, reliance on separations along arbitrary level boundaries is the best we can achieve in terms of vertical segregation of the deposit, beyond the gross distinctions identifiable between the major strata. For this reason, it is not possible to define AUs in the northwest part of the Knoll Top excavation area, where the strata showed pronounced dipping, as fill in a paleo-gully (see profile drawings, Figure 3-41) dramatically crosscut our arbitrary levels. Also, because of a westward down dipping of strata in the West Slope excavation, many of the arbitrary levels in that area could not be confidently assigned to a specific AU and have thus been placed in one or another pair of combined AUs (e.g., WS AU 1-2, WS AU 2-3, etc.). Nonetheless, as will be shown further on, time-diagnostic dart and arrow point types do largely fall into the AUs according to chronological expectations, strongly suggesting that these divisions are generally valid for separating other, non-diagnostic, materials into culturally meaningful time periods. As already noted, the upper-middle-lower tripartite division of Knoll Top Zone 2 appears to be vindicated by the correlations between AMS dates, OSL ages, and the distributions of time-diagnostic artifacts. Marked by abundant Scallorn arrow points and sporadically occurring potsherds, KT AU 1 produced a calibrated age range of 1020-660 B.P. (AMS dating of deer-bone collagen), and a supportive OSL age of 1210 ± 130 years.

Knoll Top AU 2

Knoll Top AU 2 dates ca. 2100-1540 B.P., or 150 B.C.-A.D. 410, and is equated with the Late Archaic II occupation of the site. This AU is the middle third of Zone 2. The just-listed age range is based on calibrated AMS dating of deer-bone collagen. An OSL age of 1710 ± 80 years, or A.D. 240, accords well with the AMS age. The predominant diagnostic lithic artifacts from this AU are Ensor and Fairland dart points, the combined estimated age ranges of which are 2,000-1,400 B.P., or 50 B.C.-A.D. 550.

Knoll Top AU 3

Knoll Top AU 3 dates ca. 3800-2200 B.P., or 1830-250 B.C., and represents a Late Archaic I component. This AU is the lower part of Zone 2. Predominant point types are Morhiss and Lange. Its range is best estimated on the basis of multiple lines of evidence, since the calibrated range for deer-bone collagen samples is narrower than the combined age range for OSL results and for predominant time-diagnostic point types. The bone collagen AMS results provide a calibrated age range of 3090-2750 (1140-800 B.C.). An OSL age of 3780 B.P. (1830 B.P.) should not be ignored, however, since this presumably provides an age for the deposition of some of the containing sedimentary matrix. The age of KT AU 3 is extended to ca. 2200 B.P. (250 B.C.) to accommodate the full time range of Lange points, which are estimated to last until that date in the central Texas chronology (see Prewitt 1981). Given the consistently later AMS and OSL ages for KT AU 2, this seems an acceptable procedure.

Knoll Top AU 4

Knoll Top AU 4 dates prior to ca. 9000 B.P. (ca. 7000 B.C.) and is equated with a Late Paleo-Indian occupation of the site). This AU is equivalent to Zone 3. Zone 3 can be divided into upper and lower parts. The upper part, designated Zone 3A, is slightly darker in color than the lower part, and is believed to represent the base of an A-horizon soil developed within the Zone 3 silt-sand sediment (see discussion of soil formation in Appendix A). However, there is no discernible distinction in the artifact typology between these two sub zones, and most of the lithic material came from Zone 3A, suggesting that the artifacts in the lower part of the zone were downwardly displaced by bioturbation.

As noted previously, the radiocarbon dates for Zone 3 are too late for the point typology, and the dated deer-bone fragments are interpreted to have been displaced from Zone 2 and to be middle Holocene materials pertaining to Middle Archaic occupations whose detritus was left as lag material after the original surface of Zone 3 was deflated by middle Holocene erosion.

West Slope Excavations

West Slope AU 1

West Slope (WS) AU 1 dates ca. 2800-750 B.P. (850 B.C. - A.D. 1200) and extends from the Late Archaic II into Late Prehistoric periods. This AU corresponds to Zone 1 on the West Slope. The one AMS age on deer-bone collagen, with a calibrated range of 1300-1170 B.P. (A.D. 650-780), falls approximately at the beginning of the Initial Late Prehistoric period. This fits with the presence of an arrow point (distal fragment, untyped) and possibly with the sandy-paste, bone-tempered potsherds. The presence of Kent and Ensor dart points suggests a Late Archaic age with a combined temporal range of ca. 2800-1400 B.P. (850 B.C.-A.D. 550), an early-end range for WS AU 1 that is supported by the OSL age of 2400 ± 250 B.P. (450 ± 250 B.C.) from the lower part of Zone 1. Thus it is concluded that WS AU 1 represents a rather lengthy time span that includes the later part of the Late Archaic and the Initial Late Prehistoric.

West Slope AU 2

West Slope AU 2 is equated with the Late Archaic I period and dates ca. 4100-2800 B.P. (2150-850 B.C.). WS AU 2 corresponds to Zone 2 on the West Slope. Associated point types are Morhiss, Pedernales, Refugio and Bulverde, with a combined estimated age range of 4100-2800 B.P. (2150-850 B.C.). The single AMS-derived age on deer-bone collagen for this AU is 3650-3530 B.P. (1700-1580 B.C.), which is nearly matched by the calibrated radiocarbon age range on shell of 3830-3670 B.P. (1880-1720 B.C.). Four OSL dates from Zone 2 correspond reasonably well, with a combined range of 3620-2770 B.P.

West Slope AU 3

West Slope AU 3 is associated with a Middle Archaic occupation of the site and dates ca. 5100-3820 B.P. (B.C. 3150-1870). WS AU 3 corresponds to Zone 3 on the West Slope. Associated point types are Early Triangular and Refugio. Early Triangular points are placed at 5100-4600 B.P. (3150-2650 B.C.) in Central Texas, where they are called Taylor and Baird points, and are considered diagnostic of the Oakalla phase (Prewitt 1981, 1985). AMS dating of deer-bone collagen from Zone 3 yielded a calibrated age range of 4520-3820 B.P. An OSL date from this zone falls at 4640 ± 460 B.P. In combination, these chronometric determinations fall close to the terminal age in central Texas for Early Triangular points. The more recent end of the AMS calibrated range may postdate these points; perhaps this time range corresponds to the Refugio points that were relatively abundant in Zone 3, a suggestion perhaps supported by the presence of Refugio points in the younger WS AU 2.

Chronological Parameters of Mortuary Activity

A total of 21 radiocarbon dates was obtained on collagen from human bone and/or tooth-pulp samples from burials; one sample per burial was dated, meaning that 21individuals are represented in the series of radiocarbon assays. In order to minimize destruction of human remains, all assays were run using the accelerator mass spectrometer (AMS) technique on bone or tooth-pulp collagen. This permitted recovery of sufficient collagen from a very small piece of bone or a single tooth (third molars in all cases).

Assays were run by three different radiocarbon laboratories, all of which obtained similar results: Four samples were processed by Beta Analytic, Inc., eight by the National Ocean Sciences AMS Facility at the Woods Hole Oceanographic Institution, and 10 by the University of California, Irvine, AMS facility. The latter group of 10 samples received special preparation, consisting of extended purification of collagen by Dr. Thomas Stafford, prior to AMS dating. This was done in order to minimize the chance that the resulting dates would be biased by contamination of more recent organic carbon as might be transferred, for example, in ground water. The fact that the samples thus prepared produced essentially the same ages as did the other samples suggests that such contamination is not a significant factor at Buckeye Knoll and that all of the AMS results on human collagen can be accepted as valid.

The results on all AMS assays on human bone/tooth collagen are shown in Table 6-5**,** along with the age ranges for each sample after correction for the 13^{C} factor and dendrochronological calibration. The calibrated ages for all assayed burials are presented in Figure 6-3, juxtaposed next to all radiocarbon dates for non-mortuary samples from the site. As may be seen in Table 6-5, the burials produced a wide range of ages, with the earliest obtained on molar tooth-pulp collagen at 8460-8290 years B.P. (6510-63940 B.C.), the 2-sigma calibrated age range, and the most recent obtained on bone from Burial 23, with a 2-sigma calibrated age range of 2150-2000 B.P.. (210-50 B.C.). The great majority of the ages on burials, however, fall into a tight cluster ranging in age from 7150 to 6200 B.P.. (5200-4250 B.C.). The fact that 15, or 71 percent, of the dated burials fall into this cluster is in keeping with the interpretation that the dense spatial clustering of burials on the Knoll Top largely represents a discrete cemetery dating mainly to the seventh millennium B.P.

Burial 49 produced a slightly earlier calibrated age range of 7570-7440 B.P. (5620-5490 B.C.), but is believed to pertain to the main cemetery cluster given that it was one of three apparently simultaneous interments within the cemetery (the two others being Burials 47B and 73, which produced calibrated age ranges of 7010-6880 B.P. and 6790-6870 B.P., respectively). Given that the bones of all three burials were tightly grouped together within a small circular area interpreted to represent a single grave pit (see Figure 10-9), the relatively small discrepancy in the ages can be accounted for by the fact that the age ranges represent only a statistical probability (95 percent) of accuracy.

Aside from the age range of 2150-2000 B.P. for Burial 23, three other burials produced ages significantly later than the period of the early cemetery. Burials 50A and 74B are essentially contemporaneous and pertain to the Middle Archaic, with respective 2-sigma calibrated overlapping ages ranges of 5590-5470 B.P. and 5410-5330 B.P. Burial 34 yielded an early Late Archaic age range of 3840-3710 B.P.

The unusually early age range of 8460-8290 B.P. obtained on a tooth assumed to be associated by Burial 27 is anomalous and probably represents only limited use of the site for burial prior to ca. 7000 B.P. This assay was performed on a third molar extracted by the Florida State University bioarchaeological analysts from soil matrix surrounding the Burial 27 remains and selected by them for AMS dating of that burial. Since the actual bone from this burial produced a calibrated

Table 6-5. Age Data from AMS Assays on Bone/Tooth-Pulp Collagen from Human Burials in the Knoll-Top Area at Buckeye Knoll.

Laboratory	Lab No.	Material	Burial	Raw Age B.P.	Delta C13	Corrected	Cal Age*	Cal. B.C.-A.D.*
Beta Analytic								
41VT98-1	Beta-153915	Human Bone	Burial 1A	5940±40	-17.4 o/oo	6060±40	7000-6780	5050-4830 B.C.
41VT98-2	Beta-157422	Human Bone	Burial 8	5490±40	-19.6 o/oo	5580±40	6430-6290	4480-4340 B.C.
41VT98-3	Beta-157423	Human Bone	Burial 49	6390±40	-21.7 o/oo	6410±40	7420-7260	5470-5310 B.C.
41VT98-4	Beta-157424	Human Bone	Burial 27	5630±40	-19.7 o/oo	5720±40	6640-6410	4690-4460 B.C.
Noreen Tuross' Results								
41VT98S5B74	OC 44622	Human Tooth	Burial 74	-	-15.8 o/oo	5830±30	6670-6580	4720-4630 B.C.
41VT98S3B27	OC 44623	Human Tooth	Burial 27	-	-16.2 o/oo	7570±55	8510-8400	6560-6450 B.C.
41VT98S1B6	OC 44624	Human Tooth	Burial 6	-	-16.3 o/oo	5470±35	6300-6220	4350-4270 B.C.
41VT98S10B71	OC 44625	Human Tooth	Burial 71	-	-15.6 o/oo	5750±30	6500-6610	4660-4550 B.C.
41VT98S15B23	OC 44626	Human Tooth	Burial 23	-	-18.1 o/oo	2120±30	2130-2050	180-100 B.C.
41VT98S6B5	OC 44627	Human Tooth	Burial 5	-	-13.6 o/oo	5880±45	6730-6650	4780-4700 B.C.
41VT98S7B55	OC 44628	Human Tooth	Burial 55	-	-17.8 o/oo	5990±35	6860-6770	4910-4820 B.C.
T. Stafford's Results								
-	UCIAMS-11697	Human Tooth	Burial 67B	5970±20	-17.6 o/oo	5970±20	6760-6830	4880-4810 B.C.
-	UCIAMS-11698	Human Tooth	Burial 34	3500±20	-17.0 o/oo	3500±20	3810-3730	1860-1780 B.C.
-	UCIAMS-12023	Human Tooth	Burial 13	6110±25	-14.9 o/oo	6110±25	7000-6930	5050-4980 B.C.
-	UCIAMS-12024	Human Tooth	Burial 47B	6085±25	-13.1 o/oo	6085±25	6980-6900	5030-4950 B.C.
-	UCIAMS-12025	Human Tooth	Burial 50A	4755±20	-18.4 o/oo	4755±20	5570-5480	3620-3530 B.C.
-	UCIAMS-12028	Human Tooth	Burial 57	6040±25	-28.6 o/oo	6040±25	6910-6820	4960-4870 B.C.
-	UCIAMS-12029	Human Tooth	Burial 67B	5936±25	-21.3 o/oo	5936±25	6770-6710	4820-4760 B.C.
-	UCIAMS-12030	Human Tooth	Burial 73	6005±30	-17.3 o/oo	6005±30	6790-6870	4920-4830 B.C.
-	UCIAMS-12032	Human Tooth	Burial 74B	4705±20	-17.1 o/oo	4705±20	5550-5350	3600-3400 B.C.
-	UCIAMS-12033	Human Tooth	Burial 75	6075±20	-14.4 o/oo	6075±20	6960-6900	5010-4950 B.C.

* Note: 2-sigma calibrations were obtained using CalPal Program.

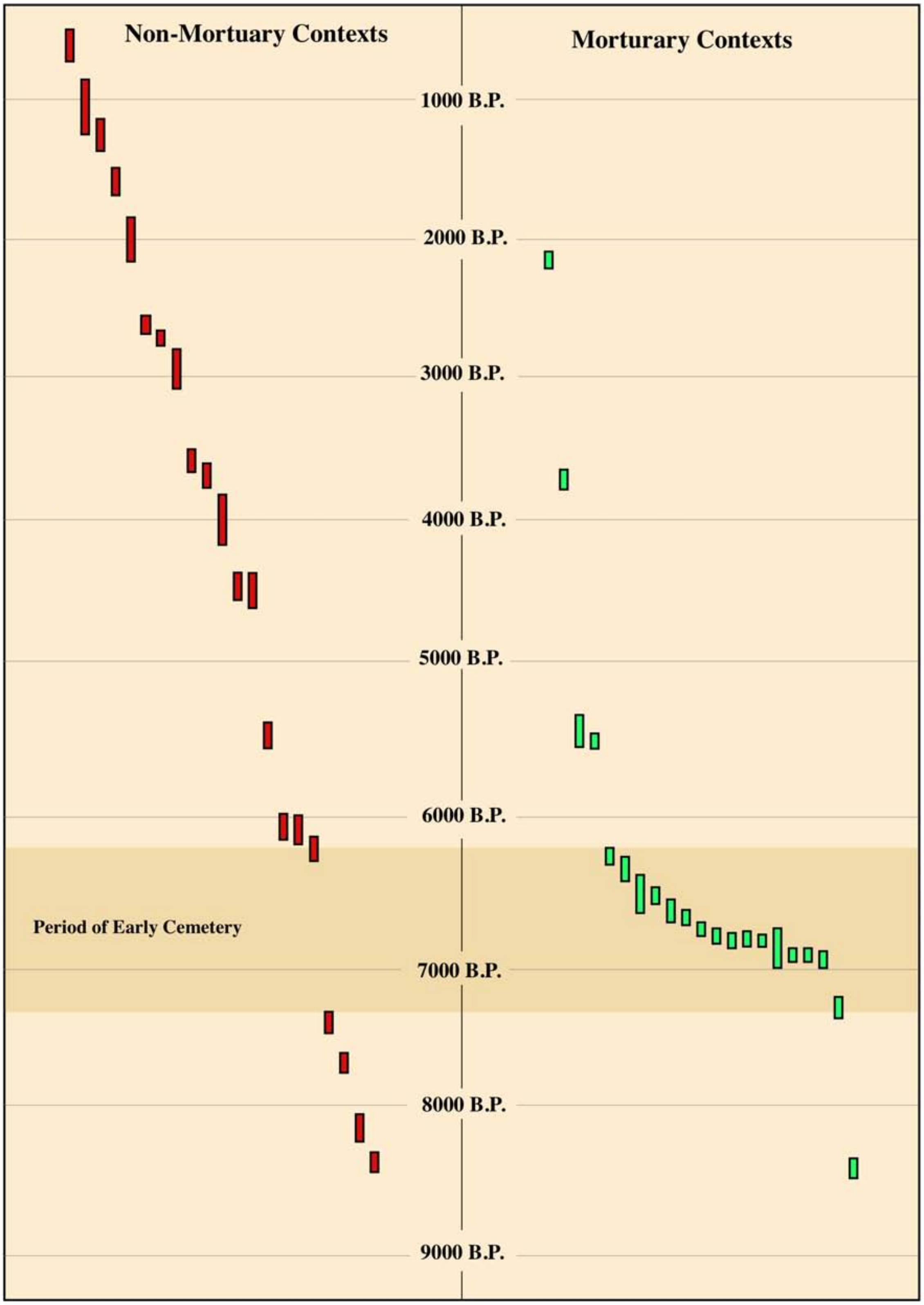


Figure 6-3. Chronological chart showing the calibrated age ranges on 14C and AMS samples (deer bone and shell) from non-mortuary contexts and human bone/tooth-collagen samples from human burials. Note the absence of non-mortuary dates from the period of Early Archaic cemetery use.

age range of 6570-6430 B.P. securely within the period of cemetery use, it is inferred that the dated tooth was not associated with Burial 27 but rather was displaced (whether by burrowing animal or human agency is unknown), into the Burial 27 matrix, apparently from an earlier burial not located within the limits of the Knoll Top excavation. Since Burial 27 rested at the eastern edge of the excavated area, it is not difficult to believe that the older tooth was dislocated from a burial lying to the east of the excavation wall.

The Cemetery as a Separate Ritual Space

An extremely interesting and probably very significant aspect of the chronological placement of the early cemetery is that it falls into a time range for which there are no radiocarbon ages for the non-mortuary occupation/use of the site. This may be seen in a glance at Figure 6-3, which shows all dates of burials (human bone/tooth-collagen samples) juxtaposed against all dates obtained on organic materials (deer-bone collagen and estuarine rangia and oyster shells) from midden deposits that were deposited during domestic occupations of the site. It should be stressed that not a single one of the fairly large number of non-mortuary radiocarbon ages is contemporaneous with the period of cemetery use that falls between 7000 and 6200 B.P., even though there are samples which date to immediately before and immediately after this time range.

If we combine the above C^{14} data with the fact that the artifact forms diagnostic of the cemetery component (described further on) are completely lacking from the extensive non-mortuary artifact sample obtained from the rest of the site, it is strongly suggested that the material culture assemblage represented by artifacts associated with the cemetery burials is not evidenced in the non-mortuary components at the site. In other words, the site appears not to have been used for domestic occupation when it served as a cemetery, suggesting that the people who created the cemetery intentionally avoided using the site for any other purpose. Thus, it can be concluded that the site was, during the seventh millennium B.P., a distinct, separate, and probably sacred precinct for burial and presumably for associated mortuary ritual.

Chapter 7

Non-Mortuary Artifacts

Robert A. Ricklis
(Contribution by Jon C. Lohse)

Non-mortuary artifacts recovered during the 2000-2001 excavations, exclusive of bulk materials such as lithic debitage and fired-clay nodules, include 527 flaked lithic tools, 42 rough and ground stone tools, 120 bone implements, 17 artifacts of shell, and 96 native potsherds. The distributions of these materials, by excavation area, are shown in Table 7-1. Lithic debitage consists of 181,781 pieces from all excavation areas combined. A total of 107,923 burned-clay nodules were recovered from the combined excavations.

Flaked Stone

Flaked- or chipped-stone tools are the most abundant general class of artifact. Sub-categories include projectile points (48 arrow points and arrow point fragments; 300 dart points and dart point fragments; see Tables 7-2 and 7-3 for metric dimensions and proveniences), bifacial knives (*n*=7), Clear Fork bifaces (*n*=9), bifacially flaked celt-like implements (*n*=4), choppers (*n*=15), 17 scrapers (10 side scrapers, 8 end scrapers, 1 a stemmed end scraper), notched flakes or "spokeshaves" (*n*=3), drills or perforators (*n*=14) and burin spalls (*n*=3). Each of these categories is discussed below, along with its basic chronological and functional implications.

Arrow Points

The arrow points include whole specimens, proximal fragments (which, along with whole specimens, can be assigned to existing type categories on the basis of diagnostic basal morphology) and untypable distal fragments. A total of 37 specimens were assigned to types with a more or less high degree of confidence. The numerical breakdown of arrow points by types (all excavation areas combined), as defined by Turner and Hester (1999) is: Perdiz (*n*=5), Scallorn (*n*=27), Edwards (*n*=1), Fresno (*n*=2), Alba (*n*=1), and Bonham (*n*=1). The quantities of each type are presented by analytical units for the Knoll Top and West Slope areas in Tables 7-4 and 7-5. Additional provenience information can be found in Table 7-2, including that for those excavation units where AUs were not definable (the northwestern-most units on the Knoll Top, and the East Area Excavations).

Clearly, Scallorn (Figure 7-1, Figure 7-2, l-m) is the overwhelmingly dominant arrow point type at Buckeye Knoll. All Scallorn points were found in the Knoll Top Excavation Area, mostly in AU 1 (ca. A.D. 700-1300). This type is placed between ca. A.D. 800 and 1250 in the Central Texas culture chronology (Prewitt 1981, 1985) and the chronometric data for AU 1 on the Knoll Top accords with this, suggesting, not unexpectedly, a contemporaneous time range for Scallorn points on the central coastal prairie of Texas.

The Bonham points (see Figure 7-2, e) have a similar time range, so their presence in KT AU 1 is congruent with the dominance therein of Scallorn points. The two Fresno points (see Figure 7-2, h-i) also come from the Knoll Top (one from AU 1, one from AU 2). This type has been identified as pertaining to the early part of the Late Prehistoric period on the nearby central Texas coast (Ricklis 1995a, 2004), so it is also chronologically at home in AU 1. The one Fresno specimen from KT AU 2 (see Figure 7-2,

Table 7-1. Artifacts Recovered from Non-Mortuary Contexts in the Different Excavation Areas at Buckeye Knoll.

Artifact	Knoll Top	West Slope	East Area	Other	Totals
Flaked Stone					
Arrow Points	35	—	2	—	37
Distal Fragments	4	1	—	—	5
Untyped Fragments	5	1	—	—	6
Preforms	9	—	3	—	12
Dart Points	72	50	21	5	148
Preforms	9	3	4	—	16
Distal Fragments	59	29	15	—	103
Medial Fragments	24	14	11	—	49
Preform Proximal Fragments	15	12	3	—	30
Preform Medial Fragments	5	2	1	—	8
Preform Distal Fragments	8	5	1	—	14
Bifacial Knives	2	2	3	—	7
Early-Stage Bifaces	16	10	3	—	29
Clear Fork Tools	4	2	3	—	9
Chipped Celts	3	—	1	—	4
Choppers	10	3	2	—	15
End Scrapers	4	1	2	—	8
Side Scrapers	8	1	1	—	10
Spokeshaves	1	2	—	—	3
Burin Spalls	*3*	—	—	—	3
Flaked Stone Drills	8	1	—	—	9
Distal Fragments	5	—	—	—	5
					530
Ground and Rough Stone					
Abraders	9	2	—	—	11
Milling Stone Fragments	6	3	—	—	9
Manos (Including Fragments)	5	1	—	—	6
Hammerstones	11	2	3	—	16
					42
Bone					
Bone Awls	3	—	—	—	3
Distal Fragments	23	11	—	—	34
Proximal Fragments	1	5	—	—	6
Medial Fragments	32	—	—	—	32
Engraved Bone Pin Fragments	15	5	—	—	20
Small Spatulate Bone Implement	3	—	—	—	3
Deer Ulna Awl/Flaking Tool	—	—	—	—	1
Perforated Canid CanineTeeth	2	—	—	—	2

continued.

Table 7-1. (concluded.)

Artifact	Knoll Top	West Slope	East Area	Other	Totals
Bone (continued)					
Needles (Proximal Fragments)	2	—	—	—	2
Needles (Medial Fragments)	2	—	—	—	2
Grooved/Snapped Bone	2	—	—	—	2
Bird Bone Beads	2	—	—	—	2
Fish Vertebra Beads	4	—	—	—	4
Metapodial "Beamers"	2	—	—	—	2
Perforated Bone Pieces	—	2	—	—	2
Atlatl Hook (?) (Unfinished)	—	1	—	—	1
Rectangular Bone Objects	—	1	—	—	1
					120
Shell					
Freshwater Mussel					
Edge-Utilized	2	1	—	—	3
Edge-Beveled	1	—	—	—	1
Edge-Nicked	2	—	—	—	2
Oyster Shell (Utilized)	5	3	—	—	8
Rangia (Perforated Valve)	1	—	—	—	1
Whelk (Modified Columella)	1	—	—	—	1
Sunray Venus (Edge-Flaked)	—	1	—	—	1
					17
Pottery					
Rockport Ware	17	—	21	—	17
Bone-Tempered Plain	47	6	1	—	54
Goose Creek Plain	4	—	—	—	4
					96

h) (which is generally ascribed to the later part of the Late Archaic) is assumed to have been vertically displaced by post-depositional bioturbation.

The five Perdiz points (see Figure 7-2, a-d), assigned to the later part of the Late Prehistoric (after ca. A. D. 1250-1300; Prewitt 1981, 1985; Ricklis 1994a, 1994b, 2004) are from the Knoll Top (AU 1 and the northwestern part of the excavation area in which stratigraphic undulation precluded AU definition) and from the upper three 10-cm arbitrary levels in the East Area (where AUs have not been defined). The two specimens from the latter area were associated with a scattering of Rockport ware potsherds and probably, in combination with those items, represent a light, short-term occupation in that area by coastal Rockport phase people.

Dart Points

One hundred and forty-three dart points and proximal fragments of dart points can be assigned to established types (Turner and Hester 1999), or otherwise be placed within distinct morphological groupings and are listed in approximate chronological order from most recent to oldest in Table 7-6.

In general, the dart points can be seen to represent a long time range, indicating recurrent occupation of the site from Late Paleo-Indian times through the end

Table 7-2. Metric and Provenience Data for Arrow Points Recovered from Buckeye Knoll.

Type	Area	Lot No.	AU/Level	Length	Max. Width	Max Stem Width	Thickness	Basal Form	Remarks
Perdiz	Knoll Top	3781	n/a	10.2+	7.9+	7.9	3.3	Contracting	Stem fragment only
Perdiz (?)	East Area	573	Level 2	19.7	13.9	—	—	—	Distal tip and stem missing
Perdiz	East Area	546	Level 3	37.1	15.3	5.2	3.5	Contracting	
Perdiz	Knoll Top	3634	AU 1	24.9	15.9	3.6	3.2	Contracting	Possible preform
Perdiz	Knoll Top	3781	n/a	10.2	7.9	7.9	3.3	Contracting	Stem fragment only
Scallorn	Knoll Top	1124	n/a	32.6	18.4	18.4	5.0	Convex	
Scallorn	Knoll Top	1312	n/a	29.6	13.2	13.2	3.6	Concave	
Scallorn	Knoll Top	856	n/a	17.5	14.7	11.5	3.6	Straight	Serrated blade edges
Scallorn	Knoll Top	824	AU 1	31.4	14.9	11.1	4.5	Concave	
Scallorn	Knoll Top	2017	AU 1	27.0	15.6	15.2	3.5	Straight	
Scallorn	Knoll Top	4177	AU 1	16.8	13.9	13.9	3.2	Convex	
Scallorn	Knoll Top	1406	AU 1	43.9	14.4	8.3	4.7	Convex	
Scallorn	Knoll Top	1954	AU 1	22.4	14.3	14.3	3.4	Concave	Serrated blade edges
Scallorn	Knoll Top	941	AU 1	27.7	14.3	13.4	3.0	Straight	
Scallorn	Knoll Top	3641A	AU 1	19.8	14.5	?	4.0	?	Imcomplete
Scallorn	Knoll Top	3269	AU 1	24.3	14.7	14.7	3.6	Convex	
Scallorn	Knoll Top	1360	n/a	19.2+	14.5	12.3	3.1	Straight	Distal tip missing
Scallorn	Knoll Top	1313	AU 1	26.1	13.2	9.8	3.2	Convex	Serrated blade edges
Scallorn	Knoll Top	1953	AU 1	27.4	17.4	13.4	5.6	Convex	

Note: Where analysis units (AUs) are not defined, the vertical provenience is given by 10-cm arbitrary levels. All measurements are in millimeters.

continued.

Table 7-2. (concluded.)

Type	Area	Lot No.	AU/Level	Length	Max. Width	Max Stem Width	Thickness	Basal Form	Remarks
Scallorn	Knoll Top	855	AU 1	18.1+	15.6	10.0	2.5	Convex	Distal tip missing
Scallorn	Knoll Top	1626	AU 1	14.7+	13.2	11.9	2.4	Convex	Distal tip missing
Scallorn	Knoll Top	1332	AU 4	27.9	15.0	9.3+	3.8	Straight	1 basal "ear" missing
Scallorn	Knoll Top	3341	AU 1	18.9+	15.7	11.8+	2.5	?	Distal tip and base broken
Scallorn	Knoll Top	1314	AU 1	23.2	16.9	9.1	3.6	Convex	Serrated, distal tip missing
Scallorn	Knoll Top	1980	AU 1	28.9	17.5	?	4.0	?	Broken base and distal tip
Scallorn	Knoll Top	1359	AU 1	16.7	12.8	10.9	2.6	Concave	
Scallorn	Knoll Top	2096	AU 1	30.5	16.8	13.0	3.0	Concave	Serrated blade edges
Scallorn	Knoll Top	1041	AU 2	25.4	12.2	10.2	2.8	Convex	
Scallorn	Knoll Top	4229	AU 1	7.2+	16.5	16.5	3.4	Concave	Basal fragment only
Scallorn	Knoll Top	2094	AU 2	36.6	12.0	?	?	?	Base and distal tip missing
Scallorn	Knoll Top	3203	AU 1	6.5+	14.7	14.7	3.2	Concave	Basal fragment only
Scallorn	Knoll Top	3200	AU 1	7.2+	13.7	13.7	2.8	Concave	Basal fragment only
Alba	Knoll Top	3765	n/a	18.4	15.7	8.2	2.4	Slightly Convex	
Bonham	Knoll Top	1272	AU 1	34.4+	20.1	6.7	4.1	Rounded	Distal tip missing
Edwards	Knoll Top	1126	n/a	43.3	15.4	11.4	3.8	Concave	Serrated blade edges
Fresno	Knoll Top	3237	AU 2	22.0	17.2	—	2.0	Straight	
Fresno	Knoll Top	2019	AU 1	25.8	12.6	—	4.2	Straight	
Preform	East Area	1916	Level 14	26.5+	19.0	n/a	7.0	Convex	
Preform	East Area	823	AU7	28.1+	21.9	n/a	4.4	Convex	
Preform	Knoll Top	1640	AU 1	46.2	18.3	n/a	5.6	Convex	
Preform	Knoll Top	1467	AU 1	25.9+.	17.8	n/a	5.2	Convex	

Note: Where analysis units (AUs) are not defined, the vertical provenience is given by 10-cm arbitrary levels. All measurements are in millimeters.

Table 7-3. Metric and Provenience Data for Dart Points Recovered from Buckeye Knoll.

Type	Area	Lot No.	AU/ Level	Length	Max. Width	Max. Stem Width	Thickness	Basal Form	Remarks
Matamoros	Knoll Top	2103	AU 1	35.5	20.8	n/a	7.3	Straight	
Matamoros	East Area	559	Level 11	33	22.5	n/a	—	Straight	
Darl	Knoll Top	3617	AU 2	12.8+	18.5+	18.5	—	Concave	Basal fragment only
Darl	Knoll Top	1941	AU 2	32.8+	17	12	6.6	Concave	Impact fracture distal end
Figueroa	Knoll Top	1646	AU 1	30.6	15.1	12.2	7	—	
Ensor	Knoll Top	1275	AU 1	38.0+	23.4	23.4	6.3	Straight	Distal tip missing
Ensor	Knoll Top	3410	AU 2	38.2	19.1	12.6	5.4	Convex	Fire-shattered
Ensor	Knoll Top	1838	AU 2	42.1	21.2	21.2	5.8	Concave	
Ensor	Knoll Top	2025	AU 2	38.7	19.7	18.4	5.0	Concave	
Ensor	West Slope	3544	AU 1	10.6+	35.7	25.7	5.5	Convex	Basal fragment only
Ensor	West Slope	4030	AU 1	11.9+	27.5	27.5	4.4	Straight	Basal fragment only
Ensor	Knoll Top	1461	n/a	9.8+	24.0	24.0	4.8	Concave	Basal fragment only
Fairland	Knoll Top	1626	AU 1	10.4	23.7	10.4	4.1	Concave	Basal fragment only
Fairland	Knoll Top	4163	AU 2	8.9	18.4	18.4	3.9	Concave	Basal fragment only
Fairland	Knoll Top	3833	AU 4	15.4	20.1	15.4	5.9	Straight	Basal fragment only
Fairland	West Slope	3626	AU 2	28.7	18.6	18.6	5.0	Concave	
Fairland	East Area	555	Level 11	33.7	22.5	22.5	6.7	Concave	
Godley	Knoll Top	879	AU 2	63.4	21.0	24.9	7.9	Convex	
Godley	Knoll Top	1121	AU 3	—	—	—	—	Convex	Basal fragment only
Godley	West Slope	3544	AU 1	—	—	—	—	Convex	Basal fragment only
Godley	West Slope	4117	AU 2	13.3+	23.0	23.0	5.7	Convex	Basal fragment only

Note: Where analysis units (AUs) were not defined, the vertical provenience is given by 10-cm arbitrary levels. All measurements are in millimeters.

continued.

Table 7-3. (continued.)

Type	Area	Lot No.	AU/ Level	Length	Max. Width	Max. Stem Width	Thickness	Basal Form	Remarks
Kent	West Slope	931	AU 1	33.1	17.6	14.5	6.9	Rounded	
Kent	West Slope	1081	AU 1	44.7	22.5	11.8	7.6	Rectangular	
Kent	West Slope	1811	AU 1-2	49.3	23.7	16.0	8.5	rectangular	Base unthinned
Kent	West Slope	1120	AU 2	51.7	24.4	13.6	10.8	rectangular	Basal fragment
Kent	S54W123	747	Level 11	55.4	19.4	14.3	9.7	Rectangular	Basal fragment
Lange	Knoll Top	2116	AU 2	13.8+	?	17.8	8.0	Slightly convex	Basal fragment
Lange	Knoll Top	3353	AU 3	8.4+	?	16.8	4.1	Straight	Basal fragment
Lange	Knoll Top	2140	AU 3	60.0	30.6	23.6	8.0	Straight	Asphaltum on stem
Lange	Knoll Top	3155	AU 4	65.5±	30.5	17.0±	—	?	
Lange	Knoll Top	1543	n/a	99.3	30.3	17.0	10.5	Straight	Used as knife?
Lange	S6W84	1305	AU 13	63.9	32.2	17.9	7.9	Slightly Convex	Basal fragment
Lange	East Area	3694	Level 8	12.3+	?	18.8	5.9	Slightly Convex	Basal fragment only
Motley	West Slope	1270	AU 1	40.1	30.2	17.2	8.1	Concave	Distal missing; reworked
Morrill	Knoll Top	1341	AU 3	77.4	23.8	20.0	10.4	Slightly Concave	
Kinney	Knoll Top	1630	AU 1	37.7	25.8	25.8	5.5	Concave	
Morhiss	Knoll Top	2195	AU 3	43.3	27.6	19.1	8.1	Rounded	
Morhiss	Knoll Top	3281	AU 3	12.5+	17.1+	?	6.5	Rounded	Basal fragment only
Morhiss	Knoll Top	4296	n/a	28.1+.	26.2+	20.7	7.6	Rounded	Basal fragment only
Morhiss	Knoll Top	1298	AU 3	107.0	40.0	24.4	10.1	Rounded	
Morhiss	West Slope	1086	AU 2	63.8	31.6	21.4	9.8	Rounded?	Base broken
Morhiss	West Slope	1861	AU 2	69.0	35.6	27.8	9.2	Rounded	

Note: Where analysis units (AUs) were not defined, the vertical provenience is given by 10-cm arbitrary levels. All measurements are in millimeters.

continued.

Table 7-3. (continued.)

Type	Area	Lot No.	AU/ Level	Length	Max. Width	Max. Stem Width	Thickness	Basal Form	Remarks
Morhiss	West Slope	1087	AU 2	68.9	35.6	27.8	9.2	Rounded	
Morhiss	West Slope	1891	AU 2	62.7	36.0	24.6	7.1	Rounded	Asphaltum on stem
Morhiss	S12W60	839	Level 13	43.7	26.8	21.4	9.3	Rounded	
Morhiss	West Canal Bank	858	Level 10	64.8	26.8	14.5	8.4	Rounded	
Pedernales	Knoll Top	2058	AU 4	52.1	23.2	15.9	7.9	Concave	
Pedernales	East Area	554	Level 6	65.7	30.1	20.5	10.1	Concave	
Pedernales	West Slope	945	AU 1-2	61.1	26.9	18.9	6.1	Indented	
Pedernales	BHT 44	566	Level 3	55.3	34.1	22.9	9.9	Indented	
Bulverde	West Slope	1853	AU 2	75.8	40.3	22.3	8.4	Straight	Asphaltum on stem
Pandora	West Slope	1810	AU 2	61.1	26	n/a	10.4	Convex	
Pandora	West Slope	3017	AU 3	64.5	19.6	n/a	7.8	Straight	
Abasolo	Knoll Top	1239	n/a	62.8	31.3	n/a	11.5	Rounded	
Abasolo	Knoll Top	3866	n/a	18.9+.	26.5	n/a	8.3	Rounded	Basal fragment
Abasolo	East Area	356	Level 3	66.1	27.9	n/a	10.3	Rounded	
Abasolo	East Area	563	Level 12	18.9+	25.9	n/a	12.4	Rounded	Basal fragment
Tortugas	Knoll Top	1583	n/a	61.3	31.4	n/a	13.5	Straight	
Tortugas	West Slope	1343	AU 3	49.2	23.2	n/a	8.0	Straight	
Tortugas	East Area	343	Level 1	47.6	26.4	n/a	9.6	Slightly Convex	
Tortugas	East Area	558	Level 10	47.0	24.0	n/a	6.8	Straight	
Tortugas	East Area	559	Level 11	32.8	23.1	n/a	7.8	Straight	
Tortugas	East Area	1814	Level 11	60.8	22.9	n/a	7.7	Straight	

Note: Where analysis units (AUs) were not defined, the vertical provenience is given by 10-cm arbitrary levels. All measurements are in millimeters.

continued.

Table 7-3. (continued.)

Type	Area	Lot No.	AU/ Level	Length	Max. Width	Max. Stem Width	Thickness	Basal Form	Remarks
Tortugas	East Area	468	Level 12	75.3	26.1	n/a	7.9	Straight	
Tortugas	BHT 44	567	Level 3	56.4	24.5	n/a	9.9	Straight	
Refugio	Knoll Top	1116	AU 2	41.9	28.5	n/a	12.3	Rounded	Proximal fragment
Refugio	Knoll Top	2024	AU 2	58.9	27.0	n/a	9.4	Rounded	
Refugio	Knoll Top	1388	AU 3	38.4	28.5	n/a	10.1	Rounded	Proximal fragment
Refugio	Knoll Top	4023	AU 3	19.9	20.8	n/a	7.6	Rounded	Proximal fragment
Refugio	Knoll Top	1586	AU 3	30.7	25.3	n/a	8.4	Rounded	Proximal fragment
Refugio	Knoll Top	1761	AU 4	53.8	18.9	n/a	9.1	Rounded	
Refugio	Knoll Top	1956	n/a	30.1	24.6	n/a	7.8	Rounded	Proximal fragment
Refugio	S6W84	1460	Level 11	31.8	23.0	n/a	5.8	Rounded	Proximal fragment
Refugio	West Slope	1356	AU 1	18.15	21.6	n/a	5.8	Rounded	Proximal fragment
Refugio	West Slope	883	AU 1	30.6	24.5	n/a	10.3	Rounded	Proximal fragment
Refugio	West Slope	1918	AU 2	34.0	23.8	n/a	9.1	Rounded	Proximal fragment
Refugio	West Slope	1273	AU 2	39.0	30.6	n/a	9.0	Rounded	Proximal fragment
Refugio	West Slope	718	AU 2	34.0	19.8	n/a	9.9	Rounded	Proximal fragment
Refugio	West Slope	1912	AU 2	47.3	17.8	n/a	6.4	Rounded	
Refugio	West Slope	1883	AU 2	59.9	25.1	n/a	9.3	Rounded	
Refugio	West Slope	1855	AU 2	38.8+	26.7	n/a	8.6	Rounded	Medial break
Refugio	West Slope	751	AU 2-3	57.5	19.6	n/a	9.4	Rounded	
Refugio	West Slope	1143	AU 3	30.9	23.2	n/a	11.0	Rounded	Proximal fragment
Refugio	West Slope	1353	AU 3	22.3	20.5	n/a	6.7	Rounded	Proximal fragment

Note: Where analysis units (AUs) were not defined, the vertical provenience is given by 10-cm arbitrary levels. All measurements are in millimeters.

continued.

Table 7-3. (continued.)

Type	Area	Lot No.	AU/ Level	Length	Max. Width	Max. Stem Width	Thickness	Basal Form	Remarks
Refugio	West Slope	1961	AU 3	25.6	22.0	n/a	5.5	Rounded	Proximal fragment
Refugio	West Slope	748	AU 3	78.5	20.0	n/a	—	Rounded	Asphaltum on point
Refugio	East Area	1833	Level 5	30.7	25.3	n/a	5.2	Rounded	Proximal fragment
Refugio	East Area	476	Level 9	48.1	16.3	n/a	10.2	Rounded	
Refugio	West Canal Bank	503	n/a	51.4	18.9	n/a	12.4	Rounded	
Lerma	East Area	1844	Level 11	52.0+	21.6	n/a	—	Pointed	Proximal fragment
Early Triangular	Knoll Top	1943	AU 3	28.7	23.3	n/a	5.8	Slightly Convex	Steep edge beveling
Early Triangular	S6W84	1334	Level 16	27.8+	24.1	n/a	5.9	Straight	Distal tip missing
Early Triangular	West Slope	1994	AU 3	30.4+.	28.6	n/a	7.6	Straight	Distal tip missing
Early Triangular	West Slope	1352	AU 3	40.1	27.2	n/a	6.7	Convex	
Early Triangular	West Slope	1900	AU 3	30.5	25.2	n/a	5.3	Straight	Reworked distal break
Early Triangular	West Slope	1170	AU 3	28.6	23.3	n/a	6.8	Concave	
Early Triangular	West Slope	1955	AU 3	30.4	25.8	n/a	7.3	Slightly Convex	
Early Triangular	West Slope	1901	AU 3	37.3	2.5	n/a	7.4	Straight	
Early Triangular	West Slope	2055	AU 3	36.7	27.4	n/a	6.8	Convex	Alternative edge beveling
Early Triangular	West Slope	1890	AU 3	36.1	23.4	n/a	5.5	Straight	
Early Triangular	West Slope	1292	AU 3	37.4	31.6	n/a	5.8	Slightly Concave	Alternative edge beveling
Early Triangular	West Slope	1901	AU 3	37.5	24.8	n/a	7	Straight	Alternative edge beveling
Early Triangular	West Slope	1145	AU 3	40.3	28.6	n/a	5.8	Straight	Fine pressure-flaking
Early Triangular	West Slope	846	AU 3	?	?	n/a	4.1	Straight	Basal fragment
Early Triangular	West Slope	1169	AU 3	16.2+	35.4	n/a	4.7	Straight	Basal fragment

Note: Where analysis units (AUs) were not defined, the vertical provenience is given by 10-cm arbitrary levels. All measurements are in millimeters.

continued.

Table 7-3. (continued.)

Type	Area	Lot No.	AU/ Level	Length	Max. Width	Max. Stem Width	Thickness	Basal Form	Remarks
Early Triangular	West Slope	1893	AU 3	15.4+	32.7	n/a	5.3	Slightly Convex	Basal fragment
Early Triangular	East Area	1867	AU 10	35.1	25.1	n/a	5.7	Straight	Alternative edge beveling
Early Triangular	ST 5	886	n/a	45.8±	29.7±	n/a	6.6	Straight	Alternative edge beveling
Andice	Knoll Top	3639A	AU 2	?	?	?	?	?	Barb fragment
Andice	Knoll Top	3385	AU 2	?	?	?	?	?	Barb fragment
Andice	Knoll Top	1118	AU 2	40.5	23.6	15.2	8.6	?	Distal tip missing
Andice	Knoll Top	1778	AU 3	?	?	?	?	?	Barb fragment only
Andice	Knoll Top	2121	AU 4	?	?	?	?	?	Barb fragment
Bell/Andice	S6W84	1351	Level 7	43.8+	34.7+	16.7	8.2	?	Medial fragment
Andice	S6W84	4003	Level 22	?	?	?	?	?	Barb fragment
Bell/Andice	West Slope	4321	AU 3	?	?	?	?	?	Barb fragment
Bell/Andice	East Area	3699	Level 9	23.8	38.1	16.0	6.2	?	Medial fragment
Uvalde	Knoll Top	2253	AU 4	71.4	28.3	21.3	11.2	Concave	Petrified wood
Triangular/Lanceolate	Knoll Top	1665	AU 2	?	?	n/a	5.5	Straight	Heavy base/edge grinding
Untyped Lanceloate	Knoll Top	1952	AU 4	49.6	18.3		7.7	Straight	Heavy edge grinding
Untyped Lanceloate	Knoll Top	1664	AU 4	60.3	25.1	n/a	8.2	Straight	Slight basal edge grinding
Untyped Lanceloate	Knoll Top	3769	n/a	16.8+	34.1+.	n/a	6.6	Concave	Basal grinding
Triangular/Lanceolate	Knoll Top	1064	AU 4	28.8+	21.1	n/a	6.5	Concave	Reworked as drill
Triangular/Lanceolate	Knoll Top	1689	AU 4	55.2	26.2	n/a	7.5	Slightly Convex	Slight base/edge grinding
Triangular/Lanceolate	Knoll Top	1792B	AU 4	45.8	30.0	n/a	7.2	Straight	No base/edge grinding
Triangular/Lanceolate	Knoll Top	1684	AU 4	25.8	29.3	n/a	7.3	Straight	No base/edge grinding

Note: Where analysis units (AUs) were not defined, the vertical provenience is given by 10-cm arbitrary levels. All measurements are in millimeters.

continued.

Table 7-3. (concluded.)

Type	Area	Lot No.	AU/ Level	Length	Max. Width	Max. Stem Width	Thickness	Basal Form	Remarks
Lanceolate?	Knoll Top	2160	AU 4	36.2+	37.7	?	8.5	?	Medial fragment
Lanceolate?	Knoll Top	2230	AU 4	?	?	n/a	5.5	?	Medial fragment
Triangular/Lanceolate	West Slope	1991	AU 2	30.2+	28.1	n/a	7.2	Straight	Basal fragment
Triangular/Lanceolate	East Area	701	Level 11	16.3	27.0	n/a	6.1	Straight	No base/edge grinding
Untyped Lanceolate	East Area	1922	Level 12	26.9+	28.5	n/a	6.6	Straight	Basal fragment
Lanceolate?	East Area	1895	Level 13	33.0+	32.4	n/a	6.7	?	Medial fragment
Lanceolate Preform	East Area	708	Level 13	44.1+.	27.8	n/a	9.5	Straight	Some cortex on one face
St. Mary's Hall	Knoll Top	2151	AU 4	28.6+	20.5	n/a	7.2	Concave	Basal fragment
St. Mary's Hall	West Slope	4036	AU 2	12.1+	19.6	n/a	5.5	Concave	Basal fragment
St. Mary's Hall	West Slope	782	AU 2	15.8	20.2	n/a	5.5	Concave	Basal fragment
Golondrina	Knoll Top	2076	AU 4	38.8	29.4	n/a	8.8	—	Base/edge grinding
Golondrina	Knoll Top	1371	AU 4	47.1	26.1	n/a	6.3	Concave	Base/edge grinding
Golondrina	Knoll Top	1584	AU 4	30.9+	32.9	n/a	6.2	Concave	No grinding
Golondrina	Knoll Top	4179	AU 4	19.1+	27.4	n/a	4.9	Concave	Base/edge grinding
Wilson	Knoll Top	2288	AU 4	72.0	?	25.6	8.7	Slightly Convex	Base grinding
Wilson	Knoll Top	3384	AU 4	11.9+	?	21.5	?	Straight	Base/edge grinding
Wilson	Knoll Top	2119	AU 4	11.8+	?	20.5	5.1	Slightly Convex	Base/edge grinding
Wilson	Knoll Top	4243	AU 4	25.6+	?	14.8	4.5	Slightly Convex	Base/edge grinding
Wilson	Knoll Top	2162	AU 4	12.6+	?	22.0	7.5	Slightly Concave	Base/edge grinding
Wilson	Knoll Top	3833	AU 4	14.4	?	19.5	5.7	Straight	Base/edge grinding
Early Side-Notched	Knoll Top	2105	AU 4	41.8	20.2	15.3	6.5	Straight	Limited edge grinding

Note: Where analysis units (AUs) were not defined, the vertical provenience is given by 10-cm arbitrary levels. All measurements are in millimeters.

Table 7-4. Arrow and Dart Point Types Within the Analytical Units of the Knoll Top Excavations at Buckeye Knoll.

AU	Point Type																									Totals
	Scallorn	Fresno	Bonham	Darl	Matamoros	Ensor	Fairland	Godley	Kinney	San Saba	Lange	Morhiss	Morrill	Pedernales	Early Triangular	Bell/Andice	Refugio	Uvalde	Triangular/Lanceolate	Lanceolate	Sub-Lanceolate	St. Mary's Hall	Wilson	Golondrina	Early Side-Notched	
1	20	1	1	—	1	1	1	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	26
2	2	1	—	2	—	3	1	1	—	1	1	—	—	—	—	3	2	—	1	—	3	—	—	—	—	21
3	—	—	—	—	—	—	—	1	—	—	2	3	1	—	1	1	3	—	—	—	—	—	—	—	—	12
4	1	—	—	—	—	—	1	—	—	—	1	—	—	1	—	1	1	1	4	2	4	1	6	3	1	28
Totals	23	2	1	2	1	4	3	2	1	1	4	3	1	1	1	5	6	1	5	2	7	1	6	3	1	**87**

Table 7-5. Dart Point Types Within the Analytical Units of the West Slope Excavations at Buckeye Knoll.

AU	Point Type														
	Ensor	Fairland	Godley	Kent	Motley	Pandora	Tortugas	Morhiss	Pedernales	Bulverde	Early Triangular	Bell/Andice	Refugio	St. Mary's Hall	**Totals**
1	2	—	1	2	1	—	—	—	—	—	—	—	—	—	6
1-2	—	—	—	1	—	—	—	—	—	—	—	—	2	—	3
2	—	1	1	1	—	1	—	4	1	1	—	—	6	2	18
2-3	—	—	—	—	—	—	—	—	—	—	—	—	1	—	1
3	—	—	—	—	—	1	1	—	—	—	14	1	4	—	21
Totals	2	1	2	4	1	2	1	4	1	1	14	1	13	2	**49**

of the Late Archaic. According to general time periods, the types represented break down from earliest to latest (Table 7-7). Each type, and its provenience at Buckeye Knoll, is discussed below.

Matamoros

This is mainly a south Texas type; it is very common in deep south Texas, between the Nueces River and the Rio Grande (see Prewitt 1995), and is believed to pertain to later part of the Late Archaic and perhaps the earlier Late Prehistoric (Turner and Hester 1999:153). The type has been documented on the central coast at site 41SP120 on Corpus Christi Bay, where it is radiocarbon dated to ca. A.D. 1000 (suggesting an overlap with the Initial Late Prehistoric, or possibly the persistence of the Archaic, as defined by pre-bow-and-arrow technology, slightly later in south Texas than in central Texas). Its scarcity (two specimens) at Buckeye Knoll (Figure 7-3, a-b) suggests that the lower Guadalupe valley area had only marginal affinity with cultures and/or populations to the south during this time period. One of the specimens from Buckeye Knoll was found in KT AU 1 in the Knoll Top Excavation, the other is from the East Area, Level 11 (100-110 cm b.s.).

Darl

Primarily a central Texas type, particularly abundant along the Balcones Escarpment (Prewitt 1995), this smallish, narrow-bladed, stemmed dart point is assigned to the terminal Archaic, ca. A.D. 500-700 (Prewitt 1985). The two specimens from Buckeye Knoll came from Knoll Top AU 2 (see Figure 7-3, c).

Figueroa

Also assigned to the terminal Archaic (200 B.C-A.D. 600; Turner and Hester 1999), this is a small, triangular-bladed dart point with side notching that forms an expanding stem. The type is most commonly distributed in the lower Pecos River and Balcones Escarpment areas. The single specimen from Buckeye Knoll comes from KT AU 1 in the Knoll Top Area.

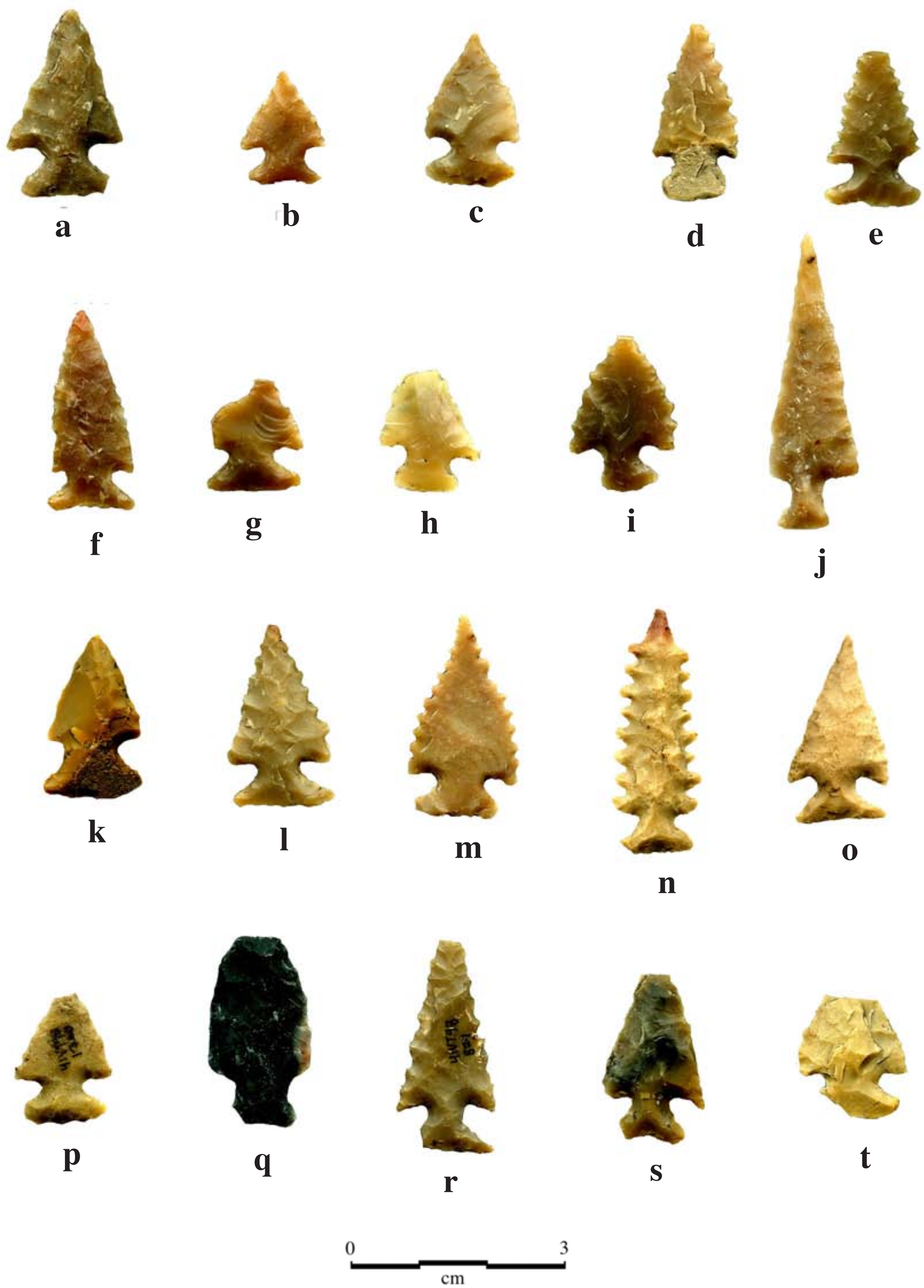


Figure 7-1. Scallorn arrow points from Buckeye Knoll: a-n, Knoll Top AU 1; o, Unit S06W84, Level 14; p, Unit S12W88, Level 11; q, Knoll Top AU 3; r, Unit S12W60, Level 9; s, Unit S12W60, Level 9; t, East Area, Level 6.

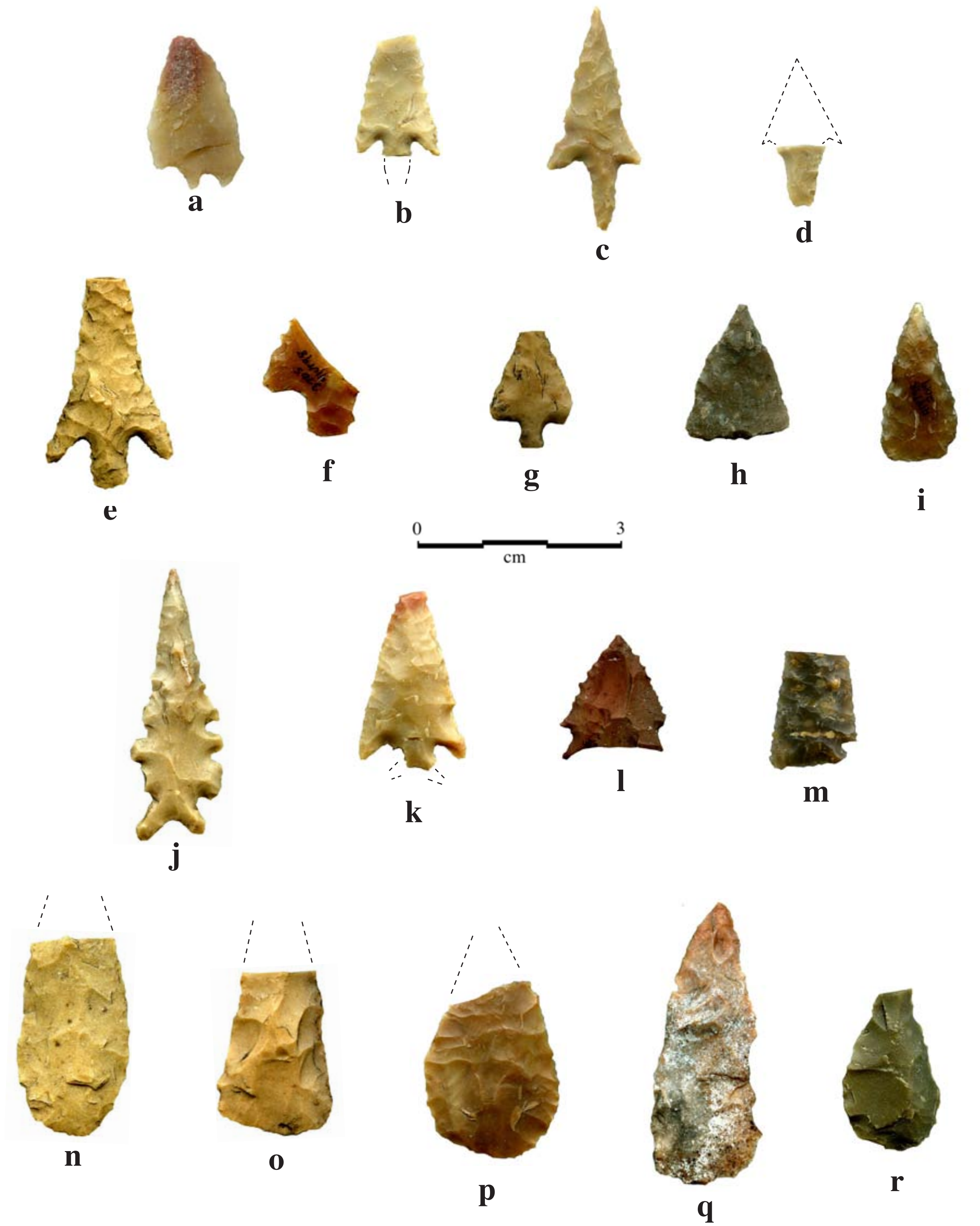


Figure 7-2. Additional arrow points and arrow point preforms from Buckeye Knoll: a, unfinished Perdiz, Knoll Top AU 1; b, possible Perdiz, East Area, Level 2; c, Perdiz, East Area, Level 3; d, Perdiz fragment, Unit S12W90, Level 15; e, Bonham, Knoll Top AU 1; f, Alba, Unit S12W90, Level 11; g, untyped, Knoll Top AU 1; h, Fresno, Knoll Top AU 2; i, Fresno, Knoll Top AU 1; j, Edwards, Unit S12W88, Level 10; k, possible Edwards, Knoll Top AU 1; l, Scallorn-like, Knoll Top AU 2; m, unfinished Scallorn, Unit S16W84, Level 9; n, arrow point preform, Unit S12W80, Level 18; o, arrow point preform, Knoll Top AU 1; p, arrow point preform, Unit S12W60, Level 7; q, arrow point preform, Unit S12W84, Level 8; n, arrow point preform, Knoll Top AU 1.

Table 7-6. Dart Points Recovered from Buckeye Knoll.

Point Type	**Totals**
Matamoros	2
Darl	2
Figueroa	1
Ensor	7
Fairland	5
Godley	4
Kent	5
Lange	7
Motley	1
Morrill	1
Kinney	1
Morhiss	10
Pedernales	4
Bulverde	1
Pandora	2
Abasolo	4
Tortugas	8
Refugio	24
Early Triangular	18
Bell/Andice	9
Uvalde	1
Lerma	1
Lanecolate untyped	4
Triangular-Lanceolate	7
St. Mary's Hall	3
Golondrina	4
Wilson	6
Early Side Notched	1

Table 7-7. Temporal Associations of Dart Point Types Recovered from Buckeye Knoll.

Late Paleo-Indian (*n*=25)	Golondrina
	St. Mary's Hall
	Wilson
	Early Side-Notched (?)
	Lanceolate, untyped
	Triangular-lanceolate (?)
Early Archaic (*n*=9)	Triangular-Lanceolate*
	Uvalde
	Lerma(?)
Middle Archaic (*n*=63)	Bell/Andice
	Early Triangular
	Refugio
	Tortugas
	Abasolo
Late Archaic (*n*=53)	Bulverde
	Pandora
	Pedernales
	Morhiss
	Kinney
	Morrill
	Motley
	Lange
	Kent
	Godley
	Fairland
	Ensor
	Figueroa
	Darl
	Matamoros

* See discussion below.

Ensor

This type has a wide distribution, from north-central Texas into south and west Texas, but is most abundant in the lower Pecos and Balcones Escarpment areas (Prewitt 1995). It is a major type of the Late Archaic, Twin Sisters phase identified in central Texas and dated to ca. A.D. 200 to 600 (Prewitt 1981). Seven Ensor points were found during the 2000-'01 excavations at Buckeye Knoll (Figure 7-4, a-d, g-j). Five are from the Knoll Top Excavation (one in AU 1, three in AU 2, and one from the northwest corner of the Knoll Top Excavation where AUs could not be defined due to extreme undulations of strata relative

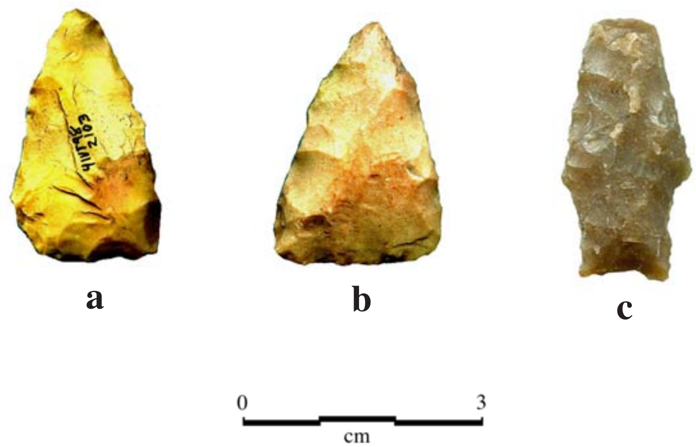


Figure 7-3. Miscellaneous dart points from Buckeye Knoll: a, Matamoros, Knoll Top AU 1; b, Matamoros, East Area, Level 11; c, Darl, Knoll Top AU 2.

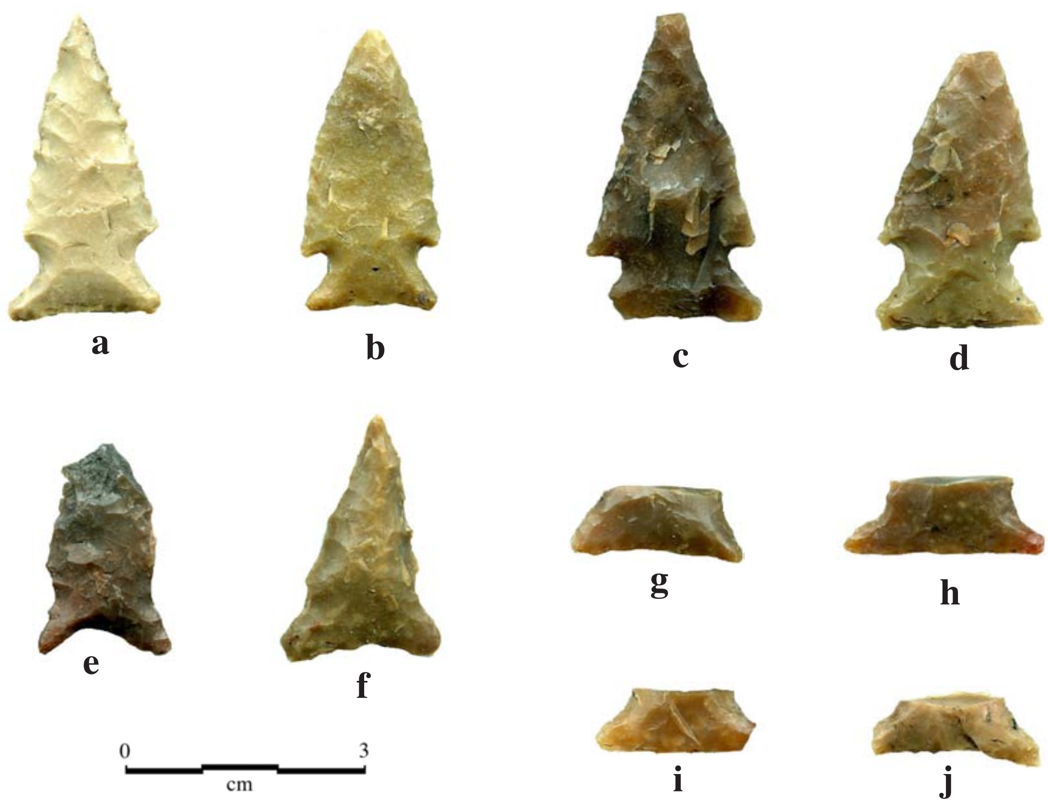


Figure 7-4. Late Archaic dart points from Buckeye Knoll: a-b, Ensor, Knoll Top AU 2; c, Ensor, Unit S14W90, Level 16; d, Ensor, Knoll Top AU 1; e, Fairland, West Slope AU 2; f, Fairland, East Area, Level 11; g, Ensor basal fragment, Unit S12W90, Level 11; h, Ensor basal fragment, West Slope AU 1; i, Ensor basal fragment, West Slope AU 2; j, Ensor basal fragment, Knoll Top AU 1.

to excavation levels). Two specimens were found in the West Slope Excavation in AU 1. Both KT AU 2 and WS AU 1 have been assigned to the later part of the Late Archaic, overlapping in time with Prewitt's (1981) Twin Sisters phase.

Fairland

Fairland points closely resemble Ensors. Both are rather small, thin and light dart points with triangular-bladed bodies. Fairlands differ from Ensors in having a markedly concave base that forms "ears" or prominent projections at the two basal corners. Fairland has primarily a central Texas distribution, with extensions into the lower Pecos and onto the central and southern coastal plain (Prewitt 1995; Turner and Hester 1999). Five specimens were found at Buckeye Knoll (see Figure 7-4, e-f). Three came from the Knoll Top (one each in AUs 1, 2 and 4) one from WS AU 2 in the West Slope Excavation, and one from the East Area, Level 11. If it is assumed that KT AU 2 and WS AU 1 correspond to the very late Archaic with which the Ensor points were associated, then we can infer that the Fairland points from the Knoll Top and the West Slope were vertically displaced. On the other hand, Fairland points may be slightly earlier than (albeit temporally overlapping with) Ensor points, in which case their presence in lower AUs may be due to their slight temporal priority. The type is too sparsely represented at Buckeye Knoll for resolution of this question.

Godley

This Late Archaic dart point has an expanded stem with a convex base. Four specimens were recovered at Buckeye Knoll (Figure 7-5, a-d); one is complete while three are basal or proximal fragments showing the diagnostic expanding stem and the basal convexity. The whole specimen is from Knoll Top AU 2; one of the basal fragments is from KT AU 3 on the Knoll Top, while the other two came from the West Slope, one from AU 1 and one from AU 2. Given the assignment of this type to the very late Late Archaic (e.g. Turner and Hester 1993; Story 1990:215), it is believed that its correct position on the Knoll Top is within AU 2, and that it pertains to WS AU 1 on the West Slope. Those specimens from other AUs in these areas are probably vertically displaced.

Kent

This is generally a narrow-bladed, straight- or slightly contracting-stem point. It is often crudely flaked, frequently with a roughly flaked base that is unfinished in appearance. The type is found in Late Archaic contexts along the central and upper Texas coastal areas (Ricklis 1995a; Ensor 1998). It should be placed temporally between ca. 1000 B. C. and A.D. 1. At the Kent-Crane site on Copano Bay, it was predominantly found within the lowermost stratum, the base of which has been radiocarbon dated to ca. 700 B.C. (Cox and Smith 1988). At the Eagle's Ridge site near Trinity Bay on the upper coast, Kent points were abundant in Stratum 2a, dated to immediately after 500 B.C. (Ensor and Ricklis 1998).

Five dart points from Buckeye Knoll are assigned to the Kent type (see Figure 7-5, e-i). All are from the West Slope (or nearby, in Unit S54W123). Two were found in WS AU 1, one in WS AU 1-2 (i.e., in an arbitrary level that crosscut the boundary between Strata 1 and 2), and one was from WS AU 2. The specimen from S54W123 is not assigned to an AU because analytical units could not be defined in this spatially isolated excavation unit. Based on the chronological placements of the AUs on the West Slope and the extant information on the temporal position of Kent points, their presence in WS AU 1 seems the most appropriate; the single specimen from WS AU 2 may have been vertically displaced.

Lange

The Lange point has a triangular blade and an expanded, straight-based stem. Its distribution is concentrated in central and east-central Texas and adjacent areas, including the coastal plain (Prewitt 1995). Lange points are of Late Archaic age (Turner and Hester 1993). In the central Texas chronology developed by Prewitt (1981), Lange points are placed in the San Marcos phase, ca. 600-200 B.C., and they were found as burial goods at the Loma Sandia cemetery site in the Nueces River valley, dated to ca. 800-500 B.C. (Taylor and Highley 1995). At Buckeye Knoll, the type (Figure 7-6, a-f) appears to pertain to KT AU 3 on the Knoll Top, which is estimated to date to between ca. 1800 and 250 B.C. Two specimens were found within this AU, while one had been displaced upward into KT AU 1 and one was translocated downward into KT AU 4. A fifth specimen came from Level 13 in Unit S6W84, in which AU determinations are not made, and the sixth was found in Level 8 in the East Area, where AUs are similarly undefined.

Motley

One point (see Figure 7-6, g) from Buckeye Knoll is assigned to this type. Motley points have triangular bodies and deep and wide corner or side notching

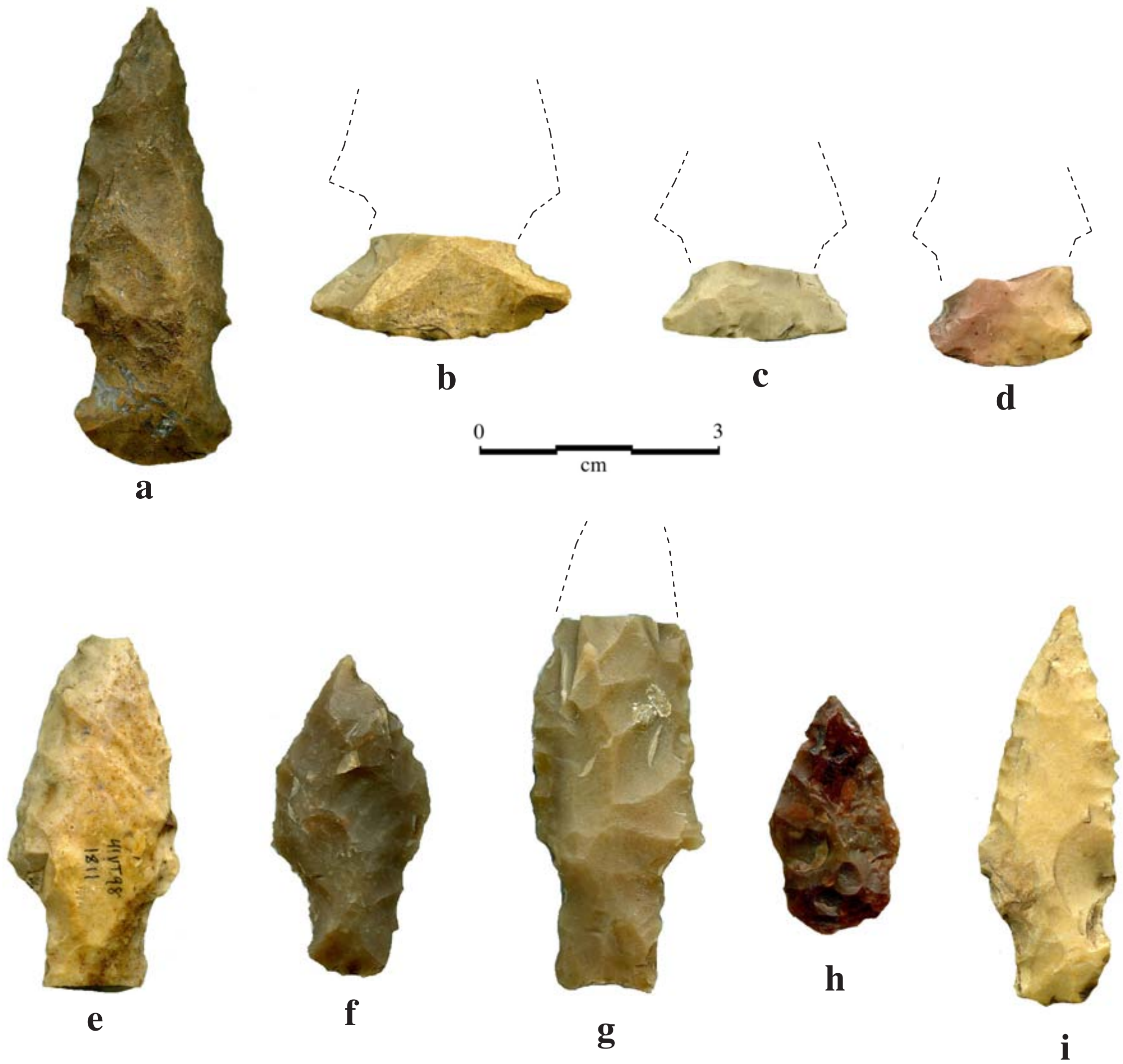


Figure 7-5. Additional Late Archaic dart points from Buckeye Knoll: a, Godley, Knoll Top AU2; b, Godley basal fragment, Knoll Top AU 3; c, Godley basal fragment, West Slope AU 1; d, Godley basal fragment, West Slope AU 2; e, Kent, Unit S29W118, Level 12; f, Kent, West Slope AU 1; g, Kent, West Slope AU 2; h, Kent, West Slope AU 1; i, Kent, Unit S54W123, Level 11.

that creates an expanded stem. Bases are frequently straight to convex, though sometimes they are concave (e.g., Schambach 1998:54-55). Motley points are not abundant in Texas, and are reported from the coastal plain in the eastern and southeastern sectors of the state (Turner and Hester 1993:162; Prewitt 1995). They are found in Louisiana and Arkansas, where they are diagnostic of the Poverty Point culture, dated to 1500-900 B.C. In Texas they have been assigned to a temporal range of ca. 1500-500 B.C. (Turner and Hester 1993:162).

The specimen from Buckeye Knoll was found in the West Slope Excavation, and is assigned to WS AU 1. It bears a reworked medial break, and has wide side notches that form a long, strongly expanding stem. The base is concave. The material is a fine-grained brown chert similar to much of the other material from the site, and thus could be of local origin (i.e., made from chert river cobbles available on the central coastal plain; see Collins 2002).

Morrill

Primarily an east Texas type (Prewitt 1995), Morrill points are assigned to the Texas Middle Archaic at approximately 2000 B.C. (see Story 1990:219-221). The type is characterized by a relatively long, narrow blade, weak shoulders and a rectangular stem with straight base. The single specimen from Buck-

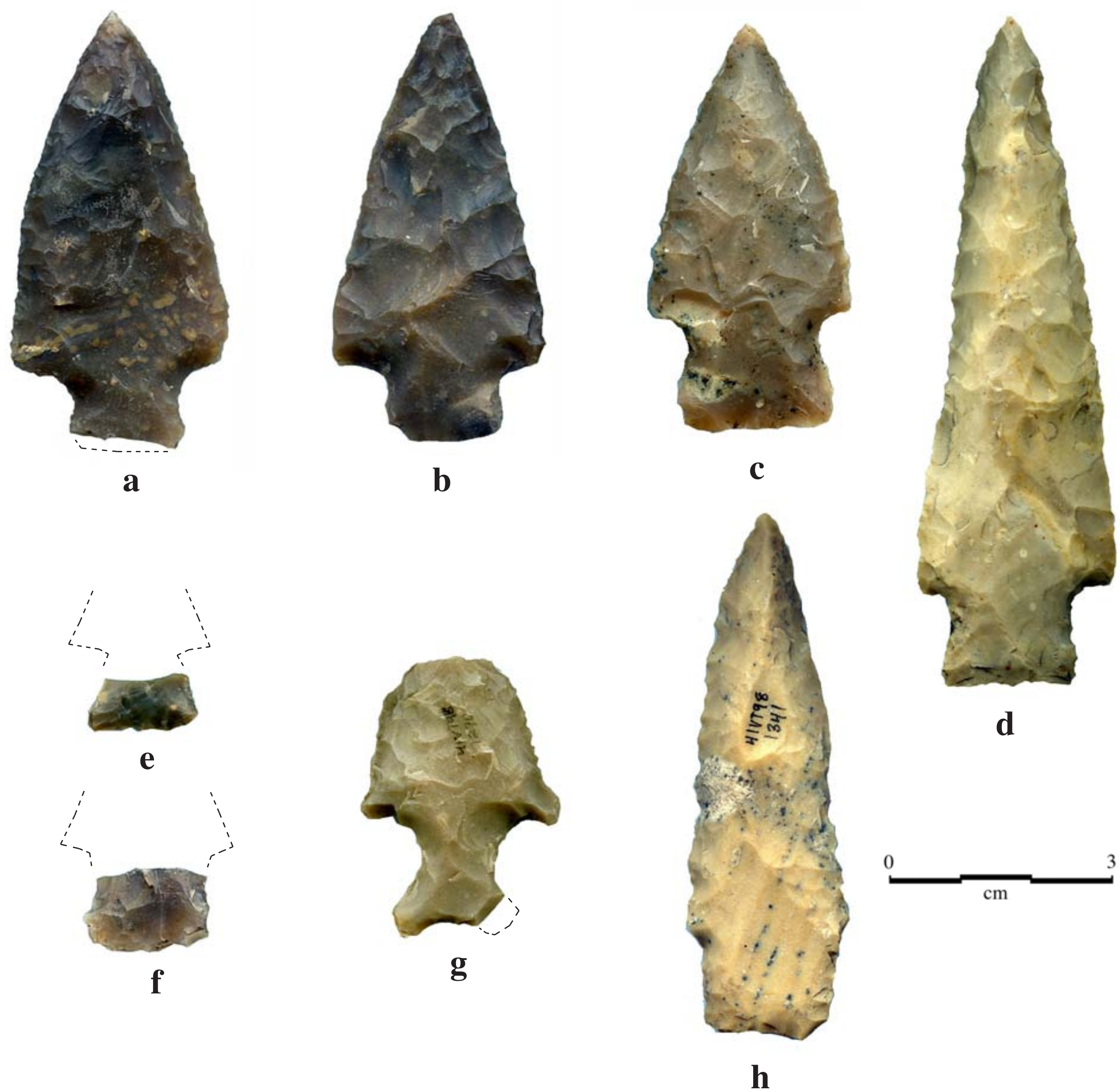


Figure 7-6. Additional dart points from Buckeye Knoll: a, Lange, Knoll Top AU 4; b, Lange, Unit S0684, Level 16; c, Lange, Knoll Top AU 3; d, Lange, Unit S12W90, Level 13; e, Lange basal fragment, East Area, Level 4; f, Lange basal fragment, East Area, Level 8; g, Motley, West Slope AU 1; h, Morrill, Knoll Top AU 3.

eye Knoll (see Figure 7-6, h) is from KT AU 3 in the Knoll Top Excavation.

Kinney

Points of this type are triangular in outline, with convex lateral edges and a markedly concave base. The type is distributed from central Texas to the lower Pecos area and into southern Texas. Turner and Hester (1993:137) attribute Kinney points to the Middle Archaic. The sole example from Buckeye Knoll was found in KT AU 1 on the Knoll Top.

Morhiss

Nine Morhiss points were recovered from the 2000-'01 excavations at Buckeye Knoll (Figure 7-7, a-g). An additional specimen was found in the 1989 testing conducted by Richard Weinstein in his 1-by-1-m test unit at S13W80 (based on the same grid as

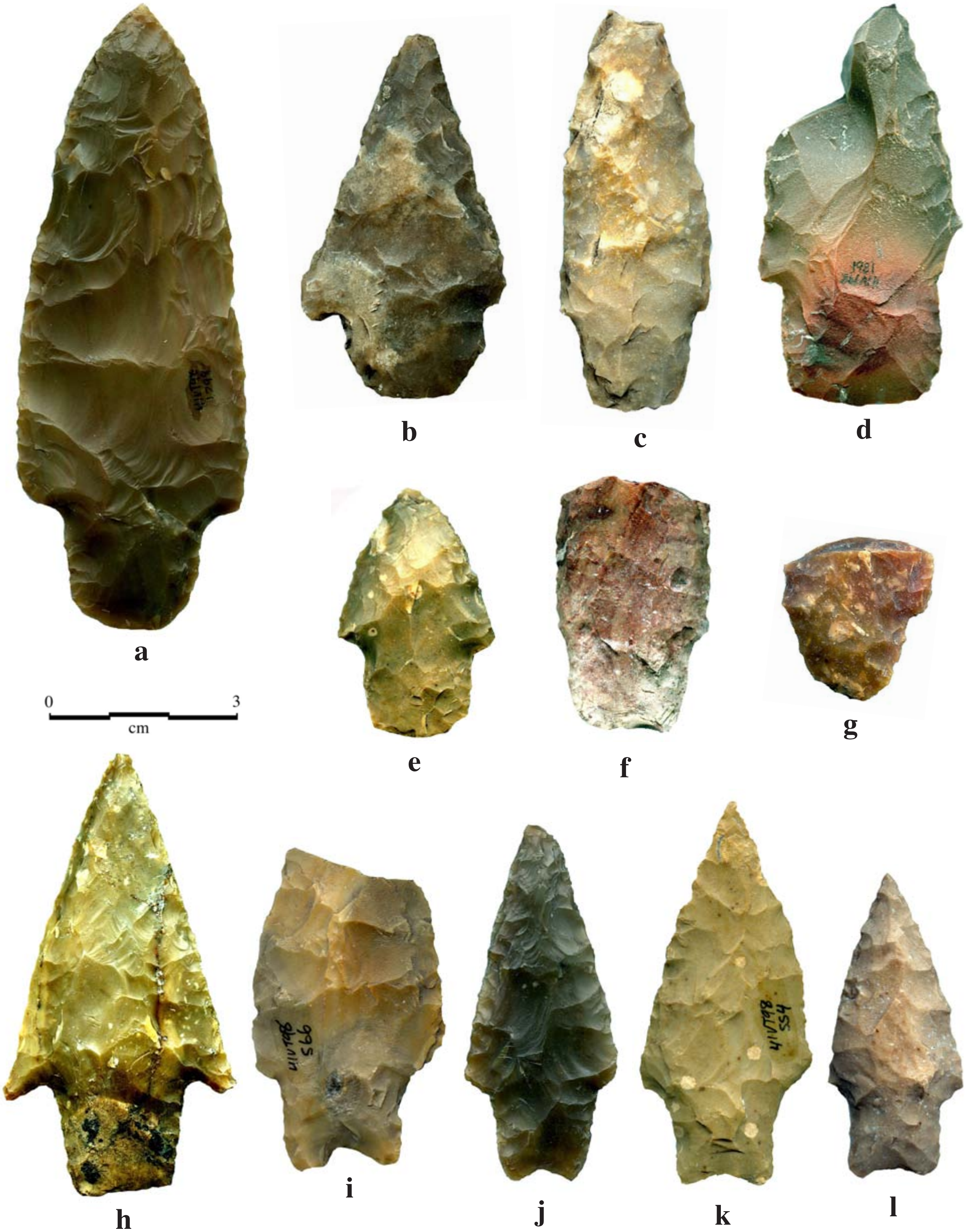


Figure 7-7. Additional dart points from Buckeye Knoll: a, Morhiss, Knoll Top AU 3; b, Morhiss, West Slope AU 2; c-d, Morhiss, West Slope AU 2; e, Morhiss, Knoll Top AU 3; f, Morhiss, Unit S12W60, Level 13; g, Morhiss, Unit S12W90, Level 17; h, Bulverde, West Slope AU 2 (Note traces of asphaltum hafting mastic on stem); i, Pedernales, BHT 44; j, Pedernales, Unit S31W116, Level 11; k, Pedernales, East Area, Level 6; l, Pedernales, Knoll Top AU 4.

used in 2000-'01, but with the northeast corner of that unit used for its designation coordinates), which was within the limits of the presently defined Knoll Top Excavation, at a depth (lower Zone 2; Weinstein 1992:296, 301) that would place it within KT AU 3. Three of the presently reported specimens come from KT AU 3, and three are from WS AU 2. An additional specimen from the Knoll Top cannot be assigned to an AU as it came from the northwest sector of the excavation where the highly undulating stratigraphy precludes assigning materials from specific levels to analytical units. An eighth specimen was found in Unit S12W60, Level 13, while a ninth was found in the West Canal Bank Area at 90-100 cm below the surface.

Points of the Morhiss type are found mostly within the area of the central coastal plain of Texas (Turner and Hester 1993; Prewitt 1995; Hudler et al. 2002:55). They are dated to the Late Archaic at ca. 800 B.C. at the Smith Creek Bridge site (41DW270) in De Witt County (Hudler et al. 2002), and were found in the Loma Sandia cemetery in a context of approximately the same age (Taylor and Highley 1995). Their association with the Knoll Top, AU 3 (B.C. 1830-250) and the West Slope, AU 2 (2150-850 B.C.) accords reasonably well with these temporal positions.

Pedernales

The Pedernales point is one of the most commonly reported types for the "Middle Archaic" of central Texas (Weir 1976). Prewitt places the type in his central Texas, Middle Archaic, Round Rock phase, estimated to date between ca. 1500 and 600 B.C. (a time range subsumed here under the early Late Archaic, for reasons discussed in Chapter 2).

Points of this type have fairly long, triangular blade outlines and more or less straight stems with deeply concave bases. In central Texas specimens, the basal concavity is often pronounced, with long basal thinning flakes extending upward onto the main body of the point, and shoulders are frequently strongly barbed. Pedernales specimens on the coastal plain, on the other hand, often have only relatively weak basal concavities (e.g., Hudler et al. 2002:99; Schmiedlin 2000), and weak, sloping, barbless shoulders. Such is the case with the four points assigned to the type from Buckeye Knoll (see Figure 7-7, i-l). Of the four Pedernales points from the site, one is from Knoll Top AU 4 (presumably displaced into this level which is dominated by Late Paleo-Indian diagnostics), a second came from West Slope AUs 1-2 (possibly from WS AU 1 but more likely from WS AU 2), and the third was found in the East Area, in Level 6 (50-60 cm below surface). The fourth specimen came from BHT 44 at the base of the A-horizon soil.

Bulverde

This point type is common in central Texas and extends into adjacent regions (Prewitt 1995). It is characterized by a triangular blade, strongly barbed shoulders and a rectangular, sometimes gently contracting stem, usually with a straight base. It is considered diagnostic of the Middle Archaic, as traditionally defined in Texas; Prewitt (1981) lists Bulverde as the primary diagnostic point of his central Texas, Marshall Ford phase, dated to ca. 2100-1500 B.C. (Prewitt 1981). The single specimen from Buckeye Knoll comes from West Slope AU 2. As may be seen in Figure 7-7, h**,** the stem of this specimen retains traces of asphaltum hafting mastic. This point is from the same AU as Pedernales and Morhiss points and for that reason, along with the rationale discussed in Chapter 2, it is here considered to be an early Late Archaic artifact.

Pandora

Pandora points are more or less slender, unstemmed points with slightly convex lateral edges and straight bases. The type is found in southern and central Texas and is ascribed to the "Middle to Late Archaic" (Turner and Hester 1999:170). Two specimens were found at Buckeye Knoll (Figure 7-8, i-j); both came from the West Slope, one from AU 2 and the other from AU 3. These contexts suggests a temporal position from the Middle Archaic to the early Late Archaic, as defined herein (see Chapter 2).

Abasolo

This type is characterized by a broad blade and an un-notched, stemless, rounded base. Abasolo points are found primarily in southern Texas (and adjacent northeast Mexico). Turner and Hester (1999) place them in the "Early and Middle Archaic." The type apparently extends into the early part of the Late Archaic as well, judging by its presence within the Loma Sandia cemetery, dated to ca. 800-500 B.C. It should be noted, however, that some bifaces that look like Abasolo points may actually be unstemmed knives, as is probably the case with two of the specimens from Burial 23 at Buckeye Knoll, dated to ca. 100 B.C. (see Figure 17-34, d, h). Both of the Abasolo points from the non-mortuary contexts at Buckeye Knoll (see Figure 7-8, g-h) are from the northwest section of the

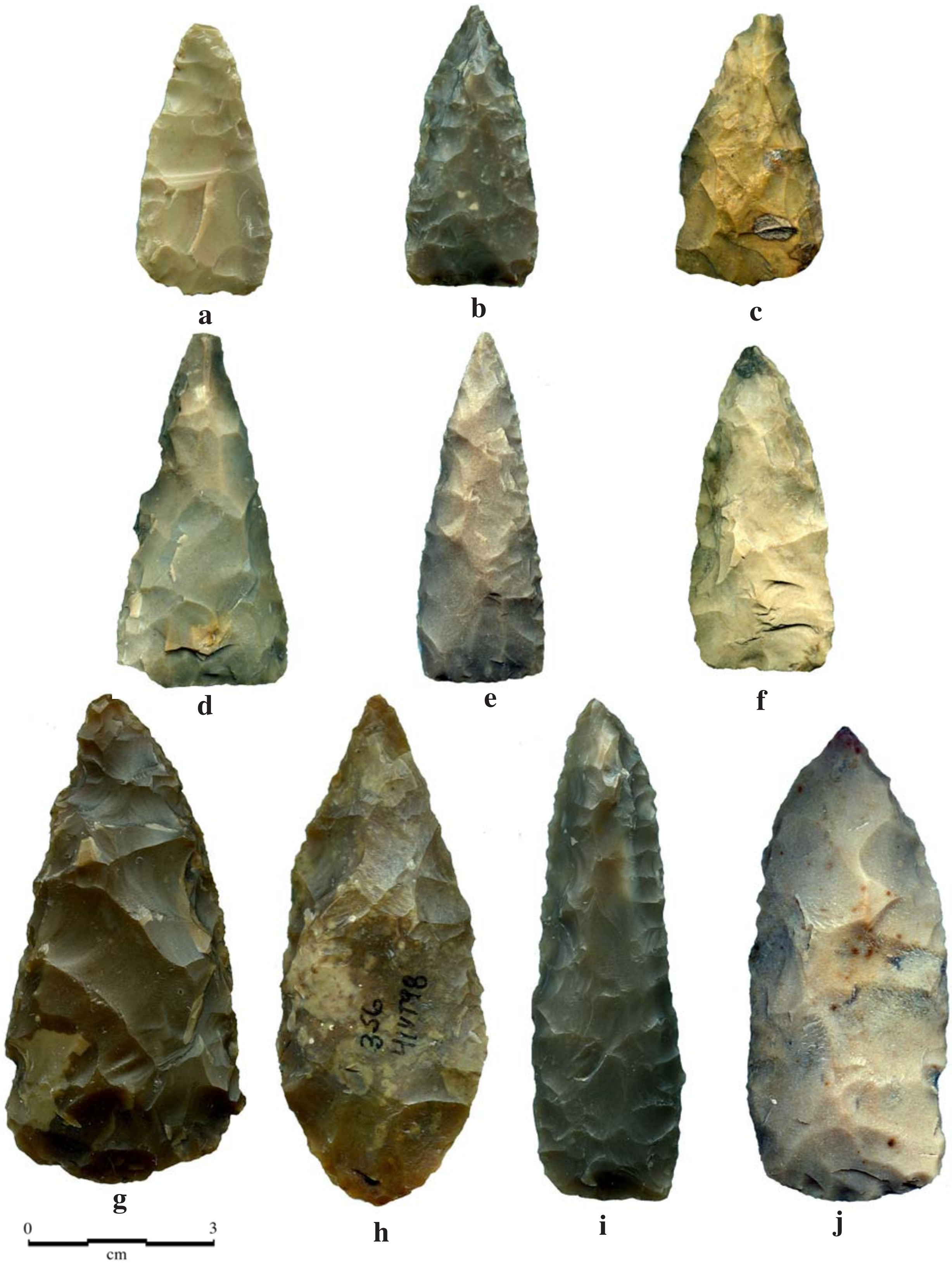


Figure 7-8. Additional dart points from Buckeye Knoll: a, Tortugas, East Area, Level 1; b, Tortugas, West Slope AU 3; c, Tortugas, East Area, Level 10; d, Tortugas, Unit S12W90, Level 16; e, Tortugas, East Area, Level 11; f, Tortugas, BHT 44; g, Abosolo, Unit S12W88, Level 18; h, Abosolo, East Area, Level 3; i, Pandora, West Slope AU 3; j, Pandora, West Slope AU 2.

Knoll Top Excavation, where AU definition was not feasible due to pronounced stratigraphic undulation.

Tortugas

An extremely common unstemmed, triangular dart point in southern Texas, the Tortugas point dates from Middle to Late Archaic times. A basal fragment of a Tortugas point was found at the McKinzie site near Corpus Christi in a discrete shell-midden stratum radiocarbon dated to ca. 5300-5900 B.P. (Ricklis 1988), and Hester (1980:105) cites evidence from 41LK201 near Three Rivers, Texas, that places Tortugas points prior to ca. 1300 B.C. More recently, Hester (2004:138) has suggested that Tortugas points align with the Middle Archaic period in south Texas, which he places between 2500 B.C. and as late as 400 B.C., following Grant Hall (1986). Numerous Tortugas points were associated with burials in the Loma Sandia cemetery, dated to ca. 800-500 B.C., which confirms its presence at that relatively late date. Apparently, the type had a long duration in southern Texas.

Eight Tortugas points were found at Buckeye Knoll (see Figure 7-8, a-f). Five came from the East Area, mostly from Levels 10-12, suggesting a fairly early time range. One specimen is from West Slope AU 3, the same analytical unit that produced numerous Early Triangular points, also suggestive of a relatively early time range (Middle Archaic, as used in this report; see discussion in Chapter 2). The final specimen is from a relatively deep position (Level 3, 50-75 cm below the surface) in BHT 44 (below the position of the Pedernales point found in that trench).

Refugio

With 25 specimens recovered, the Refugio point (Figure 7-9) is the most abundantly represented dart point type at Buckeye Knoll. The type is characterized by a narrow, elongated outline and an unstemmed, un-notched, rounded base. It has been suggested that some Refugio points may be knives or preforms (Turner and Hester 1999:178) and Hester (1980b:102) has suggested that Refugio is "not a good typological group. Most of the unstemmed, round-base specimens are either preforms or knives." While use of some Refugio "points" as knives is certainly possible, it is believed that those specimens designated as Refugio here are mostly, if not exclusively, finished artifacts rather than preforms. This inference is based on (a) the fact that the maximum width of the points averages 23.2 mm, a width similar to that for most of the hafting sections on stemmed and notched points from the site, (b) preforms, being unfinished items, should tend to be discernibly wider, and (c) though the type is characterized in general by the qualitative factor of a relatively course flaking technique, this does not necessarily indicate incomplete production, and in fact this is evidenced by one specimen (see Figure 7-9, h) that bears traces of asphaltum hafting mastic on the proximal end, indicating it had been hafted and thus presumably used as a finished tool. While it is acknowledged that a margin of error is probably inherent in separating Refugio points from round-base preforms, it is suggested that the type is valid and in general separable from unfinished specimens.

Early Triangular

This is a triangular dart point that is distinguished from Tortugas on the basis of its relative thinness, along with careful basal thinning in the form of parallel flake scars that run upward onto the main body of the point, as well as careful, short parallel pressure flaking along lateral edges that often creates distinct, steep-edge beveling. The type is often called Taylor or Baird in central Texas (Turner and Hester 1999:108), types assigned by Prewitt (1981, 1985) to his Oakalla phase, dated to ca. 3100-2600 B.C. On Nueces Bay, relatively finely flaked triangular points have been found in excavation contexts in association with radiocarbon dates calibrated to 5900-5300 B.P. (3950-3350 B.C.) and 4870-4630 B.P. (Ricklis 1988, 1995a, 2004), and the Early Triangular type was found abundantly in the surface context of a rangia shell midden at the Means site, 41NU184, with a probable associated calibrated age range on excavated *Rangia flexuosa* shells of 5630-5330 B.P. or 3680-3380 B.C. (Ricklis and Gunter 1986; Ricklis 1995a).

Early Triangular points are relatively abundant at Buckeye Knoll (Figure 7-10), with a total of 18 specimens recovered. Most of these (14 specimens) were found in Zone 3 (AU 3) on the West Slope, which also produced four Refugio points and one each of the Andice, Tortugas, and Pandora types. This zone/AU is dated, on the basis of AMS on bone and shell, as well as OSL dating of the sand matrix, to ca. 5100-3800 B.P., or 3150-1850 B.C.

Bell/Andice

These points have pairs of deep basal notches that form stems and massive barbs that are continuous with the lateral edges of the main body of the points. The notches are deeper on Andice points, so that the stems and barbs are correspondingly longer

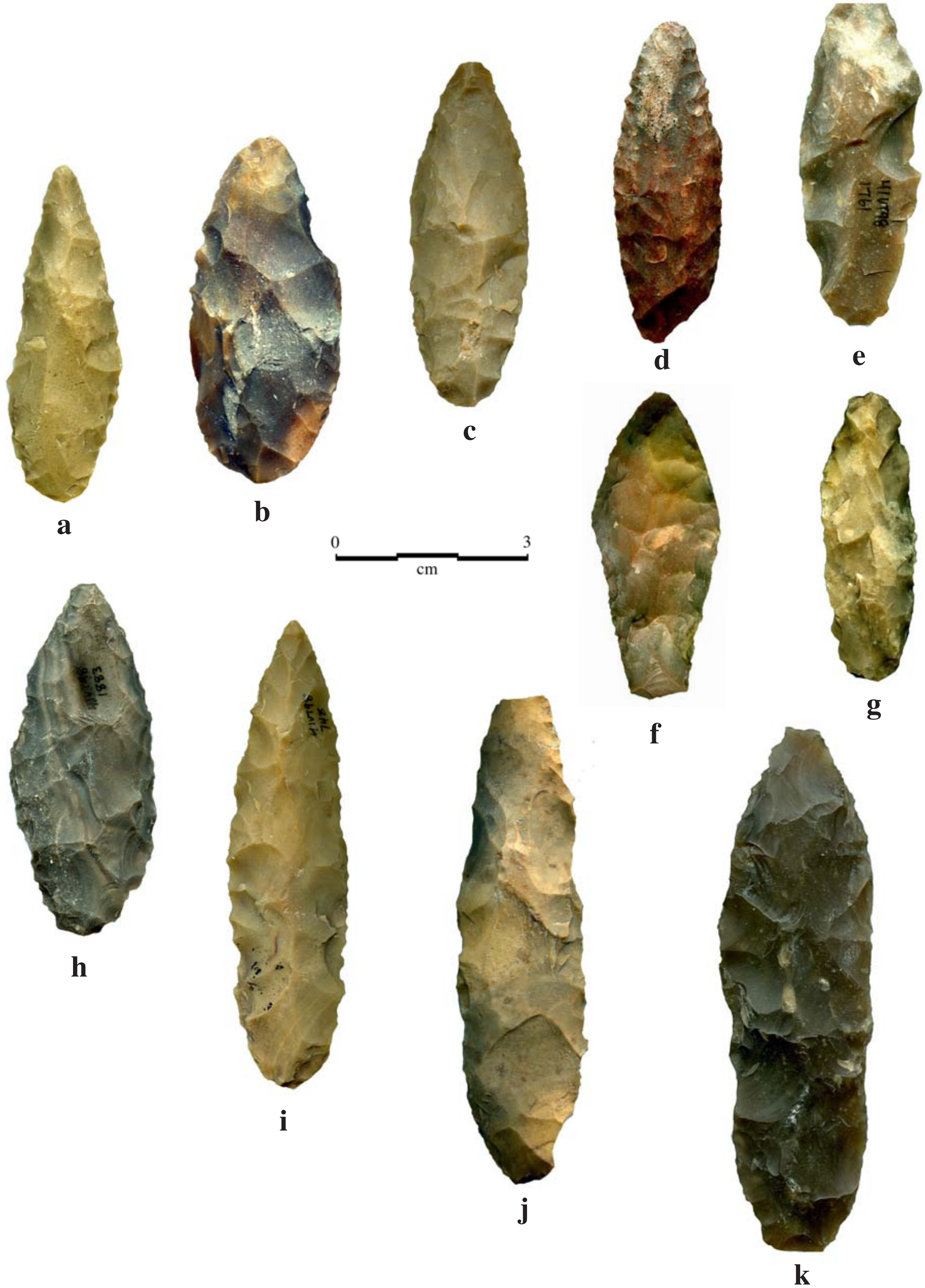


Figure 7-9. Refugio dart points from Buckeye Knoll: a, Knoll Top AU 4; b, Unit S10W88, Level 16; c, Unit S12W74, Level 16; d, East Area, Level 9; e, Knoll Top AU 4; f, East Area, Level 11 (possibly a Lerma point); g, Unit S12W90, Level 16; h, West Slope AU 2; i, Unit S33W118, Level 11; j, Unit S29W116, Level 14; k, Unit S31W116, Level 11.

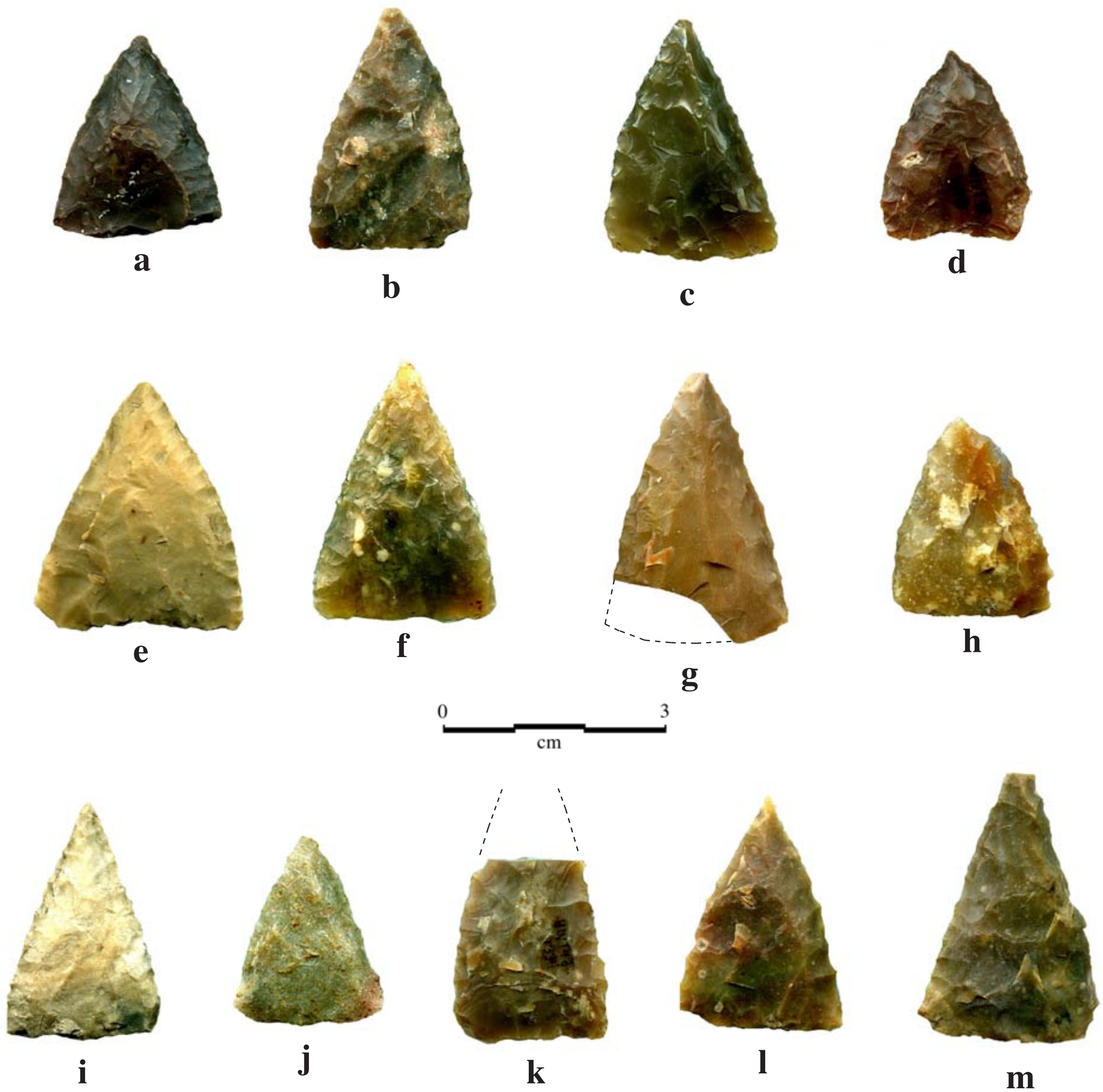


Figure 7-10. Early Triagnular dart points from Buckeye Knoll: a-i, West Slope AU 3; j, Knoll Top AU 3; k, Unit S06W34, Level 16; l, East Area, Level 10; m, Shovel Test 5 (West Canal Bank Area).

than on Bell points. Both types are closely related to the Calf Creek type found on the central Plains. Bell and Andice points are diagnostic of the Jarrell phase of central Texas, dated to ca. 4100-3100 B.C. (Prewitt 1985). At the McKinzie site (41NU221) near Nueces Bay, two Bell points were recovered from a discrete shell stratum radiocarbon dated to 5900-5300 B.P., calibrated, or 3950-3350 B.C. (Ricklis 1988, 1995a).

At Buckeye Knoll, six specimens (Figure 7-11) are assigned to the Andice type. One of these (see Figure 7-11, a) exhibits reworking of the lateral edges of the blade, thus removing traces of the basal barbs (which had probably, in any case, been broken off prior to retouch). Other Andice points are represented only by barb fragments (see Figure 7-11, b-f), one of which bears a small, notched indentation on its basal edge. An additional three specimens are subsumed under a combined Bell/Andice classification. These are all medial fragments (tips and basal sections broken off) for which it cannot be determined whether the barb/stem lengths would place them in the Bell or the Andice grouping.

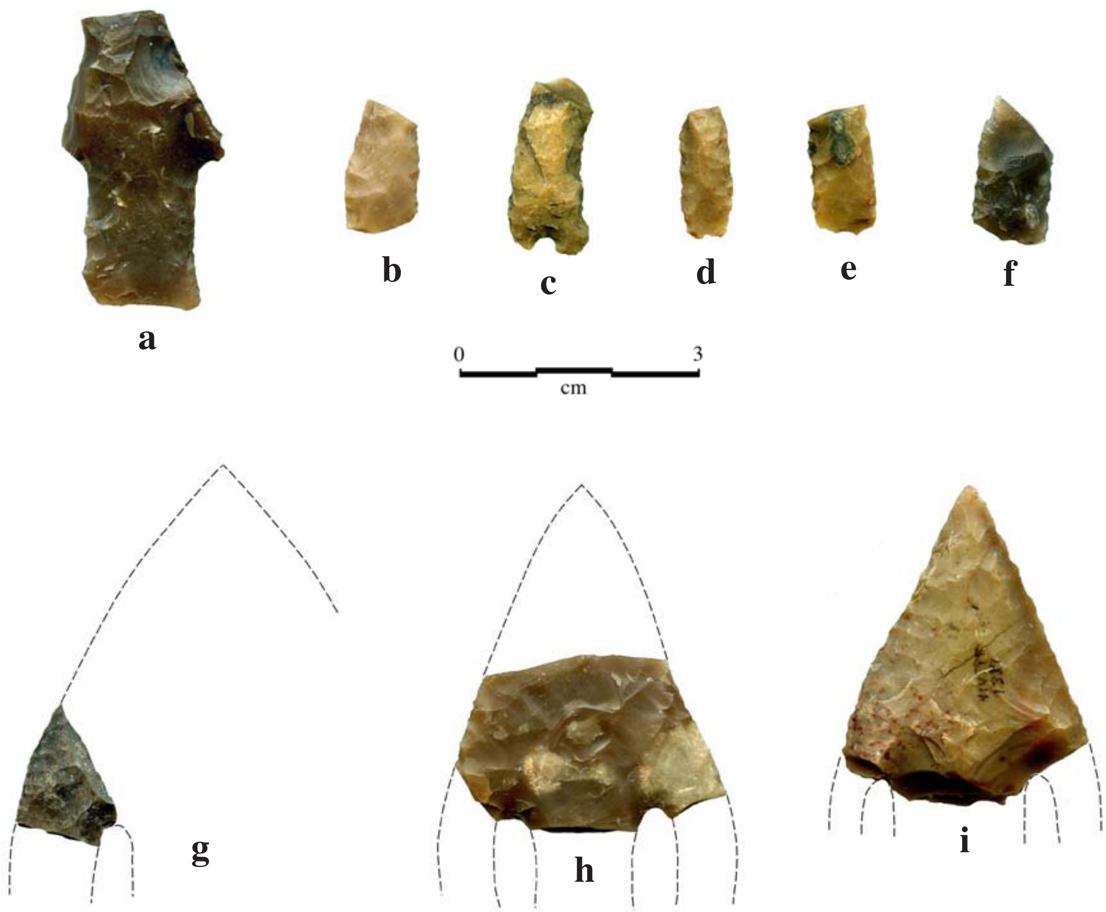


Figure 7-11. Bell/Andice point fragments from Buckeye Knoll: a, reworked Andice point with the barbs missing, Knoll Top AU 2; b, Andice barb fragment, Knoll Top AU 3; c, Andice barb fragment with basal notch, Knoll Top AU 4; d, Andice barb fragment, Knoll Top AU 2; e, Andice barb fragment, Knoll Top AU 2; f, Andice barb fragment, Unit S06W84, Level 22; g, Bell/Andice fragment, West Slope AU 3; h, medial Bell/Andice fragment, East Area, Level 9; i, distal Bell/Andice fragment, Unit S06W84, level 17.

The single Andice barb fragment from the West Slope was found in AU 3, which, as noted above, dates to ca. 5100-3800 B.P. From the Knoll Top, two specimens were found in Unit S6W84, where AUs could not be defined due to steeply sloping stratigraphy relative to excavated arbitrary levels (see discussion in Chapter 6). Of the remaining five specimens from the Knoll Top, three are from AU 2, one is from AU 3 and one is from AU 4. Since the contact between Zone 2 and 3 (i.e., between KT AUs 3 and 4) is a geologic unconformity representing deflation during the Middle Holocene, it is inferable that artifacts deposited on the knoll surface between ca. 6000 and 4000 B.P. would be either (a) removed by erosion, or (b) remain as lag materials and incorporated into the initial deposition of Zone 2 or mixed into the top of Zone 3. Presumably, the small and light Andice barb fragments found in KT AU 2 were upwardly displaced by subsequent bioturbational processes.

Untyped Lanceolate

Six points from Buckeye Knoll are lanceolate in form, and come from contexts pertaining to late Paleo-Indian times, but do not fit into any of the established lanceolate point types for Texas (Figure 7-12, a-d). All of these specimens exhibit moderate or heavy grinding on basal and lower lateral edges, a trait common in Paleo-Indian and Early Archaic points. Given this fact, plus the origin of most specimens in Knoll Top AU 4, attributed to Late Paleo-Indian to earliest Archaic times on the basis of typed points found therein, it is concluded that the untyped lanceolates are of Late Paleo-Indian, or perhaps earli-

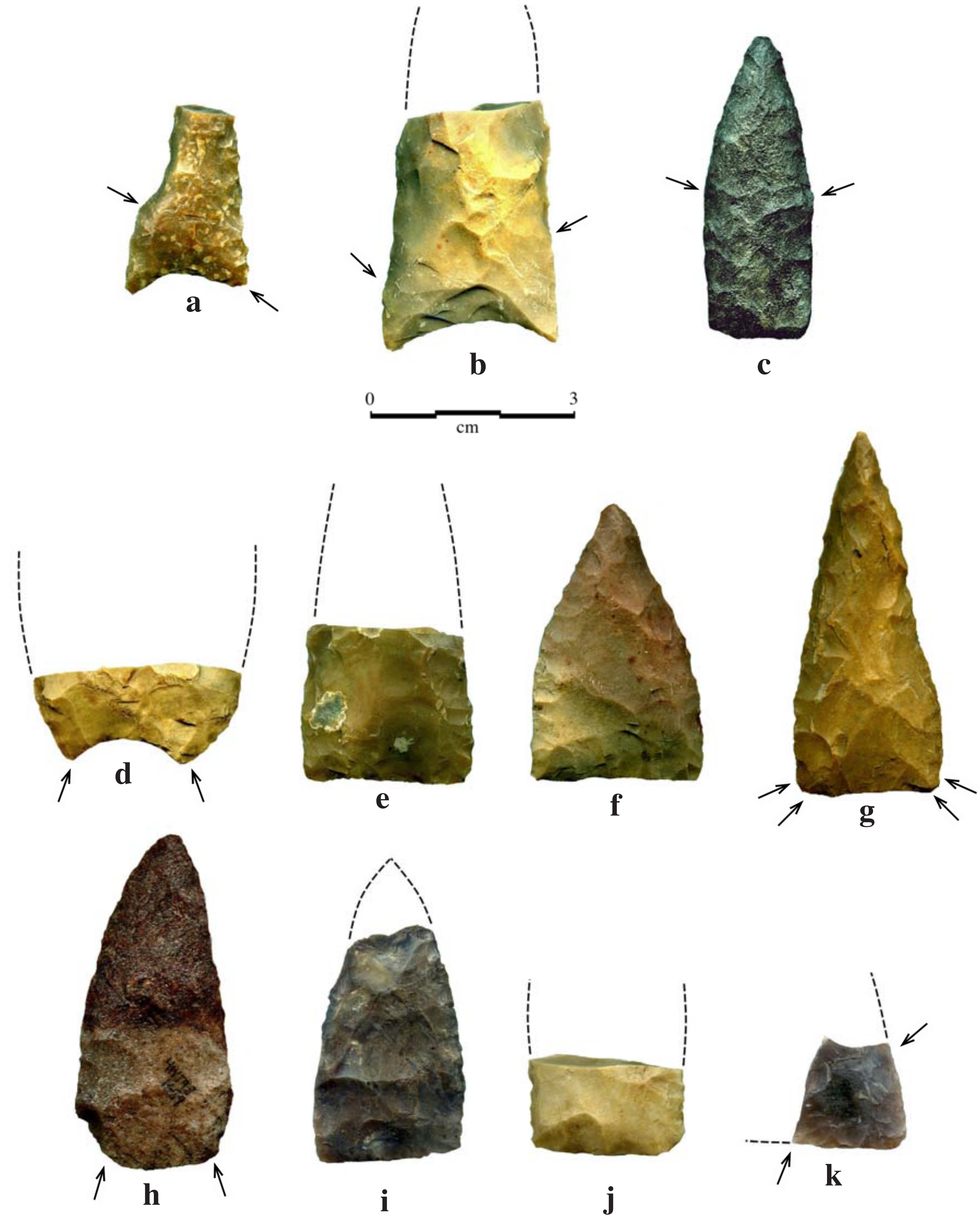


Figure 7-12. Various untyped lanceolate and triangular-lanceolate dart points from Buckeye Knoll: a-c, lanceolate dart points, Knoll Top AU 4; d, lanceolate dart point basal fragment, Unit S12W90, Level 12; e-h, triangular-lanceolate dart points, Knoll Top AU 4; i, triangular-lanceolate dart point, Unit S18W18, Level 10; j, triangular-lanceolate dart point, East Area, Level 11; k, triangular-lanceolate dart point basal fragment, Knoll Top AU 2. Arrows indicate the extent of edge or basal grinding where present.

est Archaic, age. The aforementioned calibrated age ranges falling between 8500 and 8000 B.P., obtained on oyster shells and believed to represent that later end of occupations associated with AU 4, may place the age of these points in the very early Archaic, defined further on as the Early Archaic I.

Untyped Triangular-Lanceolate

Seven dart points recovered at Buckeye Knoll are in this category (see Figure 7-12, e-k). They are un-notched, unstemmed points on which apparent reworking has made blade edges non-parallel, producing a nearly triangular outline. In most cases, bases are straight, further distinguishing these points from the concave-base lanceolate specimens that fall into established Late Paleo-Indian types such as Golondrina and St. Mary's Hall. Most of the Triangular-Lanceolate specimens are from AU 4 on the Knoll Top, strongly suggesting a Late Paleo-Indian to earliest Archaic age, given that this AU produced other dart points of known Paleo-Indian types (e.g., Golondrina, St. Mary's Hall, Wilson) as well as the untyped lanceolates mentioned above. These specimens could represent the very early Archaic (Early Archaic I), as dated by the above-referenced calibrated age range of 8500-8000 B.P. obtained on rangia shells from AU 4 and shells inferred to represent lag materials incorporated into the base of AU 3 deposits.

St. Mary's Hall

St. Mary's Hall points are lanceolate in outline, with a moderately deep basal concavity (see Bousman et al. 2004). They have been recovered from the St. Mary's Hall site in San Antonio (Hester 1977, 1978, 1991) and the Wilson-Leonard site, both along the Balcones Escarpment at the eastern and southeastern margin of the Edwards Plateau. A Late Paleo-Indian age range of 9900-8700 B.P. (11,300-9,500 B.P., (calibrated) has been suggested for the type (Bousman et al. 2004:27).

Three basal fragments of lanceolate dart points from Buckeye Knoll are assigned to this type (Figure 7-13, a-c). All show lateral edges slightly contracting toward the base, and a moderate basal concavity. Additionally, all exhibit lateral edge grinding, and two have basal grinding, as well. One specimen is from Knoll Top AU 4 and the other two are form the West Slope AU 2, the latter AU representing a Middle Archaic zone into which the points were presumably displaced by bioturbation or perhaps redeposited colluvially by Middle Holocene erosion involving deflation of Zone 3 on the nearby Knoll Top.

Golondrina

These lanceolate points have lateral edges that expand close to the concave bases. The type is widespread in Texas and into northeastern Mexico and is assigned to a Late Paleo-Indian age. All but one specimen from Buckeye Knoll has moderate to heavy edge grinding on basal portions of lateral edges and on the concave basal edge (see Figure 7-13, d-f). The one exception (see Figure 7-13, e), which actually may be an unfinished, late-stage preform, is a basal fragment with a medial break that may have occurred during manufacture. All three of the Golondrina specimens from Buckeye Knoll were found in KT AU 4 on the Knoll Top.

Wilson

Wilson points are a relatively recent addition to the Late Paleo-Indian typology in Texas (Dial et al. 1998:376-383; Bousman et al. 2004:28-32) . Wilson points are fairly large and characterized by broad side or corner notches that form an abruptly expanding stem. Bases of the stems are straight or slightly convex or concave. Stems bear edge grinding on lateral edges and/or bases. The age range of the type at the Wilson Leonard site is placed at 10,000-9500 B.P. (ca. 11,500-10,800 B.P., calibrated) (Dial et al. 1998:379).

Six Wilson points were recovered from Buckeye Knoll (Figure 7-14, a-f); all but one specimen are stem fragments with edge grinding, the exception is a complete point with grinding along the basal edge. All six were found in KT AU 4 on the Knoll Top.

Early Side-Notched

This is a relatively small side-notched point that does not fall into any established type, but has a general resemblance to other side-notched points ascribed to the Late Paleo-Indian period in Texas, such as the tentatively defined Berclair points from the Buckner Ranch site on Blanco Creek (Bousman et al. 2004:33). The specimen from Buckeye Knoll was found in KT AU 4 in the Knoll Top Excavation. It has a straight-based, expanding stem and shows traces of light stem edge grinding (see Figure 7-14, g). More research is required to better define the presence of, and variability in, Late Paleo-Indian stemmed points in Texas.

Fragments

One-hundred and fifty-two fragments of thin bifaces are classified as dart point fragments, based on their sizes and shapes. Of these, 103 specimens

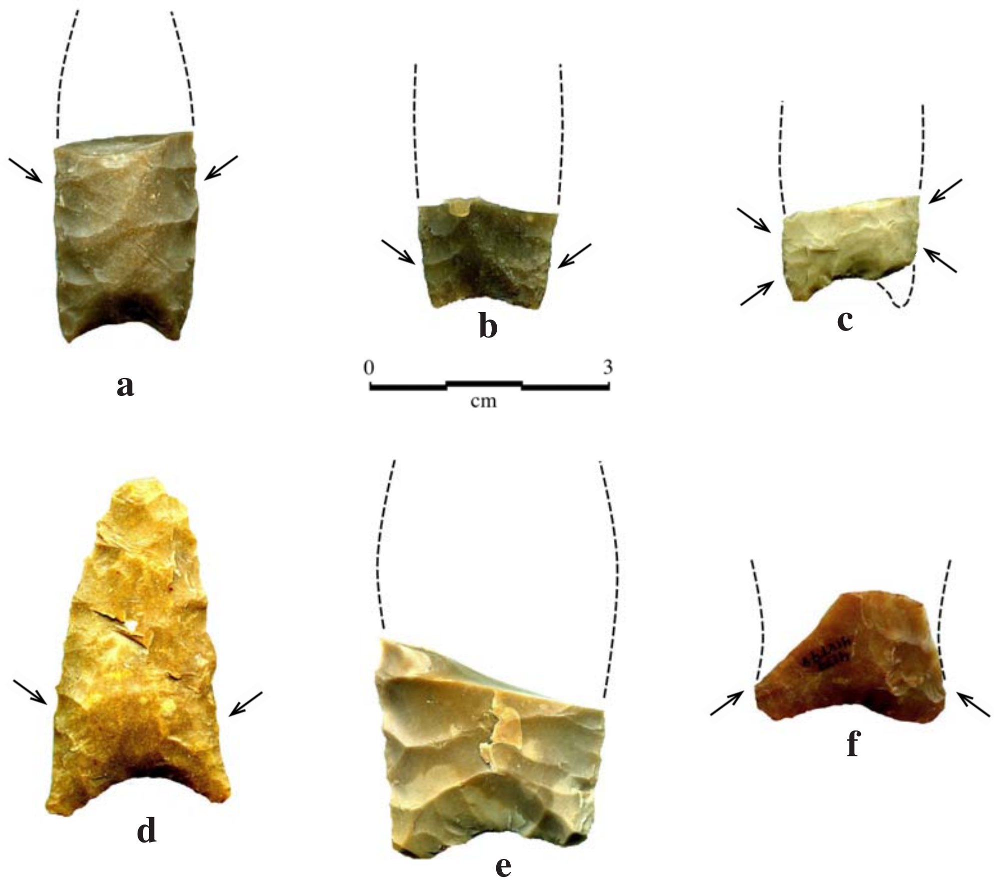


Figure 7-13. St. Mary's Hall and Golondrina dart points from Buckeye Knoll: a, St. Mary's Hall dart point, Knoll Top AU 4; b-c, St. Mary's Hall dart points, West Slope AU 2; d-f, Golodrina dart points, Knoll Top AU 4. Arrows indicate the extent of edge or basal grinding where present.

are distal fragments, and the remaining 49 are medial fragments. These are exclusive of proximal fragments, which have been included in the list of typed points just described since their distinctive basal morphologies permit typological identification. Inferably, the latter group of proximal fragments were returned to the site after use afield, still attached to shafts or foreshafts. The distal and medial fragments may have been mostly returned to the site embedded in the carcasses of procured game animals.

Preforms

Sixty-eight late-stage, thin bifaces are believed, on the basis of size, thickness and overall shape, to be preforms for dart points, or fragments thereof. A total of only 12 specimens were unbroken, probably reflecting the breakage of most specimens during manufacture, immediately prior to discard. These range in length between 56 and 106 mm, in maximum width from 25 to 72 mm, and in maximum thickness from 7.8 to 17.8 mm (Table 7-8). As may be seen from the representative sample shown in Figure 7-15, these are elongate, thin bifaces that are trianguloid or lanceolate in form. Apparently, all were lost or discarded prior to any attempt to produce type-diagnostic basal shapes. Several specimens are especially thick, and were probably discarded because they could not be subjected to final thinning.

Fifty-two preform fragments were recovered (Figure 7-16). Of this total, 30 are proximal fragments, while 8 and 14 specimens are, respectively, medial and distal perform fragments. The provenience distributions of all these specimens are listed in Tables 7-9 and 7-10 (along with distributions of the various other lithic artifact classes discussed in this chapter).

Bifacial Knives

Eight flaked chert bifaces are classified as knives on the basis of their size (longer and broader than dart points), thinness, and careful edge flaking,

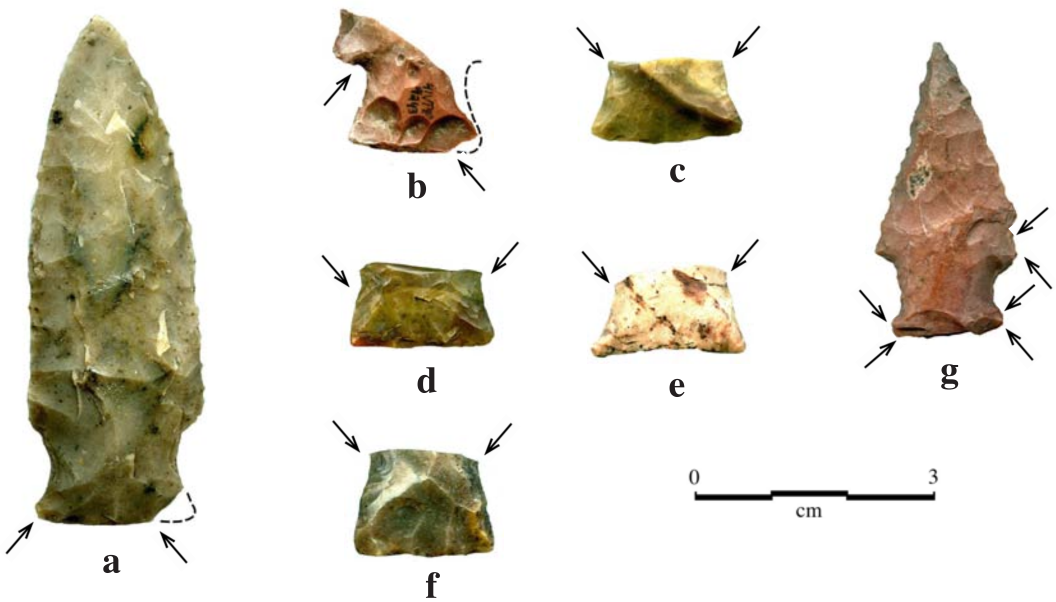


Figure 7-14. Various corner- or side-notched dart points from Buckeye Knoll: a, Wilson dart point; b-f, Wilson dart point basal fragments; g, untyped early side-notched dart point. All specimens are from Knoll Top AU 4. Arrows indicate the extent of edge or basal grinding where present.

Table 7-8. Metric Data on Whole Dart Point Preforms from Buckeye Knoll.

Artifact	Lot No.	Area	AU/Level	Length	Max. Width	Max. Thick.
Triangular preform	890	West Slope	AU 1-2	31.2	71.8	13.7
Round-based preform	1837	Knoll Top	AU 2	71.7	33.4	10.1
Oval preform	709	East Area	Level 13	82.1	54.6	12.7
Preform	1639	Knoll Top	n/a	71.3	37	10.2
Triangular preform	1335	Knoll Top	n/a	94.4	35.7	17.0
Round-based preform	2166	Knoll Top	AU 4	96.8	35.6	10.1
Triangular preform	1767	East Area	Level 4	105.8	39.5	7.8
Triangular preform	1821	Knoll Top	n/a	65.2	35.3	15.7
Round-based preform	1570	Knoll Top	n/a	56.6	28.3	12.6
Triangular preform	2070	Knoll Top	AU 4	78.7	25.2	17.8
Triangular preform	1201	Knoll Top	AU 4	50.7	32.3	14.7
Round-based preform	1567	Knoll Top	n/a	82.9	35.8	13.5

Note: Where analysis units (AUs) were not defined, the vertical provenience is given by 10-cm arbitrary levels. All measurements are in millimeters.

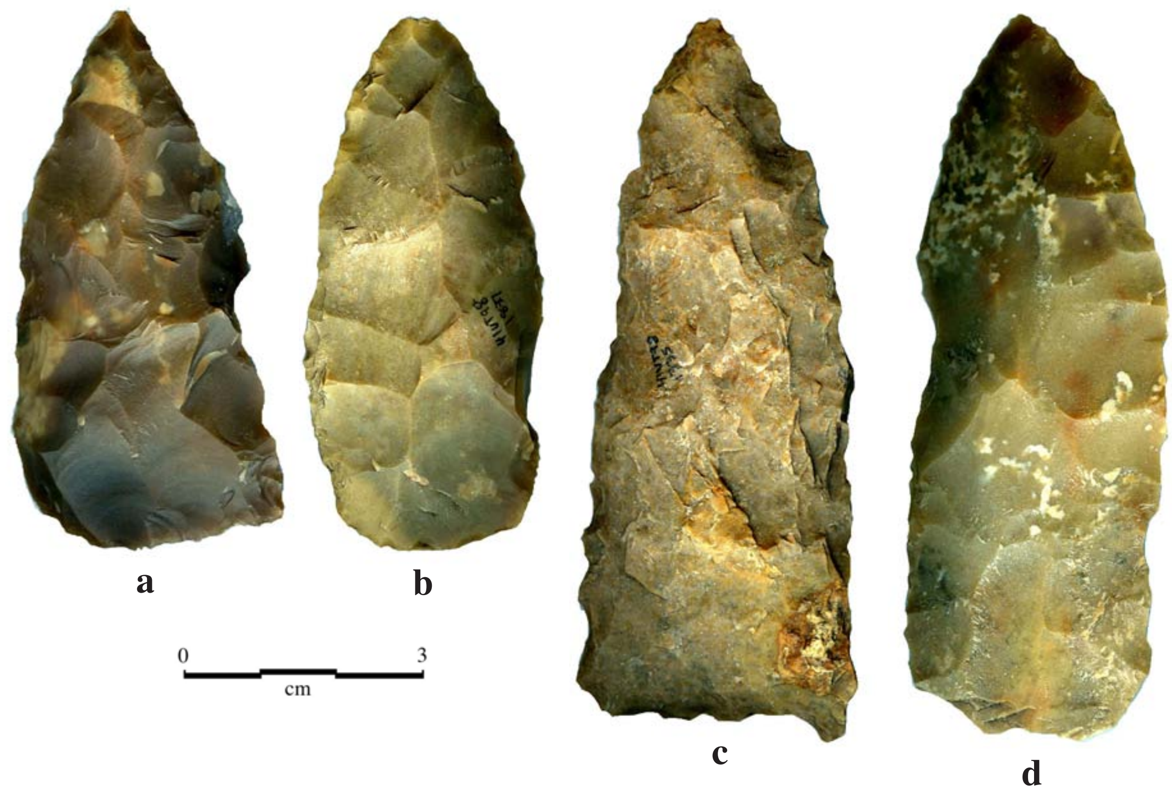


Figure 7-15. Dart point preforms from Buckeye Knoll: a, West Slope AU 1; b, Knoll Top AU 3; c, Unit S06W84, Level 16; d, Knoll Top AU 4.

which was inferably done in order to optimize effectiveness in cutting tasks.

Five of the knives are triangular in shape, one is bi-pointed, and another is leaf-shaped with a rounded base (Figure 7-17). The eighth specimen is an unusually large piece with a triangular blade, straight base and two shallow basal notches (Figure 7-18). This last specimen is similar to a form frequently called a San Saba knife or San Saba Biface (e.g., Waldorf 1989). Though a perusal of internet web sites devoted to Texas lithic artifacts (and/or the collection of such) shows this to be a recurrent lithic form, it has not been included in any of the professionally produced typologies for Texas, perhaps due to limited documentation in well-defined and dated subsurface contexts. San Saba knives have been estimated to date to ca. 1000 B.C. (e.g., Waldorf 1989). This age is not out of line with the context of the Buckeye Knoll specimen, which comes from AU 3 on the Knoll Top, a provenience that produced Morhiss and Lange dart points, types that chronologically fall at around that time. A general Late Archaic age is inferred for these items (Thomas R. Hester, personal communication 2005).

The proveniences of the other six bifacial knives are shown variously in Tables 7-9 and 7-10. They come from the Late Archaic context of Knoll Top AU 2, the early Late Archaic context in the West Slope AU 2, and from various levels (probably between Middle Archaic and Late Prehistoric context in the East Area.

Distally Beveled Bifaces

Into this group of artifacts fall Clear Fork Tools and a Dalton Adze. All are bifacially flaked from chert, or, in the case of the Dalton Adze, a fine-grained petrified wood.

Clear Fork Tools have a wide distribution in Texas and beyond into northeast Mexico (Epstein 1969), Oklahoma, and the central Plains (Bell 1957; Hughes 1980). Use-wear studies of Clear Fork Tools suggest that they served as woodworking implements (Hudler 1997).

Twelve Clear Fork Tools and/or fragments thereof were recovered at Buckeye Knoll (Figures 7-19 to

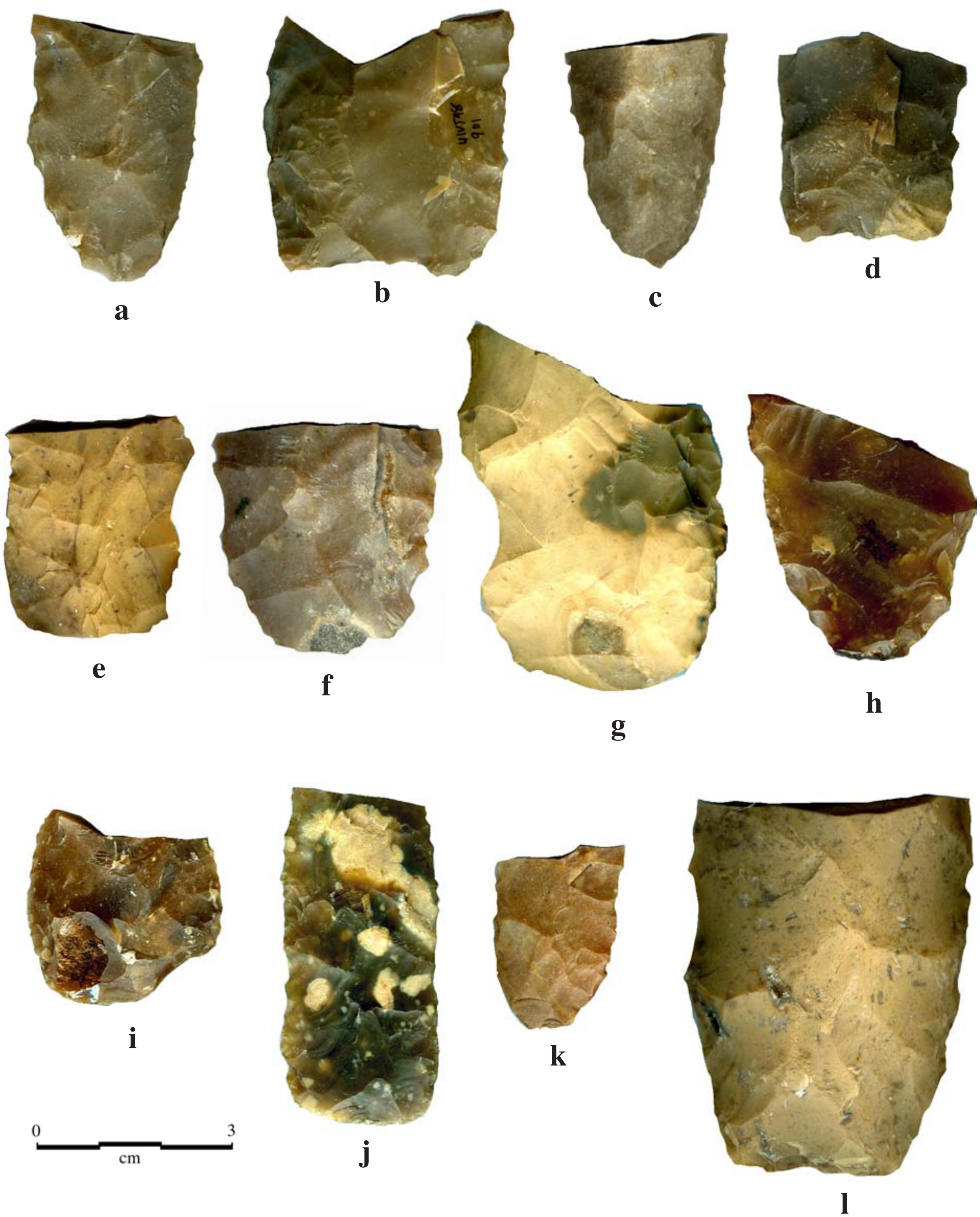


Figure 7-16. Proximal dart point preform fragments from Buckeye Knoll: a, Knoll Top AU 2; b, Knoll Top AU 3; c-g, Knoll Top AU 4; h, West Slope AU 1; i, West Slope AU 3; j, Unit S06W84, Level 14; k, Unit S12W88, Level 10; l, Unit S12W90, Level 15.

Table 7-9. Lithic Artifact Classes Within the Analytical Units of the Knoll Top Excavations at Buckeye Knoll.

	Lithic Artifacts																									
AU	Bifacial Knives	Distal Dart Point Fragments	Medial Dart Point Fragments	Distal Arrow Point Fragments	Choppers	Chipped Celts	Clear Fork Tools	Spokeshaves	Flake Perforators	Bifacial Drills	Perforator Tips	End Scrapers	Side Scrapers	Early Stage Bifaces	Preforms	Preforms (Proximal Fragments)	Preforms (Distal Fragments)	Preforms (Medial Fragments)	Arrow Point Preforms	Burin Spalls	Abraders (Sandstone)	Milling Stone Fragments	Manos	Mano Fragments	Hammerstones	**Totals**
1	—	12	3	3	—	—	—	—	1	—	—	—	—	—	—	—	—	—	3	—	1	1	—	—	—	24
2	1	21	11	—	4	1	1	—	1	—	4	3	1	2	—	3	1	1	—	2	6	3	1	2	2	71
3	—	5	5	—	4	2	—	—	1	2	1	—	2	3	—	4	3	1	—	1	—	2	—	1	3	40
4	—	15	5	1	2	—	2	—	—	1	—	1	2	9	3	6	3	3	2	—	2	—	—	1	6	64
Totals	1	53	24	4	10	3	3	0	3	3	5	4	5	14	3	13	7	5	5	3	9	6	1	4	11	**199**

7-20). The metric data for all specimens, including bit angles, are shown in Table 7-11. Four of the specimens from the Knoll Top Excavation came from the Late Paleo-Indian/Early Archaic context of KT AU 4; the others were found in contexts in which AU definitions were not possible, due to highly undulating stratigraphy. Two specimens from the East Area came from Levels 12 and 13, also apparently Late Paleo-Indian contexts judging by the presence of lanceolate dart points in those levels. In contrast, three specimens were found in the West Slope Excavation in Middle and Late Archaic contexts; one specimen came from WS AU 3, which produced numerous Early Triangular dart points, while two were found in WS AU 2, which is assigned to the early part of the Late Archaic. The combined findings are congruent with earlier estimates of the time range of bifacial Clear Fork Tools, beginning in late Paleo-Indian times and persisting into the Late Archaic (Hester 1980b, 1995; Dial 1998:507).

Another specimen is classified as a Dalton Adz (Figure 7-21). This artifact type is a distally beveled tool with bit (distal) edges that are strongly convex in plan view, in contrast to the straight, concave or only slightly convex bit edges that characterize Clear Fork tools. Dalton Adzes are late Paleo-Indian in age, and are found in association with Dalton points in Arkansas and elsewhere in the greater Southeast (e.g., Goodyear 1982; Morse and Goodyear 1973; Morse 1997). Lateral edges are frequently ground smooth, and haft-wear polish is often discernible on the faces toward the proximal end. The Buckeye Knoll specimen exhibits grinding on both lateral edges (see Figure 7-21), and there is faint haft polish, visible under low-power (45x) microscopy, on both faces near the mid-point of the artifact.

The specimen from Buckeye Knoll was found in the East Area in Level 11, in the same 2-by-2-m unit (S20W20) and the same 10-cm level that yielded one of the above-discussed Triangular-lanceolate dart points believed to pertain to Late Paleo-Indian to Early Archaic occupations. This adz has been examined by Dr. Frank Schambach and Dr. Dan Morse, professional archaeologists having close familiarity with Dalton materials, both of whom considered this specimen a

Table 7-10. Lithic Artifact Classes Within the Analytical Units of the West Slope Excavations at Buckeye Knoll.

AU	Lithic Artifacts																								
	Bifacial Knives	Distal Dart Point Fragments	Medial Dart Point Fragments	Distal Arrow Point Fragments	Medial Arrow Point Fragments	Choppers	Chipped Celts	Clear Fork Tools	Spokeshaves	Flake Perforators	Bifacial Drills	End Scrapers	Side Scrapers	Early Stage Bifaces	Preforms	Preforms (Proximal Fragments)	Preforms (Distal Fragments)	Preforms (Medial Fragments)	Arrow Point Preforms	Burin Spalls	Abraders (Sandstone)	Milling Stone Fragments	Mano Fragments	Hammerstones	**Totals**
1	—	6	4	—	—	—	—	1	—	_	—	—	1	2	—	1	4	—	—	—	—	—	—	—	19
1-2	—	4	—	—	—	—	—	—	1	—	—	—	—	2	1	1	1	—	—	—	—	—	—	1	11
2	2	10	7	1	—	2	—	1	1	1	—	1	—	3	—	—	—	1	—	—	1	2	—	1	34
2-3	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	1	—	—	4
3	—	7	1	—	1	1	—	—	—	—	—	—	—	3	—	7	—	1	—	—	1	—	—	—	22
3-4	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	2
4	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	2	—	—	—	—	—	—	—	—	3
Totals	2	29	14	1	1	3	0	2	2	1	0	1	1	10	1	12	5	2	0	0	2	3	1	2	**95**

good example of a Dalton adze (Frank F. Schambach, personal communication 2001; Dan F. Morse personal communication 2001).

Dalton Adzes are found in east and east-central Texas (Turner and Hester 1999:252). The presence of the specimen from Buckeye Knoll suggests that the lower Guadalupe River valley area was linked to some degree to a region or regions to the north/northeast during Late Paleo-Indian times.

Chipped Celt-Like Bifaces

Five bifacially flaked chert artifacts fall into this category. All are ovoid in plan and taper to a bifacially beveled bit or working edge (Figure 7-22). They are identified as "celt-like" on the basis of their shape, though, unlike true celts, they exhibit overall bifacial flake-removal scars resulting from their production via percussion flaking rather than the pecked and ground surfaces seen on true celts. In effect, it may be that these artifacts served the same function as did celts (i.e., as hafted axe blades) but were manufactured with essentially the same percussion techniques generally employed in stone tool production in southern Texas. Three of the specimens have use wear in the form of edge dulling and polish along the working edge that is visible under low-power (45x) microscopy. All are of similar dimensions, ranging in length between 76 and 80 mm, in maximum width from 47 to 56 mm, and in maximum thickness from 20 to 25 mm. Unlike the choppers described below, these tools could have been hafted for use in cutting tasks.

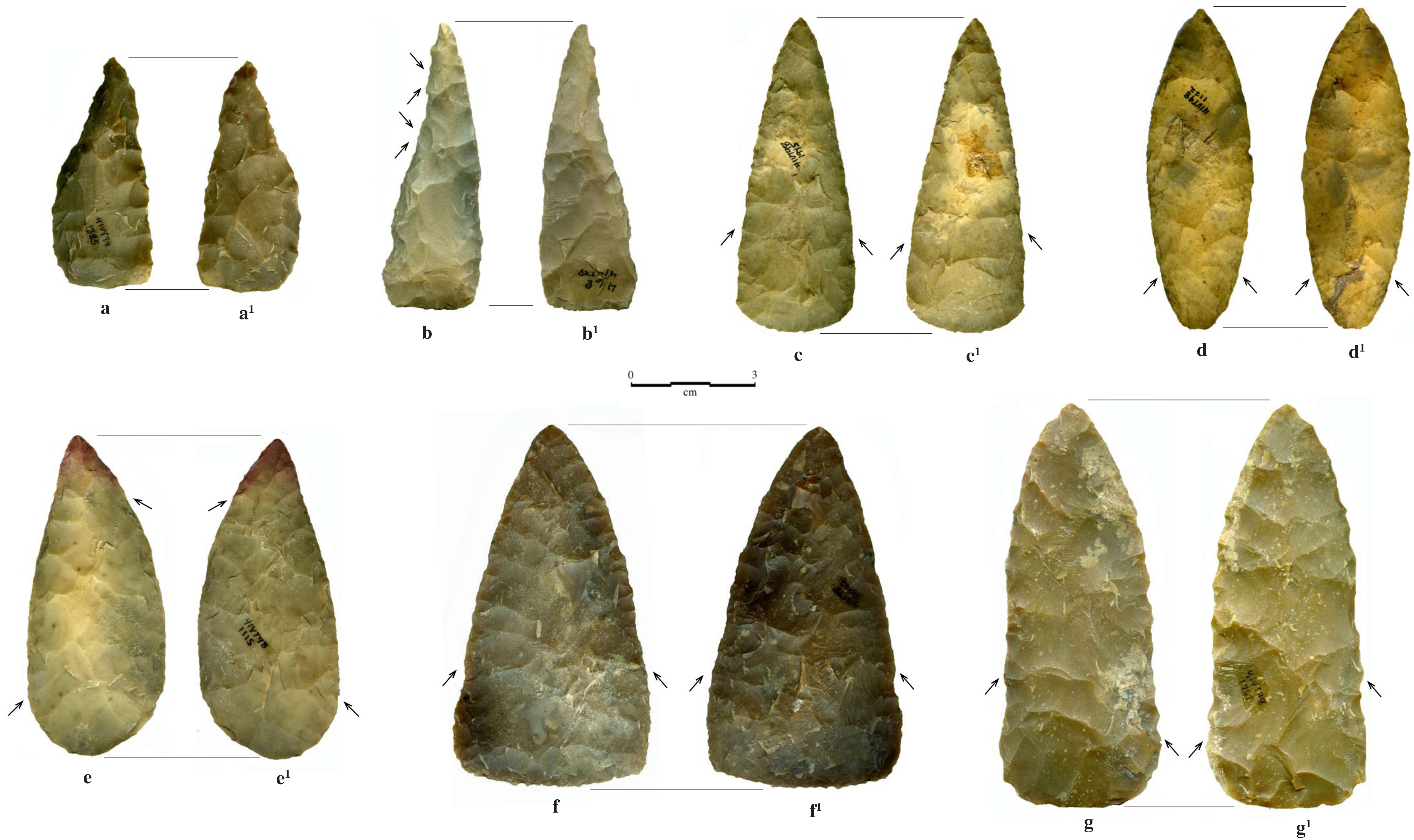


Figure 7-17. Bifacial knives from Buckeye Knoll: a-a[1], West Slope AU 3; b-b[1], East Area, Level 12; c-c[1], Unit S12W88, Zone 2; d-d[1], Knoll Top AU 3; e-e[1]; Knoll Top AU 2; f-f[1], East Area, Level 4; g-g[1], Unit S10W88, Level 13. Arrows indicate the extent of edge wear (polish) visible under 45 microscopy.

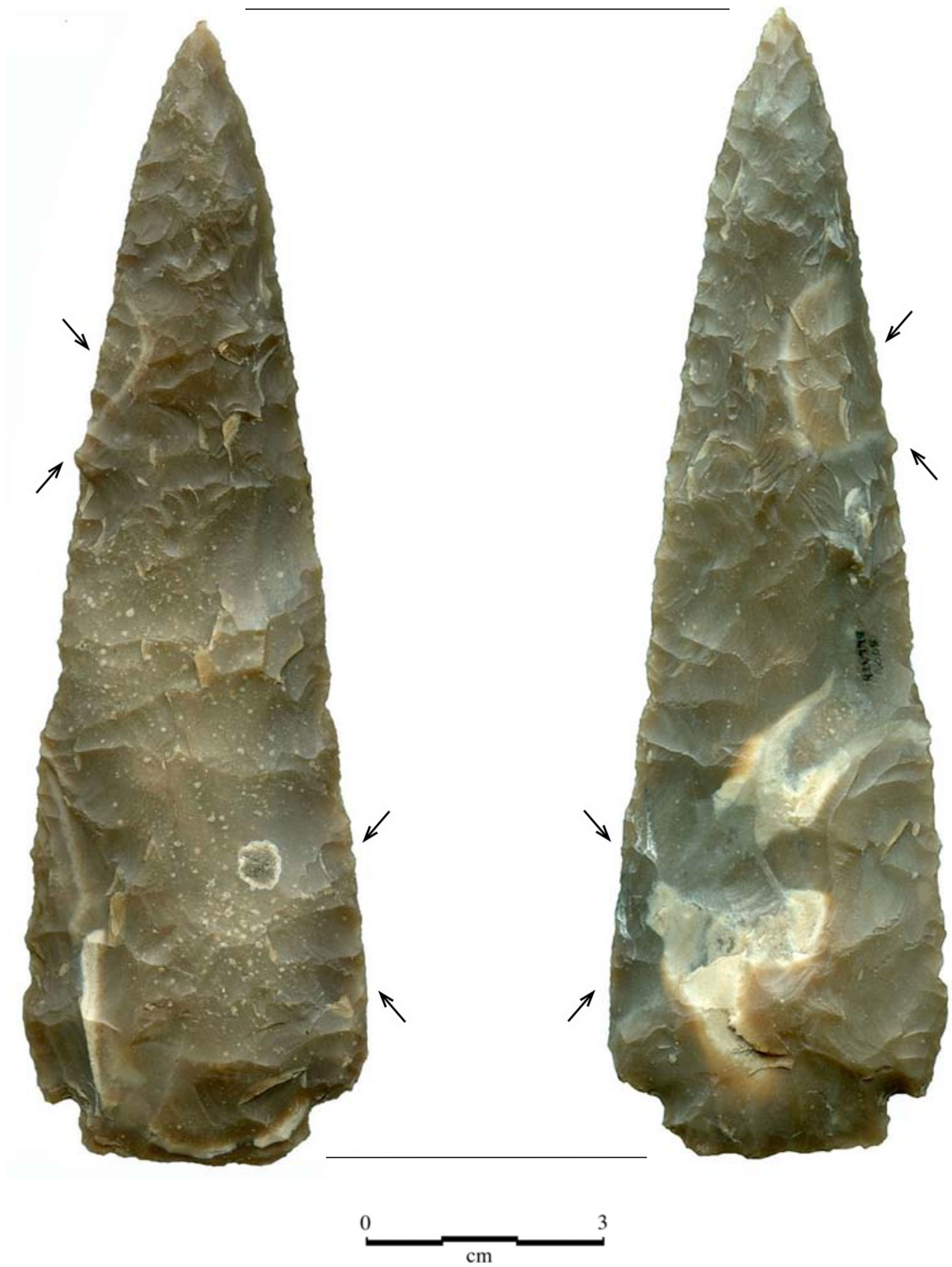


Figure 7-18. Large basally notched biface, similar to so-called San Saba Knives, from Knoll Top AU 3 at Buckeye Knoll. Arrows indicate the extent of edge wear (polish) visible under 45 microscopy.

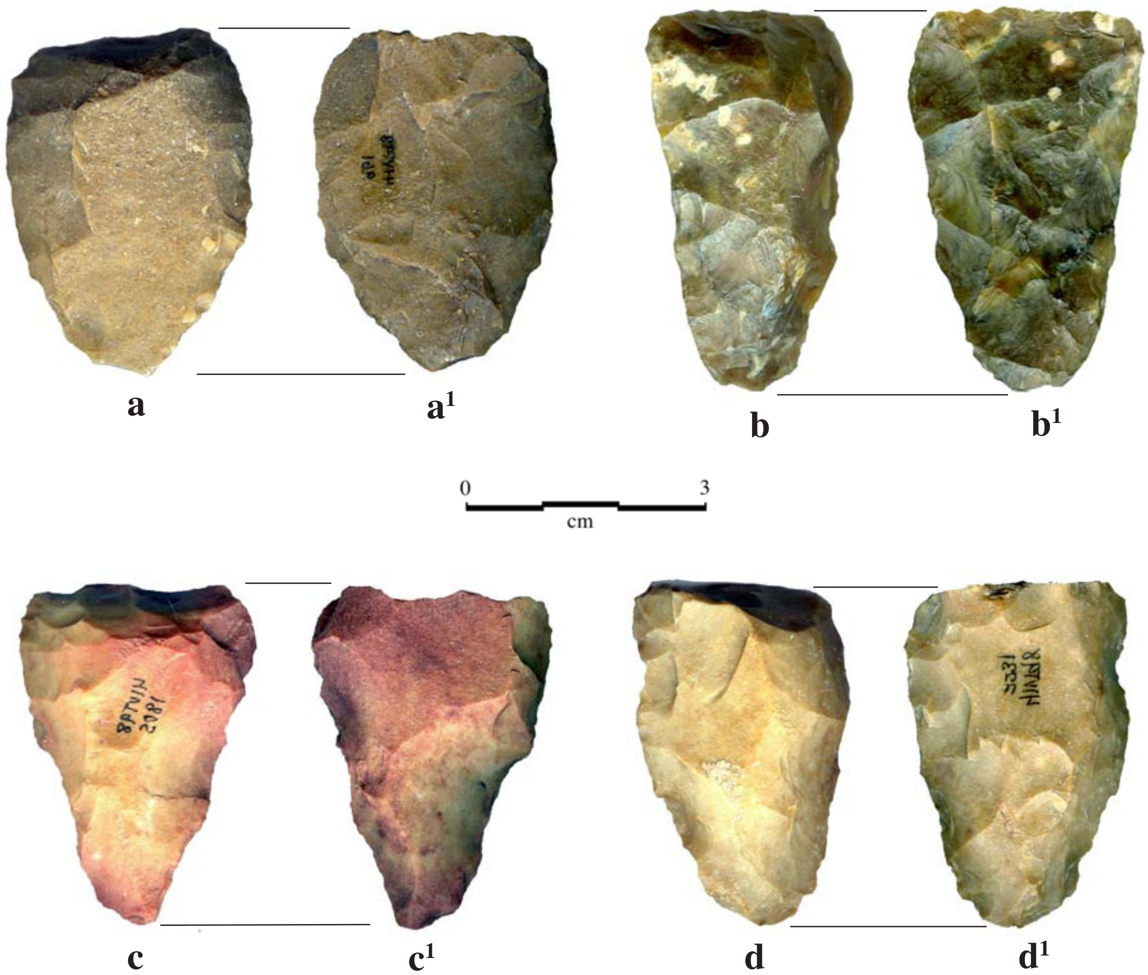


Figure 7-19. Bifacial Clear Fork Tools from Buckeye Knoll: a-a^{1}, West Slope AU 3; b-b^{1}, Unit S12W60, Level 9; c-c^{1}, West Slope AU 1; d-d^{1}, Knoll Top AU 4.

Choppers

These are relatively large, heavy implements. They are made on stream-worn chert cobbles and have bifacially flaked edges at one end for cutting and/or chopping. The measurements of the various specimens are shown in Table 7-12, and two representative examples are illustrated in Figure 7-23.

Perforators

Twelve lithic artifacts from Buckeye Knoll are classified as perforators (Figure 7-24). Their metric dimensions and proveniences are listed in Table 7-13. Seven specimens are complete (unbroken) and the remaining five are distal tip fragments. Most of the perforators were made by bifacial pressure flaking that created a projecting bit on one end of a chert flake. One specimen, with an inverted T shape (see Figure 7-24, a) exhibits complete bifacial flaking. Another completely bifacial specimen (see Figure 7-24, b) has a narrow stem and weak shoulders between the stem and bit portions, while a final specimen (see Figure 7-24, l) consists of a triangular dart point with its distal end reworked into a narrow bit.

All 12 specimens are from KT AUs 1, 2 and 3 in the Knoll Top Excavation. These AUs range chronologically from the Middle Archaic into Late Prehistoric times. The absence of perforators in AU 4 suggests an absence or scarcity of such tools during the Late Paleo-Indian occupation of the site.

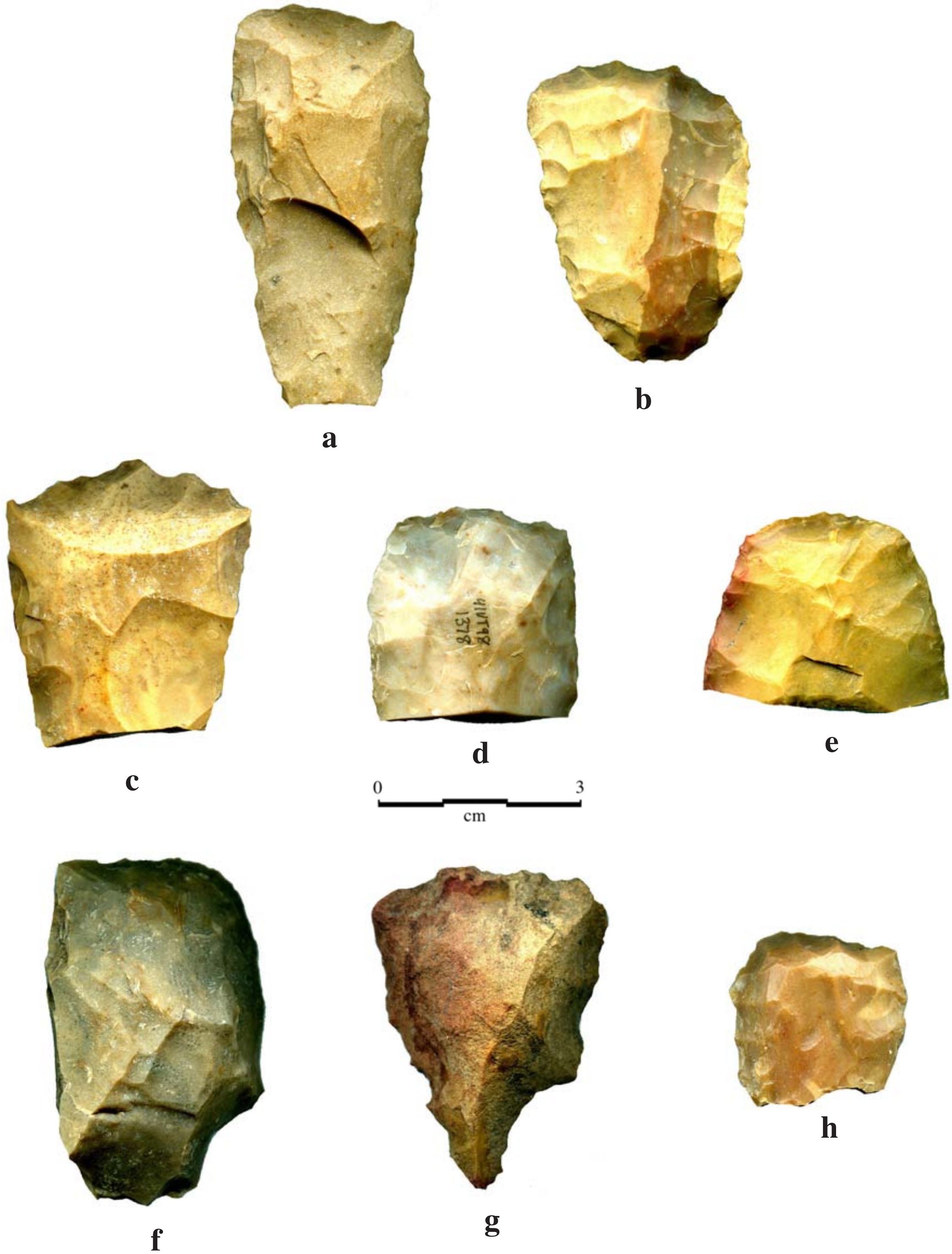


Figure 7-20. Additional Clear Fork Tools from Buckeye Knoll: a, c, h, Knoll Top AU 4; b, East Area, Level 12; d, Unit S06W84, Level 23; e, East Area, Level 14; f, Knoll Top AU 3; g, West Slope AU 2.

Table 7-11. Metric and Bit Angle Data on Distally Beveled Tools from Buckeye Knoll.

Artifact	Lot No.	Area	AU/Level	Length	Max.Width	Max.Thickness	Bit Angle	Remarks
Dalton Adze	474	East Area	Level 11	75.2	37.9	20.2	47°	
Clear Fork Tool	822	Knoll Top	n/a	52.5	32.0	13.5	59°	
Clear Fork Tool	1249	Knoll Top	AU 2	56.3+	39.8	23.0	47°	Incomplete
Clear Fork Tool	1581	Knoll Top	AU 4	64.3+	33.1	13.2	40°	Incomplete
Clear Fork Tool	2231	Knoll Top	AU 4	46.8	30.9	14.9	58°	
Clear Fork Tool	2145	Knoll Top	AU 4	29.5+	29.2	11.5	52°	Incomplete
Clear Fork Tool	3006	Knoll Top	AU 4	45.5+	40.3	18.7	33°	Incomplete
Clear Fork Tool	1378	Knoll Top	n/a	34.3+	36.6	15.7	53°	
Clear Fork Tool	1889	West Slope	AU 2	52.2	38.9	14.1	37°	
Clear Fork Tool	1805	West Slope	AU 2	46.7	32.5	11.4	55°	
Clear Fork Tool	961	West Slope	AU 3	47.7	33.6	12.5	54°	
Clear Fork Tool	1857	East Area	Level 12	49.3	36.6	10.8	58°	
Clear Fork Tool	1919	East Area	Level 14	29.1+	39.4	9.6	36°	Incomplete

Note: Where analysis units (AUs) were not defined, the vertical provenience is given by 10-cm arbitrary levels. All measurements are in millimeters.

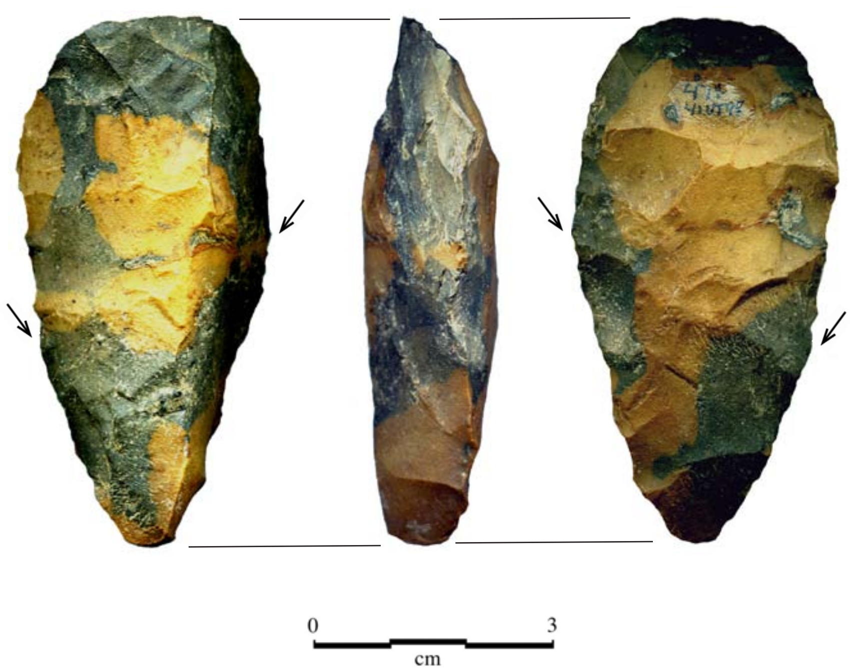
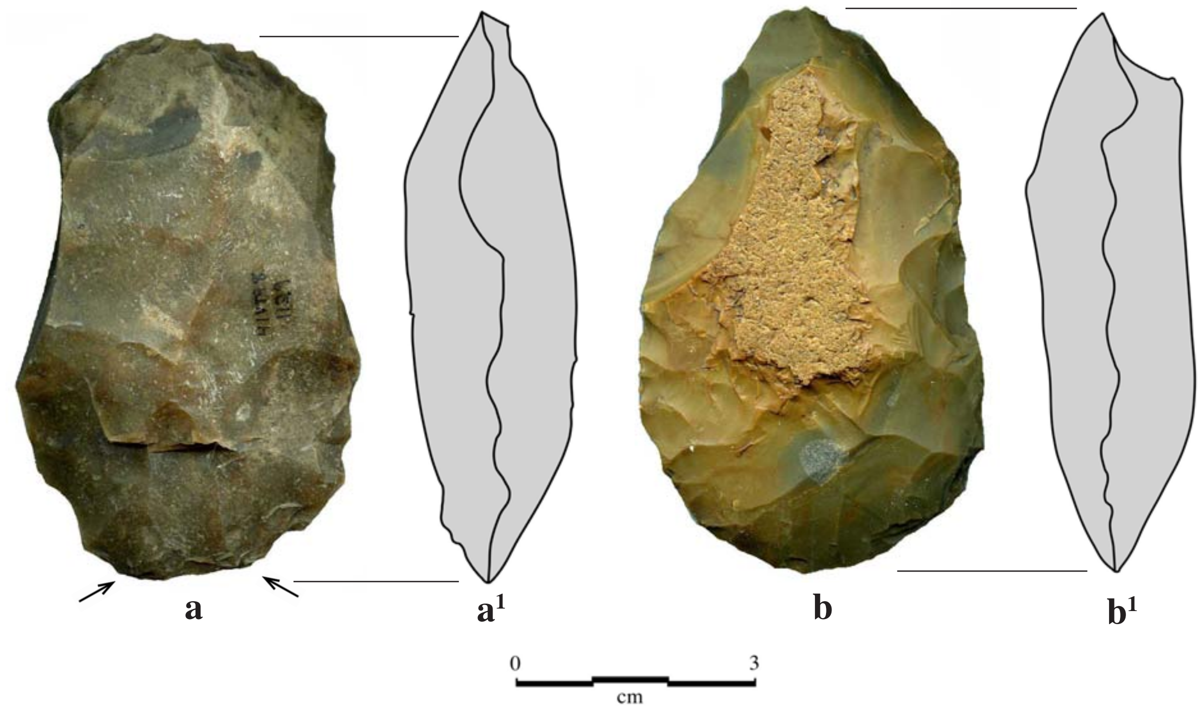


Figure 7-21. Dalton Adze from East Area, Level 11, at Buckeye Knoll. Arrows indicate the extent of edge grinding on the sides and around the pointed proximal end.



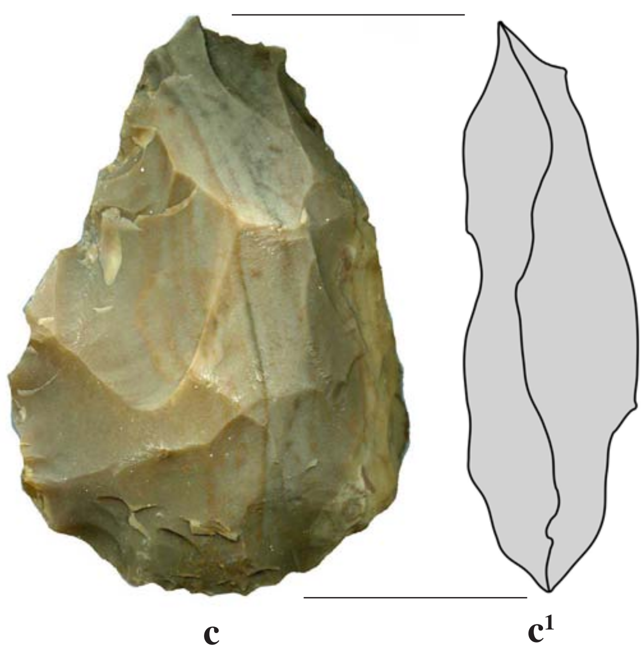


Figure 7-22. Chipped, celt-like bifaces from Buckeye Knoll. Arrows indicate the extent of edge wear (polish) visible under 45 microscopy.

Scrapers

Thirty-four scrapers were found during the 2000-’01 excavations. Most of these came from the Knoll Top. Seven were found in the West Slope Excavation and only one was found in the East Area. Scrapers pertain to all major time periods—in the Knoll Top Area they were found in all four AUs, and on the West Slope they were found in all three AUs.

Generally, the scrapers from the site tend to be of no consistent form; most are simply chert flakes with steeply beveled edges created by a unifacial series of short and generally rather uniform pressure-flake removals. This is reflected in the considerable variability in lengths and widths, as shown in Table 7-14. Lengths of flakes range from 17.8 mm 79.8 mm and maximum widths vary between 15.2 mm and 71.0 mm. Similarly, thicknesses vary a good deal between

Table 7-12. Metric Data on Choppers from Buckeye Knoll.

Artifact	Lot No.	Area	AU/Level	Length	Max. Width	Max. Thickness
Chopper	740	BHT 47	n/a	60.6	99.0	25.3
Chopper	3031	BHT G-2	n/a	111.7	63.0	39.9
Chopper	1325	Knoll Top	AU 3	40.9	36.2	34.6
Chopper	1711	Knoll Top	AU 4	99.9	47.1	23.9
Chopper	2097	Knoll Top	AU 3	90.0	60.1	44.7
Chopper	1156	Knoll Top	n/a	98.0	43.7	32.6
Chopper	549	East Area	Level 4	105.0	68.8	28.6
Chopper	4166	Knoll Top	AU 3	107.6	53.9	46.6
Chopper	1894	West Slope	AU 4	85.0	67.2	49.9
Chopper	752	West Slope	AU 2	105.3	85.0	53.0
Chopper	1849	West Slope	AU 4	71.1	53.3	30.7

Note: Where analysis units (AUs) were not defined, the vertical provenience is given by 10-cm arbitrary levels. All measurements are in millimeters.

a minimum of 2.6 mm and a maximum of 21.5 mm. Apparently, then, scraping edges were made on a rather opportunistic basis on available chert flakes of varying dimension, with little concern for any formal uniformity in final size or shape. A notable exception is a unique stemmed biface, which exhibits a steep flaked bevel on its distal end (Figure 7-25, h). The wide stem is deeply concave on the base, and unbarbed but prominent shoulders demarcate the stem section from the distal or bit end of the artifact. While it is possible that this piece was a projectile point, the medial break of which was reworked to form a scraping edge, the stem has a considerably greater width than is usual for dart points from the site, suggesting the possibility that this artifact was originally made as a scraper designed for secure hafting since the artifact was required to withstand considerable pressure.

Of the relatively abundant unifacial specimens (*n*=33), the majority (26 or 79 percent) are classified as side scrapers, while only 7 (21 percent) are classified as end scrapers. As used here, the designation as a side scraper means that the beveled scraping edge runs along the long axis of the flake from which the tool was manufactured, while on an end scraper the working edge is along the short axis (see Figures 7-25 to 7-26). A total of 13 scrapers were recovered from all four AUs on the Knoll Top. Six were found on the West Slope, mostly side scrapers from the Middle Archaic AU 3. In the East Area, where AUs have not been defined, scrapers were recovered from various depths (10-cm arbitrary Levels 1, 6, 11 and 19).

Clearly, scrapers were used at the site throughout its long history of repeated occupation. However, the data, while quantitatively limited, suggest a long-term trend in which a preponderance of side scrapers gives way to a predominance of end scrapers. As shown graphically in Figure 7-27, side scrapers outnumber end scrapers in the Late Paleo-Indian/earliest Early Archaic period (KT AU 4) on the Knoll Top, and are the sole kind of scraper in KT AU 3, which is believed to represent the Middle to early Late Archaic periods. By the later part of the Late Archaic, end scrapers outnumber side scrapers by the same ratio (4:1). Only two side scrapers and no end scrapers were found in AU 1, so the data there are statistically unreliable. On the West Slope,

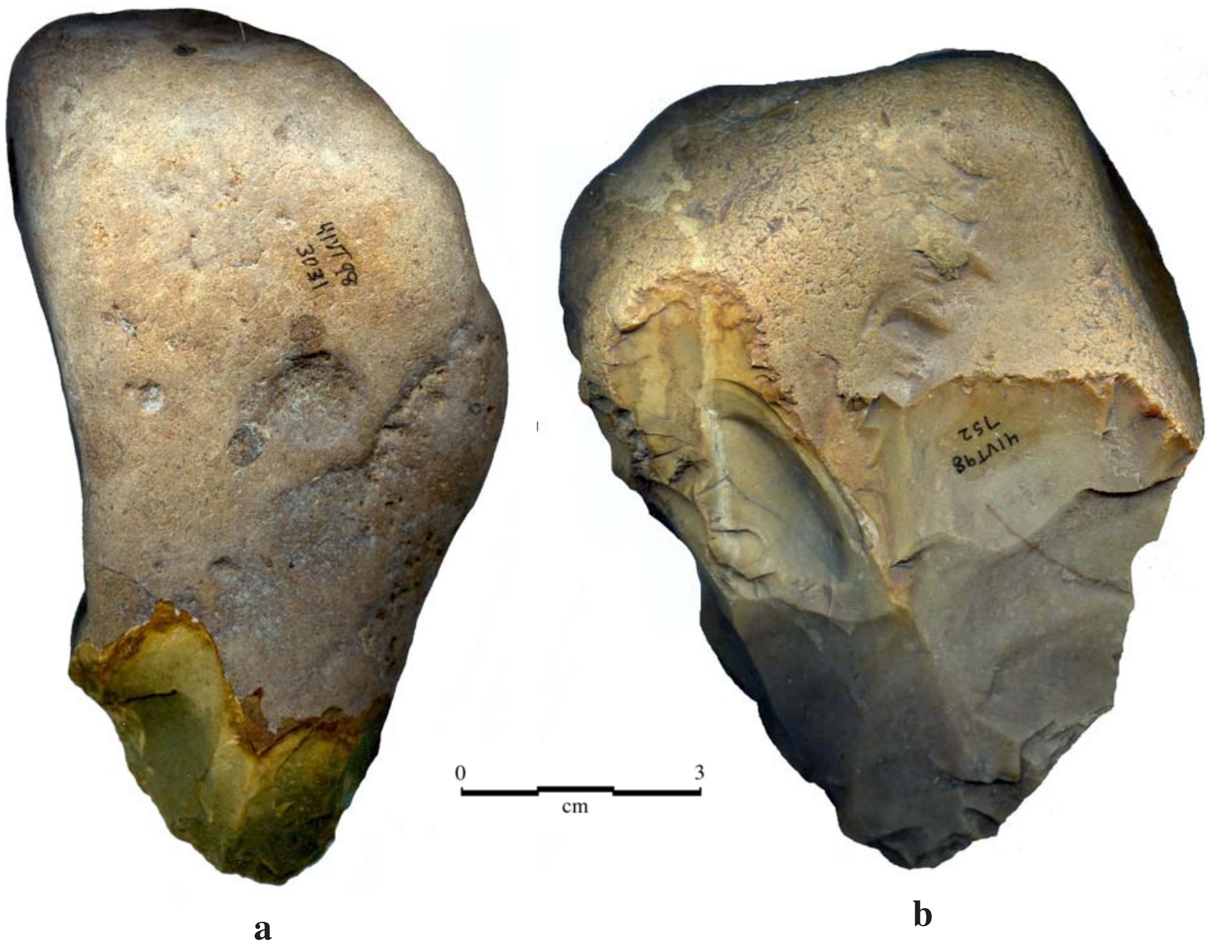


Figure 7-23. Examples of choppers from Buckeye Knoll made from water-worn cobbles: a, BHT G-2; b, West Slope AU 2. Note bifacial flaking on distal ends.

the ratio of side to end scrapers is again 4:1 in the Middle Archaic AU 3, identical to that in AU 4 on the Knoll Top.

While these figures must be considered as inconclusive, given the small sample sizes for each AU, they are suggestive of a trend to a predominance of end scrapers, a suggestion that should ultimately be tested with larger samples from other sites in the region.

Denticulates

Two unifaces, classified as denticulates, are flakes with continuous deep pressure-flake scars along one side that created a strongly serrated edge (Figure 7-28). Both are from contiguous 2-by-2-meter units (S5W11 and S4W12), one from Level 10 and the other from Level 11. The absence of such items elsewhere on the site suggests that these two specimens may have been used in a single task event at this location. In other words, they may have rested on the same buried surface, given that they came from adjacent levels in contiguous grid units. Their function is unknown, though it can be suspected that the saw-tooth pattern of the worked edges served in a saw-like cutting function.

Debitage

Lithic debitage, the residue left from the manufacture of flaked stone tools, was abundant at the Buckeye Knoll site. A total of 188,525 pieces were recovered

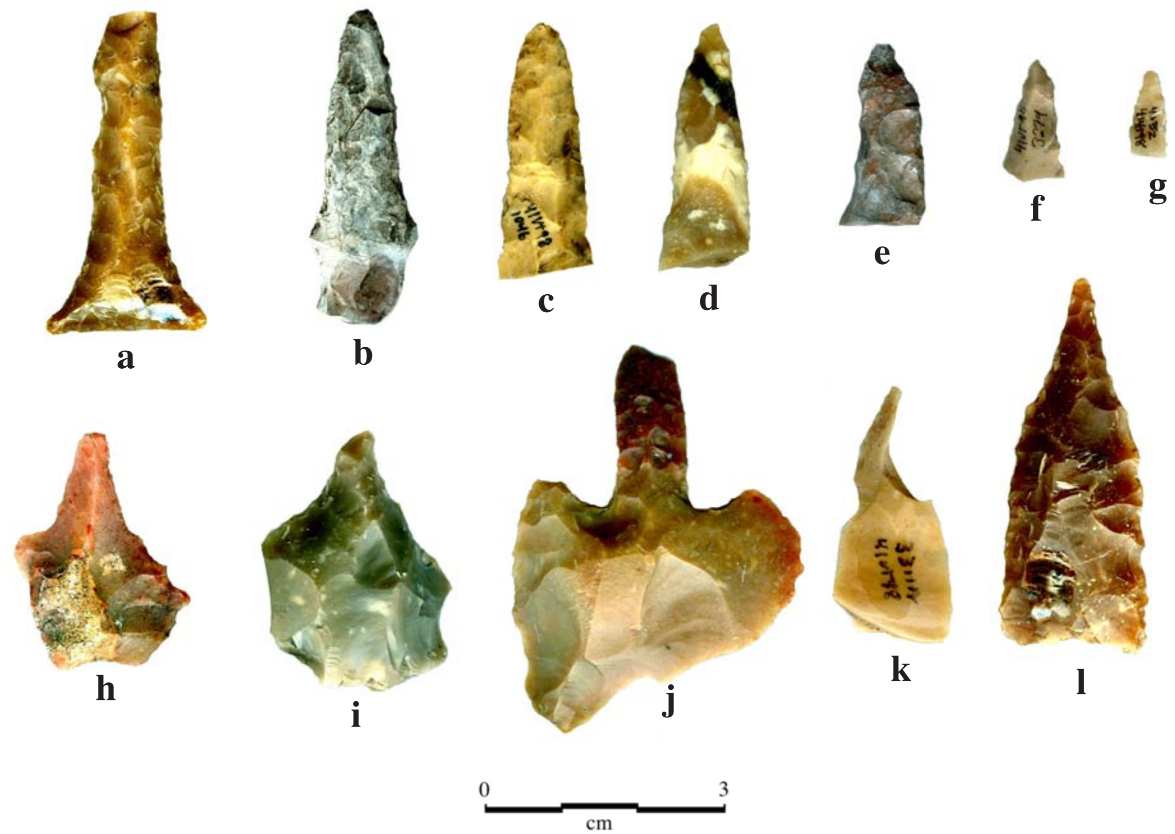


Figure 7-24. Flaked-stone drills/perforators from Buckeye Knoll: a, T-base form, Knoll Top AU 4; b, drill/perforator made from reworked dart point, Knoll Top AU 2; c, distal bit fragment, Knoll Top AU 2; d, distal bit fragment, Knoll Top AU 3; e, distal bit fragment, Unit S12W88, Level 13; f, distal bit fragment, Knoll Top AU 2; g, distal bit fragment, Knoll Top AU 2; h, expanded-base form, Knoll Top AU 1; i, expanded-base form, Knoll Top AU 4; j, expanded-base form, Knoll Top AU 3; k, expanded-base form, Knoll Top AU 1; l, drill/perforator made from reworked dart point, Unit S12W88, Level 12.

from the hand excavations at the site during 2000-01. Of these, 109,615 were recovered from the Knoll Top, 38,552 from the West Slope, and 23,644 were found in the East Area. The exact number of pieces from each analytic unit on the Knoll Top and West Slope are shown in Table 7-15, and the debitage counts per excavation level in the East Area are presented in Tables 7-16 and 7-17.

Chert is the material of the great majority (over 99 percent) of the debitage. Less than 1 percent of the debitage specimens are of hard, fine-grained quartzites—Quartzite comprises 0.1 percent of 4,846 pieces of debitage form Unit S12W82 on the Knoll Top and 0.05 percent of the debitage from Unit S29W116 on the West Slope. The common raw materials, regardless of mineralogy, were water-worn cobbles, judging by the frequency and curvatures of the cortex on many pieces. Cobbles of chert are commonly found in gravel bars within stream courses in the area. Collins (2002) reports on this phenomenon in the context of investigations at the Smith Creek Bridge site (41DW270) in nearby DeWitt County. Collins summarizes geological information on the geography of chert distributions, noting the Cretaceous limestone bedrocks of the Edwards Plateau as the primary location of cherts and secondary sources in the Willis Formation, a band of chert gravel occurrences that parallels the Gulf coast some 100 km or so inland. He also points to the availability of knappable chert cobbles in gravel bars in the generally northwest-southeast flowing streams that traverse the coastal plain in a series of subparallel courses. Hunter (2002) discusses the presence of workable chert cobbles in a gravel bar along the Guadalupe River in Victoria, Texas, only a few km upstream from Buckeye Knoll; these gravels are a likely specific source of chert for the occupants of the Buckeye Knoll site.

While Collins is careful to point out that accessibility of such gravels to prehistoric peoples would have varied through time according to cy-

Table 7-13. Metric Data on Drills or Perforators from Buckeye Knoll.

Artifact	Lot No.	Area	AU	Length	Max. Width	Max. Thickness	Remarks
Expanded Base Bifacial Drill	1656	Knoll Top	AU 3	35.5	26.4	7.3	
Expanded Base Bifacial Drill	2052	Knoll Top	AU 3	53.8	40.4	7.7	
Expanded Base Bifacial Drill	4178	Knoll Top	AU 1	32.7	24.6	4.9	
Expanded Base Bifacial Drill	3311A	Knoll Top	AU 1	35.4	16.3	3.3	
Stemmed Drill	1039	Knoll Top	AU 3	42.8	14.6	6.9	Reworked Dart Point
T-Base Drill	1212	Knoll Top	AU 4	43.4+	22.3	7.6	Incomplete
Drill	1158	Knoll Top	n/a	50.5	16.7	6.8	Reworked Dart Point
Drill (Distal Bit Fragment)	1716	Knoll Top	AU 2	33.9+	12.3+	5.0+	Incomplete
Drill (Distal Bit Fragment)	1046	Knoll Top	AU 2	34.4+	12.9+	4.3+	Incomplete
Drill (Distal Bit Fragment)	4152	Knoll Top	AU 2	11.8+	4.9+	2.2+	Incomplete
Drill (Distal Bit Fragment)	1595	Knoll Top	n/a	24.5+	12.0+	5.5 +	Incomplete
Drill (Distal Bit Fragment)	3279	Knoll Top	AU 2	16.8+	8.7+	5.3+	Incomplete

Note: All measurements are in millimeters.

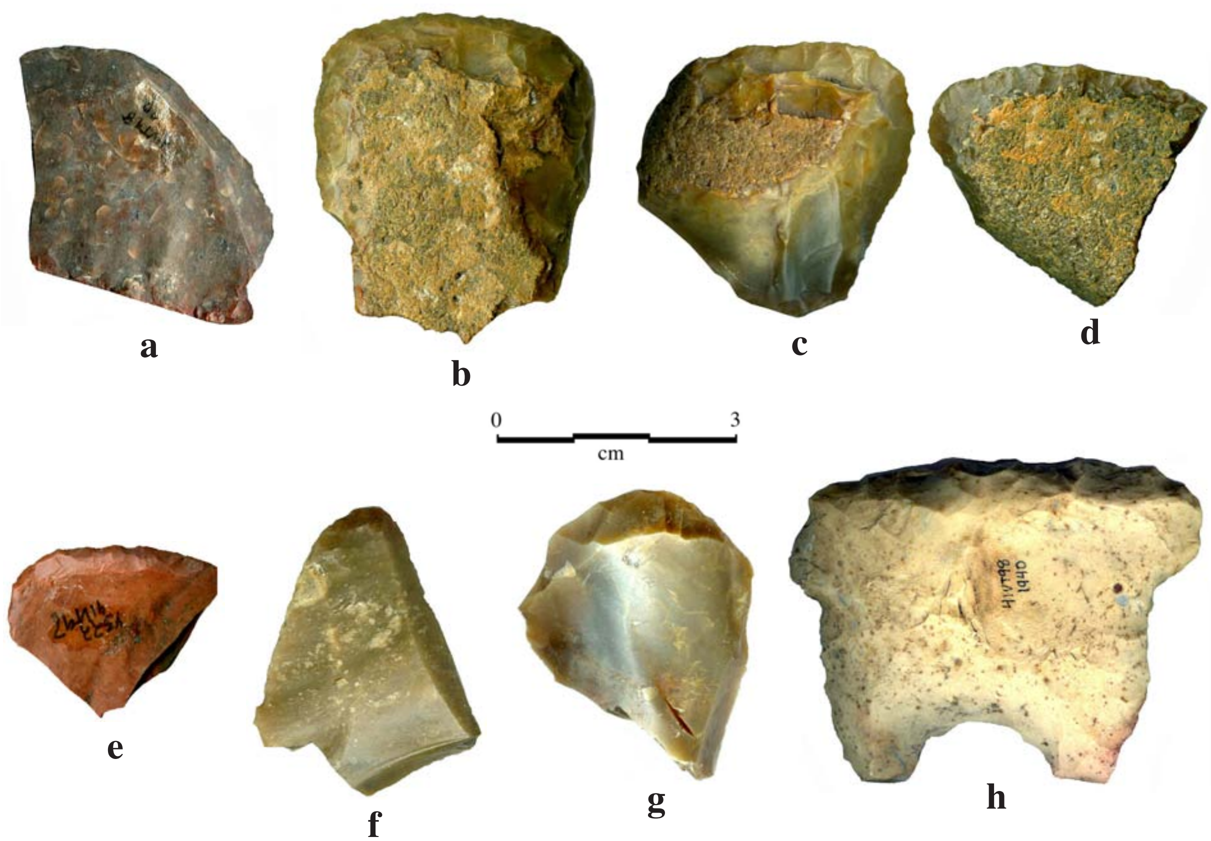


Figure 7-25. End scrapers from Buckeye Knoll: a, Unit S12W60, Level 10; b, West Slope AU 2; c, Unit S12W60, Level 11; d, Knoll Top AU 3; e, West Slope AU 3; f-g, Knoll Top AU 2; h, Unit S14W84, west wall fall.

Table 7-14. Metric Data and Bit Angles on Scrapers from Buckeye Knoll.

Artifact	Lot	Area	AU/Level	Length	Max. Width	Max. Thickness	Bit Angle
Side Scraper	3999	Knoll Top	n/a	45.0	39.7	8.9	38°
Side Scraper	4006	Knoll Top	n/a	50.1	31.9	12.3	54°
Side Scraper	1380	Knoll Top	n/a	37.6	71.0	21.5	53°
Side Scraper	2031	Knoll Top	n/a	59.5	40.4	8.3	49°
Side Scraper	3769	Knoll Top	n/a	47.2	35.5	10.1	45°
Side Scraper	1642	Knoll Top	AU 4	79.8	39.3	15.2	63°
Side Scraper	3789	Knoll Top	AU 4	42.8	24.0	7.2	48°
Side Scraper	3656	Knoll Top	AU 3	58.9	27.7	12.1	45°
Side Scraper	4202	Knoll Top	AU 1	22.8	18.5	3.3	36°
Side Scraper	4093	Knoll Top	AU 2	25.9	15.2	5.9	56°
Side Scraper	3232	Knoll Top	AU 4	25.5	33.5	13.2	67°
Side Scraper	1723	Knoll Top	AU 3	29.5	34.4	9.1	41°
Side Scraper	2188	Knoll Top	AU 4	42.7	33.5	10.1	31°
Side Scraper	750	S12W60	n/a	46.8	33.9	6.8	42°
Side Scraper	920	S12W60	n/a	34.7	32.4	10.0	43°
Side Scraper	832	S12W60	n/a	37.2	35.9	10.5	30°
Side Scraper	4322	West Slope	AU 3	29.3	22.0	2.6	46°
Side Scraper	1928	West Slope	AU 3	27.7	55.1	8.8	51°
Side Scraper	4126	West Slope	AU 3	57.6	34.8	15.5	41°
Side Scraper	4060	West Slope	AU 3	34.3	26.5	10.1	45°
Side Scraper	4349A	West Slope	AU 1	39.5	27.2	13.3	47°
Side Scraper	847	West Slope	AU 3-4	30.5	36.6	6.9	37°
Side Scraper	544	East Area	Level 6	17.8	26.8	4.2	57°
Side Scraper	4049	East Area	Level 1	41.8	35.1	6.5	48°
Side Scraper	1358	East Area	Level 19	44.5	54.9	13.6	59°
Side Scraper	556	East Area	Level 6	27.3	47.3	6.7	48°
End Scraper	4093	Knoll Top	AU 2	24.3	19.6	8.6	51°
End Scraper	1676	Knoll Top	AU 2	39.3	30.8	8.7	50°
End Scraper	1749	Knoll Top	AU 2	33.4	24.7	6.2	54°
End Scraper	1379	Knoll Top	n/a	55.5	46.6	10.8	39°
End Scraper	1768	Knoll Top	AU 4	30.1	43.1	14.2	72°
End Scraper	753	West Slope	AU 2	45.4	37.1	10.8	58°
End Scraper	3705	East Area	Level 11	51.1	33.7	12.1	61°
Hafted Scraper	1940	Knoll Top	n/a	43.0	56.7	9.8	60°

Note: Where analysis units (AUs) were not defined, the vertical provenience is given by 10-cm arbitrary levels. All measurements are in millimeters.

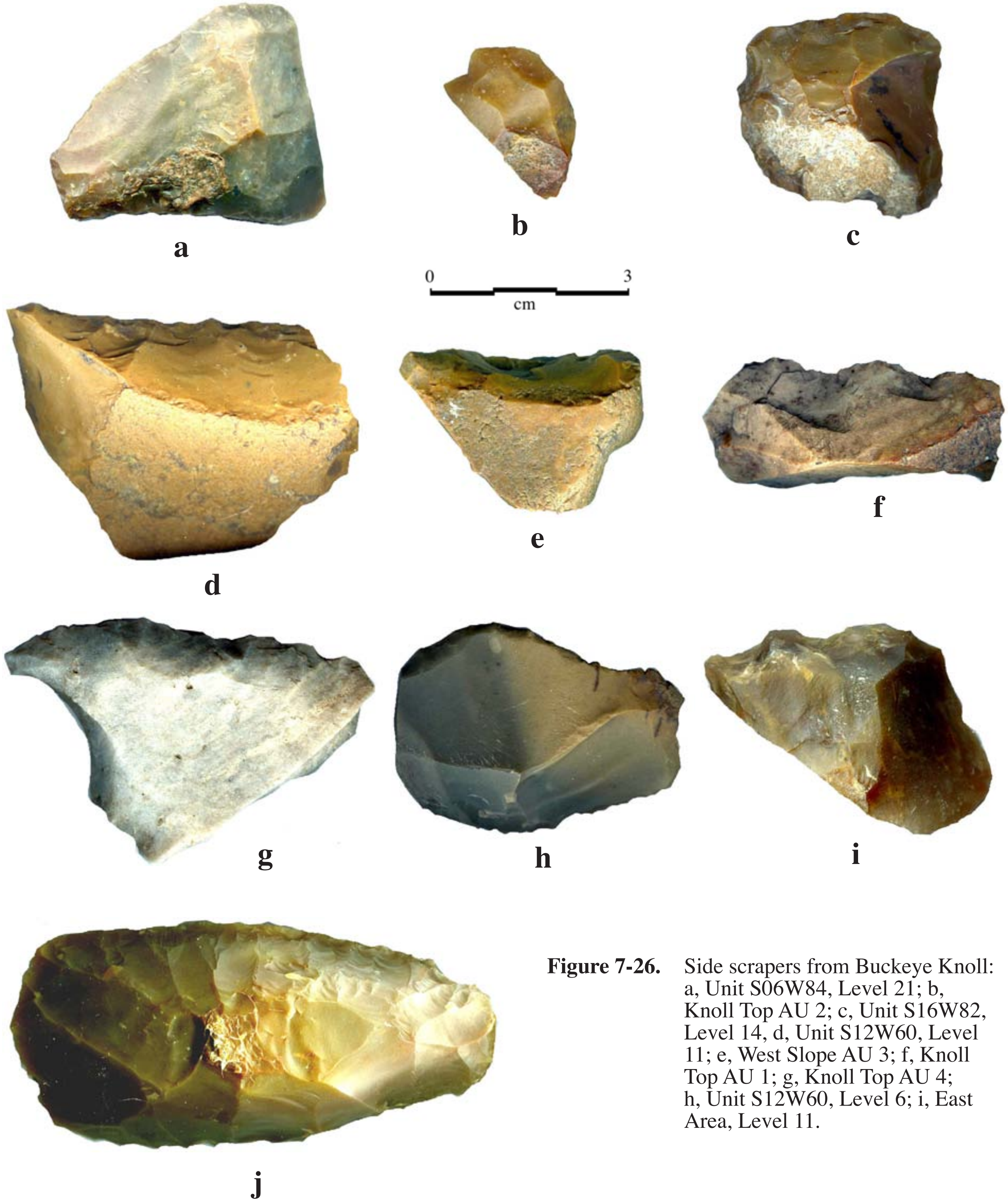


Figure 7-26. Side scrapers from Buckeye Knoll: a, Unit S06W84, Level 21; b, Knoll Top AU 2; c, Unit S16W82, Level 14, d, Unit S12W60, Level 11; e, West Slope AU 3; f, Knoll Top AU 1; g, Knoll Top AU 4; h, Unit S12W60, Level 6; i, East Area, Level 11.

cles of alluvial aggradation vs. downcutting (and corresponding exposure of gravel beds) linked to changing climatic factors, he emphasizes the important fact that chert cobbles of size and material quality for knapping were locally available, and that archaeologists need not assume that the coastal plain was devoid of useful cherts or that prehistoric knappers needed to acquire materials from as far afield as the Edwards Plateau.

The cortex on the debitage from the Buckeye Knoll site shows curvatures that represent cobbles, as opposed to the tabular cherts that occur in the Edwards Plateau limestone bedrock. While Edwards Plateau chert can occur in cobble form in its geologic source area (Collins 2002), the tabular form is not represented at Buckeye Knoll, indicating that knappable chert was procured more or less locally and not transported from central Texas. Collins makes the same suggestion for

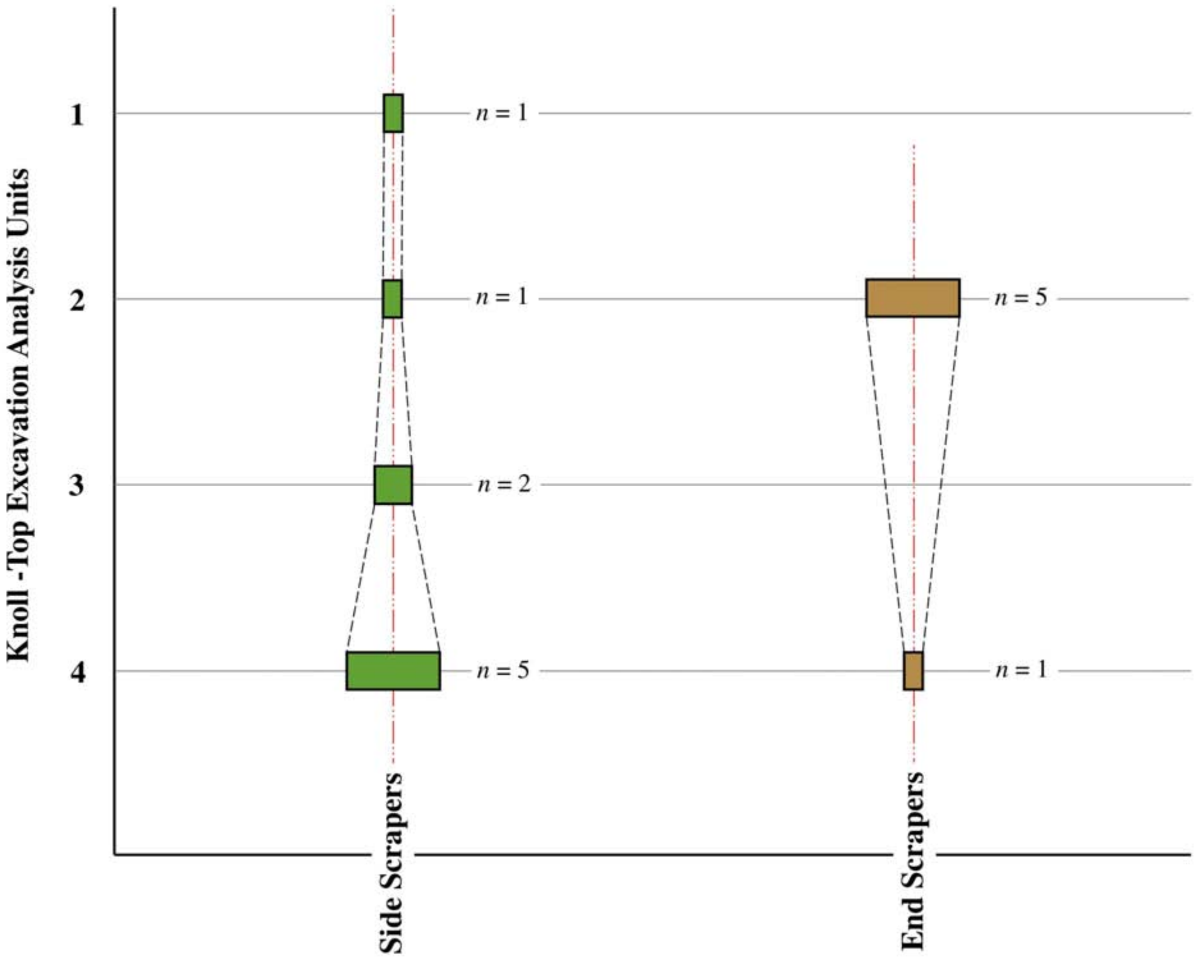


Figure 7-27. Graphic representation of the increase in end scrapers and decrease in side scrapers through time as illustrated by the analytical units in the Knoll Top Excavation.

the chert used at the Smith Creek Bridge site in De Witt County.

Inferably, then, the occupants of the Buckeye Knoll site procured chert cobbles from gravel beds found within local stream valleys. As just mentioned above, Hunter (2002) has identified a source of chert cobbles at the River Bend locality within the city limits of Victoria, Texas, some 15 km upstream from Buckeye Knoll, where stream downcutting has exposed gravels containing high-grade chert cobbles of adequate size for making the kinds of tools and projectile points found at Buckeye Knoll. Finished and unfinished chert artifacts have been found at this location on the Guadalupe floodplain (Hunter 2002; Bill Birmingham and Jimmy Bluhm, personal communications 2001), indicating its accessibility and use during prehistory. This locale is analogous to one on the Nueces River near San Patricio, Texas, where an exposed gravel bar in the river channel contains abundant chert cobbles, along with large cortex (primary) chert flakes and tested chert cobbles, indicative of prehistoric raw material procurement and initial cobble reduction (Ricklis and Cox 1993).

Collins suggests that the chert cobbles available along the coastal plain were stream-transported in the geologic past from the Edward Plateau. This certainly appears to be the case with the material from Buckeye Knoll, given that finished chipped stone artifacts from the site nearly consistently fluoresce strongly under short- and long-wave ultraviolet light, as is typical of Edwards chert (Collins 2002; Michael Collins, personal communication 2004).

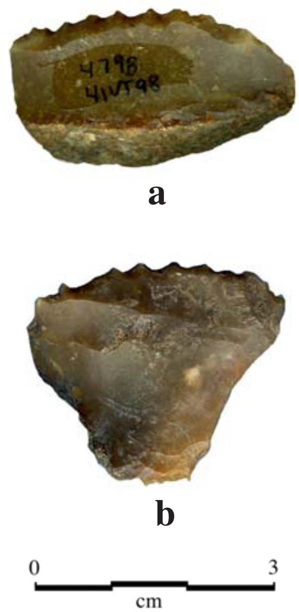


Figure 7-28. (Left) Examples of denticulates (flakes with serrated edge retouch) from Buckeye Knoll: a, East Area, Level 10; b, East Area, Level 11.

Flakes

An analysis of debitage samples from the Knoll Top and from the West Slope was undertaken in order to identify flake types and to determine the relative quantitative representation of each type. A total of 14,765 pieces of debitage were examined, 4,317 from Unit S12W82 on the Knoll Top and 10,448 from Units S29W118 and S31W118 on the West Slope. These were sorted into six categories: Primary, Secondary, Tertiary and Thinning flakes, Flake Fragments, and Chunks. Flakes consist of debitage that exhibits a definable striking platform usually with a discernible bulb of percussion, plus identifiable dorsal (exterior) and ventral (interior) surfaces.

Primary flakes have cobble cortex over 100 percent of their dorsal surfaces. Secondary flakes retain cortex on only some fraction of the dorsal surface. Tertiary flakes, also definable as “interior” flakes, show no cortex on the dorsal surface. Thinning flakes were produced by soft-hammer percussion during the late stage of biface production and are interior flakes marked by lipped platforms that represent use of the biface edge as the striking platform. Flake fragments are pieces of broken flakes in which the proximal or striking end with platform is missing. Chunks are defined as pieces of amorphous shatter, usually with an angular configuration and lacking the platforms and other attributes of flakes.

The results of the sorting are shown in Table 7-18, which lists the counts of flakes falling within each flake type by analytical units on the Knoll Top and the West Slope, and which also shows the percentage representation of each type in the total of all flakes (exclusive of flake fragments and chunks).

The data presentations in Table 7-18 and in Figure 7-29 show that the flake-type representations are closely similar in all analytical units and in both areas of the site. It can be inferred, then, that the production of chipped stone tools at Buckeye Knoll saw no fundamental changes in technique over the long time period represented. Primary flakes consistently have the smallest representation at between 3.6 and 7.2 percent of the totals, while secondary flakes comprise between about 19 percent and 28 percent and tertiary flakes are only slightly better represented at between 20 and 29 percent. Biface thinning flakes show the most abundant representation in all AUs, ranging from approximately 45 percent to 53 percent. This is in accord with the data on finished flaked-stone artifacts, which are most abundantly represented by bifacial projectile points and late-stage bifacial point preforms. In short, the data suggest that the manufacture of projectile points was the primary activity carried out by knappers working at the site, and that this emphasis was maintained throughout the long history of recurrent use of the location, from Late Paleo-Indian times, through the long-lived Archaic Stage, and into the early part of the Late Prehistoric.

Table 7-15. Counts and Weights of Bulk Materials Within the Analytical Units of the Knoll Top and West Slope Excavations at Buckeye Knoll.

Knoll Top	Non-Human Bone		Debitage	Burned Clay Nodules	
AU	no.	wt. (g)	no.	no.	wt. (g)
1	66,633	15,264	21,346	4,391	6,907
2	86,359	20,097	31,752	12,246	43,070
3	53,127	13,504	16,609	13,337	59,533
4	64,029	11,929	12,346	7,668	33,564
Other	77,026	20,680	27,562	11,688	45,888
Totals	347,174	81,474	109,615	49,330	188,962

West Slope	Non-Human Bone		Debitage	Burned Clay Nodules	
AU	no.	wt. (g)	no.	no.	wt. (g)
1	55,028	9,157	12,413	3,501	8,969
1-2	8,377	3,652	5,271	1,713	8,038
2	31,838	8,957	10,423	11,245	46,629
2-3	2,820	1,173	1,280	2,317	19,409
3	29,358	8,473	6,373	18,136	70,146
3-4	1,630	869	1,516	412	4,017
4	2,947	1,173	1,276	1,834	6,588
Totals	259,419	33,454	38,552	39,158	163,796

Cores and Modified Chert Cobbles

A total of 145 chert cores were recovered in our excavations, with 45 from the Knoll Top, 72 from the West Slope, and 22 from the combined units in the East Area. With very few exceptions, the cores are bifacially flaked and the flake scars indicate multi-directional percussion impacts. Only five specimens, all found on the Knoll Top, exhibit unidirectional flake removals; four of these (one from KT AU 3 and three from KT AU 4) are classified as blade cores, based on both the unidirectionality of relatively long and narrow flake scars and quasi-polyhedral forms. As discussed by Lohse (see section on blades, below), however, none of these specimens show the regularity in blade removals and the nearly symmetrical shape of classic blade cores.

The size of the cores, generally from 5 to 12 cm in length, as well as, in some specimens, unflaked remnants of hard, smooth cortex, indicate that all were made from small-to-medium-sized river cobbles. The material is invariably chert of colors ranging from tan trough light gray to very dark gray.

Table 7-16. Counts and Weights of Bulk Materials Within the Combined Excavation Units in the East Area at Buckeye Knoll.

Levels	Non-Human Bone		Debitage	Burned Clay Nodules	
	no.	wt. (g)	no.	no.	wt. (g)
1	103	54	469	36	161
2	476	189	1,344	301	550
3	1,141	339	1,453	599	1,059
4	1,475	504	2,499	1,060	2,366
5	1,124	402	1,606	2,212	4,224
6	1,447	452	1,798	1,259	3,577
7	1,136	375	1,563	763	1,783
8	1,514	460	1,917	1,006	1,951
9	1,899	592	2,013	975	2,300
10	2,221	645	2,295	1,102	3,656
11	1,935	542	2,303	975	2,398
12	1,309	366	2,177	1,014	2,351
13	800	314	1,495	564	1,670
14	150	159	479	226	527
15	163	49	230	119	449
16	7	7	3	124	198
Totals	16,900	5449	23,644	12,335	29,220

Note: This table includes materials from Units S04W04, S04W12, S05W3, S05W11, S05W12, S06W3, S06W04, S06W10, S06W11, S08W12, S18W18, and S20W20 in the East Area.

The use of chert cobbles is also represented by a number of otherwise unworked, split cobbles. Additionally, tested cobbles (one or two flakes removed, presumably by the prehistoric flint knappers to evaluate material quality) were found sporadically in all three excavation areas.

These various kinds of artifacts were found in various levels within the site (Tables 7-19 and 7-20), save for AU 1 in the Knoll Top Excavation. The reason for the absence of cores and other modified cobbles in that AU is not clear, though perhaps it represents a general downward translocation of these relatively heavy objects by bioturbational processes. Given that Late Prehistoric diagnostic materials (i.e., arrow points, potsherds) were largely confined to AU 1, it is clear that if the cores were so displaced, the pertinent process did not affect all materials equally.

Blades, Blade-Like Flakes, and Blade Cores (Jon C. Lohse)

Prismatic blade production defines a number of ancient stone tool technologies across the prehistoric world. These artifacts often required specialized knowledge, or at least skill, for manufacture, offered extremely sharp cutting edges useful for all manner of utilitarian and ritual tasks, and in some cases were even traded across long distances as components of complex regional economies. The presence of blades

Table 7-17. Counts and Weights of Bulk Materials Recovered from Units N06W22 and N08W32 in the East Area at Buckeye Knoll.

Levels	Non-Human Bone		Debitage	Burned Clay Nodules	
	no.	wt. (g)	no.	no.	wt. (g)
1	5	3	62	1	7
2	46	28	491	25	36
3	50	60	774	56	53
4	16	9	790	65	128
5	47	6	689	209	550
6	77	7	458	169	268
7	119	25	471	237	299
8	1	0.1	337	97	172
9	2	0.5	372	133	393
10	3	0.5	377	158	238
11	0	0	182	110	112
12	0	0	108	47	66
Totals	366	139	5,111	1,307	2,322

and associated production debris is such that it serves as one of the defining elements of some prehistoric and archaeological cultures. Clovis and pre-Columbian obsidian blade production of Mesoamerica provide perhaps the best such examples in the New World, and advances made in the study of these can be useful in illuminating studies of blades and blade production elsewhere.

Recognizing blades within a diverse lithic assemblage, however, poses something of a challenge, and not all archaeologists are in agreement as to what constitutes a "blade." Oftentimes, flakes exhibiting length-to-width ratios of over 2:1 are identified as blades on the basis of Crabtree's (1982:16) definition of "a specialized flake with parallel or sub-parallel lateral edges; the length (of which) is equal to, or more than, twice the width." Cross-sections, comprising not only width and thickness values but also dorsal morphology, are seen to vary as well and include triangular, trapezium-like, trapezoidal, prismatic, and plano-convex shapes depending on number and sequence of prior flake removals (Collins 1999:9). As examples, debitage exhibiting these qualities is offered as a possible trait of the lowland Fourche Maline archaeological culture in the Trans-Mississippi South (Schambach 1998:Table 17); this is described in some Early Archaic southeastern assemblages, such as at Tellico near the Little Tennessee River (Kimball 1996); and is reported from the Early Archaic assemblage at the Sleeper site in Blanco County, Texas (Johnson 1991). Closer to the Buckeye Knoll study area, distinctive blade technologies have been described for two prehistoric time periods, the Clovis interval of the Early Paleo-Indian (Collins 1998, 1999) and the Toyah phase of the Late Prehistoric (Black 1986; Hester and Shafer 1975). Blades are also included among Native American toolkits found in Spanish mission contexts across south Texas and northern Mexico (Hester 1989; Inman 1999; Lohse 1999; Tomka 1999; Ricklis 2000), though blade cores and associated debris are not frequently encountered.

Many blade studies, however, apply analytical focus not just on the morphology of certain debitage categories, but rather on a larger suite of behavioral or technological components represented in an assemblage. This distinction is an important one, as flakes

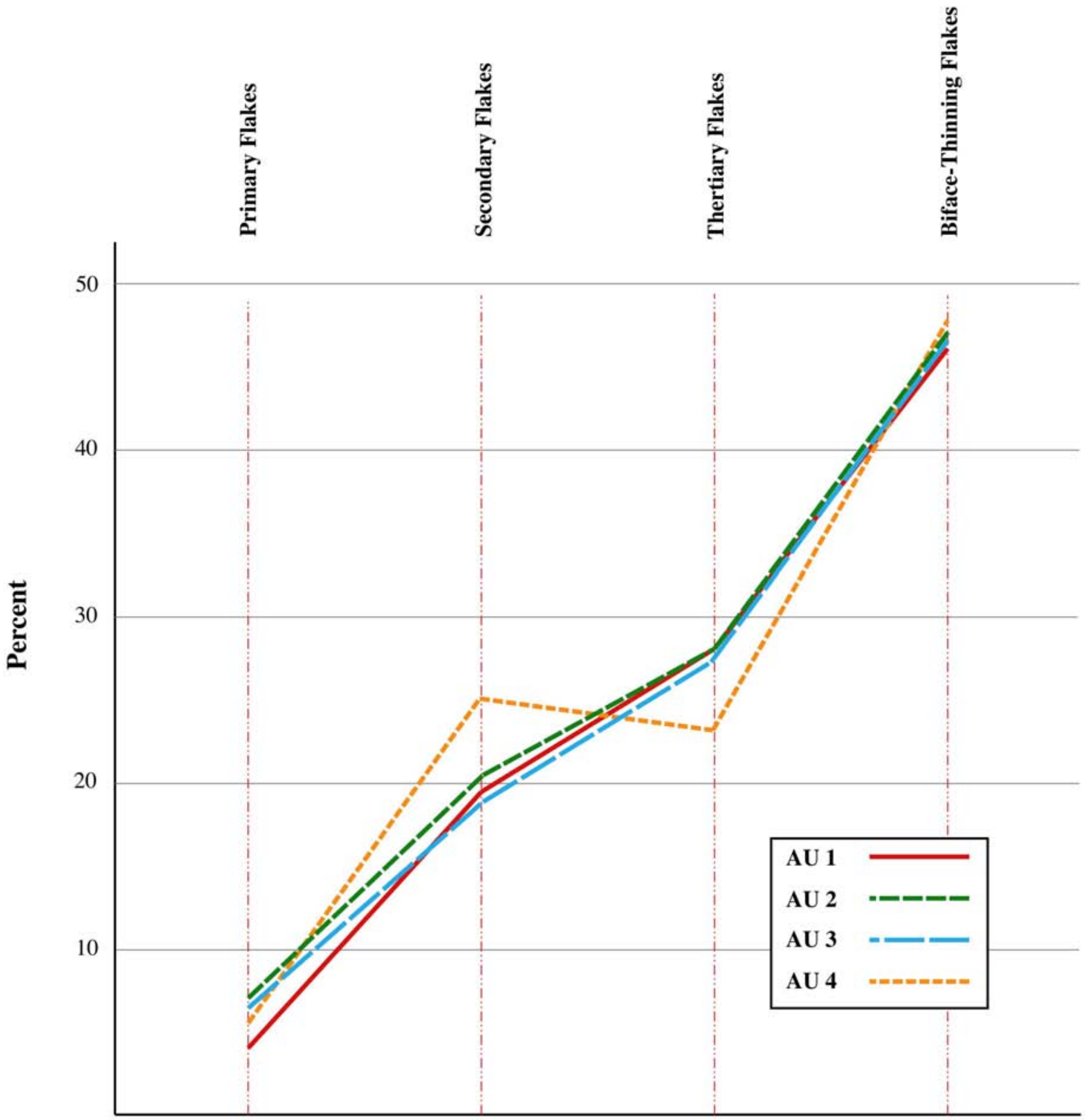


Figure 7-29. Graph showing the percentages of primary, secondary, tertiary, and biface-thinning flakes in the debitage within the analytical units of the Knoll Top Excavations. All flakes are from Unit S12W82. Note the similar percentages for all analytical units.

exhibiting length-to-width ratios of 2:1 or more can often be an unintended consequence of normal flaking and lithic reduction behaviors. For many scholars, blade technology *per se* exists only within the context of sequential production techniques that leave visible and diagnostic residues in the material record, and it has been argued that the presence of such flakes alone should not constitute a formalized blade technology (Collins 1999). Sheets (1975) made particular headway in the study of Mesoamerican obsidian blade technology by considering, at once, the prismatic blades, cores, and associated debitage found in a single workshop site. More recently, a great deal of attention has been given to reduction trajectories that have been documented for Mesoamerican prismatic blade production (Clark and Bryant 1997; Hirth 2003; Hirth and Andrews 2002), illustrating the variety of pathways that can be available for achieving similar results. Of these studies, the typology proposed by Clark and Bryant from analyses of blade and core production debris

Table 7-18. Flake Type Counts and Percentages and Debitage-to-Tool Ratios Within the Analytical Units of the Knoll Top and West Slope Excavations at Buckeye Knoll.

Knoll Top AU	Flake Types									Shatter	Total Debitage	Ratio: Debitage to Tools
	Primary		Secondary		Tertiary		Biface-Thinning		Unclassified			
	no.	%	no.	%	no.	%	no.	%	no.	no.	no.	
1	11	3.6	55	19.7	80	28.7	133	47.7	1,012	143	13,533	288:1
2	30	6.8	93	20.9	106	23.9	215	48.4	1,213	97	20,131	310:1
3	13	5.9	41	18.7	62	28.3	103	47.0	533	46	10,530	351:1
4	6	4.1	36	24.7	33	22.6	71	48.6	153	32	7,827	122:1
Totals	60	—	225	—	281	—	522	—	2,911	318	52,021	—

West Slope AU	Flake Types									Shatter	Total Debitage	Ratio: Debitage to Tools
	Primary		Secondary		Tertiary		Biface-Thinning		Unclassified			
	no.	%	no.	%	no.	%	no.	%	no.	no.	no.	
1	42	6.1	183	26.7	148	21.6	313	45.6	2,348	243	7,870	342:1
2	46	5.2	206	23.5	180	20.5	446	50.8	2,767	291	6,608	154:1
3	51	7.2	157	22.3	120	17.0	377	53.5	2,168	238	4,040	144:1
Totals	139	—	546	—	448	—	1,136	—	7,283	772	18,518	—

Note: The sample of debitage listed in this table is greater than 1/4 inch in maximum dimension.

Table 7-19. Modified Chert Cobbles and Cores Within the Analytical Units of the Knoll Top and West Slope Excavations at Buckeye Knoll.

Artifact Type	Tested Cobbles	Split Cobbles	Multidirectional Cores	Unidirectional Cores	Blade Cores
Knoll Top AU					
1	—	—	—	—	—
2	1	12	10	—	—
3	3	12	16	—	1
4	4	34	20	—	3
Totals	7	58	46	0	4
West Slope AU					
1	—	—	3	—	—
2	—	—	9	—	—
3	—	—	19	—	—
4	—	—	5	—	—
Other	—	—	36	1	—
Totals	0	0	72	1	0

Table 7-20. Modified Chert Cobbles and Cores Recovered from the Knoll Top Excavations at Buckeye Knoll by 10-cm Levels.

Artifact Type	Tested Cobbles	Split Cobbles	Multidirectional Cores	Unidirectional Cores	Blade Cores
Knoll Top Level					
1	—	—	1	—	—
2	—	—	—	—	—
3	—	—	—	—	—
4	—	—	2	—	—
5	—	—	3	—	—
6	—	1	2	—	—
7	—	—	1	—	—
8	—	—	—	—	—
9	—	—	4	—	—
10	—	—	—	—	—
11	—	—	1	—	—
12	—	—	4	—	—
13	1	—	1	—	—
14	—	—	3	—	—
Totals	1	0	22	0	0

holds particular promise for future studies, as it defines a series of steps undertaken in the processes of core preparation through sequential removal of regular and nearly uniform blades. Early stages involve removing coarse flakes with irregular dorsal morphologies (non- or sub-parallel arises) for the purpose of straightening ridges and preparing platforms; these can be distinguished from later-stage blades, which generally have more nearly parallel arises. The significance of this technological typology lies in its ability to distinguish different types of blades that pertain to different stages of core reduction. Applying this typology elsewhere, researchers (e.g., Trachman 2002) are able to identify primary production debris at areas far removed from source material outcrops.

Similarly, the study of Clovis blade technology (Green 1963; Hammat 1970) has benefited from combined analysis of prismatic blades together with available cores and other debris related to the preparation, reduction, and rejuvenation of those cores through the processes of blade removal. In examining blade cores from Clovis contexts at the Gault Site in central Texas, for example, researchers (Collins 1999; Collins and Lohse 2004) have identified not only both cone- and wedge-shaped cores, but have also recognized that flexible Clovis knappers intentionally produced blades of varying sizes from the same cores. Additionally, wedge-shaped cores, which outnumber cone-shaped specimens by as much as 10:1, exhibit bifacial flaking in their initial preparation from tabular cobbles. This fact suggests that the production of bifaces and blade cores was not perceived as completely independent from one another, and that there was some overlap between these two reduction trajectories. Analyses such as these, of both Mesoamerican and Clovis blades and cores, follow the tradition established by François Bordes and his colleagues (Bordes 1967; Bordes and Crabtree 1969, cited in Collins 1999) that places emphasis not only on the morphology of blades as a specialized category of debitage, but on the processes involved in the production of blades (see discussion in Collins 1999:7).

In spite of these advances, or perhaps in light of them, important questions persist regarding the organization of lithic technologies that appear to display blade materials, though without clear evidence of formalized core production and rejuvenation. Something of a continuum is to be found between flakes that exhibit appropriate length-to-width ratios and true blades; the technological typology of Clark and Bryant (1997) contends with this variability by defining different kinds of blades (termed first, second, and third series blades) that reflect increasingly uniform lateral proportions and parallel dorsal ridges. Given the documented ability of prehistoric stone tool makers to achieve similar outcomes through multiple (and perhaps simultaneous) knapping strategies, it seems reasonable to consider whether the presence of formalized blade cores was always necessary for the production of blades. One of the critical questions to be asked of assemblages exhibiting relatively undifferentiated blade-like materials involves the purpose of the prehistoric knappers: Did they (a) intend to produce long, parallel-sided flakes as elements of a diverse toolkit or (b) are these artifacts merely a by-product of stone reduction? If this question can be resolved in the affirmative as regards (b), archaeologists are faced with the added challenge of understanding how lithic-reduction systems were organized to the point that blade production was carried on without the preparation of formalized cores or distinctive stages of core reduction or rejuvenation.

The current analysis, which is limited to the lithic-material sample recovered from the Knoll Top Excavations, addresses some of these issues in examining the nature and possible origins of blades at Buckeye Knoll. A preliminary sorting of all debitage was carried out to categorize flakes exhibiting length-to-width ratios of 2:1 or greater, or fragments that showed a well-defined triangular or trapezoidal cross section. A second sorting was then conducted of the artifacts originally identified as possible blades, applying conservative criteria to more accurately distinguish blades from long, narrow flakes. These criteria were that (1) the longitudinal orientation of the flake must be parallel with the direction of force, that is, that the platform be at a right angle to the flake's longest axis; and (2) that the dorsal surface of interior flakes reveal evidence of parallel or nearly parallel prior flake removals. Flakes with dorsal surfaces indicating multidirectional, prior flake removals were identified as bifacial thinning flakes and were returned to the general debitage inventory. The resulting sample of blades is described below. Cores recovered from the same Knoll Top Excavation units were also examined for evidence of blade removal.

The question of intentionality, discussed above, is addressed by (1) comparing the frequency of blade use or retouch in relation to the entire debitage sample from the Knoll Top Excavations to determine whether blades that were produced were being used at a higher frequency than reported for other categories of debitage, and (2) examining the nature of dorsal flake scars to identify the intensity of patterned flake removal along parallel axes that might indicate deliberate production of blades. The second line of inquiry is informed by the Clark and Blake (1997) study, and follows the assumption that patterned blade removal will result in a relatively high frequency of parallel or nearly parallel dorsal ridges, evident in strongly triangular or trapezoidal cross-sections. Longitudinal curvature, a characteristic of many Clovis blades, was not measured, though specimens in the collection range from straight to moderately curved. Variables that were recorded include maximum width, length, and thickness; platform angles; and the presence of cortex, platform grinding, and macroscopic evidence of use. Additionally, intact platforms were measured according to width and depth.

In general terms, blade material from Buckeye Knoll (Figure 7-30) is small, with lengths of complete specimens ranging between 68.93 mm and 14.17 mm. Given the overall small size of the assemblage, no distinctions are made here between small or micro-blades and other size categories. Many blades appear to have been struck from small-to-medium-sized gravels, and it is likely that the available form of suitable raw materials provided one of the strongest constraints to blade production for ancient inhabitants of the Buckeye Knoll site. The collection of blades that remains following the initial and second, more conservative sort, is small in proportion to the overall debitage inventory from the Knoll Top (Table 7-21); this is probably one of the most important observations that can be made with respect to the question of how prehistoric blade production was organized at 41VT98.

Figure 7-30. Selected blades and blade fragments from the Knoll Top Excavations at Buckeye Knoll by analytical unit.

Table 7-21. Blades, Blade Traits, and Debitage-to-Blade Ratios Within the Analytical Units of the Knoll Top Excavations at Buckeye Knoll.

Knoll Top AU	Blades								Total Debitage	Ratio: Debitage to Blades
	Total	Complete	Ground Platforms		Use Wear		Cortex			
	no.	no.	no.	%	no.	%	no.	%	no.	
1	31	8	1	3.23	3	9.68	2	6.45	21,346	689:1
2	46	11	4	8.70	15	32.61	13	28.26	31,752	690:1
3	19	6	2	10.53	6	31.58	5	26.32	15,609	822:1
4	47	16	2	4.26	13	27.66	21	44.68	12,346	263:1
Totals	143	41	9	6.29	37	25.87	41	28.67	81,053	567:1

Metric data for complete specimens (Figure 7-31) indicate that, in very general terms, blades appear to have increased in size from KT AU 4 to KT AU 3, where they reached maximum, and then decreased through later components of the site. Blade platforms, predictably, follow the same general trend evidenced in total blade size, in that they become smaller in both width and depth dimensions through time (Figure 7-32). However, platforms on average are largest or most robust in KT AU 4; it is suspected that this trend corresponds with the larger average size of blades in lower, earlier components (KT AU 3 and KT AU 4) and that the reversal in blade size between KT AU 3 and KT AU 4 could be a matter of the small sample size from KT AU 3.

Platform angles were measured to determine if this attribute varied significantly through time (Figure 7-33). Procedures for measuring platform angles followed those described in Collins (1999:86). This measurement is known to be somewhat imprecise because of the small size of many of the blades' platforms, and was taken in five-degree increments. Platform angles describe the angle between the plane of the platform and the blade's longitudinal axis as expressed on the interior surface near the proximal end of the artifact. Not all complete blades and proximal fragments had measurable platforms; many were crushed from hard-hammer percussion to the point that, even while width and depth data could be recorded, the platform plane could not. Measured angles range fairly evenly from 90 to 150 degrees. None of data for any analytical unit appears to be strongly patterned, though AU 2 seems to reflect a bimodal distribution.

For the present analysis, blade cores are defined as cores bearing one or more long flake-scars that indicate removal of one or more blades. The total includes a small proportion of cores that are classified as polyhedral blade cores (*n*=2), but is not restricted to this category. Blade removal scars were observed on a total of 18 cores. These cores include four with unidirectional flake removal, including two polyhedral cores, and 14 cores with multidirectional flake scar removals, mostly bifacially flake cores. The fact that blade removals are evidenced on various kinds of cores and are not found mainly on formal polyhedral "classic" blade cores, in itself suggests that blade production at Buckeye Knoll was occasional and was embedded within a more general range of lithic-reduction activities. Nonetheless, we believe that blade production was an intentional activity and that is was not merely an accidental by-product of more common modes of flint knapping (such as, for example, biface reduction). This inference was based on the formal morphological characteristics of the blades themselves, which include straight, parallel arises on dorsal surfaces indicative of successive blade removals from the same core as is typical in blade-core reduction strategies.

The relatively small number of blades, compared to general debitage, as well as correspondingly small number of blade cores to all cores, indicates that blade production was of only minor significance in the total repertoire of lithic knapping activities at the site. As may be seen in the quantitative data presented previously in Table 7-21 (and Figure 7-34, which shows the ratios of all debitage to blades), this was true for all four of the Knoll Top analytical units, though the numbers suggest that blade production was of greater relative importance in the Late Paleo-Indian period (KT AU 4), and lessened thereafter (e.g., the ratio of all debitage to blades in KT AU 4 was the lowest, at 262:1, and increased markedly to 821:1 in KT AU 3, then dropped slightly in KT AUs 2 and 1 to 690:1 and 695:1, respectively.

In sum, the evidence from Buckeye Knoll suggests the lack of any highly formalized blade-core industry during the long span of the occupations from Late Paleo-Indian time through the Archaic and into the early part of the Late Prehistoric Period. This is congruent with the fact that the two periods in regional prehistory that have been identified as having been marked by formal blade-core industries—Early (Clovis) Paleo-Indian (e.g., Collins 1999) and final Late Prehistoric (Toyah and Rockport phases; Hester and Shafer 1974; Hunter 2002; Johnson 1994; Ricklis 1994b;) and into historic Colonial times (e.g. Ricklis 2000)—are not represented, or are very sparsely represented, in the Knoll Top Excavations.

These findings suggest that the formal production of blades struck from typical polyhedral cores (of Clovis times) had waned by Late Paleo-Indian times. However, less-formalized blade production remained more significant than during the subsequent Archaic. Nonetheless, aboriginal people continued to produce a limited number of mostly small blades in the context of general flint knapping, presumably with the intended goal of efficiently producing long and narrow scraping and cutting tools on an expediential basis.

Ground Stone

Ground stone artifacts comprise a small fraction of the lithic artifacts from Buckeye Knoll. They include milling stone fragments, manos and mano frag-

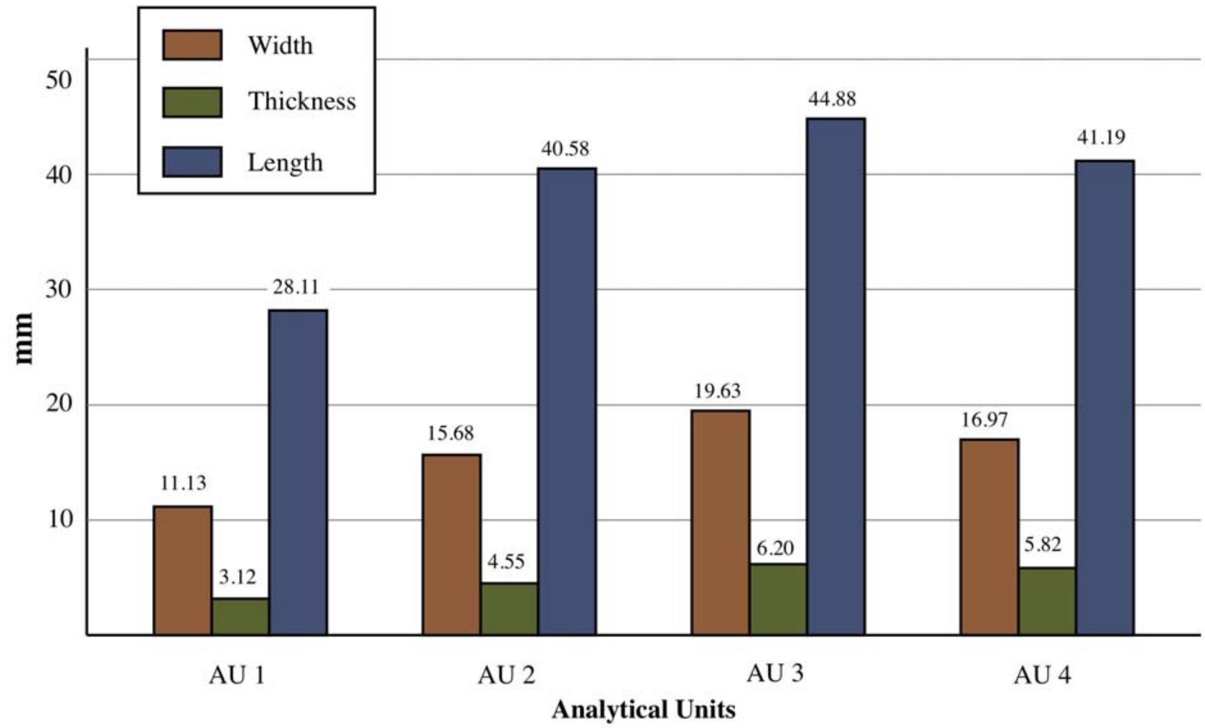


Figure 7-31. Average dimensions (in mm) for all complete blade specimens from the Knoll Top Excavations at Buckeye Knoll.

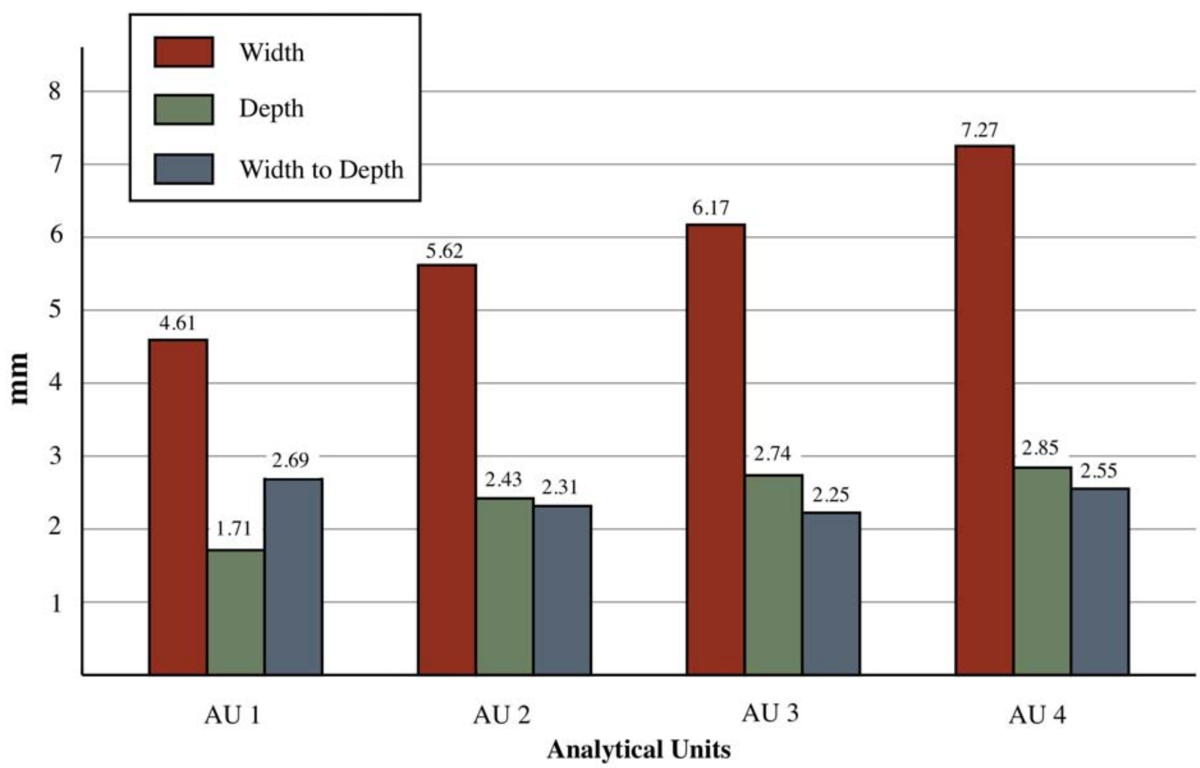


Figure 7-32. Average blade platform dimensions (in mm) in the Knoll Top Excavation analytical units at Buckeye Knoll.

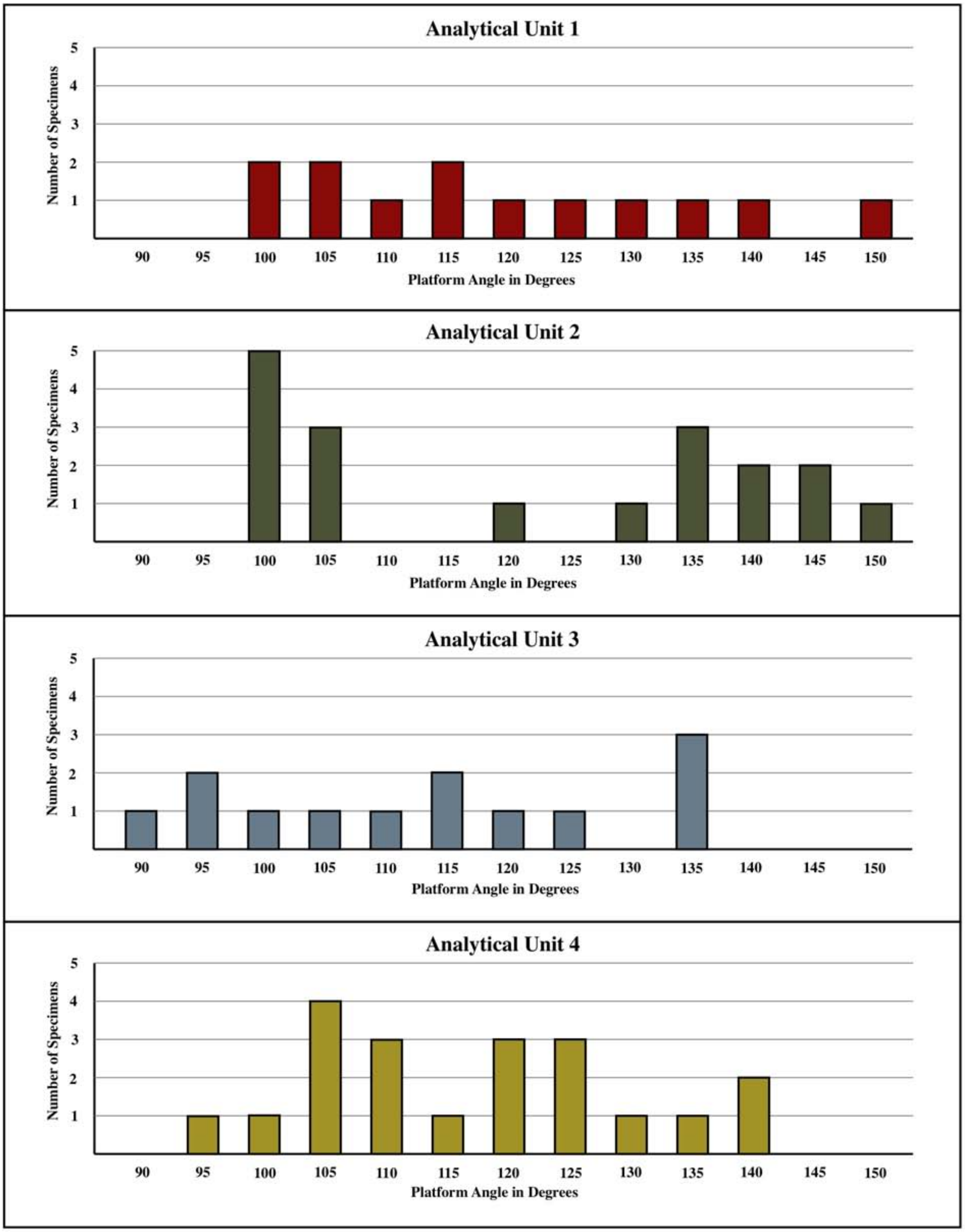


Figure 7-33. Recorded angles for measurable blade platforms in the Knoll Top Excavation analytical units at Buckeye Knoll.

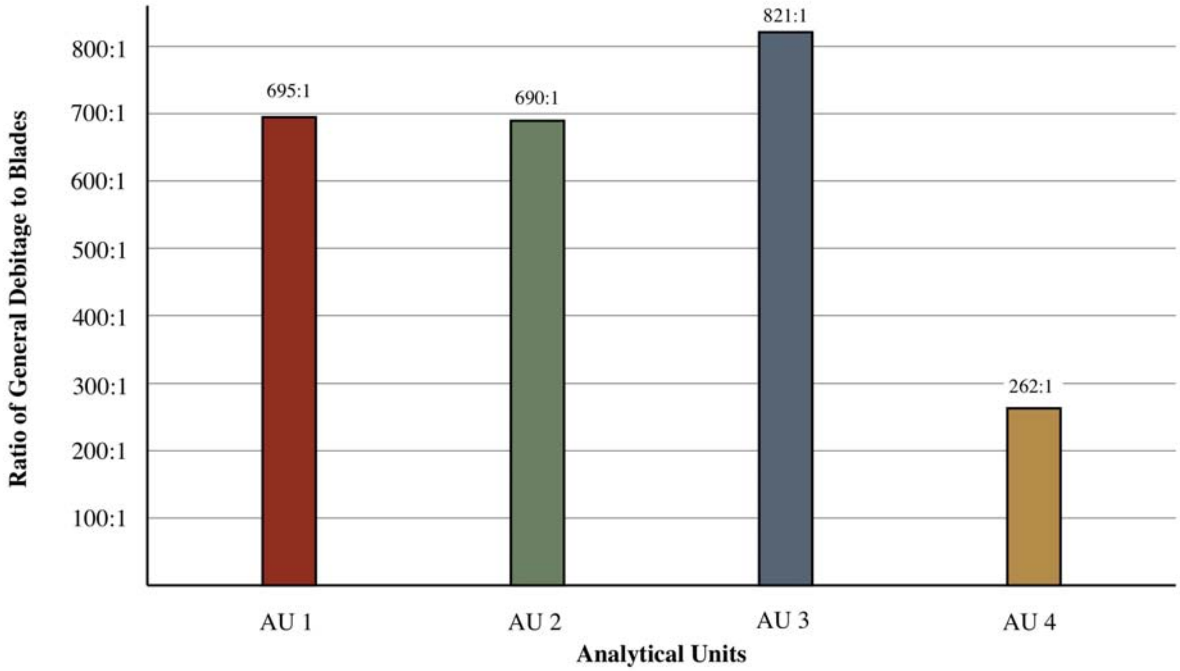


Figure 7-34. Ratios of all non-blade (general) debitage to blades in the Knoll Top Excavation analytical units at Buckeye Knoll.

ments, abraders, two fragments of tubular sandstone pipes, and two fragments of grooved stone. Most of the ground stone artifacts from midden deposits (i.e., non-mortuary contexts) are made of sandstone or course-grained quartzite.

Milling Stones and Manos

A total of nine milling stone fragments were recovered, six from the Knoll Top Excavation and three from the West Slope. A representative sampling of these items is shown in Figure 7-35, a-d[1]. All are made from medium- to coarse-grained, gray or tan-colored sandstone or, in the case of some manos, from quartzite. In all cases, one face of the artifact has been smoothed by repetitive grinding, with the result that the face is gently concave and smooth, being part of a basin-shaped depression created by what was probably a more or less rotary motion of a hand-held grinding stone or mano. The shallow, basin-like configurations are clear in the cross sections of each specimen, as may be seen in the artifact profiles shown in Figure 7-35, a-d[1]. Thus, these specimens would appear to be parts of complete milling stones that were made on slabs of sandstone as found at other Archaic and Late Prehistoric sites in southern Texas (e.g., Hester 1980b:115; Taylor and Highley 1995; Turner and Hester 1999:301).

In the Knoll Top Excavations, all AUs produced milling stone fragments, except for KT AU 4, the Late Paleo-Indian component. Thus, it can be concluded, with the general caveat that some artifacts were resting in vertically displaced contexts, that milling stones were used during the Archaic and Late Prehistoric occupations of the site, but not during the Paleo-Indian occupations. Presumably they were use to grind plant foods, an assumption supported by residue analyses that found pollen and starch remains of seeds and starches (from roots and/or tubers) on milling stones from the site (see report by Puseman and Cummings, Appendix C). On the West Slope, milling stone fragments were recovered from Middle to Late Archaic contexts in WS AUs 2 and 3.

Manos from Buckeye Knoll are represented only by fragmentary specimens. All five specimens consist of sandstone or coarse-grained quartzite, fist-size cobbles that exhibit distinct smoothing on one face that was probably caused by repetitive grinding against milling stones. All recovered specimens are shown in Figure 7-35, e-i.

Abraders

Abraders (see Figure 7-35, j-m) are thin slabs, mostly of sandstone, on which at least one face was

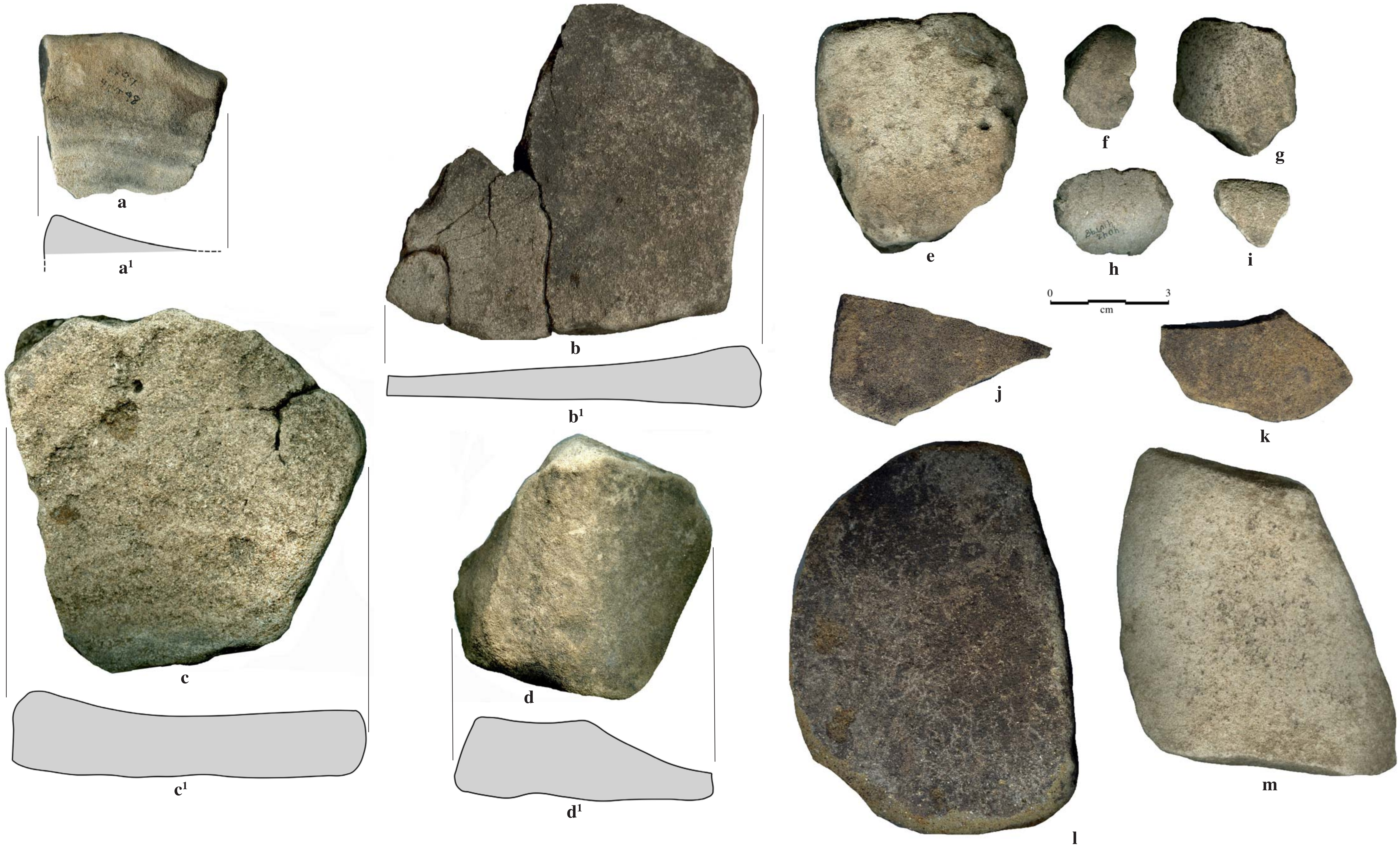


Figure 7-35. Various ground sandstone artifacts from Buckeye Knoll: a-a[1], milling stone fragment, West Slope AU 2; b-d[1], milling stone fragments, Knoll Top, Zone 2; e, whole mano, Unit S12W99, Level 18; f, mano fragment, Knoll Top AU 1; g, mano fragment, West Slope AU 2; h-i, mano fragments West Slope AU 3; j, abrader, Unit S12W90, Level 13; k, abrader, Knoll Top AU 2; l, abrader, West Slope AU 2; m, abrader, S12W90, Level 15.

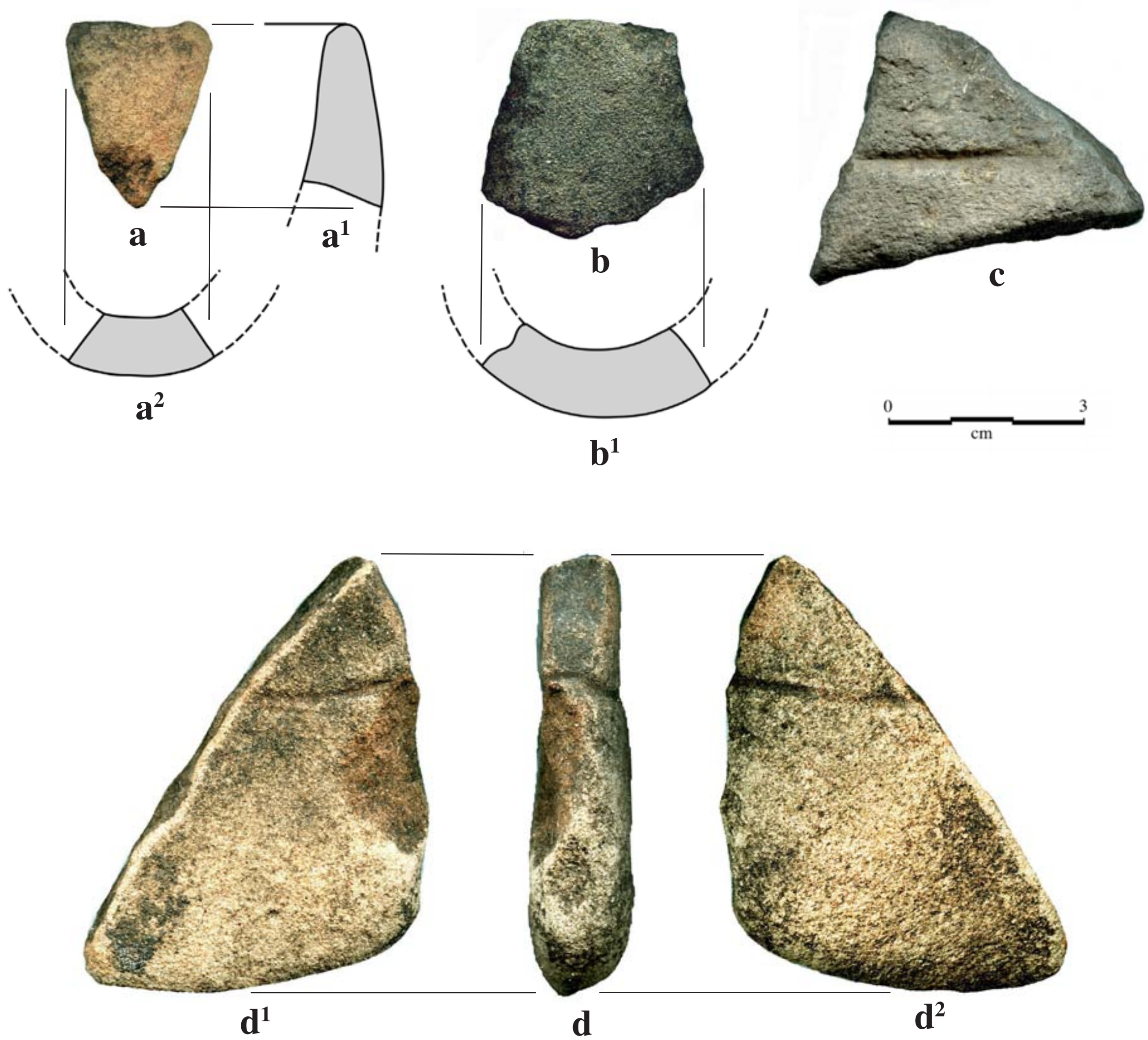


Figure 7-36. Additional ground sandstone and siltstone artifacts from Buckeye Knoll: a-a², tubular sandstone pipe rim fragment, Knoll Top AU 4 (presumably displaced from the overlying Archaic deposits); b-b¹, tubular sandstone pipe cylindrical body fragment, Knoll Top AU 2; c, groved tabular siltstone, Knoll Top AU 4; d-d², grooved tabular sandstone, Knoll Top AU 2.

ground smooth. They are here distinguished from milling stone fragments on the basis of the smoothed surface being flat or slightly convex, as opposed to concave or basin-shaped. The specific tasks for which these artifacts were used are undefinable, but might include smoothing of wood or bone in tool production, or for edge smoothing of bifaces during their manufacture (though the latter activity should have produced striations or grooves [c.f., Turner and Hester 1999:287, 290] rather than the evenly smoothed surfaces seen on most of the Buckeye Knoll specimens). One specimen, made of siltstone (Figure 7-36, c), does exhibit a v-shaped groove on one face, and this may have been used for biface edge-smoothing. Abraders were found on the Knoll Top (in AUs 1, 2, and 4) and on the West Slope (in AUs 1-2 and 2). These artifacts have no known restricted temporal range.

Tubular Pipes

Two pieces of worked, fairly soft sandstone are classified as fragments of tubular sandstone pipes (see Figure 7-36, a-b¹). This artifact form is found widely in southern Texas in Archaic contexts (Hester 1980b:115).

A number of such items were found with burials in the Late Archaic cemetery at the Loma Sandia site in Live Oak County, dated to ca. 800-600 B.C. Similar specimens have been reported from Late Archaic cemetery contexts on the middle and lower Texas coasts.

Both specimens from Buckeye Knoll are small fragments. One (see Figure 7-36, a-a[2])is a rim fragment found in KT AU 4 on the Knoll Top, in which the thickness tapers to a narrow, rounded lip. This piece was probably downwardly displaced from overlying Archaic strata. The other (see Figure 7-37, b-b[1]), from KT AU 2 on the Knoll Top, is a fragment of the main body of the tube. It is 10 mm in maximum thickness with a concave interior surface and convexly curving exterior surface.

Grooved Stones

One small piece of tabular sandstone shows v-shaped grooves on its two faces and another groove across one edge (see Figure 7-36, d-d[2]). The two grooves on the faces meet/connect with the one along the edge, suggesting that they are not the result of abrading, which would presumably not allow the required degree of control of groove orientations. Perhaps the grooves were made as the first step in the "groove-and-snap" technique to break the piece in a controlled fashion. A second specimen is a piece of tabular siltstone that bears a groove, v-shaped in cross section, on one face. As mentioned above, this may have served to abrade the edges of bifaces during the thinning process.

Rough Stone

Hammerstones

Seventeen hammerstones were recovered during the excavations. All are fist-size or smaller, water-worn hard quartzite or chert cobbles with peck marks on one or both ends or along edges of the cobble, the result of repeated hitting against other rocks (Figure 7-37). Inferably, the hammerstones were used in early-stage flint knapping to test chert cobbles and/or to begin the common process of bifacial reduction. Hammerstones were found in all excavation areas and do not show a discernible vertical clustering. Their distributions by AUs can be seen in Tables 7-9 and 7-10.

Asphaltum-Heating Stone

This item is a thin piece of tabular sandstone, measuring 104 by 85 by 16 mm. One face (Figure 7-38), which is slightly concave, is coated with black asphaltum that retains the impressions of air bubbles, as though this material was molten on the stone and them cooled. Thus, it is inferred that this slab of sandstone was used to melt asphatlum. Presumably, asphaltum, frequently used in a variety of ways (e.g., as a hafting mastic or as a sealant on basketry), was placed on the hot stone to be melted. The sandstone shows no artificial modification such as would be created by pecking or grinding.

Bone

A diverse bone artifact assemblage is represented at Buckeye Knoll. A total of 120 artifacts of modified bone were recovered, all from the Knoll Top and West Slope excavations (Tables 7-22 to 7-23). All AUs in both areas produced bone artifacts, as shown in Tables 7-22 to 7-23), though those from KT AU 4 on the Knoll Top were probably downwardly displaced by bioturbation, judging by the absence of faunal bone dating to Late Paleo-Indian or earliest Archaic times in that AU. Thus the bone artifact assemblage from the site can be assumed to represent Middle and Late Archaic and Late Prehistoric activity and technology, and does not pertain to either the Late Paleo-Indian or Early Archaic periods of occupation. This interpretation is preferred because faunal bone recovered from AU 4 produced Middle Archaic (4570-4410 B.P.) and Late Archaic (2340-2130 B.P.) calibrated age ranges, suggesting that bone from the Paleo-Indian period is not preserved and that the faunal bone that was present represents downward translocation. Thus, as noted previously, the AUs must not be considered to represent "pure" assemblages of the time periods to which they are assigned, but rather only approximations that contain a fair amount of "noise" in terms of their constituent artifacts.

Awls

Seventy-six bone awls and awl fragments were found (Figure 7-39). Only four specimens are whole, while distal, medial and proximal fragments number 34, 6 and 32, respectively. Based on observable attributes of bone density and thickness, and in more complete specimens, the shapes of artricular bone condyles, these all appear to have been made from splinters of deer longbone, mainly if not exclusively, metapodials. These bones were probably preferred due to their straightness and thick, dense cortex.

Engraved Pins

Twenty fragments of engraved bone pins were found in the Knoll Top and West Slope excavations combined. These items are made from thick, corti-

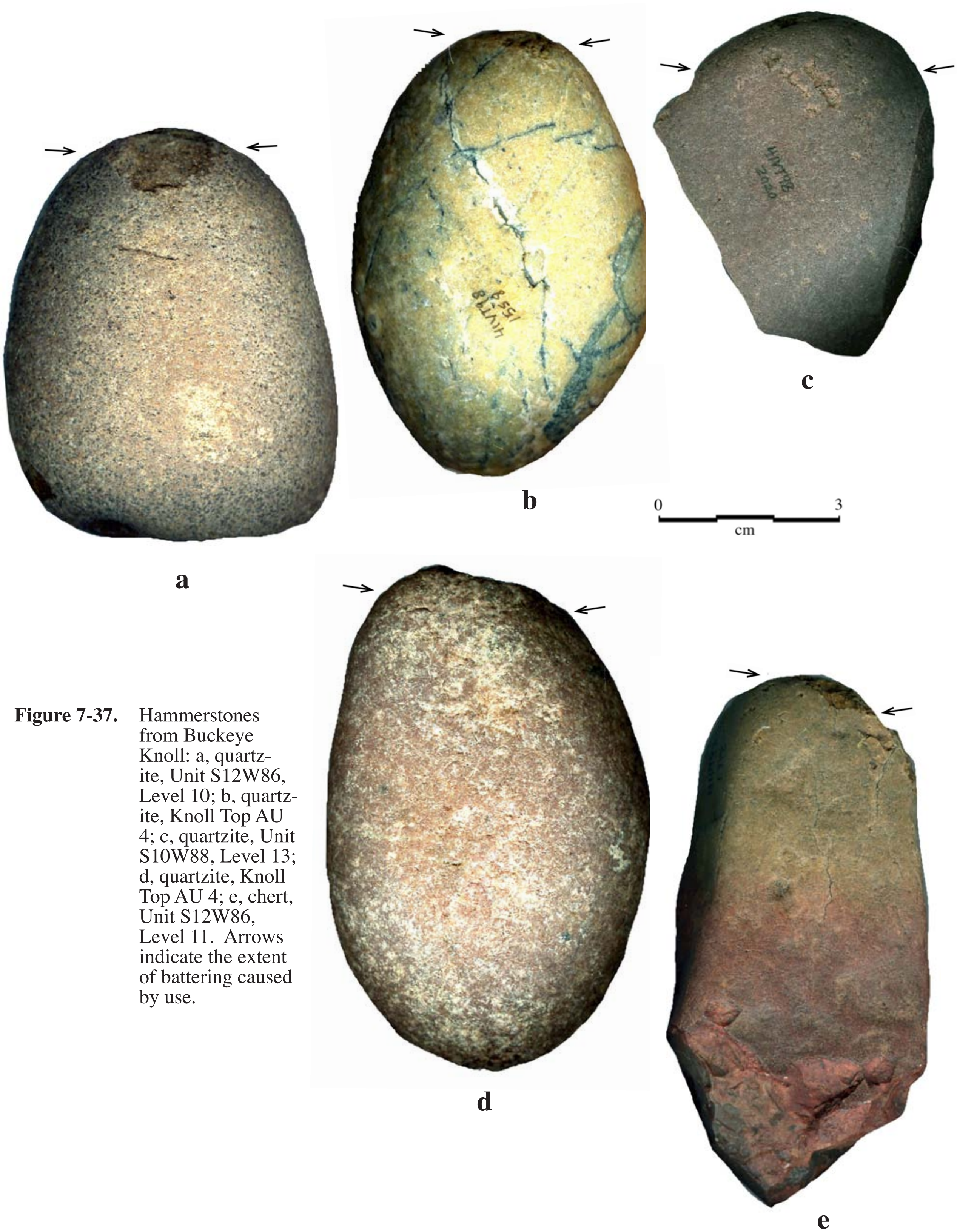


Figure 7-37. Hammerstones from Buckeye Knoll: a, quartzite, Unit S12W86, Level 10; b, quartzite, Knoll Top AU 4; c, quartzite, Unit S10W88, Level 13; d, quartzite, Knoll Top AU 4; e, chert, Unit S12W86, Level 11. Arrows indicate the extent of battering caused by use.

Figure 7-38. (Left) Sandstone slab from Knoll Top AU 1 at Buckeye Knoll that is coated with asphaltum. It was probably used when heated to melt the asphaltum on the concave side (shown here).

Table 7-22. Bone Artifacts Within the Analytical Units of the Knoll Top Excavations at Buckeye Knoll.

	Bone Artifacts																		
AU	Awls	Awls (Distal Fragments)	Awls (Proximal Fragments)	Awls (Medial Fragments)	Deer Ulna Awl/Flaker	Fish Vertebrae Beads	Perforated Canid Canine Teeth	Beamer Fragments	Needles (Medial Fragments)	Needles (Distal Fragments)	Grooved and Snapped Bone	Engraved Bone Pin (Fragments)	Drilled Bone Pieces	Bird Bone Beads	Atlatl Hook (?)	Deer Phalange Blunt Point	Rectangular Bone Object	Spatulate Tipped Tools	**Totals**
1	—	9	1	11	—	1	—	1	—	1	—	5	—	1	—	—	1	—	31
2	2	7	—	8	—	1	—	—	—	1	—	4	1	2	—	—	—	—	26
3	1	4	—	5	—	1	1	1	—	1	—	4	—	—	—	—	—	—	18
4	—	1	—	8	—	1	2	—	2	2	1	2	—	—	—	—	—	4	23
Totals	3	21	1	32	0	4	3	2	2	5	1	15	1	3	0	0	1	4	**98**

Table 7-23. Bone Artifacts Within the Analytical Units of the West Slope Excavations at Buckeye Knoll.

	Bone Artifacts																		
AU	Awls	Awls (Distal Fragments)	Awls (Proximal Fragments)	Awls (Medial Fragments)	Deer Ulna Awl/Flaker	Fish Vertebrae Beads	Perforated Canid Canine Teeth	Beamer Fragments	Needles (Medial Fragments)	Needles (Distal Fragments)	Grooved and Snapped Bone	Engraved Bone Pin (Fragments)	Drilled Bone Pieces	Bird Bone Beads	Atlatl Hook (?)	Deer Phalange Blunt Point	Rectangular Bone Object	Spatulate Tipped Tools	**Totals**
1	—	4	3	—	1	—	—	—	—	1	—	1	1	—	—	—	—	—	11
1-2	—	3	1	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	5
2	—	—	—	—	—	—	—	—	—	—	—	2	1	—	—	1	—	—	4
2-3	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
3	—	3	—	—	—	—	—	—	—	—	1	1	—	—	1	—	—	—	6
3-4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
4	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
Totals	0	11	5	0	1	0	0	0	0	1	1	5	2	0	1	1	0	0	**28**

cal mammal longbones, probably deer, judging from size and cortical thicknesses. The splinter pieces were ground and polished and then geometric designs were added by engraving thin, relatively deep, sets of parallel or opposed lines (Figure 7-40).

Engraved bone pins are reported rather commonly from Late Archaic burials on the Texas Coastal Plain, especially in the area of the lower Colorado and Brazos rivers. Numerous such specimens are documented at the Ernest Witte site (41AU36) in Austin County (Hall 1981) and at the Crestmont site (41WH39) in Wharton County (Hall 2002).

The illustrations of engraved bone pins from these sites (Hall 1981, 2002) permit the identification of a number of recurrent design patterns, as shown here in Figure 7-41. In all cases, the elongated body of the pin has been employed as the ground for panels of engraved-line geometric motifs in the forms of rows of diamond-shaped designs, oblique bands arranged in alternating opposed directions to create zig-zag motifs, and parallel bands of several closely spaced oblique lines.

The fragments from the Buckeye Knoll site are quite small (generally no more than 20 mm long), which makes identification of overall design pattern problematical in most cases. However, the specimens appear to be parts of pins with the design motifs shown in Figure 7-41, a, b, d, and e.

As may be seen in Tables 7-22 to 7-23, the engraved pin fragments found at Buckeye Knoll come from KT AUs 1, 2, 3, and 4 on the Knoll Top and from WS AUs 1, 2 and 3 on the West Slope. Thus, aside from the two probably displaced specimens from Knoll Top AU 4, all come from contexts ranging temporally from the Middle Archaic through the Initial Late Prehistoric period. Whether these items are restricted to the Late Archaic and were found in earlier and later AUs due to displacement, or actually have the longer time range suggested by their stratigraphic positions, cannot be answered with our available information.

Needles

For the purpose of the present discussion, needles are differentiated from awls and pins on the basis of

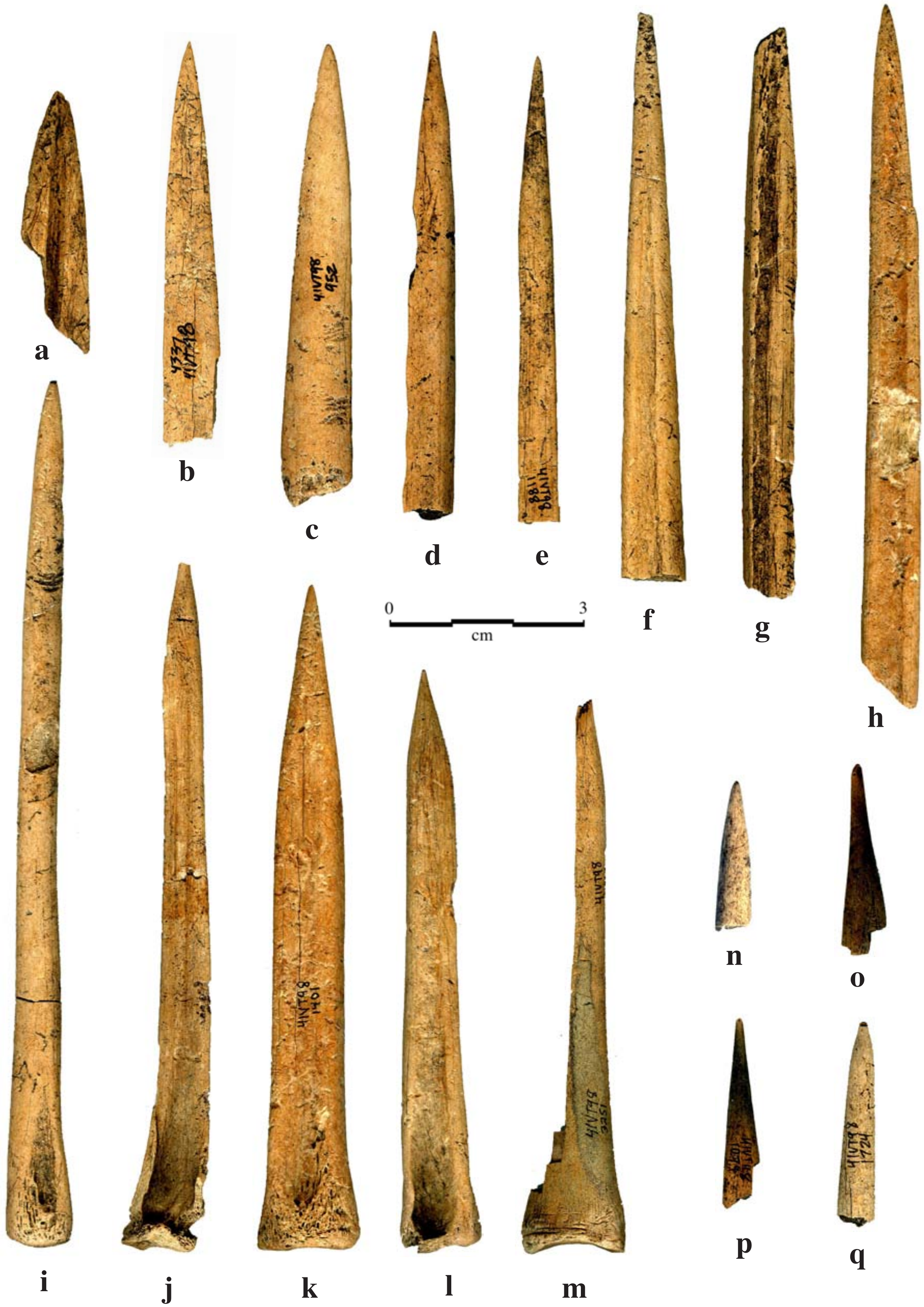


Figure 7-39. Bone awls from Buckeye Knoll: a, distal fragment, West Slope AU 1; b, distal fragment, West Slope AU 1; c, distal fragment, Knoll Top AU 3; d, distal fragment, Knoll Top AU 1; e, distal fragment, Unit S12W88, Level 13; f, distal fragment, Knoll Top AU 2; g, distal fragment, Unit S12W88, Level 12; h, distal fragment, West Slope AU 4; i, complete, West Slope AU 2; j-l, complete, Knoll Top AU 2; m, complete, Knoll Top AU 3; n, p, distal fragments, Knoll Top AU 2; o, q, distal fragments, Knoll Top AU 1.

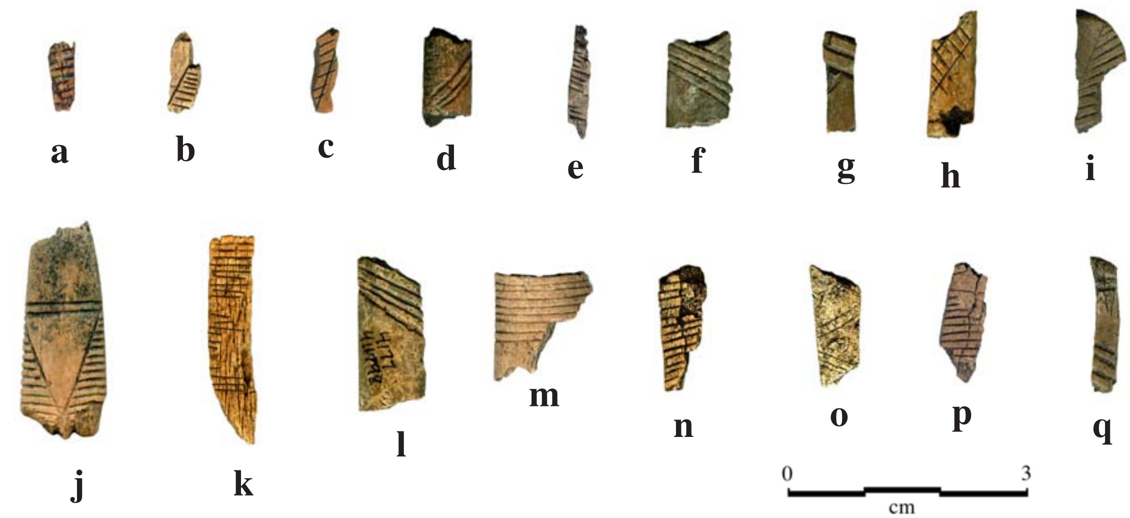


Figure 7-40. Engraved bone pin fragments from Buckeye Knoll: a, West Slope AU 2; b, Unit S12W90, Level 12; c-d, m, p, Knoll Top AU 2; e, g, l, q, Knoll Top AU 1; f, Knoll Top AU 4; h-i, Knoll Top AU 3; j, West Slope AU 1; k, Unit S06W84, Level 15; n, Unit S14W2, Level 10; o, Unit S12W90, Level 9.

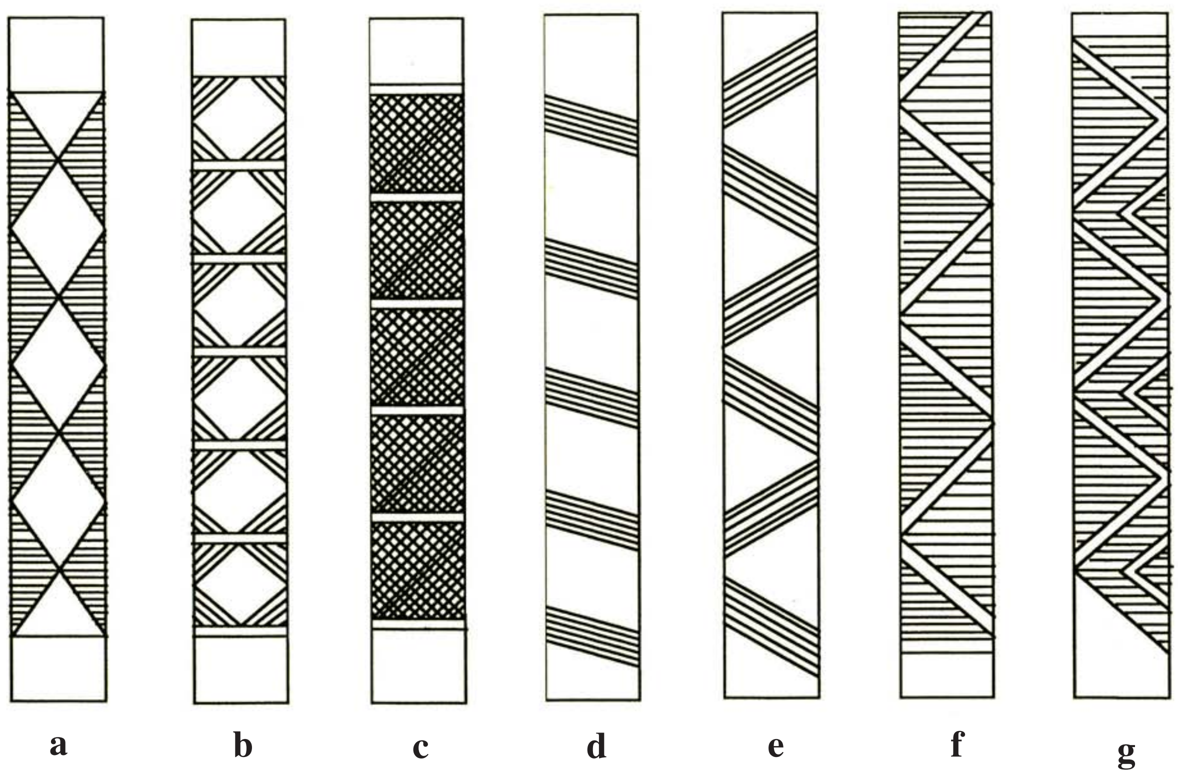


Figure 7-41. Design motifs on engraved bone pins from Late Archaic mortuary contexts in the lower Brazos/Colorado River area of the Texas coastal plain: a, continuous diamond motif; b, horizontal bands with diamond infill; c, horizontal bands with cross-hatched infill; d, diagonal bands; e, simple zig-zag; f, zig-zag with infill; g, complex zig-zag with infill (after artifacts illustrated in Hall 1981; 2002).

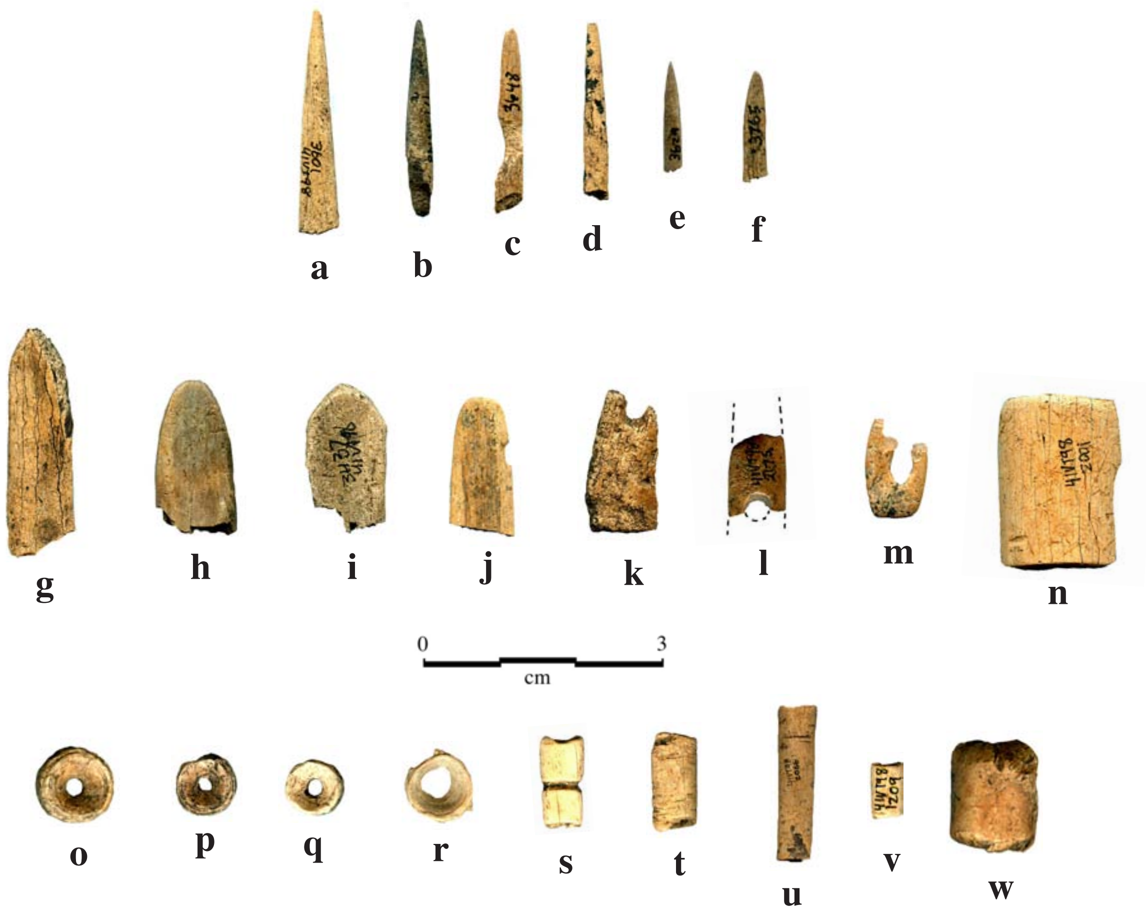


Figure 7-42. Various bone artifacts from Buckeye Knoll: a, bone needle, Knoll Top AU 1; b, bone needle, West Slope AU 1; c, bone needle, Knoll Top AU 2; d, bone needle, Unit S12W88, Level 14; e, bone needle, Knoll Top AU 3; f, bone needle, Unit S12W90, Level 11; g, tip of small spatulate bone tool, Unit S12W88, Level 14; h, tip of small spatulate bone tool, Unit S06W84, Level 14; i-j, tips of small spatulate bone tools, Knoll Top AU 4; k, fragment of perforated mammal long bone, Knoll Top AU 3; l, fragment of perforated mammal bone with ground and polished edges (a possible needle fragment), Knoll Top AU 4; m, fragment of perforated mammal long bone, Knoll Top AU 4; n, fragment of mammal (deer?) longbone worked to a rectangular shape, Unit S14W88, undifferentiated Zone 2; o, perforated fish vertebra bead, Knoll Top AU 1; p, perforated fish vertebra bead, Knoll Top AU 2; q, perforated fish vertebra bead, Knoll Top AU 3; r, perforated fish vertebra bead, Knoll Top AU 4; s, cut bird bone bead (Note that the bone has a groove that circumscribes its middle section that represents either a decorative element or an unfinished separation of two beads), Knoll Top AU 1; t-u, cut bird bone beads, Knoll Top AU 2; v, cut bird bone bead, Unit S12W88, Level 15; w, cut bird bone bead, Unit S54W123, Level 7.

being much thinner and narrower, as well as by a lack of added decoration. Eight needle fragments were found at Buckeye Knoll (Figure 7-42, a-f), seven on the Knoll Top and one on the West Slope. Five of the Knoll Top specimens came from definable AUs (one each from KT AUs 1, 2 and 3; two from KT AU 4. Two additional Knoll Top specimens are from 2-by-2-m Units S12W90 and S12W88, where AUs could not be defined because of highly undulating stratigraphy. Due to the apparent absence of bone preservation in KT AU 4, it can be surmised that all four specimens likely pertain to KT AU 3 or superior levels in the Knoll Top deposits.

Six specimens are distal tip fragments, while the other two are medial fragments. All are made of bone splinters from an indeterminate species, probably mammalian, and the surfaces are smoothed to a polish. The distal tips have finely tapered, sharp points. Maximum widths are under 5 mm and the thicknesses do not exceed 2.5 mm.

Because the proximal ends are missing on all four specimens, it is not known whether they were perforated to form an "eye." However, judging by the thin and delicate nature of these items, it seems likely they were made for some sort of fine work as opposed to the relatively heavy-duty tasks (e.g., hide perforation) that were the inferred purposes of the relatively stout awls.

Small Spatulate-Tipped Tools

Four small pieces of mammal longbone, probably deer, judging by cortical thickness, have been worked to an elongated shape with a blunt, rounded tip (see Figure 7-42, g-j). The tips are too blunt to have served as perforators (awls), and these items are perhaps weaving tools. All specimens are from AU 4 on the Knoll Top. Since none was found in higher, more recent, levels it is tempting to suggest that these artifacts may pertain to the Late Paleo-Indian-earliest Archaic occupation(s). However, it is believed, for reasons discussed previously, that no bone from this period is preserved. These items thus may be of Middle Archaic age, and be part of the considerable amount of lag material that was left by Middle Holocene erosional deflation of the surface of Zone 3 and then turbated into that stratum.

Defleshing Tools or Beamers

These are deer metapodial bones on which one side of the bone shaft has been worn down by repetitive friction against another object. They are generally interpreted as hide scrapers and are widely reported from archaeological sites in the Eastern Woodlands macroregion of North America (e.g., Griffin 1952:Figures 16, 35, 63, 166). They have been reported in Texas on the upper Coast in a Ceramic period context (Ricklis 1994).

Two specimens were recovered at Buckeye Knoll (Figure 7-43, a-b), both from the Knoll Top Excavation. One was found in AU 1, while the second came from AU 3, thus suggesting, respectively, Initial Late Prehistoric and Middle-to-Late Archaic contexts. Both specimens are fragmentary. The larger, more complete, specimen shows evidence that the articular condyle was removed from at least one end using the groove-and-snap technique.

Gouge or Defleshing Tool

This object (see Figure 7-43, a) was found during geoarchaeological backhoe trenching at the foot of the West Slope near the south end of a trench, close to 2-by-2-m Unit S54W123. It is made from a deer humerous shaft fragment on which one end has been carefully beveled by grinding. In conjunction with the natural curvature of the bone, the beveling produced a gouge-like working bit; the grinding also created a rather sharp edge along the bit.

This artifact was found on the trench backdirt, but it was clear that it came from a thick stratum of dark, organically enriched soil similar to Zone 2 in the nearby West Slope Excavation. Assuming that the correlation between Zone 2 and the containing dark soil is generally valid, the artifact can be assigned to the Late Archaic (though it is not included in Table 7-23 because it cannot be assigned to an AU).

Grooved-and-Snapped Bone

Two fragments of fairly large mammal longbones exhibit abraded grooves on one end and rough breakage along the edges of the grooves indicative of the bone having been snapped off along the grooves. One specimen (see Figure 7-43, g) is a white-tailed deer femur with the groove and snap located some 8 cm from the proximal joint. This specimen was found in West Slope AU 3, suggesting a Middle Archaic age. The other specimen was from Knoll Top AU 4 and was probably downwardly displaced by bioturbation from overlying Archaic deposits.

Beads

Nine beads made of bone were found at Buckeye Knoll. Five are cylindrically cut sections of bird longbones (see Figure 7-42, s-w); one from the Late Prehistoric KT AU 1 on the Knoll Top, two from the Late Archaic KT AU 2 on the Knoll Top, one from the northwest part of the Knoll Top Excavation where AUs are not definable, and the last from Level 7 in S54W123 near the West Slope. The specimen from Knoll Top AU 1 (see Figure 7-42, s) bears a groove that circumscribes the bead at the midpoint of its length; this may be decorative or, alternatively, it may be an unfinished attempt to cut the bead into two pieces. The other four beads are all fish vertebrae with central perforations (see Figure 7-42, o-r). One was recovered from each of the four AUs on the Knoll Top.

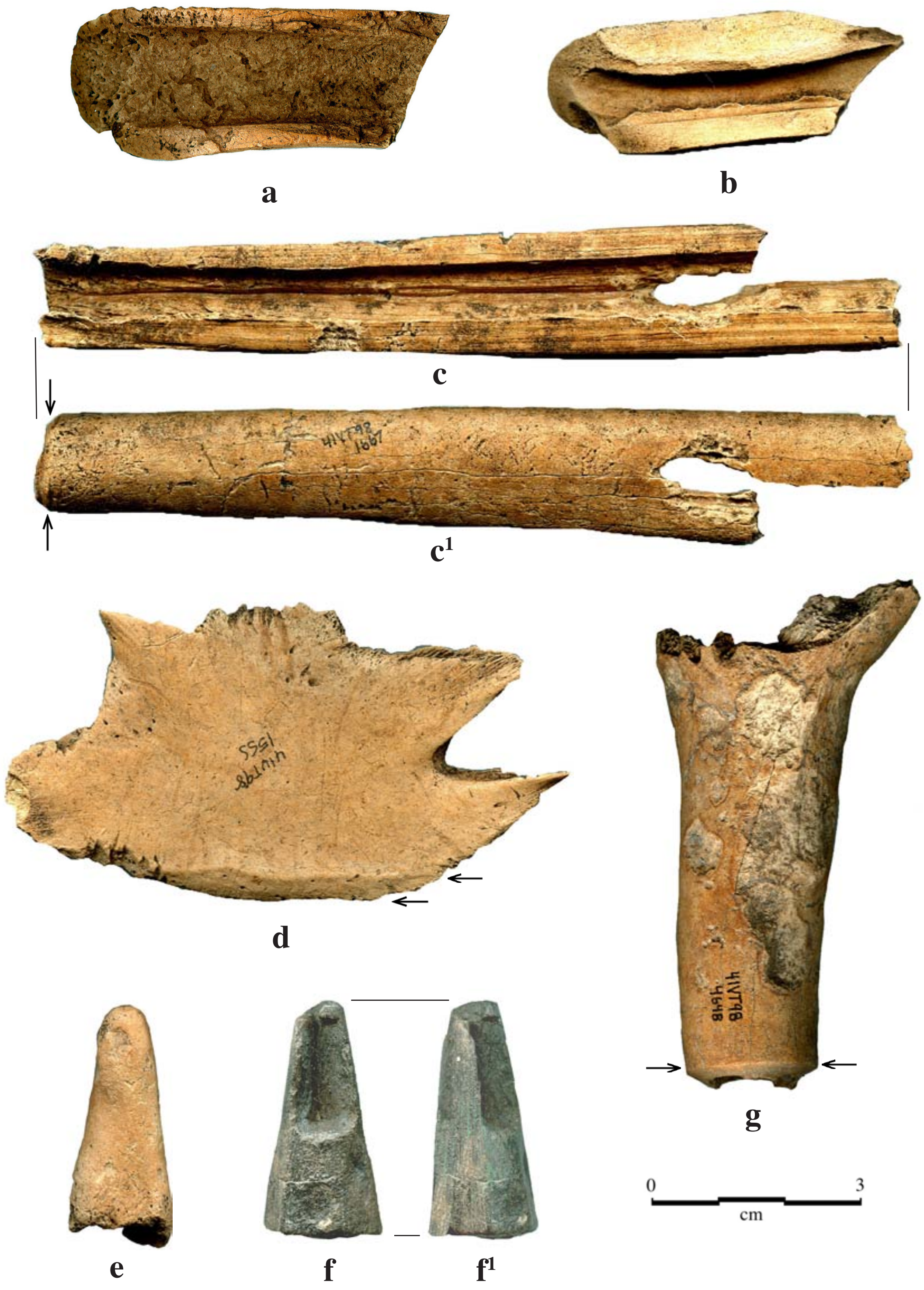


Figure 7-43. Additional bone artifacts from Buckeye Knoll: a, bone gouge, "beamer," or defleshing tool made from a deer humerus, BHT G-1, backdirt pile; b, partial defleshing tool made from deer metapodial, Knoll Top AU 3; c-c[1], defleshing tool made from deer metapodial, Knoll Top AU 2 (arrow points to groove-and-snap terminus); d; possible scraping tool made from a turtle plastron, Unit S12W90, Level 14 (arrows point to beveled [ground] edge); e, possible projectile point made from hollowed-out and blunt-tipped deer phalange, West Slope AU 2; f-f[1], possible unfinished atlatl hook, West Slope AU 3; g, grooved-and-snapped deer longbone (femur) section, West Slope AU 3 (arrows point to groove-and-snap terminus).

Miscellaneous

Several kinds of bone implements are represented by one or two specimens each. A deer phalange with its distal end ground smooth and its proximal end hollowed out may have been made to serve as a blunt projectile point (see Figure 7-43, e). This was found in the Late Archaic context of WS AU 2 on the West Slope.

A section of turtle carapace (see Figure 7-43, d) with an artificially beveled edge may have served as a scraper. It was found in the northwest portion of the Knoll Top Excavation where AU designations are not possible.

A piece of thick cortical bone was worked to a quasi-conical shape and one side was deeply gouged out to form a trough-like depression (see Figure 7-43, f-f[1]). The end of the "trough" was left uncut, creating a projection. The function of this object is unknown. Very tentatively, it can be suggested that it may be an unfinished atlatl (spear throwing stick) hook—were the gouge extended the length of the object and a hole for the atlatl shaft drilled in the basal end, it would resemble bone/antler atlatl hooks from Archaic contexts in Kentucky and elsewhere in the upland South and the Midwest.

A small piece of mammal longbone (probably deer) had been cut and ground to a flat, rectangular shape (see Figure 7-42, n). This artifact is similar to specimens reported from Ceramic period sites on the upper Texas coast (Aten 1983; Ricklis 1994a) and suggested to have served as gaming pieces. An alternative function of such rectangular bone pieces is as net mesh gauges (e.g., Walker 1992a, 1992b). The Buckeye Knoll specimen was found in KT AU 1 on the Knoll Top, suggesting an early Late Prehistoric age comparable to the specimens from the upper Texas coast area.

Three pieces of bone, probably from medium-size mammals, bear drilled perforations approximately 4-5 mm in diameter (see Figure 7-42, k-m). In addition to having been drilled, the bone pieces were formed by grinding of the edges into roughly rectilinear shapes. Given that both specimens are incomplete (broken), they may have originally had, or been intended to have, elongated shapes. The function of these items is not known.

Shell

Eighteen artifacts of modified shell were recovered from non-mortuary contexts at Buckeye Knoll: 12 from the Knoll Top and six from the West Slope (see Table 7-24 for listing of AU proveniences). These fall into several categories, as listed below.

Table 7-24. Shell Artifacts Within the Analytical Units of the Knoll Top and West Slope Excavations at Buckeye Knoll.

Artifact	Freshwater Mussel (Edge-Utilized)	Freshwater Mussel (Edge-Beveled)	Freshwater Mussel (Perforated)	Freshwater Mussel (Edge-Nicked)	Oyster (Edge-Utilized)	Sunray Venus (Edge-Flaked)	Rangia (Perforated)	Whelk (Modified Columella)
Knoll Top AU								
1	—	—	—	—	1	—	—	—
2	—	—	—	2	1	—	—	—
3	1	1	—	—	1	—	—	1
4	1	—	1	—	2	—	—	—
Totals	2	1	1	2	5	0	0	1
West Slope AU								
1	1	—	—	—	—	—	—	—
1-2	—	—	—	—	—	—	—	—
2	—	—	—	—	—	1	—	—
2-3	—	—	—	—	—	—	—	—
3	—	—	—	—	3	—	1	—
Totals	1	0	0	0	3	1	1	—

Edge-Utilized Valves

A total of eight lower valves of the eastern oyster (*Crassostrea virginica*) exhibited use wear on the distal end (Figure 7-44, h-k). The wear pattern consists of edge-modification in the form of minute flaking, as though the edge had been worn down to a straight or slightly concave configuration by repeated friction against some other material. These items are, therefore, interpreted to be scraping tools. Four specimens are from the Knoll Top, one each from AUs 1, 2 and 3, and two from AU 4. Three specimens were found in the West Slope Excavation, all in Zone 3 (WS AU 3).

Three freshwater mussel valves show edge modification along the curved sides opposite the valve umbos. On two specimens (see Figure 7-44, e-f), the wear is attritional with crushing and flaking of the edges, similar to that seen on the just-described oyster valves, and these artifacts are similarly interpreted as scraping tools. On the third (Figure 7-44, g), the edge exhibits a bevel caused by grinding rather than crushing caused by friction. Two of the edge-crushed specimens were recovered from the Knoll Top, one in AU 3 and one in AU 4. The third is from AU 1 in the West Slope Excavation.

Perforated Valves

Two shellfish valves, one freshwater mussel and the other *Rangia cuneata*, bear perforations near the umbos (see Figure 7-44, a-b). In both cases, the holes are approximately 6-7 mm in diameter. This artifacts have similar counterparts from sites along the central Texas coast such as 41CL59 near the Victoria Barge Canal at Green Lake (Weinstein 1992:220).

Along with perforated oyster shells, which are common on central coast sites (e.g. Campbell 1952; Ricklis 1995a), these items may have served as net weights. The perforated mussel shell from Buckeye Knoll was found in Knoll Top AU 4, while the perforated rangia valve is from WS AU 3 on the West Slope.

Whelk Columella Gouges

Modified columellas of large lightning whelks (*Busycon perversum*) and Florida horse conch (*Pleuroploca gigantea*) are found on shoreline shell midden sites along the central Texas coast (e.g., Campbell 1952; Ricklis 1995a). These items were made by removing the outer whorl of the conch body from the central spire (columella) and then grinding one end of the columella section to a beveled bit (see Figure 7-44, o-p). Sometimes the bevel has a concave surface, creating a gouge-like working edge. Such artifacts have been found in Late Archaic contexts along the coast (Ricklis 1995a, 2004). One of the specimens from Buckeye Knoll comes from AU 3 on the Knoll Top, suggesting an early Late Archaic age. The other specimen is from the geoarchaoelogical backhoe trench that was excavated along the base of the West Slope Area; this specimen was found on backdirt, within dark-stained, organic rich matrix that may correspond to Zone 2 (AU 2) in the West Slope Excavation. If such a correlation is correct, the artifact can be placed within a Late Archaic time range.

Whelk Adze

The only specimen of its kind from Buckeye Knoll, this artifact was recovered from Zone 2 in Unit S12W90 in the northwest corner of the main excavation block on the Knoll Top, where analytical units cannot be assigned due to pronounced undulation in stratigraphy. This artifact (see Figure 7-44, n) is fashioned from the outer body whorl of a large lightning whelk (*Busycon perversum*) shell. It is roughly triangular in shape and has a beveled bit on the working edge. Similar artifacts are widely reported from Late Archaic and Late Prehistoric contexts on the central Texas coast (Campbell 1952; Mokry 1980; Ricklis 1995a, 1996a).

Edge-Nicked Shell

Two pieces of freshwater mussel shell have small artificial nicks cut into one edge (see Figure 7-44, c-d). Edge-nicking of mussel shell is a trait that has been documented on shell ornaments from Late Archaic burial contexts at the Ernest Witte site (Hall 1981) and the Oso Dune site, 41NU37 (Cox and de France 1997) on the Texas Coastal Plain. Presumably the specimens from Buckeye Knoll, both from AU 2 on the Knoll Top, also represent Late Archaic shell ornaments.

Aboriginal Ceramics

Potsherds were found only sporadically in all three of the main excavation areas at Buckeye Knoll (Figure 7-45). A total of 108 sherds were recovered, with 72 coming from the Knoll Top Excavation, 30 from the units in the East Area, and only 6 from the West Slope.

Each of the 108 sherds was examined macroscopically to observe attributes of color, surface treatment, and thickness. Additionally, small fresh breaks were made on the edges of each sherd for examination under 20x microscopy in order to identify the technological attribute of aplastic inclusions, or tempering agents, in the sherd paste.

The results of these observations are presented in Table 7-25, which lists the attributes of surface finish (including application of asphaltum paint or coating), color, aplastic inclusions, and sherd thickness. On the basis of variability in these attributes, it was possible to sort the 108 specimens into 39 groups of sherds, each of which may represent a single individual ceramic vessel. As shown in Table 7-25, each sherd group is assigned to one of three general typological group-

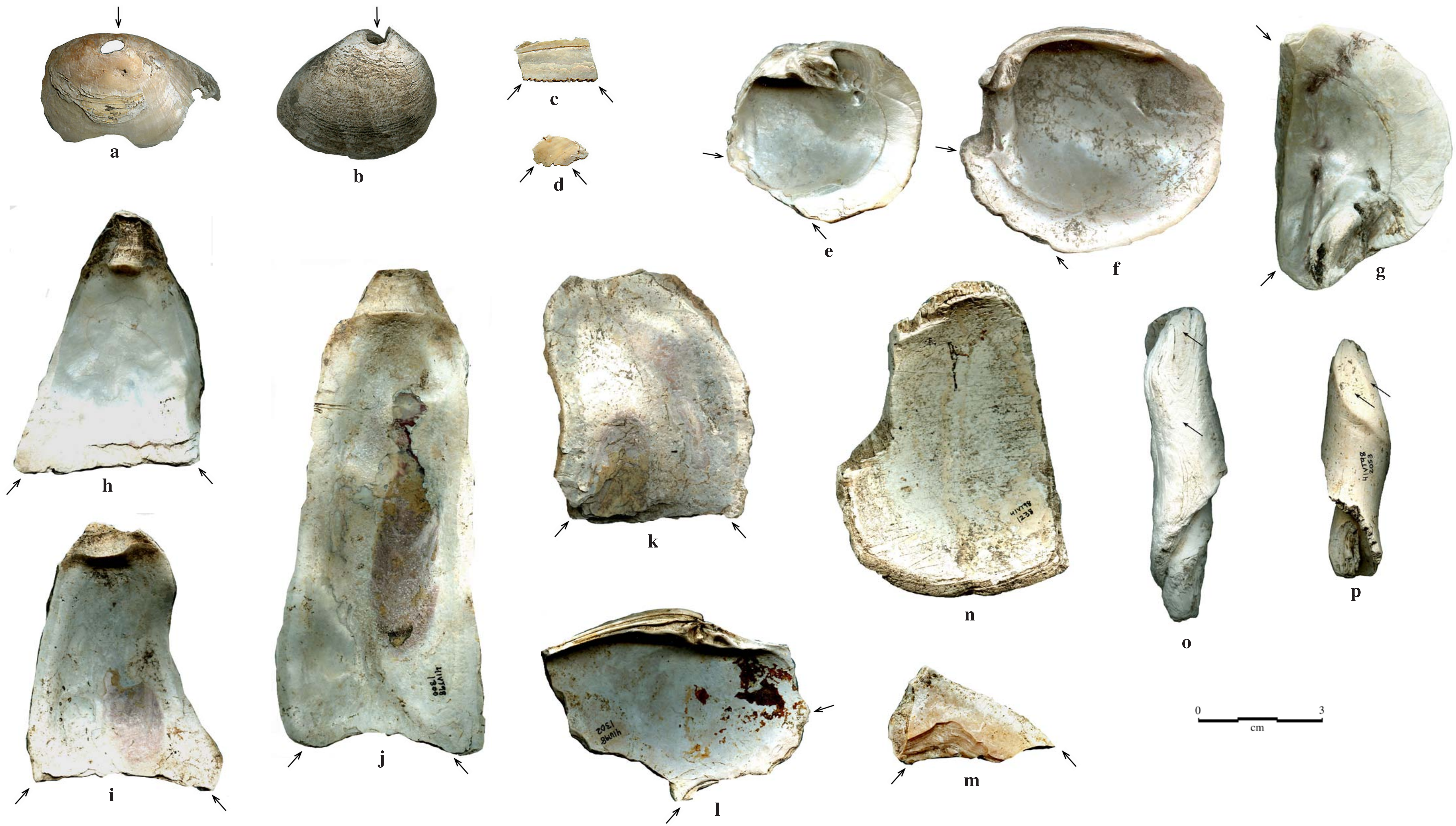


Figure 7-44. Shell artifacts from Buckeye Knoll: a, perforated freshwater mussel shell; b, perforated *Rangia cuneata* clam shell; c-d, edge-nicked fragments of freshwater mussel shell; e-f, freshwater mussel shells with edge flaking indicating use along one edge; g, freshwater mussel shell with one edge beveled by grinding, presumably to create a cutting or scraping edge; h-k, oyster (*Crassostrea virginica*) shells (all upper valves) with edge flaking indicating use; l-m, sunray venus clamshell fragments with edge flaking indicating use; n, adze made from cut section of lightning whelk body whorl; o-p, whelk columella gouges with ground surfaces. Arrows indicate location or extent of modification.

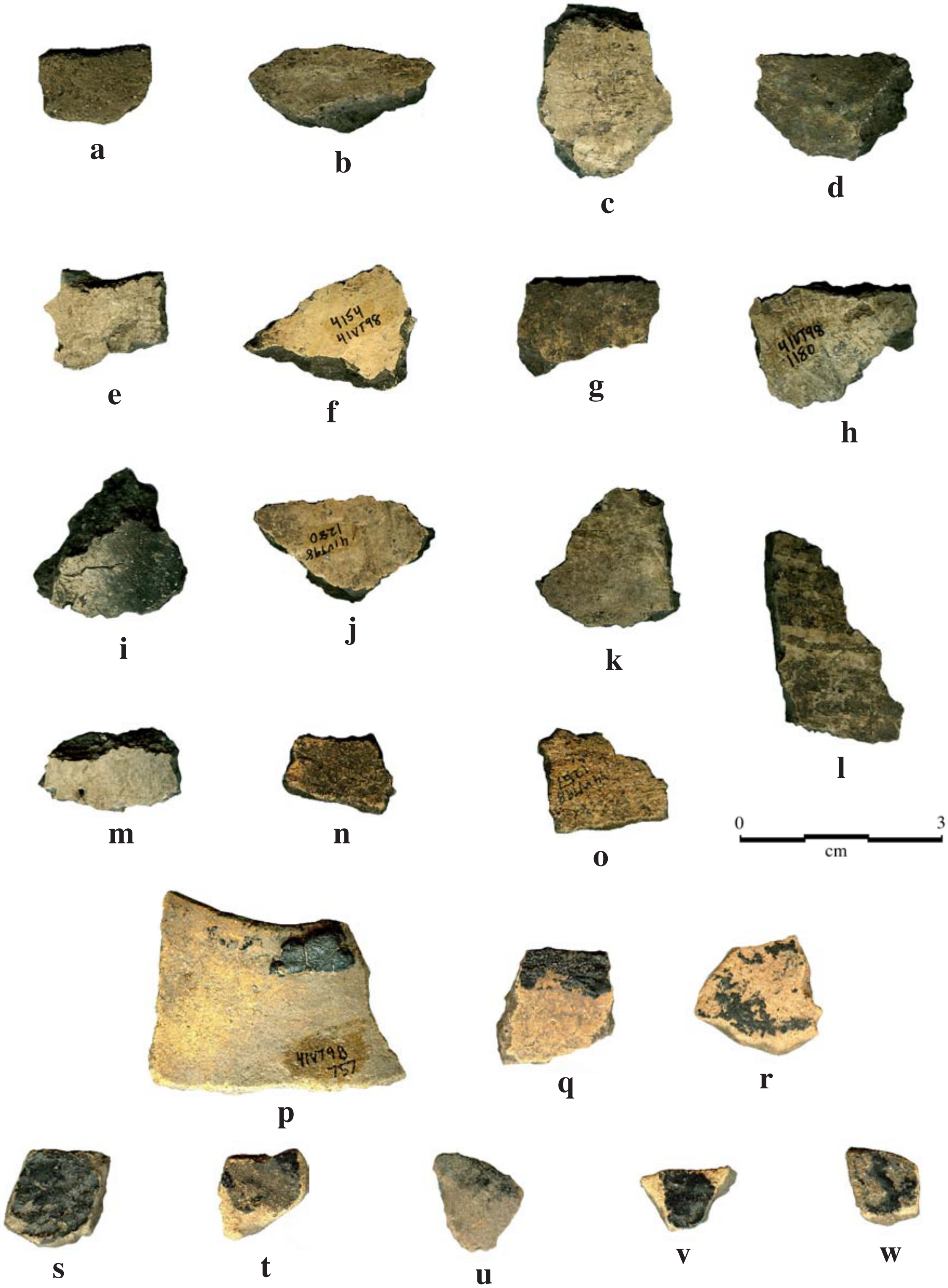


Figure 7-45. Selected potsherds from Buckeye Knoll: a-o, bone-tempered potsherds assigned to Typological Sherd Group 1 (All are from the Knoll Top Excavation, mostly from AU 1. Note the variability in color, ranging from tan to dark gray and reflecting the uneven oxidation of the vessel during firing); p, Rockport Ware rimsherd, Unit S12W60, Level 2; q, Rockport Ware rimsherd, East Area, Level 2; r, Rockport Ware body sherd, East Area, Level 2; s, Rockport Ware body sherd, Unit S12W50, Level 2; t, v, w, Rockport Ware body sherds, East Area, Level 1; u, Rockport Ware body sherd, East Area, Level 5.

ings: (1) Rockport Ware, a relatively thin, sandy paste ceramic with smooth or bivalve-scored surfaces, often bearing painted decorations and/or a coating of asphaltum, a naturally occurring petroleum tar found on Gulf of Mexico beaches (see Suhm and Jelks 1962; Campbell 1961; Ricklis 1996; Weinstein and Hutchins 2002); (2) Leon Plain, a generally undecorated pottery with crushed bone temper and smooth or burnished surfaces (Suhm and Jelks 1962; Black 1986; Highley 1986); (3) Goose Creek Plain, a sandy paste ware that tends to be somewhat thicker than Rockport Ware and has smooth or bivalve-scorred surfaces and lacks the asphaltum surface treatment frequently found on Rockport ceramics (e.g., Aten 1983; Weinstein 1992, 1994; Ricklis 1994a, 1995b). Additionally, Goose Creek pottery often has a higher proportion of sand to clay in the paste, and the sand tends to be relatively coarse and poorly sorted (Aten 1983:231; Weinstein and Hutchins 2002).

These three ceramic wares can be differentiated by their cultural-geographic distributions as well as by the just-mentioned basic differences in their diagnostic attributes. Rockport ware is commonly abundant on shoreline sites in the central Texas coast region, between Baffin Bay on the south and Matagorda Bay on the north, and is largely confined to a narrow coastal zone that extends inland only some 40 kilometers from the mainland shoreline (Ricklis 1995b, 1996a). Leon Plain is found over a very wide range, from the Edwards Plateau of central Texas onto the inland Coastal Plain and into the northern part of the Rio Grande Plain of south Texas, where it is a defining trait of the widespread Late Prehistoric Toyah phase/horizon (e.g., Hester 1980b, 1995, 2004; Prewitt 1981; Black 1986; Highley 1986; Johnson 1994). Rockport and Toyah ceramics are essentially contemporaneous, being directly associated with similar lithic assemblages of the Rockport and Toyah phases (i.e., Perdiz arrow points, end scrapers, beveled knives and a blade-core industry), respectively along the central coast and in the south and central Texas interior. The Rockport phase has been linked with the early Historic Karankawa Indians of the coastal zone (Newcomb 1983; Ricklis 1996a), while the Toyah horizon is believed to be ancestral to much of the ethnically diverse hunter-gatherer population of the interior Coastal Plain, whose presence at eighteenth-century Spanish colonial missions is marked by bone-tempered plainware very similar to, and presumably directly derived from, its prehistoric counterpart, Leon Plain (e.g., Hester 1980b; Walter 1997; Ricklis 2000b).

Goose Creek Plain is found mainly to the north and northeast on sites along the upper Texas coast and adjacent interior southeast Texas (Aten 1983; Weinstein 1991; Ricklis 1994, 2004). However, Duay and Weinstein (1992) reported Goose Creek Plain sherds at the Guadalupe Bay site (41CL2) on the central coast, distinguishable from the much more abundant Rockport ware at the site on the basis of larger-grained (medium-to-coarse) sand in the paste. More recent and intensive analysis of pottery from Guadalupe Bay (Weinstein and Hutchins 2002) employed a Wentworth chart of grain sizes to measure sand grains, resulting in the identification of :

> *a significant quantity of ceramics that meet the present criteria set up to identify Goose Creek ware, particularly when the analyst takes into consideration the quantity of sand in the paste, the friable nature of the sherds, and the overall rough surface finish—qualities that are not to be found in Rockport ware* [Weinstein and Hutchins 2002:272].

Weinstein and Hutchins (2002:275) found a much smaller proportion of sherds from Guadalupe Bay that they classed as Goose Creek using their revised, less subjective, approach. Nonetheless, they did determine that Goose Creek sherds were absent in the top stratum at the site and increased in abundance with depth (and age), suggesting that Goose Creek ware may precede Rockport ware at the site, and generally on the central coast. Interesting and probably significant in this regard is Story's (1968) report of abundant sherds of what she considered Goose Creek Plain-like pottery in association with Scallorn arrow points, generally a pre-Rockport phase point type, at the Anaqua Site (41LK8) on the lower Lavaca River within the northern limit of the central coast region. This apparent temporal precedence of Goose Creek pottery over Rockport ware on the central coast would accord with Campbell's (1961) suggestion that Rockport ware developed from sandy-paste ceramic technology (i.e., Goose Creek) that diffused southward from the upper Texas coast.

Goose Creek Plain

The three sherds from Buckeye Knoll classified as Goose Creek Plain (see Table 7-25) are so categorized due to the abundance of sand in the paste, and the poorly sorted nature of the sand (the latter attribute more clearly distinguishing the sherds from Rockport ware, some of which have still higher sand content but in which the sand is well sorted according to grain size). All three sherds come from the Knoll Top, two from AU 2 and one from AU 3. By contrast, most of the Rockport sherds from that excavation area were

Table 7-25. Aboriginal Ceramics Recovered from Buckeye Knoll.

Typological Sherd Group	no.	Area	AU/Level	Surface Treatment				Color		Aplastics		Thickness (mm)	Typological Group	Remarks
				Interior		Exterior		Interior	Exterior	Sand %	Bone %			
				Finish	Additives	Finish	Additives							
1	44	Knoll Top	AU 1-2	Smoothed	—	Burnished	—	7.5YR 4/2	7.5YR 3/1	40	20	4.0	Leon Plain	
2	3	Knoll Top	AU 2	Smoothed	—	Smoothed	—	10YR 6/3	10YR 7/3	10	5-10	6.9	Goose Creek	
3	1	Knoll Top	AU 2	Smoothed	—	Smoothed	—	5YR 7/1	5YR 5/6	40	—	3.3	Goose Creek	
4	1	Knoll Top	AU 1	Smoothed	Asphaltum	Smoothed	—	7.5YR 4/2	7.5YR 3/1	40	<5	6.3	Rockport	
5	1	Knoll Top	AU 1	Smoothed	—	Smoothed	Asphaltum	10YR 5/2	7.5YR 5/2	50	—	6.0	Rockport	
6	1	Knoll Top	AU 1	Smoothed	—	Smoothed	—	5YR 6/4	5YR 6/4	50	10	3.6	Leon Plain?	
7	1	Knoll Top	AU 3	Scored	—	Scored	—	5YR 3/1	5YR 5/2	40	—	4.3	Goose Creek	
8	3	Knoll Top	AU 1	Smoothed	Asphaltum	Smoothed	—	5YR 3/1	5YR 5/2	5	10-20	5.6	Rockport	
9	3	Knoll Top	AU 1	Smoothed	—	Smoothed	—	7.5YR 6/4	5YR 6/4	60	5	4.4	Rockport	
10	1	Knoll Top	AU 1-2	Smoothed	—	Smoothed	Asphaltum	7.5YR 5/2	7.5YR 6/4	60	<5	4.2	Rockport	Rim Sherd
11	1	Knoll Top	AU 1	Smoothed	—	Smoothed	Asphaltum	5YR 5/1	5YR 4/1	<10	10-20	3.4	Rockport	
12	3	Knoll Top	AU 1	Smoothed	—	Smoothed	Asphaltum	10YR 7/4	10YR 4/1	50	—	4.3	Rockport	
13	2	Knoll Top	AU 1	Smoothed	—	Smoothed	Asphaltum	10YR 4/2	10YR 2/1	50	—	4.8	Rockport	
14	1	Knoll Top	AU 1	Smoothed	Asphaltum	Scored	—	7.5YR 5/1	7.5YR 8/3	50	—	4.5	Rockport	
15	1	Knoll Top	AU 2-3	Smoothed	—	Smoothed	—	7.5YR 7/4	7.5YR 5/3	50	—	4.0	Rockport	
16	1	Knoll Top	AU 1	Smoothed	—	Smoothed	AsphaltuM	7.5YR 4/2	7.5YR 3/1	40	—	4.0	Rockport	Rim Sherd
17	1	Knoll Top	AU 1	Smoothed	—	Smoothed	—	10YR 6/3	10YR 7/3	<10	10-20	7.0	?	
18	2	Knoll Top	AU 2	Smoothed	—	Smoothed	Red Slip	5YR 7/4	5YR 5/6	<5	20	3.3	Leon Plain	
19	6	West Slope	AU 1	Smoothed	—	Smoothed	—	10YR 2/1	10YR 3/1	30	10	6.3	?	
20	1	East Area	n/a	Smoothed	—	Smoothed	—	10YR 5/1	10YR 5/1	40	<10	6.0	Rockport?	
21	1	East Area	n/a	Smoothed	—	Smoothed	—	7.5YR 6/4	7.5YR 6/4	10	20	3.6	Leon Plain	
22	2	East Area	n/a	Smoothed	Asphaltum	Smoothed	—	7.5YR 2.5/1	7.5YR 6/4	60	<5	4.3	Rockport	
23	2	East Area	n/a	Smoothed	Asphaltum	Smoothed	—	7.5YR 2.5/1	5YR 5/6	40	—	5.6	Rockport	
24	1	East Area	n/a	Smoothed	—	Smoothed	—	7.5YR 4/1	7.5YR 7/4	40	—	4.4	Rockport	
25	3	East Area	n/a	Smoothed	Asphaltum	Smoothed	—	5YR 2.5/1	5YR 6/4	40	—	4.2	Rockport	
26	2	East Area	n/a	Smoothed	—	Smoothed	—	7.5YR 6/4	5YR 5/4	60	—	3.4	Rockport	
27	1	East Area	n/a	Smoothed	—	Smoothed	—	5YR 3/1	5YR 3/1	50	<5	4.3	Rockport	
28	2	East Area	n/a	Smoothed	—	Smoothed	—	5YR 6/5	5YR 4/2	50	<10	4.8	Rockport	
29	1	East Area	n/a	Smoothed	—	Smoothed	—	10YR 3/1	10YR 3/1	50	—	5.0	Rockport?	
30	1	East Area	n/a	Smoothed	—	Burnished	—	5YR 6/4	5YR 4/1	50	10	5.8	Rockport?	
31	1	East Area	n/a	Smoothed	—	Smoothed	—	5YR 6/4	5YR 5/1	40	—	3.6	Rockport?	
32	2	East Area	n/a	Smoothed	—	Smoothed	—	5YR 6/5	5YR 6/2	50	5	5.4	?	
33	1	East Area	n/a	Smoothed	—	Burnished	—	5YR 5/4	7.5YR 3/1	50	5	8.0	?	
34	1	East Area	n/a	Smoothed	—	Smoothed	Asphaltum	7.5YR 5/2	7.5YR 2.5/1	50	—	5.4	Rockport	
35	1	East Area	n/a	Smoothed	—	Smoothed	—	5YR 7/4	5YR 4/1	5	10-20	4.1	Leon Plain	
36	2	Knoll Top	n/a	Smoothed	—	Smoothed	Asphaltum	7.5YR 7/4	10YR 4/2	60	5	4.4	Rockport	
37	1	Knoll Top	Level 3	Smoothed	—	Smoothed	Asphaltum	7.5YR 7/4	7.5YR 3/2	50	—	4.4	Rockport	
38	3	Knoll Top	Level 1	Smoothed	—	Smoothed	—	7.5YR 7/4	7.5YR 4/2	40	<5	4.8	?	
39	1	Knoll Top	n/a	Smoothed	—	Smoothed	—	10YR 5/2	10YR 5/2	20	5	6.2	?	

found in KT AU 1, suggesting a slight temporal priority for Goose Creek ware at the site. This is not to suggest that the sherds were necessarily in primary contexts in KT AUs 2 or 3, which are largely ascribed to the Late Archaic; while this is not impossible, it is perhaps more likely that they were originally deposited lower within KT AU 1 than were the Rockport sherds, and thus came to rest at lower levels via bioturbational downward translocation.

Leon Plain

The best represented, numerically, of the sherd groups is Group 1, from the Knoll Top. This group contains 44 sherds, most of which were found in KT AU 1, and a few of which came from KT AU 2. These sherds pertain to a single vessel assigned to the Leon Plain type. Crushed bone temper is profuse within the paste (an estimated 20 percent of the paste volume), while fine sand is estimated to comprise an additional 40 percent. The exterior surface of the vessel was burnished and shows colors ranging from dark-gray reduced areas to light-buff oxidized portions. No rim sherds were found, so the vessel form is not certain, but sherd curvatures suggest a jar with a globular body and a slightly constricted neck. Despite the relatively large number of sherds from this vessel, attempts to refit at least a portion of it were unsuccessful.

Three other sherd groups from the Knoll Top, two from AU 1 and one from AU 2, also are classed as Leon Plain (see Table 7-25). Surfaces are smooth and crushed bone accounts for an estimated 10 to 20 percent of the paste. Sand is sparse in only one group (No. 18) and the other groups may, in fact, represent Rockport ware vessels that contained bone temper, given that analyses of Rockport ware from coastal sites indicate that sparse to moderate amounts of crushed bone are not uncommon (see Ricklis 1995b). Indeed, this writer has previously suggested that, in many instances, individual sherds cannot be confidently placed within either the Rockport of Leon Plain categories, but that only the overall percentages of key attributes within sherd samples should be used to identify the ceramic wares represented at sites or within definable site components.

The presence of the bone-tempered sherd groups categorized as Leon Plain at Buckeye Knoll may represent occupation by inland coastal prairie groups of the archaeologically defined Toyah phase or horizon. Some of the classic traits of the Toyah assemblage, such as beveled knives and an abundance of unifacial end scrapers were not found, however, and a definite Toyah presence at the site cannot be asserted. It is, of course, possible that Toyah folk did visit and live at the site and that occupation was too short or functionally limited to have deposited all of the key traits in quantities sufficient to have been recovered by our excavations. The presence of Toyah-culture people at the site would be expectable, given the data from the region which indicates that Toyah occupations commonly occurred as close as around 40 kilometers to the mainland shoreline, and the documentation of Toyah phase sites in the central part of the coastal prairies (e.g., Hester and Parker 1970; Huebner 1987; Ricklis 1992b, 1996a).

Rockport Ware

Most of the sherds listed in Table 7-25 as belonging to the Rockport ware class are placed therein with some confidence, given the conjunction of key attributes such as high sand content (>40 percent), well-sorted sand grain sizes, thinness (generally 5 mm or less thick), and presence of asphaltum surface treatment. Rockport ware sherds were found in the Knoll Top, mainly in AU 1 and in the East Area in the top three 10-cm levels. The presence of Perdiz arrow points and probable bison bone fragments along with the sherds of Rockport ware in the latter area suggests the existence there of a component representing a short-term, relatively non-intensive Rockport phase occupation involving hunting of large game, the sort of occupation defined for the inland margins of the Rockport phase and identified as "Group 2 sites," or seasonal hunting camps (see Ricklis 1992b, 1995a, 1996a).

The 26 sherd groups typed as Rockport ware (see Figure 7-45, p-w) were distributed equally in the Knoll Top and East Area excavations. A complete absence of Rockport ware in the West Slope units suggests that Rockport phase people did not occupy that part of the site. In fact, only six sherds, representing a singe sherd group, and thus probably only one vessel, were found in the West Slope in AU 1 (see Table 7-25). These sherds pertain to a sandy-paste pot with a smoothed surface, black in color, and having a paste containing a considerable amount of sand (est. 30 percent of the clay body) and moderately dense crushed bone temper (approximately 10 percent of clay body). The typological classification of this group is uncertain; the moderate quantity of bone is similar to Toyah ceramics (see Black 1986; Ricklis 1995b), while the profusion of sand in the paste suggests that the vessel could have been coastal in origin (i.e., Goose Creek or Rockport ware).

Burned Clay Nodules

Small lumps or nodules of fired clay are common at prehistoric sites in southern Texas, and they were found in abundance in all excavations at the Buckeye Knoll site. A total of 102,217 specimens were recovered, including 49,330 from the Knoll Top, 39,245 from the West Slope (including the outlying unit, S54W123), and 13,642 from the East Area (Figure 7-46). The nodules range from pea-size to fist-size. Surfaces are both sharply jagged (along broken edges), and worn smooth, probably the result of weathering when exposed to the elements for an extended time.

As discussed earlier, concentrated clusters of burned-clay nodules were found at several locations in the Knoll Top and West Slope excavations. The clusters of nodules, sometimes associated with angular, fire-cracked pieces of rock, are interpreted as hearths, with the corollary inference that burned-clay nodules at the site represent cooking/heating activities. Residue analysis of a limited number of clay nodules appears to support this proposition (see Cummings and Puseman, Appendix C).

Since the containing matrices at Buckeye Knoll are all silty sand, it is clear that the burned clay nodules represent intentional transport of clay onto the site and are not the unintended result of simply building fires on/in the ground. Inferably, the occupants of the site removed clay from either nearby alluvial deposits, or from the basal sediments of the Beaumont Formation and used it to form clay lumps that could be heated and used as surrogates for hearth stones, boiling stones, and/or rock roasting platforms. While the data from the site are insufficient to precisely define the specific uses beyond inclusion in the apparent hearth features and the limited residue data, the presence of both burned-clay nodules and angular rocks within some of the exposed hearth features seemingly supports the inference that clay lumps were fired to serve as a substitute for stone in a heat-retention technology. A recently published study of burned-clay nodules from a Late Archaic context at site 41AT168 in Atascosa County (Turpin 2004) offers convincing evidence for the use of burned-clay nodules as substitutes for the sort of stone-cooking technology so abundantly represented by the burned rock middens of central Texas where, in contrast to the coastal plain, native rock (limestone) could be readily gathered in great quantities to serve in various cooking tasks (see discussions in Black et al. 1997).

As may be seen in Table 7-26, the vertical distribution of burned-clay nodules is uneven. In the two most extensive excavation locales, the Knoll Top and the West Slope, burned clay is relatively more abundant, in terms of both numbers and weights, in AUs 2 and 3 as opposed to AUs 1 or Zone 4 in the Knoll Top and AU 1 in the West Slope. This suggests that the greatest use of clay as a surrogate for stone was during the Middle and Late Archaic periods, and that relatively little such use took place during the subsequent Late Prehistoric period. This may in fact reflect a shift in cooking technology that involved the use of ceramic vessels during Late Prehistoric times, with ceramics constituting a new technology that rendered previous ones, such as rock-platform cooking and/or stone boiling, obsolete or at least less attractive.

A significant proportion of the fired-clay nodules from the Knoll Top and the West Slope bear a variety of impressions. While impressed-clay pieces comprise only less than three percent of all burned-clay nodules from the Knoll Top (ranging from as little as 1.1 percent in KT AUs 2 and 3 to 2.8 percent in KT AU 1), impressed specimens comprise a much greater proportion—as high as 23.1 percent—of the totals in the various AUs on the West Slope (see Tables 7-27 to 7-28). A total of 5,201 impressed pieces were recovered from the West Slope, as compared to a total of only 535 pieces from the more extensive excavation on the Knoll Top.

Analysis of the burned clay from these two excavation areas revealed impressions on both the surfaces and the interiors (i.e., along broken edges). Exterior or surface impressions are of several kinds: basketry or fabric impressions (Figure 7-46, n), pole impressions (see Figure 7-46, a-b[1], k-m[1]), and grass and/or stick impressions (see Figure 7-46, c-j). Additionally, though better considered a surficial alteration rather than an impression, it was observed that a significant number of pieces have smooth and/or flattened surfaces that contrast with the markedly undulating-to-jagged surfaces of the ordinary run of specimens. The types of impressions observed on nodule interiors were those of grass, small, thin sticks/twigs, or a combination of grass and twigs. The numbers and percentages of each type of impression are shown in Table 7-28.

In the present context, grass impressions consist of elongate and narrow cylindrical indentations made in the clay when it was still wet and, obviously, prior to fire hardening. The width (diameter) of the material is approximately 1 mm or less. Stick impressions have

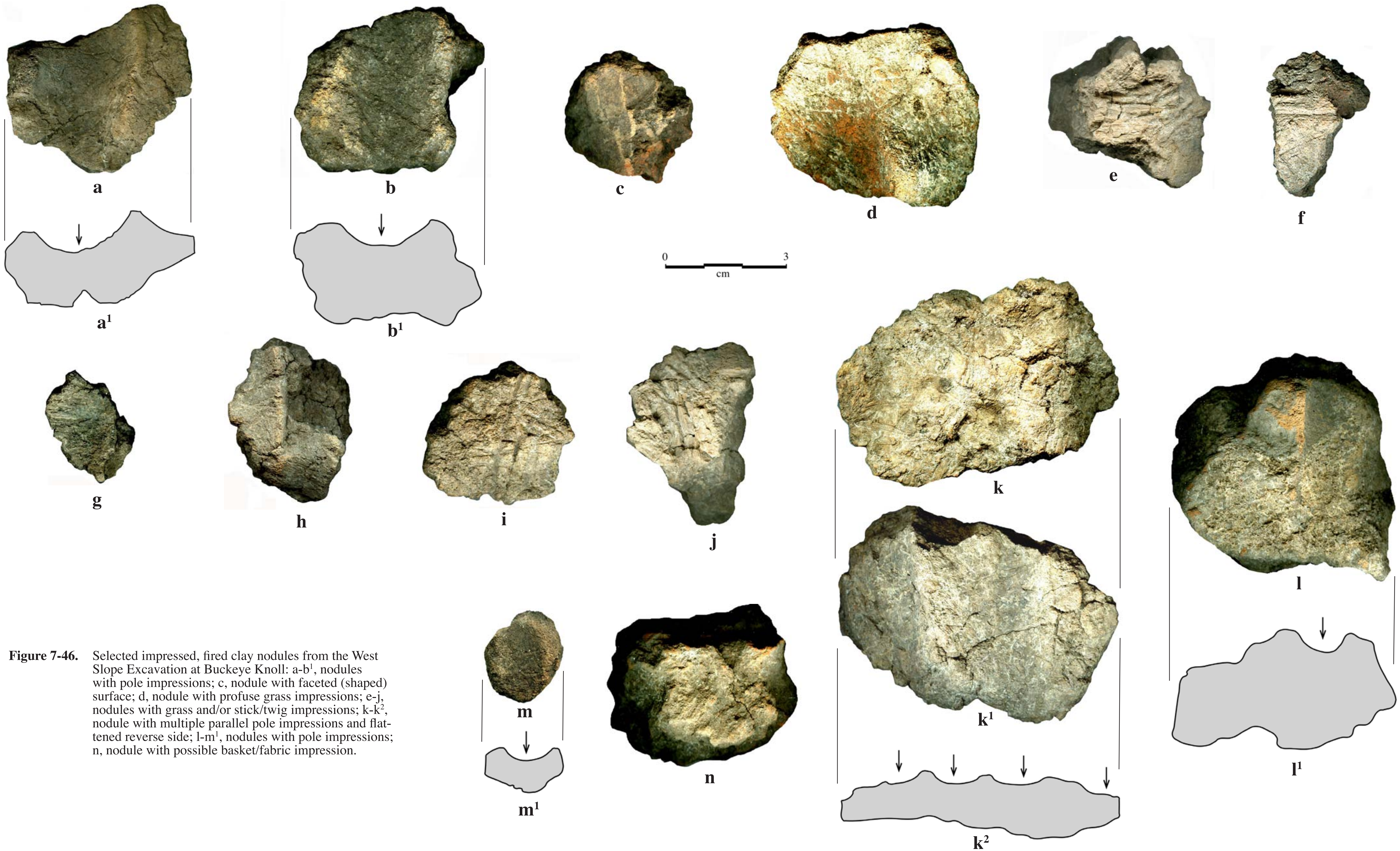


Figure 7-46. Selected impressed, fired clay nodules from the West Slope Excavation at Buckeye Knoll: a-b[1], nodules with pole impressions; c, nodule with faceted (shaped) surface; d, nodule with profuse grass impressions; e-j, nodules with grass and/or stick/twig impressions; k-k[2], nodule with multiple parallel pole impressions and flattened reverse side; l-m[1], nodules with pole impressions; n, nodule with possible basket/fabric impression.

Table 7-26. Frequencies and Weights of Impressed and Unimpressed Burned Clay Nodules Within the Analytical Units of the Knoll Top and West Slope Excavations at Buckeye Knoll.

Knoll Top AU	Impressed		Unimpressed		Totals		Percent Impressed	
	no.	wt. (g)	no.	wt. (g)	no.	wt. (g)	no.	wt. (g)
1	121	161	4,270	6,746	4,391	6,907	2.8	2.3
2	138	601	12,108	42,269	12,246	42,870	1.1	1.4
3	143	939	13,194	58,594	13,337	59,533	1.1	1.6
4	133	539	7,535	33,025	7,668	33,564	1.7	1.6
Totals	535	2,240	37,107	140,634	37,642	142,874	1.4	1.6

West Slope AU	Impressed		Unimpressed		Totals		Percent Impressed	
	no.	wt. (g)	no.	wt. (g)	no.	wt. (g)	no.	wt. (g)
1	—	—	—	—	0	0	0	0
1-2	266	2,604	1,447	5,434	1,713	8,038	1.6	32.4
2	843	7,370	10,402	39,259	11,245	46,629	7.5	15.8
2-3	467	5,279	1,850	14,130	2,317	19,409	20.2	27.2
3	1,937	12,820	16,199	57,326	18,136	70,146	10.7	18.3
Totals	3,513	28,073	29,898	116,149	33,411	114,222	10.5	24.6

a width/diameter that is greater, at approximately 2 to 5 mm. Pole impressions are quite distinctive, leaving an elongated depression in the clay surface that has a semicircular cross section as would have been created had the wet, unfired clay been pushed against the side of the cylindrical form of a thin pole, with a diameter ranging between approximately 1.5 and 5 cm (see Figure 7-46, a-b[1], k-l[2]). In at least one instance (Figure 7-46, k-k[2]), the burned-clay specimen retains several such impressions, all with parallel long axes, suggesting that it was pushed against a line of several poles that all had parallel alignment along the same axis. Some of the smaller "poles" actually may have been relatively large, thick sticks that were interwoven between upright, true poles that acted as a framework.

Virtually all the specimens with these surface impressions also bear interior grass, or, less commonly, small stick/twig (or thick grass?) impressions. This may be interpreted to mean that the clay that was pressed against sticks and/or poles had been mixed with grass and/or twigs prior to such application. Exterior grass impressions appear to be the result of the inclusive grass being pushed against the clay as it was smoothed or patted flat (c.f., Figure 7-46, d) or pushed against one or more poles (c.f., Figure 7-46, k-k[2]).

Based on these empirical observations, the following points can be suggested. First, a small percentage of the burned-clay nodules from the Knoll Top, and a much larger proportion of those from the West Slope, represent the intentional manipulation of wet clay against poles, bunches of small sticks, and/or basketry, or, perhaps more likely, fabrics woven from available natural fibrous materials. Second, the wet clay thus used was first mixed with grass and/or twigs. Third, the poles against which some of the clay was pressed were, in at least some cases, arranged in a row along parallel orientations. Finally, the clay pushed against these materials was frequently patted flat, often leaving impressions of the grass that was embedded in the clay, and presumably much of which was sticking out of the pressed clay.

In combination, all of these factors strongly suggest the use of clay as daub. The presence of inclusive grass accords with this, as grass was widely used in prehistoric and early historic daub, effectively as

Table 7-27. Frequencies and Percentages of the Types of Surface Impressions or Treatments Found on Baked Clay Nodules Within the Analytical Units of the Knoll Top and West Slope Excavations at Buckeye Knoll.

Knoll Top AU	Basketry/Fabric		Pole		Smoothed w/ Grass/Twigs		Two Smoothed Surfaces		One Smoothed Surface		Totals
	no.	%	no.	%	no.	%	no.	%	no.	%	
1	—	0.0	9	52.9	1	5.9	0	0.0	7	41.2	17
2	—	0.0	7	14.6	2	4.2	5	10.4	34	70.8	48
3	—	0.0	1	5.6	2	11.1	1	5.6	14	77.7	18
4	1	2.7	4	10.8	0	0.0	1	2.7	31	83.8	37
Totals	1	0.8	21	17.5	5	4.2	7	5.8	86	71.7	120

West Slope AU	Basketry/Fabric		Pole		Smoothed w/ Grass/Twigs		Two Smoothed Surfaces		One Smoothed Surface		Totals
	no.	%	no.	%	no.	%	no.	%	no.	%	
1	2	8.3	1	4.2	13	54.2	3	12.5	5	20.8)	24
1-2	8	7.8	14	13.7	8	7.8	18	17.6	54	53.4	102
2	36	11.0	45	13.8)	22	6.7	46	14.1	177	54.3	326
2-3	13	5.7	21	9.2	6	2.7	17	7.5	169	74.8	226
3	65	15.2	86	20.1	40	9.4	86	20.1	150	35.1	427
Totals	135	11.3	197	16.4	93	7.8	191	15.9	583	48.6	1,199

Table 7-28. Frequencies and Percentages of the Types of Impressions Observed Inside Burned Clay Nodules Within the Analytical Units of the Knoll Top and West Slope Excavations at Buckeye Knoll.

Knoll Top AU	Grass		Twigs		Twigs & Grass		Totals
	no.	%	no.	%	no.	%	
1	92	88.5	10	9.6	2	1.9	104
2	80	88.9	7	7.8	3	3.3	90
3	106	84.8	8	6.4	11	8.8	125
4	80	83.3	10	10.4	6	6.3	96
Totals	358	86.3	35	8.4	22	5.3	**415**

West Slope AU	Grass		Twigs		Twigs & Grass		Totals
	no.	%	no.	%	no.	%	
1	—	0.0	17	54.8	14	45.2	31
1-2	241	91.3	4	1.5	19	7.2	264
2	735	82.8	108	12.2	45	5.1	888
2-3	427	92.2	10	2.2	26	5.6	463
3	1,702	86.4	94	4.8	173	8.8	1,969
Totals	3,105	85.9	233	6.5	277	7.6	**3,615**

a binding agent that rendered clay more manipulable and impeded major cracking as the clay daub dried and shrank.

The presence of pole and stick impressions also fits with this interpretation, as thin, upright poles, often interwoven with sticks, were typically used as a wall framework in wattle-and-daub construction. Such construction techniques were commonly used during the Spanish Colonial period in Texas in the common jacal construction of that era, and have ancient antecedents to the south in Mesoamerica and northeastern Mexico that go back perhaps as far as the fourth millennium B.C. (MacNeish 1958).

The use of wattle-and-daub construction during the Archaic in southern Texas has no existing evidentiary precedence in the archaeological record, and it has been implicitly assumed that domiciles and other kinds of structures must have been simple and temporary hide- or mat-covered pole-frame constructions. Given the present paucity of empirical information on Archaic structures, it is perhaps advisable to remain open to a range of possibilities concerning the kinds of construction techniques that may have been employed. In light of the evidence to be presented further on concerning long-distance information flow during the Early Archaic at Buckeye Knoll, it is not unreasonable to consider the possibility of the dissemination of knowledge of wattle-and-daub construction techniques from northeast Mexico to the Archaic peoples living in south Texas.

Because no other evidence was found for structures in the West Slope Excavation, no firm conclusions are possible as to what kind of structure the presumed daub may represent. Possibilities might include domiciles or smaller structures such as storage bins. No postmolds or other structural evidence was encountered, nor was there any discernible patterning in the distribution of daub fragments that could serve as clues to their spatial arrangement. On the other hand, the concentration of these items within the West Slope Excavation block does suggest a localized use of a clay mixed with grass in that area, and highlights the fact that these objects are not typical of the more generalized use of fired-clay lumps in cooking activities. Future investigation of sites in the region should give special attention to the identification of impressed fired clay and to determining if such material occurs in association with definable evidence for structures.

Chapter 8

Vertebrate Faunal Bone

Susan L. Scott

Introduction

Vertebrate faunal remains recovered from the Buckeye Knoll site offer an unparalleled opportunity to assess long-term changes in the subsistence economy of prehistoric inhabitants of the central Texas coastal plain. Excavations at the site produced a large sample of faunal remains, some dating as far back as ca. 4000 B.C. Unfortunately, not all excavations could be analyzed, so the faunal assemblage had to be sampled. Areas sampled include one 2-by-2 m unit on the Knoll Top or "KT" (S14W84), two units on the West Slope or "WS" (S29W116 and S29W118 combined), and three units from two portions of the East Area or "EA" (S4W12 separately; S18W18 and S20W20 combined). Preservation varies a bit between areas, inferably due, in part, to perturbations in stratigraphic integrity through time, an observation especially true for the Knoll Top sample. However, material from West Slope deposits offer a chronologically unbroken sequence of exceptionally well-preserved bone spanning much of the Middle Archaic through early Late Prehistoric periods in Texas (ca. 3000 B.C. to 1000 A.D.). With the West Slope as an anchor, the Buckeye Knoll sample provides a framework for understanding broad trends in subsistence through time, and can be supplemented by data from other sites and other areas of 41VT98.

Among the research questions of interest on the central Texas coastal plain are climate change through time and its effect on the resources available; the structure of the subsistence economy and its stability through time; and the relationship between the coast proper and inland sites such as Buckeye Knoll, *viz*: were these two areas seasonal manifestations of the same subsistence system, or were they separate economies with some other form of interaction?

The central Texas coastal plain today is near the interface between wooded savannahs and more arid landscapes, making it a good barometer of long-term rainfall deficits or surpluses in the general area. Some probable climate-related variability in available terrestrial resources has already been reported for the central Texas coast (Scott and Dukes 2002). Bison, for example, appear to have been widely available by the time of the Late Prehistoric Rockport phase (after ca. A.D. 1300) at the Guadalupe Bay site, presumably a consequence of late prehistoric rainfall patterns extending prairie habitat southward. Mammals in that size range are much less common in midden deposits prior to 1000 or so A.D., perhaps because they were only periodically available locally.

The structure of the late prehistoric subsistence economy, as revealed by coastal sites such as Guadalupe Bay (Scott and Dukes 2002), has shown several trends in fish utilization that indicate a growing human population putting increased pressure on local resources. This assessment is based on optimal foraging models that specify two responses to resource shortfalls: diversification by opportunistically adding previously unexploited taxa (including more "second-line resources"), or intensification efforts by expending additional pursuit time to gather more of a traditionally exploited resource. The latter may show up in demographic profiles of primary prey, such as white-tail deer, with increasing numbers of young, immature individuals being taken as a consequence of hunting pressure. Or, where aquatic resources are available, intensification may take the form of increased time devoted to fishing, a resource base unaffected by progressively more constricted terrestrial hunting territory (e.g., Kelly 1995). At the Guadalupe Bay site, the bulk of which was deposited near the end of the sequences exhibited by the WS and KT middens, intensification of fishing takes two forms: the addition of smaller fish to the resource base by Late Archaic times (Aransas III, or A.D. 400-700), roughly coeval with KT upper AU 2 and lower AU 1, and upper AU 1 for the WS; and larger fish in the Rockport phase (by ca. A.D. 1300), a time period largely postdating the KT/WS deposits.

Finally, the question of seasonality arises. Given the resource base available on the Texas coast, there was likely some sort of hunter-gatherer seasonal round. There are several proposed models of prehistoric settlement involving the relationship between inland and coastal sites, but all deal only with relatively recent times (A.D. 1 to the Historic period). For southern Texas in the area around Baffin Bay, Herman Smith (1986) hypothesized that after A.D. 1250 coastal settlements were occupied in fall and winter, with inland sites occupied in spring and summer. For the upper coast, Lawrence Aten (1983) argues the seasonal round is exactly the opposite, with inland occupation in fall and winter, and coastal occupation in spring and summer. For the central Texas coast, Robert Ricklis (1990, 1996a) has argued that coastal sites were occupied in fall and winter, and, at that time, coastal resources would have been plentiful enough to support relatively large aggregations of up to 500 people, as is shown by ethnohistorical data. Spring and summer are postulated to have had smaller, kin-based groups dispersing to hunt terrestrial game inland. Given the 4,000-year time depth of WS deposits, the question of seasonal duration of occupation can be extended back much further in time. The KT and EA samples offer insight into more recent times.

Materials and Methods

Excavations at the Buckeye Knoll site produced an enormous quantity of animal bone, a testament to the high pH of soils in the area.[1] It was not possible to examine all of the excavated bone for this analysis. Instead, samples were selected based on the relative integrity of the deposit (noted in the field) and degree of preservation (assessed in the lab). Due to the extraordinary preservation in WS deposits, two 2-by-2-m excavation units were analyzed, while for the less pristine KT, one 2-by-2-m unit was examined. In addition, three small samples from excavation units in the East Area were assessed. Although this total sample represents only a small fraction of the bone excavated, more than 90,000 fragments were examined, of which 74,085 were identifiable, minimally to the level of taxonomic class, with at least 126 mutually exclusive taxa represented (Table 8-1).

All vertebrate remains from selected samples at Buckeye Knoll were sorted and identified to the most specific taxonomic level possible given their surviving morphology. Zooarchaeological reference collections from the University of Southern Mississippi, the University of Michigan's Museums of Anthropology and Zoology, and the Smithsonian Institution were used to identify the remains. Almost all identifications are based on direct comparisons of archaeological bone with skeletal material rather than written manuals, although the latter were consulted occasionally to help narrow possibilities in the case of unusual specimens.[2]

In addition to taxon and element, evidence of cultural or natural modification was noted, along with fragment size (in relation to a complete element), symmetry, portion, and, when possible, approximate age. Aging of whitetail deer was accomplished using traditional indicators such as unfused epiphyses (e.g., Gilbert 1990:100-109) and dental eruption and wear sequences (per Severinghaus 1949). In addition, very young deer/antelope were aged using the University of Southern Mississippi's series of cranial and postcranial remains of deer younger than 18 months. Ages for very young deer (< 6 months old) usually relied on an assessment of size and degree of ossification of postcranial elements because teeth in this age group are generally fragile and excessively fragmented. In some cases, very young (fetal or newborn) remains are recorded as "indeterminate long bone" because the specific limb could not be determined from the surviving diaphysis. Likewise, in the case of metapodials III/IV, which fuse at or near birth in whitetail deer to form the midshaft portion of metacarpals and metatar-

[1] Low soil pH (below 7.0) is the greatest detriment to post-depositional bone preservation. The pH of soils at Buckeye Knoll is very alkaline, between 7.5 and 8.4 (Scott 1992:418).

[2] I am indebted to Drs. H. Edwin Jackson, George Kulesza, Richard Redding, and Melinda Zeder for their assistance identifying unusual specimens. Even with their help, "Texas horned lizard" was only identified using Olsen's (1968) *Fish, Amphibian and Reptile Remains from Archaeological Sites*.

Table 8-1. List of Faunal Species Identified at Buckeye Knoll.

Opossum (*Didelphis virginianus*)	Oldsquaw (*Clangula hyemalis*)
Shorttail shrew (*Blarina brevicauda*)	Scoter (*Melanitta* sp)
Eastern mole (*Scalopus aquaticus*)	Ruddy duck (*Oxyura jamaicensis*)
Cottontail rabbit (*Sylvilagus floridanus*)	Swainson's hawk (*Buteo swainsoni*)
Swamp rabbit (*S. aquaticus*)	Broad-winged hawk (*B. platypterus*)
Desert cottontail (*S. auduboni*)	Crested caracara (*Caracara cheriway*)
Blacktail jackrabbit (*Lepus californicus)*	Turkey (*Meleagris gallopava*)
Gray squirrel (*Sciurus carolinensis*)	Greater prairie chicken (*Tympanuchos cupido*)
Fox squirrel (*S. niger*)	Bobwhite (*Colinus virginianus*)
Plains pocket gopher (*Geomys bursarius*)	King rail (*Rallus elegans*)
Ground squirrel (*Spermophilus* sp*)*	Clapper rail (*R. longirostris*)
White-footed/Pygmy mouse (*Peromyscus* sp*)*	Virginia rail (*R. limnicola*)
Cotton rat (*Sigmodon hispidis*)	Sora (*Porzana carolina*)
Woodrat (*Neotoma* sp)	Black rail (*Laterallus jamaicensis*)
Rice rat (*Oryzomys* sp)	Common moorhen (*Gallinula chloropus*)
Pocket mouse (*Perognathus* sp)	Coot (*Fulica americana*)
Beaver (*Castor canadensis*)	Black-bellied plover (*Pluvialis squaterola)*
Muskrat (*Ondatra zibethecus*)	Barn owl (*Tyto alba*)
Coati (*Nasua nasua*)	Blue jay (*Cyanocitta cristata*)
Raccoon (*Procyon lotor*)	Rufous-sided towhee (*Pipilo erythrophthalmus*)
Striped skunk (*Mephitis mephitis*)	Mourning dove (*Zenaida macroura*)
Mink (*Mustela vison*)	Snapping turtle (*Chelydra serpentina*)
Gray fox (*Urocyon cinereoargenteus*)	Stinkpot (*Sternotherus odoratus*)
Domestic dog (*Canis familiaris*)	Mud turtle (*Kinosternon* sp)
Wolf (*Canis lupus/niger*)	Box turtle (*Terrapene* sp)
Cougar (*Felis concolor*)	Aquatic Emydid (Cooter/slider/map turtle)
Ocelot (*F. pardalis*)	Cooter/Slider (*Pseudomys concinna*)
Whitetail deer (*Odocoileus virginiana*)	Chicken turtle (*Deirochelys reticularia*)
Antelope (*Antilocapra americana*)	Map turtle (*Graptemys* sp)
Javelina (*Pecari angulatus*)	Softshell turtles (*Apalone* sp)
Bison (*Bison bison*)	Sea turtle (Chelonidae/Dermochelyidae)
Pied-billed grebe (*Podilymbus podiceps*)	Pit viper (Viperidae)
Neotropic cormorant (*Phalacrocorax brasilianus*)	Non-poisonous snake (Colubridae)
Great blue heron (*Ardea herodius*)	Water snake (*Nerodia* sp)
Green heron (*Butorides virescens*)	Garter snake (*Thamnophis* sp)
Yellow-crowned night heron (*Nyctanassa violacea*)	Hognose snake (*Heterodon* sp)
Least bittern (*Ixobrychus exilis*)	Mud and rainbow snake (*Farancia* sp)
Snow goose (*Chen caerulescens*)	Racer/Whipsnake (*Coluber*/*Masticophis*)
Canada goose *(Branta canadensis)*	King/Rat/Corn snake (*Elaphe*/*Lampropeltis*)
Fulvous whistling duck (*Dendrocygna bicolor*)	Rat snake (*Elaphe* sp)
Mallard (*Anas platyrhynchos*)	King/Milk snakes (*Lampropeltis* sp)
Gadwall (*A. strepera*)	Racer (*Coluber sp)*
Common pintail (*A. acuta*)	Ringneck snake (*Diadophis* sp*)*
Blue-winged teal (*A. discors*)	Crowned snake (*Tantilla* sp*)*
Green-winged teal (*A. crecca*)	Brown snake (*Storeria* sp*)*
Northern shoveler (*A. clypeata*)	Texas horned lizard (*Phrynosoma cornutum)*
Wood duck (*Aix sponsa*)	Bullfrog (*Rana catesbeiana*)
Lesser scaup (*Aythya affinis*)	Frog (Ranidae)
Bufflehead (*Bucephala albeola*)	Toad (Bufonidae)

continued.

Table 8-1. (concluded.)

Lesser siren (*Siren intermedia*)	Blue catfish (*I. furcatus*)
Requiem shark (Carcharhinidae)	Yellow bullhead (*I. natalis*)
Eagle ray (Myliobatidae)	Black bullhead (*I. melas*)
Whiptail ray (Dasyatidae)	Flathead catfish (*Pylodictis olivaris*)
Gar (Lepisosteidae)	Temperate basses (*Morone sp*)
Alligator gar (*Atractosteus spatula*)	Striped bass (*M. saxatilis*)
Ladyfish (*Elops saurus*)	Sunfish (*Lepomis* sp)
Gizzard shad (*Dorosoma cepedianum*)	Longear sunfish (*L. megalotis*)
American eel (*Anguilla rostrata*)	Bass (*Micropterus* sp)
Herring/Shad (Clupeidae)	Largemouth bass (*M. salmoides*)
Menhaden (*Brevoortia sp)*	Crappie (*Pomoxis* sp)
Minnow (Cypriniformes)	Snapper (Lutjanidae)
River carpsucker (*Carpiodes carpio*)	Sheepshead (*Archosargus probatocephalis*)
Blue sucker (*Cycleptus elongatus*)	Seatrout (*Cynoscion* sp)
Quillback (*Carpiodes cyprinis)*	Spotted seatrout (*Cynoscion nebulosis*)
Smallmouth buffalo (*Ictiobus bubalus)*	Spot (*Leiostomas xanthurus*)
Smallmouth/Black buffalo (*I. bubalus/niger*)	Black drum (*Pogonias cromis*)
Spotted sucker (*Minytrema melanops*)	Red drum (*Scianops ocellata*)
Gafftop (*Bagre marinus*)	Atlantic croaker (*Micropogonias undulatus)*
Hardhead catfish (*Arius felis*)	Flounder (*Paralichthyes* sp)
Channel catfish (*Ictalurus Punctatus)*	Mullet (*Mugil* sp)

sals, fusion is noted as "dunf" (diaphysis unfused) in the database.

Fish size is an important parameter to measure because the kind of technology used in capture can affect the size profiles created by aboriginal decision making. Fish continue to grow throughout their lives, although the rate of growth decreases with age. For fish in Buckeye Knoll samples, approximate standard length (SL, the length from the rostrum to the base of the tail) was recorded in 5- to 20-cm increments, depending on element and level of identifiability, using specimens of known length in the University of Southern Mississippi's comparative collection. In addition, fish vertebrae were divided into size classes, in millimeters, and the anterior face of all atlases were measured to the nearest .01 mm.

Comments on Methodology

A broad approach was taken during this analysis to reduce the amount of "unidentifiable" bone by identifying even very fragmentary pieces to general taxonomic categories. Since some zooarchaeologists would argue that all taxonomic identifications, no matter how general, should be made only when an element is identifiable, some explanation seems warranted of how these more general identifications were made.

Bone texture, even in the absence of distinguishing landmarks, frequently alludes to the parent bone, if only very generally. Mammalian bone, for example, is usually characterized by compact bone alone (long bone shafts), compact bone over irregular trabeculae (axial elements and the articular ends of long bones), and irregular trabecular bone sandwiched between compact bone (skull fragments, or ribs, which are easy to distinguish based on curvature, thickness, trabecular structure, and surface morphology). Size of the animal (very large, large, medium, small, or micro) is determined by the size of the fragment, the thickness of the compact bone, and the size of trabeculae. Bird bone also exhibits irregular trabeculae covered by varying thicknesses of compact bone. However, in general, compact bone in birds is thinner, has a polished (as opposed to smooth or striated) texture, and trabeculae are usually larger than is true for mammalian bone. The latter is especially true of the wing, sternum, and synsacrum, less so for leg bones, which are usually more robust. If one considers the physics of flight and other forms of mobility, structure clearly follows function. For both mammals and birds, as one moves from the more proximal to the more distal elements, the relative thickness of compact bone increases, due to greater weight-bearing requirements.

Other classes are also distinctive and distinguishable. Turtle plastron and carapace fragments, like large-mammal skull fragments, are trabecular bone sandwiched between compact bone. However, the trabeculae are evenly dispersed and of the same size, and the compact bone is usually distinctive (flat, smooth, pitted, ridged, etc., and may exhibit hinges or scute grooves). The same is true for turtle long bones; articular ends are characteristically porous, but the pores are very uniform in size and shape.[3]

Snake vertebrae preserve well, being comprised of compact bone almost exclusively. Their ball and socket "pop bead" structure is unique. More specific identifications can be made by observing the size and shape of the ventral keel (narrow, curved ventral processes are present in water and garter snakes; more rounded protuberant ventral processes are present in pit vipers; hognose snakes have a distinctive spoon-shaped ventral ridge), and the overall size and shape of the specimen (racers and whipsnakes have long, thin vertebrae; others have more compact, squarish vertebrae). The height of the dorsal process and the length of transverse processes provide further clues to determining taxon (see Auffenberg 1969).

Amphibian long bones lack porosity; they are compact bone with amorphous calcareous material at either end. Only the structure of the long bone shafts, ilium, dental elements, and some vertebrae are useful for identification purposes even to class.

Finally, fish bone, even small fragments of fish bone, can be identified. In many species, skull fragments are formed in layers that may erode postdepositionally producing a flaky texture (this is particularly true of perciform fish and most suckers). Skull fragments from fishes are distinguishable from other taxonomic classes even though they may be too generalized in structure to identify. If complete, most elements are identifiable at least to family; if not, depending on the portion and obscurity of the element, identification may be "unidentifiable fish skull fragment," which at least indicates that fish processing occurred nearby.

Fish, unlike most vertebrate taxa, can continue to grow throughout their lives. Consequently, the size of many elements can be important indicators of fishing technology. Larger fish may be caught using certain technologies, smaller fish using other less-selective means. Depending on the degree of identification achieved, it is possible to compare the vertebrae (and other elements) to specimens of known size, and estimate length in 5- to 20-cm increments with a good comparative collection. Because this methodology typically produces a fairly large (and presumably more accurate) MNI, MNI can then be used to ascertain patterning in fish procurement (e.g., typical microenvironment, seasons of availability, technology employed, etc.). As a second, more objective line of size assessment, all fish vertebrae from Buckeye Knoll were divided into size classes, very small (1-2 mm), small (3-4 mm) and medium (5-6 mm). Above 6 mm, vertebral diameter was sorted into 1 mm size classes (7, 8, 9 mm, etc.). In addition, the anterior face of all fish atlases was measured to the nearest .01 mm.

In sum, when approaching an assemblage, each bone fragment is examined closely, and all possible sources are ruled out, taking into account the approximate size of the individual represented. It is possible to be left with pieces that cannot be confidently identified to a single class.[4] These nondiagnostic fragments may be relegated to unidentifiable bone, along with other fragments lacking distinguishing landmarks, shape, or texture, or they may be designated to some more general category than class (e.g., small mammal/bird).

At Buckeye Knoll, unidentifiable bone comprises four to eight percent by weight in all AUs, except AU 4 in the KT sample. KT Level 12 (Lot #3293), which produced an unusually large sample of badly scoured bone. Even though the level was sorted twice, once early in the analysis, once after the identification process was more "seasoned," 22 percent of the sample, by weight, could not be identified even to class. Of that identifiable as large mammal, a higher percentage fell into the "indeterminate" category (large amor-

[3] This is also true of immature bird and mammal bone, in accordance with biologists' axiom that "ontogeny recapitulates phylogeny." In plain English, this means that each developing embryo passes through stages that reflect the evolutionary development of that taxon. Human embryos, for example, pass through a stage during which they have gills like fish.

[4] As Brian Shafer (1995) points out, distinguishing between rabbit long bone shaft fragments and midshaft fragments from bird long bones can be difficult, although it could be argued that they still can be classified as small mammal/bird, which indicates small game was being consumed.

phous pieces of cancellous bone tissue) than is true of the rest of the samples. Coincidentally, Level 12 is believed to be the deflated remnant of a Middle Archaic deposit, correlating extensive evidence of mechanical erosion with other geologic evidence of a winnowed assemblage resulting from the erosion that created a geologic unconformity at the interface of Zones 2 and 3. Because of this anomaly, the reliability of the faunal sample from KT AU 4 is not as secure as from other contexts at the site, and, based on present evidence, probably should be viewed as translocated bone from the overlying KT AU 3 occupation, or perhaps an occupation whose detritus was deposited in sediment removed by erosion.

Having discussed the importance of attempting to identify every piece of bone in an assemblage, at least to class or suborder regardless of fragment size, methods of quantification require brief discussion. Traditional quantitative measures, NISP (Number of Identified Specimens) and MNI (Minimum Number of Individuals) are used in this report. In addition, relative bone weight is reported as an unusually reliable quantitative method capable of delineating the "broad strokes" necessary to map regional comparisons. Bone weight allows one to assess the composition of an assemblage very directly. It is a robust method that compensates for fragmentation and differential identifiability, allows incorporation of nearly all the bone in an assemblage, and appears to compensate for interobserver variability (cf., Jackson and Scott 1999).

Taphonomic Processes

Discussions of taphonomic processes are now common in most faunal reports. How closely the recovered assemblage represents the "death" assemblage is affected by numerous factors, both natural and cultural. Natural factors include soil chemistry (both pH and granulometry), geologic agents of deposition (human or natural), and attrition (weathering and bioattrition). Cultural factors include butchering, processing, and consumption patterns, all of which can be affected by ephemeral circumstances beyond the control of the archaeologist. Several ethnographically observed cultural factors are known to influence decisions related to the transport of meat resources to the area of consumption. These include size of prey, distance between the kill (or collection) site and the area of consumption, weather conditions, relative need for food, mode of transport (e.g., walking vs. canoe travel) and territorial boundary issues, both social and geographical. To a substantial extent, one must assume equivalent cultural processing techniques for each taxon regardless of time period, making much of the variability between assemblages largely a function of taxa available in the catchment area from which sustenance is drawn.

Turning to "natural" taphonomic factors, the composition of KT and WS bone samples by level is shown in Figures 8-1, 8-2, 8-3, and 8-4. The quantity of bone per level varies from 236 bone fragments (KT Level 15) to 2,500 (WS Level 7)[5]. The uppermost and lowermost levels in both excavation areas yielded relatively few bones, though the sample sizes are still large enough to brook comparison. Waxing and waning quantities in mid levels may relate to intensity of occupation or rate of aeolian sediment deposition or both.

Chemical aspects of post deposition are close to ideal at the site, with an average pH over 8.0. However, the same is not true of mechanical factors affecting the assemblage, and post-depositional circumstances may have impacted some of the samples significantly. It was apparent from the outset of analysis that almost all bone from the West Slope was extraordinarily well preserved throughout all but the lowest levels of the two-meter deep sequence, whereas Knoll Top samples had pockets and levels in which the bone had suffered extensive damage from both chemical and mechanical attrition. Poor preservation due to mechanical factors was particularly true of most of KT Levels 12 (Lot #3293) and 13 (#3294), and all of Level 14 (#3295). The latter samples, possibly the remains of a deflation episode, exhibited scouring, pitting, extensive root etching, and also had some unknown chemical process affecting the bone, some of which had a soapy feel. Because many of the bones in these levels and those below them had lost even "textural" clues to origin, unidentifiable bone contributes over 20 percent by weight and more than 40 percent by count to the KT AU 4 samples (see Figures 8-1 and 8-2, Levels 12 to 16). In contrast, the WS deposit exhibited extraordinary preservation for all levels except the very lowest, where minor amounts of eroded, mineralized bone fragments were encountered (see Figures 8-3 and 8-4).

Cultural refuse-discard practices may have contributed to differential preservation in various areas of the site. Trampling in intensively occupied areas can reduce sample size due to the probability that small or

[5] Because two 2-by-2-m excavations comprise the WS samples, level totals were divided by 2 to standardize volumetric comparisons.

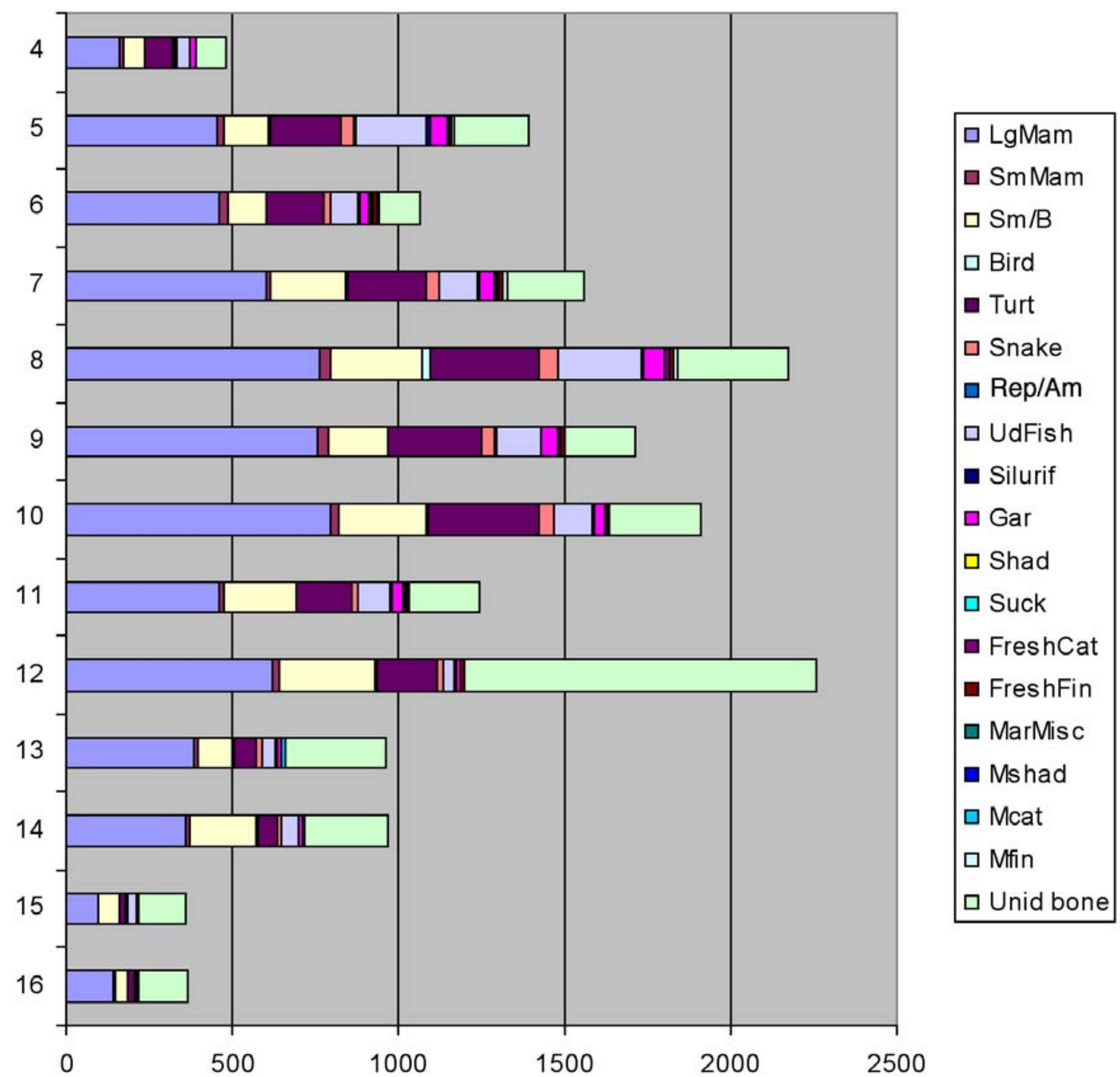


Figure 8-1. Bar graph showing bone counts by taxa in 10-cm levels, Unit S12W82, Knoll Top Excavation Area.

fragile bones are less likely to survive on the surface long enough to be buried. On the WS, on high ground in an area less likely to have been an inhabited living surface precisely because it is sloped, the average NISP per level is 1,380. The uppermost and lowermost levels of the WS deposit had the smallest samples. Levels 20, 21, and 22 collectively produced a sample NISP of 1,335, very close to the mean, possibly because bioturbation churned a deposit that originally ended with Level 20. The relative dearth of bone in Levels 11 and 12 may indicate a hiatus in occupation, also suggested by a stratigraphic break from a dark organic midden (AU 2) to gray sand with less cultural material (AU 1).

The average NISP per KT level is 1,025 fragments, 25 percent below the WS mean, with smaller samples again in the uppermost and lowermost levels. Unlike the WS deposit, the composition of the KT sample is dominated by large-mammal remains (46 percent versus 26 percent) possibly because, being more robust, they were better able to withstand human traffic.

An even lower yield is true of the East Area units, with only 279 identified bones per level for S18W18 and S20W20 combined, and 360 per level for S04W12. For these outlying areas, low yield may be due to less intensive occupation either due to settlement type and duration or due to a reduced number of inhabitants.

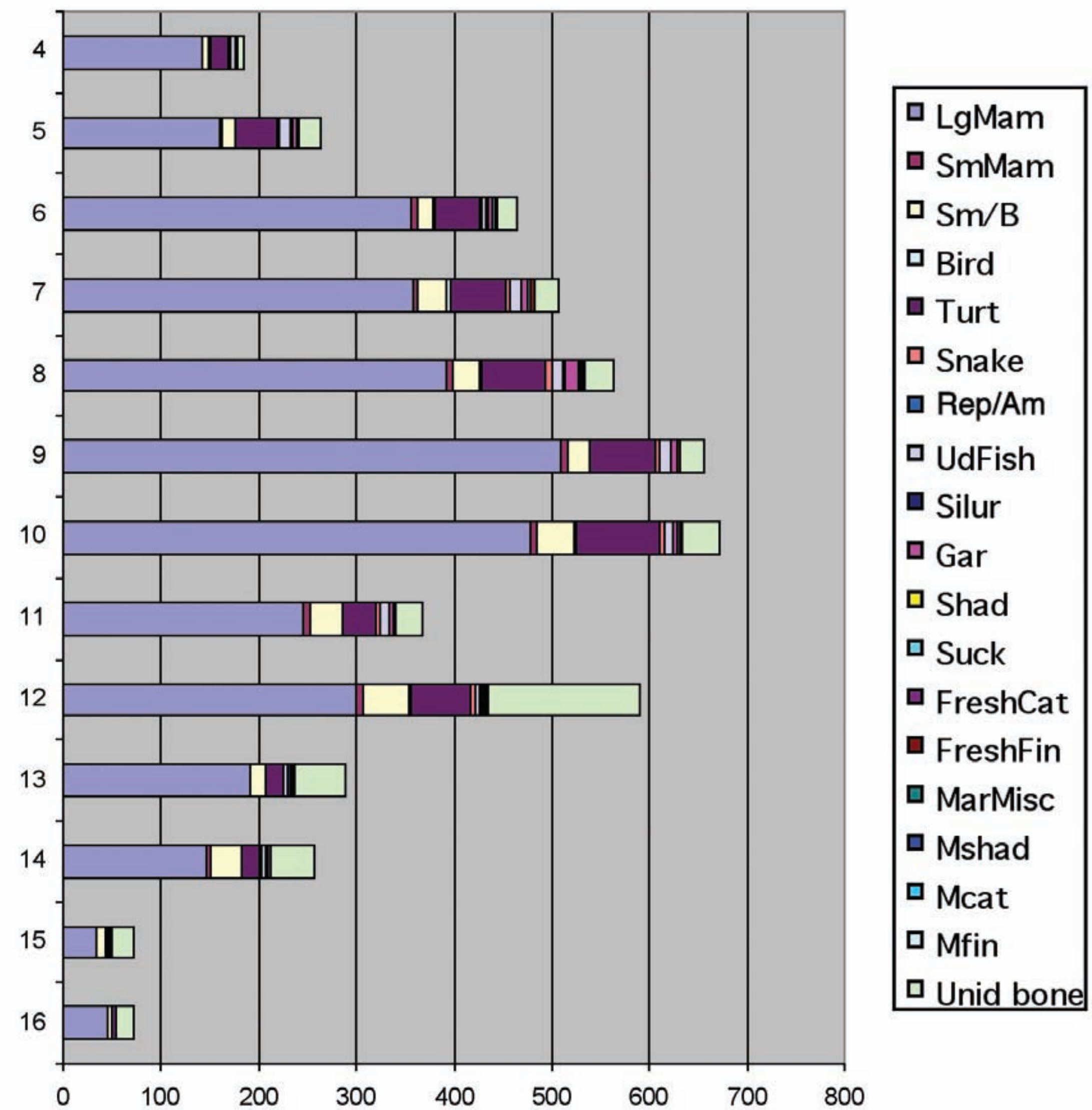


Figure 8-2. Faunal bone weight, in grams, for 10-cm levels in Unit S12W82, Knoll Top Excavation Area.

Although preservation overall in the EA was poorer than in other areas of the site, the bone there did not exhibit the same degree of battering witnessed in the KT samples.

Finally, biological agents of attrition require mention. Carnivore-gnawed bone was recorded only in WS samples, possibly because dogs had access to refuse there, but more likely because the bone surfaces were better preserved. The prevalence of such gnawing is not great (less than .01 percent). However, all the bones surviving such treatment are relatively large deer and/or antelope remains, presumably because smaller scrap bone was completely consumed. Although rodent gnawing was observed on many more samples from all areas of the site, it is unlikely to have had much effect on the assemblage composition.

Returning to cultural aspects of the assemblages, butchering marks were noted only occasionally, but

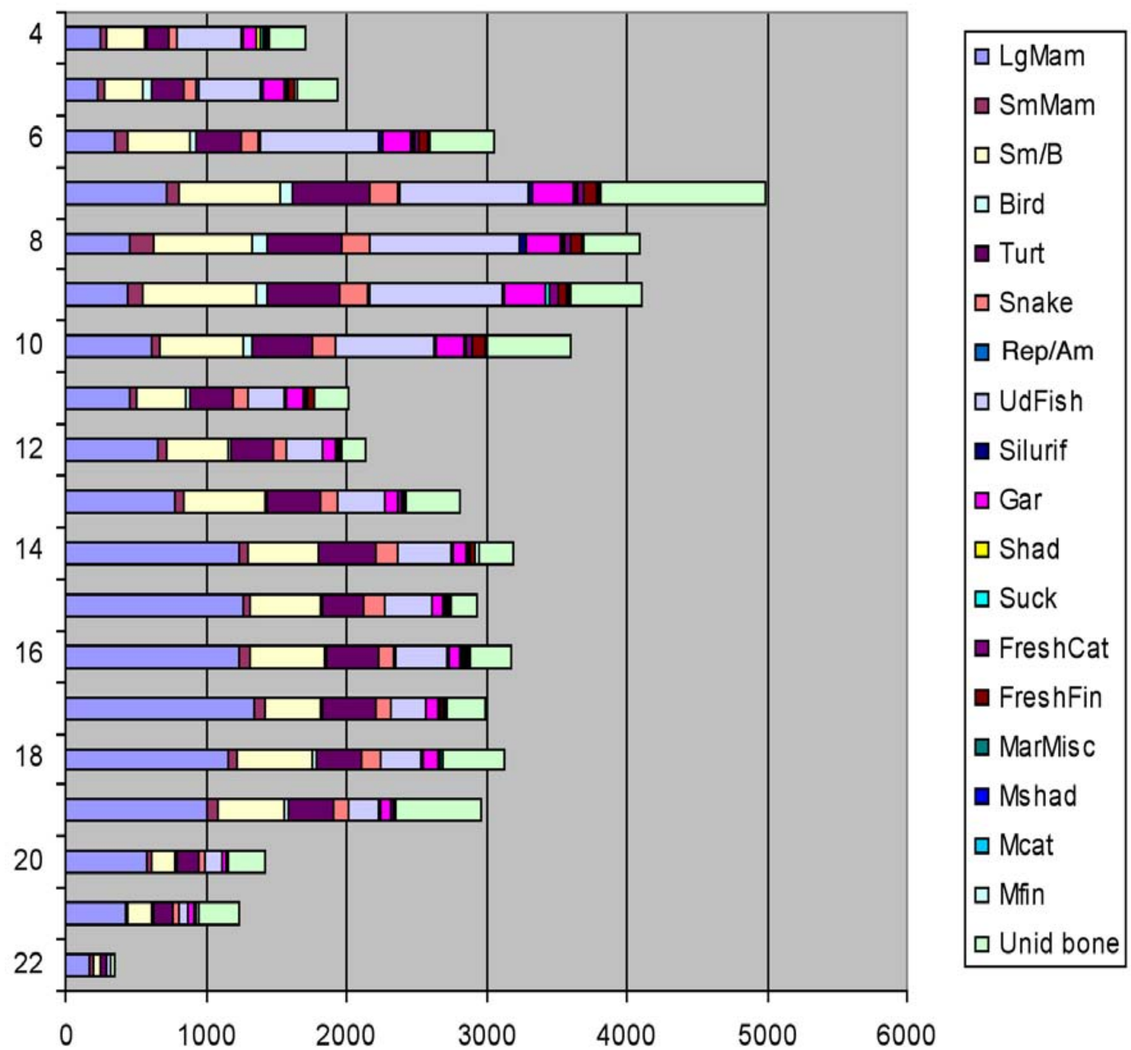


Figure 8-3. Faunal bone weight, in grams, for 10-cm levels in the West Slope Excavation Area.

include use of both cutting and chopping tools. Skinning marks were observed on the anterior face of a deer cubonavicular (Lot #3572) and on both anterior and posterior surfaces of a metatarsal about 2 cm above the distal condyles (#3559). Dismemberment marks were observed on the posterior distal shaft of a deer femur above the lateral condyle (#3266), on the medial surface of a distal scapula just above the glenoid cavity (#3569), and on the ventral face of an ilium 1-2 cm above the lip of the acetabulum (#3562). The latter likely indicates the use of small tools, as opposed to chopping tools, for disarticulation of the hindquarter (Binford 1981:113-114). Chopping tools, however, were in use at least occasionally, based on a "cervical," (i.e., adjacent to the cranium) vertebra from a large bass that had been hacked cleanly in half (#3285). Finally, multiple striations on the proximal lateral shaft of a deer femur were observed, but their purpose is difficult to surmise given that they are in an area unlikely to have been affected by skinning or disarticulation. The marks may have been produced during removal of the periosteum in preparing for marrow extraction (cf. Binford 1981:134-13).

Charred bone may relate to cooking (roasting) or disposal (incineration). Overall, the quantity of charred bone per AU in the main area of the site ranges from 17 to 37 percent, with that from the WS falling between 21

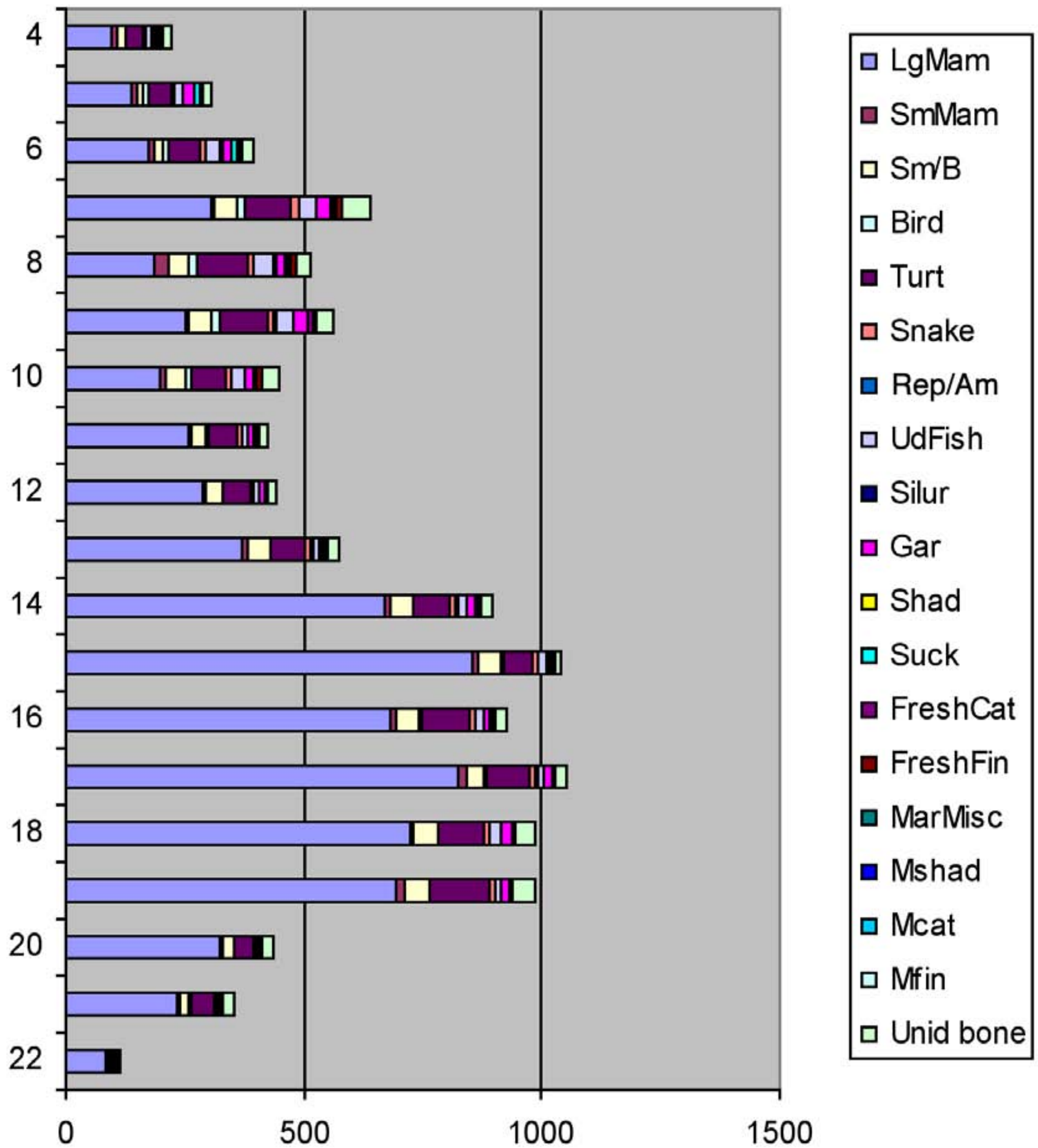


Figure 8-4. Bone weight by 10-cm levels, West Slope Excavation Area.

and 30 percent, and KT assemblages being much more variable, with 17 to 37 percent charred. In both units, turtles were most likely to be charred, 32 to 44 percent in the KT samples and 46 to 49 percent in the WS deposits, presumably a consequence of being roasted in the shell. Charring of large-mammal bone is the next most common category, with 27 to 44 percent of KT AUs and 33 to 38 percent of the WS samples, followed by small mammals/birds (15 to 39 percent), fish (14 to 24 percent) and snakes (11 to 23 percent). Evidence of roasting in the form of partially charred bones include a rat femur, a jackrabbit calcaneum (both from WS AU 1), and a softshell turtle carapace fragment (WS AU 3). Charring was a bit more prevalent in the East Area, ranging from 37 percent (S18W18, S20W20) to 41 percent (S4W12). Turtle shell again exhibited the highest rate of burning, with 63 percent charred in both EA areas. Large and small mammals and birds, again, are the next most frequently charred (37 to 46 percent), followed by fish (30 to 33 percent) and snakes (14 to 26 percent). Roasted bones exhibiting zones of charring in the EA include a deer/antelope distal calcaneum, and a deer/antelope radius shaft fragment charred only on the medial side (both from S4W12).

It is of considerable interest that snakes and fish were more or less equally charred. For snakes, many of which burrow, the somewhat low incidence of charring could stem from the fact that some are commensal inclusions, but might also be a consequence of food preparation methods. Irregular surfaces of vertebrae, from all taxa, make boiling the most efficient meat conservation method (Binford 1981). However, collectively only eight percent of other potentially commensal inclusions (shrews, moles, rats and mice, pocket gophers, armadillo, lizards, frogs and toads) were burned, indicating first, that these taxa may have been consumed at least occasionally, and second, because there is a higher incidence of charring in snake remains, many or most of them may have been consumed.

Results

Tables 8-2, 8-3, and 8-4 show counts (NISP), weights, and MNI by AU for the four excavation areas responsible for the faunal sample: the West Slope, the Knoll Top, and two separate locations in the East Area. Because of their near ubiquity, and the absence of any subsistence value, gar scales and deer antler/antelope antlers/horn are tabulated separately, and are excluded from all of the quantitative analyses that follow. Combining the samples into analytical units sometimes masks significant patterning in the remains. Therefore, some of the following discussion uses data by level, and will refer back to Figures 8-1 to 8-4 and the data tables from which they derive. The content of each of the areas excavated will be discussed briefly followed by synthesis of the data.

Knoll Top Composition

The KT sample was the second largest from the site, almost 17,000 bone fragments, most from Levels 6 through 12. The KT was divided into four analytical units based on associated artifacts: AU 1, Levels 4-7 (ca. A.D. 650-1350); AU 2, Levels 8 and 9 (ca. 100 B.C.-A.D. 650); AU 3, Levels 10 and 11 (1800 B.C.-A.D. 200); and AU 4, Levels 12-16 (8000-7000 B.C.). The bone in AU 4 dates much later than the artifacts associated with it, and, although it is presented separately, it is probably more accurately associated with the same occupation producing AU 3. As mentioned previously, there are solid taphonomic data to support the hypothesis that the faunal bone in AU 4 is lag material, in accord with the suggestion that the interface between Zones 2 and 3 (i.e., between AUs 3 and 4) is an erosional unconformity.

Analytical units within the excavation block yielded assemblages of roughly the same size, varying from 3,300 to 5,000 bone fragments. By weight, large mammals consistently produce over 75 percent of the samples. NISP shows a consistent decrease in the proportion of large mammals through time, coupled with slight increases in turtles and fish. Small quantities of very large mammal remains (bone fragments within the size range of bison) are present in AUs 2, 3, and 4 only, and include skull fragments and an unidentifiable long bone shaft.

Two small mammal taxa, a shrew in AU 4 and moles in AUs 1 and 3, are probably commensal inclusions, as no elements were charred. Rats and mice show up in all AUs as fragments. Other large mammals identified include deer, antelope, cougar, and large dog/wolf. Antelope remains are more concentrated in AU 4 than in any of the overlying AUs, although they are present also in AUs 1 and 2.

Small mammals identified in the KT assemblage include opossum, striped skunk, dog/coyote, rabbits, tree squirrels and numerous micromammals in all four AUs. Aquatic and riparian (bottomland) taxa include beaver (AU 2), muskrat (AUs 1 and 2), mink (AU 3), and raccoon (AU 3). Four species of Lagomorpha were identified: cottontail and swamp rabbits, desert cottontails, and jackrabbits. Of the four taxa, swamp rabbits are the only species to be found in wooded bottomland. The remaining three taxa are found in more open conditions, usually near grassland, but both desert cottontails and jackrabbits can tolerate more arid conditions. The percentage NISP of swamp rabbits to all rabbits increases to 56 percent in AU 1 compared to 0 to 15 percent in the lower AUs, suggesting that either hunting/trapping was more concentrated in the immediate environs of the site or that the general area had become more wooded through time, presumably due to increased rainfall. The relative frequency of tree squirrels (NISP), 3 to 7 percent of all identified small mammals below AU 1 but 19 percent in AU 1, supports the same paleoenvironmental inference. In addition, coati, denizens of open forest are found only in AUs 1 and 2. (Editor's note: This is in agreement with Albert's palynological findings, presented in Appendix B, that suggest relatively moist climate after ca. 3,000 B.P.) Additionally, at least one rat/mouse postcranial fragment was burned in each AU, leaving open the possibility that at least some of these small mammals were consumed.

Very few bird bones proved identifiable in the KT material, and the small sample creates a stochastic distribution of aquatic versus upland species. AUs 2 and 4, for example, produced no upland birds, and AU 3 produced no aquatic taxa. Rails, usually found in marshy habitat, are the most commonly occurring taxa, but ducks and geese are present in most AUs. Upland taxa include turkey, quail, and greater prairie chicken.

Most of the turtles in all AUs are aquatic or semi-aquatic species. Box turtles, more likely to be encountered in wooded, upland areas, range from 6 to 11 percent of NISP. All AUs produced snapping, mud-musk, and softshell turtles and some form of aquatic Emydid (cooter, slider, map turtle).

Snakes include semi-aquatic, lowland taxa such as mud/rainbow snakes and water snakes, but the majority of taxa identified are more likely to be found at higher elevations.[6] The only identifiable amphibian, a bullfrog, would have been procured near water.

Identifiable fish are dominated by gar remains, probably more a consequence of the fact that there are few gar bones that are not easily identified than an aboriginal emphasis on this particular taxon. In order of decreasing importance, other fish fare includes freshwater catfish, freshwater finfish (bass, etc.); marine finfish (drums, etc.), suckers, marine catfish and, finally, shad. Shad, in contrast to gar and most catfish, have very delicate elements with fenestrations that are easily crushed, so their presence only in the upper AUs (1 and 2) may be a taphonomic issue. Marine taxa are more common in the lower levels, particularly in AU 4, where they comprise nearly 20 percent of the sample.

West Slope Composition

Excavation Units S29W116 and S29W118 collectively produced a very well-preserved sample of over 63,000 bone fragments spanning a 5,300-year period from roughly 4000 B.C. to A.D. 1300. Based on associated artifacts and ^{14}C dates, the samples were divided into three AUs: AU 1 (ca. 800 B.C.- A.D. 1300); AU 2 (ca. 2000-800 B.C.); and AU 3 (3100-2000 B.C.). As noted previously, all but the very lowest levels of this deep (2+ meters) deposit exhibited excellent preservation and for that reason the sample is considered a reliable record of subsistence practices over the time period represented. Because preservation was so good, many more taxa were identifiable than is the norm, in the writer's experience. Fragile muscle attachments on bird bones and relatively intact fish elements allowed unusually precise identifications, yielding a long species list of at least 38 birds, 11 snakes, and 32 fish.

AUs of the combined excavation units yielded assemblages of 10,000 (AU 3), 18,000 (AU 2), and 36,000 (AU 1) bone fragments. By weight, large mammals consistently produce over 70 percent of the samples from the earlier AUs (2 and 3), but for AU 1, the contribution of large mammals to the total drops, ranging from 38 to 52 percent. NISP shows a consistent decrease in the proportion of large mammals through time, coupled with large increases in fish. Small quantities of very large-mammal remains (bone fragments within the size range of bison) are present in all AUs, and a probable bison tooth fragment was recovered in AU2. Elements identified as very large mammal include fragments of a maxilla and mandible, a thoracic vertebra dorsal spine fragment, several rib or vertebral spine fragments, and unidentifiable long bone shaft fragments. Other large mammals identified include deer, antelope, cougar, large dog, wolf, and javelina. Antelope remains were recovered in all AUs, but, as was true of the KT sample, they were more frequently encountered in the lower AUs. Javelina was identified only in AUs 2 and 3.

Small mammals identified in the WS assemblage include opossum, striped skunk, dog/coyote, grey fox, ocelot, rabbits, tree squirrels, and numerous micromammals in all three AUs. Aquatic and riparian (bottomland) taxa include beaver (all AUs), muskrat (AUs 1 and 2), and raccoon (AUs 1 and 3). Four species of Lagomorpha were identified: cottontail and swamp rabbits, desert cottontails, and jackrabbits. Of the four taxa, swamp rabbits are the only species to be found in wooded bottomland. As noted earlier, the remaining three taxa are found in more open conditions, usually near grassland, but both desert cottontails and jackrabbits can tolerate more arid conditions. The percentage NISP of swamp rabbits to all rabbits is consistently low (as was the case in KT AUs 2, 3, and 4 on the Knoll Top), ranging from 4 percent (AU 3) to 17 percent (AU 2). Of particular interest is the fact that desert cottontails comprise 37 percent of Lagomorphs from the WS AU 3, strongly suggesting drier environmental conditions in the vicinity of the site between 4000 and 1750 B.C.

As was true of the KT sample, tree squirrels become abundant only in the upper levels of the WS sample, by NISP contributing only one percent of

[6] This statement refers only to identifiable Colubrids since it was not possible to distinguish between upland and lowland vipers.

Table 8-2. Faunal Taxa by Analytical Units, Knoll Top Excavation Area, Buckeye Knoll Site.

Taxa	AU1				AU2				AU3				AU4			
	NISP	**Charred**	**g**	**MNI**	**NISP**	**Charred**	**g**	**MNI**	**NISP**	**Charred**	**g**	**MNI**	**NISP**	**Charred**	**g**	**MNI**
Very Large Mammals																
Unid. Very Large Mammal					5	3	4.3	1	7	0	20.7	1	6	3	8.1	1
	0	**0**	**0**	**0**	**5**	**3**	**4.3**	**1**	**7**	**0**	**20.7**	**1**	**6**	**3**	**8.1**	**1**
Large Mammals																
Deer	76	12	242	4	42	8	216.6	4	29	5	79.1	2	23	5	73.8	3
Antelope	2	0	0.4	1	1	0	3.4	1					3	1	3.6	1
Deer/Antelope	139	49	240	2	120	45	207.6	2	119	32	184.8	4	75	30	81.3	0
Medium Artiodactyl	2	0	0.4	0	11	3	1.8	0					1	0	0.2	0
Large Carnivor									1	0	0.3	0				
Large Dog/Wolf	1	1	1.7	1									1	0	0.2	1
Cougar	1	1	1	1												
Unid. Large Mammal	1457	643	531.4	0	1345	610	468.4	0	1096	439	437.8	0	1497	387	547.1	0
	1678	**706**	**1016.9**	**9**	**1519**	**666**	**897.8**	**7**	**1245**	**476**	**702**	**6**	**1600**	**423**	**706.2**	**5**
Medium/Small Mammals																
Opossum	8	1	3.2	2	1	0	0.2	1	1	0	0.3	1	1	0	1.4	1
Shrew													1	0	0.1	1
Mole	1	0	0.1	1					1	0	0.2	1				
Unid. Rabbit	3	0	0.3	0	2	1	0.3	0					3	0	0.5	0
Cottontail	1	0	0.3	1	6	3	1	1	3	0	0.6	1	1	1	0.6	1
Swamp Rabbit	5	1	1.2	2	2	1	1.6	1					2	0	0.6	1
Desert Cottontail					1	0	0.1	1					2	0	0.5	1
Blacktail Jackrabbit	3	0	1	2	4	2	1.6	1	6	1	2.8	2	8	2	2	2
Squirrel (Sciuridae)													3	1	0.4	1
Unid. Tree Squirrel	1	1	0.1	0	1	0	0.1	0	3	0	0.3	1	2	1	0.2	1
Gray Squirrel	11	2	2.4	2	1	0	0.1	1								
Fox Squirrel	1	1	0.1	1												

continued.

Table 8-2. (continued)

Taxa	AU1				AU2				AU3				AU4			
	NISP	Charred	g	MNI	NISP	Charred	g	MNI	NISP	Charred	g	MNI	NISP	Charred	g	MNI
Medium/Small Mammals (cont.)																
Beaver					1	0	0.1	1								
Muskrat	2	1	0.4	1	1	0	1.3	1								
Pocket Gopher (Geomyidae)	2	0	0.2	0												
Pocket Gopher	1	0	0.2	1	5	0	1.7	2	1	0	0.1	1				
Cricetidae	2	1	0.2	0												
Rat Size Cricetine	10	0	1	1	8	3	0.8	0	5	0	0.6	0	2	1	0.2	0
Mouse Size Cricetine					1	0	0.1	0					3	0	0.2	1
Hispid Cotton Rat	4	0	0.4	1	4	0	0.6	3	5	0	0.7	2	2	0	0.2	1
Woodrat									1	1	0.1	1				
Pocket Mouse	1	0	0.1	1	4	0	0.4	1								
Unid. Rodent									1	0	0.2	0				
Raccoon									1	0	0.3	1				
Coati	1	0	0.4	1	1	1	0.3	1								
Racoon/Coati (Procyonidae)					1	0	0.1	0								
Mink									1	0	0.5	1				
Striped Skunk									1	0	0.6	1				
Medium Dog/Coyote									5	1	4.9	1				
Medium Carnivore	2	0	0.5	0	1	1	0.2	0								
Small Carnivore	1	0	0.2	0												
Unid. Medium Mammal	5	2	0.9	0	2	0	0.6	0	5	1	1	0	11	4	3.9	0
Unid. Small Mammal	4	1	0.5	0	11	4	1.1	0	4	0	0.3	0	9	3	1	0
Micromammal					2	0	0.2	0					4	1	0.3	0
	69	**11**	**13.7**	**17**	**60**	**16**	**12.5**	**15**	**44**	**4**	**13.5**	**14**	**54**	**14**	**12.1**	**11**
Small Mammal/Bird																
Small Mammal/Bird Indet.	540	206	68.4	0	453	191	50.3	0	483	154	72.5	0	691	98	110.3	0
	540	**206**	**68.4**	**0**	**453**	**191**	**50.3**	**0**	**483**	**154**	**72.5**	**0**	**691**	**98**	**110.3**	**0**

continued.

Table 8-2. (continued)

Taxa	AU1				AU2				AU3				AU4			
	NISP	**Charred**	**g**	**MNI**	**NISP**	**Charred**	**g**	**MNI**	**NISP**	**Charred**	**g**	**MNI**	**NISP**	**Charred**	**g**	**MNI**
Birds																
Unid. Small Goose													1	0	0.5	1
Unid. Large Duck					1	1	0.3	1					1	0	0.5	1
Unid. Medium Duck	1	0	0.1	1	1	0	0.3	1								
Teal					1	1	0.1	1								
Diving Duck (*Aythya sp.*)	1	1	0.3	1												
Green Heron	1	0	0.2	1												
Sora					1	0	0.1	1								
American Coot	5	1	0.9	1	2	0	0.2	1					2	1	0.1	2
Moorhen	3	1	0.3	2												
Turkey	1	0	1.6	1												
Greater Prairie Chicken	1	1	0.1	1					1	0	0.1	1				
Bobwhite	1	0	0.1	1												
Swainson's Hawk									2	0	0.3	1				
Medium Hawk									1	0	0.1	0				
Barn Owl									1	0	0.2	1				
Blue Jay													1	0	0.1	1
Passerine: Sparrow Size													1	0	0.1	1
Unid. Large Bird	1	0	0.8	0	20	1	1.2	1	1	0	0.5	0				
Unid. Medium Bird	3	0	0.3	0	1	1	0.2	0	1	0	0.1	0	7	1	1	0
Unid. Small Bird	1	0	0.5	0												
	19	**4**	**5.2**	**9**	**27**	**4**	**2.4**	**6**	**7**	**0**	**1.3**	**3**	**13**	**2**	**2.3**	**6**
Turtles																
Unid. Turtle	557	243	99.5	0	454	188	72.3	0	357	143	68.5	0	286	91	66.1	0
Snapping Turtle (Chelydridae)					1	0	0.4	0			1.9	1				
Snapping Turtle	5	2	3.5	1	1	0	0.1	1	3	0	3.7	0	3	1	1.9	1
Mud-Musk Turtle (Kinosternidae)	20	8	5.4	0	18	8	5	2	13	2		0	10	2	3.8	0

continued.

Table 8-2. (continued)

Taxa	AU1				AU2				AU3				AU4			
	NISP	**Charred**	**g**	**MNI**	**NISP**	**Charred**	**g**	**MNI**	**NISP**	**Charred**	**g**	**MNI**	**NISP**	**Charred**	**g**	**MNI**
Turtles (cont.)																
Musk Turtle	1	0	0.4	1												
Mud Turtle	8	5	3.2	2	9	0	5.4	1	4	0	1.6	1	3	2	1.4	2
Box Turtle	16	3	6.3	2	9	2	4.9	1	14	3	4.9	1	5	0	4.4	1
Map Turtle					1	0	0.5	1								
Aquatic Emydid	72	35	33	1	98	45	38.2	0	83	50	29.7	0	19	8	7.3	0
Cooter/Slider					1	0	0.5	1	1	0	0.5	1	4	0	14.8	1
Chicken Turtle					2	2	0.6	1								
Softshell Turtle	26	12	12.1	2	14	5	4.9	1	22	5	11.1	1	11	4	3.5	1
	705	**308**	**163.4**	**9**	**608**	**250**	**132.8**	**9**	**497**	**203**	**121.9**	**5**	**341**	**108**	**103.2**	**6**
Snakes																
Unid. Snake	21	6	1.7	0	27	9	1.7	0	14	2	1.1	0	9	4	0.7	0
Viper	16	3	2.9	1	13	4	1.5	1	8	1	1	1	2	0	0.2	1
Non-Poisonous Snakes	8	0	0.6	0	11	1	0.8	0	6	1	0.9	0	9	1	1.3	0
Water Snake	3	1	0.5	1	10	0	1.2	1	7	0	0.9	1	4	0	1.3	1
Garter Snake	4	0	0.4	1												
Hognose Snake					2	0	0.2	1					1	0	0.1	1
Mud/Rainbow Snake					1	0	0.1	1	1	0	0.1	1				
Racer/Coachwhip	23	4	2.5	1	15	3	2.3	0	11	1	1.4	1	17	5	1.6	1
Racer					2	0	0.2	1								
Rat/Corn/Kingsnake	25	8	2.8	0	19	6	2.5	1	16	2	2.1	1	17	2	2.4	1
Rat Snake	1	0	0.1	1												
Milk/Kingsnake	1	0	0.1	1												
	102	**22**	**11.6**	**6**	**100**	**23**	**10.5**	**6**	**63**	**7**	**7.5**	**5**	**59**	**12**	**7.6**	**5**
Amphibians																
Unid. Amphibian	1	0	0.1	0												
Frog/Toad	3	1	0.3	0	4	0	0.4	1								

continued.

Table 8-2. (continued)

Taxa	AU1				AU2				AU3				AU4			
	NISP	Charred	g	MNI	NISP	Charred	g	MNI	NISP	Charred	g	MNI	NISP	Charred	g	MNI
Amphibians (cont.)																
Bullfrog	2	0	0.3	1												
Unid. Frog													1	0	0.1	1
Salamander									1	0	0.1	1	1	0	0.1	1
	6	**1**	**0.7**	**1**	**4**	**0**	**0.4**	**1**	**1**	**0**	**0.1**	**1**	**2**	**0**	**0.2**	**2**
Fish																
Shark	1	1	0.2	1					1	0	0.3	1				
Eagle Ray	1	0	0.2	1												
Gar	139	31	17.2	7	102	30	11.1	8	70	14	9.7	4	39	11	6.8	5
Alligator Gar	2	1	2.2	1	7	4	9.5	2	1	0	0.5	1	3	1	0.9	1
Gizzard Shad	4	0	0.4	4	1	0	0.1	1								
Sucker (Catostomidae)	5	0	0.6	0	3	0	0.3	0	2	1	0.4	2				
Quillback													1	1	0.1	1
Smallmouth Buffalo	5	0	1.6	3	10	3	4.2	5	1	0	0.3	1				
Smallmouth/Black Buffalo	2	0	0.5	1									3	0	0.9	2
Catfish (Siluriformes)	18	5	1.9	0	10	0	1	0	4	1	0.5	0	13	4	3.1	0
Freshwater Catfish (Ictaluridae)	2	0	0.3	1	2	0	0.2	1					2	2	0.2	1
Freshwater Catfish (*Ictalurus sp.*)	5	0	0.8	2	11	5	1.5	1	7	5	0.9	2				
Bullhead	6	1	0.7	3	1	0	0.1	1								
Yellow Bullhead													1	1	0.1	1
Channel/Blue Catfish	9	3	2.2	8	4	1	1.2	3	4	0	0.6	2	2	0	0.9	2
Blue Catfish													1	0	0.3	1
Channel Catfish	2	0	0.6	1												
Flathead Catfish					1	1	0.1	1					1	0	2.4	1
Marine Catfish (Ariidae)									1	0	0.2	1	7	0	0.6	1
Gaftop					1	1	0.2	1					2	0	0.6	2
Finfish (Perciformes)	5	0	0.5		1	0	0.1	0	2	0	0.2	0	1	0	0.1	0

continued.

Table 8-2. (concluded)

Taxa	AU1				AU2				AU3				AU4			
	NISP	**Charred**	**g**	**MNI**	**NISP**	**Charred**	**g**	**MNI**	**NISP**	**Charred**	**g**	**MNI**	**NISP**	**Charred**	**g**	**MNI**
Fish (cont.)																
Mullet	17	3	1.6	4	10	2	0.7	4	2	0	0.1	1	1	1	0.1	2
Sunfish (Centrarchidae)					1	0	0.1	0	2	0	0.2	1	8	4	0.5	0
Sunfish	4	0	0.4	2	3	0	0.3	2	1	0	0.1	1				
Redear Sunfish	1	0	0.1	1												
Bass	17	3	2.8	5	13	5	1.6	7	4	1	1.2	2	2	1	0.2	1
Largemouth Bass	2	1	0.2	2	1	0	0.1	1								
Crappie	6	2	0.6	4	3	0	0.3	3	2	0	0.2	2	3	0	0.3	3
Sheepshead					2	0	0.2	2	1	0	0.3	1				
Drum (Scianidae)	4	1	0.5	1					2	0	0.7	0	1	0	0.1	0
Seatrout					1	0	0.1	1	1	1	0.1	1	1	0	0.1	1
Croaker	2	0	0.2	2									2	0	0.2	1
Black Drum									1	1	0.2	1				
Flounder	2	1	0.2	1					1	0	0.1	1	1	1	0.1	1
Unid. Fish	453	75	30.8	0	386	87	22.4		214	0	18	0	146	12	17.6	0
	714	**128**	**67.3**	**55**	**574**	**139**	**55.4**	**44**	**324**	**24**	**34.8**	**25**	**241**	**39**	**36.2**	**27**
TOTAL "NISP"	**3833**	**1386**	**1347.2**		**3350**	**1292**	**1166.4**		**2671**	**868**	**974.3**		**3007**	**699**	**986.2**	
Other																
Anterler/Horn	16	5	14		30	10	36		25	7	27.9		21	3	15.5	
Gar Scales	85	11	9.4		84	14	7.1		120	15	12.1		73	7	9.9	
Alligator Gar Scales	1	0	0.6						1	0	0.8					
TOTAL NISP	**3935**	**1402**	**1371.2**		**3464**	**1316**	**1209.5**		**2817**	**890**	**1015.1**		**3101**	**709**	**1011.6**	
Unid. Bone	661	179	74		546	154	54.3		486	94	64.8		1898	136	290.3	
GRAND TOTAL	**4596**	**1581**	**1445.2**		**4010**	**1470**	**1263.8**		**3303**	**984**	**1079.9**		**4999**	**845**	**1301.9**	

Table 8-3. Faunal Taxa by Analytical Units, West Slope Excavation Area, Buckeye Knoll Site.

Taxa	AU1				AU2				AU3			
	NISP	**Charred**	**g**	**MNI**	**NISP**	**Charred**	**g**	**MNI**	**NISP**	**Charred**	**g**	**MNI**
Very Large Mammals												
Bison/Cow (Bovidae)					1	0	0.2	1				
Unid. Very Large Mammal	22	9	25.9	1	46	22	42.4	0	20	14	32	1
	22	**9**	**25.9**	**1**	**47**	**22**	**42.6**	**1**	**20**	**14**	**32**	**1**
Large Mammals												
Deer	131	22	418.7	7	149	25	606.6	6	98	14	170.9	8
Antelope	2	1	10.7	1	5	1	43.8	1	17	3	44.2	2
Deer/Antelope	442	95	453.2	9	602	150	875.1	11	426	105	586	12
Medium-Sized Artiodactyl	20	2	8.2	0	21	5	4.6	2	16	1	4.2	0
Javelina					2	0	2.4	1	1	0	4.2	1
Large Carnivore					1	0	0.1	0	1	0	0.5	0
Large Dog/Wolf	2	1	1.2	0	10	1	7.8	0	3	0	3.3	1
Large Dog	1	0	12.9	1								
Wolf	1	0	1.7	1	2	2	3	1				
Cougar												
Unid. Large Mammal	3590	1338	1047.9	0	4896	1957	1812	0	2780	975	1133.1	0
	4189	**1459**	**1954.5**	**19**	**5688**	**2141**	**3355.4**	**22**	**3342**	**1098**	**1946.4**	**24**
Medium/Small Mammals												
Opossum	5	0	5.4	1					1	1	0.2	1
Shrew	3	0	0.3	0								
Short-Tailed Shrew	1	0	0.1	1	2	0	0.2	1	1	0	0.1	1
Mole	19	1	2.1	3	15	1	1.9	3				
Unid. Rabbit	23	2	4.1	0	7	2	0.8	0	9	4	1.3	0
Cottontail	17	2	4.7	4	10	2	2.7	3	18	4	6.5	2

continued.

Table 8-3. (continued)

Taxa	AU1				AU2				AU3			
	NISP	Charred	g	MNI	NISP	Charred	g	MNI	NISP	Charred	g	MNI
Medium/Small Mammals (cont.)												
Swamp Rabbit	4	0	0.4	1	5	1	1.2	1	2	0	0.8	1
Desert Cottontail	7	1	1.5	2	5	3	0.5	1	19	4	11.5	2
Blacktail Jackrabbit	10	3	4.1	2	10	6	4.1	2	7	0	1.3	2
Squirrel (Sciuridae)	5	0	0.5	0	1	0	0.1	0				
Tree Squirrel	13	3	1.3	0	2	0	0.4	1				
Gray Squirrel	29	1	6.5	3					1	0	0.2	1
Fox Squirrel	3	1	0.5	1								
Ground Squirrel	7	0	0.9	1	3	1	0.3	1				
Beaver	1	0	1.4	1	8	2	3.2	1	2	0	1.3	1
Muskrat	5	0	0.9	1	1	0	0.1	1				
Pocket Gopher (Geomyidae)	7	0	0.8	0	1							
Pocket Gopher	44	1	5.6	5	17	1	2.9	1	16	0	3.3	3
Cricetidae	38	6	2.7	0	5	0	0.6	0	5	0	0.4	0
Rat Size Cricetine	112	14	10.9	5	58	9	5.5	3	24	6	2.5	2
Mouse Size Cricetine	22	3	2.1	5	2	0	0.2	1	1	0	0.1	1
Hispid Cotton Rat	78	2	9.1	25	51	2	5.8	18	16	0	2	5
Woodrat	3	0	0.3	1	5	0	0.7	2	2	0	0.2	1
Rice Rat	2	0	0.3	1								
White-Footed Mouse	1	0	0.1	1								
Pocket Mouse					1	0	0.2	1				
Unid. Rodent	14	3	0.5	0								
Raccoon	1	0	0.1	1					2	0	0.6	1
Coati	2	0	1.2	1	1	0	0.2	1				
Striped Skunk					1	1	0.1	1				
Grey Fox	1	0	0.2	1	1	1	0.8	1	1	0	0.2	

continued.

Table 8-3. (continued)

Taxa	AU1				AU2				AU3			
	NISP	**Charred**	**g**	**MNI**	**NISP**	**Charred**	**g**	**MNI**	**NISP**	**Charred**	**g**	**MNI**
Medium/Small Mammals (cont.)												
Medium Size Dog/Coyote	1	0	0.7	1	1	0	0.2	1	2	0	1.7	
Ocelot	1	0	0.2	1	2	1	2.7	1				
Medium Size Carnivore	10	1	3.5	0	8	2	1.6	0	5	0	1.6	
Medium Size Mammal	39	9	8.4	0	50	12	14.1	0	31	4	7.7	
Small Size Mammal	164	36	12.8	0	41	7	2.8	0	32	2	3	
Micromammal	27	4	1.4	0	18	0	1.5	0	1	0	0.1	
	719	**93**	**95.6**	**69**	**332**	**54**	**55.4**	**46**	**198**	**25**	**46.6**	**24**
Small Mammal/Bird												
Small Mammal/Bird Indet.	4697	1432	311.8	0	2449	791	227.6	0	1340	363	142.1	0
	4697	**1432**	**311.8**	**0**	**2449**	**791**	**227.6**	**0**	**1340**	**363**	**142.1**	**0**
Birds												
Pied-Billed Grebe	8	1	1.7	3								
Neotropic Cormorant	1	0	0.2	1								
Blue or White-Fronted Goose					2	0	2.9	1				
Canada Goose	1	0	0.1	1								
Large Duck	5	0	1.4	0	3	0	0.5	0	2	0	0.3	0
Medium Duck	23	4	3.9	0	8	2	1.6	0	2	0	0.3	0
Small Duck	3	0	0.3	0	1	1	0.1	0				Í
Fulvous Whistling Ducks	2	0	0.8	1								
Gadwall	1	0	0.2	1	1	0	0.4	1	1	1	0.2	1
Mallard	16	2	9.7	4	5	0	1	2	3	2	1.3	2
Pintail	1	0	0.1	1								
Wood Duck	3	0	1.7	2								

continued.

Table 8-3. (continued)

Taxa	AU1				AU2				AU3			
	NISP	Charred	g	MNI	NISP	Charred	g	MNI	NISP	Charred	g	MNI
Birds (cont.)												
Northern Shoveler					1	0	1.3	1	1	0	0.1	1
Blue-Winged Teal	9	2	3.2	2	1	1	0.1	1	1	0	0.2	1
Green-Winged Teal	3	1	0.7	1								
Teal	17	3	3.4	2	7	2	1	1				
Scoter									1	0	0.6	1
Oldsquaw	1	0	0.3	1								
Lesser Scaup	4	2	1.2	1	1	0	0.4	1				
Bufflehead	2	0	1	1	1	1	0.1	1				
Rudy Duck	6	4	1.5	3								
Small Heron	1	0	0.1	0								
Medium Heron	1	1	0.1	0								
Large Heron									1	0	0.2	1
Great Blue Heron	1	0	0.2	1								
Yellow-Crowned Night Heron	2	0	0.2	1								
Green Heron	1	0	0.1	1								
Least Bittern	1	0	0.2	1								
Unid. Rail	1	1	0.1	0								
Large Rail	3	1	0.1	0					1		0.1	
Medium Size Rail	5	1	0.6	0	3	0	0.7	0	2	1	0.3	0
Small Rail	1	0	0.1	0								
Virginia Rail	8	1	0.8	2								
King Rail	1	0	0.1	1								
Clapper Rail	3	1	0.3	1					1	1	0.3	1
Sora	7	0	0.7	1	1	0	0.1	1				
Black Rail	1	0	0.1	1								

continued.

Table 8-3. (continued)

Taxa	AU1				AU2				AU3			
	NISP	**Charred**	**g**	**MNI**	**NISP**	**Charred**	**g**	**MNI**	**NISP**	**Charred**	**g**	**MNI**
Birds (cont.)												
American Coot	54	6	18.7	4	11	1	2.1	2	8	3	1.2	1
Moorhen	18	6	3.7	2	1	0	0.1	1	4	1	0.7	1
Black-Bellied Plover	1	0	0.1	1								
Turkey					1	0	0.5	1				
Prairie Chicken	1	1	0.3	1					1	1	0.1	1
Bobwhite	5	0	0.7	1	1	0	0.1	1				
Broad Winged Hawk	1	0	0.9	1	1	0	0.4	1				
Caracara	1	0	0.5	1								
Raptor	1	0	0.2	0								
Medium Raptor	1	0	0.1	1								
Barn Owl	1	0	0.6	1								
Mourning Dove	1	0	0.1	1								
Blue Jay	4	0	0.4	2	3	0	0.3	1				
Towhee	1	0	0.1	1								
Passerine (Chickadee Size)	1	1	0.1	1								
Passerine (Warbler Size)	1	0	0.1	1								
Passerine (Wren Size)	7	0	0.7	3								
Passerine (Sparrow Size)	21	1	2.5	3	1	0	0.1	1				
Passerine (Cardinal Size)	1	0	0.1	1	3	1	0.3	1				
Passerine (Jay Size)	1	0	0.1	0								
Large Bird	9	1	3.8	0	8	0	1.2	0	6	0	2.7	0
Medium Bird	234	44	23.7	0	17	3	2.7	0	20	4	2	0
Medium/Small Bird	4	0	0.4	0								
Small Bird	26	1	1.7	0	2	0	0.2	0				

continued.

Table 8-3. (continued)

Taxa	AU1				AU2				AU3			
	NISP	**Charred**	**g**	**MNI**	**NISP**	**Charred**	**g**	**MNI**	**NISP**	**Charred**	**g**	**MNI**
Birds (cont.)												
Micorbird	1	0	0.1	0								
Unid. Bird	3	1	0.2	0								
	542	**87**	**95.1**	**61**	**84**	**12**	**18.2**	**19**	**55**	**14**	**10.6**	**11**
Turtles												
Unid. Turtle	2681	1378	388.5	0	1327	603	198.5	0	666	311	123.8	0
Snapping Turtle (Chelydridae)	1	1	1.9	0	3	0	0.5	0				
Snapping Turtle	10	2	3.6	2	2	1	0.5	1				
Mud-Musk Turtle (Kinosternidae)	85	22	27.1	4	28	3	7.5	0	16	2	4.5	1
Mud Turtle	42	5	24.1	2	19	4	8.4	3	11	4	8.5	2
Pond/Box Turtles (Emydidae)	1	0	0.1	0	2	0	0.4	0				
Box Turtle	99	8	43.7	5	25	7	11.4	3	16	3	6.6	1
Aquatic Enydid	424	226	158.1	1	296	168	105.4	1	210	106	90	0
Pconcina Cooter/Slider	4	0	7.8	1	12	0	26.3	1	12	3	52.8	2
Chicken Turtle	3	2	0.6	1					1	0	1	1
Softshell Turtle	31	17	8.5	2	44	19	16.5	1	34	16	27.3	1
cf. Sea Turtle					1	0	2.1	1				
	3381	**1661**	**664**	**18**	**1759**	**805**	**377.5**	**11**	**966**	**445**	**314.5**	**8**
Snakes												
Viper	130	32	15.4	1	96	25	17.4	1	56	8	10.3	1
Unid. Snake	318	67	16	0	154	31	8.8	0	94	15	5.3	0
Non-Poisonous Snake (Colubridae)	175	22	6.5	0	85	11	4.8	0	22	5	1.6	0
Water Snake	60	7	9.2	2	18	3	2.3	1	16	2	2.5	1
Brown Snake	3	0	0.2	1								

continued.

Table 8-3. (continued)

Taxa	AU1				AU2				AU3			
	NISP	**Charred**	**g**	**MNI**	**NISP**	**Charred**	**g**	**MNI**	**NISP**	**Charred**	**g**	**MNI**
Snakes (cont.)												
Garter Snake	75	5	2.5	1	14	2	1	1	5	0	0.4	1
Hognose Snake	21	5	1.4	1	8	0	0.5	1	2	0	0.2	1
Ringneck Snake	5	1	0.2	1	1	0	0.1	1	1	0	0.1	1
Mud/Rainbow Snake	8	2	0.6	1								
Racer/Coachwhip	147	38	10.5	1	148	35	14.2	1	55	11	6.3	1
Rat/Corn/Kingsnake	290	56	26.5	1	143	32	16.9	1	72	14	9.1	1
Rat Snake	2	0	0.3	1	1	0	0.2					
Milk/Kingsnake					1	0	0.1	1				
Crowned/Black/Flat-Headed Snake	3	0	0.2	1								
	1237	**235**	**89.5**	**12**	**669**	**139**	**66.3**	**8**	**323**	**55**	**35.8**	**7**
Other Herps												
Texas Horned Lizard	1	0	0.1	1	1	0	0.1	1				
Unid. Lizard	14	0	1	1	2	0	0.2	0				
Reptile/Amphibian									1	0	0.1	0
	15	**0**	**1.1**	**2**	**3**	**0**	**0.3**	**1**	**1**	**0**	**0.1**	**0**
Amphibians												
Unid. Amphibian	6	1	0.5	0								
Frogs/Toads	34	1	2.3	0	14	1	1.3	0	3	0	0.3	0
Bullfrog	9	3	2	1	6	1	1.1	1	3	1	0.6	1
Unid. Frog	6	0	0.5	4	1	0	0.1	0				
Unid. Toad	11	0	0.9	3	2	0	0.2	1				
Salamander	4	0	0.4	1	1	0	0.1	1	1	0	0.1	0
Lesser Siren					1	0	0.1	1	1	0	0.1	1
	70	**5**	**6.6**	**9**	**25**	**2**	**2.9**	**4**	**8**	**1**	**1.1**	**2**

continued.

Table 8-3. (continued)

Taxa	AU1				AU2				AU3			
	NISP	Charred	g	MNI	NISP	Charred	g	MNI	NISP	Charred	g	MNI
Fish												
Shark	10	1	1	1	3	0	0.3	1	2	0	0.2	1
Eagle Ray	3	2	0.3	1	4	1	0.6	1	1	1	0.1	1
Marine Fish	1	1	0.6	0	1	0	0.2	0	7	5	3.4	0
Gar	1664	343	150.3	40	417	113	42.9	16	231	61	27.4	9
Alligator Gar	23	7	19.9	2	11	6	18.7	2	12	1	16.9	1
Laydfish	3	0	0.3	1	3	0	0.3	1				
American Eel	1	0	0.1	1								
Shad/Herrings (Family)	33	0	2.3	0								
cf. Menhaden	1	0	0.14	1	1	0	0.1	1				
Gizzard Shad	58	1	4.6	22	1	0	0.1	1	1	0	0.1	1
Minnow	2	0	0.2	2								
Sucker	37	2	4.4	2	6	0	0.6	1	7	1	1.2	5
River Carpsucker	2	0	0.2	2								
Small-Mouth Buffalo	83	3	26.9	19	16	0	3	7	3	1	0.6	3
Small-Mouth/Black Buffalo	12	1	2.1	1	5	0	0.6	2	1	0	0.6	1
Spotted Sucker	2	0	0.2	1	1	0	0.1	1				
Catfish (Siluriformes)	189	30	15.2	0	38	6	3.4		27	6	5.5	0
Freshwater Catfish (Ictaluridae)	58	18	5.6	2	10	1	1					
Freshwater Catfish (*Ictalurus sp.*)	64	9	6.5	2	28	4	3.2	6	16	5	1.8	5
Bullhead	27	3	2.4	10	3	1	0.3	2	3	0	0.3	3
Black Bullhead	6	1	0.6	1	1	0	0.1	1				
Yellow Bullhead	5	1	0.7	1	1	1	0.2	1				
Channel/Blue Catfish	78	4	20.8	1	8	2	1.4	1	16	3	2.5	5
Blue Catfish	19	2	5	11	2	0	1.4	2				
Channel Catfish	25	6	6.5	11	7	0	2.3	5	1	0	0.1	1

continued.

Table 8-3. (continued)

Taxa	AU1				AU2				AU3			
	NISP	Charred	g	MNI	NISP	Charred	g	MNI	NISP	Charred	g	MNI
Fish (cont.)												
Flathead Catfish	11	2	2.8	6	1	0	0.3	1				
Marine Catfish (Ariidae)	13	2	1.1	2	13	5	1.8	1	4	1	1	0
Hardhead Catfish	8	7	0.6	3	13	6	1.9	4	1	0	0.1	1
Gafftop	18	7	1.7	3	15	5	2.5	4	5	0	1	1
Finfish (Perciformes)	144	20	9.1	0	15	1	1.3	1	2	0	0.2	0
Mullet	68	5	5.1	13	48	3	3.8	14	8	2	1.3	3
Temperate Basses (Moronidae)	15	0	1.7	6	1	0	0.1	1	1	0	0.1	1
Stripped Bass					1	0	0.3	1				
Sunfish (Centrarchidae)	27	1	2.6	0	7	1	0.4	1	3	0	0.3	0
Sunfish	108	8	10.2	28	23	0	2.1	9	4	2	0.4	4
Redear Sunfish	16	0	1.8	9	2	0	0.2	2				
Bass	96	9	11.5	10	34	6	3.8	11	16	3	2.9	4
Largemouth Bass	36	2	10.4	11	10	3	2	7	4	0	0.6	6
Crappie	81	9	8.2	23	21	1	2.1	16	11	1	1.1	6
Snapper	1	0	0.1	1								
Sheepshead	5	1	0.5	2	8	0	1.6	4	5	2	0.7	4
Drum (Family)	9	1	1	2	2	0	0.2		3	0	0.4	0
Speckled Trout					2	0	0.2	2	1	0	0.1	1
Seatrout	4	0	0.4	1								
Spot	1	0	0.1	1	1	0	0.1	1				
Croaker	3	0	0.4	3	4	0	0.4	4				
Blackdrum	5	0	1.8	2	1	1	0.01	1	3	0	0.4	1
Red Drum	1	0	0.1	1	2	0	0.4	2				

continued.

Table 8-3. (concluded)

Taxa	AU1				AU2				AU3			
	NISP	**Charred**	**g**	**MNI**	**NISP**	**Charred**	**g**	**MNI**	**NISP**	**Charred**	**g**	**MNI**
Fish (cont.)												
Flounder	10	4	1	1	15	2	1.3	2	4	0	0.5	1
Unid. Fish	5909	761	236.1	0	1625	363	82.6	0	701	145	50.3	0
	8995	**1274**	**585.14**	**263**	**2431**	**532**	**190.21**	**141**	**1104**	**240**	**122.1**	**69**
TOTAL "NISP"	**23867**	**6255**	**3829.24**	**454**	**13487**	**4498**	**4336.41**	**253**	**7357**	**2255**	**2651.3**	**146**
Other												
Antler/Horn	326	23	140.2	0	109	42	73.5	0	84	20	66.1	0
Gar Scales	5293	604	186	0	1294	259	80.7	0	614	96	52.3	0
Alligator Gar Scales	5	1	1.3	1	11	2	5.7	1	7	0	2.8	1
TOTAL NISP	**29491**	**6883**	**4156.74**	**455**	**14901**	**4801**	**4496.31**	**254**	**8062**	**2371**	**2772.5**	**147**
Unid. Bone	6157	729	377.2	0	2940	485	243.6	0	1580	287	127.8	0
GRAND TOTAL	**35648**	**7612**	**4533.94**	**455**	**17841**	**5286**	**4739.91**	**254**	**9642**	**2658**	**2900.3**	**147**

Table 8-4. Faunal Taxa Recovered from Unit S04W12 and Units S18W18 and S20W20 (Combined) in the East Area Excavations, Buckeye Knoll Site.

Taxa	Unit S04W12				Units S18W18/S20W20			
	NISP	Charrred	g	MNI	NISP	Charrred	g	MNI
Large/Very Large Mammal								
Bison					1	0	15.5	1
Unid. Very Large Mammal	6	2	5.4	1	62	8	62.6	0
Deer	70	14	176.9	3	40	2	100.9	2
Antelope	19	3	42.9	3	1	0	3.7	1
Deer/Antelope	255	81	148.9	3	159	58	185.5	1
Artiodactyl	14	4	4.5	0	1	1	0.01	0
Unid. Large Mammal	2459	1039	688.9	0	1484	571	364.8	0
	2823	**1143**	**1067.5**	**10**	**1748**	**640**	**733.01**	**5**
Medium/Small Mammal								
Opossum	1	0	0.9	1				
Mole					1	0	0.1	1
Unid. Rabbit	7	0	0.8	0	5	2	0.5	0
Cottontail	7	3	2.3	4	1	0	0.2	1
Swamp Rabbit					1	1	0.1	1
Blacktail Jackrabbit	9	1	4	1	2	2	0.4	1
Squirrel (Sciuridae)					3	1	0.4	0
Gray Squirrel					2	0	0.2	1
Beaver	1	1	0.9	1				
Pocket Gopher	1	0	0.1	1				
Cricetidae	1	0	0.1	0				
Rat Size Cricetine	1	0	0.1	0	1	0	0.1	1
Hispid Cotton Rat	1	0	0.1	1				
Unid. Rodent	1	0	0.1	0				
Coati	1	1	0.5	1				
Grey Fox	1	0	0.1	1				
Medium Size Dog/Coyote	3	2	1.6	1				
Medium Size Mammal	9	4	2.6	0	3	1	0.7	0
Small Mammal	1	0	0.1	0	1	0	0.1	0
	45	**12**	**14.3**	**12**	**20**	**7**	**2.8**	**6**
Birds								
Medium Duck	1	0	0.1	1				
Mourning Dove					1	0	0.3	1
Large Bird	1	0	0.3	1				
Medium Bird	1	0	0.1	0	2	2	0.3	1
Small Bird	1140	531	92.9	0	931	345	70.8	0
	1143	**531**	**93.4**	**2**	**934**	**347**	**71.4**	**2**

continued.

Table 8-4. (continued)

Taxa	Unit S04W12				Units S18W18/S20W20			
	NISP	Charrred	g	MNI	NISP	Charrred	g	MNI
Turtles								
Unid. Turtles	485	307	51.3	0	188	113	18.4	0
Snapping Turtle	3	0	1	1				
Mud-Musk Turtle (Kinosternidae)	1	0	0.2	0	4	3	0.9	1
Mud Turtle	7	3	3.7	1				
Box Turtle	5	1	1.8	1	2	0	2.4	1
Aquatic Enydid	75	50	23.7	1	75	51	15.2	1
Pconcina Cooter/Slider	20	15	17.9	1				
Softshell Turtle	14	10	5.8	1	7	6	2.6	1
	610	**386**	**105.4**	**6**	**276**	**173**	**39.5**	**4**
Snakes								
Unid. Snake	25	4	1.5	0	5	0	0.4	0
Viper	8	1	0.9	1	3	1	0.3	1
Family Colubridae	6	2	0.6	0	4	0	1.2	0
Garter Snake					1	0	0.1	1
Hognose Snake	1	0	0.1	1	1	0	0.1	1
Racer/Coachwhip	7	0	0.7	1	1	0	0.1	1
Rat/Kingsnake	26	12	2.9	1	6	2	0.6	1
	73	**19**	**6.7**	**4**	**21**	**3**	**2.8**	**5**
Fish								
Shark					1	0	0.1	1
Marine Fish					1	0	0.1	0
Gar	58	11	5.8	7	31	12	3	4
Alligator Gar	19	5	15.6	4	1	0	0.5	1
Ladyfish					1	0	0.1	1
Sucker					1	0	0.2	1
Small-Mouth Buffalo	1	0	0.1	1				
Catfish (Siluriformes)	9	2	1	2	3	1	0.6	1
Freshwater Catfish (*Ictalurus sp.*)	2	1	0.3	2	1	1	0.1	1
Bullhead	1	0	0.1	1				
Black Bullhead					1	1	0.1	1
Blue/Channel Catfish	7	4	2.1	4				
Channel Catfish	1	0	0.1	1				
Marine Catfish (Family)	1	1	0.1	1	2	0	0.2	0
Gafftop	13	7	1.7	1	2	1	0.3	1
Finfish (Perciformes)	7	2	1.1	3				
Mullet	3	1	0.3	4	1	0	0.1	1
Morone ?	2	1	0.2	1				

continued.

Table 8-4. (concluded)

Taxa	Unit S04W12				Units S18W18/S20W20			
	NISP	**Charrred**	**g**	**MNI**	**NISP**	**Charrred**	**g**	**MNI**
Fish (cont.)								
Sunfish (Family)	2	0	0.2	2	1	0	0.1	1
Bass	1	0	0.1	1				
Crappie	2	0	0.2	2				
Sheepshead	1	1	0.1	1				
Drum	2	0	0.2	0				
Sea Drum	1	0	0.7	0				
Seatrout	1	0	0.1	1				
Croaker	1	0	0.1	1				
Black Drum	1	0	0.2	1	1	1	0.1	1
Flounder	6	1	0.6	3				
Unid. Fish	192	73	13.5	0	31	7	2.8	0
	334	**110**	**44.5**	**44**	**79**	**24**	**8.4**	**15**
TOTAL "NISP"	**5028**	**2201**	**1331.8**	**78**	**3078**	**1194**	**857.91**	**37**
Other								
Antler/Horn	37	9	29.1		1	0	0.2	
Gar Scales	89	14	7.2		22	4	1.7	
Alligator Gar Scales	12	2	4.3					
Armadillo					1	0	0.1	
	138	**25**	**40.6**	**0**	**24**	**4**	**2**	**0**
Unid. Bone	1006	323	64.7		728	213	49.4	
Grand Total	**6172**	**2549**	**1437.1**	**78**	**3830**	**1411**	**909.31**	**37**

AUs 2 and 3, but 10 percent of AU 1, again indicating increased forestation through time. Coati, which reside in open forest, are present only in AUs 1 and 2, reiterating the pattern, and again indicating increased forestation after ca. 2000 B.C.

One interesting contrast between the KT and WS samples is the relative contribution of rats and mice to the identified (at least to taxonomic family) small mammals. In the KT samples, rats and mice contribute between 23 and 39 percent of the small mammal component, whereas in the WS sample they contribute between 37 percent (AU 3) and 55 to 56 percent of the upper AUs (1 and 2). This relative increase of rats and mice in the upper levels may relate to taphonomic factors (especially trampling, which would differentially destroy smaller bones), or it could be related to increased consumption. In the KT sample, between 2 and 7 percent of the mouse/rat bones were charred versus 9 to 13 percent in the WS sample. Shrews and/or moles were identified in each WS AU, and in AUs 1 and 2, a small fraction of mole elements exhibited charring.

The WS assemblage produced a remarkable sample of birds, with at least 38 mutually exclusive taxa represented. The seasonal residency habits for species identified are listed in Table 8-5. Records kept by the Aransas National Wildlife Refuge and reported by annual Christmas counts by the Audubon Society (in McAlister and McAlister 1987) indicate that migratory waterfowl overwintering on the Texas Coast begin arriving in September, populations peak in December, and most are gone by the end of March. In addition to geese and ducks, the population of American coots, apparently a favored prey species, is also concentrated during these cooler months. Peak months for hunting along the salt bays and brackish marshes would have been November, December, and January. Today, in the refuge, the seven most numerous species in rank order are: snow goose, Canada goose, American coot, pintail, gadwall, lesser scaup, and green-winged teal. All of these taxa were identified in the WS sample, but in this prehistoric sample, the rank order is very different: American coot, common moorhen, pied-billed grebe, lesser scaup, gadwall, green-winged teal, and bufflehead. Given the fact that most migratory ducks and geese are represented by very few elements, it seems likely that most bird hunting occurred inland rather than at the shore proper. The one possible exception to this is a sea duck, a scoter from WS AU 3, which probably was procured on the coast. Using NISP as a measure of abundance,[7] the relative frequency of upland to lowland/aquatic birds is 4 percent in AU 3, and 18 to 19 percent in AUs 1 and 2.

A second interesting pattern observed in the WS bird assemblage is that the number of large birds captured decreases substantially in AU 1, in which many songbirds join a host of small and medium-sized rails, herons, and ducks. For AUs 2 and 3, large birds make up 13 percent of the assemblage (NISP); for AU 1, the number drops to 3 percent. There are no small birds in AU 3, possibly due to issues related to preservation (as time increases, the probability that some chemical or mechanical force will destroy bone fragments, especially small ones, increases). Small birds contribute 14 and 12 percent of NISP for AUs 1 and 2, respectively, and both samples produced songbirds. A few songbird elements are charred in both samples, suggesting consumption. Reduction in the size of prey may be an indication of subsistence stress. Most of the turtles in all AUs are aquatic or semi-aquatic species. Box turtles, more likely to be encountered in wooded, upland areas, range from 6 to 14 percent of NISP, very similar to the KT sample. All AUs produced mud-musk, softshell turtles, and some form of aquatic Emydid (cooter, slider, map turtle). Snapping turtles were found only in AUs 1 and 2, probably a result of sampling error. One probable carapace or plastron fragment from a sea turtle (based on size) was found in AU 2.

Snakes include semi-aquatic, lowland taxa such as mud/rainbow snakes and water snakes, but the majority of taxa identified are more likely to be found at higher elevations. Lowland taxa contributed between five and 11 percent of identifiable Colubrids. Spiked frontals from Texas horned lizards, a desert species, were recovered in AUs 1 and 2. Two identifiable amphibians, lesser siren (a large aquatic salamander) from AUs 2 and 3, and bullfrog, from all AUs would have been procured near water.

As was true of the KT sample, identifiable fish are dominated by gar remains, probably more a consequence of identifiability than the prehistoric subsistence economy. In order of decreasing importance other fish fare includes freshwater finfish (bass, etc.), freshwater catfish, marine finfish (drums, etc.), suckers, marine catfish, and shad. Shad, in contrast to gar and most catfish, have very delicate elements, so their presence in all AUs, including the lowest levels of the deposit (Level 19), indicates relatively good preservation extends throughout the WS deposit. Marine taxa are more common in the lower levels, peaking in Level 15 with over 20 percent of identified fish NISP being from marine catfishes and finfish such as sheepshead, red drum, flounder, and mullet.

If gar are removed from the identifiable fish component, NISP by AU shows that the remaining freshwater fish make up roughly 55 percent of the lower AUs, but increase to 75 percent in AU 1. Suckers provide 10 to 15 percent of NISP, Catfish 40 to 60 percent, and finfish 30 to 40 percent. Shad, present in all AUs, are most numerous (about 3 percent of NISP) in AU 1. If identifiable catfish are divided into slackwater (bullheads) versus river species (channel, blue, and flathead cats), there is subtle evidence of river gradient change. Bullheads, species more likely to be found in slackwater habitats, comprise 15 percent of AU 3, 22 percent of AU 2, and 24 percent of AU 1. If sea level was 1 to 3 meters below its current levels at 4000 B.C. (AU 3), a gradually decreasing gradient would have produced an environment more favorable to these species over time. The data suggest that most of these adjustments were made prior to the AU 2 occupation at roughly 1750 B.C. Shad and River Carpsuckers, also

[7] Because bird bones must be pristine and relatively complete to identify, very few prove identifiable, and most taxa identified will end up with an MNI of only 1. NISP allows an alternative assessment of relative frequency, although there is a chance the bones are from a single individual.

Table 8-5. Seasonality Information for Various Faunal Taxa Recovered from Buckeye Knoll.

Area	Analytical/ Excavation Unit	Taxa	Winter (December-February)	Spring (March-May)	Summer (June-August)	Fall (September-November)
West Slope	AU 1	Deer/Antelope:	—	Newborn, 0-1 mos.	1-1.5, 2-3, 3-4, 14-16 mos.	4-5, 6-8 mos.
			—	—	Antler in Velvet	—
		Birds:	Canada Goose	—	—	—
			Gadwall	—	—	—
			Pintail	—	—	—
			Green-Winged Teal	—	—	—
			Oldsquaw	—	—	—
			Lesser Scaup	—	—	—
			Bufflehead	—	—	—
			Ruddy Duck	—	—	—
			Virginia Rail	—	—	—
			Sora	—	—	—
			Black-Bellied Plover	—	—	—
	AU 2	Deer/Antelope:	6-9 mos.	Newborn, 0-1 mos.	1-1.5, 1-2, 2-3, 3-4 mos.	4-6 mos.
		Birds:	Snow Goose	—	Broad-Winged Hawk	—
			Gadwall	—	Fledgling Quail	—
			Northern Shoveler	—	—	—
			Lesser Scaup	—	—	—
			Bufflehead	—	—	—
			Sora	—	—	—
		Other:		—	Immature Jackrabbit	—

continued.

Table 8-5. (concluded)

Area	Analytical/ Excavation Unit	Taxa	Winter	Spring	Summer	Fall
			(December-February)	(March-May)	(June-August)	(September-November)
West Slope	AU 3	Deer/Antelope:	8-10 mos.	Newborn, 0-0.5, 0-1 mos.	1-2, 2-3, 3-4 mos.	4-6, 16-18 mos.
		Birds:	Gadwall	Immature Birds	Fledgling Heron	—
			Northern Shoveler	—	—	—
			Scoter	—	—	—
Knoll Top	AU 1	Deer/Antelope:	—	Newborn, 0-1 mos.	1-2, 2-3 mos.	—
	AU 2	Deer/Antelope:	—	0-2 mos.	2-3 mos.	—
	AU 3	Deer/Antelope:	—	Newborn	2-6 mos.	4-6, 18-20 mos.
	AU 4	Deer/Antelope:	—	Newborn		4-8 mos.
East Area	S04W12	Deer/Antelope:	—	Newborn, 0-1 mos.	1-2, 3-4 mos.	—
	S18W18/S20W20	Deer/Antelope:	—	0-1 mos.	—	17-18 mos.

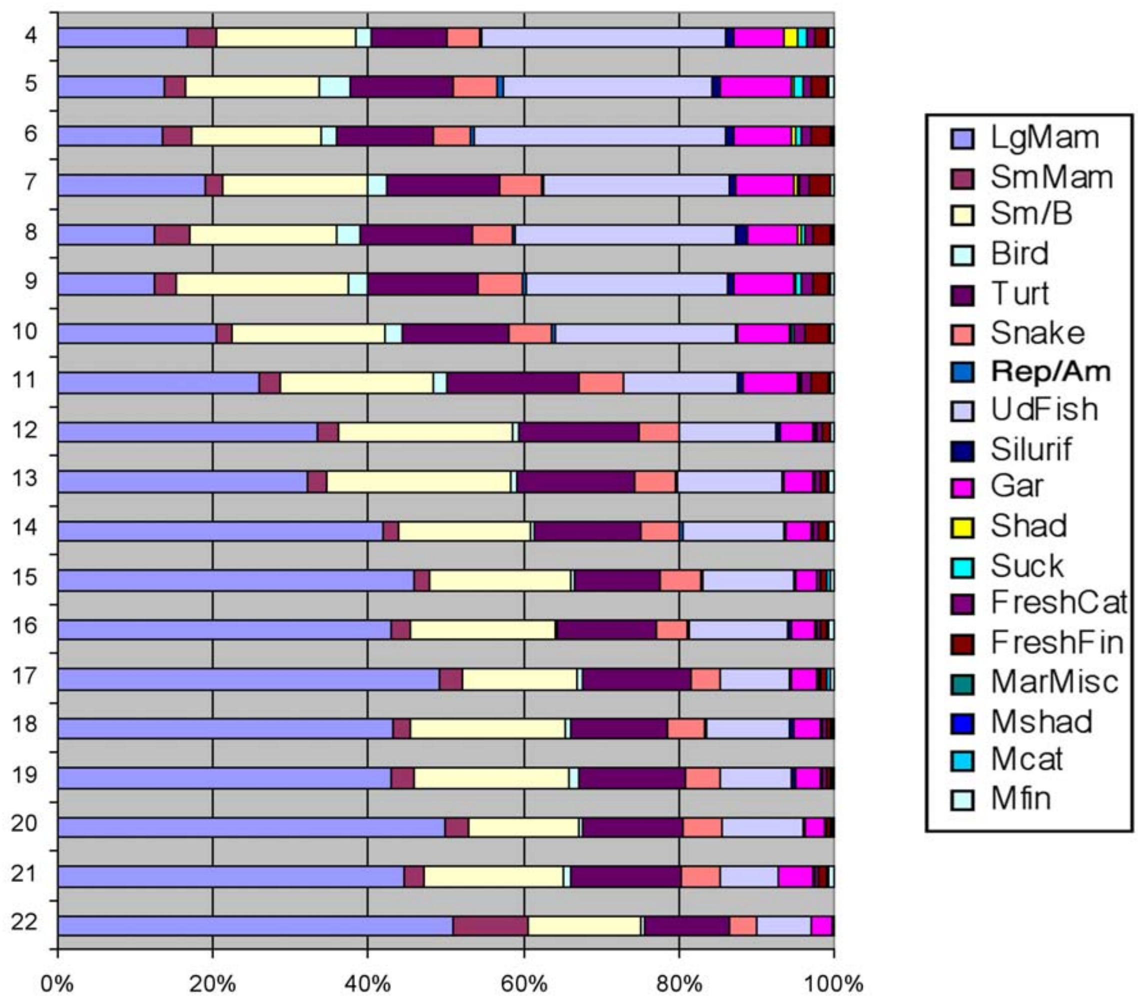


Figure 8-5. Numbers of individual specimens (NISP) of faunal taxa by 10-cm levels, West Slope Excavation Area.

denizens of low gradient streams, likewise are most common in AU 1.

Subsistence Change Though Time

The proportional contribution of various taxonomic classes by level to WS deposits offers convincing data to support the premise of a gradually increasing human population in the area. In Figure 8-5, percent NISP by level indicates a subsistence system initially largely dependent on large mammals (Levels 14-22) transforming into one in which fish contribute proportionally more by count than do large mammals (Levels 4-11). Likewise, proportional weight of large mammals by level (Figure 8-6) decreases substantially beginning in Level 10, from an average of 75 percent below Level 10 to only 48 percent above it, while fish increase from an average of five to 18 percent. By comparing Figures 8-5 and 8-6, the quantity of fish bone necessary to produce this modest change in proportional weight is considerable, as must have been the increased effort expended on fishing pursuits.

There are subtle changes in all taxonomic categories through time, with the proportional contribution of most taxonomic groups expanding as depen-

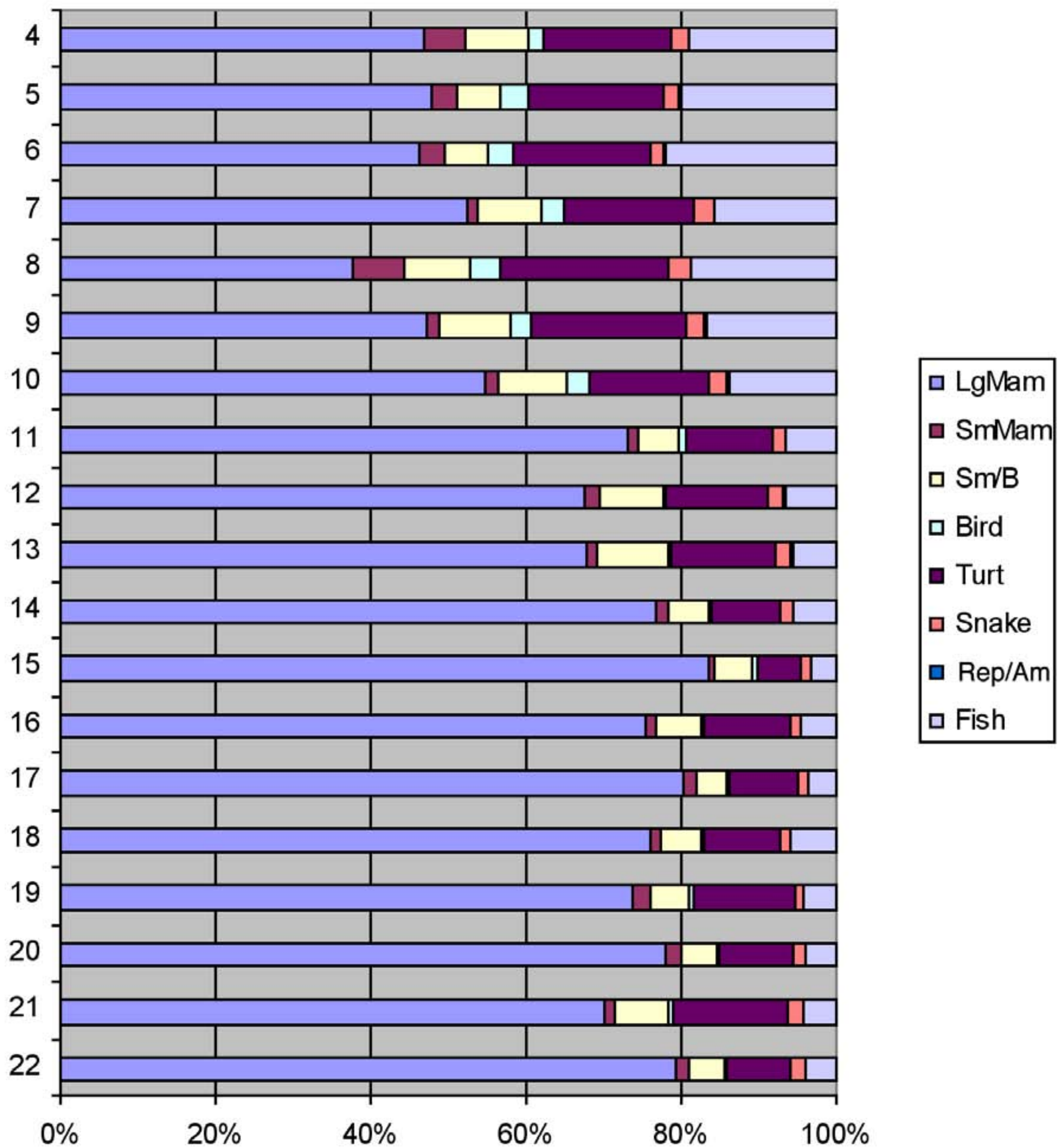


Figure 8-6. Percent of weight of various faunal taxa by 10-cm levels, West Slope Excavation Area.

dence on large mammals decreased. Looking just at proportional weight, probably a fairly good indicator of the actual importance of each category to the subsistence economy,[8] there appears to be a break between Levels 10 and 11. Beginning with Level 10, small mammal/bird and fish jump to double digits, turtles increase from an average of 10 to 18 percent, and even minimally significant snakes and amphibians double. The most extreme diversification is seen in Level 8 which is roughly 40 percent large mammal and 20 percent each for small mammal/bird, turtle, and fish. If NISP is consulted, initial diversification, presumably correlated with some population-based stressor, actually begins in Level 13, though the composite changes are subtle until Level 10. Beginning with Level 10, the quantity of fish bone in the sam-

[8] The relative proportions of bone weight by taxonomic category mirror, with slight distortion, the meat weight associated. Allometry, the logarithmic relationship between bone weight and meat weight, indicates the relationship for birds and mammals is similar, but more variability exists for the remaining classes. Turtles, for example, provide smaller quantities of meat per unit of bone weight due to the weight of carapace and plastron, fish provide more (e.g. Reitz et al 1987).

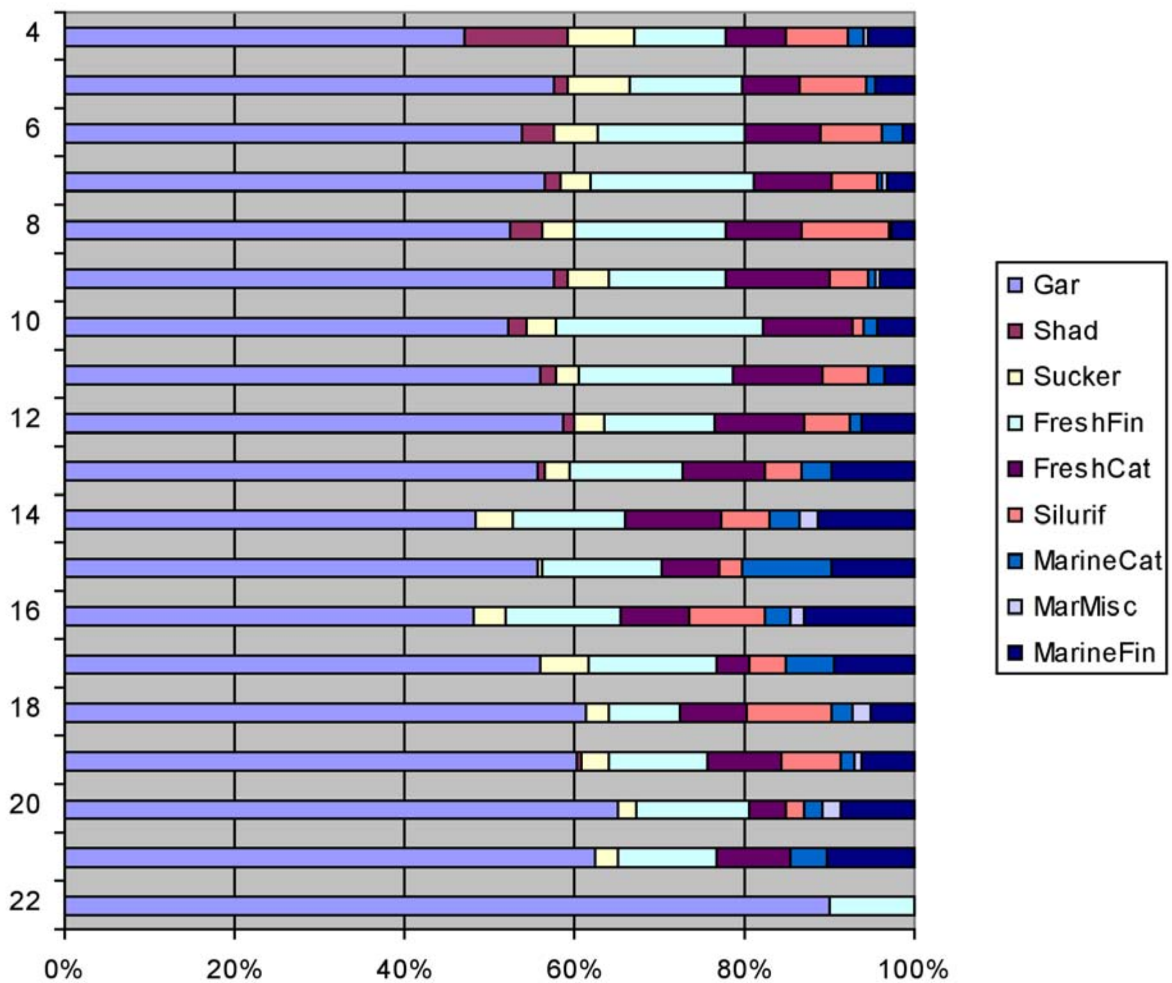


Figure 8-7. Percentages of NISP of identifiable fish taxa, by 10-cm levels, West Slope Excavation Area.

ples increases radically, and the focus on freshwater fishing resources increases.

The composition of identifiable fish[9] from the West Slope deposit is shown by level in Figure 8-7 and by AU in Figure 8-8. Gar, a relatively large fish with many unique identifiable elements (even excluding the ubiquitous scales not included in this analysis) make up roughly 60 percent of NISP for identifiable fish in AU 3 and slightly less in AUs 1 and 2. Marine fish (NISP) make up roughly 15 percent of samples in Levels 13-21, but comprise only five percent of remains in Levels 4-11. Marine catfish and finfish are most numerous in AUs 2 and 3, but collectively never exceed 20 percent of sample NISP. The same pattern of decreasing exploitation of marine fish is also evident when fish MNI is considered (see Figures 8-5, 8-6, and 8-7). In AUs 2 and 3 (roughly Levels 13-22), the ratio of freshwater to marine individuals is 4.6:1 and 4.9:1, respectively. In AU 1, freshwater fish jump, relative to marine taxa, to a ratio of 6.7:1. The contribution of shad, suckers, and freshwater finfish increases through time at the expense of all marine taxa. Of particular interest, since their abundance indicates use of fish nets, is the marked increase in shad seen in AU 1. Shad are small schooling fish that filter feed bottom detritus, subsist on microscopic zooplankton, and are rarely taken by any means other than nets (Pflieger 1997).

Increasing use of fish nets is also suggested by a progressive reduction in the average size of captured

[9] Unidentifiable fish bone comprises between 50 and 75 percent of all fish bone by count, averaging 67 percent per level.

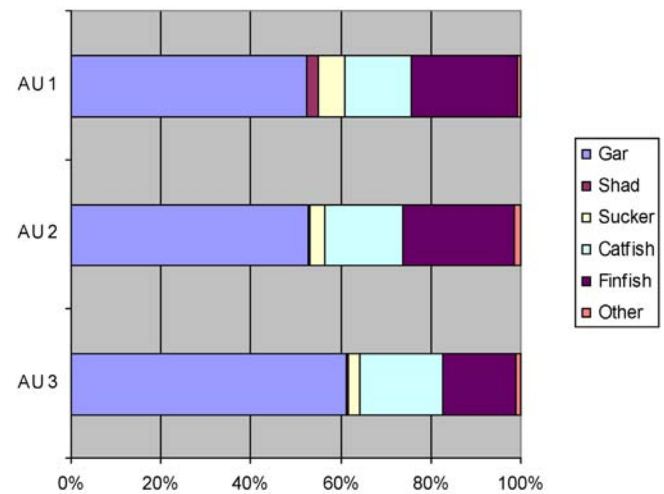


Figure 8-8. (Left) Percentages of NISP of fish taxa, by analytical unit, West Slope Excavation Area.

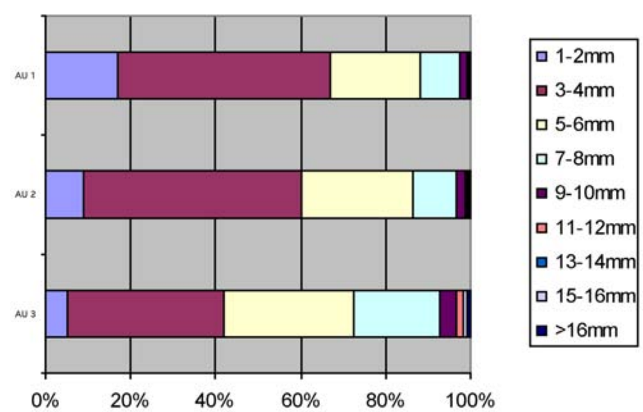


Figure 8-9. (Right) Measurements of fish vertebrae, including atlases, by analytical unit, West Slope Excavation Area.

fish through time. Figure 8-9, based on a total of 5,489 axial elements (atlases, vertebrae, Webberian apparati), shows changes in the diameters of all measured fish elements for WS analytical units. For AU 3 the average diameter of measured elements, including those from unidentifiable fish (basioccipital, atlas, Webberian apparati, and vertebrae), is 3.86 mm, decreasing to 3.41 mm in AU 2 and 3.14 mm in AU 1. Looking just at atlases (Figure 8-10), the greatest difference between AUs 1 and 2 is that there is a massive increase in fish with atlases measuring between 3.5 and 5.49 mm; in effect, fish weighing on average about a pound (Carlander 1950). Although rivers can be viewed as open systems, medium-sized rivers such as the Guadalupe do not support large numbers of very large fish. Given sample size and the fact that fish vertebrae preserve well even under poor post-depositional conditions, the pattern here should be viewed as very robust.

A final zooarchaeological measure of aboriginal population pressure on local resources may be revealed by age profiles of large mammals; at Buckeye Knoll, these include antelope but are mostly whitetail deer. If predation is light, one would expect a fair number of individuals to survive to be two years old or older; if heavy, mortality rates reduce the number of individuals reaching adulthood. Due to extensive mechanical abrasion coupled with high pH, complete deer and antelope teeth, usually the best prospects for age-profile reconstruction, were exceedingly rare in the assemblage considering sample size. In the WS deposit, 642 deer/antelope tooth fragments were identified, of

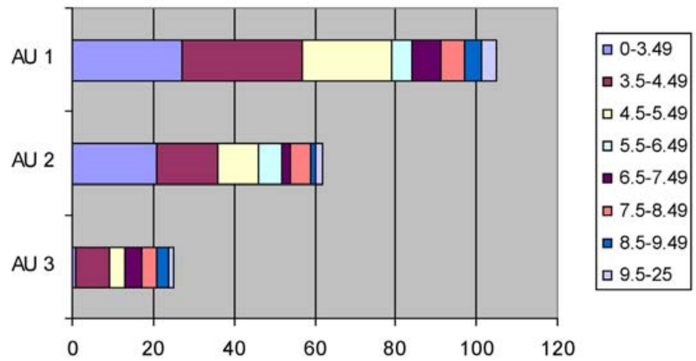


Figure 8-10. (Left) Fish atlas vertebrae diameters by analytical units, West Slope Excavation Area.

which only eight percent were sufficiently intact to be aged. To bolster this somewhat small sample, aged teeth were divided into two groups, juvenile (under 2 years) and adult (older than two years).[10] In the WS deposit, the greatest frequency of young animals is in AU 1, 58 percent. In contrast, only 19 percent of deer/antelope are under the age of two in AU 3, and none is under two in AU 2. Similarly, examining the relative frequency of fused versus unfused epiphyses for early-fusing elements (distal humerus, distal tibia, proximal phalanges, and the *tuber calcis* of the calcaneum), which in whitetail deer begin to fuse at 17 months (Purdue 1983), 12 percent were unfused in AU 3, 18 percent in AU 2, and 31 percent in AU 1. The fact that there is a relative increase of 50 to nearly 300 percent in the contribution of juvenile deer in AU 1 using both methods suggests that by AU 1, Buckeye Knoll inhabitants were more likely to take prey on an encounter basis, without regard for age and/or size, a hallmark of decreased selectivity.

Predation on deer must have been extremely high in WS AU 1. In a now-classic study, Elder (1965) compared deer-mortality profiles for prehistoric- and historic-era aboriginal sites versus those produced by modern hunters. For the modern sample, Elder found that between 50 and 61 percent of modern kill populations (*n*=2,620) were deer under the age of 2 years, a mortality rate probably based on killing prey on a non-selective encounter basis. In contrast, for aboriginal populations, juveniles contributed only 20 to 28 percent of the mandibles recovered (*n*=649). The 58 percent figure for juvenile deer teeth in WS AU 1 most resembles the latter. This pattern is tempered a bit by the figure of 31 percent of early fusing elements in AU 1, but still exceeds Elder's data on juvenile deer at aboriginal sites.

In sum, the faunal signatures observed in the WS sample strongly suggest a gradually increasing human population putting increasing pressure on existing resources. The number of animal taxa captured increases, an emphasis on large mammals is replaced by fishing and more intensive use of all other taxonomic groups, fishing is more focused on locally available freshwater taxa, and there is a marked decrease in fish size, probably associated with increased use of fish nets. In addition, there appears to have been greater hunting pressure on deer and antelope in AU 1 compared to the earlier AUs. The patterns observed by level suggest that the initial population-based stressor, indicated in slight changes in proportional NISP, is in the sample from Level 13, and the greatest stress, based on degree of diversification (and equitability), is in the sample from Level 8.

[10] For the age category 1 to 3 years, half were assumed older, half younger, than 2.

Chapter 9

Estuarine Faunal Materials

Robert A. Ricklis

The Materials

Estuarine faunal remains found at the Buckeye Knoll site consist of fish bones and otoliths and estuarine bivalve shells. Susan L. Scott has described and discussed the fish bones in Chapter 8, whereas the otoliths are discussed here.

Otoliths recovered from Buckeye Knoll represent several marine-fish species, namely, black drum (*Pogonias cromis)*, Atlantic croaker (*Micropogonias undulatus*), marine catfish (*Aureus felis* and, possibly, *Bagre marinus*), redfish, also known as red drum (*Sciaenops ocelleta*), and spotted sea trout (*Cynoscion nebulosis*). Otoliths and bones of these species are found in abundance on Archaic and Late Prehistoric shoreline campsites on the nearby central Texas coast (e.g., Ricklis 1988, 1995a, 1996a; Weinstein 1992, 2002; Zimmerman and Steele 1988).

The estuarine molluscan species represented by bivalve shells and, more abundantly, shell fragments, are only two in number. They are oyster (*Crassostrea virginica*) and the common rangia (*Rangia cuneata*). Oyster is a low-to-moderate salinity species that thrive in beds and oyster reefs within the bays of the Texas coast. Large and numerous reefs are documented in San Antonio Bay, into which empties the Guadalupe River (McGowen et al. 1976). Today, *Crassostrea virginica* are most abundant in the open primary bays that have moderate salinities (i.e., 10-20 o/oo as compared to the marine salinity of 36 o/oo) because they are largely cut off from wave and tidal influence from the open Gulf by the barrier islands. Prior to modern barrier formation after establishment of modern sea level, ca. 3,000 B.P., marine influence and relatively high average salinities would have extended farther into the bays and the lower reaches of streams, enabling oysters to inhabit somewhat more inland waters than was possible during the late Holocene.

Rangia cuneata is a brackish-water species of clam that lives in salinities of less than 10 o/oo (Andrews 1977; de al Cruz 1985). Thus, this species is typically found in beds in the more inland (headward) parts of primary bays, and within secondary bays and the marine-influenced, seaward stretches of coastal-plain rivers. Archaeological shell-midden deposits containing profusions of *Rangia cuneata* shells are found along the northwestern Gulf of Mexico shore, from Corpus Christi Bay, northward to Galveston and Trinity Bays on the upper Texas coast (Aten 1983a, 1983b), and eastward across the Louisiana coastline (e.g., Weinstein and Kelley 1992).

At Buckeye Knoll, the marine-fish otoliths and rangia and oyster shells were found almost exclusively in the Knoll Top and West Slope areas; only one specimen, a marine catfish otolith, was recovered from an excavation unit (N41E10) in the eastern part of the site. Thus, these materials were largely deposited in those areas of the site closest to the Guadalupe River, suggesting that perhaps fish and shellfish were brought from the coast via canoe on the river and shucked and consumed in domestic habitation areas set up immediately next to the floodplain. While this inference is speculative, it may be supported by the very fact that the clams and oysters were brought to the site in the shells, suggesting a lack of preservational treatment (e.g., drying, smoking) on the coast, and a rapid mode of transport back to Buckeye Knoll to allow consumption of the meats before spoilage. The presence of otoliths almost exclusively in the more western parts of the site (i.e., the Knoll Top and West Slope areas) accords with the idea that fish heads were removed there prior to the consumption of the fish meat across the entire site (post-cranial fish bones were found in abundance in all areas, including the East Area). Water travel by canoe would have been much faster than overland travel on foot, thus making such a strategy feasible. Wooden dugout canoes were used by the Karankawa Indians of the region in early historic times (Newcomb 1983; Ricklis 1996a), and prehistoric examples have been found in Florida and radiocarbon dated to as early as 7020-6740 B.P., calibrated (Wheeler et al. 2003:546), so their early use at Buckeye Knoll and along the Texas coast is reasonably conceivable. It is worth noting, in this context, that the bioarchaeological analysis of human skeletal material from the site (see Chapter 12) suggests relatively great upper-body robusticity, which could be the result of common use of canoes.

Marine Resource Exploitation at Buckeye Knoll

In general, the data show a decline in the abundance of marine fish and estuarine shellfish remains from bottom to top in the deposits. In the Knoll Top deposits, there is a straight linear decline in the percent of fish that are marine species, from a high of 29 percent in AU 4 to a low of 13 percent in AU 1 (Figure 9-1). This indicates a progressive decrease in the proportional use of marine fish over time, with relative abundance in the Early Archaic I (AU 4), followed by a long-term decrease that continues into the Initial Late Prehistoric (AU 1). The data from the West Slope are in only partial agreement, as the highest percentage of marine species is found in AU 2, dating to the Late Archaic I, ca. 4100-2800 B.P., then declining to 13 percent in AU 1 (a representation identical to AU 1 in the Knoll Top), which spans a time range from Late Archaic II into the Late Prehistoric, or ca. 2800-750 B.P. The earliest definable cultural component in the West Slope (AU 3), a Middle Archaic zone with an estimated calibrated age range of 5100 to 3820 B.P., shows a marine-fish percentage of only 11 percent. Thus, while the Knoll Top shows a gradual decrease in marine fish exploitation through time, the West Slope data show a unimodal peak in the early part of the Late Archaic (see Figure 9-1). The possibility must be considered that the Knoll Top data are skewed by the erosional unconformity between Zones 2 and 3, which probably mixed fish bones from the Early Archaic I with Middle and Late Archaic specimens, effectively smoothing the data and thus creating the apparently straight linear decrease in marine fish remains which those data show.

The abundance of estuarine shellfish shows similar declines. *Rangia cuneata* appears to have been of greatest significance in the Middle Archaic and to have declined through the Late Archaic and into the Late Prehistoric. As may be seen in Figure 9-2, the greatest proportion of rangia shells in the West Slope Excavation was found in AU 3, dated to the Middle Archaic, or ca. 5100-3800 B.P., calibrated. On the Knoll Top, rangia is best represented in AU 3, which is believed to contain mixed debris from the Middle Archaic and the early part of the Late Archaic, ca. 3800-2200 B.P. The species is poorly represented in AU 1 on the West Slope, dated at ca. 2800-750 B.P., suggesting that by 2,800 years ago it was already of reduced significance. Thus, we can conclude that this estuarine clam was used most abundantly by Buckeye Knoll folk between ca. 5000 and 2800 B.P. and declined markedly in importance toward the end of the Late Archaic and into the Late Prehistoric.

Oyster shows a peak in abundance, in WS AU 2 on the West Slope and in KT AU 3 on the Knoll Top. Both of these analytical units pertain largely to the early part of the Late Archaic. They have largely overlapping estimated age ranges of 4100-2800 B.P. and 3780-2200 B.P., respectively. Associated diagnostic artifacts include Refugio, Morhiss, and Lange dart points. Thus, the peak in oyster exploitation (4100-2200 B.P.) by people occupying the Buckeye Knoll site overlaps significantly with the time range of maximum rangia gathering (5000-2800 B.P.). As in the case of rangia, oyster use declined dramatically in the more recent years of the Late Archaic, beginning ca. 2800 B.P. in West Slope AU 1 and showing a continued decline in the Initial Late Prehistoric period as represented in KT AU 1 on the Knoll Top.

Since oysters are proportionately poorly represented in WS AU 1 on the West Slope, which begins ca. 2,800 B.P., it can be inferred that the temporal interval of their greatest use at Buckeye Knoll is 4100-2800 B.P., though the fairly high representation of oyster in WS AU 3 (5100-3820 B.P.) suggests that their peak importance could have started before 4,100 years ago. Therefore, we are left with the probability that the peak use periods of both rangia and oyster were essentially

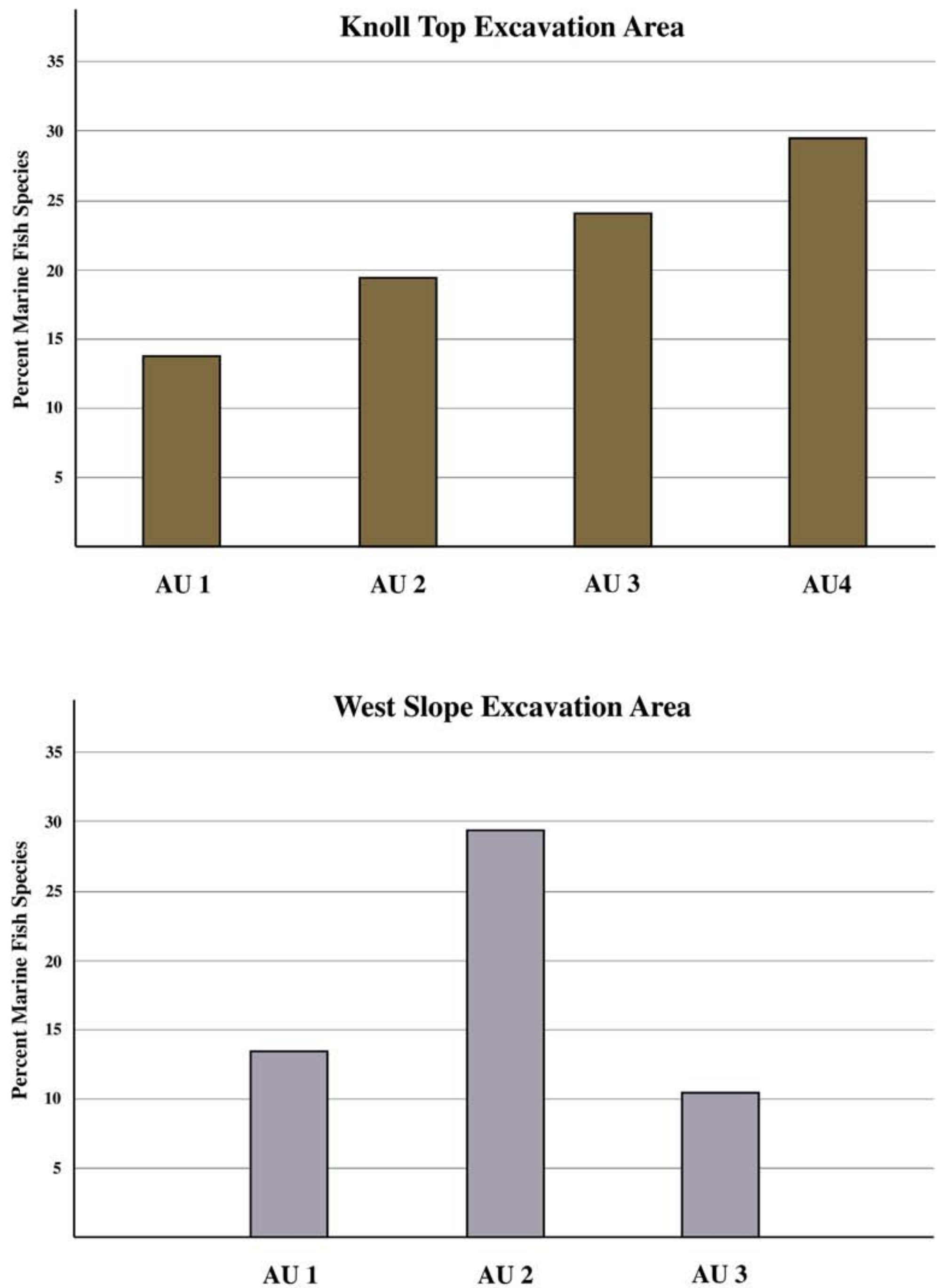
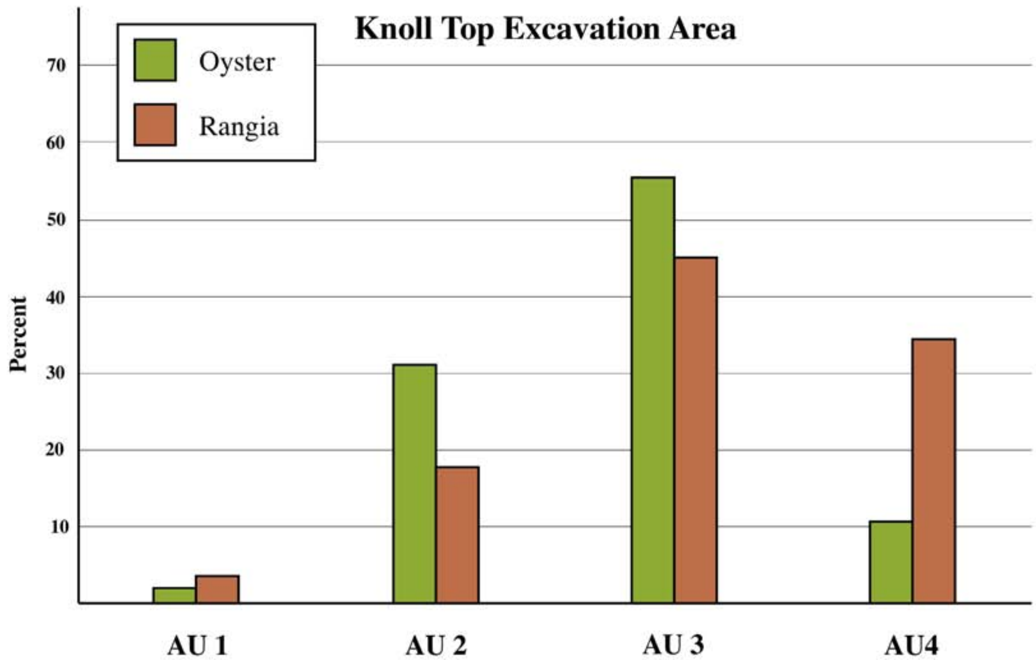


Figure 9-1. Bar graphs showing the percentages of fish that are marine species for each of the analytical units in the Knoll Top and the West Slope excavation areas.



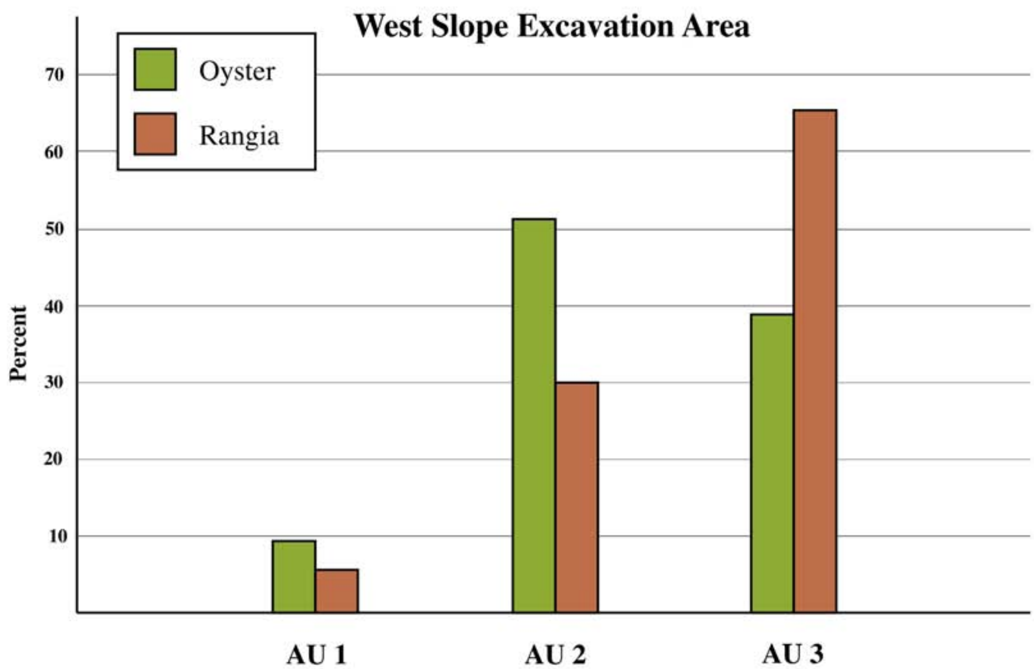


Figure 9-2. Percentages of the total samples of *Rangia cuneata* and oyster (*Crassostrea virginica*) from the Knoll Top and West Slope excavation areas that were found in each of the analytical units within the two areas.

the same, in the interval between ca. 5100 and 2800 B.P.. A concordance here is not surprising, and in fact a lack of agreement would be unexpected, given that both shellfish species inhabit similar and overlapping portions of estuarine bay and lagoon environments, areas with typically low-to-moderate salinities.

Already discussed in Chapter 2 is the hypothesis that sea level rose rapidly, perhaps to a highstand, beginning around 4,200 B.P., with stabilization at modern stillstand by ca. 3,000 B.P. If this was the case, we should expect to see evidence for increased estuarine salinity during this time interval, as rising sea level breached the barrier islands and marine transgression pushed saline waters farther inland than was previously the case. The data presented above for peaks in rangia and oyster exploitation at Buckeye Knoll during the interval between 5100 and 2800 B.P. accord with this hypothesis, insofar as a landward transgression of saline marine waters would have correspondingly pushed the habitats of the two species upstream of the mouth of the Guadalupe River, closer to Buckeye Knoll.[1] With greater proximity of these resources to the site, they could be more readily and thus more frequently procured, increasing the deposition of their shell detritus at the site.

The diachronic pattern of marine-fish abundance at the site is somewhat more ambiguous. The West Slope data seem rather clear on this point, insofar as the peak in marine-fish exploitation was in AU 2 which represents the Late Archaic I period, ca. 4100-2800 B.P., essentially the same time range as the estimated period of highstand and increased estuarine salinity (ca. 4200-3000 B.P.). As noted earlier, the data from the Knoll Top are not as clear, in that there appears to be a clinal decrease in marine fish abundance between AU 4 (Late Paleo-Indian/Early Archaic I) and AU 1 (Initial Late Prehistoric). Also noted, however, is the possibility that mixing of AU 3 (Middle Archaic to Late Archaic I) materials into AU 4 may have provided a false impression of relative abundance for the early end of the sequence. In light of this possibility, it may be reasonable to assume that the data from the West Slope are the more reliable, especially as they accord quite closely with the data for the relative abundances of rangia and oyster through time.

1 Support of this hypothesis can be found further in a ^{14}C date of 2755-2340 B.P. (805-390 B.C.; 2-sigma, calibrated) on oyster shells recovered from dredge material along the banks of the Victoria Barge Canal ca. 10.5 km south-southeast of Buckeye Knoll (Weinstein 1992:376, Figure 10-4, Table D-1).

In sum, then, marine resources were incorporated into the adaptive strategies of Buckeye Knoll residents by the Early Archaic I, ca. 8500 B.P.. as early Holocene sea-level rise and marine transgression flooded coastal river valleys to create the forerunners of the modern coastal bay systems. The peak in marine/estuarine resource use at the site appears to have occurred ca. 4100-2800 B.P., inferably in response to rising sea level (possibly to a high-stand) and resultant transgression toward the site of saline, estuarine waters that could support oyster, *Raniga cuneata*, and marine fish species. After sea level stabilized at its modern stillstand, ca. 3,000 B.P., ongoing alluvial sedimentary infilling of the head of San Antonio Bay pushed the river delta seaward, in effect reversing the previous landward transgression of estuarine habitats, resulting in greater distance from Buckeye Knoll of associated fish and shellfish resources. At the same time, increasing biotic productivity of the coastal zone after 3000 B.P., and a corollary of increasing human population density along the coast (Ricklis and Blum 1997; Ricklis and Weinstein 2005), led to human population increase along the coast and the concomitant emergence of a broad cultural boundary that separated the operational areas and territories of distinctly coastal and inland populations, effectively tending to isolate Buckeye Knoll residents from ready access to the shoreline and its estuarine resources. For these combined reasons, we see a significant decline in the quantities of oyster, rangia and marine fish remains at Buckeye Knoll during the Late Archaic, a trend that continues into the Late Prehistoric period.

Seasonality

The lower valves of oyster, *Crassostrea virginica*, and marine-fish otoliths are two kinds of estuarine faunal remains that have been employed for archaeological seasonality studies along the Texas coast. Otoliths have long been recognized as containing information on fish ages (Casteel 1976), and in the last two or three decades, their usefulness in seasonality studies has been introduced into archaeological work (Huddleston 1981; Prewitt 1987; Ricklis 1988, 1994a, 1996a; Smith 1983; Wilson 2002; Stringer 1998). Oysters also contain a range of information on aquatic environments (Cox and Cox 1993; Kent 1988), and are effective as seasonality indicators (Kent 1988; Lawrence 1988; Ricklis 1996a, 1998). Until recently, *Rangia cuneata* have been widely regarded as reliable indicators of seasonality (Aten 1981; Carlson 1988; Ricklis 1996a), but some researchers have questioned this (Weinstein and Whelan 1987:52-55; Patterson 1992), and recent blind tests at estimation of season of death of modern rangia of known collection dates have not supported the reliability of rangia seasonality estimations (Lawrence E. Aten, personal communication 1997). For this reason, rangia shells are not used here for making seasonality estimates.

Otolith Seasonality

Methodology

Otoliths are small concretions made of protein and calcium carbonate (aragonite) that grow as pairs in the neurocrania of fish to aid in maintaining equilibrium (Casteel 1976). Individual fish each have three pairs of otoliths, the largest of which, the sagittae, are of concern here. Each species has sagittal otoliths of distinctive, easily identifiable shape (Zimmerman 1988). The most commonly recovered otoliths on Texas coastal archaeological sites are of the species black drum (*Pogonias cromis*), redfish or red drum (*Sciaenops ocellata*), spotted sea trout (*Cynopscion nebulosis*), marine catfish (*Aurius felis*) and Atlantic croaker (*Pogonius undulatus*) (e.g., Ricklis 1996a; Wilson 2002). The growth of otoliths is directly correlated with the growth of the fish. As the fish grows in size and weight, the otolith enlarges by adding on protein and aragonite in layers. Starting with a nucleus that forms in the first year of the fish's life, one layer, or annulus, is added to the otolith for each additional year of growth. Thus otoliths can be used to determine the age of the fish at the time of its death, and to accurately estimate the size of the fish. Biologists have, therefore, used otoliths for study of fish life cycles and growth patterns for many decades (Casteel 1976).

Season of fish capture (and death) is estimated on the basis of the amount of growth in the final annulus. This is possible because a relatively thin, opaque layer is added at the margin of the otolith during the winter, while a relative wide, translucent layer, representing rapid growth, is added during the spring, summer, and fall seasons. Thus, if the outer margin of the otolith consists of the thin opaque layer, it is deduced that the fish died in the winter. For the spring, summer and fall periods of rapid growth, the translucent layer will have grown, respectively, (a) between zero and one third of its full width, (b) between one-third and two-thirds of its full width, and (c) between two-thirds and all of its full width. The full width that would have been attained by the still-growing final annulus at the time of the fish's death is estimated on the basis of the widths of previous annuli within the otolith.

In order to observe these variables, the otoliths were cross-sectioned transversely by breaking in half with pliers, after which the transverse broken edge was smoothed and polished by successive abrasion with 200-grit and 600-grit sandpaper. The smoothed edge was then coated with mineral oil to increase visible contrasts between layers, and examined under reflected light using 10-20x binocular microscopy. The number of annuli around the nucleus were counted to obtain the age at death of the fish, and the season of death was estimated based on the just-mentioned characteristics of the otolith's margin, as visible in the polished cross-section.

Results

A total of 50 marine-fish otoliths were recovered at Buckeye Knoll. The most common species were the marine catfish species, hardhead (*Aurius felis)* and gafftopsail (*Bagre marinus*), having a combined representation of 41 otoliths. Black drum (*Pogonius cromis*), spotted sea trout (*Cynoscion nebulosus*), and Atlantic croaker (*Micropogon undulatus*), are represented by six, two and one otolith, respectively. These quantities are in marked contrast to species counts of otoliths from shoreline sites along the central Texas coast, where black drum, redfish, and spotted sea trout are usually far more abundant than are otoliths of marine catfishes (e.g., Prewitt 1987; Ricklis 1996a; Wilson 2002). This reversal of species abundances may reflect the greater availability of marine catfish in the low-salinity water of the more inland portions of coastal bays, as well as in the estuarine portions of the streams that empty into the bays. Hardhead and gafftopsail catfish, though adapted to saline aquatic environments, are able to live in very low-salinity environments (Muncy and Wingo 1983).

A total of 45 otoliths can be placed within the defined AUs in the Knoll Top and West Slope Excavations (Table 9-1). Thirty specimens are from the Knoll Top and 15 are from the West Slope. All of these were cross-sectioned and examined microscopically to obtain estimates of season of death. The combined seasonality results from the two excavation areas (Figure 9-3) are as follows: spring (*n*=6), summer (*n*=14), fall (*n*=13), and winter (*n*=12).

This seasonal breakdown is expressed graphically in Figure 9-3, and the seasonality results for each excavation area and analytical unit may be seen in Table 9-2. The samples available from any given analytical unit are too small to provide a reliable assessment of seasonality for that AU, though it is readily apparent

Table 9-1. Marine Fish Otoliths Within the Analytical Units of the Knoll Top and West Slope Excavations at Buckeye Knoll by Species.

Species	Black Drum	Catfish	Atlantic Croaker	Redfish	Sea Trout	Totals
Knoll Top AU						
1	—	2	—	—	—	2
2	—	4	—	—	—	4
3	1	9	—	—	1	11
4	3	9	1	—	—	13
Totals	4	24	1	0	1	**30**
West Slope AU						
1	—	—	—	—	—	0
2	—	2	—	—	—	2
3	1	11	—	1	—	13
Totals	1	13	0	1	0	**15**

Table 9-2. Seasonality Derived from Marine Fish Otoliths Within the Analytical Units of Knoll Top and West Slope Excavations at Buckeye Knoll.

Season	Fall	Winter	Spring	Summer
Knoll Top AU				
1	—	—	—	2
2	3	—	1	—
3	5	2	—	4
4	3	5	1	4
Totals	11 (37%)	7 (23%)	2 (7%)	10 (33%)
West Slope AU				
1	—	—	—	—
2	1	—	—	1
3	1	5	4	3
Totals	2 (13%)	5 (33%)	4 (27%)	4 (27%)

that multiple seasons are represented in all AUs and none shows a significant clustering within a single season.

The combined data from all proveniences indicate that the procurement of marine fishes took place in all seasons of the year. Out of the total of 45 otoliths in our sample, 29 percent represent the fall season, 27 percent represent winter, 13 percent represent spring and 31 percent are summer. Thus, each season is represented by about the same percentage of the total sample, with the exception of spring, which has a representation of slightly less than half that of the other seasons. These results are in contrast to otolith seasonality from shoreline sites along the coast, which exhibit a strong tendency to cluster in the fall through early spring, or cool-weather part of the annual cycle (e.g., Prewitt 1987; Ricklis 1988, 1996a; Smith 1986; Wilson 2002). The broad temporal range of these data indicates that the multi-seasonal pattern, which they represent persisted essentially throughout the long history of the site's occupation.

Oyster Seasonality

Methodology

A method for assessing the seasonality of the Atlantic (or eastern) oyster, *Crassostrea virginica*, was developed on the Atlantic coast (Kent 1988; Lawrence 1988) and has more recently been employed in archaeological contexts on the Texas coast (Cox and Cox 1993; Cox 1994; Ricklis 1996a, 1998, 2002). Basically analogous to the method used with otoliths, oyster seasonality readings depend on the identification of winter growth interruptions and estimation of the relative amount of growth following the final winter interruption. Although growth interruptions are registered on the exteriors of oyster shells, the shell surfaces are too irregular for reliable assessment of the amount of growth after formation of the final growth

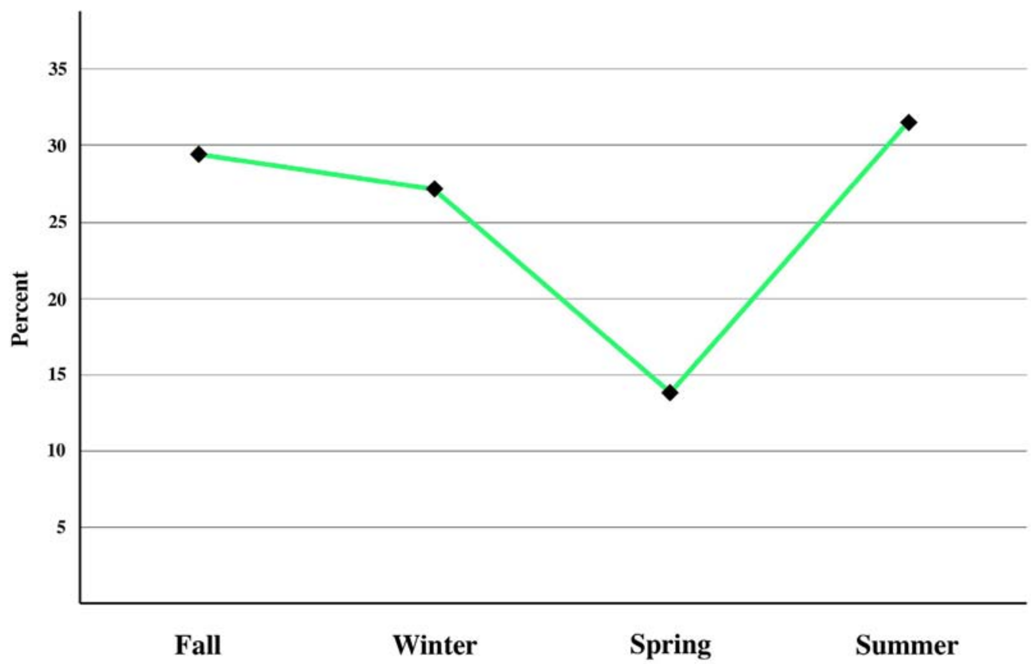


Figure 9-3. Line graph showing the seasonal breakdown of all marine fish otoliths from the Knoll Top and West Slope excavation areas, combined, expressed as percent of total in each of the four seasonal categories.

interruption. The interior umbo section (chondophore) of the lower oyster valve, by contrast, does show annual growth interruptions and growth increments that are sufficiently even for estimation of season of death of the oyster. Winter growth interruptions are registered in the trough-like chondophore as narrow grooves (Figure 9-4) (Custer and Doms 1990; Cox 1994; Cox and Cox 1993; Lawrence 1988; Steponaitis and Herbert 1995). Since each groove is assumed to represent a winter growth interruption, season of death is estimated on the basis of the amount of shell growth beyond the final interruption groove, as a proportion of the measured width of the final complete growth year. Because the width of growth annuli must be determined for comparison, only shells of oysters at least two years old at death are suitable. If an oyster died in its first or second year of growth, the analyst has no comparative reference for estimating at what point in the annual cycle this happened.

Oyster shells were not found in profusion in the Buckeye Knoll deposits but occurred sporadically, mostly in the lower occupational strata at the site. Additionally, most specimens are fragments rather than whole shells. For these reasons, along with the fact that many specimens were too small (young at the time of death) for reliable seasonality readings, only a limited number of shells were suitable for seasonality analysis. Shells were selected for this analysis by examining the samples of oyster shell from all excavation levels in both the Knoll Top and West Slope excavations. Only unbroken, lower valves with undamaged chondophores and with sizes large enough to represent multiple growth years were selected for analysis. In this way, a sample of 64 analyzable shells was obtained.

Results

Due to the small total sample size, not enough analyzable shells were available for any single analytical unit with which to obtain a reasonably reliable estimation of the seasonality of oyster procurement according to discrete cultural periods. However, multiple seasons are represented in all AUs defined for the Knoll Top and West Slope, so oyster gathering does not appear to have ever been confined to any one season. The results for the total combined sample are presented in Table 9-3 and shown graphically in Figure 9-5. It will be seen that all seasons are represented, with spring and summer having the highest representation.

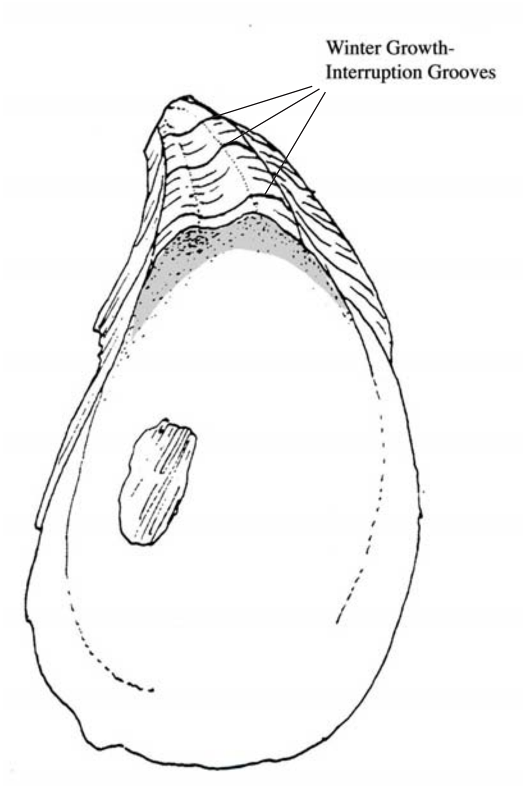


Figure 9-4. A drawing of the interior of the lower valve of the American (or eastern) oyster (*Crassostrea virginica*), showing the winter growth-interruption grooves in the chondophore. This specimen is estimated to have died in the spring of its fourth growth year.

Table 9-3. Seasonality Derived from Oyster Shells Within the Analytical Units of the Knoll Top and the West Slope Excavations at Buckeye Knoll.

Season	Spring	Summer	Fall	Winter
Knoll Top AU				
1	—	1	—	1
2	4	4	1	2
3	—	1	1	1
4	3	4	1	—
NA	4	5	2	—
Totals	11 (31%)	15 (43%)	5 (14%)	4 (11%)
West Slope AU				
1	1			
2	2	1	4	1
2-3	7	7	2	
3		1		1
Totals	10 (37%)	9 (33%)	6 (22%)	2 (7%)
Combined	23 (36%)	24 (38%)	11 (17%)	6 (9%)

Discussion

The data for both the otoliths and the oysters show that estuarine resources were procured by Buckeye Knoll residents in all seasons. This suggests that the site was generally occupied during all seasons throughout the long history of its use. These data do not indicate whether occupation was recurrent at various times within the annual cycle, or rather that all seasons are represented because people were living at the site throughout the year in an essentially sedentary, or semi-sedentary, mode of residence. Given that non-agricultural populations generally were more or less mobile in their residence patterns, along with the seemingly well established fact that the ethnohistorical records show that the early historic aboriginal groups of southern Texas were non-sedentary and practiced a mobile pattern of subsistence and settlement (e.g., Campbell 1988; Campbell and Campbell 1983; Ricklis 1996a), it seems reasonable to infer that the Buckeye Knoll site was occupied by non-sedentary, hunter-gatherers at multiple times during the yearly cycle. Additionally, it can be inferred that the site was close enough to the coastal shoreline that estuarine shellfish and fish could be procured and brought to the site for consumption. As discussed earlier in this section, the data point to a declining abundance of coastal faunal remains through time, suggesting that estuarine resources became progressively less accessible, either because of seaward progradation of the Guadalupe delta, denial of access by strongly territorial resident coastal populations, or a combination of these factors.

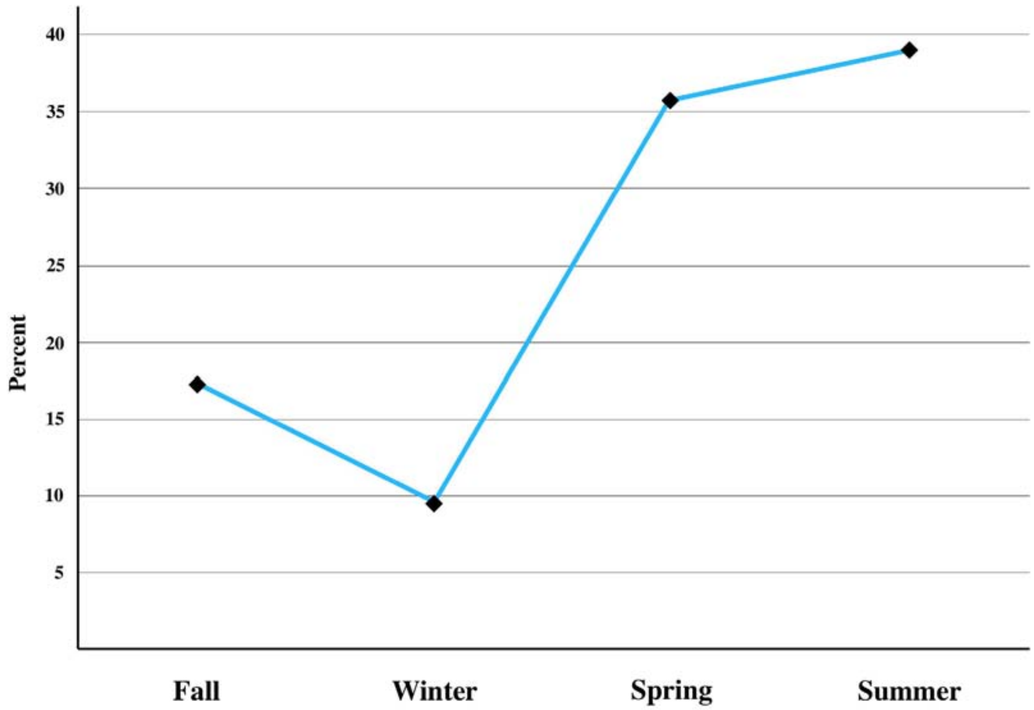


Figure 9-5. Line graph showing the percentages of oyster shells falling into the four main seasonal categories, based on the analysis of 64 lower valves from the combined analytical units in the Knoll Top and West Slope excavation areas.

While true sedentism may have been unlikely, the year-round (though intermittent) occupation of the site does suggest a pattern of limited mobility, in which people did not move over great distances but rather were able to recurrently return to favored locales, such as Buckeye Knoll, at various times during the year. Alternatively, we may envision a semi-sedentism, in which Buckeye Knoll served as a base camp from which individuals or task groups were able to radiate outward into different ecozones, such as the coastal bay shoreline, to procure a variety of resources. In this scenario, some proportion of the population could have been in residence at the site throughout the year.

Chapter 10

Burial Descriptions

Robert A. Ricklis

A total of 75 prehistoric human burials were documented during the 2000-'01 fieldwork at the Buckeye Knoll site. Although 75 burial number designations were assigned in the field (Table 10-1), teeth and/or bone elements within burials that did not pertain to the primary, recognized skeleton(s), represent other individuals. Thus, the MNI represented by the remains recovered by the excavations is 119.

With only one exception, the burials were located within a limited area on the top of the knoll near the west end of the site. The exception, Burial 30, was found at the base of Zone 2 in the West Slope Excavation block. A map of the Knoll Top Area showing the locations of all the numbered burials is presented in Figure 10-1. The MNI on the Knoll Top is 118. Since six of these pertain to the Late Archaic and two to the Middle Archaic, the MNI represented for the Early Archaic cemetery is 110. Given that only about 30 percent of the estimated Knoll Top cemetery area was excavated, it can be conservatively estimated that the total MNI was originally in the neighborhood of 200 to 300.

The stratigraphic positions of burials at Buckeye Knoll in, combination with AMS dating of human collagen, suggest three general periods of mortuary activity at the site. The earliest and best represented pertains to the Early Archaic period, with 16 different burials thus far yielding calibrated radiocarbon age ranges (AMS on bone collagen) between ca. 7400 and 6300 B.P. As will be apparent further on, artifacts associated with the Early Archaic burials appear to represent a coherent and unique mortuary assemblage. The Early Archaic individuals were interred in flexed, semiflexed, or seated positions and, in several cases, were secondary, or "bundle," burials.

The later mortuary components at the site are assigned to the Middle and Late Archaic periods. Late Archaic burials on the Knoll Top were found within the bottom part of Zone 2, or, in one case (Burial 25), within a clearly discernible grave pit that had intruded from Zone 2 into the upper part of Zone 3. Two burials, Nos. 23 and 25, contained mortuary accompaniments diagnostic of the Late Archaic. Associated with Burial 23 were several thin bifaces, including a large Lange dart point, a type assigned to the Late Archaic period (Turner and Hester 1999) and a recurrent item in the Loma Sandia cemetery in Live Oak County, dated to ca. 2800-2600 B.P. Burial 25 contained an Ensor-like dart point (embedded in the right scapula and probably the cause of death), as well as two large whelk shell pendants virtually identical to Late Archaic specimens reported from Ernest Witte (41AU36) and other sites in the lower Brazos-Colorado River area. Both Burials 23 and 25 were in extended positions, in common with most Late Archaic burials in the lower Brazos-Colorado area. Three other burials at the site, Nos. 20, 30, and 35, were also apparently extended; two of these were in the base of Zone 2 on the Knoll Top, while the third (No. 30) was in the bottom of Zone 2 on the West Slope.

At least three burials found in the Knoll Top Block Excavation, Nos. 41, 48, and 51, were found at the interface of Zones 2 and 3. These are considered to be Early Archaic in age, based on the fact that the bottoms of the skeletal elements were resting in Zone 3. The variables for each burial are summarized in Table

Table 10-1. List of Burials Encountered During the Excavations at Buckeye Knoll.

Burial No.	MNI	Sex	Age	Period
1A	1	M	Adult	Early Archaic
1B	1	?	Subadult	Early Archaic
1C	1	?	Adult	Early Archaic
2	1	F	37.6	Early Archaic
3	1	F	51.49	Early Archaic
4	2	F	54.07	Early Archaic
		?	4.0	Early Archaic
5	4	F	22.22	Early Archaic
		F	55+	Early Archaic
		?	55+	Early Archaic
		?	0.5	Early Archaic
6	4	M	?	Early Archaic
		F	55+	Early Archaic
		?	39.64	Early Archaic
		?	7.0	Early Archaic
7	3	M	55+	Early Archaic
		?	21.5	Early Archaic
		?	1.75	Early Archaic
8	1	M	45.17	Early Archaic
9	1	M	56.39	Early Archaic
10	2	M	38.84	Early Archaic
		?	5.0	Early Archaic
11	2	M	Adult	Early Archaic
		?	5.85	Early Archaic
12	1	F	20.24	Early Archaic
13	1	F	48.02	Early Archaic
14	1	M	Adult	Early Archaic
15	1	F	39.99	Early Archaic
16	3	?	33.34	Early Archaic
		?	Adult	Early Archaic
		M	23.0	Early Archaic

continued.

Table 10-1. (continued.)

Burial No.	MNI	Sex	Age	Period
17	Not collected	—	—	—
18	2	F	55+	Early Archaic
19	Not collected	—	—	—
20	1	M	Adult	Late Archaic
21	1	F	Adult	Early Archaic
22	2	F	53.27	Early Archaic
		M	17.0	Early Archaic
23	3	F	40.86	Late Archaic
		F	53.0	?
		?	12.82	?
24	1	M	Adult	Early Archaic
25	1	M	38.62	Late Archaic
26	2	M	32.0	Early Archaic
27	1	M	55+	Early Archaic
28	1	?	Adult	Early Archaic
29	1	?	Adult	Early Archaic
30	1	F	55+	Late Archaic
31	2	M	55+	Early Archaic
		?	8.0	Early Archaic
32	Not collected	—	—	—
33	1	?	6.5	Early Archaic
34	2	F	55+	Late Archaic
		?	5.0	?
35	1	M	Adult	Early Archaic
36	2	M	29.22	Early Archaic
		F	20.0	Early Archaic
37	2	F	48.44	Late Prehistoric (?)
		?	2.5	Late Prehistoric (?)
38	3	F	Adult	Early Archaic
		?	1.5	Early Archaic
		?	47.49	Early Archaic

continued.

Table 10-1. (continued.)

Burial No.	MNI	Sex	Age	Period
39	1	?	24.24	Early Archaic
40	1	?	49.89	Early Archaic
41	1	M	32.17	Early Archaic
42	1	?	0.75	Early Archaic
43	1	?	13.9	Early Archaic
44	5	?	5.85	Early Archaic
		F	23.76	Early Archaic
		?	55+	Early Archaic
		?	1.0	Early Archaic
		?	11.0	Early Archaic
45	1	M	30.18	Early Archaic
46	2	F	26.36	Early Archaic
		?	14.0	Early Archaic
47	3	M	24.13	Early Archaic
		?	2.0	Early Archaic
		F	Adult	Early Archaic
48	2	M	46.24	Early Archaic
		M	37.45	Early Archaic
49	3	M	54.77	Early Archaic
		M	Adult	Early Archaic
		?	1.0	Early Archaic
50	2	F	39.9	Early Archaic
		?	1.0	Early Archaic
51	1	M	34.87	Early Archaic
52	1	M	47.81	Early Archaic
53	2	F	Adult	Early Archaic
		?	5.0	Early Archaic
54	1	?	13.5	Early Archaic
55	1	F	55+	Early Archaic
56	1	?	?	Early Archaic
57	1	M	Adult	Early Archaic
58	1	?	5.5	Early Archaic

continued.

Table 10-1. (concluded.)

Burial No.	MNI	Sex	Age	Period
59	2	?	Adult	Early Archaic
		?	2.7	Early Archaic
60	1	?	8.0	Early Archaic
61	2	M	31.68	Early Archaic
		?	5.0	Early Archaic
62	3	M	31.13	Early Archaic
		F	49.04	Early Archaic
		?	7.0	Early Archaic
63	1	M	Adult	Early Archaic
64	2	F	Adult	Early Archaic
		?	15.27	Early Archaic
65	2	?	15.27	Early Archaic
		?	Adult	Early Archaic
66	2	F	38.67	Early Archaic
		?	6.0	Early Archaic
67	2	F	30.64	Early Archaic
		?	2.5	Early Archaic
68	1	?	5.5	Early Archaic
69	2	?	56.15	Early Archaic
		?	9.0	Early Archaic
70	1	?	Adult	Early Archaic
71	2	F	21.2	Early Archaic
		?	1.0	Early Archaic
72	1	M	38.15	Early Archaic
73	1	?	30.3	Early Archaic
74	1	M	44.76	Early Archaic
75	1	?	29.96	Early Archaic
Total MNI	**119**			

10-1, which is an inventory of all burials, in numerical order, based on field notes.

Individual Burials

The following descriptions are presented in the numerical sequence as assigned in the field, which reflects the order in which each burial was discovered. For each burial, stratigraphic position and radiocarbon dates (when available) are used to form the bases for temporal placement.

Burials 1-A, 1-B, and 1-C

The first three burials (see Figures 10-1 and 10-2) found at the site were in Unit S12W82, in Zone 3. The skulls of the respective interments were all in the southwestern part of the unit, so it appeared that all three individuals might have been placed within a single grave. For this reason, all were designated as Burial 1, with the three individuals distinguished by the letter designations A, B, and C. Although it later became apparent that each individual represented a separate burial, additional burials had already received numbers, so the original designations for Burials 1-A, 1-B, and 1-C were retained.

Burial 1-A

Burial 1-A (see Figures 10-1 and 10-2) occupied Units S12W82 and S14W82, Levels 14-15 (131-141 cm below datum [b.d.]), Zone 3-A. The skeleton was incomplete, and its bones were in poor to fair condition. The long bones did not retain their epiphyses, and the facial bones were missing, presumably through decay. The skeleton was represented by a cranium, mandible, teeth, and incomplete long bones—probably humerus, femur, and tibia fragments.

No grave pit outline was discernible. The maximum dimensions of the burial, as represented by the distribution of bones, was about 100 cm northwest-southeast and 20 cm southwest-northeast. The arrangement of the preserved skeletal elements suggests a flexed position. Judging by the juxtaposition of the skull, mandible, and a humerus shaft, headward orientation was to the northwest. The size of the skull and the apparent robustness of the mandible suggest the individual was an adult male. There were no apparent burial associations.

Burial 1-A dates to the Early Archaic period, as indicated by a calibrated AMS radiocarbon age range of 6780-7000 B.P. (Beta-153915), which was obtained on a small piece of the humerus of this burial. Though very incomplete, Burial 1-A is believed to be a primary interment, based upon the apparently articulated positions of the cranial vault, mandible, and long bones. Additionally, the humerus shaft, as well as femur and tibia fragments, were approximately in the correct anatomical position relative to the skull and mandible. The missing portions of the skeleton may have been removed and scattered by bioturbation or, perhaps, by erosional activity subsequent to the use of the Knoll Top as a cemetery.

Burial 1-B

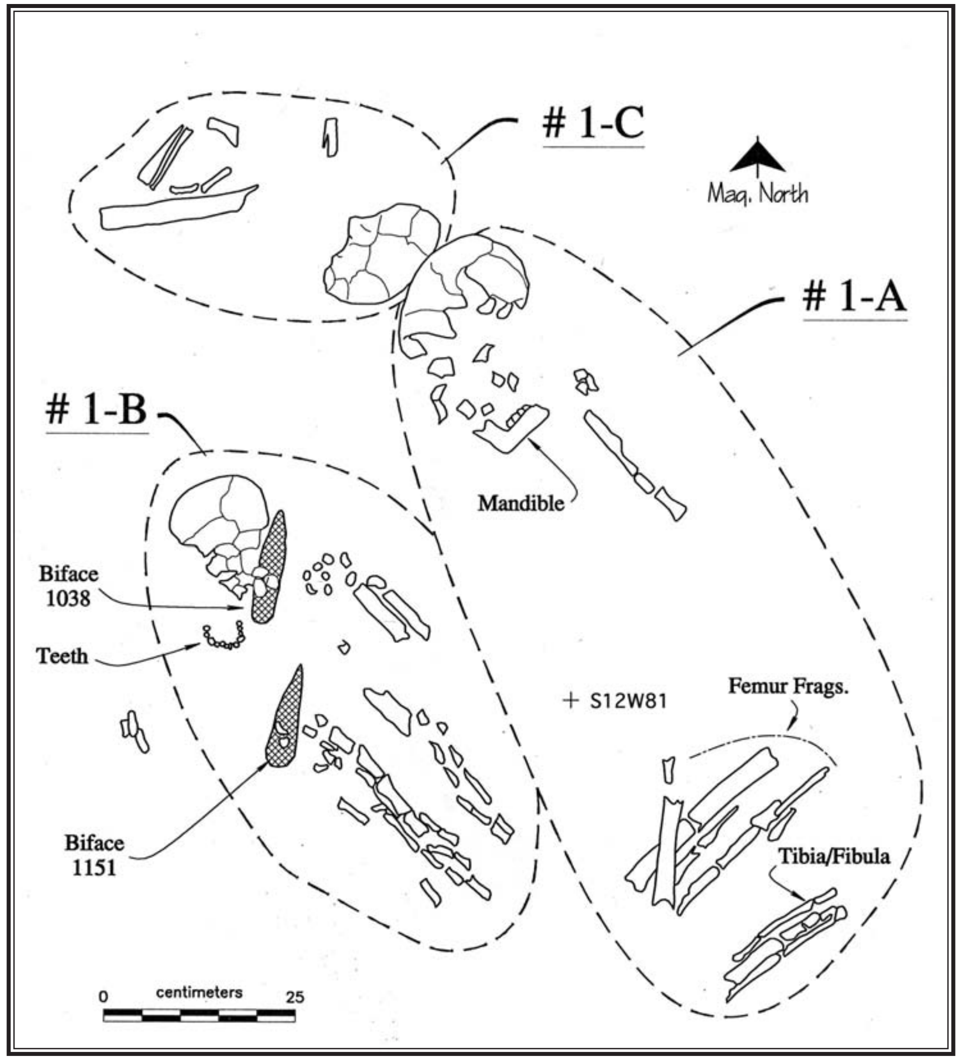
Burial 1-B (see Figures 10-1 and 10-2) occupied portions of Units S12W82 and S14W82, Level 14 (135-140 cm b.d.), Zone 3-A. The skeleton was represented by a fragmentary cranial vault, maxillary (?) teeth, phalanges, and long bones (a humerus shaft and fragmented femur, tibias and fibulas). The long bone epiphyses and facial bones were absent, and other bones were missing probably due to decay.

No grave pit outline was discernible. The maximum dimensions of the burial, based on the distribution of bones, was 81 cm northwest-southeast and approximately 34 cm northeast-southwest. The positions of the various skeletal elements approximate the expectable anatomical relationships for a flexed, primary burial. The headward orientation appears to have been to the northwest.

Judging by the size of the skull and long bones, this individual was an adult. Its sex could not be determined in the field. Bioarchaeological analysis suggests that this person was a sub-adult (see Chapter 12).

Two large bifacially flaked chert blades were found near the skull. These artifacts were clearly intentional grave goods, as they rested together and parallel to one another at the same level as the skull. Both specimens were unstemmed and unnotched; one had a rounded base while the other had a straight base with slightly rounded basal corners, which gave the specimen an overall lanceolate outline. A lanceolate- to triangular-shaped bifacial chert dart point, reworked as a drill (and exhibiting a broken bit), was found immediately beneath the skull bones. This point (shown in Figure 7-12, a) may pertain to the Paleo-Indian camp occupation(s) represented in Zone 3 and, thus, may predate the intrusive Early Archaic cemetery. The burial appears to date to the Early Archaic period.

Figure 10-1. Map of the main part of the Knoll Top Excavation Area, showing the locations of numbered burials. Three additional numbered burials were exposed and recorded in 2-by-2-m Unit S12W96, which is off this map, immediately to the west.



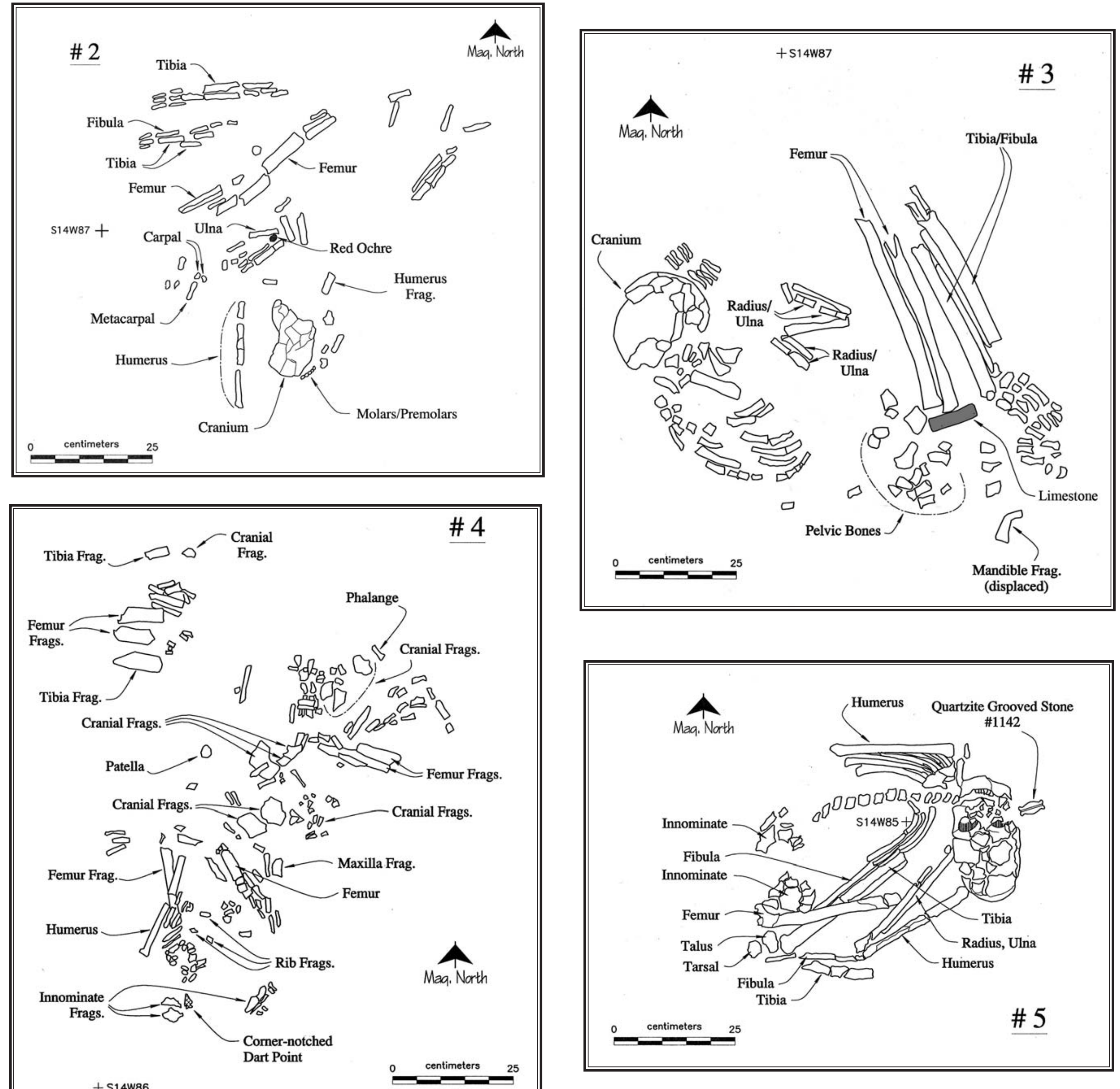


Figure 10-2. Plan view drawings of burials at Buckeye Knoll: Burials 1-A, 1-B, and 1-C (Note the pair of large bifaces with Burial 1-B); Burial 2; Burial 3; Burial 4 (Note the disarticulated state of bones, suggesting a secondary or "bundle" burial); and Burial 5, a tightly flexed interment (Note the quartzite grooved stone placed next to the right side of this individual's face).

Burial 1-C

Burial 1-C (see Figures 10-1 and 10-2) was within Unit S12W82, Level 14 (130-140 cm b.d.), Zone 3-A. This individual was represented by a cranial vault and probably one long bone section. It is unclear whether the long bone fragments actually relate to the same burial as the skull. It is possible that the skull was disassociated with other bones. The fact that it laid next to the skull of Burial 1-A at least suggests the possibility that the long bone was interred with the latter individual.

The bones were in fair condition, and no burial pit was discernible. The skull and the long bone fragments occupied an area measuring approximately 40 cm (east-west). The position of the body was indeterminate, due to the paucity of remains. Based on the size of the skull, as observed in the field, this individual appears to have been an adult whose sex was indeterminate. There were no apparent associated grave goods. This interment is believed to date to the Early Archaic period.

Burial 2

Burial 2 (see Figures 10-1 and 10-2) occupied portions of Units S16W88 and S14W88, Levels 10-11 (100-120 cm b.d.), Zone 3-A. The preserved elements of the burial included fragmented portions of the cranium, humeri, ulna, carpals, and metacarpals. The less dense elements (e.g., ribs, vertebrae, and pelvis) were missing, presumably due to decay.

No discernible burial pit was evident. The bones occupied an area measuring 75 cm north-south by 60 cm east-west. The preserved elements (i.e., skull and long bones) were in positions that strongly suggest a primary, semi-flexed burial with the head oriented to the south. Limited bone preservation and fragmented condition allowed for field identification only as an adult. The bioarchaeological analysis suggested this individual was a female with an estimated age of 37.6 years. A small lump of red ochre was found next to the right radius and ulna.

Burial 2 rested on or within 2 to 3 cm of the basal Beaumont clay surface. At this point, Zone 3 was quite thin, presumably due to erosion subsequent to cemetery use. It is, therefore, presumed that the interment dates to the Early Archaic period.

Burial 3

Burial 3 (see Figures 10-1 and 10-2) was located within Unit S16W88, Levels 11-13 (103-121 cm b.d.), resting on the Beaumont clay surface at the base of Zone 3-A. The preservation of the bone can be best described as fair. The skull was fragmentary with little preservation of facial elements. The mandible and teeth were present, as were some of the ribs and vertebra. The pelvis was highly fragmented and poorly preserved, while the long bones and phalanges displayed fair preservation. Except for the decay of some of the less dense bones, the skeleton would have been complete.

No grave pit discernible. However, the bones were confined to an area measuring 91 cm northwest-southeast by 65 cm northeast-southwest. The interment was evidently a primary, flexed burial, resting on its left side, with the hands drawn up in front of the face. The orientation of the head was to the northwest.

Field observations suggested the individual was a female based on the modest size of skull and long bones. The bioarchaeological analysis showed this individual to be a probable adult female 51.49 years old at death.

A natural (but anomalous to the soil) cylindrical limestone concretion was found near, and some 5 cm above, the pelvic bones (see Figure 10-2). It is unclear whether this was directly associated with the burial. A large basally notched "San Saba" biface was found not far from this burial. However, this specimen was clearly in Zone 2 and was probably not related to the interment, which is believed to have been associated with the Early Archaic cemetery.

Burial 4

Burial 4 (see Figures 10-1 and 10-2) was within Unit S14W86, Level 14 (130-140 cm b.d.), Zone 3. The elements identified in the field included fragments of long bones (tibia, femur, fibula, and humerii), numerous pieces of the cranium, teeth, a patella, and phalanges. It is possible that more than one individual was represented. Although these elements were fragmented, preservation was fair. The breaks did not appear to have been green fractures and were probably the result of post-depositional disturbances, such as ground pressure. The epiphyses on the long bones were mostly decayed.

No grave pit outline was discernible. The disarticulated bones were found in two closely spaced clusters. The larger measured 96 cm northeast-southwest by 38 cm northwest-southeast. The smaller cluster measured 31 cm north-south by 15 cm east-west. The bones in this burial were completely disarticulated and appear to represent a secondary bundle burial. The size of many of the long bone fragments suggest that at least one adult was represented. Bioarchaeological analysis indicates an adult female 54.07 years of age. A second individual, represented only by teeth, was a sub-adult, aged four years.

A corner-notched dart point, similar to the Early Archaic Palmer and/or Kirk Notched types, was found in apparent association with this burial. It rested within and near the south edge of the larger of the two clusters of bone (see Figure 10-2). The burial is believed to date to the Early Archaic period.

Burial 5

Burial 5 (see Figures 10-1 and 10-2) was within Units S14W86 and S16W86, Levels 11-12 (105-112 cm b.d.), Zone 3-A. The bones were in poor to fair condition. The skull was nearly complete but fragmented, while the facial bones and mandible were present but in numerous pieces. The long bones were basically intact but fragmented; there was partial preservation of epiphyses, ribs, vertebral column, and pelvic bones. The teeth, tarsals, carpals, and phalanges were present.

Again, there was no discernible pit outline. However, the skeleton clearly represents an articulated, primary, tightly flexed burial measuring some 60 cm east-west by 52 cm north-south. The individual was probably resting on its left side with its head oriented to the east, though facing north.

Based on field observations, the robustness of the brow and mandible suggested this individual was an adult male. The bioarchaeological analysis also indicated that this was a probable adult male, rather robust and 22.22 years old at death.

A ground, pecked, and polished quartzite grooved stone was found next to the right side of the face. Given its position, this object was evidently a grave offering associated with this individual. The interment is believed to date to the Early Archaic period.

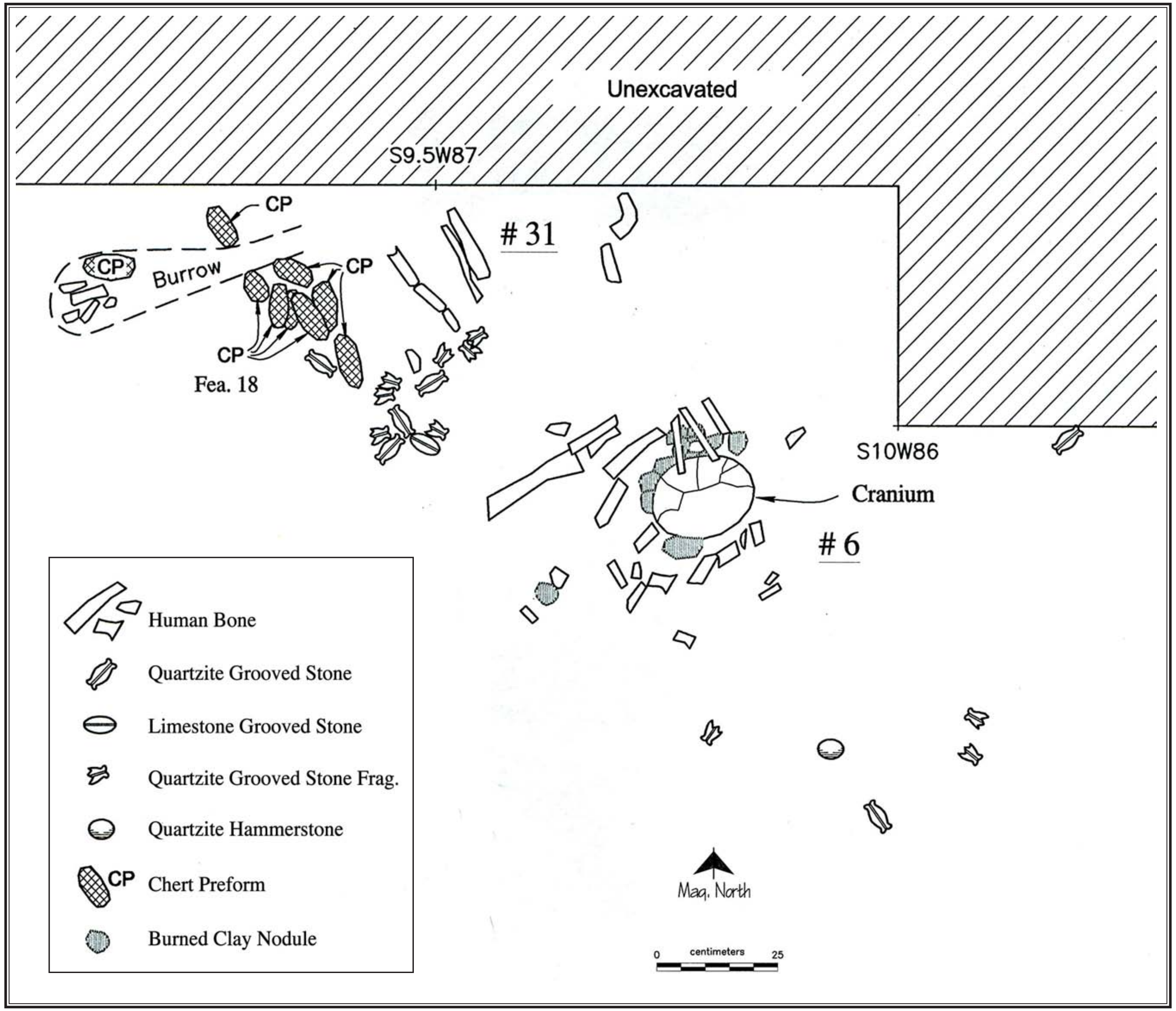
Burial 6

Burial 6 (see Figures 10-1, 10-3) occupied portions of Unit S12W88 and adjacent Unit S10W88, Levels 16-18 (150-175 cm b.d.), Zone 3-A extending into Zone 3-B. The remains of this interment include elements identified as the cranium, mandible, and fragmented long bones in a fair to good state of preservation. The mandible was present, as were fragmented long bones from which epiphyses were missing, presumably due to decay.

The cranial vault was above a mandible in a seemingly articulated position. Unfused cranial sutures suggested a young adult; however, the teeth were missing from the mandible due to pre-mortem decay, and the mandible suffered attrition during life, strongly suggesting an older individual. The absence of discernible articulation of long bones, along with the fact that the cranium and mandible probably represented different individuals, indicates that this was a secondary bundle burial containing the remains of at least two people. Field observations noted a paucity of long bones for a multiple interment, indicating that the individuals were represented by only partial skeletons.

The bioarchaeological analysis (see Chapter 12) resulted in the estimation of four individuals in this grave: an older adult male, a second adult (possibly a female), a third adult of indeterminate sex, and a child with an estimated age of seven years. The sex of the individual represented by the mandible was indeterminate, while the pre-mortem tooth loss and bone attrition suggested a relatively old individual.

No grave pit was discernible. The bones were found in a tight cluster that measured 65 cm east-west by 50 cm north-south. The associated artifacts included seven pecked, ground, and polished quartzite grooved stones, three limestone grooved stones, and a tight cluster of large chert preforms (see Figure 10-3). One of the quartzite grooved stone specimens was found scattered around the bones in 13 fragments. These could have been reconstructed to form the nearly complete original, and showed a clear point of impact that shattered the specimen, suggesting that it was intentionally broken or “killed” during mortuary ritual at the gravesite. Finally, a cache of 11 chert bifaces appears to be associated with these materials. Designated Feature 18, this consisted of a tight cluster of specimens that included six large ovate or leaf-shaped preforms, two large bifacially reduced flakes (i.e., early-stage bifaces), and two large cortical flakes. In the aggregate, these materials were distributed around the bones of the secondary burial, suggesting that the bones were interred in a sizeable pit and that the artifacts were distributed around the bones within, and perhaps along the edges of, that pit. These artifacts were dispersed over an area measuring about 200 cm southeast-northwest by at 100 cm northeast-southwest. Since this pattern seemed to extend beyond the



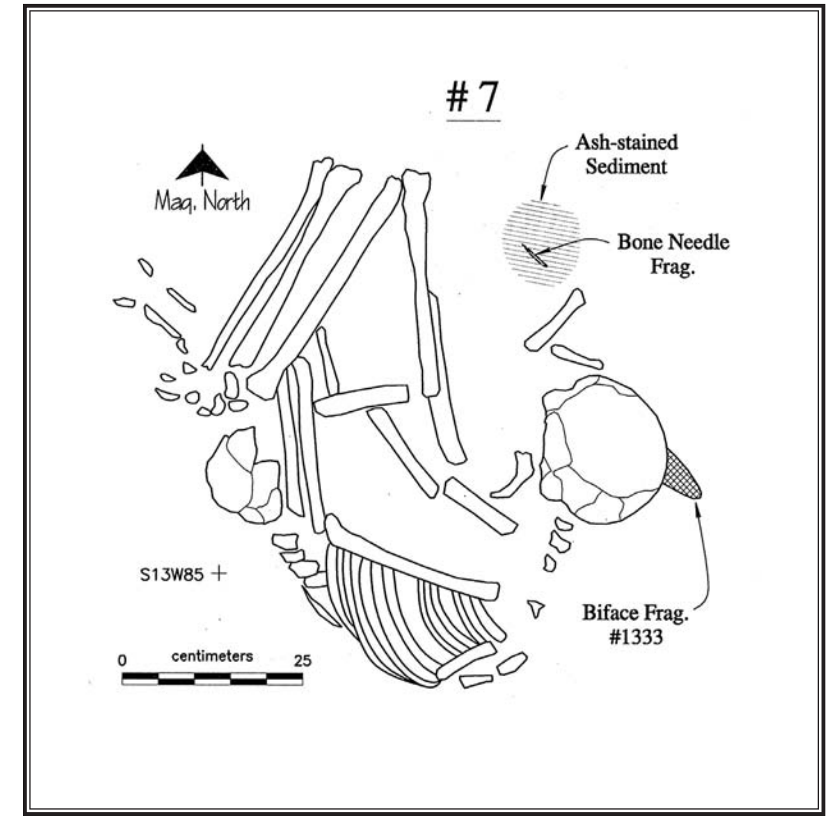


Figure 10-3. Plan view drawings of additional burials at Buckeye Knoll: Burials 6 and 31 (Note the various mortuary artifacts in proximity that appear to surround Burial 6 and are interpreted to be associated with that interment. Feature 18 is a cluster of bifacial chert preforms) and Burial 7 (Note the flexed position of the body and the patch of ash-stained sediment to the north [in front of] the face, and resting at the same depth as the base of the cranium)

north wall of the block excavation, it is possible that more mortuary artifacts were present but unexcavated. Burial 6 is believed to date the Early Archaic period.

Burial 7

Burial 7 (see Figures 10-1, 10-3) was fairly complete and occupied Unit S14W86, Level 15 (141-148 cm b.d.), Zone 3-B. The skull was intact but fragmented, and the mandible and teeth were present. The long bones were somewhat fractured but intact, with partially intact epiphyses. The phalanges and other hand and foot bones were preserved but somewhat displaced. The ribs, partial vertebrae, and fragmented pelvic bones were also there. Bone preservation could be described as fair.

The individual was placed flexed on its right side with the left elbows near the pelvis and the forearms extended toward its drawn-up knees. No grave pit outline could be seen; the bones were contained in an area measuring 95 cm north-south by 80 cm east-west. A medially broken biface, possibly a preform, rested at the back of, and partially under, the skull. The distal end of a polished bone pin or needle was found within a small area of charcoal/ash-stained sediment in front of the face (see Figure 10-3).

The individual was an adult, judging by the sizes of skull and long bones. Bioarchaeological analysis indicates that he was a male greater than 55.9 years old. Also represented by fewer elements were a young adult of indeterminate sex and an infant. The primary individual in this interment is believed to date to the Early Archaic period.

Burial 8

Burial 8 (see Figures 10-1, 10-4) was within Units S12W86 and S14W86, Zone 3-B. The preservation of the bones was fair to good, this being one of the better-preserved Early Archaic skeletons at the site. The skull and mandible were fragmented. The vertebrae, ribs, pelvic bones, and other less dense elements were present, and long bone epiphyses are intact. Hand and foot bones were found mostly in good anatomical positions. The relatively good state of preservation may be attributable to the fact that the burial was relatively deep (resting on the Beaumont clay under Zone 3), and, thus, may have been removed from the intense biotic (microbial) activity closer to the original ground surface.

No grave pit was observable, but the intact skeletal remains were confined to an area measuring around 100 cm north-south by 69 cm east-west. The individual was placed in a semi-flexed position, resting on its back with the legs folded to the left (west). The elbows were on either side of the lower torso with the hands meeting over the lower pelvic area. The head was oriented to the south.

There were numerous artifact associations with this interment, this individual having been buried with one of the larger arrays of materials encountered at the site (see Figure 10-4). A pair of perforated limestone plummets was found next to the mid-section of the left femur (one of the pair was partly under the femur). The two “plummets” comprise one of two pairs found with Early Archaic burials at Buckeye Knoll (the other pair was found with Burial 62). The occurrence of these items as pairs suggests that they may have been used together, perhaps as “bolas” stones.

Immediately behind (to the east of) the pelvis and the drawn-up right foot was a tight cluster of artifacts interpreted as a flint-knapping tool kit. This contained two lanceolate, bifacially flaked chert dart points, an early-stage biface, three chert flakes, a tabular piece of sandstone (probably an abrader) broken into two pieces, a large antler billet, four smaller antler billets, two thinner antler flaking tools, a bone billet or flint-knapping “punch,” and a pointed bone tool (probably a pressure-flaking tool, judging by the kinds of associated artifacts). The association of individual with this rather elaborate tool kit suggests some degree of specialization as a flint knapper.

The size of the skull and long bones, plus the size and relative robustness of the mandible, suggests that this individual was an adult male. Bioarchaelogical analysis indicates a middle-aged male, with an estimate age at death of 45.77 years.

The interment was made during the Early Archaic period. A calibrated AMS age range of 6290-6430 B.P. (Beta-157422) was obtained on collagen from a small piece of femur from this burial. The two lanceolate points were similar to the Angostura type in outline, but lacked the basal edge grinding and neat, parallel pressure flaking characteristic of that type (c.f., Dial and Kerr 1998; Turner and Hester 1999). The AMS date on this burial is seemingly too recent to fall into the generally accepted time range for Angostura points (ca. 8,000-9,000 B.P.). However, the Burial 8 specimens may represent a type of similar outline, a possibility supported by the presence of similar specimens from other burials in the Early Archaic cemetery component at Buckeye Knoll.

Burial 9

Burial 9 (sees Figures 10-1, 10-4) was located near the south edge of Unit S14W86 in Level 14 (134-140 cm b.d.), Zone 3-B, resting on basal Beaumont clay surface. The preservation of the extant skeletal elements was poor. The cranium was crushed, and no facial bones were present. The pelvic bones were also crushed, presumably due to the weight of overlying sediment, which pushed the bones against the resistant Beaumont clay surface. The ribs and vertebrae were absent, presumably due to decay. Other elements documented in the field included the mandible, teeth, long bones, patella, and phalanges. This burial was immediately east of, and a few centimeters lower than, Burial 5. The interment of Burial 5 did not greatly disturb Burial 9, although some of the disarticulated bone elements may have been displaced in the process.

No grave pit outline was discernible. The bones occupied a roughly circular area measuring 46 cm north-south by 52 cm east-west. The positions of the bones indicate that this was a tightly flexed primary interment. While the bones were somewhat disarticulated and scattered, the knees appeared to have been tightly drawn up toward the face. Headward orientation was to the north. There were no apparent burial associations.

Bioarchaeological analysis indicates that this individual was probably a male, age estimated at 56.39 years (see Chapter 12). The interment probably dates to the Early Archaic period.

Burial 10

Burial 10 (see Figures 10-1, 10-4) occupied Unit S16W84, and extended slightly into Unit S14W84 in Levels 11-13 (103-128 cm b.d.), Zone 3-A. Preservation was poor. The bones were highly fragmented and scattered. The skeleton was very incomplete, represented by a partial cranial vault in several conjoining pieces, a mandible fragment, and long bone parts.

Due to poor preservation, the body position was indeterminate. Most of the bones were concentrated in an oblong cluster that measured 47 cm north-south by 24 cm east-west. This included long bone fragments and the partial mandible. The incomplete cranial vault was some 40 cm to the north-northwest. Given the very limited representation of skeletal elements, and lack of any apparent articulated position of the bones, this may have been an incomplete, secondary bundle burial. The partial cranium to the north may have been associated, but this is not clear. It may, in fact, have represented a different individual. Nine *Marginella* shell beads and one nerite shell bead were recovered in the screens from the soil matrix taken from around the bones.

Judging by field assessment of the size of the cranium and the diameters of long bone fragments, this was an adult of indeterminate sex. An adult male, 38.48 years old at death, is indicated by the bioarchaeological analysis (see Chapter 12). Also represented by a few small rib fragments was a sub-adult around five years old. The burial is believed to date to the Early Archaic period.

Burial 11

Burial 11 (see Figures 10-1, 10-4) was within Unit S16W82 and extended into Unit S16W84, Levels 11 and 12 (105-115 cm b.d.), Zone 3-A. The remaining bones were in fair condition and consisted of two fragmented crania and a partial humerus.

The bones occupied in a small, tight cluster measuring 35 cm north-south by 17 cm east-west. Burial 11 appears to be an incomplete secondary interment of two individuals. Judging by the crania, one appears to be an adult male, the other, a juvenile of indeterminate sex.

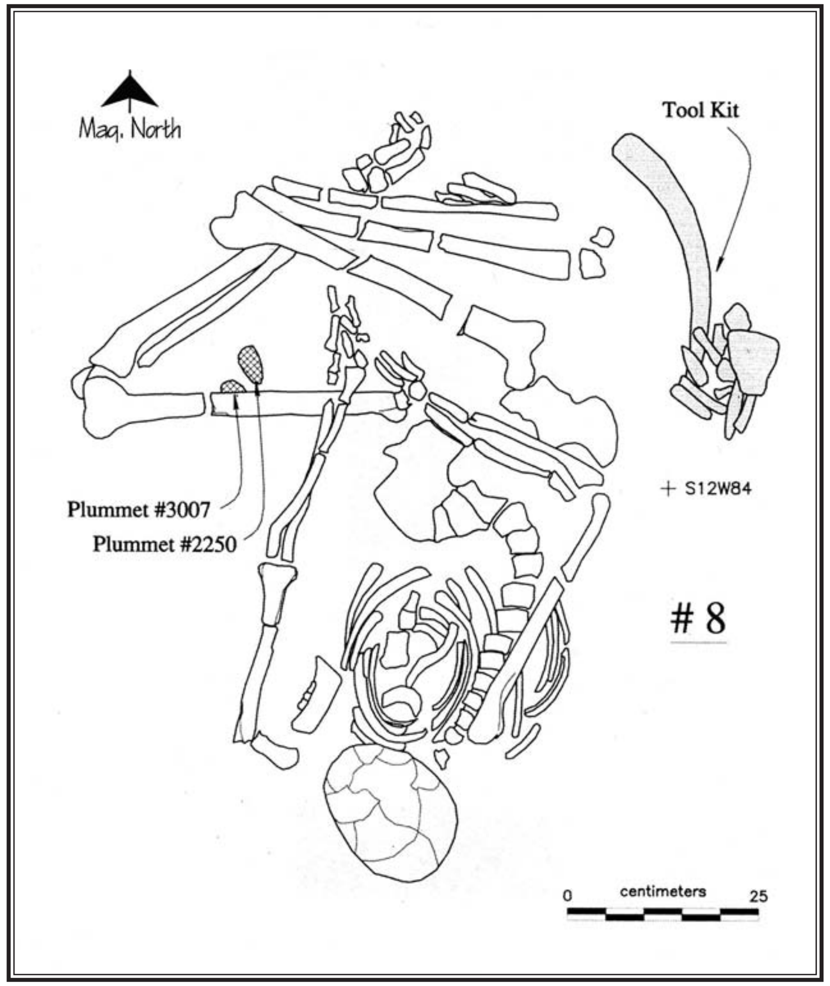
A quartzite grooved stone, found 40 cm to the southeast, may have been displaced from this burial. Four nerite shell beads were recovered from the soil matrix around the bones. This interment has been assigned to the Early Archaic period.

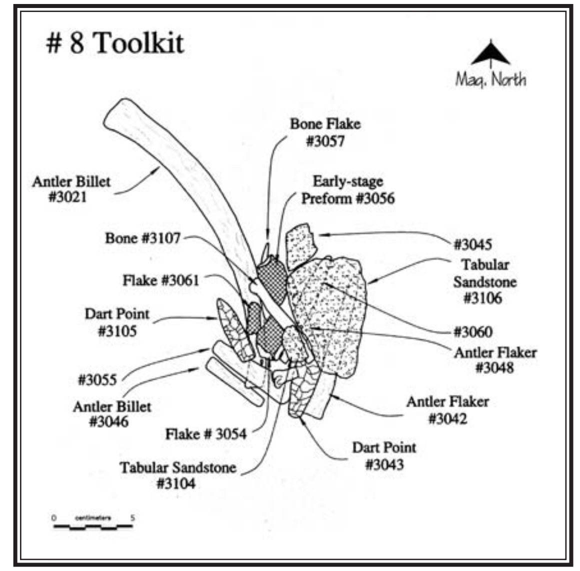
Burial 12

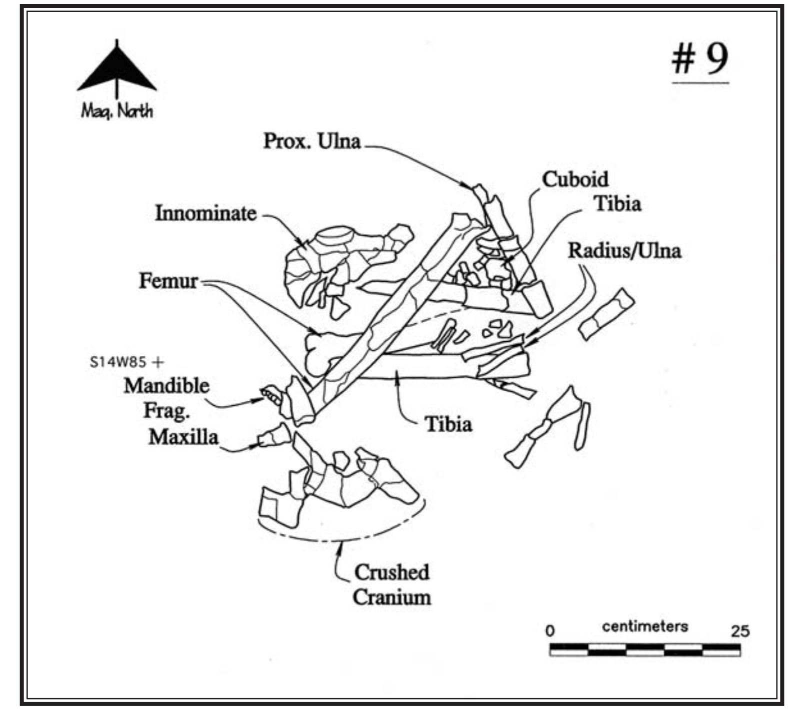
Burial 12 (see Figures 10-1, 10-4) occupied Unit S16W84, Level 12-13 (110-127 cm b.d.), and portions of Unit S18W84, Zone 3-A. This burial extended south of grid line S16 and, thus, beyond the limits of the Knoll Top Excavation Block. A small enlargement of the excavation was made into S18W84 to fully expose the remainder of this burial.

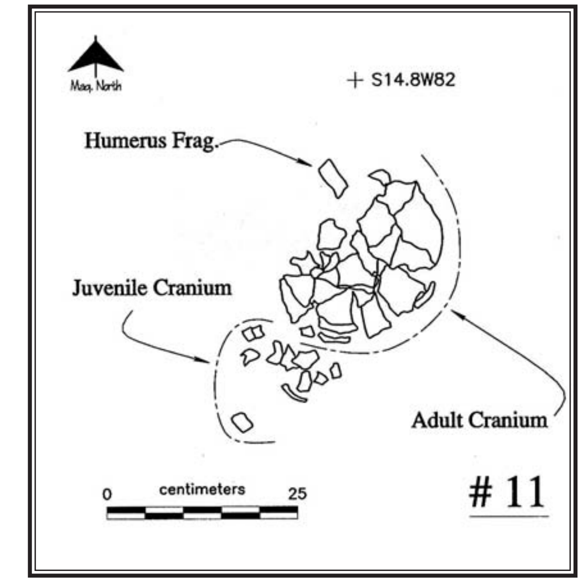
The condition of the bones was fair. The remaining elements included broken long bones, a fragmented cranium, mandible and teeth, a scapula, pieces of vertebrae, and phalanges. No burial pit was discernible. The bones were clustered within an area measuring 52 cm north-south by 40 cm east-west.

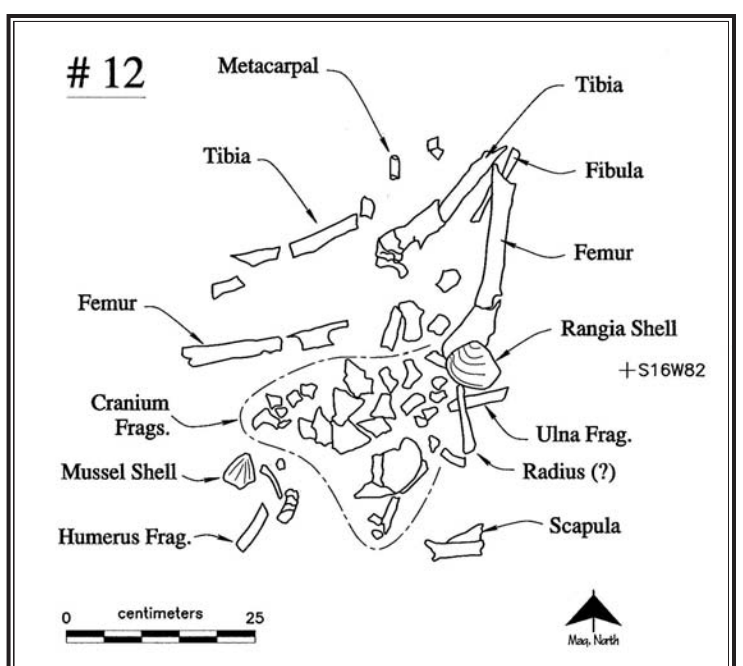
The individual was interred in a semi-flexed position, resting on its back. The flexed legs were in a splayed position, with the right knee towards the north

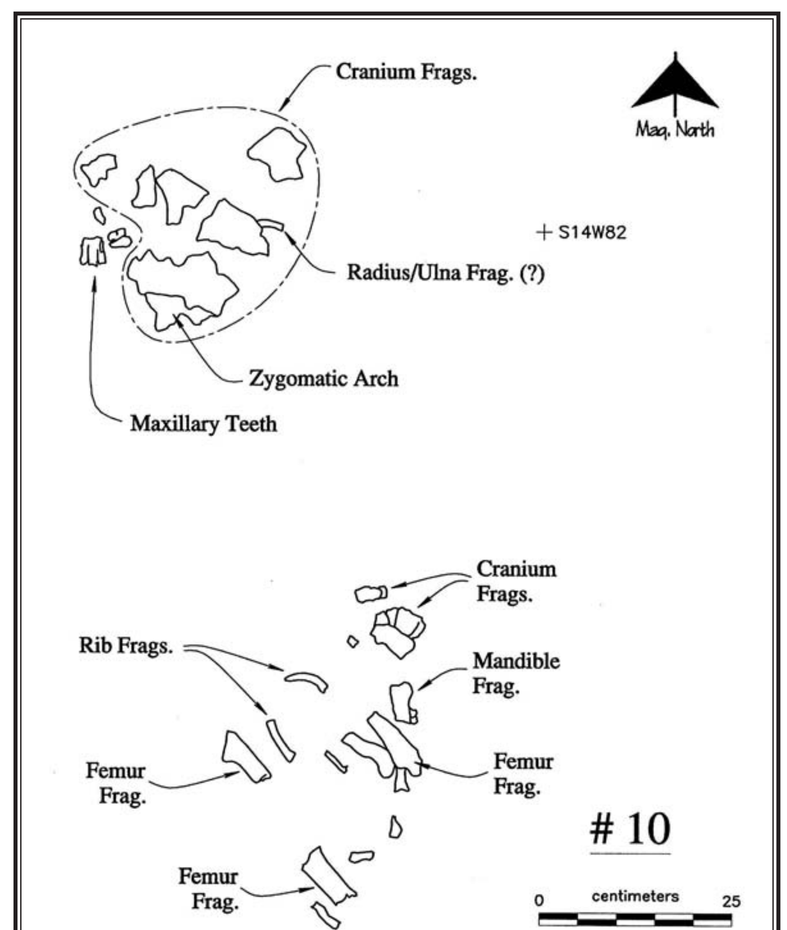












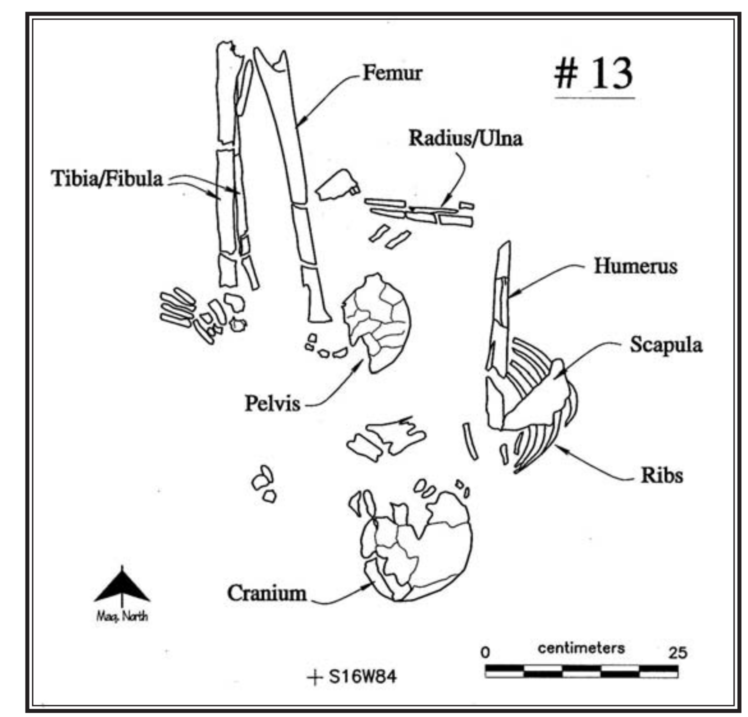


Figure 10-4. Plan view drawings of additional burials at Buckeye Knoll: Burial 8, a loosely flexed, middle-aged adult male (Note the limestone plummets next to the left femur and flint-knapping tool just northeast of the pelvis); Burial 8 tool kit; Burial 9; Burial 10; Burial 11, one adult cranium and one juvenile cranium; Burial 12; and Burial 13.

(away from the skull) and the left knee oriented to the west. The head was placed to the south. Post-depositional displacement of the arm bones precludes determining the positions of these limbs.

No discernible burial associations were present. A rangia shell and seven fragmentary freshwater mussel shells were in the matrix around the bones. These, however, appeared unmodified and without any discernible pattern, suggesting they were accidental inclusions in the grave fill.

The appearance of the bones suggested that the individual was a young adult male. However, the bioarchaeological analysis indicated a female with an age of 20.24 years at death (see Chapter 12). The burial was assigned to the Early Archaic component of the cemetery.

Burial 13

Burial 13 (see Figures 10-1, 10-4) was within Unit S16W84, Levels 12 and 13 (116-130 cm b.d.), and extended into Unit S16W86, Zone 3-A. The bones were in fair condition. Most of the skeleton was represented, although the long bone epiphyses and some other porous bone elements were missing due to decay. The right arm and left leg were largely or entirely gone. The skull and mandible were fragmented, as were the long bones, pelvis bones, and scapulas. Some ribs were present, as were the hand and foot bones.

No burial pit was discernible. The bones were encompassed within an oblong area measuring 76 cm north-south by 55 cm east-west. The individual was placed in a flexed position with the knees oriented away from the skull. The body rested either on its back or its left side with the head oriented to the south. The upper right arm was extended away from the skull toward the pelvic area, and the lower arm was at a right angle to the upper arm, with the hand in the pelvic area. As noted above, the left arm and right leg appeared to be missing, possibly due to post-depositional displacement. There were no apparent burial associations observed with this individual; however, seven *Marginella* shell beads were recovered in the screens from soil taken from around the bones.

In the field, this individual appeared to be an adult female, based on the size of the skull and long bones. The bioarchaeological analysis confirmed this, and placed the age at death at 48 years. This interment is believed to date to the Early Archaic period.

Burial 14

Burial 14 (see Figures 10-1, 10-5) was within Unit S16W96, Levels 11 and 12 (101-114 cm b.d.), Zone 3-A. Generally, the bones were in a poor state of preservation. The articulated position of the bones suggests that originally the entire skeleton was present. The skull was crushed and facial bones were missing, presumably due to decay, although the mandible and teeth were present. The long bones were fragmented, and the epiphyses were missing, again presumably due to decay. At least some hand/foot bones were included. Thinner and/or more porous bones, such as ribs and vertebrae, were gone, although pelvic and scapula fragments were present.

No grave pit outline was discernible. The bones were tightly clustered within a roughly circular area measuring 65 cm north-south by 61 cm east-west. The individual appears to have been tightly flexed with knees drawn up near the face, probably resting on the left side. The arms were positioned so that hands were in the pelvic area. The head was oriented to the southeast. There were no observable burial associations.

Observations made in the field suggested that these remains belonged to an adult male. This was confirmed by bioarchaeological analysis. The interment is believed to date to the Early Archaic period.

Burial 15

Burial 15 was encountered in Unit S16W96, Level 11 (106-108 cm b.d.), Zone 3-A, which was not a portion of the main Knoll Top Block Excavation (see Figure 3-39). While considerable effort was made to remove entire burials in those several instances in which they extended beyond the limits of the excavation, time constraints did not allow for the complete exposure and removal of Burial 15. The decision to remove only those bone elements exposed in S16W96 was partly based on the fact that no individual bone elements in the excavation actually intruded into the wall of that unit. Due to the very incomplete exposure of this burial, it is not illustrated here.

Generally, the bone preservation was extremely poor, making field determinations of the represented elements and body position impossible. Nor was any burial pit discernible. The bones occupied an area measuring 17 cm north-south by 12 cm east-west. However, the latter dimension is probably not accurate, as the burial possibly extended beyond the west wall of Unit S16W96. No artifacts were associated with this individual, whom bioarchaeological analysis determined was a probable adult female about 40 years old. The interment was associated with the Early Archaic utilization of the site.

Burial 16

Burial 16 (see Figures 10-1, 10-5) was within Unit S14W84 and extended slightly south into Unit S16W84, Levels 12-13 (116-130 cm b.d.), Zone 3-A. Bone preservation was poor. The skull was mostly complete (but fragmented) except for facial bones that were missing. The mandible was in pieces, as were the long bones, which consisted of humerus shafts. Other bones were not present.

There was no discernible grave pit, the bones being clustered within a small oblong area measuring 37 northwest-southeast by 15 cm northeast-southwest. The position of the body was indeterminate, largely due to poor preservation. Taking into account some displacement, the cranium, the mandible, and the humerus shafts were in approximate anatomical order. However, the lack of other bone elements and absence of any apparent disturbance by other burials suggest that this burial may have been an incomplete secondary interment. A leaf-shaped dart point was found lying flat, 3 cm above the cranium (see Figure 10-5).

This burial was immediately adjacent to Burial 50. Given that the bones of these two burials combined were clustered within a tight circular area, it is probable that both individuals were placed within a single grave pit.

The primary individual in Burial 16 was an adult whose sex is indeterminate. Two other individuals were represented by teeth only. One was an adult male, 23 years of age; the other was and adult of indeterminate age and sex. This burial also dated to the Early Archaic period.

Burial 17

Burial 17 (see Figures 10-1, 10-5) was within Unit S16W84, Levels 12-14 (118-131 cm b.d.), Zone 3-A. Again, preservation was poor. What remained of the bones appeared to be disbursed and incomplete. The elements present included a broken cranium, mandible, teeth, femurs, and other highly fragmented long bones.

The bones were found within an oblong area measuring 52 cm north-south by 40 cm east-west. No evidence of a grave pit was observed. The cranial fragments were clustered some 27 cm north of long bones. This was possibly a flexed primary interment. No artifacts were associated.

Bioarchaeological analysis indicated the remains belonged to nine-year-old juvenile of indeterminate sex (see Chapter 12). It is presumed that the interment was made during the Early Archaic period.

Burial 18

Burial 18 (see Figures 10-1, 10-5) was unearthed in Unit S16W84, Levels 11-13 (108-128 cm b.d.), and extended slightly into Unit S14W84, Zone 3-A. This individual was represented by broken long bones, phalanges, and one cranium fragment, all in a poor state of preservation.

No grave pit was discernible. The bones occupied an oblong-shaped area that measured 57 cm north-south by 48 cm east-west. This individual possibly was flexed, although the incompleteness of the skeleton and apparent displacement of some bones made this inferential. The tibias were parallel to one another with foot bones nearby, and humerus fragments were found some 20 cm to the south in association with the fragmentary mandible. Thus, if this was, in fact, a flexed burial, the head was oriented towards the south. The sole cranial fragment was, however, found between the two tibia. A secondary bundle burial is a possibility. There were no obvious burial associations noted in the field. However, two *Marginella* shell beads were recovered in the screens from the soil matrix taken from around the bones.

The bioarchaeological analysis (see Chapter 12) indicated that this individual was an adult female, with an age at death greater than 55 years. A second individual, a sub-adult, was represented only by teeth. The interment is related to the Early Archaic utilization of the site.

Burial 19

Burial 19 was also encountered in Unit S16W96, Level 11 (109 cm b.d.), Zone 3-A, which is not within the main Knoll Top Block Excavation (see Figure 3-39). Bone preservation ranged between fair and poor. Only a tibia and a fibula were uncovered. Both were bone shafts minus the epiphyses, which were missing presumably due to decay. The remaining portions of these bones were approximately 17 cm long. Since only two long bone fragments were found against the

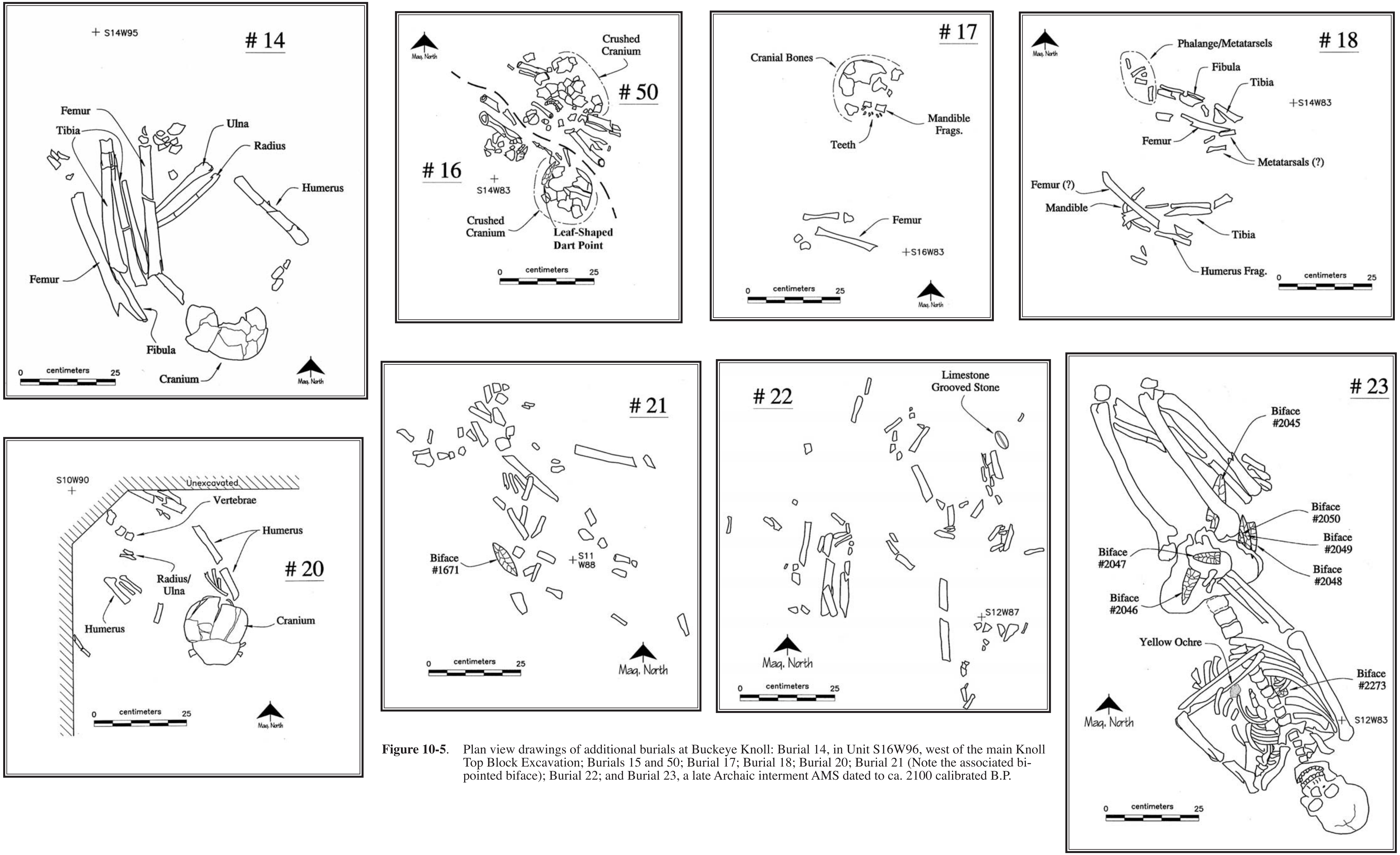


Figure 10-5. Plan view drawings of additional burials at Buckeye Knoll: Burial 14, in Unit S16W96, west of the main Knoll Top Block Excavation; Burials 15 and 50; Burial 17; Burial 18; Burial 20; Burial 21 (Note the associated bi-pointed biface); Burial 22; and Burial 23, a late Archaic interment AMS dated to ca. 2100 calibrated B.P.

east wall of Unit S16W96, it was decided, due to time constraints, to leave them in place rather than expose the entire burial, which would have required considerable additional effort.

With this small amount of information, it is impossible to determine how the body was placed. The fact that the tibia and fibula were next to, and parallel to, one another suggests a primary interment. No artifacts seem to have been associated with this individual.

Based on the size of the bones, the in-field age assessment was of an adolescent or an adult. Sex was indeterminate. The burial was also associated with the Early Archaic utilization of the site.

Burial 20

Burial 20 (see Figures 10-1, 10-5) was exposed in the extreme northwestern corner of Unit S12W90, Levels 14-16 (131-160 cm b.d.), base of Zone 2. The bones were in good condition, although the skeleton was incomplete, possibly due to disturbance and partial dispersal through bioturbation. The elements present included a cranial vault; right humerus and pieces of the right radius and ulna; left humerus, radius, and ulna; rib fragments; and vertebrae.

No evidence of a grave pit could be discerned in the field. The bones extended southeastward from the northwest corner of Unit S12W90 for a distance of 53 cm. This is not the actual dimension of the burial itself, as it seems that it continued to the northwest beyond the limits of the excavation.

The individual was interred extended, on the back, with head to the southeast. The right arm was more or less parallel to the body. However, the left arm appears to have been bent at the elbow, placing the hand toward the face. The lower radius, ulna, and hand bones were missing, but the acute angle of humerus and low arm bones at the elbow suggest this position. No artifacts appear to have been associated with this burial. The size of the bones and the robustness of the brow ridge suggest that the interment was that of an adult male.

The extended, supine position of the body and the southeastward head orientation are identical to Burials 23 and 25, both of which can be confidently assigned to the Late Archaic based on stratigraphic position and the presence of unquestionably associated Lange dart points. A Late Archaic placement for Burial 20 is also suggested by its position within the bottom part of Zone 2.

Burial 21

Burial 21 (see Figures 10-1, 10-5) was primarily in Unit S12W90 and extended eastward into Unit S12W88, Levels 18-19 (174-186 cm b.d.), bottom of Zone 3. Preservation was generally poor. The bones were fragmented and appear to have been scattered. A buried erosional gully, defined by “v-shaped” dips in both the cultural strata there and the underlying surface of the Beaumont clay, appears to have disturbed and partially removed this burial.

The bones were concentrated in an oblong area measuring approximately 50 cm northwest-southeast by 33 cm northeast-southwest. Other fragments were, however, scattered for an additional 40 cm or so toward the southeast. The disturbance made it impossible to determine how the body was originally positioned. A finely flaked, thin, bi-pointed biface was found immediately adjacent to the bones and appears to represent an intentional association.

The diameters of long bone fragments suggested to field observers that this burial was an adult. Bioarchaeological examination indicated that the individual was a female (see Chapter 12). The interment dates to the Early Archaic period.

Burial 22

Burial 22 (see Figures 10-1, 10-5) was centered mainly in Unit S12W88, Levels 18-21 (179-201 cm b.d.), but extended slightly into Unit S14W88, bottom of Zone 3. The bones were fragmented and scattered, probably by an erosional gully, as was the case with Burial 21. The erosion cut through Zone 3 and into the surface of the underlying Beaumont clay. The identified elements consisted solely of long bones and phalanges. Cranial bones were not present. Bioarchaeological analysis indicates that two individuals are represented, one a young adult or older adolescent male, the other an older female around 53 years of age.

Due to the badly disturbed condition of the burial, the position of the body could not be determined. There was no evidence of a grave pit, but the bones occupied a roughly circular area measuring 80 cm north-south by 75 cm east-west. A limestone grooved stone was found in proximity to, and at the same level as, the bones and is believed to be an associated mortuary item. One *Marginella* shell bead was found while screening the soil matrix taken from around the bones. The burial is estimated to date to the Early Archaic period.

Burial 23

Burial 23 (see Figures 10-1, 10-5) was primarily within Unit S12W84, Level 13 (120-130 cm b.d.), but extended into Unit S14W84, bottom of Zone 2. Preservation was very good, and the skeleton was complete. The skull, including facial bones, was intact, although with post-depositional hairline fractures.

Again, no burial pit was discernible. The skeleton was confined within an oblong-shaped area measuring 130 cm northwest-southeast and 45 cm northeast-southwest. The body and upper legs were supine and extended, although the lower legs were folded at the knees so that the feet were drawn up toward the buttocks. The head was oriented toward the southeast but faced the northwest.

Seven thin chert bifaces were clearly associated with this burial. A tight cluster of three was found under the right innominate. A large Lange point was nearby, immediately under the proximal right femur. Two bifaces were resting on the pelvic area. The final biface was under the lower right rib cage; this specimen was lying flat, as though it were intentionally placed under the body and not used as a weapon against this individual. A small mass of yellow ochre approximately 5 cm in diameter was under the lower left rib cage, opposite the last-mentioned biface. All of the bifaces, with the exception of the Lange point, were unstemmed and unnotched triangular or lanceolate forms. All were well finished with carefully pressure-flaked edges and were probably used as knives. Likewise, the unusually large size of the Lange point suggests that it was used as a knife, rather than a dart point, although it could have functioned as a point on a thrusting spear.

This individual appears to have been an adult male. Bioarchaeological analysis revealed that two additional individuals were represented by teeth within the sediment matrix of the main individual. One of these persons was a sub-adult around 13 years old, while the other was an older adult female, approximately 53 years old (see Chapter 12).

This burial appears to date to the Late Archaic period, based on the associated Lange point and its stratigraphic position in the bottom of Zone 2. This interpretation is validated by a 2-sigma calibrated age range of 2150-2000 B.P. from AMS dating of tooth-pulp collagen. This burial was very close, and oriented parallel, to Burial 25. As discussed below, Burial 25 contained an Ensor-like dart point and two large whelk shell pendants, both suggesting a Late Archaic age and approximate contemporaneity with Burial 23.

Burial 24

Burial 24 (see Figures 10-1, 10-6) was located within Unit S12W90, Level 16 (152-160 cm b.d.), bottom of Zone 3. The interment consisted only of a fragmented cranium that was generally in a good state of preservation. No maxilla, teeth, or mandible were present, suggesting that this may have been solely a skull burial. The 15 cranium fragments occupied a small area measuring 16 cm north-south by 15.5 cm east-west. No artifacts seem to have been associated with this interment.

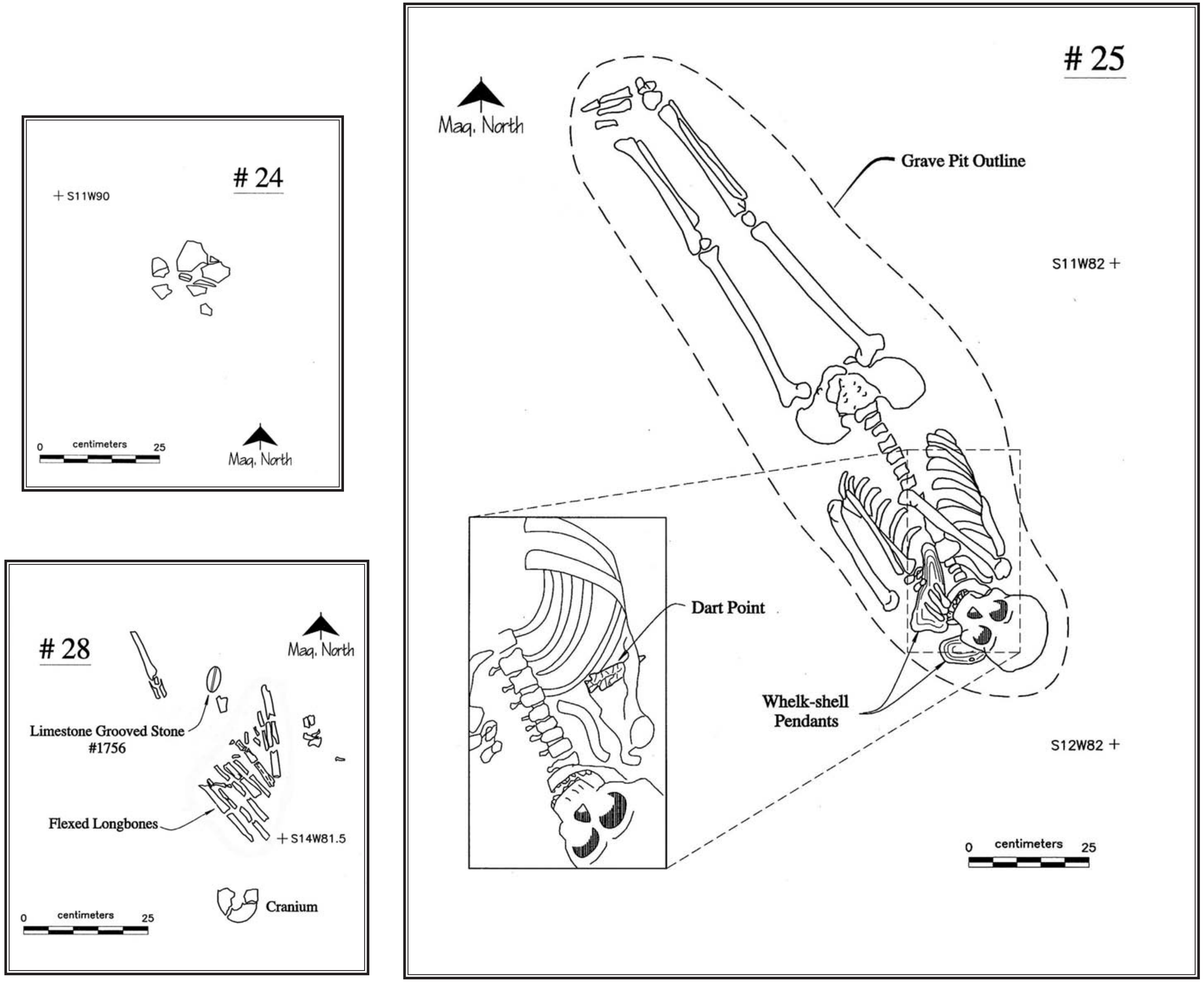
Field observations relative to the cranium suggested that the remains were associated with an adolescent or adult individual. Subsequent bioarchaeological observation indicated an adult male and also identified a small radius fragment (see Chapter 12). The burial seems to be associated with the Early Archaic utilization of the site.

Burial 25

Burial 25 (see Figures 10-1, 10-6) was within Unit S12W84, Levels 13-14 (125-139 cm b.d.). Unlike the burials described above, there was a clear grave pit outline, which originated in Zone 2 and intruded into the top of Zone 3.

Bone preservation was very good. With the exception of the right lower arm and hand, the skeleton was complete. The skull was intact and articulated with the mandible. The individual was placed into the grave pit, which measured 170 cm northwest-southeast by 55 cm northeast-southwest, fully extended, resting on the back. The upper left arm (humerus) was parallel to the body; the lower arm was bent up toward the face with the hand clutching a large whelk shell pendant (see Figure 10-6). The right humerus extended from the shoulder down over the mid-torso area. The lower right arm and hand were missing altogether. The upper incisor teeth of this individual exhibited a pattern of symmetrical, concave wear. This can be interpreted as representing repeated use of the teeth in some kind of technical activity, perhaps stripping leather or processing other materials such as sinew, bark, or other fibers.

The burial associations included two large whelk shell body whorl pendants, one (as noted above) clutched in the left hand just below the face. The other was next to the left side of the head and possibly attached to the



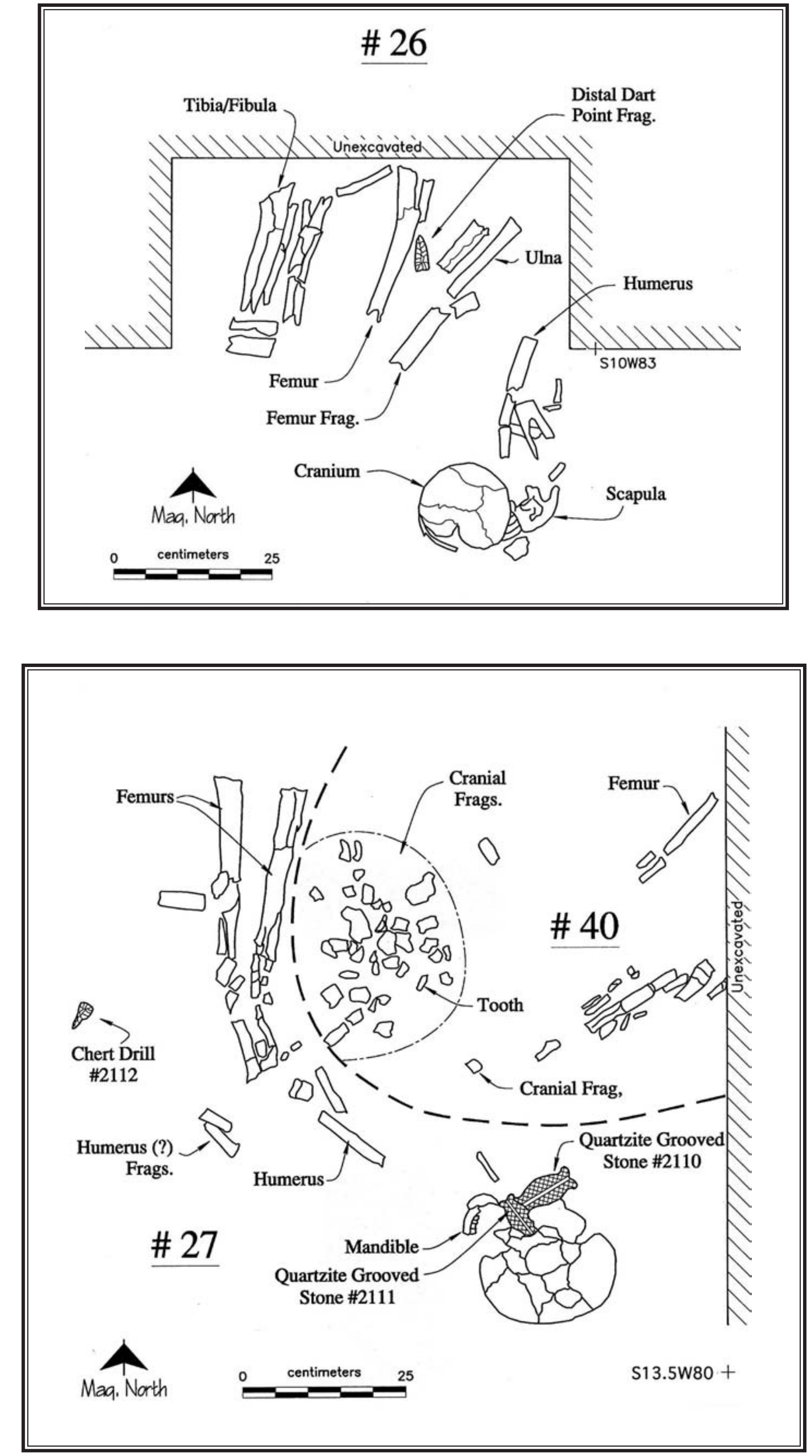


Figure 10-6. Plan view drawings of additional burials at Buckeye Knoll: Burial 24, a crushed portion of an apparently isolated cranium; Burial 25, a Late Archaic male interment (The insert shows the position of an Ensor-like dart point that penetrated the right scapula); Burial 26; Burials 27 and 40 (Note the pair of quartzite grooved stones next to the right side of the skull of Burial 27); and Burial 28 (Note the associated limestone grooved stone).

hair at the time of burial. An Ensor-like dart point was securely embedded in the right scapula. Presumably the cause of death, this projectile point had entered the chest cavity from the front left, judging by the angle of penetration into the scapula. The tip had penetrated through the scapula, so that 5 mm of the point protruded beyond the rear surface of the bone.

The body was that of an adult male, estimated on the basis of bioarchaeological analysis to have been about 39 years old at death. The burial dates to the Late Archaic, as indicated by the Ensor-like dart point (Hester 1980b; Turner and Hester 1999). Also diagnostic of this time period are the two large whelk-shell pendants, which have direct counterparts in the Group 2 cemetery at the Ernest Witte site (41AU36) on the lower Brazos River, dated to ca. 500 B.C. to A.D. 400, and at the approximately coeval Crestmont site (Hall 2002) in the lower Colorado River area.

As noted above, this burial and Burial 23 appear to be a more-or-less contemporaneous pair. As may be seen in Figure 10-1, they are positioned close together, and are extended parallel to one another with the heads at the same point relative to the lengths of the graves. The extended positions, along with the presence of the large whelk shell pendants in Burial 25, would seem to link these burials culturally to the lower Brazos-Colorado Late Archaic mortuary tradition discussed in Chapter 5.

Burial 26

Burial 26 (see Figures 10-1, 10-6) was located within Unit S12W84, Levels 13-14 (127-138 cm b.d.), and extended north into Unit S10W84, Zone 3-A. The skull and torso portions of this burial were found in the northern part of S12W84. Because the long bones extended north beyond the main excavation, a rectangular extension into the north wall of the excavation was made, large enough to expose the additional remains that consisted of leg bones. The other identified elements of this burial consisted of the skull and mandible (both fragmented), at least one scapula, some vertebrae, and ribs. All were in fair to poor condition.

No grave pit outline was discernible. The bones, which represent a primary interment, were found within an area measuring approximately 70 cm north-south by 54 cm east-west. The body appears to have been flexed with the head oriented to the south. A distal fragment of a possible lanceolate dart point was resting flat near the right tibia and possibly represents an intentional offering.

Judged in the field to be an adult of indeterminate sex, the bioarchaeological analysis suggests that the remains belong to possible adult male, aged 32 years. Teeth of an additional young adult of indeterminate sex were also identified during bioarchaeological analysis. The burial is believed to date to the Early Archaic period.

Burial 27

Burial 27 (see Figures 10-1, 10-6) was found in Unit S14W82, Levels 13 and 14 (125-140 cm b.d.), Zones 3-A and 3-B. The skeletal remains were in fair to poor condition. The pieces of the skull and the mandible (also fragmented) were more or less articulated. The ribs, sternum, vertebrae, and pelvic bones were missing, presumably due to decay and, likely, post-depositional disturbance. The humerii and leg bones were broken and incomplete.

No grave pit was discernible. The bones occupied an area that measured 85 cm north-south by 70 cm east-west. The positions of the skull, humerii, and leg bones suggest a loosely flexed primary interment. The head was oriented to the southeast. The positions of the arms could not be determined due to their scant representation by somewhat dispersed humerus fragments.

Two quartzite grooved stones were immediately adjacent to the right side of the skull (see Figure 10-6). This close association indicates that these items were intentional grave inclusions. An expanded-base, chert drill/perforator was found at 140 cm b.d. and 21 cm to the south of the fragmented femur; this may be associated with Burial 27 or, alternatively, may actually pertain to Zone 3 beyond the limits of the grave.

Judging from the size of the skull and long bones, this individual was an adult. Moderate robustness of the brow and mandible suggest a male. Bioarchaeological analysis indicates an age greater than 55 years. The burial evidently dates to the Early Archaic period as indicated by an AMS calibrated age range of 6640-6410 B.P. (Beta-157424) that was obtained on a small sample of long bone.

Burial 27 probably is associated with Burial 40 (discussed below), the remains of a juvenile (see Figure 10-6). The crushed skull of Burial 40 was next to the proximal femurs, and close to the presumed location of the pelvic area, of Burial 27. Very possibly, both interments were simultaneously placed within a single grave.

Burial 28

Burial 28 (see Figures 10-1, 10-6) was located within Unit S14W82, Levels 13 and 14 (121-136 cm b.d.), Zones 3-A and 3-B. The only bone elements than could be confidently ascribed to this burial were a group of sub-parallel femurs, tibias, and fibulas. All were fragmented and missing the presumably decayed epiphyses. A fragmented cranium, located some 15 to 20 cm to the south in adjacent Unit S16W82, may have been associated. Generally, the bones were in a poor state of preservation.

The fragmented leg bones occupied an area measuring 36 cm north-south by 18 cm east-west. This excludes outlying bone elements that were possibly displaced from Burial 28. These included a fragmented ulna approximately 20 cm to the northwest, several unidentified bone elements 10 cm to east, and the aforementioned skull 15 to 20 cm to the south.

The almost parallel arrangement of the leg bones suggests a flexed primary interment. If the fragmented skull in Unit S16W82 did, in fact, pertain to this burial, then the head was oriented to the south. A grooved stone made of limestone rested approximately 12 cm to the north of the cluster of leg bones and was probably an associated grave item.

The general size of the bones suggests that the individual was an adult. The sex, however, was indeterminate. The burial probably dates to the Early Archaic period.

Burial 29

Burial 29 (see Figures 10-1; 10-7) occupied Unit S12W84, Levels 13-15 (129-145 cm b.d.), Zone 3-A. Preservation was poor. What remained consisted of a partially intact and fragmented skull and, possibly, an incomplete femur. There was no apparent grave pit, and the position of the body was indeterminate. Based on the size of the skull, the individual appears to have been an adult, but the sex could not be determined.

The incompleteness of this burial was probably due, in large part, to the intrusion of a modern trash pit or looter's hole (see Figure 10-7). The outlines of this pit were clearly discernible in both unit level floors and in the west wall profile of S12W84. Its modern origin was revealed by the inclusion of numerous aluminum soft drink cans.

There was a Lange dart point approximately 5 cm from the skull. This is a Late Archaic point and was probably not associated with this burial. Rather, it probably was displaced downward by bioturbation from Zone 2. The burial is estimated to date to the Early Archaic period.

Burial 30

Burial 30 (see Figure10-7) was located within Units S29W116 and S29W118, Levels 16-17 (160-179 cm b.d.), base of Zone 2, in the West Slope Area. This is the sole burial in the West Slope Excavations.

The bones were in a fairly good state of preservation, but the skull, ribs, pelvis, and long bones were fragmented. No grave pit was discernible. The bones lay within an area measuring 155 cm northwest-southeast by 50 cm northeast-southwest. The individual was placed extended on the back, with the head to the southeast. It appears that the individual was probably an adult female of advanced age, greater than 55 years.

A cluster of seven small, smooth pebbles rested next to (behind) the top of the skull. These are anomalous to the Zone 2 soil and probably were an intentionally placed grave item, possibly the remains of a rattle.

The burial is believed to date to the Late Archaic, based on the extended, southeast-heading of the body (see Burials 23 and 25, above) and its stratigraphic position in the bottom of Zone 2. If the grave was dug from a prehistoric surface within Zone 2, the burial probably dates to the early part of the Late Archaic, roughly 2,500-4,000 B.P., calibrated, since Zone 2 produced several point types of that general era (Bulverde, Pedernales, and Morhiss). The fragmented nature of the bones, as compared to the relatively intact bones in the Late Archaic burials on the Knoll Top, may be due to the greater depth and, thus, relatively greater volume and weight of the overlying sediments.

Burial 31

Burial 31 (see Figures 10-1, 10-3) was located in Unit S10W88, Levels 16-17 (153-169 cm b.d.), Zone 3-A. The remains were in poor condition, the bones friable and fragmented. The skeleton was very incomplete, represented only by long bone pieces and a mandible fragment.

There was no discernible grave pit; the bones were found within an area measuring 38 cm north-south by

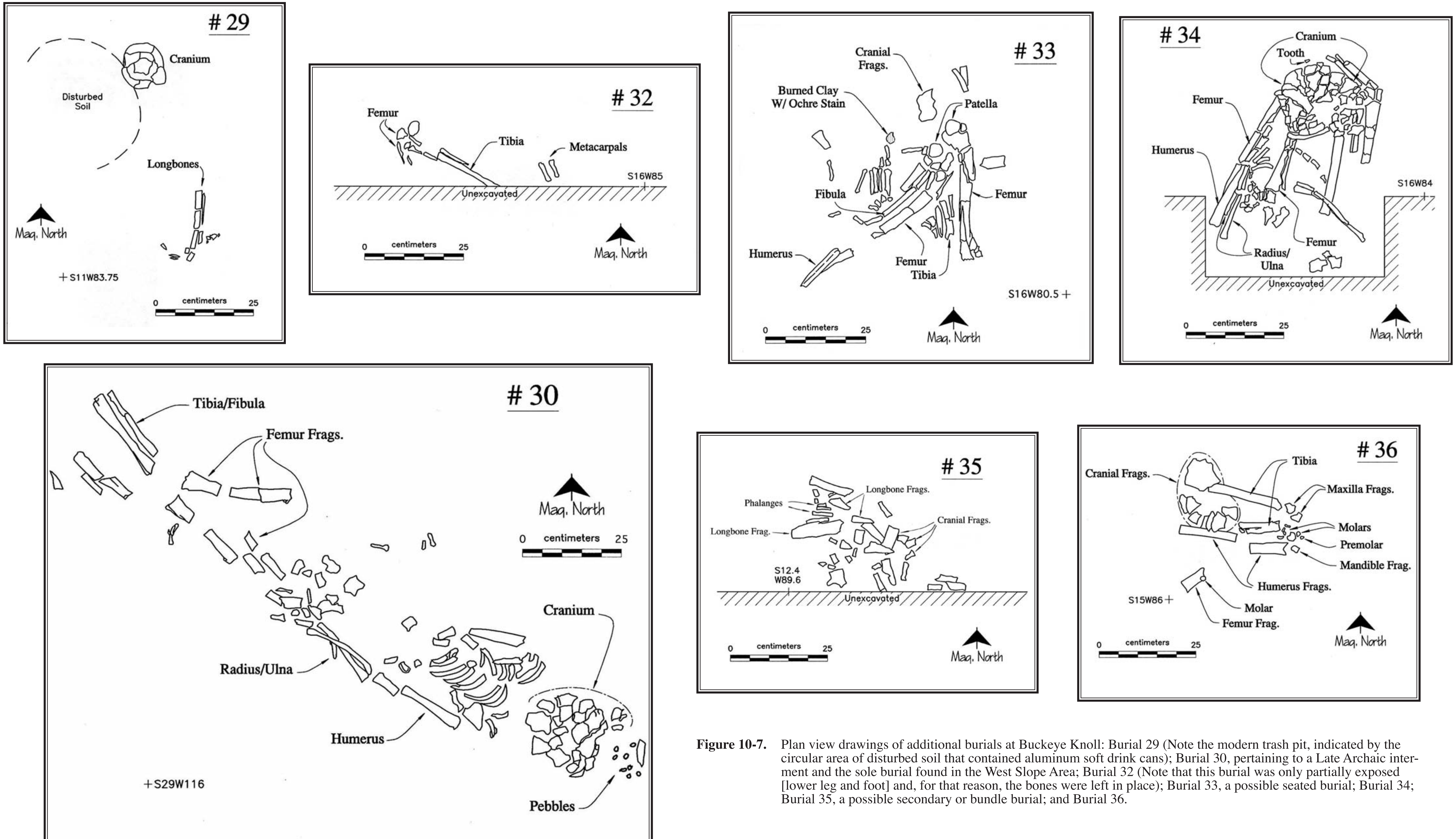


Figure 10-7. Plan view drawings of additional burials at Buckeye Knoll: Burial 29 (Note the modern trash pit, indicated by the circular area of disturbed soil that contained aluminum soft drink cans); Burial 30, pertaining to a Late Archaic interment and the sole burial found in the West Slope Area; Burial 32 (Note that this burial was only partially exposed [lower leg and foot] and, for that reason, the bones were left in place); Burial 33, a possible seated burial; Burial 34; Burial 35, a possible secondary or bundle burial; and Burial 36.

54 cm east-west. A small scatter of femur fragments some 55 to 75 cm to the west (and at the same level as Burial 31) probably were the result of dispersal of bones from this burial by animal burrowing. The body was probably flexed, judging by the sub-parallel juxtaposition of the femur, tibia, and fibula. If the mandible indeed belonged to the same individual, and was not significantly displaced, the head was to the northeast. The individual was probably an adult male, greater than 55 years of age at death. Some bones and teeth of a second individual, a child about eight years old, were also present.

A sizeable cache of bifacial chert preforms (Feature 18) rested only some 20 cm west of the bones attributed to Burial 31 (see Figure 10-3). However, it must be noted that these items appear to conform to a semicircular distribution of mortuary artifacts (mainly quartzite grooved stones) centered upon Burial 6, as mentioned above. The occurrences among the preforms of a finely made quartzite grooved stone and a fragment of the "killed" purple quartzite grooved stone associated with Burial 6 appear to link Feature 18 with the semi-circle of grooved stones and grooved stone fragments. Since the preforms were at the same level as the bones of Burial 31, and given the interpretation that the circular pattern of mortuary items lined a large pit containing Burial 6, it also can be posited that Burial 31 was interred within that pit. Alternatively, Burial 31 may have been dug later into the inferably large Burial 6 pit without any apparent disturbance to the arrangement of materials in the pre-existing grave.

While it was recognized that additional bones from Burial 31 might have lain beyond (to the north of) the excavation, no attempt was made to expose these. This decision was based on (a) time constraints, (b) the highly fragmented and somewhat dispersed condition of the remains, and (c) the fact that none of the individual skeletal elements in S10W88 extended into the north wall of the excavation. Burial 31 is thought to date to the Early Archaic period.

Burial 32

Burial 32 (see Figures 10-1, 10-7) was within Unit S16W86, Level 10 (95-100 cm b.d.), bottom of Zone 2. This burial was only partly exposed, as it appeared to be largely located beyond the southern limits of the excavation. The fact that only a small portion of this burial was within the excavation block led to the decision to leave the exposed skeletal elements in place. The bones were carefully covered with soil by hand prior to mechanical backfilling of the excavation.

Bone preservation was fair, and the observed elements included a distal femur fragment, a tibia, and two metatarsals. The angle between the distal femur and the tibia suggested a leg bent at the knee, indicating a flexed burial. The size of the bones suggested that the individual was an adult of indeterminate sex.

No burial associations were present within the small portion of the burial exposed. Given that Burial 32 was in the bottom of Zone 2, it is estimated to be Late Archaic in age.

Burial 33

Burial 33 (see Figures 10-1, 10-7) was within Unit S16W82, Levels 11-14 (104-140 cm b.d.) Zones 3-A and 3-B. Bone preservation was fair. No grave pit was discernible. The bones rested within a roughly oval area measuring 50 cm north-south by 42 cm east-west.

This appears to have been a sitting, primary interment. The femur/tibia were bent at the knees, with the knees angled upward and, thus, at a higher elevation than the proximal femurs and distal tibias. The patellas rested at 104-106 cm below datum while the foot bones rested at 120 cm below datum. The cranium was represented by only one fragment; the remainder of the skull may have been removed by the erosion that created the unconformity between Zones 2 and 3. In other words, the positions of the bones suggest that the legs were bent at the knees and the cranium was at a somewhat higher elevation. The juxtaposition of the remaining bone elements in this burial is similar to that in other, more complete, burials that are clearly sitting interments. This burial appears to be one of at least four or five interments in Zone 3 in which the bodies were placed in sitting positions.

Bioarchaeological analysis suggests that this individual was a 6.5-year-old adolescent of indeterminate sex. A red ochre-stained lump of burned clay rested near the bones of the left foot. This burial is thought to date to the Early Archaic period.

Burial 34

Burial 34 (see Figures 10-1, 10-7) occupied portions of Units S16W86 and S18W86, Levels 10 and 11 (90-105 cm), Zone 3-A. Generally, bone preservation was fair. The skull and long bones were fragmented, but the long bones retained partial condyles. The pelvis was incomplete, fragmented, and somewhat displaced. Only a few rib and vertebrae fragments remained.

No grave pit outline was discernible. With the exception of the displaced pelvic fragments to the south, the bones rested within an oval area measuring 45 cm north-south by 41 cm east-west. The legs were tightly folded and drawn up under the skull. It is likely that this was, in fact, a collapsed sitting burial, given that the skull rested on top of the lower leg bones and feet. As in more clearly seated burials, the skull may have collapsed down on top of the rib cage and vertebral column.

Bioarchaeological analysis suggests that the individual was an older female, more than 55.9 years old at death (see Chapter 12). It also revealed the presence of a second individual, a young child. Sixteen *Marginella* shell beads were found scattered in the soil that contained the bones. A calibrated AMS age range of 3810-3730 B.P. placed this burial in the earliest part of the Late Archaic period.

Burial 35

Burial 35 (see Figures 10-1, 10-7) was within Unit S14W90, Level 15 (141-148 cm b.d.), Zone 3-A. It rested directly on the surface of the Beaumont Formation clay. Preservation of the extant skeletal elements was poor to fair. The identified bones included cranial fragments, pieces of long bones, and phalanges.

No grave pit outline was discernible. The bones were found in a tight cluster measuring 50 cm northwest-southeast by 36 cm northeast-southwest. There was no anatomically correct arrangement of the bones. That, and the tight clustering of the remains, suggests this burial was a secondary bundle.

The remains appear to be from a single adult male of indeterminate age. No burial associations were present. This interment is believed to date to the Early Archaic period.

Burial 36

Burial 36 (see Figures 10-1, 10-7) occupied a portion of Unit S16W86, Level 10 (100-109 cm b.d.), Zone 3-A. Like Burial 35 discussed above, it rested on the surface of the Beaumont clay.

Preservation was generally poor, and there was a very incomplete representation of the skeleton. The skull was highly fragmented. A piece of the maxilla was present, as was a fragmentary mandible. Several loose teeth were also observed. The long bones were represented by fragmentary humerii, femurs, and a tibia. A metatarsal and several small unidentifiable bone fragments completed the field inventory.

No grave pit was discernible. The bones were within a small, roughly circular area measuring 32 cm north-south by 32 cm east-west. The distribution of the bones, along with representation of both leg bones and cranium, suggests that this may be a secondary bundle burial.

Two individuals were represented in Burial 36. One was an adult male, with an estimated age of 29.22 years at death. The other was an adult female, around 20 years old (see Chapter 12). No artifacts were associated with these individuals. The burial appears to date to the Early Archaic period.

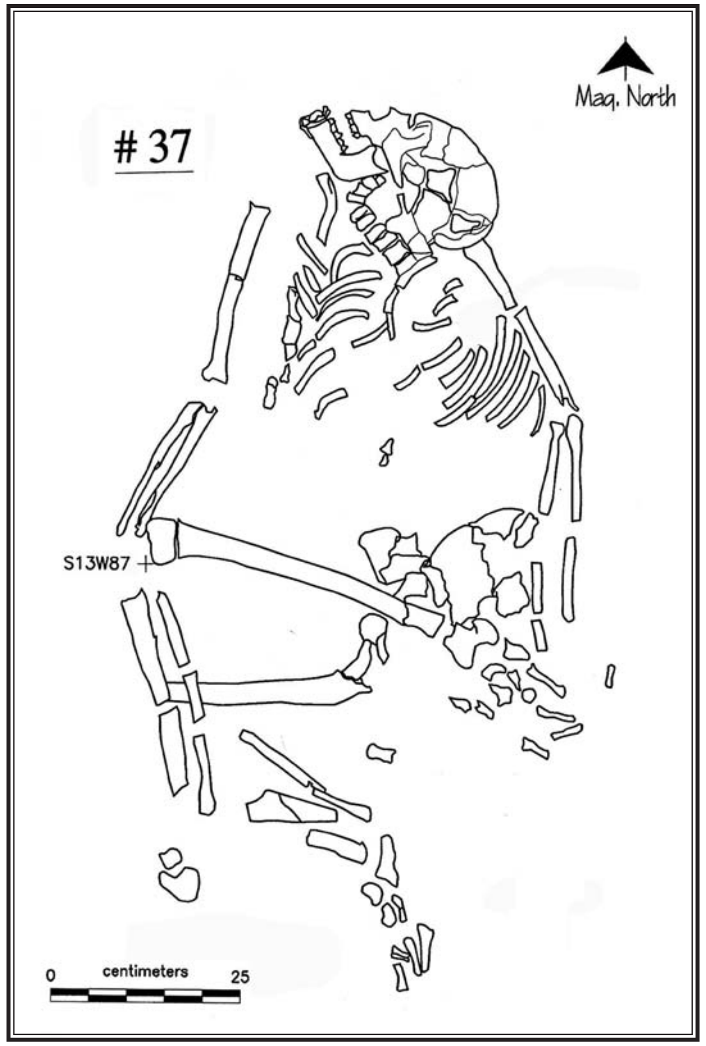
Burial 37

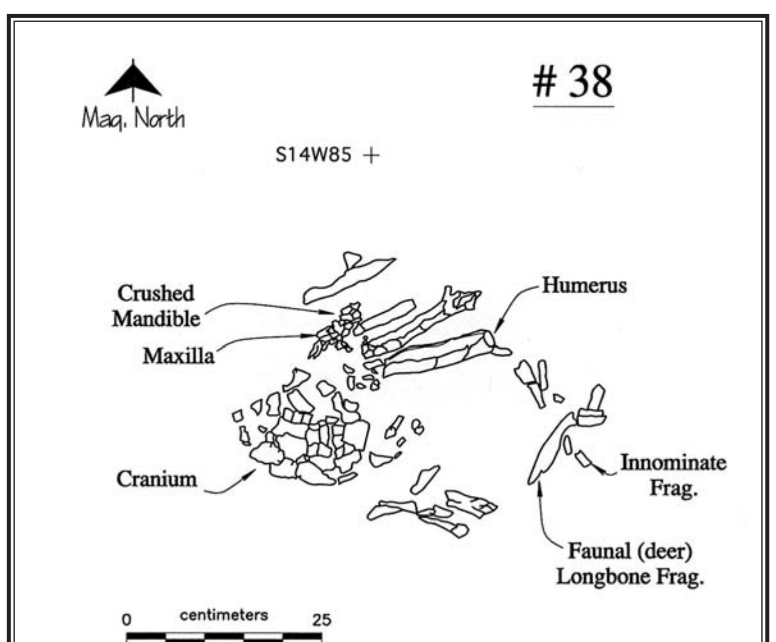
Burial 37 (see Figures 10-1, 10-8) was within Unit S14W88, Levels 9-11 (87-105 cm b.d.), bottom of Zone 2. Essentially, the entire skeleton was present. The bones were broken but in otherwise good condition.

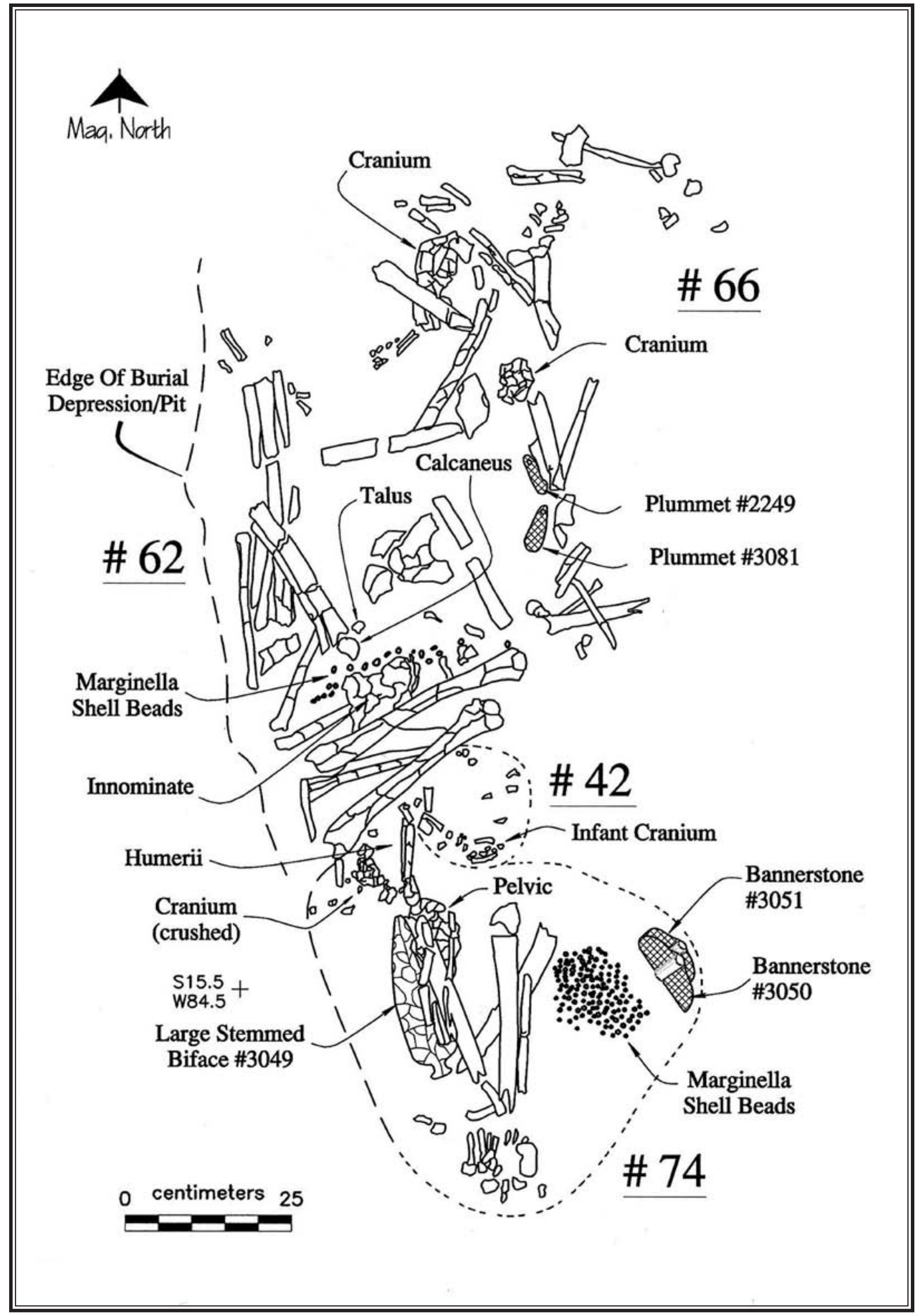
No discernible grave pit was observed. The bones were within an area measuring 105 cm north-south by 65 cm east-west. This was a loosely flexed primary interment, with the body resting on its right side and the head toward the north. The arms were extended downward from the shoulders. Although the cervical and upper thoracic vertebrae were still well articulated, a right-angle turn was evident so that the back of the skull was almost touching the spinal column; apparently, the neck was broken prior to burial and was the probable cause of death. The broken neck of this individual suggests a violent demise; however, it is impossible to determine whether it was by accident or intentional. Healed pre-mortem injuries to both humerii were discerned during bioarchaeological analysis. Also observed were surface modifications on both tibias that are thought to reflect soft-tissue injury.

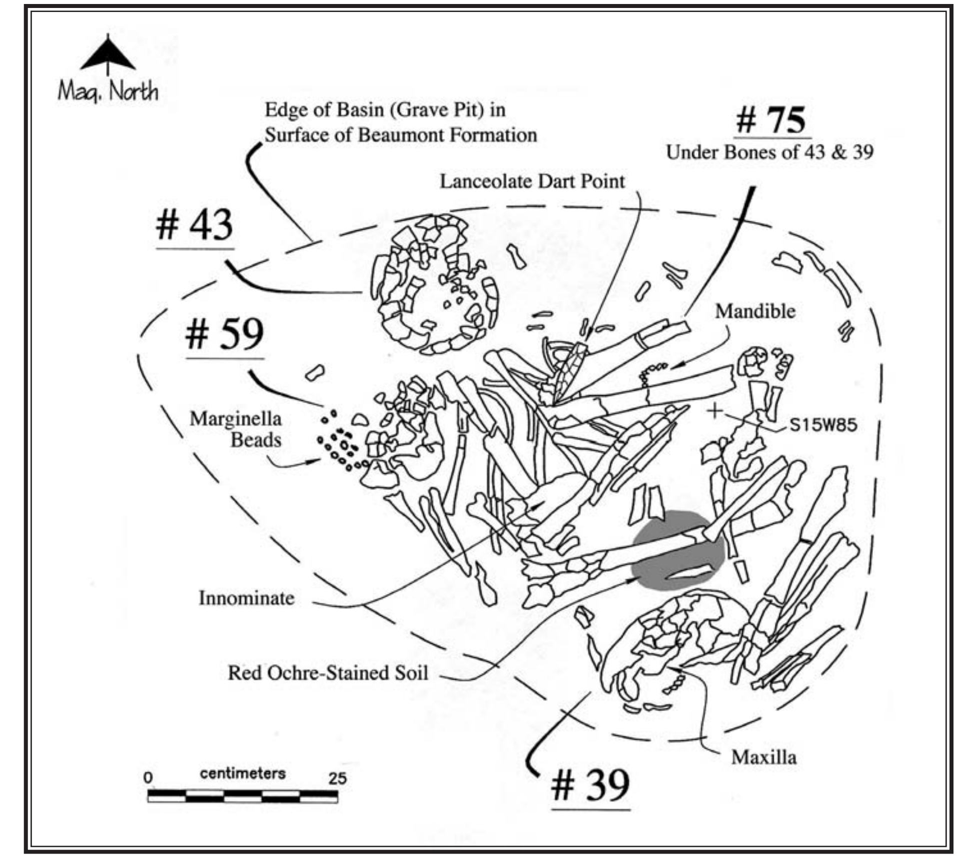
The size of the bones led to the field assessment that this was an adult. Later analysis showed the individual to be a female, aged around 48 years at the time of death. An infant, 2 to 3 years of age, and probably buried with this adult female, was represented only by a few teeth.

A thick triangular, early-stage biface or preform rested 7 to 8 cm above the left humerus. This may have been an associated grave item, although it might have been an accidental inclusion from the Zone 2 midden fill.









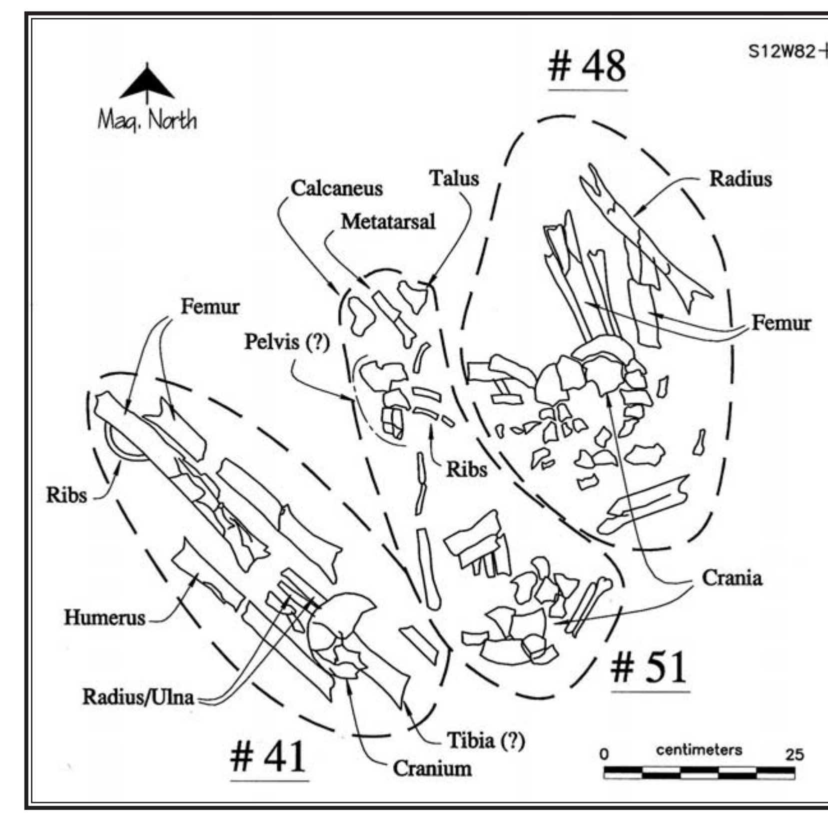


Figure 10-8. Plan view drawings of additional burials at Buckeye Knoll: Burial 37, a loosely flexed adult female, possibly dating to the Late Prehistoric period; Burial 38; Burials 39, 43, and 59, all tightly packed within a basin-shaped depression, probably the base of a burial pit dug into the surface of the basal Beaumont Formation clay; Burials 41, 48, and 51; and Burials 42, 62, 66, and 74.

Burial 37 either dates to the Late Archaic or Late Prehistoric periods. This interment rested at basically the same stratigraphic position as the Late Archaic burials identified as Burials 20 and 23. However, the flexed position is in contrast to the extended body positions of the demonstrably Late Archaic interments at Buckeye Knoll. Moreover, flexed burials were typical of the nearby Blue Bayou site (41VT94), which dates largely to the early part of the Late Prehistoric period (Huebner and Comuzzie 1992), as well as the Late Prehistoric Group 4 cemetery at the Ernest Witte site on the lower Brazos River (Hall 1981).

Burial 38

Burial 38 (see Figures 10-1, 10-8) occupied Unit S16W86, Level 12 (109-112 cm b.d.), base of Zone 3, and rested on the surface of Beaumont clay. Bone preservation was poor. The cranium was crushed, and the long bones were highly fragmented and entirely missing the epiphyses. Ribs, vertebrae, and other more porous bones were missing, with the exception of a pelvic (innominate) fragment.

There was no discernible grave pit outline. The bones were tightly clustered within an oval area measuring 33 cm north-south by 49 cm east-west. This appears to have been a tightly flexed, primary interment, with the head toward the west, based on the relative positions of the cranium, humerii, pelvic fragment, and larger long bone (probably femur) pieces. Bones of three individuals were present. One was a young adult female, the second an older adult of indeterminate age, and the third an infant, 1.5 years old and of indeterminate sex.

A single *Marginella* bead was recovered in the screens from the matrix taken from around the bones. This may be one of the many such small beads scattered through the Zone 3 fill and apparently dislocated from other burials. Burial 38 is believed to date to the Early Archaic period.

Burial 39

Burial 39 (see Figures 10-1, 10-8) occupied a portion of Unit S16W86, Levels 12 and 13 (108-125 cm b.d.), base of Zone 3. The interment was made in a shallow basin-shaped depression within the surface of the Beaumont clay.

Generally, preservation was poor. The skull was highly fragmented, as were the long bones. This was one of at least four individuals buried together in a discrete circular basin in the surface of the Beaumont clay. This basin, as discernible at the surface of the Beaumont clay, measured 70 cm north-south by 107 cm east-west; it attained a depth below the Beaumont surface of some 15 cm. The Burial 39 bones may have been tightly packed within a small circular area measuring approximately 35 cm north-south by 35 cm east-west. However, it is possible that a mandible, tibia, fibula, and femur (located immediately to the north within the basin) all pertained to this burial.

This appears to have been a secondary bundle burial, with a tibia and femur resting partly on top of the skull. However, the mentioned tibia, fibula, and femur situated nearby could have been articulated or, alternatively, may have been placed in the basin in such a position as to approximate anatomical articulation. It is unclear whether these leg bones and the nearby mandible pertain to Burial 39; possibly they represent the incomplete remains of a separate individual (as, in fact, was assumed in the field, leading to the designation of these bones as Burial 75). The individual represented in Burial 39 was an adult of indeterminate sex. The estimated age at death was 24.24 years.

No artifacts were buried with this person, although two of the other individuals within the basin did have associated materials (a lanceolate dart point with Burial 43 and several *Marginella* shell beads with Burial 59). Additionally, a circular red-ochre stain, some 15 cm in diameter, may have been related to the Burial 39 skull or, alternatively, may have been associated with all of the burials in the basin, given that it was several cm above any of the bones. These burials appear to date to the Early Archaic period.

Burial 40

Burial 40 (see Figures 10-1, 10-6) was located within Unit S14W82, Level 15 (142-150 cm b.d.), Zones 3-A and 3-B. The extant skeletal elements were in poor condition. The skull was crushed into many fragments, and the long bones, which were possibly associated, were in pieces and missing the epiphyses.

No grave pit outline was discernible. The bones were within an oblong area measuring 38 cm north-south by 65 cm east-west. The body position was difficult to determine due to the poor condition and very incomplete representation of the elements. The long bones were horizontally separated from the crushed skull by some 20 cm. They may have been somewhat displaced, post-depositionally. The represented individual appears to be a 50-year-old adult of indeterminate sex. The fact that the remains of Burial 40 were situated immediately next to the upper femur and pelvic area of the adult male of Burial 27, suggests that the two were associated within a single grave.

An early stage biface fragment, a piece of large freshwater mussel shell, and a small lump of asphaltum may have been associated with this burial. Several burned-clay nodules and a small fragment of burned non-human bone were found among the elements. These likely represent intrusive midden material (i.e., brought in by animal burrowing), as there was no evidence of in situ burning. This burial is believed to date to the Early Archaic utilization of the site.

Burial 41

Burial 41 (see Figures 10-1, 10-8) was within portions of Unit S14W84, Level 11 (103-108 cm b.d.), top of Zone 3, and perhaps bottom of Zone 2. Bone preservation was fair. The long bones were missing the epiphyses and were fractured. The skull was fragmented and somewhat dispersed, but not crushed.

No grave pit was discernible. The exact dimensions of the interment were difficult to ascertain due to the apparent dispersal of some skeletal elements into the mass of bones from several individuals that occurred within what appears to be a single grave. Burial 41 was one of at least three adult individuals interred as secondary or bundle burials within a single circular concentration of bones in Unit S14W84. The other two were Burials 48 and 58. The tight clustering of these remains suggests that all individuals were buried simultaneously in one grave pit. The combined remains were clustered within a roughly circular area measuring 80 cm north-south by 85 cm east-west.

The various long bones in Burial 41 (i.e., humerus, femur, and tibia) were arranged parallel to one another. Combined with the fact that much of the cranium rested on these long bones, suggests a secondary bundle burial. The size of the skull and long bones, plus a large mastoid process, implies that the individual was an adult male. Estimated age at death is 32 years. No artifacts appear to have been associated with this individual.

This burial was found at the interface between Zones 2 and 3 and cannot definitely be ascribed to the Early Archaic mortuary component. However, the unconformable contact between these zones is obscured by mottling due to bioturbation, so the burial could well have been in the upper part of Zone 3-A and still have, in places, been in contact with darker Zone 2 soil. The interpretation that the burial pertains to Zone 3-A may be supported by the absence of a discernible grave pit. If it had originated within Zone 2, such an outline would have been fairly clear, with black Zone 2 soil filling at least the upper part of the grave pit (as was the case with Late Archaic Burial 25). Thus, while inconclusive, assignment of this burial to the Early Archaic is inferred.

Burial 42

Burial 42 (see Figures 10-1, 10-8) was within Unit S16W86 and extended slightly into Unit S16W84, Level 12 (113-119 cm b.d.), base of Zone 3. The burial rested on the surface of the Beaumont clay.

Preservation was generally poor, and the recognized elements consisted of disarticulated fragments of long bones, the cranium, and teeth. There was no discernible grave pit, the bones confined to a small oblong area measuring 18 cm north-south by 14 cm east-west. The original position of the burial cannot be determined. The bones were disarticulated. However, this could be the result of post-depositional disturbance

The small size of the skeletal elements indicates a young juvenile, perhaps a neonate infant. Bioarchaeological analysis places the age at .75 years, or 9 months. No artifacts were associated with this interment, which is believed to date to the Early Archaic period.

Burial 42 was one of at least four burials interred within an oblong area measuring 217 cm north-south by approximately 60 cm east-west. Bioarchaeological analysis indicates the presence of the remains of nine individuals. Included within this cluster of remains (from south to north) were Burials 74, 42, 62, and 66. All of these remains rested at the base of Zone 3 directly on, or with a few centimeters of, the surface of the Beaumont clay. Along the western edge of the bone cluster was a sharply defined, 10- to 15-cm-deep depression in the surface of the Beaumont clay, seemingly the result of burial pit(s) (otherwise undetectable in the overlying Zone 3 sediments) dug down into the top few centimeters of the clay (see Figure 10-8). It is unclear whether this continuous intrusion into the Beaumont surface represents a single, long burial pit or several overlapping pits. However, the apparent displacement of the upper portion of Burial 42 suggests that multiple episodes of interment took place.

Burial 43

Burial 43 (see Figures 10-1, 10-8) occupied portions of Unit S16W86, Level 11-12 (107-117 cm b.d.), bottom of Zone 3. The condition of the bones was poor. The skull was highly fragmented, as were the long bones. Porous bone elements were missing, probably due to decay.

No grave pit outline was discernible within the Zone 3 sediments. However, as noted above in the description of Burial 39, this and at least two other individuals were within a circular basin dug into the surface of the Beaumont clay measuring 70 cm north-south by 107 cm east-west.

With the skull toward the west and apparently folded legs, this individual appears to have been flexed, possibly lying on its right side. The size of the skull and long bones suggests an adolescent or adult. Bioarchaeological analysis places the age of death at around 14 years; sex was indeterminate.

A slender lanceolate dart point, resting flat, was located 12 to 13 cm southeast of the skull. It is possible that this projectile point was the cause of death, as it appears to have lain in the vicinity of the upper chest cavity (the position was difficult to define precisely due to decay of ribs and vertebrae and this artifact very well may have been placed in the grave as an offering). A circular patch of red ochre-stained soil was located over what appears to have been the left femur of Burial 43. Two *Marginella* beads were found in the screens in soil taken from around the bones. These may, in fact, have been derived from adjacent Burial 59, which was associated with a discrete cluster of such beads. Burial 43 appears to date to the Early Archaic period.

Burial 44

Burial 44 (see Figures 10-1, 10-9) was within Unit S16W84, Levels 13-14 (122-140 cm b.d.), Zone 3-A. The skeletal elements were poorly preserved. The skull and mandible were fairly complete, but highly fragmented. The long bones were in pieces and missing the epiphyses. The ribs were represented by a cluster of small pieces, as were the pelvic bones. Other porous and/or thin bones, such as vertebrae and scapula, were missing, presumably due to decay.

There was no discernible grave pit outline; the bones were clustered within a circular area measuring 48 cm north-south by 52 cm east-west. The relative positions of the skull, leg bones, rib fragments, and arm bones suggest a primary flexed interment, but the presence of bones and teeth from several individuals (two adults and three sub-adults) gives the possibility of a secondary burial of multiple individuals. No artifacts seem to have been associated with Burial 44, which appears to date to the Early Archaic period.

Burial 44-A

Burial 44-A (see Figures 10-1, 10-9) was within Unit S16W84, Levels 13-15 (126-142 cm), Zone 3-B. This interment consisted of fragmented leg bones without epiphyses and a scatter of cranial fragments, all in a poor state of preservation.

Again, there was no discernible grave pit outline. The bones were found scattered in an oblong area measuring 58 cm north-south by 28 cm east-west. Body position was indeterminate. The size of the long bones and cranial bones suggests a juvenile. The sex of the individual also could not be determined. This burial was initially thought to be part of Burial 44. Complete exposure of the remains, however, showed it to be a separate individual, possibly within a separate grave. The absence of any discernible grave pit outline(s) precludes any definite answer to this question.

Two limestone bannerstone fragments were found together, some 15 cm west of the skull fragments. They rested at the base of the Zone 3-B soil and on (and in one case partially embedded in) the Beaumont clay surface. The proximity of these objects to the Burial 44-A skull, and the relatively greater distance to other burials, suggests a direct association to Burial 44-A. Similarities in the granular texture and color of the stone of which each fragment was made suggest they pertain to a single bannerstone. This artifact may have been intentionally broken at the gravesite as part of mortuary ritual. Burial 44-A is thought to date to the Early Archaic period.

Burial 45

Burial 45 (see Figures 10-1, 10-9) was exposed in Unit S16W84 and extended south into Unit S18W94, Levels 13 and 14 (124-140 cm b.d.), Zone 3-B. The bones were poorly preserved. The skull was fragmented and incompletely represented; the pelvic bones were present but highly fragmented. The leg bones and humerii were also broken and incomplete. The mandible was either missing or so poorly preserved that it was not recognized as such in the field.

There was no discernible grave pit outline. The bones occupied an elliptical-shaped area measuring 67 cm north-south by 38 cm east-west. The tibias and femurs were found in a tightly grouped, sub-parallel arrangement that suggests tightly flexed legs. The pelvic fragments were clustered near the proximal femur fragments, indicating an approximately correct anatomical relationship. On this basis, this burial could be inferred to be a tightly flexed, primary interment. However, the close spacing of the cranial bones and legs seems too constricted for an in-flesh burial. Also, the occurrence of a sizeable lump of asphaltum, bearing what appears to be an imprint of a fibula, suggests that molten or heat-softened asphaltum was placed with the bones prior to, or at the time of, burial. These factors suggest that this is a secondary bundle burial in which the various bone elements were arranged to approximate their anatomical order in a flexed position.

Numerous *Marginella* shell beads were found in a linear arrangement near the cranial fragments. The position and distribution of the beads suggest they may have been from a necklace. Five lumps of asphaltum were found near the leg bones. As noted above, one piece bears the imprint of what appears to be a fibula shaft, as though it had been pressed in heated state against the bone. Other apparent grave inclusions were an unmodified freshwater mussel shell and a tabular piece of sandstone (a possible abrader); both were found next to, and partly under, the bones.

The individual represented in Burial 45 was an adult male about 30 years old. This burial evidently dates to the Early Archaic period.

Burial 46

Burial 46 (see Figures 10-1, 10-9) occupied portions of Units S16W84 and S18W84, Levels 13-15 (126-144 cm b.d.), Zone 3-A. The recognized bones included poorly preserved fragments of the cranium and pelvis, incomplete and fragmented long bones, and phalanges.

There was no discernible grave pit outline. The bones were found clustered within an area measuring 39 cm north-south by 65 cm east-west. The incomplete representation of the elements plus post-depositional disturbance, presumably by bioturbation, makes determination of body position problematical. The positions of the humerus, leg bones, and pelvic and cranial bones suggest a primary flexed interment, but a secondary bundle burial is also a possibility. Bioarchaeological analysis indicates the presence of two individuals—a female approximately 26 years old and a young child, age three.

A nested set of six whole sunray venus (*Macrocallista nimbosa*) clam shell valves was found associated with this burial. Two of these have perforations at one end, suggesting that they were ornamental pendants. The other four may also have been perforated, but this is not known because of the deteriorated condition of the ends of the shells. Burial 46 appears to date to the Early Archaic period.

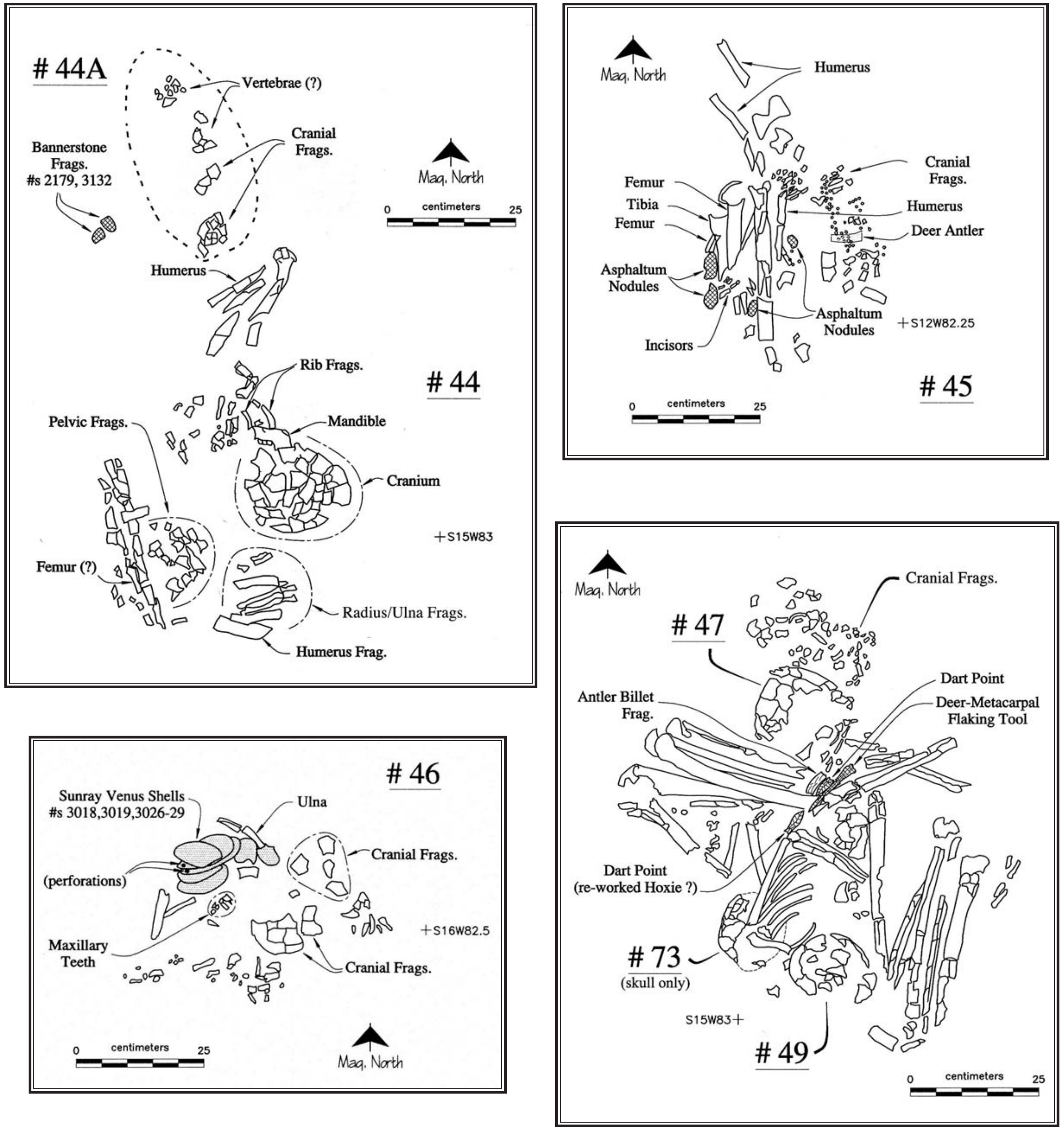
Burial 47

Burial 47 (see Figures 10-1, 10-9) was within Unit S16W84, Levels13-15 (128-144 cm b.d.), Zone 3-B. Here, again, the bones were in a poor to fair state of preservation. The skull was fragmented and appeared to be somewhat displaced. Teeth were found among the cranial bones. The long bones were also fragmented, but retained some of the epiphyses. The ribs had decayed, except possibly for very small, fragmentary remnants. The phalanges and other hand/foot bones were present, as was part of a scapula and the patellas.

There was, once again, no discernible grave pit outline. However, this was one of three individuals found tightly clustered within an oval area measuring 95 cm north-south by 80 cm east-west. Burial 47 was partly overlain by Burial 49, which also lay over Burial 73. All three individuals appear to have been interred within the same pit.

The articulated positions of the legs in relation to the skull indicated that Burial 47 was a primary flexed interment with the head to the north. The knees rested some 15 to 20 cm above the pelvis, and the skull appeared to have fallen toward the pelvic area, post-depositionally. It appears that the knees and head were resting at somewhat higher elevations than the lower torso/pelvis, suggesting that they were placed against the side of the grave pit. The displacement of the skull indicates that it moved downward with slumping of the grave fill.

The main individual in Burial 47 was an adult male, aged about 24 years at death. Bioarchaeological analysis identified elements of two additional individuals, a possible adult female and a two-year-old child (see Chapter 12). Six chert flakes and a small lump of asphaltum were found immediately beneath the bones in the area of the lower torso and/or pelvis. Burial 47 is thought to date to the Early Archaic period.



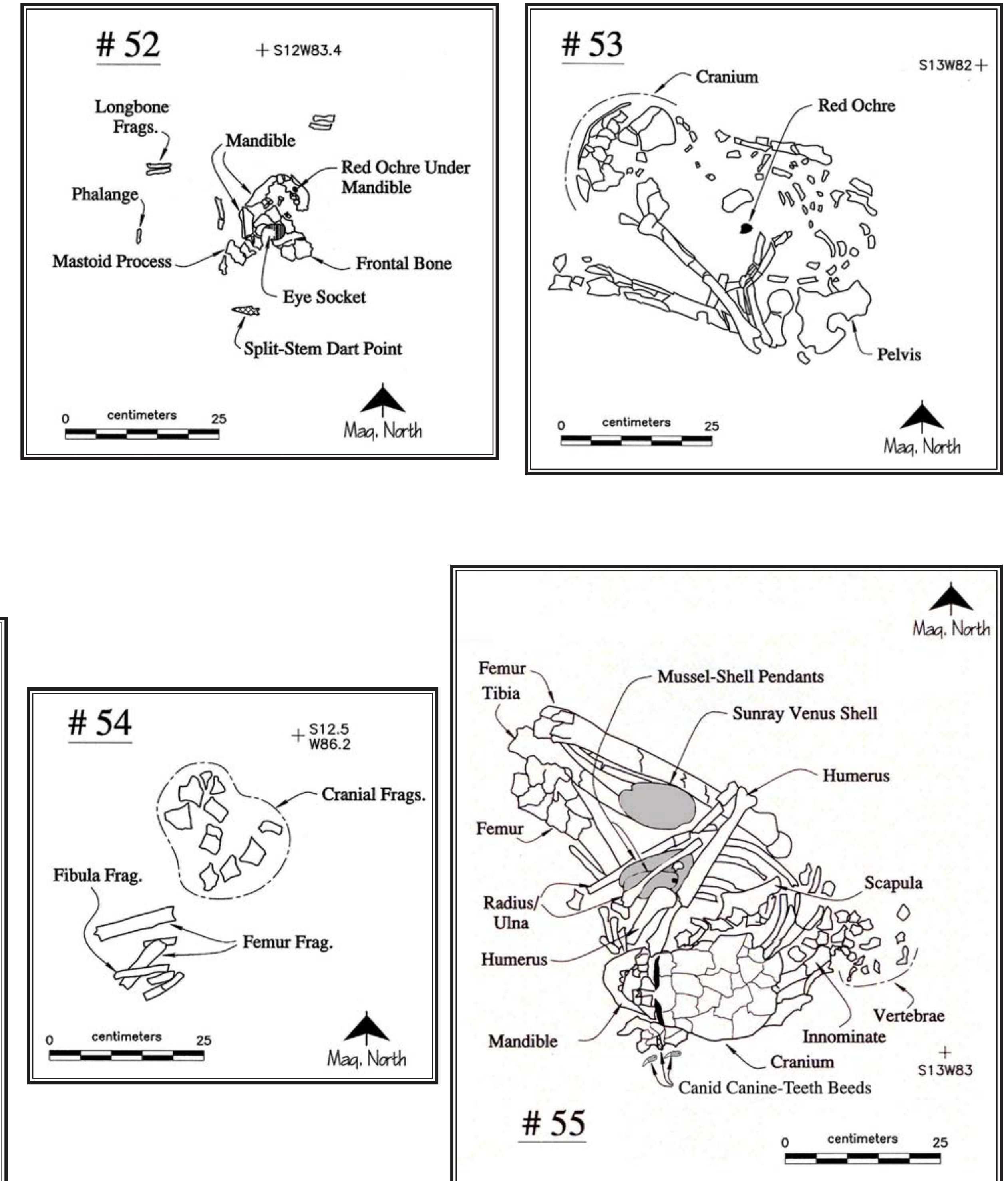


Figure 10-9. Plan view drawings of additional burials at Buckeye Knoll: Burials 44 and 44-A (Note the two bannerstone fragments associated with Burial 44-A); Burial 45; Burial 46 (Note the cluster of sunray venus clamshells, some perforated, in the upper left); Burials 47, 49, and 73, all tightly clustered in what may have been a single grave; Burial 52 (Note the stemmed dart point just south of the cranium); Burial 53, a tightly flexed adult female; Burial 54; and Burial 55, an adult female in a seated position (Note the bivalve-shell pendants to the north of the skull and perforated canine-teeth beads to the south (left side) of the skull.

Burial 48

Burial 48 (see Figures 10-1, 10-8) was within Unit S14W84, Level 10-12 (99-117 cm b.d), at the contact of Zone 2 and Zone 3-A. The recognized skeletal elements included the skull and mandible (both of which were somewhat fragmented), broken vertebrae and ribs, long bones, clavicles, and hand and foot bones. Bone preservation was fair.

No grave pit outline was discernible. The bones were concentrated within an oblong area measuring 57 north-south by 29 cm east-west. The skull lay on top of the long bones. The mandible was under the skull but upside down. The anatomically incorrect position of this tight cluster bones indicates a secondary bundle burial.

The size of the long bones, along with the prominent mastoid process and robust mandible, indicates the primary individual in Burial 48 was an adult male. Bioarchaeological analysis places the age at around 46 years. A second adult, possibly a male, was slightly younger (37 years) and was a smaller individual. No artifacts were associated with this interment. This is one of three bundle burials that are tightly clustered in Unit S14W84. The other two were Burials 41 and 58. All three probably were interred together in a single pit.

As in the case of Burial 41, Burial 48 was found at the interface between Zones 2 and 3 and cannot definitely be ascribed to the Early Archaic mortuary component. However, the unconformable contact between these zones is obscured by mottling due to bioturbation. The burial could well have been in the upper part of Zone 3-A and still have been in contact with darker Zone 2 soil in places. The interpretation that the burial pertains to Zone 3-A may be supported by the absence of a discernible grave pit. If a pit had originated from within Zone 2, its outline should have been fairly easy to see, with black Zone 2 soil filling at least the upper part of the grave pit (as was clearly the case with the Late Archaic Burial 25). Thus, while inconclusive, assignment of this burial to the Early Archaic is inferred.

Burial 49

Burial 49 (see Figures 10-1, 10-9) was within Unit S16W84, Levels 14-15 (132-148 cm b.d.), Zone 3-B. Here, again, bone preservation was poor to fair. The skull was fragmented, as were most of the larger elements. However, the long bones retained some of the epiphyses, and the skeleton was well represented and largely in its original anatomical order.

There was, once again, no discernible grave pit outline. This was one of three individuals found tightly clustered within an oval area measuring 95 cm north-south by 80 cm east-west. Burial 49 partly overlay Burial 47 and Burial 73. All three individuals appear to have been interred within the same pit. Additional individuals, not discernible in the field, were identified during human osteological analysis.

Burial 49 was a tightly flexed primary interment, resting on the right side with the head to the south. The knees were drawn up to, and in front of, the face. The left elbow was near the hip, and the left forearm was across the lower torso. The primary individual in Burial 49 was an adult male about 55 years old. Also represented were another adult, possibly a male, and an infant six months to one year of age. Since the remains of these three individuals appear not to have disturbed one another, it can be inferred that all were simultaneously interred within a single grave pit.

A number of items were found immediately behind the pelvic area of the primary individual. A lanceolate dart point with a slightly flared base was resting at the left elbow and close to the hip. A tight cluster of artifacts immediately behind the pelvis was interpreted as a tool kit. This group included a lanceolate dart point with concave based, a pointed bone tool made from a deer metapodial (probably a pressure-flaking tool), a section of deer antler (possibly a billet), a blade-like flake of dark gray chert, and a second chert flake. The positioning of this apparent tool kit behind the pelvic area is similar to that seen with Burial 8. Other artifacts associated with this burial included an asphaltum nodule found in front (to the east) of the pelvis and a patch of red ochre-stained soil in the area of the right shoulder, behind the skull.

Burial 49 dates to the Early Archaic period. An AMS date on human bone collagen (tibia) from this burial yielded a calibrated (1-sigma) age range of 7420-7260 B.P. The two lanceolate dart points are similar to established types. The concave-base point found with the tool kit is similar in outline to the Angostura type, although its does not bear the neat parallel pressure flaking often found on points of that type. The other specimen, which had a slightly constricted basal section with slightly flaring basal corners, fits into no established type, although Elton R. Prewitt (personal communication 2004) suggested that it could be a reworked Hoxie point. Both specimens showed light grinding along the basal lateral edges.

Burial 50

Burial 50 (see Figures 10-1, 10-5) was within Unit S14W84, Level 13-15 (122-140 cm b.d.), Zone 3-A. Generally, bone preservation was poor. The recorded skeletal elements included the fragmentary and somewhat crushed skull with articulated maxillary teeth, the mandible, femurs, tibias, humerii, and a radius.

Again, there was no discernible grave pit outline. The bones of Burial 50 were within a tight oval cluster measuring 35 cm northwest-southeast by 25 cm northeast-southwest. The legs were flexed with the knees at markedly higher elevations than the proximate femurs. The skull appears to have fallen downward (and nearly upside down) over the pelvic area, between the knees to the east and the arm bones to the west. This juxtaposition of skeletal elements suggests that the individual was placed in the ground in a sitting position; with settling grave fill, the skull moved and fell downward over the pelvis.

Bioarchaeological analysis suggests that this was an adult female around 40 years old at death. Also a child, 7 to 8 years old, was represented only by teeth. Burial 50 was immediately to the northeast of Burial 16. The bones of these two individuals were found within a tight, nearly circular area measuring 42 cm north-south by 37 cm east-west. Additionally, neither burial appears to have disturbed the other. These two facts suggest that both were interred simultaneously within a single grave pit.

No artifacts seem to have been associated with Burial 50. This interment appears to date to the Early Archaic period.

Burial 51

Burial 51 (see Figures 10-1, 10-8) was located within Unit S14W84, Levels 10-12 (98-114 cm b.d), at the contact between Zones 2 and 3-A and extended into Zone 3-A. The bones were in fair condition. The skeleton was incomplete, represented by the skull, arm and leg bone fragments, rib fragments, a scapula, a clavicle, and incomplete hand and foot bones.

The skull rested on top of the various other bones, which were not in anatomical order. This was a secondary bundle burial, which analysis suggests was a male around 25 years of age. No associated artifacts were noted.

As in the case of Burials 41 and 48, this burial was found at the interface between Zones 2 and 3 and cannot definitely be ascribed to the Early Archaic mortuary component, although that is its likely temporal placement. This is one of three bundle burials that were tightly clustered in Unit S14W84. The other two were Burials 41 and 48 (see Figure 10-8). All three probably were interred together in a single pit.

Burial 52

Burial 52 (see Figures 10-1, 10-9) was within Unit S14W84, Levels 13-14 (122-134 cm b.d.), Zone 3-A. Preservation was poor, with very limited representation of the skeleton. Part of the skull and the complete mandible were found together. Other bones included long bone fragments, phalanges, and several teeth.

There was no discernible grave pit. The bones were found loosely clustered within an area measuring 45 cm north-south by 50 cm east-west. The very limited representation of the skeleton suggests that this may have been a secondary burial of the partial remains of the individual, who bioarchaeological analysis indicates was an adult male around 48 years old.

A small nodule of red ochre and a perforated canid canine tooth were found immediately under the skull. A stemmed dart point was found 10 cm from the skull. The proximity of these items suggests direct association with Burial 52.

Burial 52 presumably dates to the Early Archaic. The dart point had a fairly narrow, triangular blade, slightly expanding stem, and concave base. The lateral edges of the stem were heavily ground. This specimen falls into the generic group of "split-stem" points diagnostic of Early Archaic assemblages in central Texas (e.g., Dial and Kerr 1998).

Burial 53

Burial 53 (see Figures 10-1, 10-9) occupied a portion of Unit S14W84, Levels 13-14 (124-134 cm b.d.), Zone 3-B. The entire skeleton was represented, except for the vertebrae, sternum, and ribs that, presumably, had decayed. The skull and larger bone elements were fragmented. Generally, the bones were in a poor to fair state of preservation.

No grave pit outline was discernible. The bones occupied an oblong area measuring 32 cm north-south by 55 cm east-west. This was a tightly flexed interment resting on its right side, with the head toward the northwest.

The size of the skull and long bones suggests an adult female. Bioarchaeological analysis failed to determine the age of this individual. Additionally, a 5-year-old child was represented by fibula fragments.

A small nodule of red ochre was found in the mid-torso area and probably represents a burial association. Burial 53 appears to date to the Early Archaic period.

Burial 54

Burial 54 (see Figures 10-1, 10-9) was within Unit S14W88, Level 11 (110-114cm b.d.), Zones 3-A and 3-B. At best, preservation was poor. This burial was represented only by clusters of cranial and leg long bone fragments, possibly disturbed by bioturbation.

There was no discernible grave pit. The bones were within a small oblong-shaped area measuring 45 cm north-south by 26 cm east-west. The position of the body could not be determined, given the paucity of remains.

Bioarchaeological analysis showed this individual to be an adolescent of indeterminate sex, approximately 13.5 years old. No associated artifacts were present. The interment was dated to the Early Archaic period.

Burial 55

Burial 55 (see Figures 10-1, 10-9) occupied portions of Unit S14W84, Levels 14 and 15 (132-145 cm b.d.), Zones 3-A to 3-B. Preservation was fair. The skeleton was essentially complete. The skull and mandible were fragmented but articulated, and the long bones were broken but retained their epiphyses. Thin and/or porous bones, such as the ribs, scapulas, vertebrae, and pelvis, were present.

No grave pit outline was discernible. The bones were confined to an area measuring 75 cm northwest-southeast by 40 cm northeast-southwest. This was a primary, sitting burial. The skull had collapsed downward directly upon the rib cage, while the vertebral column had fallen downward upon itself and had come to rest upon the pelvic bones (i.e., the cervical and upper thoracic vertebrae rested upon lower thoracic and lumbar vertebrae). The legs were flexed with the knees to the northwest of the skull. The juxtaposition of the bones indicates that the body was originally interred in a sitting position, facing west, and that the skeleton collapsed with decay of the flesh and/or slumping of grave fill.

The size of the bones suggested to the field crew that the individual was an adult. Bioarchaeological analysis indicated the burial was that of a female greater than 55.9 years old at the time of death.

A whole sunray venus (*Macrocallista nimbosa*) clam shell rested in the acute angle formed by the flexed leg bones. Three perforated freshwater mussel shells were found near the skull resting on the rib cage; these appear to have been pendants. Three perforated canid canine teeth beads were found near the left side of the skull suggesting that they were suspended as part of necklace. Six *Marginella* shell beads were scattered around the skull. A small lump of red ochre lay immediately behind the skull. This burial appears to date to the Early Archaic period.

Burial 56

Burial 56 (see Figure 10-1) was located in Unit S16W86, Levels 11-12 (105-112 cm b.d.), Zone 3-A. This interment consisted only of the poorly preserved, fragmented, and slightly dispersed cranium.

No grave pit outline was discernible. The cranial fragments were found within a small circular area approximately 18 cm in diameter. The original position of the body could note be determined. Since only the fragmented cranium was found within the excavation block, it is very possible that additional elements were present beyond the south wall of S16W86 to which it was immediately adjacent.

The size of the cranial bones suggested the individual was an adolescent or adult. The sex was indeterminate. No burial associations were evident. The interment is believed to date to the Early Archaic utilization of the site.

Burial 57

Burial 57 (see Figures 10-1, 10-10) was within Unit S14W84, Levels 13-15 (128-150 cm b.d.), and extended slightly into Unit S12W84, Zone 3-B. Preservation was fair with the entire skeleton represented. Some long bone shafts were intact; others were fragmented. For the most part, the long bone epiphyses were present. The skull and mandible were essentially intact and articulated, although somewhat fragmented. Thin and/or porous elements, such as vertebrae, ribs, scapulas, and pelvis, were also present.

There was no discernible grave pit outline. The bones were within an area measuring 75 cm north-south by 73 cm east-west. This was a primary, sitting burial that faced the west. The legs were flexed, with the right knee toward the north and the left knee to the southwest. The knees were some 15 to 20 cm higher than the proximal femurs. The left arm was bent at the elbow, with the forearm in front of the skull. The right arm was tightly bent with the elbow to the north. The skull and mandible had collapsed, still articulated, so that the face had fallen or slumped downward onto the pelvic area. The rib cage and vertebrae had collapsed behind the skull.

The size of the long bones, skull, and mandible indicated that this individual was an adult male. Two small lumps of red ochre were present, one next to the mid-section of the left femur and the other next to the left knee. This burial appears to date to the Early Archaic period.

Burial 58

Burial 58 was within Unit S12W84, Level 14 (137-140 cm b.d.), Zone 3-A (see Figures 10-1, 10-10). The poorly preserved interment consisted of several broken long bones (femur, humerus, and tibia), tarsals, pieces of innominate, a vertebra, talus fragments, rib pieces, two molars, and miscellaneous small bone fragments.

There was no discernible pit outline. The bones were found within an oblong area measuring 45 cm north-south by 23 cm east-west. The position of the body could not be determined due to the poor condition and incomplete representation of elements.

Judging from the size of the long bones, the individual was assessed in the field as immature, probably an older juvenile or a young adolescent. Bioarchaeological analysis revealed that it was a juvenile of indeterminate sex, 5.5 years old at death.

The associated artifacts included four small lumps of red ochre, a short lanceolate point preform, and a large unifacially worked flake of Georgetown chert. A Guadalupe Tool was found to the east of the burial at 148 cm below datum, very close to the vertical position of the bones. Burial 58 appears to date to the Early Archaic period.

Burial 59

Burial 59 (see Figures 10-1, 10-8) occupied a shallow basin in the Beaumont clay in Unit S16W86, Levels 12 and 13 (115-121 cm b.d.), at the base of Zone 3. The remains consisted of cranial and long bone fragments in a poor state of preservation.

This was one of at least three individuals buried in a discrete circular basin intruding into the surface of the Beaumont clay. This basin, as discernible at the surface of the Beaumont clay, measured 70 cm north-south by 107 cm east-west; it extended some 15 cm below the Beaumont surface. The bones related to Burial 59 were restricted to a small area in the western part of the basin measuring 30 cm north-south by 12 cm east-west. The original position of the body could not be determined due to the paucity and poor condition of the remains.

The primary individual in Burial 59 was a juvenile of indeterminate sex. An adult female, 30 years old, is also represented by dental elements. A cluster of 78 *Marginella* shell beads was found directly associated with the bones. The beads were not in a linear arrangement as to suggest a necklace, but rather had the appearance of a small pile placed into the grave (which could, of course, have been strung). Burial 59 dates to the Early Archaic utilization of the site.

Burial 60

Burial 60 (see Figures 10-1, 10-10) was located within Unit S14W84, Levels 14 and 15 (132-144 cm b.d.), Zone 3-B. What remained of the body was in a fair to poor state of preservation. The skull and mandible were articulated but fragmented, and the long bones were in pieces. The phalanges and fragmentary pelvic bones and ribs were present.

No grave pit outline was discernible. The bones were confined to an area measuring 50 cm north-south by 34 cm east-west. The juxtaposition of skull, mandible, ribs, pelvic bones, and long bones suggests a tightly flexed primary interment with the head toward the southeast. The presence of finger phalanges in front of the skull implies that the hands may have been drawn up in front of the face.

In the field, the size of the long bones and skull suggested an adolescent individual. Bioarchaeological analysis indicates a juvenile of indeterminate sex, 8 years old at the time of death.

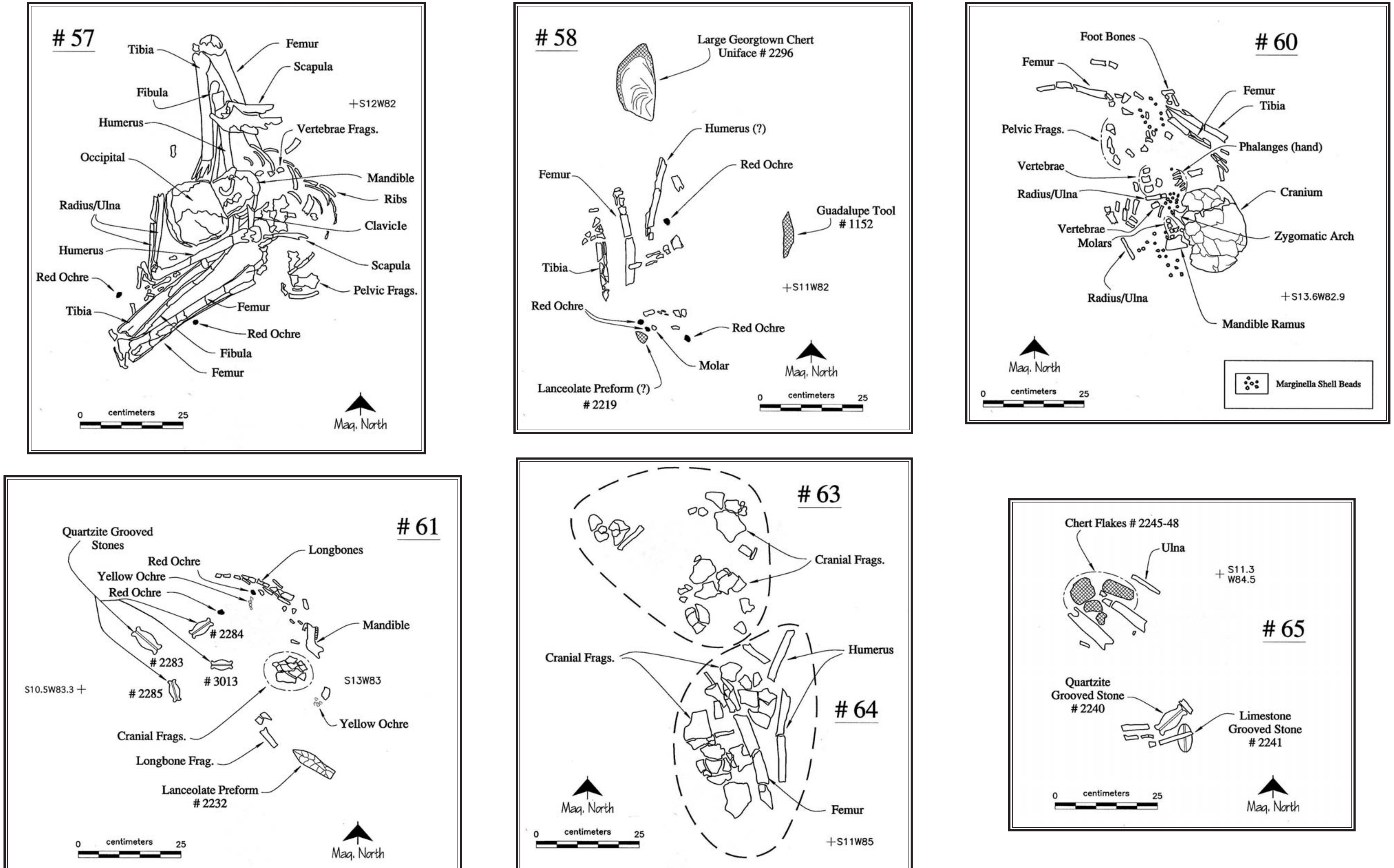


Figure 10-10. Plan view drawings of additional burials at Buckeye Knoll: Burial 57, an adult male buried in a seated position (Note that the skull has collapsed onto the rib cage and spinal column); Burial 58, a subadult accompanied by lithic artifacts and nodules of red ochre; Burial 60 (Note the linear arrangements of marginella shell beads, possible jewelry or ornamental attachments to clothing); Burial 61 (Note the accompanying artifacts consisting of four quartzite grooved stones, lanceloate dart point preform, and red and yellow ochre nodules); Burials 63 and 64; and Burial 65 with accompanying artifacts consisting of chert flakes and a pair of grooved stones, one of quartzite and the other of limestone.

At least 39 *Marginella* beads were associated with this burial. A linear distribution of at least 27 beads around the facial area could indicate a necklace. This interment is estimated to date to the Early Archaic period.

Burial 61

Burial 61 (see Figures 10-1, 10-10) was uncovered in Unit S12W84, Level 15 (140-149 cm b.d.), Zone 3-A. What remained was in a poor state of preservation. The cranium was fragmented and incomplete; the mandible was largely intact. The long bones were incomplete and in pieces.

No grave pit outline was discernible. The bones and associated artifacts were found within a circular area measuring 43 cm north-south by approximately 42 cm east-west. The original position of the body was undetermined due to the poor and incomplete condition of the skeleton.

The primary individual in Burial 61 was a five-year-old child. An adult male around 32 years old at death was represented only by teeth.

A late-stage lanceolate dart point preform was uncovered in proximity to the bones. Additionally, four finely pecked, ground, and polished quartzite grooved stones were found in a cluster immediately to the west of the bones. Three lumps of red ochre and two of yellow ochre were also found among the bones. Burial 61 appears to date to the Early Archaic period.

Burial 62

Burial 62 (see Figures 10-1, 10-8) occupied a part of Unit S16W86 and extended into Unit S16W84, Level 13 (120-128 cm b.d.), base of Zone 3. What remained of the interment was in a poor state of preservation. All of the elements were heavily fragmented and mostly incomplete.

As usual, there was no discernible grave pit outline. However, this is one of at least three burials made within a shallow, apparently artificial, basin-like depression in the surface of the Beaumont clay. The Burial 62 bone cluster itself measured approximately 55 cm north-south by 20 cm east-west.

The bones of Burial 62 were quite jumbled and actually appear to represent a partial redeposition of the upper part of nearby burial 42 resulting from the intrusion of Burial 66 (see Figure 10-8). Other individuals may have been represented among the Burial 62 bone cluster, but this could not be determined in the field. Bioarchaeological analysis indicates that the primary individual in Burial 62 was an adult male around 31 years old at the time of death. A 49-year-old female and a seven-year-old child were also represented.

Two perforated limestone plummets were found within the Burial 62 bone cluster. This interment is believed to date to the Early Archaic period.

Burial 63

Burial 63 (see Figures 10-1, 10-10) was within Unit S12W86, Levels 14-16 (135-152 cm), Zones 3-A and 3-B. What remained of the burial was in a poor state of preservation. It consisted only of a fragmented cranium that was somewhat dispersed, plus a piece of a radius.

No grave pit outline was discernible. These bones were in two small clusters, both confined to an area measuring 35 cm north-south by 40 cm east-west. The poor state of preservation and the lack of additional skeletal elements made determining the position of the body impossible.

The individual represented in Burial 63 was an adult male of undetermined age. No artifacts were associated with this interment, which is believed to date to the Early Archaic period.

Burial 64

Burial 64 (see Figures 10-1, 10-10) was in Unit S12W86, Level 16 (152-157 cm b.d.), Zones 3-A and 3-B. This poorly preserved interment consisted of cranial fragments and long bone shafts for which all the epiphyses were missing. The skeleton was very incomplete. Although the absence of thin and/or porous elements could have been the result of decay, the absence of phalanges, metatarsals, metacarpals, tarsals, and carpals suggests that only part of the skeleton was interred in this burial.

No grave pit outline was discernible. The bones were within an area measuring 43 cm north-south by 22 cm east-west. The body position could not be determined with certainty due to the very incomplete representation of elements and their fragmented condition. However, a secondary bundle burial is suggested by the non-anatomical juxtaposition of cranium, femur, and humerus fragments.

The primary individual in this interment was a probable adult female of indeterminate age. Also represented was an adolescent around 15 years old. No burial associations were present. This burial is believed to date to the Early Archaic period.

Burial 65

Burial 65 (see Figures 10-1, 10-10) occupied portions of Unit S12W86, Levels 15 and 16 (144-155 cm b.d.), Zones 3-A and 3-B. The poorly preserved skeleton was represented only by fragmented long bone shafts without their epiphyses.

There was no discernible grave pit outline. The bones were within an area measuring 49 cm north-south by 21 cm east-west. The incomplete and fragmentary nature of the elements precludes confident determination of body position. The primary individual in Burial 65 was an adolescent approximately 15 years old at the time of death. Some remains of an adult of indeterminate sex and age were also present.

Several artifacts were apparently associated and were found in two groups. A cluster of flaked lithic artifacts was found among several long bone fragments. These artifacts included three fairly large chert flakes and an early-stage biface or preform. With another group of long bone fragments was a pair of grooved stones. One specimen was made from pecked and ground quartzite; the other was an oval, grooved limestone specimen. The pairing of the two suggests that the quartzite and limestone varieties were contemporaneous and functionally equivalent. This burial appears to date to the Early Archaic period.

Burial 66

Burial 66 (see Figures 10-1, 10-8) was within Unit S16W86, Level 13 (121-130 cm b.d.), bottom of Zone 3. This was one of a number of individuals buried within a shallow basin dug through Zone 3 and several centimeters into the surface of the underlying Beaumont clay. As noted earlier, Burial 66 appears to have intruded into Burial 42 such that some of the bones in the latter burial were pushed aside, to the east.

While the entire skeleton of Burial 66 appears to have been represented, the cranium was crushed, and the bones were highly fragmented. Most of the thin and more porous elements were missing (presumably due to decay) or extremely fragmented and incomplete.

No grave pit outline was discernible. The bones were found within an elliptical-shaped area measuring 75 cm northeast-southwest by 43 cm northwest-southeast. The juxtaposition of the crushed cranium and various long bones, including flexed and articulated leg bones, suggests a primary flexed interment resting on the right side with the head toward the north.

The human remains in Burial 66 belonged to a probable adult female, 38 years old, and a six-year-old child. A small patch of red ochre-stained soil was found about 5 cm west of the crushed cranium. A broken canid canine tooth found in the soil matrix on the screen may be part of a bead associated with this burial, which is believed to date to the Early Archaic period.

Burial 67

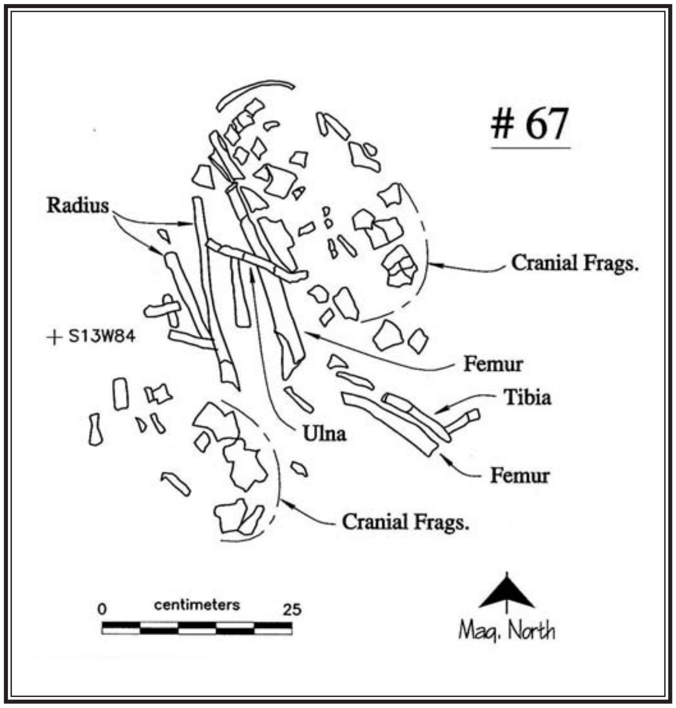
Burial 67 (see Figures 10-1, 10-11) was within Unit S14W84, Levels 15 and 16 (142-155 cm b.d.), Zone 3-B. What remained of the skeleton was in a poor to fair state of preservation. The bones were mostly in pieces, including scattered cranial fragments.

No grave pit outline was discernible. The bones were found within an oval area measuring 60 cm north-south by 46 cm east-west. The anatomically jumbled positions of skeletal elements within a tight cluster strongly suggest that this was a secondary bundle burial.

Bioarchaeological analysis indicates the presence of a female approximately 31 years old at death and a 2-year-old child of indeterminate sex. A small lump of red ochre rested near the southern margin of the bone cluster. Two *Marginella* shell beads were found near the southeastern margin of the bone cluster. Burial 67 is believed to date to the Early Archaic period.

Burials 68, 69, and 70

Burials 68, 69, and 70 (see Figures 10-1, 10-11) were in Unit S12W84, Levels 14 and 15 (139-149 cm b.d.), Zone 3-A. What remained of these interments was in a poor state of preservation. There was no discernible grave pit outline. The three bone clusters that comprise these burials were found within an area measuring 56 cm north-south by 36 cm east-west. Due to the fragmentary and incomplete nature of the bones, the positions could not be determined.



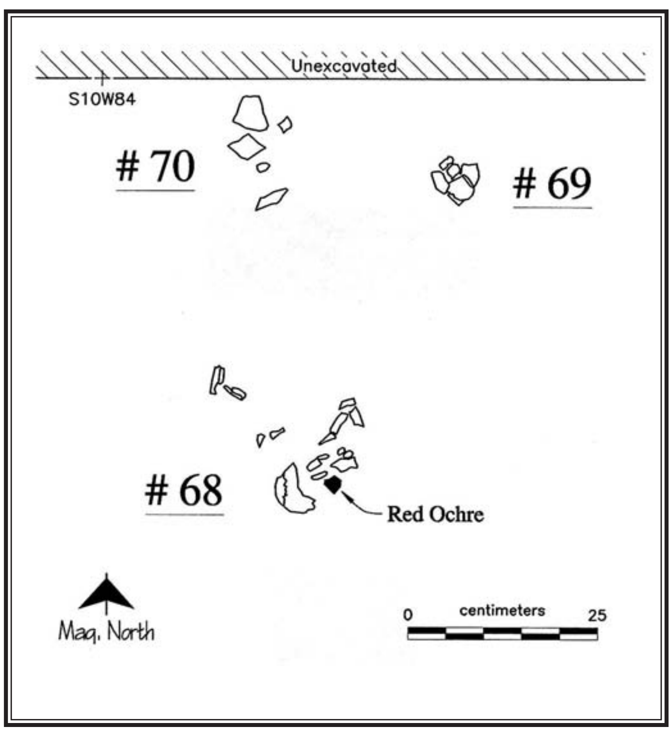


Figure 10-11. Plan view drawings of additional burials at Buckeye Knoll: Burial 67 and Burials 68, 69, and 70.

All three bone clusters consisted of bones of one or more individuals. Bioarchaeological analysis indicates the remains of a 30-year-old female, a five-year-old child, and a 56-year-old adult of indeterminate sex. A red ochre nodule was found with the bone cluster designated as Burial 68. These burials are believed to date to the Early Archaic period.

Burial 71

Burial 71 (see Figures 10-1, 10-12) was within Unit S12W86, Levels 18-20 (170-192 cm b.d.), bottom of Zone 3-B on the Beaumont clay surface. What remained of this burial was in a poor to fair state of preservation. Although the skull and mandible were crushed, the fragmented long bones retained their epiphyses, and various thin and/or porous elements, such as the ribs, were present.

This was the only burial pertaining to Zone 3 that was in a discernible grave pit. The pit was roughly circular, measuring 77 cm north-south by 73 cm east-west. It could be seen, because it was filled with the grayish brown (10YR 5/2) sandy sediment of Zone 3-A, which contrasted with the surrounding pale brown (10YR 6/3) color of the Zone 3-B matrix. This indicates that Burial 71 was dug from and/or through Zone 3-A into the lighter colored Zone 3-B. This is in marked contrast to Late Archaic Burial 25, which was dug from Zone 2 so that the grave fill was the much darker-colored midden soil of that stratum. Inferably, Zone 3-A was an A-horizon soil that developed/accumulated during the Late Paleo-Indian period; the later Early Archaic burial pits were dug from that surface. Many of these burials were within Zone 3-A, while others, presumably in somewhat deeper pits, intruded into Zone 3-B. The general lack of discernible pit outlines for Zone 3-B burials is probably due to the pervasive mottling of soils resulting from bioturbational mixing. Burial 71 appears to be a fortuitous exception due to relatively little bioturbation at this location.

Burial 71 was a primary flexed interment. The body rested on the back, and the knees were drawn up toward the head, which was oriented toward the south-southeast. The upper left arm extended to the west-northwest, away from the head, and was bent at the elbow so that the hand rested in the area of the left hip. The position of the right arm could not be determined because of probable bioturbational disturbance and displacement of skeletal elements.

This individual was a young adult female of around 21 years of age. Also represented was a one-year-old infant. No burial associations were present. The interment is believed to date to the Early Archaic period.

Burial 72

Burial 72 (see Figures 10-1, 10-12) was within Unit S16W84 and extended south into Unit S18W84, Level 15 (140-148 cm b.d.), Zone 3-B. The condition of the bones was fair. Most of the skeleton was represented. Although the skull and other bones were fragmented, the long bones retained their epiphyses and thin and/or porous elements, such as the ribs, pelvic bones, scapulas, and clavicles, were present.

No grave pit outline was discernible. The bones rested within an oval-shaped area measuring 45 cm north-south by 57 cm east-west. The articulated positions of the foot and leg bones, the ribs, and the almost anatomically correct juxtaposition of clavicle, humerus, and ulna/radius indicate a primary interment. The skull lay between the feet and the bones of the upper torso, which suggests that it had collapsed downward from a sitting or semi-seated position.

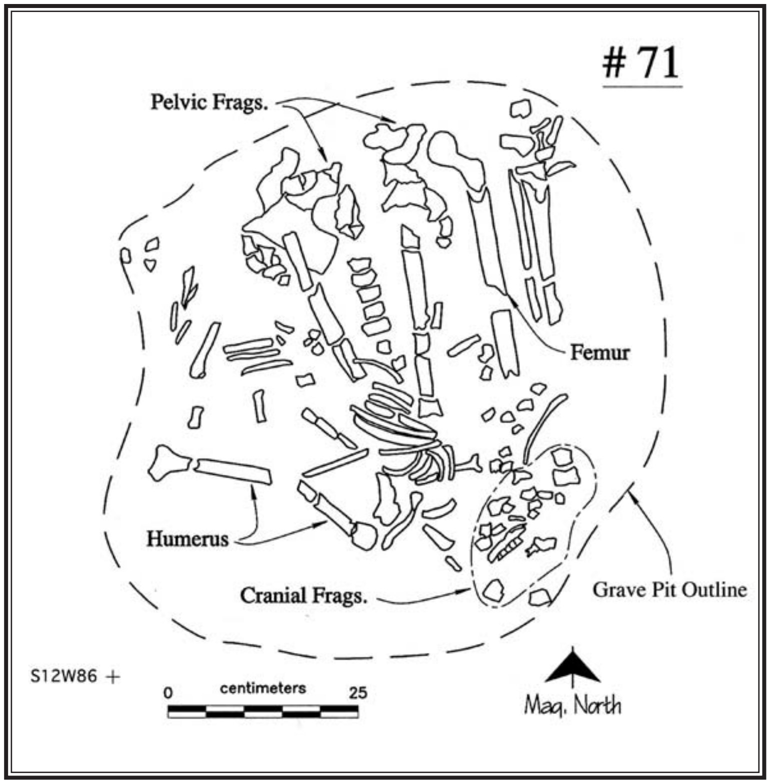
A male around 38 years of age is indicated by the bioarchaeological analysis. An unmodified freshwater mussel shell may have been an intentional grave inclusion. A fragment of a large, thin chert biface was found near the skull. The burial appears to date to the Early Archaic period.

Burial 73

Burial 73 (see Figures 10-1, 10-9) was within Unit S16W14, Levels 14-16 (139-159 cm b.d.), bottom of Zone 3-B, and rested on the Beaumont clay surface. What remained of the interment was in a poor state of preservation. The skull was fragmented but retained the maxillary and its teeth. The mandible was missing the vertical rami. This burial appeared, in the field, to consist solely of the skull and mandible.

There was no discernible grave pit. Burial 73 was one of three individuals within an oval grave, probably a single pit judging by the tight cluster of the bones. The other two were Burials 47 and 49. The dimensions of the mass of bones belonging to all three individuals were 95 cm north-south by 80 cm east-west. The Burial 73 skull laid immediately to the west, and partially under, the upper back/shoulder of the flexed individual that was designated Burial 49.

As noted above, this burial appeared in the field to consist only of the skull and mandible. Bioarchaeo-



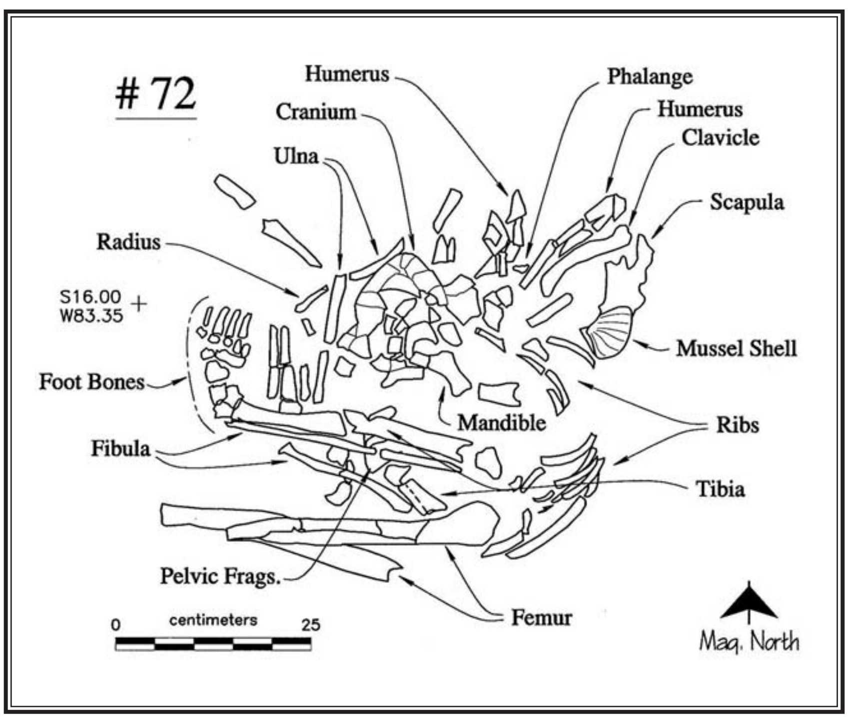


Figure 10-12. Plan view drawings of additional burials at Buckeye Knoll: Burial 71 (Note that this was the only Early Archaic burial for which the pit outline was visible.) and Burial 72.

logical analysis, however, revealed a number of small fragments of post-cranial elements that had also been collected with the cranial specimens. The individual represented by burial 73 was a 30-year-old adult of indeterminate sex.

The soil immediately on top of the skull was red-stained, probably as the result of intentional placement of powdered red ochre. The mandible rested upon a semicircle-shaped piece of tabular sandstone. In outline, this artifact resembled the lunate, undrilled bannerstones found on Archaic sites in the Eastern Woodlands region of North America (e.g., Ritchie 1965:127).

The clear co-occurrence of Burial 73 with Burial 49 places it in the Early Archaic period. Burial 49 produced an AMS 1-sigma calibrated age range of 7420-7260 years B.P. and was clearly associated with lanceolate dart points, one of which may be a reworked Hoxie point (Elton R. Prewitt, personal communication 2004).

Burial 73 may represent a "token" burial, that is, an individual represented by only a single or limited number of anatomical parts. Alternatively, it could represent a trophy head or skull. In either case, it appears to have been directly associated with the primary flexed interment, Burial 49.

Burial 74

Burial 74 (see Figures 10-1, 10-8) was in Unit S16W86 and extended into Unit S16W84, Levels 12-14 (115-132 cm b.d.), bottom of Zone 3. The interment rested on the surface of the Beaumont clay. The skull was crushed and highly fragmented, and most long bones were also in pieces. The mandible was broken and friable, although the mandibular teeth were still in anatomical order. Thin and/or porous bone elements were largely missing, presumably due to decay.

There was no discernible grave pit outline. The bones and associated artifacts were found within an area measuring 45 cm north-south by 49 cm east-west. This appears to have been a tightly flexed primary interment with the head toward the north, judging by the positions of the leg bones in relation to the cranium.

Bioarchaeological analysis indicates this individual was an adult male approximately 45 years old at death. This interment dates, on the basis of an AMS assay (6670-6580 B.P., calibrated), to the Early Archaic period. A second individual was identified during the bioarchaeological analysis as a nine-month-old infant. This child, designated Burial 74-B by the bioarchaeologists, was probably a part of nearby Burial 42, which was dated by AMS to the Middle Archaic period (5550-5350 B.P., calibrated).

An impressive series of artifacts was found associated with Burial 74. Resting against and partly under the leg bones was a very large stemmed chert biface. This piece was finely thinned, showing broad, shallow, soft-hammer percussion flaking and final edge shaping by careful pressure flaking. The length was 278 mm, the maximum width was 85 mm, and the maximum thickness was 9.5 mm. The extreme distal tip was broken off, so the original length would have been approximately 285 mm. The expanding, fishtail-shaped stem bears neat flute-like channel flake scars on both faces, as well as lateral edge grinding. The material was a mottled cream- and caramel-colored, fine-grained, resilicified brecciated chert. Also near the leg bones, but on their opposite (east) side, was a pile of 604 *Marginella* shell beads. An additional 24 *Marginella* beads were found scattered nearby. Immediately east of the pile of beads was a pair of perforated, semi-lunar winged bannerstones made of limestone. The larger of the two was expertly fashioned from a hard, fossiliferous limestone. Found among the leg bones was the distal tip of a dart point. The width, thickness, and flaking patterns of this piece, including its fine edge serrations, were virtually identical to the distal portion of the lanceolate point found with Burial 43 (see Figure 10-8).

Burial 75

Burial 75 occupied a shallow basin in the surface of the Beaumont clay in Unit S16W86, Levels 12 and 13 (117-128 cm b.d.) (see Figures 10-1, 10-8). The skull was crushed and highly fragmented. Other bones were also in numerous pieces. However, some long bones retained their epiphyses, and the thinner and more porous bones, while fragmentary and incomplete, were represented.

This was one of at least four individuals buried in a discrete circular basin in the surface of the Beaumont clay. This basin, as discernible at the surface of the Beaumont clay, measured 70 cm north-south by 107 cm east-west; it attained a depth below the Beaumont surface of 15 cm. The Burial 75 bones were resting on the bottom of the basin, under the bones of Burials 39 and 43.

The various bone elements were in approximate anatomical juxtaposition and appear to represent a flexed individual with the head to the east or northeast. The individual was an adult of indeterminate sex, approximately 30 years old, as indicated by bioarchaeological analysis. No artifacts appear to have been associated with this interment, which is believed to date to the Early Archaic period.

Burial 75 seems to have been interred within a single pit along with Burials 39, 43, and 59. Burials 43 and 75 appear to have been either primary flexed interments or partially re-articulated secondary burials, while Burials 39 and 59 appear to be secondary bundle burials.

Burial Patterns

As a perusal of the information given above shows, human burials at Buckeye Knoll fall into at least three distinct time periods, namely, the Early, Middle and Late Archaic. All but one of the burials was found in the Knoll Top Excavations. The exception is a Late Archaic extended burial (Burial 30), which rested in the base of Zone 2 in the West Slope Excavation. The 74 burials in the Knoll Top Area are overwhelmingly ascribed to the Early Archaic (*n*=68, or 92 percent of the total). Eighteen calibrated AMS dates on Early Archaic burials cluster within a discrete time interval, dating between 7300 and 6200 B.P. (5350 and 4250 B.C.), a fact which, in combination with the tight spatial clustering on the Knoll Top, indicates the existence of a formal cemetery at the site pertaining to the Early Archaic as defined in Texas (e.g., Collins 1995; Johnson and Goode 1994; Prewitt 1981, 1985). In two cases, Burials 50-A and 74-B, bone elements representing individuals associated with those numbered burials were AMS-dated to the Middle Archaic, ca. 5500 B.P. (3550 B.C.), calibrated. These individuals should not be confused with the main interments, represented by the non-hyphenated burial numbers (one of which, Burial 74, was AMS dated to the Early Archaic), which were the remains of skeletons recognized and assigned numbers in the field. The additional individuals in such cases were identified only during bioarchaeological laboratory analysis, as they were represented by only one or a few bone elements that must be assumed to be either "floaters" (i.e., post-depositionally translocated bones from other burials) or parts of skeletons intentionally placed with the grave's primary individual. Finally, six of the Knoll Top burials date to the Late Archaic. One of these, Burial 23, has been AMS-dated to ca. 180-100 B.C., calibrated.

Individual vs. Multiple Burials

Most of the graves in the Knoll Top Area are interments of single individuals. Notable exceptions to this rule are (a) the inclusion of four individuals, Burials 39, 43, 59, and 75, in a single grave, the basal portion of which is represented by a shallow basin dug into the basal Beaumont clay in 2-by-2-m Unit S16W86, (b) the possible combination of the remains of six or more individuals, Burials, 42, 62, 66, and 74, in a similar, although larger, basin in Unit S16W86 and extending eastward into Unit S16W84, and (c) the clear inclusion of three individuals (two complete skeletons and the skull of a third person), Burials 47, 49, and 73, in a very tight, more or less circular, cluster in Unit S16W84. In certain other instances, the remains of multiple individuals were found in close enough proximity to suggest the possibility of shared graves, but the poor and incomplete condition of the skeletons, along with the absence of discernible grave outlines, rendered confident determinations impossible. Tentatively assuming that the three rather clear instances of multiple graves are the only ones represented, then 11 out of the 75 individuals (14.6 percent) identified in the field were placed in graves with other individuals.

Modes of Burial

Four distinct modes of burial are identifiable at Buckeye Knoll (Table 10-2). Extended burials are confined to the Late Archaic (Burials 23, 25, 20, 30, and possibly 32, which was incompletely exposed). Among the burials ascribed to the Early Archaic cemetery, body position could be determined with reasonable confidence in 44 instances. Of those, 23 (52 percent) were flexed or semi-flexed, with legs bent at the hip and knee joints and, in the case of tightly flexed burials, the knees drawn up toward the torso. In 13 (29.5 percent) of the burials, the bones appeared to be disarticulated, suggesting bundle or secondary (de-fleshed) burials. Six individuals (13.6 percent) were buried in sitting positions, with the legs splayed to the sides and the lower legs bent under, with the knees at higher elevations than the pelvis, and the rib cage, vertebral column, and skull all collapsed onto the pelvic area. Finally, two individuals (Burials 24 and 73) were represented only by the skull, suggesting either (a) interment of the skull as a token of the person, whose post-cranial remains were, for some reason, not interred in the grave, or (b) placement of trophy skulls, perhaps

Table 10-2. Head Orientations and Body Positions of Burials Encountered During the Excavations at Buckeye Knoll.

Burial	Head Orientation								Burial Type					Sex
	North	Northeast	East	Southeast	South	Southwest	West	Northwest	Flexed	Extended	Sitting	Bundle	Isolated Skull	
1A								X						?
1B								X	X					F
1C														?
2					X				X					F
3								X	X					F
4												X		F
5			X						X					F
6												X		M
7			X						X					M
8					X				X					M
9	X								X					M
10														M
11														M
12											X			M
13					X				X					F
14			X						X					M
15														F
16												X		A
17	X								X					SA
18														F
19														?
20				X						X				M
21														F
22														M
23				X						X				SA
24													X	A
25				X						X				M
26					X				X					M
27				X					X					M
28					X				X					A
29														A
30				X						X				F
31		X							X					M
32														?
33											X			SA
34											X	X		F
35												X		M
36														M

Note: These data pertain to what was identified as the primary interment within a grave that had elements of more than one individual. The totals included here do not include those burials dating to the Late Archaic. M (Adult Male), F (Adult Female), A (Adult, Indeterminate Sex), SA (Sub-Adult, Indeterminate Sex).

continued.

Table 10-2. (concluded.)

Burial	Head Orientation								Burial Type					Sex
	North	Northeast	East	Southeast	South	Southwest	West	Northwest	Flexed	Extended	Sitting	Bundle	Isolated Skull	
38					X				X					F
39														A
40														A
41												X		M
42									X					SA
43					X				X					SA
44			X											F
44-A														SA
45												X		M
46	X								X					F
47												X		M
48														M
49				X					X					M
50												X		F
51												X		M
52												X		M
53								X	X					F
54														SA
55											X			F
56														?
57											X			M
58														SA
59														A
60			X						X					SA
61														M
62														M
63														?
64														F
65														SA
66		X							X					F
67												X		F
68														SA
69													X	A
70														A
71				X					X					F
72														M
73														A
74									X					M
75												X		A
Totals	**3**	**2**	**4**	**2**	**7**	**0**	**2**	**4**	**24**	**0**	**6**	**13**	**2**	

Note: These data pertain to what was identified as the primary interment within a grave that had elements of more than one individual. The totals included here do not include those burials dating to the Late Archaic. M (Adult Male), F (Adult Female), A (Adult, Indeterminate Sex), SA (Sub-Adult, Indeterminate Sex).

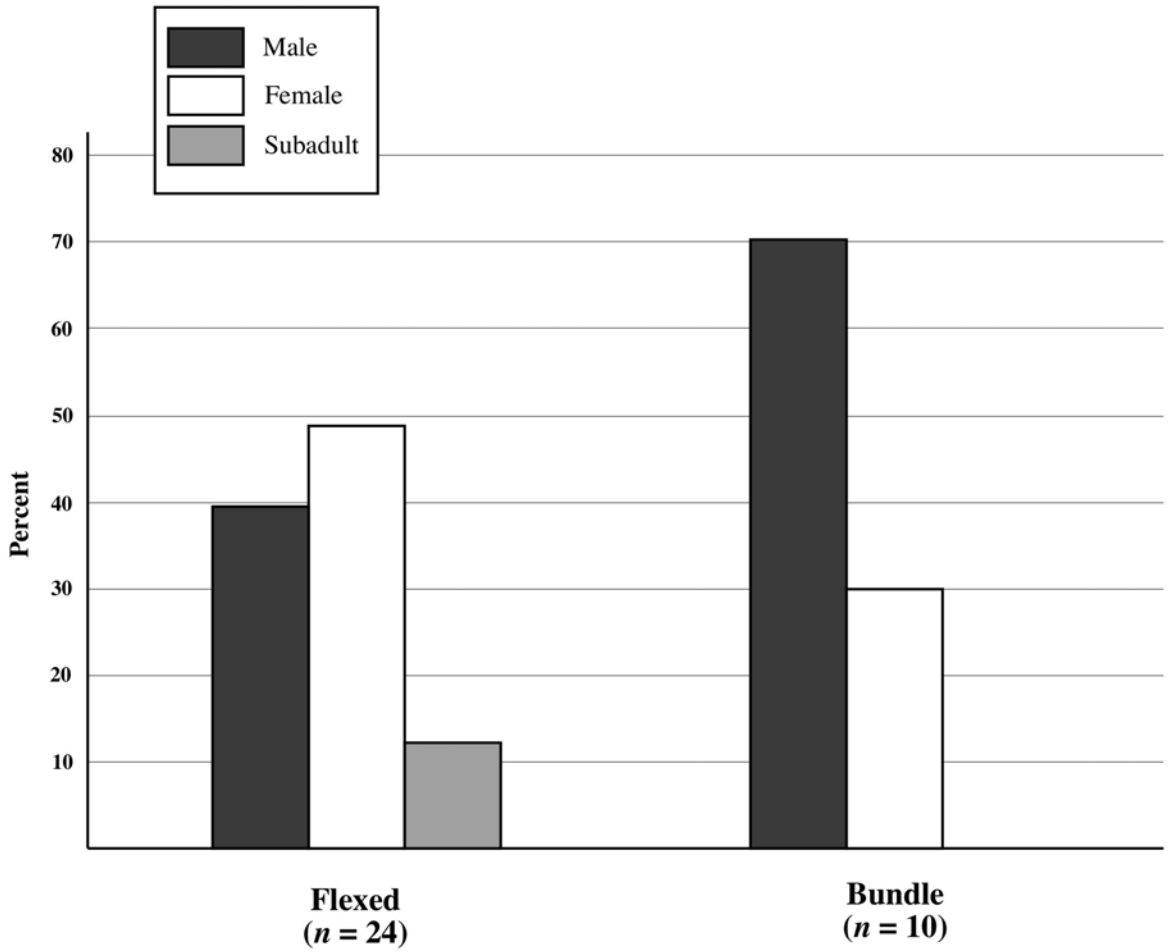


Figure 10-13. Bar graph showing the proportions (as percentages) of adult male, adult female, and subadult individuals who were buried in flexed and secondary "bundle" modes in the Early Archaic cemetery at Buckeye Knoll. Note the relatively high representation of adult males in the bundle-burial category.

representing enemies killed in conflict, in the grave of other individuals, as could be in the case of Burial 73, a skull placed under the torso of the adult male that comprised Burial 47. The relative quantitative significance of these modes of Early Archaic burial is expressed graphically in Figure 10-13. Interestingly, cremations, which are occasionally found in Late Archaic, Late Prehistoric, and Early Historic mortuary sites in the surrounding Texas coastal plain (e.g., Perttula 2000; Ricklis 1994b; Taylor and Highley 1995), are completely absent in the Buckeye Knoll cemetery.

These data show that the most common mode of burial in the Early Archaic cemetery was the primary flexed or semi-flexed interment. The other form of primary burial—bodies interred in a sitting position—is also a recurrent phenomenon, represented by 13 percent of the total number of burials for which body position was identifiable. The significance of the skull-only burials (Nos. 24 and 73) is ambiguous; as already noted, they might represent token burials of deceased individuals whose entire body could not be brought to the cemetery, or alternatively, they could be trophy skulls of enemies who were buried with members of the society that used the cemetery. The secondary, or bundle burials, numbering 13 and thus representing nearly 30 percent of all burials, may reflect carrying of defleshed bones to the cemetery from some distance away within, or beyond, the boundaries of the group's territory. As is discussed further on, the operational area and territory of the Buckeye Knoll population may have been fairly extensive, so that defleshing the skeleton and

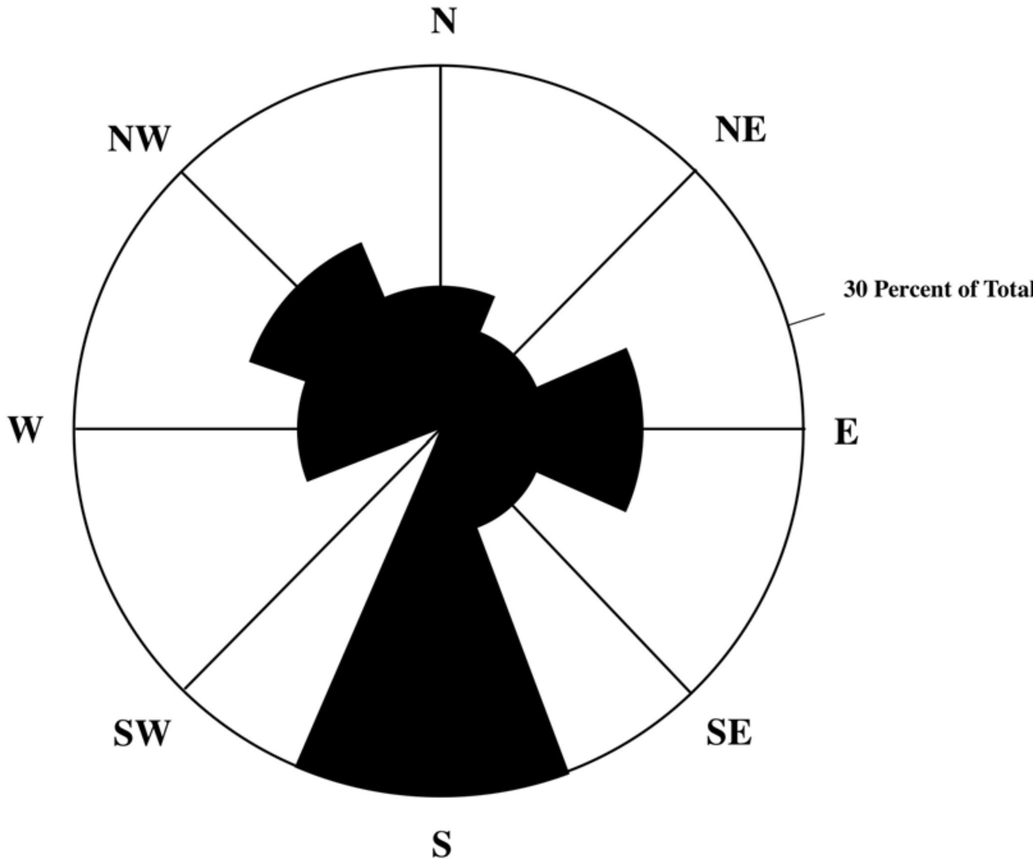


Figure 10-14. Circle graph showing the proportions of Early Archaic burials, as percentages of the total (*n* = 24), with headward orientations toward the eight basic compass directions.

transporting only the bones for burial in the cemetery may have been a practical solution to the problem of how to move the remains of the deceased from his or her place of death to the place of burial.

The fact (as shown graphically in Figure 10-13) that adult males comprise 70 percent of the bundle burials may correlate with this suggested explanation. If, in fact, secondary interment of de-fleshed skeletal remains does represent death at relatively great distances from the home-territory cemetery, this would accord with the inference that adult males, as hunters and perhaps as traders, were more frequently ranging farther afield than women and children, who we might expect to have been more tethered to their home-based, essentially domestic, ecumene.

Orientations

The compass orientation of the crania could be determined for 24 of the Early Archaic burials (Figure 10-14). The headward orientation was estimated in the field, based on the orientation of the upper torso and cranium. In terms of the four primary (N, S, E, W) and four secondary (NE, SE, SW, NW) directions, headward orientations were fairly disparate. Individuals were oriented to all eight directions, with the exception of southwest, to which no individuals were headed. There was however, a relatively high proportion of individuals who were headed toward the south (*n*=7, or 29.5 percent of the total). A possible significance for this tendency is discussed in Chapter 14.